ECONSTOR
Make Your Publications Visible.

A Service of
ZBW
Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Li, Xin

Doctoral Thesis

Toward an Integrative Framework of National Competitiveness: An application to China

PhD Series, No. 26.2011

Provided in Cooperation with:
Copenhagen Business School (CBS)

Suggested Citation: Li, Xin (2011) : Toward an Integrative Framework of National Competitiveness: An application to China, PhD Series, No. 26.2011, ISBN 9788792842138, Copenhagen Business School (CBS), Frederiksberg,
https://hdl.handle.net/10398/8357

This Version is available at:
https://hdl.handle.net/10419/208790

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

https://creativecommons.org/licenses/by-nc-nd/3.0/

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

COPENHAGEN BUSINESS SCHOOL
HANDELSHØJSKOLEN
SOLBJERG PLADS 3
DK-2000 FREDERIKSBERG
DANMARK

www.cbs.dk

ISSN 0906-6934

Print ISBN: 978-87-92842-12-1
Online ISBN: 978-87-92842-13-8

Toward an Integrative Framework of National Competitiveness

PhD Series 26.2011

Copenhagen Business School
HANDELSHØJSKOLEN

Toward an Integrative Framework of National Competitiveness

An application to China

Xin Li

The PhD School of Economics and Management

PhD Series 26.2011

Toward an Integrative Framework of National Competitiveness:
An Application to China

(PHD THESIS)

Date of submission:
2 May 2011

Date of acceptance:
2 August 2011

Xin Li

Asia Research Centre
Department of International Economics and Management
Copenhagen Business School

Porcelænshaven 24
2000 Frederiksberg
Denmark

Tele: +45 3815 3406
Web: www.cbs.dk/staff/xinli
E-mail: xl.int@cbs.dk

Xin Li
Toward an Integrative Framework of National Competitiveness
An application to China

1st edition 2011
PhD Series 26.2011

© The Author

ISSN 0906-6934

Print ISBN: 978-87-92842-12-1
Online ISBN: 978-87-92842-13-8

"The Doctoral School of Economics and Management is an active national and international research environment at CBS for research degree students who deal with economics and management at business, industry and country level in a theoretical and empirical manner".

All rights reserved.
No parts of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage or retrieval system, without permission in writing from the publisher.

To my beloved parents

Contents

Acknowledgement **5**
Executive Summary **6**
Chapter 1: Introduction **9**
1.1 The importance of national competitiveness research 9
1.2 The problems of the quantitative indexing-and-ranking method 10
1.3 About the PhD research: research question, aim, and research strategy 11
1.3.1 Gaps in the literature 11
1.3.2 The research question 11
1.3.3 The aim of this research 11
1.3.4 The research strategy 12
1.4 The structure of the PhD thesis 12
Chapter 2: Literature review 14
2.1 Is national competitiveness meaningless? A historic assessment 14
2.2 Is competitiveness concern a dangerous obsession? 20
2.3 The definition of national competitiveness 24
2.4 The sources of national competitiveness 32
2.5 The role of government in improving national competitiveness 35
Chapter 3: The methodological issues **39**
3.1 The proper methods for national competitiveness research 39
3.2 Defining national competitiveness by dimensionalizing the complex concept 42
3.3 The differences in the designs of the competitiveness indexes of the WEF and IMD 45
3.4 The problems of the indexing-and-ranking methods 49
3.4.1 The lack of scientific rigor in the index design 49
3.4.2 The problem of index competition based on sophistication of design techniques 50
3.5 The issue of the proper level of analysis for competitiveness research 52
3.6 The issue of data sources 54
Chapter 4: An integrative framework **57**
4.1 Conceptualizing a multi-dimensional concept of competitiveness 57
4.2 The four dimensions of national competitiveness 59
4.3 Measuring the four dimensions of national competitiveness 62
4.3.1 Measuring effectiveness 62
4.3.2 Measuring efficiency 62
4.3.3 Assessing sustainability 64
4.3.4 Assessing potentiality 64
4.4 An integrative framework of national competitiveness 66
Chapter 5: The effectiveness dimension **67**
5.1 Maintaining high economic growth 67
5.2 Creating more employment 72
5.3 Ensuring price stability 80
5.4 Pursuing balance of international payments 84
Chapter 6: The efficiency dimension **91**
6.1 China's efficiency of use of labor 92
6.2 China's efficiency of use of capital 97
6.3 China's efficiency of use of natural resources 103
6.3.1 Material efficiency 104
6.3.2 Energy efficiency 106

6.3.3 Land efficiency 108
6.4 The overall efficiency of Chinese economy 110
6.4.1 The growth accounting approach to TFP 110
6.4.2 The index number approach to TFP 112
6.4.3 The distance function approach to TFP 113
6.4.4 China's total factor productivity 114
6.4.5 China's terms of trade 115
Chapter 7: The sustainability dimension 117
7.1 The economic constraints – the structural imbalances of Chinese economy 117
7.1.1 Internal imbalances 117
7.1.2 External imbalance 125
7.2 The environmental constraints 127
7.2.1 Environment pollutions and ecological destruction 127
7.2.2 Natural resource constraints 132
7.3 The social constraints 136
7.3.1 Domestic social constraints 136
7.3.2 International relations constraints 139
7.4 The Demographic constraints 142
Chapter 8: The Potentiality Dimension 146
8.1 Toward a theory of potential for catching up 146
8.1.1 Catching-up and leapfrogging 146
8.1.2 Two basic routes for technological progress 149
8.1.3 Three levels of Technological learning: balance and upgrading 151
8.1.4 Three scenarios of catching-up potential 153
8.2 Factors underlying technological catching-up 156
8.2.1 The four basic factors underlying technological progress 156
8.2.2 Entrepreneur and entrepreneurship 157
8.2.3 The links between entrepreneurship, economic development, and business cycle 160
8.3 A theoretical justification of state entrepreneurship 161
8.3.1 The proper role of the state cannot be determined a priori 161
8.3.2 State intervention: market failures or patience costs 162
8.3.4 State & Market Partnership: A Third Way forward? 166
8.4 China's potential for catching up 168
8.4.1 Human capital deepening 168
8.4.2 Institutional improvement 169
8.4.3 National innovation system 171
8.4.4 Entrepreneurship: state & market partnership in China? 175
Chapter 9: Conclusion 178
9.1 China's overall national competitiveness 178
9.2 The global implications of the rise of China 179
9.3 The applicability of the proposed integrative framework 180
9.4 Contributions, limitations, and future research 182
9.4.1 The four contributions 182
9.4.2 The three limitations 182
9.4.3 Suggestions for future research 183
References 184

Acknowledgement

First of all, I would like to express my deepest gratitude to my PhD supervisor, Professor Kjeld Erik Brødsgaard, for accepting me for carrying out this research project and for his great support and guidance to me, intellectually and personally, along the whole process of my PhD research.

Secondly, I would like to thank Professor Peter Ping Li for agreeing to be my second supervisor in the second year of my PhD research and for his great intellectual support and guidance to me along the process.

Thirdly, I would like to express my deep gratitude to the Danish EAC Foundation for sponsoring my PhD study at Copenhagen Business School and for their generous financial support for my stay after my three year PhD stipend ended, which allowed me to stay in Denmark and get my PhD thesis completed.

Fourthly, I also want to thank the staff members, especially Diana Kazemi and Professor Peter Nolan, at the Development Studies Committee of the University of Cambridge which hosted my two month stay as a visiting scholar from 15 September to 15 November 2010.

Fifthly, my thanks go to the following colleagues and friends who have given me helpful comments on my PhD thesis. They are, in alphabetic order of surname, Mathew Abraham, Frank Cao, Anthony D'Costa, Paul D. Deng, Masatoshi Fujiwara, Michael Jacobsen, Yang Jiang, Sushil Khanna, Ari Kokko, Niels Mygind, Can-Seng Ooi, Ole Risager, Koen Rutten, Poul Schultz, and Verner Worm.

Special thank goes to Liyun Feng for her firm support since the start of my writing process.

Finally, I would also like to extend my deepest gratitude to my beloved parents who have been always supporting me for pursuing excellence in my life. Without their encouragement and support, I would have not been able to accomplish this.

Executive Summary

Toward an Integrative Framework of National Competitiveness: an application to China

(PhD thesis)

The starting point of this PhD research is two observations. The first is that people often tend to discuss a country's national competitiveness in a general tone, i.e., judging a country to be either competitive or uncompetitive, rather than making more balanced assessment, and therefore their opinions often contradict each other. The second observation is that there are many competing international reports that rank a large number of countries in terms of their national competitiveness. These reports often provide different rankings for a given country (e.g., China), and therefore the readers of these reports are often left with a confusing picture. The first observation reflects the reality that there has been a lack of commonly accepted definition of national competitiveness. The second reflects the methodological problems of the indexing-and-ranking methods commonly used by international competitiveness reports.

The research question of the present PhD project is: (1) is national competitiveness research meaningful? (2) if so, is the commonly used quantitative indexing-and-ranking approach an appropriate research method for doing national competitiveness research at the current stage of development of the field? (3) if not, how should we design an integrative framework for national competitiveness research?

The aim of this research is three-fold: (1) to design an integrative framework of national competitiveness that can capture the different aspects of the phenomenon; (2) to propose a theoretical framework for analyzing the dynamic aspect of national competitiveness which is often neglected in the literature; (3) to apply the integrative framework I have proposed to an in-depth analysis of the national competitiveness of China.

In this research, I first conceptualized national competitiveness as a four-dimensional concept by suggesting national competitiveness, as a nation's ability to compete in the simplest sense, includes four dimensions: effectiveness, efficiency, sustainability, and potentiality. Then, this four-dimensional concept was adopted to design an integrative framework of national competitiveness. In this framework, each of the four dimensions is further broken down into four sub-dimensions.

While the first three dimensions are widely talked about by other scholars, they have never been put into an integrative framework like this research does. In addition, the potentiality dimension is largely neglected in the existing literature. To bring the dynamic aspect of national competitiveness into the framework, I have theorized the potentiality dimension (see Chapter 8) by defining potentiality as a country's potential for improving on its current national competitiveness.

Applying the proposed integrative framework, I then conducted an in-depth case study on China's national competitiveness. In the case study, I looked into China's effectiveness in pursuing four macroeconomic objectives (i.e., economic growth, full employment, price stability, and balance of international payments), its efficiency in the use of input factors of production (i.e., labor, capital, natural resources, and total factors combined), its sustainability in terms of economic, environmental, social, and demographic constraints China is and will be facing, and its potentiality for catching up the advanced countries through technological progress.

Below is a brief summary of the results of the case study on China's national competitiveness.

In terms of effectiveness, I find that China is very effective in maintaining high economic growth; it was very effective in creating employment from 1978 to mid-1990s while less effective after mid-1990s. However, China is very ineffective in ensuring price stability and pursuing balance of international payments.

In terms of efficiency, I find that China has dramatically improved its labor productivity from 1978 to 2009, but China's labor productivity is still very low compared to that of the developed countries. China's capital productivity has been declining. Although declining capital productivity is a general trend along the development process, China's capital productivity level is still very low compared to the advanced countries. China efficiency of use of natural resources (materials, energies, and land) is also very low compared to advanced country. In terms of use of raw materials, although China's material efficiency has improved over time since its reform, its current level is still very low compared to the advanced countries such as Japan (about one eleventh of Japan's) and Germany (about one sixth of Germany's). In terms of energy use, China's energy efficiency improved dramatically from 1978 to 2001, then decreased from 2002 to 2005 due to the development of energy-intensive industries, and improved again from 2006 to 2010 with serious measures taken by the Chinese government in addressing energy-efficiency problems due to the global climate change pressures. However, China is still among the world's 30 worst countries in terms of energy efficiency. In terms of land use, China's urban use of land is of extensive nature therefore the land efficiency is very low compared to that of advanced countries.

In terms of sustainability, I find China is and will be facing serious economic, environmental, social, and demographic constraints. In terms of economic constraints, there are many structural imbalance problems in Chinese economy, such as regional disparities, urban-rural income disparity, sectoral disparities (i.e., primary-secondary-tertiary industry imbalance), consumption-saving/investment imbalance, and external imbalances (i.e., the 'twin surplus' of current and capital accounts). In terms of environmental constraints, Chinese economic miracle has been at the high expenses of environment pollution and ecological destruction, resource depletion, and wasteful water usage. In terms of social constraints, China will face challenges from home and abroad. Domestically, China's economic growth has caused high income inequality and social injustice. In recent years, there are tens of thousands of 'mass incidents' taking place in China every year, which indicates widespread social discontent. Internationally, China's rapid rise has caused concerns in developed as well as developing countries. China's currency, trade, and climate policies have been increasingly challenged by many countries. In terms of demographic change, China is going to, in not so remote future, face the problem of aging population and approaching the Lewis turning point when China will be no long in a situation of 'an unlimited supply of surplus labor'.

In terms of potentiality, the analysis in Chapter 8 is more of theoretical than empirical in nature. This is because while the other three dimensions can be more or less analyzed objectively or empirically, any analysis on one's potential tends to be more or less subjective. Thus, I chose to propose a theoretical argument on how a developing country can improve its competitiveness or realize its potential for catching up. I take a technological capability approach to the theorization of catching-up. I posit the only route, except by luck or war, for a developing country to catch up with the developed countries is through technological progress. While technological progress can be advanced by both technology importation and indigenous innovation, only indigenous innovation can give a developing country a high potential/possibility for catching up. I identify the four factors contributing to technological progress are: human capital deepening, institutional improvement, national innovation system, and entrepreneurship (state-market partnership).

This theoretical discussion is followed by examining the four factors in the case of China. The findings are as follows. With a national strategy of 'revitalizing China through science, technology, and education', China's human capital has been deepening, institutional reforms have been progressing, a basic enterprise-centered national innovation system has been developed, and Chinese entrepreneurship has flourished, all of which indicate China has a good potential for catching up. However, there are still many problems in China. Its education system, for example, does not encourage critical thinking and creativity, many inefficient institutions need to be reformed, and there is still a lack of collaboration among enterprises, research institutions, and universities, the three key performers of China's national innovation system. Moreover, China's state entrepreneurship has been in competition rather than partnership with private entrepreneurship.

By discussing these four dimensions, I argue that China's national competitiveness, if any, is currently spurious as opposed to authentic, because while China is effective in economic growth, and to a less degree in employment creation, China is very ineffective in ensuring price stability and in pursuing balance of international payment; also, its efficiencies of use of labor, capital, and natural resources are relatively low compared to those of developed countries, in spite of its improvement since 1978; what is more, China's economic miracle has come at the high expenses of environmental problems and social injustices therefore the country is, and will be, facing tremendous sustainability challenges. On the other hand, I argue, from a technological capability point of view, China has a huge potential for making technological progress which will enable it to catch up with developed countries. However, whether China can cope with the sustainability challenges and fully unleash its potentials will be an open question, which will depend on what actions the Chinese government will take to address the problems as well as how local governments and the Chinese people at the local level will respond to the strategies and directives coming from the central government. It is too early to speculate on the possible outcome. Given the progress that has so far been made in China, I tend to be cautiously optimistic about the future prospect of China's national competitiveness.

In conclusion, this research has realized its aim by (i) proposing a four-dimensional concept of national competitiveness, (ii) designing an integrative framework based on this four-dimensional concept, (iii) proposing a theoretical framework for analyzing the potential of a country for improving its national competitiveness (i.e., catching-up or forging-ahead), and (iv) applying the integrative framework to the in-depth analysis of China's national competitiveness.

Chapter 1: Introduction

1.1 The importance of national competitiveness research

National competitiveness is a popular term widely used by politicians, business leaders, scholars and ordinary people around the globe nowadays. It was made popular partly by Bill Clinton's famous analogue that each nation is like 'a big corporation competing in the global marketplace' (cited in Krugman, 1997: 4), and partly by the annual publication of world competitiveness reports by the World Economic Forum (WEF) and the International Institute for Management Development (IMD) since 1979.

However, some economists such as Paul Krugman (1994) would reject and dismiss the notion of national competition. No matter some economists like or not, the reality is that nations are competing with each other for accessing to the world's natural resources, capitals, and talents. Those economists may say that a nation is not a unitary entity and is made up of many industries and firms and therefore it is not nations per se but the firms that are competing (e.g., Krugman, 1994). This argument sounds true but not helpful because the national agents representing their own nations (i.e., the governments and their politicians) are competition-minded and engaging in competition-driven national policies. Therefore, we can still have confidence in saying the 'nations' do compete in a simplified way. Put another way, it is counterintuitive and difficult to imagine that 'there is no such thing as competition among nations' when the national politicians, business leaders and even the general public are talking about national competitiveness.

The importance of national competitiveness seems to be self-evident. To win competition among nations, a nation must be competitive. But, what is national competitiveness? How should we measure national competitiveness? How can a nation improve its national competitiveness? These are some important questions to address. Therefore national competitiveness research is important from an academic as well as a policy point of view.

It seems that national competitiveness research has emerged as a distinct field of research. There are academic institutes (or university centers)[1], scholarly journals[2], and annual conferences[3] that are dedicated to competitiveness research. There exist numerous commissioned studies or reports on national competitiveness in many countries such as the US, UK (EU), Ireland, South Korea, and China. However, despite some 30 years of research history[4], the field of national competitiveness is still in its early stage of development. There are still no commonly accepted definition, measurement, and theory of national competitiveness. In the discussion of national competitiveness, the term is often used freely implying different meanings. The field can be said to be in the pre-paradigm stage (Kuhn, 1962).

Nevertheless, the commonly-used research methods in the field are quantitative in nature. Specifically, many researches adopt an indexing-and-ranking method. The researchers first design an index of national competitiveness (by compiling individual sub-indicators into a single composite indicator) and then calculate each country's score on the index and finally rank all the

[1] For instance, Institute for Strategy and Competitiveness at Harvard Business School, and International Center for Competitiveness at IESE Business School, University of Navarra, Spain.
[2] For instance, *Competitiveness Review* (CR) and *Advances in Competitiveness Research* (ACR) are two scholarly journals dedicated to competitiveness research.
[3] For instance, there is an annual conference of the American Society for Competitiveness.
[4] We can see the first publication of world competitiveness report by the WEF/IMD in 1979 as the beginning of national competitiveness research.

countries under research according to their scores. This indexing-and-ranking method is used by the WEF and IMD with some technical differences.

1.2 The problems of the quantitative indexing-and-ranking method

While such international competitiveness reports do offer some insights, the quantitative indexing-and-ranking methods used to make those reports are problematic. The problem is very similar to the classical argument of 'measurement without theory' made by Koopmans (1947), an economist who won the Nobel Prize in economics in 1975, namely, without a commonly accepted definition, measurement, and theory of national competitiveness, the design of any competitiveness index is inevitably subjective, reflecting the personal understandings or choices of the index designers rather than the 'truth' about national competitiveness phenomenon. It is reasonable to expect that different researchers may come up with different indexes and therefore generate different rankings. This is indeed the case for the two internationally renowned competitiveness reports published by the WEF and IMD. For example, in 2007, China was ranked as the 34th position by the WEF and the 15th by the IMD, while Iceland was ranked as the 23rd by the WEF and the 7th by the IMD.

Such a big difference in rankings for a same country by different researches causes confusion and unclarity. It seems that, without adopting a commonly accepted definition, measurement, and theory of national competitiveness, differences in rankings are inevitable. Competition for prominence in indexes and therefore rankings and reports will only cause more confusion than comprehension, because each of them may be claimed to be a better solution. This is particularly the case when the index designers resort to sophisticated techniques of designing composite indicators in order to make their researches look more 'rigorous'. Some scholars have already followed this approach by utilizing some sophisticated techniques such as the Data Envelopment Analysis (DEA) (e.g., Bowen and Moesen, 2007), artificial neural networks (ANN) (e.g., Önsela et al., 2008), and knowledge discovery in databases (KDD) (e.g., Zanakis and Becerra-Fernandez, 2005).

I see the technical sophistication of index design particularly unhelpful for the healthy development of the field for two reasons.

The first is that sophisticated index design without rigorous theoretical underpinnings is meaningless and useless. It reminds me of the classical criticism made by Hayek (1947) on the 'pretence of knowledge' in economics profession. According to Hayek, 'the failure of the economists to guide policy more successfully is closely connected with their propensity to imitate as closely as possible the procedures of the…physical sciences' (p. 3) and many economists seem to prefer 'a pretence of exact knowledge that is likely to be false' to 'true but imperfect knowledge, even if it leaves much indetermined and unpredictable' (p. 5). It seems that there might be a factor of 'pretence of knowledge' behind the rationale of making index design more sophisticated. Such a practice, if commonly accepted and rewarded, may shape the incentive structure in the field which can influence the future researchers' behaviors, namely, much of the energy and time of future researchers will be diverted from exploring the theoretical underpinnings which is much needed to exploiting the opportunities for making more sophisticated indexes.

The second reason is that technical sophistication of index design gives an impression of objectivity and scientific rigorousness which may not reflect reality. For example, based on an analysis of the evolution of the measurement of national and business competitiveness done at the WEF over the last decade, Vujovic (2008) concludes that 'the brunt of theoretical and methodological issues have already been resolved through a series of advances in the measurement of national competitiveness' and 'remaining challenges are mainly technical in nature'. Similarly, after its assessment of the WEF's GCI, the European Commission Joint Research Centre, an organization 'widely recognized

as holding the world's leading expertise on composite indicators' (WEF, 2010: 10), concludes that 'overall, the GCI proved to be robust and consistent…the index draws a reliable picture of national competitiveness and represents a well-balanced plurality of different fundamental aspects'[5].

Given the current stage of development of the field of national competitiveness research, I posit researches that are much more needed should be qualitative rather than quantitative in nature, because researches at the early stage of development of a field are often explorative and preliminary. What we urgently need are researches that aim at exploring the theoretical underpinnings of the researched phenomenon, i.e., national competitiveness here, rather than a rush to design an index that enable the researchers to conduct large-sample quantitative studies. Quantitative researches should come after some well-reasoned theories about the researched phenomenon have been proposed. The reality seems to be that we have a long way to go before we can confidently claim our quantitative researches are rigorous and meaningful.

Before we can engage in any meaningful theoretical research, we must have a common understanding of what the term of national competitiveness means. If the term is about a complex phenomenon, we must identify the different aspects (or dimensions) of the term. I contend that the term of national competitiveness indeed describe a very complex issue related to the economic health of a national economy, the national capabilities for achieving some competitive goals, or comprehensive national power of a country, etc. Therefore, without clarifying what we mean by national competitiveness and what aspects we consider, it will be difficult to have any meaningful theory-building research, needless to say quantitative indexing-and-ranking studies.

1.3 About the PhD research: research question, aim, and research strategy

1.3.1 Gaps in the literature

Based on the analysis above, it is clear that there are some gaps in the existing literature on national competitiveness. Firstly, there is no a commonly accepted definition of national competitiveness. While many definitions are proffered, there is still a lack of comprehensive conceptualization of national competitiveness that can capture the multifacetedness of the complex phenomenon. Secondly, within the existing definitions and conceptual frameworks of national competitiveness, most of them neglect the dynamic aspect of national competitiveness, i.e., the evolution of national competitiveness. Thirdly, while most of the national competitiveness researches adopt the indexing-and-ranking approach, there are only few qualitative researches that aim at doing in-depth analysis of one country's or comparing few countries' national competitiveness.

This PhD research aims at filling the gaps identified above.

1.3.2 The research question

The research question of the PhD research is: (1) is national competitiveness research meaningful? (2) if so, is the commonly used quantitative indexing-and-ranking approach an appropriate research method for doing national competitiveness research at the current stage of development of the field? (3) if not, how should we design an integrative framework for national competitiveness research?

1.3.3 The aim of this research

The aim of this study is three-fold: (1) to design an integrative framework of national competitiveness that can capture the different aspects of the phenomenon; (2) to propose a theoretical framework for analyzing the dynamic aspect of national competitiveness which is often

[5] See, Appendix B: The Joint Research Centre assessment of the Global Competitiveness Index, the Global Competitiveness Report 2010-2011, Geneva, Switzerland: World Economic Forum

neglected in the literature; (3) to apply the integrative framework I have proposed to an in-depth analysis of the national competitiveness of China.

1.3.4 The research strategy

This PhD project adopts a case study research strategy. The case study in the PhD research has two distinct functions at two separate stages, namely, theory building at the first stage and theory application at the second stage.

I use case study method for developing the integrative framework by looking at the case of China first; and then I adopt the integrative framework developed to guide an illustrative case study of China's national competitiveness again.

The illustrative case study has two functions. The first is to demonstrate the analytical capacity of the integrative framework I have proposed. The second is to provide an in-depth analysis or thick description of the different dimensions of national competitiveness in the specific case of China.

1.4 The structure of the PhD thesis

The structure of the PhD thesis is as follows.

In Chapter 2, a literature review will be conducted, in which I will discuss several issues related to national competitiveness, such as, the debate over national competitiveness, i.e., is national competitiveness meaningless and is competitiveness concern a dangerous obsession? Other issues include the definition of national competitiveness, the sources of national competitiveness, and the role of government in improving national competitiveness.

In Chapter 3, I will address several methodological issues, such as, the proper methods for national competitiveness research at the current development stage of the field and how to define the concept of national competitiveness in order to capture its multifacetedness? Other topics of discussion include the designs of competitiveness index at the WEF/IMD, the flaws of the indexing-and-ranking method, the level of analysis issue, and the data source issue.

In Chapter 4, I propose an integrative framework of national competitiveness. The framework is based on the four-dimensional concept of competitiveness I proposed, which dimensionalizes the notion of competitiveness, the ability to compete in the simplest sense, into four aspects: effectiveness, efficiency, sustainability, and potentiality. In the integrative framework, each of the four dimensions is further divided into four sub-elements. With this analytical framework, it is possible to conduct in-depth qualitative research on national competitiveness. To illustrate its analytical capacity, this framework is applied to the case study of China, which is then presented in the following four chapters dealing with the four dimensions of China's national competitiveness.

Chapter 5 is an analysis of the effectiveness dimension of the China case. In this chapter, I analyze in detail China's effectiveness in pursuing four macroeconomic objectives: economic growth, employment creation, price stability, and balance of international payments.

Chapter 6 deals with the efficiency dimension of the China case. In this chapter, I analyze China's efficiencies of use of three input factors: labor, capital, and natural resources. I also divide the discussion of natural resources into three categories: raw material, energy, and land. To complement to the discussion of these partial efficiency indicators, I also discuss the overall efficiency of the total input factors combined (i.e., a comprehensive efficiency indicator).

Chapter 7 analyzes the sustainability dimension of the China case. In this chapter, I analyze the four sustainability challenges or constraints China is and will be facing: the economic constraints due to the structural imbalances built in Chinese economy; the environmental constraints caused by

environment pollution, ecological degradation, and natural resource bottlenecks such as shortage of water, minerals, and energies; the social constraints due to the inequalities and social injustices at home and exogenous factors such as trade frictions and geopolitics; and the demographic constraints due to population aging and China's 'one-child policy'.

In Chapter 8, I try to theorize the potentiality dimension of national competitiveness by trying to identify which factors contribute to a country's potential for improving its national competitiveness. By improving competitiveness, I mean, for a developing country, catching up with the leading country; and for a developed country, forging ahead and leaving the following countries further behind. I adopt a technological capability approach to catching-up/forging ahead issue and identify four factors that are crucial to making technological progress: human capital deepening, institutional improvement, national innovation system, and entrepreneurship. Heavy emphasis is placed on entrepreneurship and I also try to provide a theoretical justification for state entrepreneurship. The theoretical argument concludes with a statement that a State & Market Partnership (SMP) may be, what Peter Nolan (2004, 2005) terms, the 'Third Way' forward, in comparison to the free market fundamentalism or collectivist Communism.

Chapter 9 draws the conclusion. In this chapter, firstly I sum up the thesis and discuss China's overall national competitiveness the global implications of the rise of China; secondly I discuss the applicability of the proposed analytical framework; thirdly and finally, I conclude with an analysis of the contributions, limitations, and possible avenues for future research.

Chapter 2: Literature review

The annual world competitiveness reports which rank countries according to their national competitiveness have been published by the WEF and the IMD since 1979. However, it was not until the early 1990s that there was an 'explosion of interest in world competitiveness' (Sachs, 1995: 49) and 'the use of the word competitiveness flourishe[d]' (Reinert, 1994: 2).

Today, in an increasingly open and integrated world economy the understanding of national competitiveness is a central concern for both advanced and developing countries (Porter, Ketels, and Delgado, 2007). Certainly, the spirit of global competitiveness is widespread in the world (Cammack, 2006). When the yearly competitiveness rankings are released, it receives wide coverage from the world media and is widely discussed around the world at a political and policy level. The rationale behind this wide interest is that national competitiveness is seen as vital for the economic success of a country. This interest is a result of the fact that in a globalized world driven by global competition in commerce and trade, there is a need for countries to improve their national competitiveness in order to survive and thrive.

Despite the popularity of national competitiveness, there have been many debates in academia about this concept since it was first brought in the United States. The larger concerns were whether America was/is facing a competitiveness crisis, whether national competitiveness is a meaningful concept or a dangerous obsession, how to define and measure competitiveness at national level, what are the sources of national competitiveness;,what is the role of state in improving national competitiveness; and so on. In this chapter, I will briefly review the existing literature on some of these debates[6].

2.1 Is national competitiveness meaningless? A historic assessment

Right after the Second World War, the US emerged as the dominant economic power and unchallenged technological leader (Hill, Hitt, and Hoskisson, 1988). In the following two decades until the the first oil embargo in 1973 and second energy crisis in 1979, it experienced rapid growth and rising standard of living. The 1970s America witnessed a period of stagflation, i.e., stagnating productivity coupled with price inflation. In the mean time, the US economic supremacy was seriously challenged by the rapid growth of Europe and Japan. From mid-1960s to 1980, the four major European economies (West Germany, France, Italy and Britain) along with Japan experienced growth rates or increase in real Gross Domestic Product (GDP) consistently higher than the US (Pianta, 1988). The US industries were in retreat as a result of progressive losses of market shares, both in its domestic and world market. In some manufacturing products, including steel, automobile, machine tools, video-recorders, industrial robots, fiber optics, semiconductor chips and consumer electronics, the American corporations were losing dominance to the Japanese producers[7]. In terms of international trade, the US trade surplus slowly diminished and morphed into an increasing deficit[8]. This economic turmoil sparked a debate in the US in the 1980s about whether the US can compete in an increasingly globalized world.

Many American scholars, managers, and politicians opined that the US was facing a sudden and profound decline in industrial competitiveness and there was a need for the government to come up with a comprehensive policy to boost its traditional industries and foster the emergence of high-tech

[6] The issue of how to measure national competitiveness is dealt with in the Chapter 2 on the methodological issues and Chapter 4 on the integrative framework of national competitiveness.
[7] See, Business Week, 3 March 1986, p. 57
[8] See, Business Week, 20 April 1987, p. 46

industries. Competitiveness soon entered mainstream US economic policy debate in spite of some criticisms (Burton, 1994). In 1982, the Democratic Caucus of the US House of Representatives released a document titled 'Rebuilding the Road to Opportunity: A Democratic Direction for the 1980s', which addresses the competitiveness issue and calls for both supporting long-term productivity growth and maintaining fairness for American workers. In 1983, President Reagan created the President's Commission on Industrial Competitiveness to review means of increasing the long-term competitiveness of United States industries both at home and abroad, with particular emphasis on high technology. The Commission published its first report in 1984 where it defined the country's competitiveness agenda. By the late 1980s, there was a sense of urgency among workers, unions and traders regarding America's economic future and this helped the determined Congress to pass the Omnibus Foreign Trade and Competitiveness Act of 1988. By the early 1990s, the US government had joined the US private sector in regularly referring to competitiveness as a driving rationale for their policies. When Bill Clinton took office as the President in 1993, he whole-heartedly embraced a competitiveness agenda as he himself characterized nations like 'big corporations competing in the global marketplace' (cited in Krugman, 1994). At the same time, across the Atlantic, European leaders began a discourse of Europe's competitiveness. They attributed European unemployment to the lack of competitiveness of their economies vis-à-vis that of the US and Japan. The term of national competitiveness gained wide acceptance in Europe after the publication of the European Commission's White Paper on competitiveness in 1993, along with the two British White Papers on competitiveness (Comission of the European Community, 1993; HMSO, 1994, 1995). As a result of this, 'improving national competitiveness has become a key policy theme of the 1990s' (Eltis and Higham, 1995).

In 1994, Paul Krugman, a then young economist who just won the prominent John Bates Clark Medal in 1991, made a serious criticism that competitiveness was a meaningless concept when applied to national economies (Krugman, 1994). He had two justifications for his opinion: first, while uncompetitive corporations may go out of business, countries do not have such a bottom line and therefore the concept of national competitiveness is elusive. Second, countries do not compete with each other the way corporations do because international trade is not a zero-sum game, meaning one country's gain is not another's loss. Instead, 'international trade is not about competition, it is about mutually beneficial exchange' (Krugman, 1993: 24; 1997: 120).

John Kay (2005) repeated this Krugmanian reasoning that it was undisputable that countries are not like corporations because uncompetitive countries do not disappear. However, Peterson (2005) challenged this view by pointing out that states having failed to remain economically competitive and militarily strong (the latter often being a function of the former) do on some occasions disappear, either through internal upheaval, external invasion or from just a general unraveling. The examples he gave include the Soviet Union, the Republic of South Vietnam and the People's Democratic Republic of Yemen. Besides these historic examples, from an economic perspective, I would argue that one of the reasons why countries do not go out of business is simply because they can default their debts repayment when they become insolvent while corporations do not have that option. Mexico in 1982 did that when it faced the debt crisis. Iceland intended to do so in the aftermath of the 2008 global financial crisis. So, the notion that national competitiveness is meaningless simply because countries do not go out of business can be challenged and it is legitimate and meaningful to discuss how a country's economic competitiveness can improve to avoid insolvency.

In the context of whether international trade is zero-sum game or a mutually beneficial exchange, there has been a long history of debate dating back to the 16th century when international trade became possible and profitable after the Great Geographic Discovery. Mercantilism was the

prevailing economic theory in 16th and 17th centuries. It considered wealth as gold and silver, or bullion, and it believed that a country needed to accumulate bullion in order to increase national wealth. This view is commonly referred to as bullionism. In the light of this ideology, countries encouraged imports (i.e., increasing) and forbade the exports (i.e., reducing) of bullion. This soon was translated into trade policies aiming at a favorable balance of trade. To achieve this, a country had to export as much of its own manufactured goods as possible while importing as little as possible from other countries. The surplus in trade would then be exchanged into bullion. Mercantilist trade practices included lowering taxes for exports, providing subsidies to exports, and imposing high tariffs on imports (Cho and Moon, 2000). Obviously, Mercantilists viewed international trade as a zero-sum game in which export were beneficial while import were not.

Adam Smith critiqued Mercantilism and called for free trade in his landmark *The Wealth of Nations* (Smith, 1976). Smith proposed the theory of 'invisible hand', which says that there is a natural law or an invisible hand to enable all men pursuing their own desires and self-interests to collectively contribute to the common welfare of the society if they are given the freedom. Smith argued that the advantage of this natural law was based on the division of labor, which massively improved the productivity of joint work. He extended this idea to international division of labor and argued that specialization, cooperation and exchange can make economic progress worldwide. Therefore, free international trade based on specialization in activities, where a country has absolute advantage is a positive-sum game and any government restrictions on international trade would hamper the natural growth of economic activities (Cho and Moon, 2000). Smith's theory is revolutionary because it posits that free trade is a win-win game for all trading nations.

David Ricardo (1817) made an important contribution to Smith's free trade argument by proposing a comparative advantage theory by revising Smith's absolute advantage theory. According to Smith, if a country has absolute advantages in all products, then there is no benefit gained from trading with other countries. Ricardo argues that even if a country has absolute advantages in all products, it can still benefit from trading with others if it can specialize in what it is most good at. Ricardo called such an advantage as comparative advantage. Ricardo attributed comparative advantage to superior labor productivity but failed to satisfactorily explain why there was difference in labor productivity among nations. In early 20th century, Heckscher (1919) and Ohlin (1933), two Swedish economists, made a significant contribution to the comparative advantage theory. They argue that comparative advantage is derived from the difference in factor endowment, i.e., abundance of factor(s) of production (i.e., labor, capital, land) required to produce a product. The Heckscher-Ohlin theorem predicts that a country has a comparative advantage in products in which its most abundant factor is used relatively intensively and therefore is able to export those products while import those products which use relatively intensive those factors with which it is poorly endowed. The Heckscher-Ohlin model was later on expanded by Paul Samuelson (1948, 1949). One theoretical extension is the factor price equalization theorem, which predicts that free and competitive trade will make factor prices in different trading nations converge along with traded good prices. By implication, free trade will ultimately result in international income convergence making free trade a positive-sum game.

The comparative advantage theory has been a fundamental element in the neo-classical trade theory, which Krugman believes is still the basis for international economics and 'the essential things to teach students' (Krugman, 1993: 26). However, comparative advantage theory has been criticized as being static (e.g., Kitson, Martin, and Tyler, 2004: 992), based on problematic assumptions (Dunning, 1995) as well as being unable to explain much of the reality, such as the 'Leontief Paradox' (Leontief, 1954), the intra-industry trade between developed nations (Krugman, 1979, 1980, 1981), and the trade pattern of developing nations (Lall, 2001a). Some scholars also point out

that comparative advantage in trade is not a real advantage over other countries because every country has a comparative advantage by definition (Adams, Gangnes, and Shachmurove, 2006: 102). Economic policy recommendations based on comparative advantage are sometimes sub-optimal, like in the case of the economic development of Japan after the Second World War (Allen ,1981, cited in Gilpin ,1996:421). Hämäläinen (2003: 5) argues that countries building their policies purely on comparative advantage 'run risk of neglecting a wide variety of efficiency-enhancing and growth-promoting policy options, which stem from the pervasiveness of market failures in modern economies'.

Likewise, the factor price equalization theorem is the most controversial one as it has been found to have the least agreement with the economic evidence. While this theorem applies mainly to advanced economies, it is contradicted by the reality of the widening income gap between the North and the South with globalization and free trade movement. This has been the starting point of the globalization debate (e.g., Abdelal, 2007; Bhagwati, 2007; Sassen, 2006; Stiglitz, 2006). Many people feel free trade is not mutually beneficial but in favor of the developed nations due to an unjust international economic order. Such a feeling is underpinned by a line of economic thinking dating back to the Dependency Theory of 1950s-1960s and continued by the World Systems Theory and the Global Commodity Chain Theory in 1970s-1980s and the 1990s respectively.

Dependency theory was developed in 1950s to explain the underdevelopment of Latin America, contradicting the prediction of the Modernization Theory that, with the assistance of the developed world the underdeveloped nations can be brought to development following the same pattern of more developed countries have (e.g., Rostow, 1959, 1960). The two major schools in dependency theory (Vernengo, 2006) are the American-Marxist (e.g., Baran, 1957; Baran and Sweezy, 1966; Frank, 1967) and the Latin American structuralist schools (e.g., Furtado, 1959; Prebisch, 1950; Pinto, 1959). Although there are differences and sometimes debates between the two, they share some common arguments like:

the expansion of capitalism does not necessarily bring about modernization or development, critiquing Karl Marx's description of capitalist propagation as a 'progressive' movement;

development and underdevelopment constitute the two sides of the same coin. Underdevelopment in poor countries is due to the development of the rich countries and the coexistence of development and underdevelopment is a result of the core-periphery structure and associated international division of labor;

the rich countries are in the centre while the poor in the periphery. The center exports industrial goods to the periphery, while the periphery supplies primary goods and raw materials to the centre. Such a trade pattern is characterized by unequal exchange and exploitation. Due to this dependency reality, the periphery is deprived of the ability to develop autonomously.

Dependency theory reached its prime in 1970s before strong economic growth in South East Asian countries in the 1980s made it less convincing[9] (e.g., Harris, 1986). Building on the dependency theory (Chirot and Hall, 1982), the World Systems Theory (e.g., Wallerstein, 1974, 1980, 1989) provides a macro level analysis of world history and social change. Wallerstein argues that the basic unit of social analysis should consist of the whole world system rather than nation states.

[9] Dependency theory has gradually lost support since the mid-1980s. However, Shie and Meer (2010), using the cases of Taiwan and India, demonstrate that the growth of these two economies parallels more technological dependence on advanced countries. Due to this widening knowledge gap, dependency silently reproduces itself in the knowledge-based economy. Therefore, they argue that far from losing its explanatory value, dependency theory continues to be relevant today.

Developing countries are not exploited by individual countries but by the whole capitalist profit-seeking system in a unified capitalist world economy. Wallerstein added a semi-periphery category to the core-periphery dichotomy of the dependency theory and offered a more dynamic model in which countries are socially mobile. According to him, nations can move from the periphery into the semi periphery and the core or move from the core out into the semi periphery. Although countries move between the core-periphery hierarchy, the power relations remain is still characterized by unequal exchange (Petras, 1981).

The Global Commodity Chain (GCC) analysis (e.g., Gerefi, 1994) is useful in understanding issues of development and the processes of variation of production and consumption across physical and social space (Smith and Ciccantell, 2008). It provides a bridge between the macro-historical concerns characterized in the world-systems literature and the micro-organizational and state-centered issues in international political economy of 1990s (Gereffi and Korzeniewicz, 1994). Global commodity chain in this context refers to sets of inter-organizational networks clustered around one commodity or product that link households, enterprises and states to one another within the world economy. Within this network, specific processes or segments are represented by 'nodes' linked together to form networks. There are core and periphery nodes or lead and subordinate firms, within a chain. What distinguishes lead from subordinates firms is that they control access to major resources (such as product design, new technologies, brand names, or consumer demand) that generate the most profitable returns to the industry. The GCC approach emphasizes on how competition and innovation work as forces in shaping the organization and transformation of global commodity chains and distribute wealth among different nodes. A dominant argument is that within a chain, a relative greater share of wealth accrues to core-like nations than to peripheral ones as a result of enterprises in the core having a competitive advantage through innovation that transfer competitive pressures to the peripheral areas of the world economy (Hipkins and Wallerstein, 1994).

From the above outline, we infer that the debate whether international trade is a zero-sum game or mutually beneficial exchange is far from settled. It is worth noting that within the mainstream economics, there are some scholars who are unconvinced that the neo-classical thesis of free trade is always mutually beneficial. Two prominent figures in this respect are Jeffrey Sachs and Pual Sameulson. Sachs (1995), a proponent of Russia's 'shock therapy' reform[10], once confessed that although international trade and finance is generally a positive-sum game, there may be circumstances in which trade and finance pose a zero-sum game. Sameulson (2004), a prominent figure in the development of neoclassical economics and the first American to win the Nobel Prize in Economics in 1970, recanted his earlier belief that free trade would always bring about win-win result. Such an apostasy shocked many of his 'orthodox peers', like Bhagwati, Panagariya, and Srinivasan (2004) and Dixit and Grossman (2005). Sameulson's (2005) response was his purpose was just to tell the truth.

Therefore, we can dismiss Krugman's assertion that it is meaningless to talk about national competition based on his one-sided judgment that international trade is not zero-sum game (and not about competition) but mutually beneficial exchange. It is interesting to note that, apart from the disagreement about trade being zero-sum, there is a logical flaw in Krugman's argument. Krugman makes an implicit assumption that competition is a zero-sum game and goes on to assert that trade is not zero-sum. In this light he claims international trade is not about competition and therefore talking about national competitiveness is meaningless. Though this argument may sound seamless, the devil is in the details. Krugman assumption is wrong in the first place, because competition is

[10] 'Shock therapy' reform prescribed quick privatization, trade liberalization, price marketization, and withdrawal of state subsidies.

not always a zero-sum, although it often is. For instance, in the case of duopoly, the two competitors compete to gain market share and in many situations only one wins. However, if they compete in exploring new markets, they may both end up with bigger market shares although one may gain relative more than the other does. If competitors compete under or distant to the frontier of technology or market size, then competition may result in Pareto improvement, i.e., all win without losers. In sum, the effects of competition cannot be determined a priori, depending on the specific circumstances. I will elaborate on this in the next session where I talk about the economic relationships between the poor and rich countries.

Nevertheless, some economists would still argue that companies of different nations rather than nations themselves are the ones in competition with each other. Even Michael Porter, who made the notion of 'competitive advantage of nations' popular, claims 'firms compete in industries, not nations' (Porter, 1990: 619). Some scholars would also argue that it is fairly clear what firm competitiveness is, but the meaning of national competitiveness is elusive (Krugman, 1994).

The first argument that firms not the nations compete sounds reasonable, however, it can be further argued that, strictly speaking, it is not companies but similar products companies produce that directly compete against each other as a company may produce several different types of products. For example, Google was initially an Internet search engine and was not in competition with Microsoft and Apple, but when Google entered Internet browser and smart mobile phone businesses, it came in direct competition with Microsoft and Apple.

This does not imply that firm competitiveness always needs to be analyzed at a product level. In a multidivisional firm, at the business unit level managers talk about the competitiveness and performance of individual products, but the firm's overall competitiveness hinge often not on one particular product line but the entire portfolio of the products it produces.

We can see competitiveness are legitimate concerns both at the product and firm level depending on the level of inquiry. Likewise, an industry can be seen as a portfolio of firms within the industry and a nation as a portfolio of industries within the nation. Therefore, it is a legitimate concern, particularly for those 'managers' at national level, how to improve the competitiveness of an industry (e.g., Porter, 1990) as well as a nation as a whole. Cho (1998) points out that 'competitiveness can be measured for any entity with different domains—product, firm, industry, nation, bloc, or the globe'. Buckley, Pass, and Prescott (1992) list various competitiveness measures for four different levels: product, firm, industry, and country. The European Commission publishes annual European Competitiveness Report in pursuit of improving the European Union's overall competitiveness.

With regards to the second argument regarding national competitiveness being an elusive concept, it is true in the sense there is no commonly accepted definition. However, this elusiveness does not justify rejection of the existence and importance of the phenomena. I will discuss this in detail in the next section. In general, there are many things that do exist but are elusive to describe precisely, for instance, charisma. When it comes to firm competitiveness, many economists tend to believe that the definition is fairly clear. However, Richard Rumelt (2003), a famous strategy scholar, has identified four areas of disagreement and confusion around the notion of firm competitiveness, which are about how value is to be conceptualized or measured, the meaning of rent, the use of opportunity cost concept, and whether competitive advantage means the ends or the means. Business strategy research, in which competitive advantage is at the core, has been around for half century from Chandler (1962) without a precise definition. Therefore, I posit, even if national competitiveness is currently an elusive concept, it is still a meaningful one that deserves scholars' attention and more research.

2.2 Is competitiveness concern a dangerous obsession?

Krugman (1994) calls the competitiveness concern a dangerous obsession for three reasons: first, it could result in misallocation of resources in pursuit of improving national competitiveness; second, it could lead to protectionism and trade wars; and third, it could result in bad public policy on a spectrum of important issues.

Krugman's worry about wasteful spending of government money supposedly to enhance national competitiveness is understandable from his example of the US government competing against the Soviet Union by spending considerable amount of money on doubtful items like bomb shelters. The undertone of this resource misallocation argument is that in order to gain the highest return of investment, a country should concentrate limited resources on areas where the comparative advantages lie. Diverting resources to areas it does not have comparative advantage will reduce the resources that can be invested into the profitable areas where the country has comparative advantage. Since it is uncertain whether such diverted investment can successfully develop into a profitable one, the result led to diverted resources adversely affecting the performance of the comparative advantage areas due to investment reduction. Therefore, any diversion of investment to areas the country does not have comparative advantage can be viewed as a waste of resources.

However, Krugman recognizes the induced cold-war hysteria of 1950s that led to the US government spending money on things like highways and science education were useful for national competitiveness and economic prosperity in the long run. Obviously, possibility of wasteful spending does not justify abandoning any spending aimed to improve national competitiveness. There are several reasons for such spending. Firstly, according to finance theory, low risk is associated with low expected return while high risk is associated with high expected return. Focusing on known comparative advantage is of low risk, therefore it brings low expected return though such return might be the highest possible at present. In contrast, diverting some resources into areas where the country does not have comparative advantage at present, though without certainty, might nurture these areas into profitable ones in the future. The return on such diverted investment might compensate the losses caused by reducing investment into the known comparative advantage areas. A good example of this is investment in basic scientific research. Basic research does not generate immediate return, but it has big potential for high return in the long run. Many advanced countries spend a lot of money on basic research and do not see them as wasteful spending. Secondly, there is an effect of learning by doing, governments can learn from their own actions and improve their effectiveness and efficiency of spending. In this sense, there is a need for scholars to carry out competitiveness research in order to improve understanding of the true sources of national competitiveness, which in turn can reduce wasteful spending in pursuit of national competitiveness.

With regard to the risk of protectionism and trade war, Burton (1994) responded that the record of the last decade has not supported this claim. On the other hand, the historic record does not prove the nonexistence of future possibility of trade protectionism. Most economists would oppose protectionism, however, Ha-Joon Chang (2005), a well-known heterodox economist, has made a case for certain degree of protectionism. Chang (2003) points out that virtually all of today's developed countries built up their economies using trade protection and other government intervention measures in the past. History has proven that it is necessary to protect indigenous industries that are not yet profitable, especially in developing countries. It is extremely difficult, if not totally impossible, for technologically-backward countries to develop without trade protection. Therefore, the rich countries pressing for free trade and free markets in the developing world, in the

name of 'level playing field', is unwarranted and in essence to 'kick away the ladder' that they have used to develop themselves (Chang, 2003).

It is also not convincing that concern of national competitiveness could result in 'bad' public policies because what Krugman sees as bad may not necessarily be bad policies to others. This maybe the case that what orthodox economists see as wrong is what heterodox economists favor. In addition, what is good or bad policy may depend on times in which the judgements are made. Reinert (1995) makes a convincing case of how the developed countries got rich. He states that they actively used trade protection and industrial policy in their processes of development – a method seen to be essentially 'wrong' from the perspective of today's mainstream economics.

Based on above analysis, we can dismiss Krugman's assertion that competitiveness concerns are a dangerous obsession. Many scholars (e.g., Grabowski, 1994; Hausmann and Rodrik, 2003; Rodrik, 2006; Wade, 2004) have vindicated the important role of government in remedying market failures and strengthening the foundations of national competitiveness. Prestowitz (1994) argues that competitiveness, far from being a dangerous obsession, is an essential concern. Burton (1994) also points out that Krugman focuses too much on international trade and competitiveness is also about investment, technology, and human resources, which together with international trade constitute the building blocks of productivity. Lall (2001a: 1505) echoed this view by pointing out that competitiveness analysis is 'a way of integrating numerous branches of economic analysis' and if done well 'it can serve as a valuable tool of policy'.

It is an irony that while the spirit of competitiveness is certainly in the air, professional economists in general avoid discussing it. Krugman's (1995) explanation is that 'real men don't eat quiche'[11]. Hämäläinen (2003: 3) attributes economists' lack of interest in competitiveness issue to two reasons. Firstly, competitiveness issues contradict the basic premis of the established theoretical paradigm of the mainstream economics, which makes it an illegitimate object of inquiry for many economists. Reinert (1995: 24) points out that 'competitiveness if properly used exposes important weakness in the neo-classical economic paradigm'. which are rooted in the assumptions that representative firms operating in an efficient market under perfect information with no scale effect are irrelevant to the real world, where imperfect information and economies of scale create cumulative causations, path-dependency and lock-in effects. Chang (2005) argues that free trade works well only in the fantasy theoretical world of perfect markets. Secondly, the preliminary state of competitiveness theorizing has been an easy target for the attacks of critical economists trying to protect the old theoretical paradigm. It is widely accepted that national competitiveness is difficult to define, measure and explain. The term is often used loosely and sometimes it may be used with contradictory meanings in various passages of the same article or report (Hatzichronoglou, 1996: 17). I accept the criticism that the competitiveness research lacks precision and rigor at the current stage of development of the field. Nevertheless, I argue it is inappropriate to reject the whole notion of national competitiveness altogether just because the research on it is preliminary. Instead, we should keep the baby in the bath water (Sachs, 1996) and strive for good theorizing and empirical analyses.

To summarize the above two sections on competitiveness debate, I assume argue that nations do compete economically for several reasons. Firstly as Fagerberg (1996:39) argues, competitiveness is 'a perspective found in nearly all aspects of social life, work, sports, business, etc., among individuals as well as collectives'. In this context it is hard to make sense of the claim that

[11] It is also interesting to note that Krugman himself has also discussed the competitiveness issue in his earlier works, in the industry-specific sense as well as in an economy-wide sense (cf. Krugman and Hatsopoulos, 1987; Hatsopoulos, Krugman, and Summers, 1988).

countries do not compete economically while they compete in political, military, cultural, technological and other arenas like sports and soft power. A supporting example is that China in 1958 adopted a Great Leap Forward policy with an explicit plan to outdo the Soviet Union and catch up with Britain and the US in economic terms. Secondly, few people would doubt that political elites in all countries try to gain power and improve their status, domestically and internationally. Dunn (1994) argues that since power is relative, which means power gained by one party implies power lost by other parties, the win-lose character of power motivation may have impacts on the way nations act economically. Thirdly, nations are made up of human beings, and they compete against each other because there is a contradiction between the limited resources and the unlimited self-interests and desires of human beings of nations. The limited resources countries compete for include natural resources like oil and minerals, FDI as productive capitals, talented people as human capitals, strategic geographic locations like Panama Canal and the polar regions, and the rights for CO2 emissions that are useful for serving a nation's economic interests.

Countries also cooperate in some ways within the world economy. But economic cooperation does not exclude the possibility of economic competition and even exploitation. So, I would argue, like companies, countries cooperate as well as compete with others, a situation like what Nalebuff and Brandenburger (1997) call as co-opetition. In this sense, we can understand why Prestowitz (1994) criticizes Krugman for ignoring the different kinds of trade taken place. He uses trade between the US and Costa Rica to explain a win-win situation where the US imports bananas from Costa Rica and Costa Rica imports airplanes from the US. This is however a sharp contrast to the relationship between the US and Europe competing for airplane orders from Saudi Arabians where American's gain is European's loss.

Krugman (1981) has pointed out that the nature of trade depends on how similar countries are in their factor endowments. He goes on to state that as countries become more similar, the trade between them will increasingly become intra-industry in character and if intra-industry trade is sufficiently dominant, the advantages of extending the market will outweigh the distributional effects and the owners of scarce as well as of abundant factors will be better off. So, the exact economic relationships among nations vary and are more complex than this simple term of co-opetition can capture.

To elaborate on the complex economic relationships among nations, I adopt Wallenstein's typology of Core, Semi-Periphery and Periphery countries. I assume that countries *within* each category compete against more than cooperate with each other because they are more similar than compared to countries in different categories. Still, differences exist across categories. While in all three categories countries compete in expanding world market shares of their products, countries within the Core category compete in order to maintain to stay at the center and attract high skill labors or immigrants from the rest of the world. Countries within the Periphery category compete to move out of the Periphery and attract foreign investments. Likewise, the semi-peripheral countries compete in order to move into the Core and avoid dropping into the Periphery.

In comparison, countries *between* different categories complement more than compete against each other because they do not have much similarity and there is little basis for competition but more for complement or cooperation. For example, the trade between the centre and the semi-periphery is largely between high value-added and low value-added manufactured goods so that the trade relationships are complementary or cooperative in nature, although there may be few areas where the semi-periphery countries may directly compete against the core countries. For instance, China is now competing against advanced countries like the US and Sweden in telecommunication industry. However, the trade between the center and periphery is largely manufactured goods in

exchange for primary goods therefore there is minimum or no competition involved. Such trade relationships may be underpinned by high degree of unequal exchanges and dependency. In this sense, it is meaningful and necessary to have a national competitiveness strategy to safeguard a country from exploitation by unequal exchanges on the one hand and to benefit from engaging in the world economy on the other.

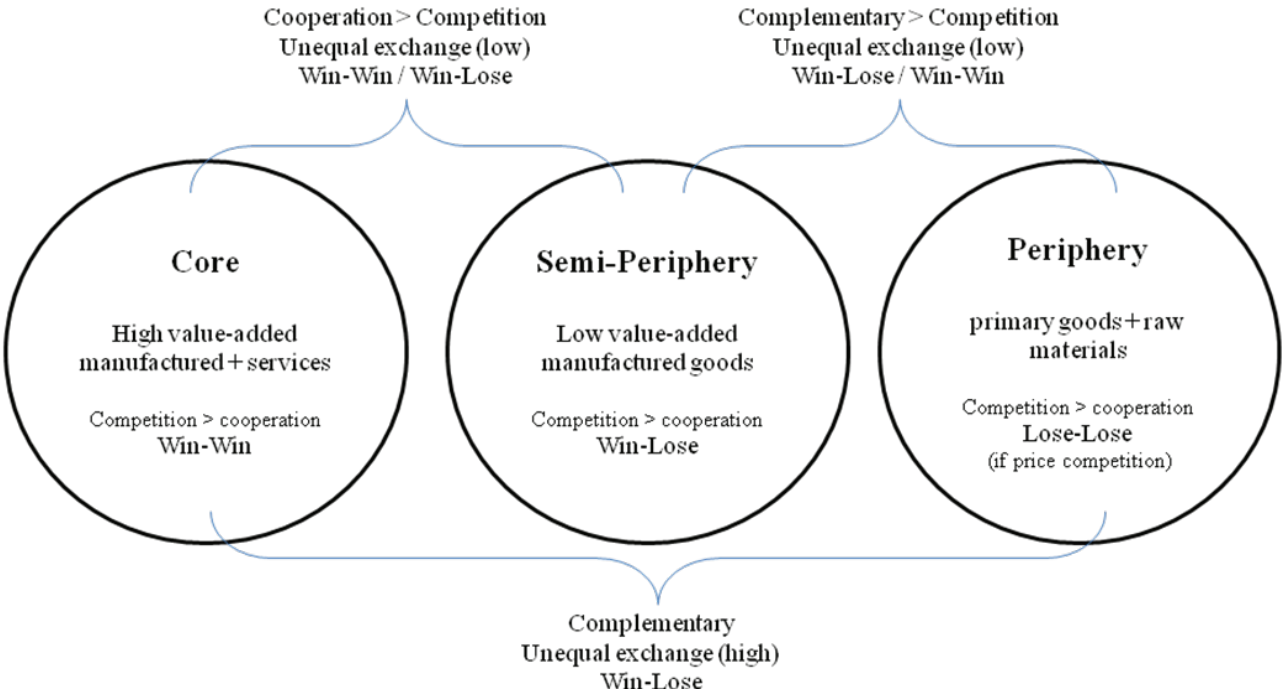
Therefore, the effects of competition vary from category to category. For countries in the Core that are similar in terms of factor endowments and development stages, competition may be beneficial because it fosters innovation and industrial upgrading. In the process of competition, their competitiveness may be enhanced in comparison to other countries that do not engage in competition. This may be one of the reasons why most western and northern European countries have quickly improved their living standards at par with that of the US after the Second World War.

Competition within the semi-periphery category may be in a win-lose situation. This is because the semi-periphery countries are no longer just producers of primary goods and raw material like peripheral countries, they are also competing in manufactured goods. Manufacturing competitiveness of those countries in the semi-periphery category depends on their production costs and specifically labor costs,. A competitive player in this category can effectively grab world market shares of manufactured goods, which means the other players would lose market share. This is why some scholars have argued that China being a competitive manufacturing country, poses competitive threats to other semi-peripheral countries in Southeast Asia and Latin America (Lall and Albaladejo, 2004; Lall, Weiss, and Oikawa, 2005). One of the arguments is that China is becoming increasingly competitive in the range of both low and high technology products and shifting its export specialization rapidly to the latter. Given its size and rapid growth, China is forcing other semi-peripheral countries like Mexico and Costa Rica down the technology scale.

The effect of competition in the periphery depends on how peripheral countries compete against each other. Since they are mainly exporters of primary goods and raw materials, if they compete to upgrade their industrial capabilities, the competition will be beneficial. For example China has moved out of the Periphery and entered into the semi-periphery category; in contrast, if they compete on price, it will be mutually destructive, i.e., lose-lose situation because falling export prices would lead to deteriorating terms of trade for the peripheral countries. Figure 2.1 summarizes the various economic relationships and gains from trade among nations in different categories[12].

[12] In Figure 2.1, the sign '>' means the economic relationships between countries are more of the former type than of the latter type. For instance, 'competition > cooperation' means the relationship is more of competition than of cooperation.

Figure 2.1 Economic relationships and gains from trade among nations



2.3 The definition of national competitiveness

Twenty years of research has gone by since Michael Porter published his seminal book *The Competitive Advantage of Nations* (1990), yet there is still no agreed upon definition among scholars for national competitiveness (e.g., Boltho, 1996). People talking about national competitiveness use this term loosely. Belkacem (2002) notes that almost every paper on this subject struggles with defining it. There have been all kinds of definitions, such as firm ability based, productivity based, business environment based, trade performance based, living standard based, export price based, and non-price based. While some definitions use single measures, others adopt a combinative approach(i.e., combining external and domestic performances of the economy). There are also some multi-dimensional types of definitions. Table 2.1 summarizes some of the definitions used by various scholars and organizations[13].

[13] The variety of definitions reflect the complexity of the term, due to which A. Michael Spence, the Nobel Prize winner in Economics of 2001refrains from using an exact definition in his edited volume International Competitiveness (cited in Siggel (2006: 140), cf. Spence and Hazard (1988)).

Table 2.1 Different definitions of national competitiveness

type	Definition	Source
Firm ability based		
	Competitiveness is primarily a firm-level concept; any understanding of the determinants of competitiveness must begin at that level.	Asian Development Bank (2003: 206-208)
	Competitiveness as the ability of Irish-based firms to achieve success in international markets, so as to provide Ireland's people with the ability to improve their living standard and quality of life.	National Competitiveness Council's Annual Competitiveness Report (2007) vol 2, p. 2 (Ireland)
	Competitiveness is synonymous with a firm's long-run profit performance and its ability to compensate its employees and provide superior returns to its owners	Report of the Select Committee of the House of Lords on Overseas Trade, 1985 (UK)
	Industrial competitiveness is the ability of a company or industry to meet challenges posed by foreign competitors	US Department of Energy
	The single most important criterion of national competitiveness is the strength of these firms compared to foreign firms within domestic markets, a strength reflected by domestic market share…can be alternatively expressed as… import penetration ratios	Papadakis (1996)
Productivity based		
	The economy's competitiveness is its ability to make use of the productivity advantages of the international division of labor.	Keller (1985: 59)
	The only meaningful concept of competitiveness at national level is national productivity.	Porter (1990: 6)
	If competitiveness has any meaning, then it is simply a poetic way of saying productivity	Krugman (1994, 1996)
	In the long run competitiveness would be synonymous with trend productivity growth	Boltho (1996:3)
	Competitiveness implies elements of productivity, efficiency and profitability. Globally, by increasing productivity and efficiency in the contest of international specialization, competitiveness provides the basis for raising people's earnings in a non-inflationary way.	Competitiveness Advisory Group (1995) 'Enhancing European Competitiveness', First report to the President of the Commission, the Prime Minsters and the Heads of State, June 1995
	The focus on productivity is apparent throughout the industrialized world, e.g., in the US, Council on Competitiveness (2001); in the UK, DTI (1998, 2003a,b), HM Treasury (2000), Brown (2001); in the EU, European Commission (2003)	Kitson, Martin, and Tyler (2004: 993)
Business environment based		
	Competitiveness, a field of economic knowledge, which analyses the facts and policies that shape the ability of a nation to create and maintain an environment that	IMD's World Competitiveness Yearbook, 2003

	sustains more value creation for its enterprises and more prosperity for its people.	
	The World Competitiveness Yearbook (WCY) analyzes and ranks the ability of nations to create and maintain an environment which sustains the competitiveness of enterprises.	IMD's World Competitiveness Yearbook, 2010
	Global competitiveness as the set of institutions and economic policies supportive of high rates of economic growth in the medium term'	WEF's Global Competitiveness Report, (2000: 14)
	We define competitiveness as the set of institutions, policies, and factors that determine the level of productivity of a country.	WEF's Global Competitiveness Report, (2010: 4)
Trade performance based		
	Competitiveness of a nation is the ability to sell enough products and services, at factor incomes in line with countries aspiration level, and at macro-conditions seen as satisfactory by the people.	Aiginger (1998: 164)
	A narrower definition is to take the country's ability to compete in trade (particularly exports)	Lall (2001b: 4)
Living standard based		
	Competitiveness…has successively been viewed mainly…, most recently, simply in relation to raising living standard	Clark and Guy (1998:365)
	Competitiveness should be seen as a basic means to raise the standard of living, provide jobs to the unemployed and eradicate poverty.	Competitiveness Advisory Group (1995) 'Enhancing European Competitiveness', Second report, December 1995
	Competitiveness remains a key priority of government policy as we seek to continually improve the living standards of everyone in Ireland.	Ireland's National Competitiveness Council's Annual Competitiveness Report (2007) vol. 1, p. iii
	Competitiveness is taken here to mean a sustained rise in the standard of living of a nation or region and as low a level of involuntary unemployment as possible.	European Competitiveness Report 2010, p. 17
Double-meaning based		
	A nation's competitiveness is the degree to which it can, under free and fair market conditions, produce goods and services that meet the test of international markets *while* simultaneously expanding the real incomes of its citizens	President's Commission on Industrial Competitiveness (1983). This definition has been adopted widely (Tyson, 1992:1) by, e.g., OECD (1992), US Competitiveness Policy Council (1993), UK HMSO (1994, 1995)
	National competitiveness refers to a country's ability to create, produce, distribute and/or service products in international trade *while* earning rising returns on its resources.	Scott and Lodge (1985)

	Competitiveness refers to the ability of a country to realize central economic policy goals, especially growth in income and employment, *without* running into balance of payments difficulties.	Fagerberg (1988: 355)
	being competitive is the... ability to deliver goods and services at the time, place and form sought by overseas buyers at prices as good as or better than those of other potential suppliers *whilst* earning at least opportunity cost returns on resources employed	Sharples and Milham (1990: 1)
	A competitive nation is one that can succeed in international trade via high technology and productivity, *with* accompanying high income and wages	Dollar and Wolff (1993: 3)
	Competitiveness is the degree to which a nation can, under free trade and fair market conditions, produce goods and services which meet the test of international markets, *while* simultaneously maintaining and expanding the real incomes of its people over the long-term.	OECD's official definition (1992, 1996)
	our economic competitiveness, defined as our ability to produce goods and services that meet the test of international markets while our citizens enjoy a standard of living that is both rising and sustainable	Tyson (1992: 1)
Multi-dimensional types of definition		
	Competitiveness includes both *efficiency* (reaching goals at the lowest possible cost) and *effectiveness* (having the right goals). It is this choice of industrial goals which is crucial. Competitiveness includes both the ends and the means towards those ends.	Buckley, Passa, and Prescott (1988)
	The *immediate* and *future ability* of, and opportunities for, entrepreneurs to design goods worldwide whose price and non-price qualities from a more attractive package than those of foreign and domestic competitors	European Management Forum (1984)
	Competitiveness… is the ability to sustain, in a global economy, an acceptable growth in the real standard of living of the population with an acceptably fair distribution, while efficiently providing employment for substantially all who can and wish to work, and doing so *without reducing the growth potential* in the standard of living of future generations.	Landau (1992: 6)
	Competitiveness can refer to a *competitive position* of an economic agent (a firm, an industry or a country), or it can refer to an agent's *ability to compete overtime*.	Bieńkowski (2006: 11)
	The concept of competitiveness involves *static* and *dynamic* components: although the productivity of a country clearly determines its ability to sustain a high *level* of income, it is also one of the central determinants of the returns to investment, which is one of the key factors explaining an economy's *growth potential*.	WEF's Global Competitiveness Report, (2010: 4)

Among the above-mentioned definitions, I do not prefer those based on firm abilities as what we are talking about is competitiveness at national level rather than at firm level. Although these firm-ability-based definitions can use a collective word like 'Irish-based firms' to make a distinction from competitiveness of an Irish firm, it is still confusing what this collective word really refers to. If this word refers to *all* Irish-based firms, then it is simply an unnecessary substitution word of the Irish economy. If this word refers to individual Irish-based firms, then, obviously, there may be some competitive Irish-based firms as well as some uncompetitive ones, so by placing our focus on individual firms we may encounter difficulties to get a unified assessment of the competitiveness of the nation as a whole. However, I do not imply that firms do not matter; instead, I agree that a group of internationally competitive firms is important to the competitiveness of the economy as a whole. The point here is that when it comes to national competitiveness, it is the health of the whole economy, or Irish-based firms as a unified whole, rather than (multiple) individual Irish-based firms, that is the object of assessment.

It is also problematic to equate national competitiveness with national productivity for the following four reasons. Firstly, although some economists argue that in the long run productivity increase is the main cause of increases in real per capita income (e.g., Bannock, Baxter, and Davis, 1998; Porter, 1990)[14], Mawson, Carlaw, and McLellan (2003) have pointed out that a number of economists would argue that productivity is actually a measured observation of increases in real per capita income. Therefore, productivity can be said not a cause but rather an observation of economic growth. Carlaw and Lipsey (2003: 458) explicitly state that 'TFP [total factor productivity], whatever it measures, is an outcome not a cause of anything and, therefore, not a lever for policy makers to use to explain growth rates'. Despite more than half a century's have followed since Solow's (1957) seminal work on growth accounting, economists today are still struggling with how to measure the growth of TFP[15]. What Abramovitz (1956) described the TFP residual as 'a measure of our ignorance' seem to have not changed yet.

Secondly, Reinert (1995: 26) argues that 'high relative or absolute productivity levels do not necessarily lead to competitiveness'. Although it is difficult to be competitive if you have low productivity or efficiency, he argues that it is not obvious that the most efficient producer of an internationally traded product makes a country competitive, in the sense of enabling a rising standard of living; and in reality as some very efficient producers and nations are desperately poor. For example, Haiti is the manufacturer of baseballs in the world and it has a large world market share, yet Haitians' living standard is very low. Therefore, it is not the productivity or efficiency but the kind of production that makes a nation competitive. Being the most efficient in the 'wrong' activities may lead to negative development (ibid.). One kind of such 'wrong' activities may be products with declining terms of trade (TOT). Diewert and Morrison (1986), in a seminal article, argue that an improvement in the terms of trade is similar to technological progress; therefore, an improvement in the terms of trade, other things being equal, is income and welfare enhancing. By implication, the deterioration of terms of trade, other things being equal, is income and welfare reducing. Cypher and Dietz (1998) have demonstrated that there might be welfare loss in the long run after the initial one-off gain from trade if a country specializes in products characterized by

[14] The idea that growing per capita wealth requires increasing productivity goes back as early as to Adam Smith's (1776) *The Wealth of Nations* (Beinhocker, 2006:25).

[15] TFP remains the residual of the part of output growth that cannot be accounted for by the growth of input factors such as labor and capital.

declining TOT[16]. In sum, as Reinert (1994: 3) argues, competitiveness should be divorced from the issues of productivity or efficiency.

Thirdly, productivity is a measure focusing on the production side of economy while real per capita income is a measure focusing on the consumption side. The two measures do not always match and there are possibilities that productivity improvement does not always translate into increase in real per capita income. This is often the case in a trade relationship between the US and a poorer country. For example, in the China-US trade relationship, China is a trade surplus nation while the US is a trade deficit country. The huge trade surplus China has earned from the bilateral trade with US and elsewhere has become China's foreign exchange reserves, which is largely invested in US Treasury bonds earning China low interests. Due to China's overcapacity (i.e., over production) and under consumption, it has essentially been financing American's over consumption by either increasing labor input or improving Chinese productivity or both. This means, the benefit of Chinese economic growth (or productivity improvement) has not accrued to Chinese citizen and a part of the benefit has been diverted to the American citizens. Such a diversion cannot be stopped as long as there exists the 'US dollor hegemony' (cf. Liu, 2002). I argue, the status of reserve (or hard) currency gives the currency printing country an extra source of economic power and competitiveness over those countries whose currencies are not reserve currencies.

Lastly, Cohen (1994) argues that 'a near-exclusive focus on productivity has some dangers and problems' because 'national productivity data have technical difficulties that radically reduce the reliability of the numbers'. For instance, it is impossible to get reliable productivity numbers for some service sectors in any given country[17]. This is more so in countries where many types of service activities like infant nursing are provided by families rather than by market and therefore cannot be priced and taxed, making productivity calculation impossible. It is even more problematic to compare the service productivities between two countries at different stages of development. For example, how does one make sense of an American barber being productive than his Chinese counterpart doing the similar job; does a Chinese barber improve his productivity by moving from China to the US where he receives 20 times higher wage than his previous income for the same kind of haircutting jobs?

I am also opposed to equating national competitiveness with business environment of a country. Within the existing literature, the WEF and the IMD have placed a heavy emphasis on economic freedom of the business environment of a country, openness to international trade, well functioning capital market, and a lean and efficient government sector. In theory, investor friendly environments (i.e., open to international investors, together with stable economic and political conditions) are easier to attract FDIs, which in turn facilitate productivity and economic growth in host countries. However, the relationship between FDI and productivity growth is not clear cut, as Tybout (1992: 189) points out 'although many economists believe that there are important links between trade regimes and factor productivity, they have had to look elsewhere for formal models that support their priors. Blomstrom and Kokko (1998) draw on an extensive survey of literature to conclude

[16] This may explain why there is a 'curse of natural resources' (Sachs and Warner, 1995, 1999, 2010) in some developing countries. The 'curse of natural resources' argument states that dependency on natural resources may result in declining per-capita GDP. Natural resources export may also enjoy increasing terms of trade, for example, Canada and Australia have enjoyed such benefit (cf. Kohli, 2005). So, it is not natural resources but rather overreliance on exporting natural resources that will bring the 'curse' to the country because such overreliance may retard enhancing industrial capabilities outside the natural resource sector..)

[17] Economist Oskar Morgenstern (1972:1183) raises the concern that traditional economic theory is not suited to measure the productivity of service activities and it is difficult to understand what productivity of a nation mean when 60 percent of the GNP in the US arises from non-physical, i.e., service activities.

that there is no comprehensive evidence on the exact nature or magnitude of productivity spillover effect of FDI to the host country. Lall (2000) argues that there is a risk that domestic enterprises of host country may be crowed out by FDI in both product and factor markets.

In reality, the real effect of FDI on the productivity of host economy depends on many factors including host country's absorptive capacity for technology and the investor's willingness in technology transfer. On one hand if the host country lack of technological absorptive capacity, FDI inflows can generate little spillover effects, on the other hand, if the foreign investors are not willing to transfer technology, the result might be just the host country's market shares are eaten by foreign investors and domestic enterprises are crowded out. Although many empirical studies have shown that economic freedom is in general positively related to economic growth, this does not necessarily mean national competitiveness should be equal to the degree of economic freedom. Evidences have also been accumulated that simple liberalization of trade and investment in many developing countries in the 1990s has resulted in disappointing performance (World Bank, 2005). In an empirical study of the effect of FDI on Indian manufacturing productivity, Kathuria (2002) finds both positive and negative spillovers. The stusy show only the scientific non-FDI firms had benefited while the productivities of the non-scientific domestic firms were depressed. Some scholars like Ha-Joon Chang (2005) have argued that developing countries need some forms of trade protection in order to facilitate economic growth and development. The 2008 global financial crisis has shown that financial liberalization without regulation and supervision could be very dangerous, even to advanced countries like the US.

In addition to economic freedom, the WEF and the IMD also emphasize on other business environment variables like institution, infrastructure, and goods market efficiency, etc. I agree they are important factors influencing national competitiveness, although they are not a measure of national competitiveness per se. To make an analogy, a good school does not mean everyone in such school will be good student. Obviously, a good business environment is a necessary condition, but not singularly sufficient one. Similarly Siggel (2006: 141) also suggests that a favorable business climate is different from national competitiveness and the WEF/IMD reports are useful for international investors and banks for evaluating investment location choices and country-specific risks respectively.

I argue that trade performance *alone* cannot be the sufficient indicator of national competitiveness. There are many ways to increase the market share of a product of a country without changing the product by selling the product under its cost or by devalue its currency to make its product artificially cheap. However, such increase of market share may cause deterioration of the country's terms of trade and make such market share increase worthless. For instance, in order to boost China's textile export, Chinese government provides high tax rebate to textile exporters on one hand and keeps Chinese currency undervalued on the other, which successfully helps Chinese textile products to gain more of the world market share. However, such market share gain is made at costs. Western countries like the US accuse China for manipulating its currency and there are many trade frictions. Also, the tax rebate policy may not provide the necessary incentive for many Chinese textile exporters to improve product qualities and technologies, instead, they may be forced to cut prices due to their weak bargaining power once their international buyers have heard about such tax rebate news. They choose to increase sales(i.e., market share) by further lowering selling prices of their products within the range in which they can still make a little more profit after adding the tax rebates. The result is the bulk of the benefit from the tax rebate goes to the foreign buyers while a small share accrues to Chinese exporters. Here both foreign buyers and Chinese exporters are winners although the Chinese government (and Chinese people) may be the only loser. Today, China has the biggest world market share for textile export; yet, more and more Chinese now

realize this is not something to be really proud of. Such a sentiment is clearly reflected in a widespread comment of China's former Minister of Commerce, Bo Xilai, who once said that China needed to sell 800 million shirts in order to buy one Airbus A340 plane. Thus, I argue, is not the market share, but, "market share that matters" when it comes to national competitiveness.

With regard to living standard, I argue that it should be an indispensable element of national competitiveness. Aiginger (1998) points out that 'a dynamic evaluation of the competitiveness of nations must be done with respect to the ultimate goals of nations, namely to increase the well-being of a nation or its people'. Here, I argue that we can draw a simple parallels between the firm and the nation. The nation is a big business, its shareholders are the people, its management team is the government, and the parliament is the board of director. As Milton Friedman (1970) argues that the social responsibility of business is to increase its profits, or to maximize shareholder value as many business scholars put it, I tend to see the social responsibility or ultimate goal of the nation as to improve its people's living standard[18].

However, many scholars seem to think, like trade performance, living standard *alone* does not give a complete answer to the competitiveness question. Hence they combine issues of external balance and domestic performance (Aiginger, 1998), which Fagerberg et al. (2007) call as the 'double meaning' of national competitiveness, i.e. trade performance and economic well-being of citizens. Among the existing double-meaning definitions, the one from the US President's Commission on Industrial Competitiveness (1983) is widely adopted and used in many books, articles, and reports on this topic (Tyson, 1992: 1), such as UK Department of Trade and Industry (DTI)'s 1984 *White Paper on Competitiveness* and OECD (1992, 1996). This definition describes a nation's competitiveness as the degree to which it can, under free and fair market conditions, produce goods and services that meet the test of international markets while simultaneously expanding the real incomes of its citizens.

Laura A. Tyson, a prominent figure in the competitiveness debate in the US, also adopts this definition but with a minor change in her 1992 book *Who's bashing whom?* The minor change is that she excluded the requirement 'under free trade and fair market conditions' in her definition. Although she did not explain why she made this change, we may understand by the fact she is an advocator of industrial policies, which contradicts to the principle of free trade. I think this exclusion is reasonable. Although the demand for 'new international economic order' that favors the developing world is now a matter of the distant past (Haque, 1995: 1), today's world trading environment has become less hospitable due to protectionism and technonationalism in developed countries since 1980s (Dahlman, Haque, and Takeucki, 1995). Also, while tariff barriers have continued to be reduced since early 1970s, nontrade barriers (NTBs) have increased, which seriously compromise the success achieved in tariff reductions and make the trading relations strained.

In an increasingly globalizing world, most countries are integrated into the world economy, voluntarily or by force. Economic competitiveness of a nation then has to be reflected in both international and domestic performances simultaneously. Like the economic terms internal and external balances that are interrelated, a country's domestic and external performances are interrelated too. We cannot say a country is competitive if its living standard is low although its cheap products are sold worldwide; and, it is not common that a country enjoys a high living

[18] Porter (1990) also says 'the principal economic goal of a nation is to produce a high and rising standard of living for its citizens'.

standard but does not have any internationally competitive products, firms or industries[19]. However, I argue, a high and rising living standard is the ultimate test of a country's competitiveness and economic health, irrespective of what contributes to such success, be it outstanding trade performance or high domestic productivity. Therefore, in this research I propose a more general and simpler definition: *national competitiveness is a nation's ability to compete in achieving a high and rising standard of living for its people relative to other countries.*

2.4 The sources of national competitiveness

Scholars have come up with different sources of national competitiveness. They include, among others, relative labor costs (Muellbauer, 1986, 1991), real exchange rate (Boltho, 1996), manufacturing (Pitelis and Antonakis, 2003), knowledge-intensive service sector (Windrum and Tomlinson, 1999), FDI (Gugler and Brunner, 2007), technology (Guerrieri and Tylecote, 1994; Narula and Wakelin, 1998; Fagerberg, 1996), innovation (Cantwell, 2004; Clark and Guy, 1998), social infrastructure, i.e., institutions and government policies (Hall and Jones, 1999), and regulations (Williams, Macdonald, and Kind, 2002).

Porter (1990) puts forth a 'diamond model', which provides a systemic view of competitive advantage of nations. According to him, there are four interlinked factors contributing to the global competitiveness of particular industries of a nation: factor conditions, demand conditions, related supporting industries, and firm strategy, structure and rivalry. Contrary to the classical international trade theories which argue that comparative advantage resides in the factor endowments that a country inherit, Porter argues that the key factors of production (or specialized factors), such as skilled labor, capital and infrastructure, are created, not inherited. Demand conditions affect the competitiveness of firms because the more demanding the customers are the more pressure for the firms to constantly improve their performance via innovation and cost reduction. Related supporting industries located in a region form a cluster, which can promote innovation and therefore improve competitiveness of participating firms due to a continuous exchange of ideas. And finally, it is the rivalry or direct competition within a same industry that compels firms to constantly look for innovative ways to outcompete others.

Other scholars have tried to expand the list of factors that contributing to national competitiveness. For example, Dong-Sung Cho (1994) proposes a 'Nine Factor Model' which adds four human factors on top of the four physical factors and an external factor. In this model, the four physical factors are endowed resources, business environment, related and supporting industries, and domestic demand, which are similar to Porter's four diamond factors. The four human factors correspond to four groups;politician and bureaucrats, entrepreneurs, professional managers and engineers, and workers. The argument is that the engine of the economic growth of less developed countries may be an abundant and diverse group of people with high level of education, motivation and dedication to work (ibid.: 21). The external chance events are unpredictable changes in the international environment, such as unexpected breakthrough in new technologies, oil shocks, and movements in international demands, which may affect the competitiveness of products, firms, and industries of a nation.

The most comprehensive lists of factors contributing to national competitiveness are provided by the WEF/IMD world competitiveness reports. The 12 major factors WEF's 2008 Report includes are institutions, infrastructures, macroeconomic stability, health and primary education, higher

[19] There are some exceptions. Some Middle East countries achieve high living standard due to the abundance of oil without building strong manufacturing industries. Norway increased its living standard after it found oil in the North Sea in 1970s.

education and training, goods market efficiency, financial market sophistication, technological readiness, market size, business sophistication, and innovation. These 12 factors are further broken down to over 100 indicators. In comparison, the IMD's 2008 report uses 254 indicators.

There are also scholars who try to provide some simple ideas about what are the essential determinants of national competitiveness. One such idea is the 'high value-added jobs' argued by Magaziner and Reich (1982). Although they did not use the term of national competitiveness, they assert that a country's real income can rise only if its labor and capital increasingly flow toward businesses that add greater value per employee and maintains a position in businesses that are superior to that of its international competitors. This means 'success depends on gaining and sustaining a competitive advantage in specific business segments' (ibid.: 4). Porter (1985, 1990) argues that the greatest returns will always be obtained from product differentiation rather than cost minimization, therefore less developed countries should not rely on cost-based sources of comparative advantage (i.e., low value added activities) and instead endeavor to acquire the skilled manpower, public infrastructure and entrepreneurial attitudes necessary for success in the development of differentiated products (i.e., high value added activities) (cited in Warr, 1994: 9).

Scholars who support industrial policies, like, Amsden (1989), Wade (1990), Nolan (2001), Chang (2003), Lall (2004), and Rodrick (2008), should have no problem with this 'high value-added jobs' argument as industrial policies aim at nurturing industries in which a country does not have a comparative advantage presently and does not need them for future development purpose. In other words, there are strategic industries a country should promote in terms of its industrial policies. I support this 'high-value job' argument but nevertheless argue that what really matters is how much value you can appropriate/capture from rather than how much value you add to by doing a job. Simply, it is difficult to measure precisely how much value a job really adds to the total value of the final product, but it is clear how much value you capture from the value chain. Although people still say a job adds certain amount of value, it is in fact a way of saying how much the job is paid for. How much you are paid for doing a job depends often not on how much your service is truly worth of but instead how much you can bargain for it. The collective bargaining practice in Nordic countries is a good example. A worker's salary is decided by collective bargaining rather than by his real contribution to the job. Another evidence supporting this argument is that a similar job, say, cutting garments, is paid differently in different countries, say in the U.S. and in China. By outsourcing the job to China, American firms can bargain for a much lower price with Chinese workers. Here again we see what matters is not how much value of a certain type of job (e.g., cutting garments) the American firms are buying, but how much bargaining power of the American firms have over their suppliers.

Pitelis and Vasilaros (20010: 4) argue that 'firms can capture less, equal or more value than the one they have created' and the size of value captured depends on the firm's market power. With globalization, the production of commodities like personal computer and automobile often involves many different activities located in different countries. All of these activities, ranging from sourcing of raw material and manufacturing components to assembling parts together and delivering a final commodity to customers, are linked into a global commodity chain (Gereffi, 1994). On this chain, different jobs located in different countries add values to the final commodity. However, the proportion of the value added by a particular job depends on the power structure within the chain. Unlike standard international trade theories where the implications for economic power are not pursued, power in the form of strategic behaviors affecting upstream and downstream activities and agents is a key issue (Raikes, Jensen, and Ponte, 2000). Gereffi (1994) identifies two types of commodity chain, the producer-driven and buyer-driven, in which some key agents (branded

producers and giant buyers) dominate and impose certain disciplines through complex webs of contracts and subcontracts, thus dictating the value distribution on the chains.

Stan Shih, the founder of Taiwanese computer giant Acer, first proposed the concept of the smiling curve in 1992. This a useful tool for illustrating the value-adding potentials of different activities in the value chain. According to Shih's observation, in the personal computer industry, both upstream (e.g., R&D and key components) and downstream (e.g., marketing and after-sales services) of the value chain command higher values added to the product than the middle part (e.g., manufacturing or assembling). Compared to 1960s, in the 1970s the slopes of the smiling curve have over time become steeper[20] (see Figure 2.2). This means the value captured (i.e., profit margin) by the middle part over time is squeezed by the both ends of the value chain. Therefore, the terms of trade for developed nations specializing in both ends of the value chain[21] have become increasingly advantageous and the terms of trade for developing nations specializing in assembling jobs or raw material and primary goods have become less advantageous .

The reason for this change of the smiling curve is due to the change of power relations between developing and developed countries, both of which are now linked together on the global commodity value chains. Due to the decline of transportation costs, liberalization of international trade, and modularization of production, nowadays, specialization, off-shoring and outsourcing have become the trend in international economy. Developing countries with abundant surplus labors are competing against each other in order to attract foreign investments. They often relax environmental and labor regulations or lower taxation to make their countries attractive for offshoring and outsourcing. Such competitions often undermine the ability of governments to enforce labor standards like minimal wage, to raise taxes to fund social services, and to remedy externalities such as environmental pollutions. In other words, the developing countries may lose collectively in a 'race to the bottom'. The reason for this is two-fold. Firstly, what is outsourced or offshored are in fact either the more labor-intensive (or least knowledge-intensive) segments of the value chain in which developing countries have no bargaining power over global MNEs. Secondly, the outsourced or offshored jobs are often polluting and are not allowed or welcomed in developed countries. Developing countries are nevertheless competing to get them because of the opportunities for employment and economic growth.

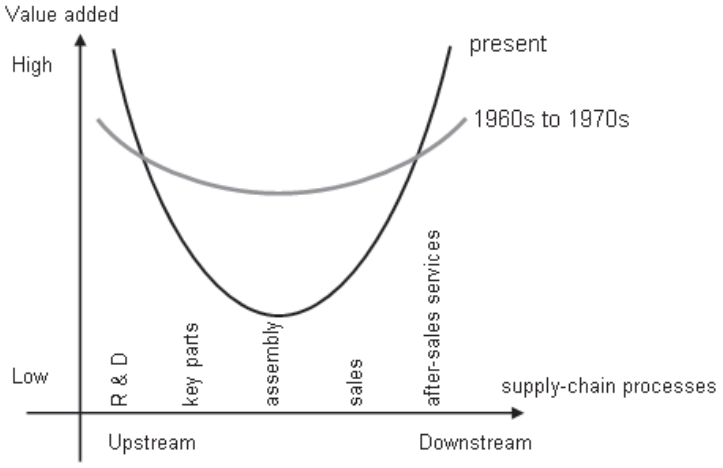
Obviously, contrary to the comparative advantage theory, which prescribes that every country should specialize in activities it has a comparative advantage in, I argue that specializing in the bottom section of the smiling curve is all but a solution for improving national competitiveness. To use Magaziner and Reich (1982) terminology, they are not 'high value jobs', not because they add less value than other more knowledge-intensive jobs at the both ends of the chain do, but because they might often be under-compensated for their added value due to decreased bargaining powers. Intuitively, some people tend to believe that manufacturing jobs are better than agricultural ones while service is better than manufacturing for wealth generation. However, this may not hold true because there are high-value knowledge-intensive agricultural jobs as well as low-value labor-intensive manufacturing and service jobs. Therefore, the essential determinant of national competitiveness is what kind of economic activities a country specializes in rather than what industries they are involved in. In this context, we can define competitive advantage as comparative advantage in higher value activities. In a two-country two-product model, if a country has

[20] *See, 'For Whom Does the Smiling Curve Smile?- China is caught in the immiserizing growth trap', China in transition, January 16, 2004, http://www.rieti.go.jp/en/china/04011601.html*

[21] Terms of trade (TOT) in this context measures the relative prices at which the technologies of developed countries are exchanged for developing country labor.

comparative advantage in the higher value activity while another country's comparative advantage is in the lower value product, then the former has a competitive advantage over the latter. Therefore, the source of national competitiveness is the high value activities in which a country is specialized.

Figure 2.2 The change of the smiling curve from 1960-70 to present)



Source: Kwan (2004), available at: http://www.rieti.go.jp/en/china/04011601.html

2.5 The role of government in improving national competitiveness

There are three competing neoclassical views that tries to explain how national governments can fuel economic development (or national competitiveness), the strong neoclassical, the moderate neoclassical, and the structuralist views (Lall, 2004).The key difference between them lies in their attitudes toward industrial policy.

The neoclassical model assumes that all markets are efficient and therefore sees any government intervention in the operation of market as distorting. Neoliberal economists accept that the role of state in economy is to provide basic public goods like education, health and infrastructure and to establish a set of institutions like a sound legal system and financial markets. To them, the best solution to growth and development is free trade based on comparative advantages and openness to foreign investment. In the mid-1980s, the neoliberal economists attributed the success of East Asian economies to free trade and other non-interventionist policies. However, in the period that followed, this neoliberal interpretation came under intense criticism. Scholars, such as Amsden (1989), Lall (1992), Pack and Westphal (1986), Wade (1990) and Westphal (1982, 1990), argued that most of the East Asian Tiger economies had been very interventionist in trade, FDI, technology transfer and domestic resource allocation (Lall, 2005: 10) during this period. Such overwhelming evidence has forced the neoliberals to take on a more moderate neoclassical approach in studying this phenomenon.

Different from the strong neoclassical model, the moderate neoclassical stance admits some market failures[22] and therefore emphasizes on some role of the state to intervene in order to remedy failures. But, they only accept non-selective or functional intervention and opine that government policies should not aim at influencing allocation at the activity, firm or technological level. The argument

[22] The notion of market failure is first brought up by Francis M. Bator (1958)

for such anti-selectivity is that even if there are market failures it is impossible for governments to mount effective selective interventions because governments themselves could fail and government failuresmay be more costly than market failure (Mckean, 1965). To respond to critics of the neoclassical interpretation of the East Asian development experience, the moderate neoclassical account[23] 'devoted enormous effort to explain why selectivity had been redundant and unnecessary' (Lall, 2004: 10).

There is evidence to suggest that three East Asian Tigers (Singapore, South Korea, and Taiwan) used extensive selective industrial policies in their development process and such selectivity played a decisive role in promoting industrial competitiveness. This can be compared to the typical failing import-substituting strategies and also to the disappointing performance of those developing countries which blindly adopted passive and rapid liberalization. Lall (2004) points out that the reason why neoliberalism finds it difficult to analyze industrial development in developing world is mainly due to how they look at technology. A large body of literature on technological capabilities has argued that industrial success in developing countries depends on the hard task of how enterprises manage the process of mastering, adapting and improving upon existing technologies. However, the moderate neoclassical position retains the simplistic assumptions of the strong neoclassical one with regard to technology. They believe all markets affecting technology are assumed 'efficient', (i.e., there can be no significant market or institutional failure) and therefore, there are no additional costs, risks or other constraints in using technologies and the best way for developing countries to facilitate technological advancement is to welcome foreign investment embodying advanced technology and acquire those technologies thereafter. In sharp contrast, the structuralists argue that technology has strong 'tacit' elements that require investments on the part of the users in new skills, routines, and technical and organizational information. Since such investments are prone to market and institutional failures, government intervention is necessary in such situations; and since technologies differ in their tacit features and externalities, many policy interventions have to be selective (Lall, 2004: 11).

Scholars have pointed out that the development of technological capabilities can be hindered by market and institutional failures at two stages: the stage of building initial capacity and the stage of subsequent deepening of capabilities. At the initial stage, free markets may not give correct signal for investment in a particular new technology if there are high, unpredictable learning costs and widespread externalities (Lall, 2004; Rodrik, 2006, 2008), therefore without proper government intervention to provide sufficient incentives for private sector, there tends to be under investment in such new technology. In some situations where complex activities are involved or where there are widespread externalities, unaided newcomers may never enter those areas (Lall, 2004). To make industrial policy successful in such situation, Hausmann, Hwang and Rodrik (2007: 23) argue that government should subsidize the initial entrants in their new activities (but not the followers). At the subsequent deepening stage, there is also a risk of market failure because of the learning costs involved (Lall, 2004: 14). Normally, the effective and rapid way to access new technology is through FDI by establishing wholly foreign-owned enterprises which can transfer 'internalized' technology from which the host country can learn the production capabilities. However it may be hard to learn the more advanced capabilities like design, R&D, and innovation. Due to the high learning cost and risk involved, the foreign investors are reluctant to allocate innovative activities in developing countries. In such situation, the governments of developing countries have to intervene in the way in which foreign technologies are transferred by providing incentives to stimulate foreign investors to invest in R&D in the host country.

[23] It is presented in World Bank's (1993) *The East Asian Miracle*.

The technological capability approach tells us that there are some technological capabilities that are more important than others, otherwise there is no need for government intervention aiming at facilitating acquisition of those capabilities. I would argue that those capabilities that add or capture high values are more important than others. Therefore, to improve national competitiveness, what a national government should do is to facilitate and stimulate its labor force and enterprises to enter into those high-value economic activities and master high-value capabilities demanded by those activities. And since the high-value activities also change over time, national governments should continue to play such a role in order to upgrade the capabilities of the labor forces and enterprises.

The difference between these three competing views (strong neoclassical, moderate neoclassical, and structuralist) is that they view the role of the state in development economics differently, which in fact has evolved over time since the end of the Second World War. With the success of Keynesianism at the later part of the Great Depression, Marshall Plan for European Reconstruction, and Stalinist industrial development in the Soviet Union, the conventional wisdom in 1950 and 1960s saw capital accumulation as the key to economic growth (e.g., Lewis, 1955; Nurkse, 1953; Robinson, 1956; Rosenstein-Rodan, 1943; cf. Fel'dman, 1928/1964; cf. Harrod, 1939; cf. Domar 1946), and therefore the state can play a proactive role in helping accumulate capital needed for industrial expansion by encouraging high rate of household savings, reinvesting enterprise profits into capital goods like productive equipments, borrowing foreign debts and transferring capital from agricultural sector to industrial sector via so called scissors difference of price.

However, in 1970s, the US entered into a period of stagflation, which made Keynesianism less feasible. In the meantime, there was a sharp contrast between the disappointing performance of Soviet style of industrialization policies and the economic miracles of East Asian Tiger economies. This consequently led to the rise of neoclassical economics in 1980s after Margaret Thatcher and Ronald Reagan were elected to power. According to Neoclassical economics, the key to growth and development was efficient allocation of resources rather than capital accumulation and therefore the role of state should be to get price right and not to intervene the operation of the market which will work out on its own. With the World Bank and IMF's promotion of the Washington Consensus worldwide, neoclassical economics has become the orthodox. However, after more than a decade of Washington Consensus-guided reform in the developing world, the overall performance is said to be disappointing (World Bank, 2005). In sharp contrast, during this period, countries that did not follow strictly the neoclassical prescriptions, like China and India, have made outstanding economic progress. Eventually, in 2008, the shock of global financial crisis and the subsequent global economic recession called the ideologies of neoclassical economics into question. Global wide efforts of economic stimulation seem to revive Keynesianism. World leaders and scholars once again are forced to rethinking the proper role of state, which, according to Paul Sameulson (1963), cannot be determined a priori.

My understanding of this cycle of conventional wisdom on economic development (Krugman, 1996) is that some economists are too biased when dealing with the market vs. state issues. Neoclassical economists have too much faith in the efficiency of market and too little in the capacity of state. This might have something to do with the ideology of 'government, even in its best state, is but a necessary evil; in its worst state, an intolerable one' (Paine, 1776) and therefore it should be confined to minimal. In comparison, some economists who support command economy and central planning are confident in the capacity of state and believe the state can replace market. Datta-Chaudhuri (1990) points out that the debate on the relative virtues of the free market as opposed to state intervention inevitably remains inconclusive and neither side succeeds in convincing the other. The important question for developing countries is how to develop a mutually supportive structure of market and non-market institutions that is well-suited to promote economic development

(Adelman, 1999, 2000; Stiglitz, 1996). One good example of this is housing policy. Singapore is a market economy but more than 80% of Singaporeans live in public houses provided by the state. In contrast, China is a so-called socialist country but the government started a housing reform in 1998 which abandoned house welfare and now roughly 80% of new houses/flats built since 2003 are sold at the market prices. While almost every Singaporean can have a place to live, many Chinese find it difficult to afford a flat so that the ordinary Chinese households are forced to save for buying a flat. High savings in China has largely reduced Chinese household consumption. As a consequence, the Chinese government has had to rely on investments and foreign demand to maintain its economic growth, which causes problems that I will discuss in the case study.

In reality, the relative importance of state versus market depends on the stage of development the country is at. I argue that there are three broad development stages, where the market and the state have different roles. The first stage is the stage of underdevelopment where development is the prerogative of the state as the private sector is too weak and capital scarce. At this stage market failure is common and there is tendency of underinvestment in certain economic activities due to public goods problem, uncertainties etc. Therefore, the state should lead economic development with an emphasis on capital accumulation. In this stage, import substitution might be justifiable because it can essentially build a minimal level of industrial base (or industrial capabilities) essential for the country to compete in the second stage with more developed countries with stronger industrial capabilities.

The second stage is the dual-track stage, a transitional stage from the state-led to the market-led stage. Here, the country has a basic industrial base and the deficiencies,defects and bottleneck of the heavy state-led development model are present. In this scenario, there is a need to gradually reduce the role of the state in economic area and to nurture the markets. Since this is a transition process, , the reform should be gradual and steady in order to make this process smooth. Examples of dual track market-state coexistence can be seen in the experiences of China (1979) and Russia (1990s). In this stage, a gradual liberalization of trade is needed to import competition to erase the X-inefficiency in the domestic economy. In addition, an export-promotion strategy is needed for job creation and utilization of surplus agricultural labor. The import competition strategy and the export promotion strategy are complement rather than substitutes at this stage.

The third stage is the developed and market-led stage in which the private sector dominates the economy and market becomes the principal mechanism for resource allocation. Here, the state should exit from those industries in which private firms are competing intensively. The state's role is mainly to regulate market, foster competition and innovation, as well as to provide public goods.

In short, the state plays an important role in improving national competitiveness , especially in the developing countries. Although globalization (via WTO regulations) has reduced the feasibility of some industrial policy interventions like infant industry protection and export subsidy, it increases possibilities of other options like technology support and innovation financing (Lall, 2004). Under the current international economic order, the degree of policy freedom left to developing countries is limited, which makes the role of government in promoting healthy industrial development more important. Unfortunately, there is no universal recipe for success. It demands continuous practice and research.

Chapter 3: The methodological issues

Methodological issues are important for academic research in general and for national competitiveness research in particular. There are three reasons. Firstly, despite more than 30 years of research, there has been no consensus on what national competitiveness is, i.e., there being a lack of a commonly-accepted definition. Secondly, there are several competing international competitiveness indexes and rankings that measure and compare different countries' national competitiveness. The designs of the indexes are different and often subjective and therefore the rankings are very different and sometimes confusing. Thirdly, there has been a trend that the index designers are trying to make their index design techniques more sophisticated. This can be problematic because of the 'measurement without theory' problem, a classical critique on composite index design made by a Nobel Prize-winning economist T. C. Koopmans in 1947. Making index design sophisticated can only give the reader an artificial feeling that the index is 'scientific' but in fact it cannot be rigorous when the theoretical foundation of that index design has not been well-established. Unfortunately, this is the reality of research field of national competitiveness at the present stage of development.

In this chapter, I will discuss six major methodological issues. First, what are the proper research methods for national competitiveness research at the present time? Second, how should we define the concept of national competitiveness? Third, what are differences in the designs of national competitiveness indexes used to rank different countries and produce their own world competitiveness reports by the WEF and IMD? Fourth, why is the indexing-and-ranking method flawed? Fifth, the level of analysis issue will be discussed briefly. Last, I will talk about the issue of data sources that will be used in the case study of China's national competitiveness.

3.1 The proper methods for national competitiveness research

I assume what are proper research methods for a research field will depend on the stage of development of the field and the nature of the research questions (Yin, 2009). Let us first of all look at the current stage of development of the field of national competitiveness research.

In spite of 30 years research, the field of national competitiveness research is still in its early stage of development, because there is still no commonly accepted definition, measurement, and theory of national competitiveness. Based on their own understandings of the issue, people talking and writing about national competitiveness use the term freely. Therefore, many competing views coexist and confusion about national competitiveness is inevitable. National competitiveness research is in reality in the stage of what Thomas Kuhn (1962) calls 'pre-paradigm'. Since the field is still young, our researches at the present stage are inevitably preliminary and exploratory. Therefore, a qualitative research methodology is naturally a proper one for the time being. In other words, a quantitative research methodology, like the indexing-and-ranking method used by the World Economic Forum (WEF) and the International Institute for Management Development (IMD) since 1979, is not proper at this stage. The reason is simple and straightforward, namely, without a commonly-accepted definition, scientifically-designed measurement, and well-developed theories, we cannot propose any meaningful hypotheses and then test these hypotheses empirically; and we also cannot design any rigorous indexes to evaluate and rank multiple countries. Any such quantitative researches, albeit many, inevitably lack of scientific rigor and external validity at this stage.

However, this is not to say that quantitative research, such as indexing-and-ranking method, will not be appropriate forever. If one day we have sufficient knowledge and much deeper understanding

about the topic, or if we can come up with some good enough index of national competitiveness, then we can accept such a quantitative approach. But, I argue we have a long way to go before we reach that point. I will give a more detailed analysis of the quantitative method used by the WEF and IMD later in this chapter and explain why it is flawed. Here, let me discuss about the qualitative case study method, which I see as an alternative research method to the commonly used quantitative indexing-and-ranking

Conventional wisdom goes that case study provides 'the detailed examination of a single example of a class of phenomena' and 'may be useful in the preliminary stages of an investigation' (Abercrombie, Hill, and Turner, 1984: 34). Flyvbjerg (2006) has made a forceful argument that it is a misunderstanding that case study is most useful for generating hypotheses in the first stage of a total research process whereas other methods are more suitable for hypothesis testing and theory building. Flyvbjerg points out an important role of cases in human learning, namely, the case study produces the type of context-dependent knowledge that is necessary to allow people to develop from rule-based beginners to true human experts, as research on human learning shows that context-dependent knowledge and experience are at the very heart of expert activity.

Case study methodologists, like Eisenhardt (1989), Flyvbjerg (2006), Stake (1995), and Yin (2009), have made decisive arguments that case study is a proper method for social science research. As a matter of fact, as Yin (2009: 5) points out, 'case studies are commonly used as a research method in the social science disciplines – psychology…sociology…political science…and anthropology—and for doing research in different professional fields, such as social work…business and marketing…public administration… public health…education…accounting, and evaluation'.

Yin (2006: 111) contends that 'compared to other methods, the strength of the case study method is its ability to examine, in-depth, a "case" within its "real-life" context'. In-depth case studies are very valuable for advancing our understanding of the research question at hand as Thomas Kuhn (1987) once points out that 'a discipline without a large number of thoroughly executed case studies is a discipline without systematic production of exemplars, and that a discipline without exemplars is an ineffective one'. Flyvbjerg (2006) argues that social science may be strengthened by the execution of a greater number of good case studies. At any rate, case study method is proper for national competitiveness research because the research field is still in its early stage of development.

Whether a case study method is appropriate depends, according to Yin (2009:4), 'in large part on your research question(s)', namely, 'the more that your questions seek to explain some present circumstance (e.g., "how" or "why" some social phenomenon works), the more that the case study method will be relevant' and 'the more that your questions require an extensive and "in-depth" description of some social phenomenon'. Yin (2009: 4) further points out that 'the distinctive need for case studies arises out of the desire to understand complex social phenomena. In brief, the case study method allows investigators to retain the holistic and meaningful characteristics of real-life events'.

Yin (2009) points out that the term 'case study' can refer to either single- or multiple-case studies and the researchers have to decide whether to do a single case study or a set of case studies from very beginning. While having multiple cases might help you to strengthen the findings from your entire study, focusing on a single case will force you to devote careful attention to that case. I would argue, at current development stage of the field, in-depth analyses of national competitiveness of individual countries are very valuable. Once more and more single-case studies have been done, we can easily do comparisons and further researches based on these single-case studies. In other words, even if individual scholars undertake single-case studies, collectively, the single-case studies together can be viewed as multiple case studies. So, due to the constraints of time and resources I

have for my present PhD research, I will choose single-case method to do an in-depth analysis of one country's national competitiveness.

However, some people may argue that 'you cannot generalize from a single case' and 'social science is about generalization' (Flyvbjerg, 2006). Well, it is a fundamentally controversial question whether social science can develop generalizable theory across contexts. Currently, there are competing views with regard to this question of generalization. For example, Yin (2009) has made a distinction between analytical and statistical generalization. According to him, Analytic generalization can be used whether your case study involves one or several cases. Yin also has made a categorical statement that 'A fatal flaw in doing case studies is to conceive of statistical generalization as the method of generalizing the results of your case study' (ibid.: 38). So, as a case study researcher, 'you should try to aim toward analytic generalization in doing case studies, and you should avoid thinking in such confusing terms as "the sample of cases" or the "small sample size of cases'. Simply put, what Yin (2009) argues is that case study researches should only aim toward analytical rather than statistical generalization.

To avoid the generalization debate here, I confess I subscribe to one powerful yet minority view that 'social science never has been, and probably never will be, able to develop the type of explanatory and predictive theory that is the ideal and hallmark of natural science' and 'social science emulation of natural science is a cul-de-sac; mainstream social theory and social science methodology stand in need of reorientation' because 'context and judgment are irreducibly central to understanding human action' (Flyvbjerg, 2001: 4).

Although I don't believe 'there does not and probably cannot exist predictive theory in social science' (Flyvbjerg, 2006: 223) that is generalizable or context-independent, I do have faith that we can further our understanding of some general issues by looking at particular case studies, sometime even from a single case. Especially, an in-depth single-case study is valuable for explorative researches because novel constructs and theoretical frameworks may emerge out of the case studied and may be applied to other cases. In my present research, I choose China as the single case because there are debates on China's economic performance or national competitiveness, which makes the case study of China interesting and challenging because researchers have to reconcile the competing views in their studies. Doing so may enable the researcher to come up with novel constructs and ideas.

Yin (2009: 35) claim that the purpose of using case study method can be both theory building and testing. Yin (2009: 19-20) has identified four different applications of case studies, especially in evaluation research, the first, to explain the presumed causal links in real-life interventions that are too complex for the survey or experimental strategies; the second, to describe an intervention and the real-life context in which it occurred, the third, to illustrate certain topics within an evaluation, again in a descriptive mode, and the fourth, to enlighten those situations in which the intervention being evaluated has no clear, single set of outcomes.

In this PhD research, I will adopt a case study method. In this research, the case study has two distinct functions at two separate stages, namely, theory building at the first stage and theory application at the second stage. Simply put, I chose the case study methodology for developing an integrative framework of national competitiveness first and then I used the integrative framework developed to guide an illustrative case study on China's national competitiveness.

At the theory/framework building stage, I use discourse analysis (Gee, 1999) and content analysis (Krippendorff, 2004) methods to review the existing literature on national competitiveness and the various indexes produced by various scholars and organizations for generating national

competitiveness rankings. The scope of literature I have reviewed is extensive in order to have a clear understanding of the state of the field. The major international competitiveness indexes (e.g., the WEF's and IMD's) are thoroghly analyzed and compared so that I can unveil the problems of the index designs.

Based on my understanding of the problems of competitiveness index design, I have chosen to design an integrative analytical framework rather than an index of national competitivenss in the current PhD research. Some of the constructs used in the final integrative framework were initially induced or grounded up from the preliminary case study of China. Then I derived the context-free constructs from the preliminary constructs induced from the preliminary case study. After I got the preliminary conceptual framework which was context-free, I re-examined the case of China again in order to enrich the preliminary conceptual framework by inducing more fine-grained sub-constructs. Then I derived some context-free sub-constructs from the preliminary sub-constructs induced from the re-examining case study. Then I got the final integrative framework presented in Chapter 4.

At the theory/framework application stage, I applied the integrative framework I developed in the earlier stage to China by doing a case study which aims at providing an in-depth analysis or thick description of the different dimensions of national competitiveness in the specific case of China.

To choose China as the empirical setting is due to two reasons. For one, I am a Chinese and am more familiar with China than other countries so that it is relatively easier for me to get Chinese data than other countries'. For another, more importantly, China presents more multifactedness when it comes to national competitiveness. There have been unsettled debates whether China is competitive or not and whether China's rise is an opportunity or a threat to the rest of the world. Therefore, China is a suitable case for testing the analytical capacity of the integrative framework I have proposed in the first stage.

3.2 Defining national competitiveness by dimensionalizing the complex concept

Obviously, the history of national competitiveness research is relatively short if we see Porter (1990) as a starting point[24]. In the literature of national competitiveness research, there is a lack of consensus on how to define the concept of national competitiveness. Most researchers adopt different definitions or even provide their own. Garelli (2006) lists 13 different definitions offered by individual scholars, national government agencies and international organizations such as US Competitiveness Policy Council, UK Department of Enterprise, Trade and Employment, European Commission's Competitiveness Advisory Group and Organization of Economic Cooperation and Development (OECD). Even for the well-known Global Competitiveness Report published annually since 1979 by the WEF, its definition of the key concept has also changed several times[25].

[24] The competitiveness of nations has been on the research agenda for some time (Oral and Chubchoub, 1997: 528). Reinert (1994, 1995) even traces the predecessors of competitiveness issues back to at least 500 years ago. Although scholarly research on international competitiveness has intensified since early 1980s, such as Anderson and Dunnet (1987), Durand and Giorno (1987) and Keller (1985), most of these research focused either on enterprise level or on international trade performance of nations. Porter (1990) was an exceptional study because it explicitly examines what kind of national competitive environment fosters international competitiveness of a particular industry of a particular country. Before Porter (1990), economists have paid little attention to economic competitiveness at the national level since what they really cared about was the industries or the firms of a particular country rather than the country as a whole.

[25] One of the reasons why the WEF has changed its definition of national competitiveness is that when new scholars joined their research team, they managed to change the definition according to their own understandings of the issue. Before 1996, the WEF's World Competitiveness Report was jointly published by the WEF and the International Institute for Management Development (IMD). In 1996, the Forum entered into collaboration with Harvard University's Center for International Development, and the center's director Professor Jeffrey Sachs joined the WEF

As a relatively new field of research, the existing researches are in essence at what Thomas Kuhn (1962) calls 'the pre-paradigm stage' of the development of a scientific discipline, in which different perspectives compete for prominence. Therefore, it is understandable that there are various definitions of national competitiveness in the literature.

Although it is understandable that different researchers adopt or even offer different definitions, there is still a puzzle to me: why most of the existing researches only focus on one aspect of a country's competitiveness rather than look at the phenomenon from different angles and try to give the readers a more holistic picture? Take China for example. There are broadly three types of assessment of China's economic competitiveness: the first one is that China is very competitive, and predictions such as China's GDP will overtake that of the U.S. in about 30 or 40 years are clear evidences of this type of assessment[26]; the second one is that China is not competitive, which is supported by the fact that Chinese economy is still based on its comparative advantage of cheap labor and heavily relying on large inputs of natural resources and mineral energies; the third one is that Chinese economy, no matter how large and fast-growing, is not sustainable due to reasons range from environmental constraints, aging population, social inequality and potential political instability. Obviously, these are all insightful information; however, none of them in isolation gives us a full picture of China's economic competitiveness. In fact, they are complementary to each other although they seem to be contradictory to each other.

However, 'contradictions are complementary' is a kind of natural law, according to the great Danish Nobel Prize winning physicist Niels Bohr[27], who first brought up the complementarity principle to the scientific community of quantum physicists and later on promoted it as a kind of philosophy of science. In the following paragraphs, I will briefly outline the development and meaning of this complementarity principle (based on Pais, 1991: 301-316).

Bohr's complementarity principle has been a path-breaking interpretation of the puzzling particle-wave duality of light in the 1920s. In 1905, Albert Einstein noted that light behaves as a set of particles (photons as later called) under some circumstances while it behaves like waves under some other circumstances. This particle-wave duality brought much trouble to the physicists because particle and wave were thought as distinct and contradictory to each other and light was interpreted as either particle or wave in the long history since Aristotle's time[28]. In 1909, Einstein imagined that a kind of fusion of both particle and wave interpretations should be adopted for future theorization of light. In 1912, physicists found out that X-rays also exhibit the particle-wave duality. Later in 1923, de Broglie made a conjecture that the same particle-wave duality applies to matter (i.e., every thing), which was proved true by experiments later in 1927 by Clinton Davisson at Bell Labs.

Competitiveness research team. Due to the difference over how to define and measure national competitiveness between the newcomers and the former architect of the Report, IMD professor Stephane Garelli, the collaboration between the WEF and the IMD collapsed and the joint publication of the Report discontinued since then. In 1998, Professor Michael E. Porter of the Harvard Business School joined the WEF team. Once again, Porter managed to influence the Global Competitiveness Report to extend its methodology to include a greater focus on the microeconomic foundations of competitiveness and to introduce a new microeconomic competitiveness index parallel to the existing macroeconomic index. In 2009, the WEF competitiveness team decided to merge the two parallel indexes into a single one, the so-called New Global Competitiveness Index.

[26] The latest estimation made by Goldman Sachs is that China may overtake the U.S. in terms of GDP by 2027. See, http://news.xinhuanet.com/english/2009-11/03/content_12373969.htm

[27] When awarded the Order of the Elephant by the Danish government in 1947, Neils Bohr designed his own coat of arms which featured a Tai-Ji picture (symbol of yin and yang) and the Latin motto '*contraria sunt complementa*' (contradictions are complementary). See, http://en.wikipedia.org/wiki/Niels_Bohr

[28] See, http://en.wikipedia.org/wiki/Wave-particle_duality

Then theoretical physics entered into the second half of the 1920s which is a very important period for the development of quantum physics (Beller, 1999). In 1925-1926, two major theories of atomic phenomena emerged: matrix mechanics and wave mechanics, the former was originated in Werner Heisenberg's radical reinterpretation of basic physical magnitudes (Heisenberg, 1925) and the latter was developed by Erwin Schrödinger (1926). While the two theories are radically different in their basic assumptions and mathematical treatments, the two theories were soon proved to be equivalent by Schrödinger himself, despite the fact that two theories are based on two different basic concepts, i.e., light being of particle and of wave respectively (Beller, 1999: 18). However, such mathematical equivalence of the Heisenberg and the Schrödinger pictures did not in and of itself lead to any improved understanding of the particle-wave duality as Schrödinger attempted to interpret quantum physics in classical terms while Heisenberg and his colleagues (i.e., Bohr) tried to offer non-classical interpretations. Heisenberg once made a summary of the heated debate between Schrödinger and Bohr as 'no real understanding could be expected since, at the time, neither side was able to offer a complete and coherent interpretation of quantum mechanics' (Pias, 1991:300).

After Schrödinger's visit to Copenhagen and the unsolved heated debate between him and Bohr in late 1926, Bohr and Heisenberg worked very hard to come up with a theoretical interpretation of the still indigested notion of particle-wave duality. Heisenberg and Bohr took very different approaches toward the shared goal: while Heisenberg wanted to start from the ready-to-hand (i.e., his matrix mechanics) to try to derive a better interpretation, Bohr wanted to come to the bottom in the philosophical interpretation. In 1927, Heisenberg published an important work uncovering the uncertainty principle which is now one of the foundational principles of quantum physics. According to the uncertainty principle, certain pairs of physical properties, like position and momentum, cannot both be known to arbitrary precision. That is, the more precisely one property is known, the less precisely the other can be known[29]. Almost at the same time when Heisenberg formed his idea, Bohr had a different idea; however, Bohr got a source of inspiration from the results and the failures in Heisenberg's work (Pias, 1991: 310). According to Bohr's complementarity principle, matter exhibits a wave-particle duality; an experiment can show the particle-like properties of matter, or wave-like properties, but not both at the same time[30]; however contrary these different properties may seem to be, they are complementary and indispensible when describing the matter under observation.

Largely due to this complementarity principle and the complementarism promoted by Bohr himself into Biology, Psychology, Culture and other disciplines, Bohr was viewed as one of the greatest philosopher of the twentieth century. Eschewing the specifics of the complementarity principle in physics, we find Bohr's idea appealing. The best illustration of the complementarity principle is the 'blind men and the elephant' story. The insight is so simple and straightforward, different people may give different observations of a same object. None of them in isolation is right or wrong, instead, they are complementary to each other. Only by putting more different aspects together, we can get a better and more complete picture of the object we observe.

Then, what is the relevance of Bohr's complementarity principle to the present research on national competitiveness. Simply, I argue, we have to take into consideration of different (though contradictory) perspectives which address different aspects of a country's (e.g., China's) national competitiveness. In isolation, none of them is completely right or wrong; we have to pull them together if we are to offer a better and fuller picture of that country's national competitiveness. In order to do this, we have to establish a theoretical framework which integrates those competing

[29] See, http://en.wikipedia.org/wiki/Uncertainty_principle
[30] See, http://en.wikipedia.org/wiki/Copenhagen_interpretation

perspectives. My own solution is to conceptualizing national competitiveness into a multi-dimensional concept by dimensionalizing it to bring together different aspects of the phenomenon. Otherwise, if we only focus on one aspect and ignore the others, we may tend to distort the reality or even overstate one aspect. Therefore, the effort of dimensionalization of the concept is justifiable.

The dimensionalization of the national competitiveness concept follows a 'exhaustive yet parsimonious' principle, namely, the dimensions and their sub-dimensions should be exhaustive yet parsimonious. The concept was first dimensionalized into two dimensions, current state and future prospect. Although one may argue this dimensionalization is not exhaustive because it should include an extra dimension, i.e., the past record, I was aware of this but nevertheless excluded the construct of 'past record' from the framework because what are most interesting to and important to scholars are the current state and future prospect, not the past record. Then each of the two dimensions was further dimensionalized into two, resulting in four dimensions of the concept of national competitiveness, i.e., effectiveness, efficiency, sustainability, and potentiality.

The selections of the sub-elements of each of the four dimensions also follow the same exhaustive yet parsimonious principle.

For the dimension of effectiveness, the four sub-elements of the effectiveness are the four standard macroeconomic objectives commonly accepted and adopted by many countries; the four sub-elements of the efficiency dimension are self-evident because the three input factors are labor, capital, and natural resources, and the overall efficiency indicator is a comprehensive efficiency indicator complementary to the other three partial ones; the sub-elements of the sustainability dimension encompass the conventional 'three pillars' plus a demographic element which I find appropriate and necessary in the context of economic development. The sub-elements of the potentiality dimension may be debatable because it seems subjective or speculative to talk about the potential of a country. Nevertheless, the choices of the sub-elements were made with a clear logic in the sense I adopted the technological capability approach to the potentiality issue and choose the four arguably most important factors contributing to technological progress. The importance of the four factors is justified from the economic growth theory perspective. Also, the importance of the four factors I chose is self-evident. Deepening human capital provides the human resources necessary to technological work; improving institutions shape the incentive structure for carrying out technological work; national innovation system provides the platform for technological works; and entrepreneurship is the activity underpinning technological progress.

3.3 The differences in the designs of the competitiveness indexes of the WEF and IMD

For quantitative research, measurement is an important issue, especially for comparative researches. For those clearly defined and simple concepts, such as speed and temperature, it is easy to measure. However, for those not clearly defined and complex concepts, such as culture and transaction cost, how to measure becomes a complicated issue. This is especially the case when it comes to research on national competitiveness because many researchers from the outset aim to compare different countries in terms of their economic competitiveness. To do so, they have to quantify the concept of national competitiveness. Although other methods exist[31], the common way of quantifying the

[31] Other measures of international competitiveness used by scholars include relative export prices (REP), relative total costs (RTC), relative unit labour costs (RULC) and export profit margins (EPM) (Anderton and Dunnett, 1987: 46). Using these measures shows that scholars used to link an economy's international competitiveness directly with its share of world trade (see, Keller, 1985).

concept is to create a competitiveness index based on which different countries can then be rated and ranked according to their scores of such index.

Among many existing researches[32], there are two prominent international rankings of economic competitiveness of nations published annually by the WEF and IMD, both based in Switzerland. The WEF released its first Global Competitiveness Report in 1979[33] by teaming up with the researchers of the IMD. In 1989, the IMD World Competitiveness Center was created by Prof. Stephane Garelli and has been publishing the IMD World Competitiveness Yearbook since then. In the mean time, the WEF had collaborated with the IMD and jointly published its annual Global Competitiveness Report for 15 years before they split up in 1996 (The Economist, 1995: 86, 1996:104). The split-up and then competition between their publications was trigger by the assertion of Paul Krugman (1994), a Stanford University Professor of Economics, who criticizes that competitiveness was at best meaningless word when applied to national economies and at worst dangerous for obsession because nations do not compete like firms do. Krugman (1995) further contended that 'real economists don't talk about competitiveness'. In response to such harsh criticism, the WEF, under the guidance of the famous Harvard economics professor Jeffrey Sachs, decided to overhaul its old competitiveness index in 1996. Then there was a difference over how to define the term of national competitiveness and how to revise the old index between the WEF and the IMD researchers, which caused the collaboration for jointly producing the competitiveness report between the two Swiss institutions to collapse. Since then they have been competing for prominence of their own reports. Unfortunately, due to the different definitions, indexes and data sources they use, their rankings of national competitiveness are very different and sometimes confusing. For instance, for the year of 1996, Germany was ranked as the 22nd position by the WEF and 10th by the IMD, while Japan was ranked as 13th and 4th respectively. So, it is worthwhile to analyzing how these two rankings are generated before we can make a judgment whether they are academically rigorous or scientific.

It is fair to say that the both the WEF and IMD adopt a 'successive aggregation' (WEF Global Competitiveness Report 2009-2010, p. 45) methodology in their computations of their competitiveness indexes though there are differences over which indicators they choose, how to convert different forms of data into a computational standardized form, and how much weight they assign to different indicators when aggregating them. The successive aggregation methodology is used to aggregate the scores of indicators from the lowest level all the way up to the highest level of the final single index, using a certain weighting scheme. The rationale behind this methodology is as follows. A country's national competitiveness is determined/influenced by several major factors (WEF calls them as pillars); each of these major factors can be broken down into several sub-factors; and the sub-factors then can be divided further into more indicators (WEF calls them as variables). Since at the lowest level, we will have a large amount of number of data speaking for different information, we have to find a way to combine them in order to present a unified picture of what all these data together may speak for. It seems the most convenient way is to aggregate them and

[32] There are other institutions doing similar reports ranking international competitiveness of multiple countries. For example, the Institute for Policy & Strategy on National Competitiveness (IPS-NaC) based in Seoul, Korea also has been publishing its annual IPS National Competitiveness Research Report since 2001. For more detail, see http://www.ips.or.kr/site/IPS_english/research/develop_03.aspx. Chinese Academy of Social Sciences (CASS) also produces its own international ranking of national competitiveness, see http://news.xinhuanet.com/english2010/china/2010-10/25/c_13574861.htm. Kao et al., (2008) measure and compare the national competitiveness of 10 Southeast Asian countries based on their own methodology.

[33] Initially, it is called the World Competitiveness Report, which covered only about 30 countries (OECD plus 15 newly industrialized countries). Its coverage has expanded each year since, now extending to 134 major and emerging economies.

compare the aggregated scores. There are two ways of aggregation: we can either aggregate all the lowest level indicators at once to get a final score or we can aggregate lower level indicators into the higher level sub-factors first then aggregate the sub-factors into the major factors and then aggregate the major factors into the final single index. The reason for choosing the latter way (successive aggregation) is because we may consider some of the middle-level sub-factors having different degrees of significance in determining the final index so we need to assign different weights to them when aggregating them up to a higher level. Apparently, assigning different weights to a same sub-factor will result in a different aggregated score of higher level factor.

Now, let us compare how differently the WEF and IMD carry out their respective computations of competitiveness index. There are three major differences between the WEF and the IMD approaches. The first one is the use of different competitiveness indicators where the IMD uses far more indicators than the WEF does[34]. According to the IMD World Competitiveness Yearbook 2008 (pp. 472-476), it breaks down the national competitiveness into four main Competitiveness Factors: economic performance, government efficiency, business efficiency and infrastructure, each of which is further divided into 5 sub-factors, for example, the Economic Performance factor is divided into domestic economy, international trade, international investment, employment and prices. Therefore, we have 4 main factors and 20 sub-factors. Each sub-factors is once again divided into several lower-level indicators so that in total we get 331 lowest-level indicators, in which 208 indicators are hard data (i.e., statistical data) while another 123 indicators are soft data (i.e., survey data collected by Executive Surveys). However, of the total 331 indicators, IMD only use 254 indictors to compute its competitiveness index while the other 77 hard data are used to present background information about the country under assessment. In comparison, according to the WEF Global Competitiveness Report 2009-2010 (pp. 45-47), it uses 110 lowest-level variables which then be grouped into 12 pillars. The 12 pillars identified as the sources of national competitiveness are: institutions, infrastructure, macroeconomic stability, health and primary education, higher education and training, goods market efficiency, labor market efficiency, financial market sophistication, technological readiness, market size, business sophistication and innovation. The 12 pillars are then further grouped into 3 broad categories: basic requirements (the first 4 pillars), efficiency enhancers (from the 5th to the 10th pillars), and innovation and sophistication factors (the last 2 pillars).

The second difference between the WEF and the IMD approaches is the different ways to convert the raw data into standardized computational form of data. As we mentioned before, there are two types of data collected and used: hard data and survey data. The hard data are statistical data collected from national and international organizations. The survey data are collected by sending survey questionnaires to business executives at randomly selected companies within a country. Receiving the survey questionnaires, executives are often asked to give their personal opinions on questions like how business friendly the local environment is and how corruptive the local government is. The designers of the questionnaire normally give a number range for the executives to select according to their own impressions. While the WEF adopts a 1-7 scale in the design of the survey questionnaire, the IMD uses a 1-6 scale. Whether a larger number indicates a better or a worse situation depends on the nature of the question asked. For example, for the indicator measuring the number of personal computers owned by 1000 households, higher value indicates

[34] When the WEF and IMD jointly published the World Competitiveness Report from 1980 to 1995, the WEF also used many indicators. In their last joint publication in 1995, they used 378 indicators. When the WEF started to publish its Global Competitiveness Report independent from the IMD in 1996, it adopted a new index and largely reduced the number of indicators to 155, in comparison, IMD in the same year, though also trimmed its indicator, still used 224 indicators (The Economist, 1996: 86).

better situation; in contrast, for the indicator measuring the number of crimes per month, the situation is completely reverse, i.e., a higher value indicates a worse situation. So, different types of data are collected, i.e., statistical data, 1-6 or 1-7 scale data, and true or false type data. In order to aggregate the different types of data, we have to convert them into a standardized form which are then computable. For this purpose, the IMD firstly convert the survey data from 1-6 scale to a 0-10 scale and then compute them into a standardized value (STD value) by using the Standard Deviation Method (SDM). The standardized value of indicator i (STD value)$_i$ = (x_i - x')/Sn, where x_i is the original value of the indicator, x' is the average value of all the same indicators of all the countries we are about to rank, N is the number of countries we are to rank, while Sn is the standard deviation of the indicator i of all the countries.

$$s_n = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(x_i - \overline{x})^2}.$$

So, after converting all the hard and survey data into STD values, IMD then calculate the weighted-average of the several lower-level indicators to get an aggregated higher-level sub-factor. In comparison, the WEF adopts a very different method. The WEF firstly convert the hard data indicators into a 1-7 scale in order to align them with the survey data which is in 1-7 scale too. According to the WEF Global Competitiveness Report 2009-2010 (pp. 45-47), the standard formula for converting hard data is

6 * (country score – sample minimum) / (sample maximum – sample minimum) + 1

or

–6 x (country score – sample minimum) / (sample maximum – sample minimum) + 7

Which formula to choose depends on whether a higher value indicates a better situation or worse situation. By doing so, it is more convenient for computation of the converted data because after such conversion, for all converted data it is always the case that a higher value indicates a better situation. The WEF 2009-2010 Report does not say much about how the standardized 1-7 scale data are further aggregated, but we can speculate that the similar SDM method is used because in the past the WEF did use such method (bear in mind that the WEF and IMD used to jointly produce the Forum's Global Competitiveness Report from 1979 to 1995).

The third difference between the IMD and the WEF approaches lies in their different weighting scheme, i.e., how much weight to assign to different indicators or sub-factors in computation of the aggregated index. According to IMD 2008 Report, it seems that the IMD gives the 20 different sub-factors equal weights that is 5% (20*5%=100%) while it does not say much about the weightings of the lowest level indicators. In comparison, the WEF seems to have a more 'sophisticated' weighting scheme, according to its 2009-2010 Report, different countries may be described as being at three different stages of development: factor-driven, efficiency-driven and innovation-driven stages; for countries in different development stages, the weights of the three categories of competitiveness factor (i.e., basic requirements, efficiency enhancers and innovation and sophistication factors) should be assigned differently[35]. For example, for countries at the lowest development stage (i.e.,

[35] At the first glance, this special treatment seems fairer to countries at backward stages of development, in that if we use a universal standard to assess one advanced country and one backward country, it is obvious that the backward country will be rated badly in comparison to the advanced country. So by using a different standard, we can give the backward country a better evaluation. This is like if we use the superrich people's lifestyle to assess the poor people's living standard, then the poor's life seems miserable; so we use another standard, say other poor people's lifestyle, to assess the poor, then the poor's life seems not too bad. In our daily life, we may use this different standard to comfort

factor-driven stage), the innovation and sophisticated factors should be given least significance (weights) in assessing their national competitiveness because it is obvious that those countries are not innovative and their business systems are far less sophisticated than those more advanced countries (i.e., at innovation-driven stage). Since the WEF then weighs the 12 pillars of national competitiveness equally within each of the three categories of competitiveness factor, we can imagine different countries may get very different weights for the same factor in comparison with other countries at different development stages.

3.4 The problems of the indexing-and-ranking methods

3.4.1 The lack of scientific rigor in the index design

From above introduction, we may have a sense of non-science of the indexing-and-ranking methodology used by the WEF and IMD. This sense can be justified as some scholars have already argued, suck like Lall (2001a, 2001b), Thompson (2003, 2004), and Siggel (2006:141)[36], that there are many deficiencies at several levels in the best-known index of the WEF's Global Competitiveness Report. Lall (2001b) pointed out that the WEF's definitions of competitiveness are too broad, its approach is biased and the methodology is flawed. Many qualitative measures are vague, redundant or wrong. Its theoretical and empirical foundations are weak. Therefore, the value of the indices for analytical or policy purposes is limited. Here, let me focus on the flaws of such index methodology, based on Lall (2001a, 2001b).

From their reports, we can see that, different from the tendency of oversimplifying complexity in traditional economic analysis, the WEF and IMD competitiveness researchers strive for diversity and detail, aggregating a large number of variables from various academic disciplines such as economics, management and others without analyzing whether they are redundant, relevant or interrelated. Obviously, this is very problematic given the fact that the WEF uses more than 100 variables while the IMD uses 254 variables in their computations of the competitiveness index.

Even if we eschew the redundancy problem, the causality issue cannot be ignored. It is extremely complex when it comes to the casual relationships among 100-300 variables. Simply put, we are never sure about whether these variables cause competitiveness or the other way around in some circumstances, and what the interrelationships among those variables are. Weaver (1958) once identified three types of scientific problems: two-variable type, multiple-variable type and very large number-variable type of problems. For scientists, the first and the third types are easy to handle while the second type is more difficult. As we know, it is quite easy to figure out causal relationship between two variables such as the speed and distance of a moving object. It is also easy for scientists to figure out the general patterns of very large number (say, millions or billions) of variables with the assistance of statistics. But, when we use statistics to depict the general pattern out of the very large number of variables, we then normally neglect the details of individual variables and their inter-relationships. Take the Brownian motion (named after the Scottish botanist Robert Brown) for example. When we observe the particles suspended in a fluid (i.e. a liquid such

---

ourselves sometimes, however, as a scholarly research, I argue such 'double standard' is not only unnecessary but also flawed, i.e., the result of the evaluation is misleading and 'unfair' at all. For example, if using the same standard, a poor country has a very bad score in comparison a rich country. But when using a double standard, the poor may get a better score while the rich country has a same score. Then the readers will have a *false* impression that the competitiveness gap between the poor country and the rich country is not as big as they might have thought.

[36] Siggel (2006: 141) touches on the problems of WEF/IMD index method without detailed explanation. This author writes 'the index is the basis for an international ranking of countries in terms of their business climate. It is a composite of a large number of attributes condensed into a single index. It may serve a useful purpose to international investors, but its theoretical base and, especially, its aggregation method are problematic'.

as water or air), although each particle has a seemingly random movement, all particles as a whole may present some general pattern of movement. So, in this situation, scientists don't focus on the movement of a particular particle, instead they care about whether there is a general pattern, statistically significant, emerging from the randomness. For scientists, the most difficult research problems are the situations where the number of variables is moderately large, say between 10 and 100, and the research purpose is to find out the causal relationships among these variables. Maybe we can speculate that for less-than-10-variable problems, scientists may still be capable to manage, though with difficulty. However, for a large number of variables, like the WEF's 110 variables and the IMD's 254 variables, it is fair to say that it is a nightmare to figure out the causal relationships among them. To borrow a metaphor, it is like a 'bowl of noodle', which is messily intertwined without clear order. Therefore, it is reasonable to doubt the scientific nature of the indexes of the WEF and IMD which are aggregated from 100-300 variables whose relationships are almost impossible to figure out at the current stage of scientific development.

Another problem of using more than 100 variables to construct an index is that there is a lack of theoretical underpinnings which link national competitiveness as a dependent variable and the 100-300 independent variables. For example, we don't know what the relationship between the number of Nobel Prize winners of a country and the country's international competitiveness is. This is why Lall (2001a: 12-13) argues that the WEF and the IMD have claimed a degree of precision and reliability greatly in excess of what the underlying theory and evidence supports.

I argue, in general, all existing indexing-and-ranking methodologies of successive aggregation suffer from these problems detailed above and there seems to be no way to eliminate these methodological flaws if we stick to such an indexing-and-ranking idea. This is essentially to say that, with our current knowledge about economic competitiveness, at any time in the foreseeable near future, we simply cannot or can hardly produce any scientifically reliable index and ranking of national competitiveness of different countries. Therefore, I argue, no matter how tempting, we, as scholars, in our scholarly research, should restrain from trying to produce an international league table of national competitiveness, because such rankings are inevitably unscientific and misleading.

Robert Wade (2010) has identified another problem of using (foreign) executive opinion survey data in measuring national governance, which is also applicable to the measurement of national competitiveness. Wade (2010: 154-155) sees the problem is:

> "to base the assessment of state capacity on the opinions of foreign businesspeople implies that the interests of foreign investors, buyers and sellers are the same as the national interest. Yet foreign businesspeople may judge any state regulation of their activities to be 'growth inhibiting', and they may score state capacity as 'low' when the state is effective in imposing taxes and regulations that they do not like, and state capacity as 'high' when they can easily evade taxes and regulations. One of the main data sets about governance is provided by the World Bank. This data set uses 'absence of red tape' as one of its main criteria of 'the quality of bureaucracy', and it measures absence of red tape by: (1) how quickly decisions are made in regulatory agencies; and (2) how easily 'foreign investors can go about their business' (Kaufman et al., 2005a, p. 93, 2005b). However, if one applies this reasoning to South Korea and Taiwan of the 1950s to the 1980s one would have to score them quite low on administrative capacity. Foreign businesspeople complained loudly about delays. But as I document in my book, Governing the Market (Wade, 2004), delays were often 'tactical' in pursuit of industrial policy objectives'".

3.4.2 The problem of index competition based on sophistication of design techniques

In my view, the existence and popularity of such international competitiveness reports are due to two reasons: one is people's curiosity and tendency to compare with others and the other is the

commercial motive[37] of those institutions/researchers to meet such market demand. However, readers of these international competitiveness reports can be easily confused by the differences in various different rankings produced by different institutions. Take the WEF and IMD reports for example. In 2007, China was ranked as the 34th position by the WEF and the 15th by the IMD, while Iceland was ranked as the 23rd by the WEF and the 7th by the IMD.

Obviously, without adopting a commonly accepted definition, measurement, and theory of national competitiveness, differences in rankings are inevitable. Competition for prominence in indexes and therefore rankings and reports will only cause more confusion than comprehension, because each of them may be claimed to be a better solution. This is particularly the case when the index designers resort to sophisticated techniques of designing composite indicator in order to make their researches look more 'rigorous'. Some scholars have already followed this approach by utilizing some sophisticated techniques such as the Data Envelopment Analysis (DEA) (e.g., Bowen and Moesen, 2007), artificial neural networks (ANN) (e.g., Önsela et al., 2008), and knowledge discovery in databases (KDD) (e.g., Zanakis and Becerra-Fernandez, 2005).

I see the technical sophistication of index design particularly unhelpful for the healthy development of the field because of two reasons.

The first is that sophisticated index design without rigorous theoretical underpinnings is meaningless and useless. It reminds me of the classical criticism made by Hayek (1947) on the 'pretense of knowledge' in economics profession. According to Hayek, 'the failure of the economists to guide policy more successfully is closely connected with their propensity to imitate as closely as possible the procedures of the…physical sciences' (p. 3) and many economists seem to prefer 'a pretence of exact knowledge that is likely to be false' to 'true but imperfect knowledge, even if it leaves much indetermined and unpredictable' (p. 5). I feel there might be a factor of 'pretence of knowledge' behind the rationale of making index design more sophisticated. Such a practice, if commonly accepted and rewarded, may shape the incentive structure in the field which can influence the future researchers' behaviors, namely, much of the energy and time of future researchers will be diverted from exploring the theoretical underpinnings which is much needed to exploiting the opportunities for making more sophisticated indexes.

The second reason is that laymen tend to believe the more technically sophisticated indexes and the rankings as more reliable even though they might hardly understand the techniques involved. This may be the case not only for laymen but also some scholars. For example, based on an analysis of the evolution of the measurement of national and business competitiveness done at the WEF over the last decade, Vujovic (2008) concludes that 'the brunt of theoretical and methodological issues have already been resolved through a series of advances in the measurement of national competitiveness' and 'remaining challenges are mainly technical in nature'. Similarly, after its assessment of the WEF's GCI, the European Commission Joint Research Centre, an organization 'widely recognized as holding the world's leading expertise on composite indicators' (WEF, 2010: 10), concludes that 'overall, the GCI proved to be robust and consistent…the index draws a reliable picture of national competitiveness and represents a well-balanced plurality of different fundamental aspects'[38].

[37] When explaining why the World Competitiveness Report jointly published by the WEF and the IMD does not give much detail about the methodology it uses in the report, Oral and Chabchoub (1996) argue it is 'perhaps for proprietary reasons since the report is a commercial enterprise itself'.

[38] See, Appendix B: The Joint Research Centre assessment of the Global Competitiveness Index, the Global Competitiveness Report 2010-2011, Geneva, Switzerland: World Economic Forum

Then, is competitiveness research meaningful? Of course it is meaningful as Lall (2001a: 8) pointed out that competitiveness analysis is 'a way of integrating numerous branches of economic analysis that pertain to such issues as physical and human capital formation, innovation and diffusion, risk financing, competition polity, mobility, clusters and so on. If the integration is done well, with a sound framework, appropriate empirical analysis and a good grasp of governance issues, it can serve as a valuable tool of policy'. From Lall's argument, we see that competitiveness research can integrate many of existing knowledge of economics and management. However, the trick is how the integration should be done. Apparently, the indexing-and-ranking methodology used by the WEF and IMD is one way of integration, but it is not an appropriate integration, as we have analyzed above. It is fair to assert that there will be a long way to go before we can finally get a good approach of such integration. Then what should we as competitiveness researchers do at the moment? I would argue we should focus our energies on two tasks: a theoretical one and an empirical one. The theoretical task is for us to come up with more and more theoretical frameworks about national competitiveness (and industrial competitiveness, for this point, I will discuss more in the next section on the level of analysis). Never mind if these newly developed frameworks are imperfect or even totally wrong, because they will be subject to the force of evolution which selects the most fit theoretical frameworks to survive. The empirical task is for us to concentrate our research energy on analyzing a single country's competitiveness or doing comparative studies on few countries. The more empirical details we gather the easier for future researchers to utilize in an advanced theoretical framework.

3.5 The issue of the proper level of analysis for competitiveness research

Another important methodological issue is: what is the proper level of analysis for competitiveness research, national, industrial or firm level?

For some international business (IB) scholars, the nation should not be the unit of analysis because the importance of the state is being reduced with the rise of transnational corporations (TNCs or MNEs) in the globalization era (Dicken, 2003). My critiques to this 'the nation does not matter' view are three-fold. Firstly, for those nations that do not have their own MNEs or do not have many MNEs investing in their territories, nations still matter and therefore the nation is still the proper unit of analysis. Secondly, for those nations that have their own MNEs investing overseas, it is legitimate to analyze what kinds of national environment and policies have enabled the development of their MNEs (i.e., home base research, e.g., Porter, 1990). Thirdly, for those countries who do not have (many) their own MNEs but have many MNEs investing in their territories, it is still important to analyze whether or how MNEs can make an impact on their own industries, and to analyze how the state can play a role to facilitate positive impacts (e.g., technological spillover effect) and restrict or minimize negative impact (e.g., crowding out domestic firms in an industry, taxation avoidance, revenue repatriate, and monopolizing domestic industry). Therefore, even in the globalization era, both the state and MNEs matter (Dicken, 2003) and therefore the nation is still the proper level of analysis.

For many professional economists, the answer should be either the firm or the industrial level, but not the national level. The reason for this is what Paul Krugman (1994a, 1994b) once argues that nations do not compete like companies do. According to Krugman, countries are dependent on each other in the system of world economy. Countries specialize in different economic activities according to their comparative advantage and trade with each other for what they need and by cooperating with each other (i.e., specialization and trade) all of us can gain more benefit than otherwise if there were not international trade at all. Krugman (1994b) asserts that talking about

economic competitiveness at national level is meaningless and obsession with the so-called national competitiveness is dangerous.

Krugman emphasizes that it is companies that compete against each other, not the nation as a whole, which means the most proper level of analysis is the firm level. I have analyzed in the Literature Review chapter whether nations compete against each other economically, here, let me focus on the level of analysis issue only. I would argue, Krugman's argument is not justified because we may further point out the fact that in many situations it is not the firm as a whole but instead it is the particular products produced by a firm that really compete against the same or similar products produced by other firms. This is because many firms are multi-divisional multi-product conglomerates. For them, they do not consider one small single-product firm as a competitor but this small single-product firm does compete against the same or similar product produced by one division of the conglomerate. Another situation is for two large conglomerates, they may directly compete against each other for some same or similar products produced by both companies, but in the same time, they may be strategic alliance partners in co-developing a new product. Therefore, to follow Krugman's logic, we really need to say, competition occurs only at the product level so the proper level of analysis should be the product level, not the firm level.

According to Porter (1980, 1985), there are two types of competitive advantage at the product level, which are low cost and differentiation. As scholars have pointed out, these two competitive advantage can be further unified as one advantage of superior value/cost ratio, which means, one firm's product is competitive if it has a superior ratio of perceived value-added over perceived cost among other same products offered by other firms. So, we have already had knowledge of competitiveness at the product level, and if the product level is the most proper level for competitiveness analysis, then why should we bother about competitiveness at any other level?

I would argue, there are two reasons for further analyzing competitiveness at higher level. For one, we want to know why one particular firm can gain such competitiveness at the product level. There must be some firm-specific factors which contribute to such competitiveness at the lower level. We can further ask similar question to even higher level, i.e., what are the industry-specific and nation-specific factors which contribute to such competitiveness at the lower firm level? For another reason, we can treat the firm as a portfolio of products, and the industry as a portfolio of firms while the nation as a whole as a portfolio of industries. Therefore, competitiveness at a higher level than product level can be understood as how well the higher level entity (i.e., a firm, an industry or a nation) manages its portfolio to generate wealth and bring benefit to its constituents. In this sense, it is meaningful to talk about competitiveness at any level. This may explain why a Korean professor Dong-Sung Cho[39] (1998: 11) argues that 'the level of competitiveness can be measured for any entities with different domains – product, firm, industry, nation, bloc, or the globe'.

Although there is an interlink between higher level and lower level competitiveness, namely, higher level factors may influence the lower level competitiveness while the lower level competitiveness is the basis for the higher level competitiveness, one should not be confused by one another. Yet such confusion is often the case. For example, when talking about national competitiveness, some people may think about competitiveness of national firms or industries because strong national firms or industries indicate (and sometimes well indicate) the competitiveness of a nation. However, they are different precisely because higher level entity is a portfolio of lower level entity. Say, a country has an internationally competitive textile industry; however, it may still be internationally

[39] Dong-Sung Cho is the President of the Institute of Industrial Policy Studies (IPS) based in Seoul, Korea. This Institute has been publishing its annual *IPS National Competitiveness Research Report* since 2001. For more detail, see http://www.ips.or.kr/site/IPS_english/research/develop_03.aspx.

uncompetitive as a whole. Here is another related issue. Sometimes, people debate whether firm ownership matters for national competitiveness, namely, does it matter to national competitiveness if firms within a country are owned by the country's own people or by foreigners? This is a legitimate question yet a complex one. Different people may have different answers. I would argue there is no context-free answer and it will depend on the specific national circumstances. To avoid complicating the research, I will choose the nation as the level of analysis and not to touch firm-level issues like the ownership question.

3.6 The issue of data sources

The final methodological issue is about data source and how to collect data. As I explained above that I will not attempt to develop an international competitiveness index, so there is no need for me to follow the executive survey method used by the WEF and IMD to collect 'soft' data (i.e., subjective opinion data). Instead, I will solely rely on hard (i.e., statistical) data in the present research about China's national competitiveness. The three major sources of hard data include China's statistical yearbooks, the official websites of China's governmental departments and agencies, and scholarly publications of China studies.

To use Chinese statistical data, there then is a data reliability issue to address first because some people since 1990s have doubted the accuracy of China's economic statistics released by Chinese government (e.g., Keidel, 1992, 2001; Maddison, 1997; Sinton, 2001; Rawski and Xiao, 2001; Rawski, 2001; Wang and Meng, 2001; Iritani, 2006; Lin, 2006; Song, 2007; Xu and Ljungwall, 2008).

There are two opposite views, namely, some people suspect Chinese data might be over-reported while others see them under-reported. The over-reporting view is represented by American economist Thomas Rawski (2001). Rawski organized a roundtable discussion on Chinese economic statistics in 2001 and out of this conference several articles were published in China Economic Review (Rawski and Xiao, 2001). The majority of those published articles view Chinese official statistics problematic, except only one plain defensive voice made by someone from China's National Bureau of Statistics (Zheng, 2001). Rawski (2001) speculates that 'cumulative GDP growth during 1997/2001 was no more than one-third of official claims, and possibly much smaller' as he argues that 'official Chinese statistics contain major exaggerations of real output growth beginning in 1998. The standard data contain numerous inconsistencies. Chinese commentaries castigate widespread falsification at lower levels and question the authenticity of figures emanating from the central statistical authorities'. Rawski points out that while the official data shows that Chinese GDP grew by 24.7% between 1997 and 2000, the energy consumption dropped by 12.8% during the same time period and 'the implied reduction of 30% in unit energy consumption over 3 years seems implausible, despite the rapid growth of computer manufacture and other activities with low unit energy consumption' (Rawski, 2001: 348).

There was a consensus among those critics, which to some degree shared by Chinese scholars as well, namely, there are mainly two reasons causing the statistical problems, one being the declining capacity for accurate measurement on the part of statistical bureaus, and the other being the political pressures to distort information passed up (Rawski and Xiao, 2001: 299).

For the first reason, there are two major reasons attributive to the declining capacity of Chinese statistic authority. On the one hand, with the transformation of Chinese economy from a centrally planned to a market economy, Chinese statistic authority has also switched from the old Soviet-style statistical method of Material Production System (MPS) to the System of national Accounts

(SNA)[40] widely used in the West. However, China's efforts to install a system of sample survey to replace the traditional method of universal reporting have developed slowly. The central statistic bureau has to depend on reporting from lower level branches', reducing its ability to verify data independently (Sinton, 2001: 381). Rapid changes in Chinese economic structure, i.e., the shrinking of state-owned sector and the expansion of the private sector means the portion of economic activity within the control of government has shrunk and therefore Chinese statistical authority's ability to gather data was affected, gradually eroding the accuracy of statistics (Sinton, 2001: 378). On the other hand, Chinese statistical bureaus are understaffed and underfunded. In China, during several rounds of administrative reform, the goal has been to 'reduce staff and increase efficiency'. In 1998 as a result of the State Council administrative reform, the central statistical bureau was cut its 47% staff (Rawski and Xiao, 2001: 299).

For the second reason that there is political pressure for distortion of statistics, Wang and Meng (2001) offer a historical account of China's falsification of statistics. During the 'Great Leap Forward' movement in 1958 – 1960, there was massive falsification when local leaders wanted to please Chairman Mao, but this was corrected in 1962 when Mao stepped down from managing economy. During the Cultural Revolution from 1966 to 1976, the statistical work was suspended. In 1980s after Deng started the economic reform, there was a debate about whether the reform is 'capitalist or socialist'. Due to the policy uncertainty caused by the debate, the local governments had less incentive to over-report the growth of the non-state economy despite the fact that the non-state economy did grow fast. In 1990, Deng made clear that he was concerned the slowing down of economic growth, which urged him to make his famous 'Southern Tour' in 1992 and once again to emphasize the political importance of economic growth. Since then, Chinese leaders at the central and local levels became firmly pro-reform. Under the refueled economic reform, the performance of GDP growth was adopted as a key criterion for the evaluation of local government officials. Therefore there are strong incentives in the local governments for over-reporting economic growth by inflating the GDP figures. In 1998, in the aftermath of the 1997 Asian financial crisis, Chinese government for the first time announced the 'striving for 8% GDP growth target', the 'wind of falsification and embellishment' has since then flourished, which was once recognized and criticized by former Chinese Premier Zhu Rongji. On 28 January 2010, China's National Bureau of Statistics (NBS) made public that the sum of provincial GDP data is 9.9% larger than the national GDP figure for the year of 2009. However, the year of 2009 is not the only year this discrepancy occurred, in fact, since 2004, this has been a norm rather than an exception. This may further strengthen the perception that Chinese official statistics are not reliable.

On the contrary, there are scholars who argue that the Chinese GDP data is underestimated rather than overestimated (Song, 2007; Xu and Ljungwall, 2008). The main argument is that the service and informal economy are seriously underreported in China. In China, there are all kinds of informal economic activities such as hourly paid domestic service which are not taxed and therefore not reported. Also, in China there is a cultural tradition to have baby nursing done home rather than sending them to commercial nurseries, therefore, much of the hidden economy is not added to the GDP. In addition, in China, there is big underground gambling industry, which is not reported.

From above analysis, we may have an impression that the official statistical data, especially the GDP and GDP growth rate, are not accurate and there are political pressure and incentives in China for manipulating the data and the data may often be over-reported. However, on the other hand,

[40] From 1952 to 1984, China only used the MPS. From 1984 to 1992, China used both MPS and SNA in parallel, which reflects China's dual-track reform thinking. From 1992 onwards, China primarily used the SNA and the MPS gradually was phased out (Xu and Ljungwall, 2008:99).

Chinese statistics may have missed out a fairly large portion of informal and underground economy. So, the over-reporting problem may be fairly cancelled out by the under-reporting problem. Although it is extremely difficult to judge how accurate the Chinese statistics are, but we may have to trust, what Marton (2000) says, that Chinese data are 'fairly reliable'. In addition, it is worth noting that, if we reject using Chinese official data, then we can still never be sure about the accuracy of the other sources of data that estimate Chinese economic performances from outside China. So, while I will mainly rely on Chinese official data, whenever it is possible, I will also refer to complementary information from international organizations and other scholarly analyses in order to provide a more accurate assessment.

Chapter 4: An integrative framework

4.1 Conceptualizing a multi-dimensional concept of competitiveness

In the literature review chapter, I have proposed to define *national competitiveness as a nation's ability to compete for making a high and rising standard of living for its people.* National competitiveness is then a relative term, relative to other countries as well as relative to its own past. The double criteria for a competitive nation are good internal and external performances. The internal performance here refers to high productivity, i.e., total factor productivity, while the external performance here refers to good export performance, in terms of a combination of indicators including export volume, export structure, the real value added by the nation in the export, and the terms of trade. It is worth noting that trade surplus is not necessary for two reasons. For one, as long as a nation does not run into balance of payment difficulty, its trade deficit can be financed by its capital account surplus. This is why the US has been one of the most competitive nation even if it has had a trade deficit since 1976[41]. For another, it is possible to increase trade surplus without any substantial improvement in export, e.g., reducing import while maintaining export level.

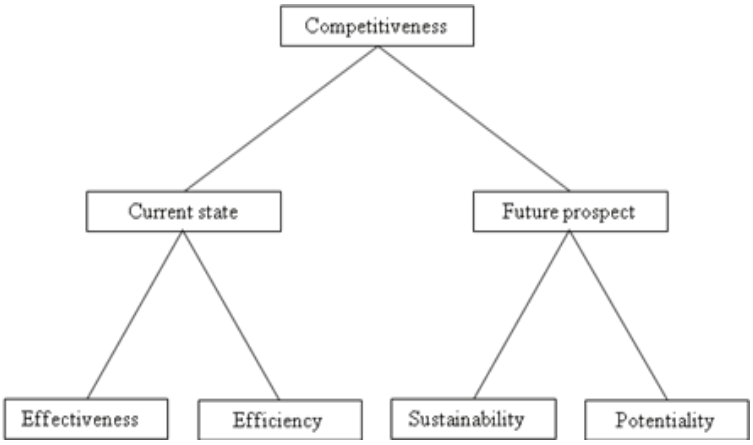
I assume, competitiveness, i.e., an agent's ability to compete in the simplest sense, can be described by its current state and future prospect. The current state can be further described by two dimensions: the agent's effectiveness and efficiency of achieving the competitive goals. Likewise, the future prospect can be further described by its sustainability of current state and potentiality of improving on current state[42] (see Figure 4.1). This four-dimensional conception of competitiveness is also applicable to national economy[43] since I argue nations do compete. Before I discuss these four dimensions of national competitiveness in a more academic way, let me first use an analogy of running a race to illustrate it.

[41] Data source: http://www.invisibleheart.com/Iheart/TradeDeficitJobs.pdf

[42] Masatoshi Fujiwara, a visiting scholar at my research centre from Kyoto Sangyo University, pointed out that there are similarities between the two dimensions of the current state and the two of the future prospect, namely, the sustainability is similar to the future effectiveness while the potentiality is similar to the future efficiency. This similarity view is interesting although I argue there are still differences between them, namely, sustainability dimension is about whether current state (both current effectiveness and efficiency) can be sustained, while potentiality dimension is about whether current state (both current effectiveness and efficiency) can be improved.

[43] In the European Commission's (2010: 3) policy document 'An Integrated Industrial Policy for the Globalisation Era', it is pointed out that to achieve a competitive industrial Europe, it is essential for the EU economy to transit to a low carbon resource- and energy-efficient economy, to restore health and sustainability, to increase productivity in manufacturing industry and associated services to underpin the recovery of growth and jobs, and to refocus attention on the central importance of manufacturing for the competitiveness and job-creation potential. Such argument reflects the four dimensions of national competitiveness I proposed here although the authors of the document did not put them in the way as I do.

Figure 4.1 The four dimensions of competitiveness

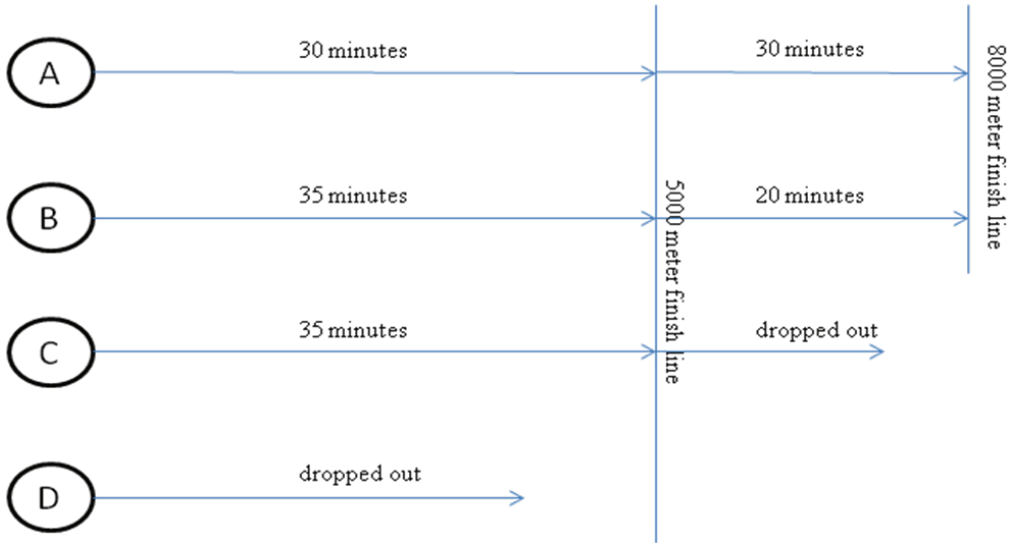


There is a 5000-meter race competition with 4 contestants (see Figure 4.2 for visual representation). The goals of all contestants are the same, namely, to reach the finish line as fast as possible. During this race, A, B, and C completed the 5000 meter while D dropped out before the finishing line. Obviously, D is not effective because he has not achieved the goal. By the same token, A, B and C are effective. So, D is less effective (and competitive) than A, B and C. Since A, b and C are effective in the sense that all of them have achieved the goal, to judge who is more competitive, we compare their efficiencies to achieving that goal. Since A uses less time than B and C do to reach the 5000-meter finish line, we say that A is more efficient (and competitive) than B and C in the 5000-meter race. Since both used 35 minutes to finish the 5000 meter race, which means that B and C are equally effective and efficient. Then how should we judge who between B and C is more competitive? Then we need use the sustainability dimension to make the judgement.

So far, we have understood the relationship between the effectiveness and efficiency dimensions. Now let me explain the meanings of and differences between the sustainability and potentiality dimensions by using an analogy of four-people race competition. If we decide to extend the race from 5000 meter one to 8000 meter and A, B and C agree to continue the competition. Let's see what happens. During the first phase (i.e., the first 5000 meter), we see A is more competitive than B and C. We can treat that as the current state and what happens in the second phase of the extended 3000 meter as future prospect. If anyone of the three contestants drops out before reaching the 8000-meter finish line, it means he or she is not sustainable in the second phase. Obvious, C is less sustainable than A and B as he dropped out before the 8000 meter finishing line, which means C is less competitive than B. Since both A and B do not drop out, we can compare their efficiencies in the second phase. In the example we designed, B used less less time than A does in the second phase and as a result B outcompete A in the entire 8000 meter race. So, B is more competitive than A for the whole race. This is so due to the improvement of B's efficiency in the second phase. In other words, although B is less competitive than A in the current state (the first 5000 meter phase), B has more potential than A in the future (the second 3000 meter phase).

What this race analogy tells us is that when assessing the competitiveness of an agent, we should not only see its current state but also consider its future prospect, and for each of these two aspects, we should also look at it from two sub-aspects: the effectiveness and efficiency for the former, and the sustainability and potentiality for the latter. In doing so, we can have a more dynamic and holistic assessment, which is better than any unbalanced and general view.

Figure 4.2 An analogy of racing for comparing competitiveness



4.2 The four dimensions of national competitiveness

In the literature there exist some multi-dimensional types of definitions of competitiveness, some of which are intended for firm competitiveness. For example, Buckley, Passa, and Prescott (1988) argue that competitiveness include both efficiency and effectiveness. They refer efficiency as reaching goals at the lowest possible cost while effectiveness as having the right goals. The European Management Forum (1984) defines competitiveness as the immediate and future ability. In the literature review chapter, I have argued that the concept of competitiveness can be applied to any level (Cho, 1998) if we adopt a portfolio view, i.e., any higher level entity is a portfolio of the lower level entities. At the national level, this four-dimensional conception of competitiveness is still applicable. For instance, the case of China confirms this multifacetedness of national competitiveness. When debating about China's economic performance and competitiveness, different people make very different assessments. The various assessments are often competing and contradictory. They often have reasonable points. However, in isolation, each of them seems to be somewhat biased and not holistic. I posit if we adopt a multi-dimensional conception to the debate, then we can better reconcile the contradictory views.

The notion of effectiveness has been examined extensively in the organization studies field[44] and ordinarily referred to goal attainment (Georgopoulos and Tannenbaum, 1957). Steers (1975) traces the study of organizational effectiveness to Thorndike (1949) who first noted a general trend among personnel and industrial psychologists to measure effectiveness in terms of the attainment of some 'ultimate criteria' such as productivity, net profit, mission accomplishment, or organizational growth and stability. Georgopoulos and Tannenbaum (1957) argue that the study of organizational effectiveness must pay attention to the question of organizational means and ends. Hatry (1978) points out that effectiveness encompasses the aspects of quality and level. Although the concept of effectiveness is easy to understand, there are measurement problems as Steers (1975) has analyzed. One difficult is to decide what kind of goals to use against which the organizational effectiveness can be evaluated. Steers (1975: 555) suggests attempts to measure effectiveness should be made

[44] The concept of effectiveness is also used in many other disciplines such as mathematics, physics, medical science, and human-computer interaction. See http://en.wikipedia.org/wiki/Effectiveness_(disambiguation)

with reference to the operative goals which are flexible enough to account for diversity in goal preferences, instead of the static official goals discussed by Yuchtman and Seashore (1967). Although effectiveness is not normally applied to national level, I argue it is appropriate to talk about national effectiveness since a nation has also some ultimate criteria for success, such as economic growth, export expansion, and rising living standard. In a sense, a nation can be viewed as a big organization within the world of nations.

The clear distinction between effectiveness and efficiency as different performance domains has long been made in organizational studies (Burkhead and Hennigan, 1978; Hatry, 1978; Ostroff and Schmitt, 1993; Pennings & Goodman, 1977). This effectiveness vs. efficiency contrast brings our attention to the distinction between spurious competitiveness and authentic or systemic competitiveness [45] made by Fernando Fajnzylber (1988). According to him, spurious competitiveness is based on application of low wages, over operation of the natural resources, or application of state subsidies and/or tariff protection, among others. In contrast, authentic competitiveness is based on a sustainable approach relying on the incorporation of technology, innovation, the extension of the enterprise base, the improvement of manual labor, and the establishment of relations that promote cooperation between the government and the enterprise sector (cited in Alvarado, Molina, Ac Bol, 2008:376). I argue, high effectiveness without high efficiency is the characteristic of spurious competitiveness while high effectiveness with high efficiency is that of authentic competitiveness. Likewise, good external performance (such as increasing world market share or trade surplus) without high or rising living standard is spurious competitiveness, and good external performance with high or rising living standard is authentic competitiveness.

While organizational effectiveness and efficiency are important issues in organizational studies, at the core of economics is the concept of economic efficiency[46]. In his seminal work, Farrell (1957) makes a distinction between technical efficiency and price efficiency. Technical efficiency, also known as productive efficiency, occurs when the economy is utilizing all of its resources efficiently, producing most output from least input. Price efficiency, now better known as allocative efficiency, refers to an economic state in which resources are allocated in a way that allows the maximum possible net benefit from their use.

Both technical and allocative efficiencies are essentially theoretical states that can be approached but never reached. In reality, all firms, industries and economies are operating with certain degree of inefficiency. Therefore, a Pareto improvement (Pareto, 1906) can be achieved when taking an action in an economy helps at least one person without harming anyone else. In real-world economics, Pareto efficiency is treated as a subset of the Kaldor-Hicks efficiency (Hicks, 1939; Kaldor, 1939), under which an outcome is considered more efficient if a Pareto optimal outcome

[45] Lall (2001b: 4) also made a distinction between what he called 'genuine competitiveness' and what is not. According to him, improved short-term performance in manufactured exports based on the exploitation of a static advantage like cheap unskilled labour may not be regarded as 'real' improvement in competitiveness, and being a static low-wage exporter of simple products would not be considered genuine competitiveness. Hämäläinen (2003: 6) also argues we must distinguish between a competitive advantage that is based on non-price factors (such as quality, speed, design, color, taste, performance etc.) and that which is price- and cost-dependent. He terms the former competitive advantage as 'real' competitiveness.

[46] The concept of efficiency is also used in other disciplines such as physics, theradynamics, statistics, and computer science.

can be reached in theory[47] by arranging sufficient compensation from those that are made better off to those that are made worse off so that all would end up no worse off than before.

In emphasizing the allocative function of prices and markets, traditional microeconomic theory has ignored the allocation of resources within firms with an implicit assumption that firms are always internally efficient and cost minimizers (Frantz, 1998). In a influential paper, Leibenstein (1966) argues that there is a type of non-allocative efficiency, which he terms as X-efficiency[48], important to economic growth. The X-inefficiency of a firm is all of the operationally effective phenomena that limit the achievement of technical efficiency (Potts, 2006), which is mainly caused by lack of motivation or incentive for people and organizations to work either as hard or as effectively as they could. Leibenstein (1966, 1976, 1978, 1979) repeatedly explained the X-efficiency theory and argues that in many situations the welfare gains by increasing allocative efficiency are trivial while those due to increasing X-efficiency are frequently significant. Although not without criticisms (e.g., Stigler, 1976), empirical studies have supported this theory (e.g., Frantz, 1992, 1998; Shelton, 1967).

The notion of sustainability has been used more in the sense of human sustainability on planet Earth since 1980s. The most widely quoted definition of sustainability is given by the World Commission on Environment and Development of the United Nations on 20 March 1987, which refers sustainable development to one that 'meets the needs of the present without compromising the ability of future generations to meet their own needs' (UNGA, 1987). At the 2005 World Summit it was noted that sustainable development requires the reconciliation of environmental, social and economic demands, which are the 'three pillars' of sustainability. Here in the present study, the sustainability dimension is related to but broader than the common usage of sustainability. It concerns any factors challenging to the maintenance of current state of national competitiveness, e.g., the structural problems of the economy, i.e., internal and external imbalances, the environmental constraints, i.e., environmental pollutions and ecological destruction, and natural resource constraints, the social constraints, domestic and international, and demographic constraints such as aging population and shortage of labor supply. Why the sustainability dimension is important? This is because in a competition, if one's (including the leader) competitiveness is unsustainable, then he/she may slow down and be overtaken by his/her followers.

The notion of potentiality might be first discussed extensively by Aristotle in his *Physics, Metaphysics, Ethics*. Aristotle used potentiality and actuality as a dichotomy to analyze motion, by which he understands any kind of change. Aristotle defines motion as the actuality of a potentiality, which seems to involve a contradiction. However, some commentators on the works of Aristotle, such as St. Thomas Aquinas, claim that this is the only way to define motion (Joe Sachs, 2005). In this context, the concept of potentiality generally refers to *any* possibility that a thing can be said to have. This is a very broad conception of potentiality. We can categorize such 'any possibility' into two broad types, one being something possible but less likely to happen while the other being possible and likely to happen in short and medium term. For the first type of potential, we can say, the worse one's current situation is, the more potential one has to improve his situation in the long run. For the second type, we can say, the more preparation efforts one makes, the more potential one has to improve his situation in the short and medium term. In this PhD research, I focus on the second type of potentiality, i.e., a country's potential for improving on its current state of national competitiveness which is *likely* to happen in the short and medium term.

[47] Kaldor–Hicks improvement does not require compensation actually be paid as long as the possibility for compensation exists. Thus, under Kaldor–Hicks efficiency, a more efficient outcome can in fact leave some people worse off if the theoretical compensation is not carried out.

[48] X-efficiency is similar to what Andrews (1949) calls 'managerial efficiency' (Potts, 2006)

In the context of national competitiveness, I define potentiality in a specific way. The potentiality dimension of national competitiveness examines (or is defined as) the *potential* for improving on the current competitiveness. In a competition, if one is a follower, the potentiality examines his potential for catching up the leader. If one is the leader, then the potentiality examines his potential for forging ahead and leaving his/her followers further behind.

4.3 Measuring the four dimensions of national competitiveness

Then, how do we measure national competitiveness? With this four-dimension model in mind, it is natural to say that we should avoid attempting to use any single measurement to measure national competitiveness and even for each of these four dimensions. Each dimension may be better described by a set of measures or indicators. This means it is difficult and even impossible to rank order different countries in terms of *overall* national competitiveness[49]. Obviously, if a country is measured better than another country in all aspects, then it is surely correct to say the former is more competitive than the latter. In contrast, if a country is scored higher than another country in only one or more but not all aspects, then it is difficult to give a precisely overall assessment whether the former is more competitive than the latter. Similarly, it is difficult to say whether a country is competitive or not overall because we have to simultaneously consider all aspects that may present different images of the country, and therefore, different people may have different judgments. This is precisely so in the case of China's national competitiveness. Let me now discuss the measurements for each dimension.

4.3.1 Measuring effectiveness

For the effectiveness dimension, as we have defined effectiveness as the extent to which the agent has realized its goals, we have to be clear about what goals we should choose to evaluate? Since every country might have many various economic goals, we have to narrow down to some common goals which allows for international comparison. In standard economics, there are four macroeconomic objectives: high but sustainable growth, full employment, price stability, and keeping the balance of payments in equilibrium[50]. China has officially adopted these four objectives as its principal goals of macroeconomic management in 2002[51]. So, using these four macroeconomic objectives as criteria to evaluate the effectiveness of a nation is justifiable and appropriate for the case study. Accordingly, the measurements can include: GDP growth, employment growth, consumer price index (CPI), trade surplus, inward FDI and foreign reserves, among others.

4.3.2 Measuring efficiency

At the micro, i.e., the firm level, economists have developed sophisticated techniques to measure the efficiencies of economic activities. While measuring technical efficiency requires quantitative volume data of inputs and outputs only[52], price information is also necessary for measuring allocative efficiency. Some early studies on price/allocative efficiency in agriculture include Schultz

[49] This is why this research does not attempt to rank China among other countries, but instead tries to do an in-depth single-case study analyzing China's national competitiveness.

[50] For example, the US Full Employment and Balanced Growth Act of 1978 explicitly instructs the government to strive toward four ultimate goals: full employment, growth in production, price stability, and balance of trade and budget. Also see, http://www2.resbank.co.za/internet/Glossary.nsf/0/76b5b02d8d629ee442256b43002e0d97?OpenDocument

[51] China may have had different macroeconomic goals including some of these four standard objectives. The first official document in which these four objectives are grouped together and said as the major goals of China's macroeconomic management is Jiang Zemin's Report to the Sixteenth National Congress of Chinese Communist Party on 8 November 2002.

[52] An alternative activity approach to measuring technical efficiency was provided by Koopmans (1951).

(1964), Hopper (1965), Yotopoulos (1967, 1968) and Dillon (1971). Farrell (1957) points out the difficulty of obtaining the prices information accurately enough to make good use of economic efficiency measurement[53]. Some scholars, like Charnes, Cooper, and Rhodes (1978), cite this concern as a motivation for emphasizing technical efficiency measurement. There are three main methods for measuring technical efficiency: Data Envelopment Analysis (DEA) pioneered by Charnes, Cooper & Rhodes (1978), Stochastic Frontier Analysis (SFA)[54] simultaneously introduced by Aigner, Lovell and Schmidt (1977) and Meeusen and Van den Broeck (1977), and index number methods originated by Malmquist (1953) based on the famous Konus (1924) index[55].

However, technical efficiency is not a particularly good approximation for overall economic efficiency as it does not utilize any price information whatsoever (Kuosmanen and Post, 2001). Therefore, there have been many efforts to find ways to combine technical and allocative efficiency together. Lau and Yotopoulos (1971, 1972) are early attempts. Kopp (1981) generalizes the Farrell indexes of productive efficiency to nonhomothetic production technologies with maintaining the cost interpretation of the Farrell measures. Kalirajan (1990) considers a system consisting of a production frontier and factor share equations to measure firm-specific technical efficiency and input-specific allocative efficiency simutenously, given the technology and prices. Kalirajan and Huang (1996) point out that one solution to measuring economic efficiency when there is uncertainty about the reliability of the price data is to model the production process in a homothetic form which is more general than the homogeneous form and to examine the returns to scale in production. Another solution is provided by Kuosmanen and Post (2001) who design a measurement that extends the classic Farrell's theoretical framework to include incomplete price information available.

The problem of measuring economic efficiency of an industry or entire economy is important to both economic theorists and economic policy makers. For economic theorists, they need some accurate measurements of efficiency in order to empirically test the theoretical arguments as to the relative efficiency of different economic systems. For economic policy planners, they need some actual measurements in order to make international comparison; they also need reliable measurement of industry efficiency if economic planning is to concern itself with particular industries (Farrell, 1957).

At the macro, i.e., national, level, economists normally measure the macroeconomic efficiency by calculating national productivities. For an economic production to operate there must be input factors that are to be used for producing outputs. Such input factors include human labor, capital (in the forms of cash and productive equipments), natural resources (in the forms of materials, energies, and lands) and knowledge (in the forms of technology and know-how). For each input factor, we can talk about its productivity (or technical efficiency of use) by dividing the total final outputs with the total amount of that input factor, i.e., calculating the final output per unit of that input. While the productivities of labor, capital, and natural resources are calculated, it is almost impossible to calculate the productivity of knowledge due to the difficulty of quantifying knowledge input.

Yet, since it is possible in the production process that one input factor might be substituted by another, for instance, labor and capital can be mutually substituted, i.e., machineries can be used in order to save labor or labors can be used to cut the costs of expensive machinery, so, both labor

[53] The reason why these early studies on allocative efficiency are all about agriculture might be the relative simplicity of agricultural products and their inputs therefore it is easier to handle the price estimation for the inputs and outputs.
[54] Frontier production function analysis was pioneered by Aigner and Chu (1968) who introduce a liner programming method. Afriat (1972) originated a non-stochastic frontier production analysis.
[55] The common indexes include Törnqvist index (Törnqvist, 1936) and Fisher index (Fisher and Shell, 1972).

productivity and capital productivity are partial productivity measures, each of which can give distorted information about the real level and growth of productivity of labor or capital. To mitigate this problem, economists also calculate the comprehensive/overall productivity of multiple factors combined, which is called multiple factor productivity (MFP), or total factor productivity (TFP) when *all* input factors are considered[56]. The level of MFP/TFP can be calculated by dividing the index of total output by the index of multiple/total inputs combined. Mawson, Carlaw and McLellan (2003) point out that, as MFP/TFP levels are sensitive to the measurement of inputs and outputs, they are rarely of primary interest. Rather, the measurement of TFP growth is of primary interest.

Besides these technical efficiency measures, we should also discuss the allocative efficiency of use of each of the three resources and all of them combined. I will discuss this issue in more detail in chapter six (the Efficiency dimension).

4.3.3 Assessing sustainability

While it is possible to measure the effectiveness and efficiency in a more or less quantitative/precise way, it is impossible to quantitatively measure the sustainability and potentiality dimensions. Our assessments on a national economy's sustainability and potentiality are inevitably predictive or speculative. Borrowing from the 'three pillars' idea of the sustainability research, I argue we can also analyze a national economy's sustainability from the three aspects: economic, environmental, and social aspects. The economic aspect examines whether there are structural problems in the economy, i.e., any internal and external imbalances. The environmental aspect examines whether there are any environmental challenges facing the economy, such as pollution and degradation and resource bottlenecks. The social aspect examines whether there are any social constraints domestically and internationally. Domestic social tensions may be caused by widening income disparity and political suppression. International social tensions may be caused by trade frictions and geopolitical competitions. In addition to the 'three pillars', I argue, we should also look at the demographic side in assessing the sustainability of an economy's competitiveness. Obviously, an aging population and shortage of labor supply will pose sustainability challenge to an economy.

4.3.4 Assessing potentiality

The potentiality dimension may be examined from a growth theory perspective, i.e., the potential for sustainable economic growth. According to growth theory literature, there are four sources of growth, (1) capital deepening (Domar, 1946; Harrod, 1948; Solow, 1956), (2) technological progress (Solow, 1956, 1957; Romer, 1986, 1990), (3) institutional improvement (Schultz, 1968; North and Thomas, 1973; North, 1981, 1990; Acemoglu, Johnson and Robinson, 2005), and (4) entrepreneurship (Schumpeter, 1912/1934, 1942; Baumol, 1990, 2008, 2010). But, as I will make a detailed argument in Chapter 8, potentiality can be understood as a country's potential for catching up the leading countries (for developing countries) or potential for forging ahead and leaving the following countries further behind (for developed leading countries). And I will argue in Chapter 8, we can adopt a technological capability approach to such a catching-up or forging-ahead potentiality. Therefore, we may also examine the potentiality from a technological capability perspective, an approach I adopt in the current research, by looking into the four factors contributing to technological capability improvement, i.e., human capital deepening, institutional improvement, national innovation system, and entrepreneurship.

Therefore, we can examine the potentiality of national competitiveness by looking into these four aspects of an economy, first, the potential for further capital investment causing capital deepening

[56] Diewert and Lawrence (1999) point out that the concept of total factor productivity was introduced into the economics literature by Tinbergen (1942) and Stigler (1947).

and widening; second, the potential for technological advancement which improves factor productivity, i.e., investments in education, science and technology, and research and development (R&D), and the establishment of a national innovation system; third, the potential for institutional improvement which reduces X-inefficiency and improve allocative efficiency as well as effectiveness, and fourth, the potential for more entrepreneurship, replicative and innovative (Baumol, 2008:3), which may cause increasing return to scale. Table 4.1 summarizes the possible measures and indicators for assessing national competitiveness discussed above.

Table 4.1 Measures and indicators of national competitiveness

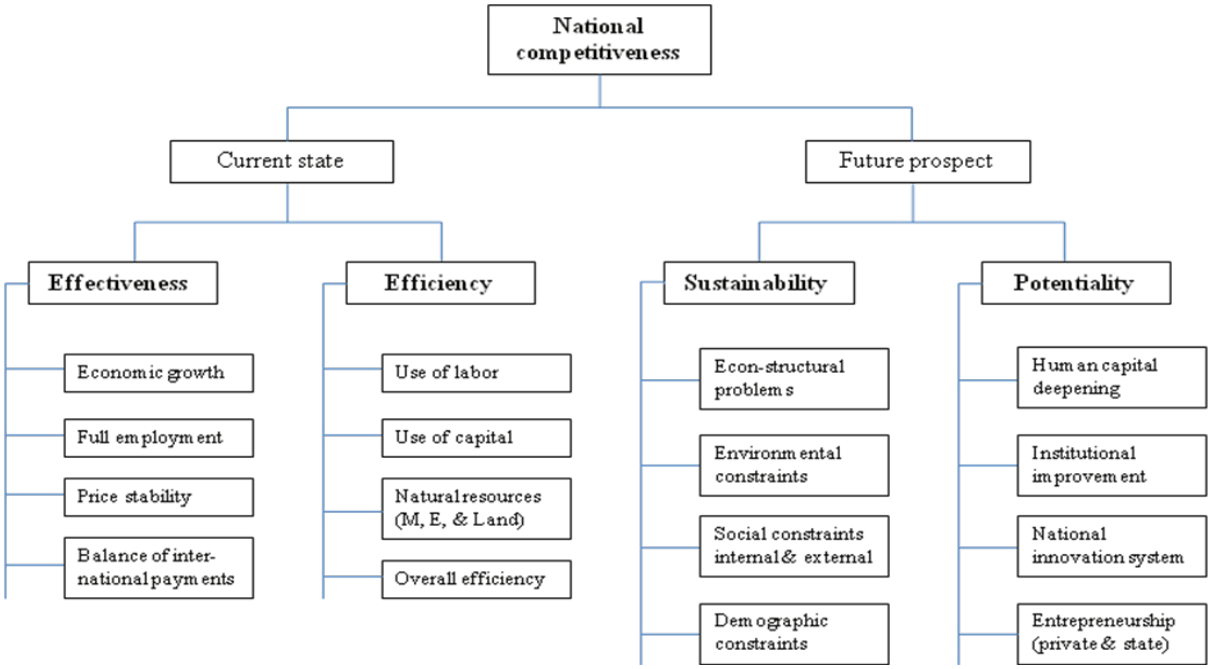
Some measures		Some indicators	
Effectiveness	Efficiency	Sustainability	Potentiality
Economic growth • GDP growth • GDP per capita growth	Labor efficiency • Labor productivity, i.e., GDP per person employed, or, GDP per hour worked • Labor wage level	Economic constraints Structural imbalances: • Internal imbalances • External imbalances	Human Capital deepening • Educational investment • Learning by doing
Full employment • Employment growth • Unemployment	Capital efficiency • Return on capital investment • Profitability • Capital productivity • ICOR / MPK • Non-performing loans (NPL) ratio	Environmental constraints • Pollutions • Ecological degradations • Resource bottleneck • Energy constraints • Water shortage	Institutional improvement • Reducing X-inefficiency of SOEs • Promotion of private economy • Social security system reform • Government bureaucracy reform • Other institutional reforms
Price stability • Consumer price index (CPI) • Purchasing managers index (PMI)	Natural resources efficiency • Material efficiency • Energy efficiency or energy intensity • Land efficiency	Social constraints Domestic social tension • Income disparity • Social injustice • Corruption, International relations frictions • Trade friction • Ban on high-tech exports • Containment	National innovation system (NIS) • Science and technology system • Universities • Research institutions • Business enterprises • Collaboration between the three key performers
Balance of payments • Trade balance • Inward FDI	Overall efficiency • Total factor productivity • Terms of trade	Demographic constraints • Aging population • Shortage of labor	Entrepreneurship (state-market partnership) • Promotion of private entrepreneurship

• Outward FDI • Foreign reserve		supply • Inefficient Social security system	• State entrepreneurship: industrial policies, provision of patient capital, basic research, high-risk and significant projects

4.4 An integrative framework of national competitiveness

Based on the analysis above, I propose an integrative framework for doing national competitiveness analysis (see Figure 4.3). I will then use this framework to analyze the case of China in the following four chapters. Through Chapter 5 to Chapter 8, I will discuss each of the four dimensions in a separate chapter one by one. While Chapter 5 (on effectiveness dimension), Chapter 6 (on efficiency dimension), and Chapter 7 (on sustainability dimension) will be mainly based on empirical data, the Chapter 8 will be more of theoretical than empirical nature because I try to propose a theoretical framework for a country's potential for improving its national competitiveness. The final Chapter 9 is the discussion and conclusion chapter, in which I will discuss China's overall national competitiveness and whether the rise of China is an opportunity or threat to the rest of the world. I will also discuss the contributions and limitations of this PhD research and therefore make some suggestions for future research.

Figure 4.3 An integrative framework of national competitiveness



Chapter 5: The effectiveness dimension

In this chapter, I will analyze China's effectiveness in achieving each of the four macroeconomic goals one by one, i.e., maintaining high economic growth, creating more employment, ensuring price stability, and pursuing balance of international payments.

5.1 Maintaining high economic growth

Maintaining high economic growth can be said to be the top economic goal of Chinese government since it started its reform and opening up policy in 1978. In the post-Mao era, when Deng Xiaoping came to power, the Chinese Communist Party (CCP) shifted its main focus from class struggle to economic construction. This policy shift came at a time when China was distantly left behind by its neighboring countries. Japan had become the world's second largest economy while South Korea, Taiwan, Hong Kong and Singapore, the four Tiger Economies, had well taken off. So there was a sharp contrast in economic performance between China and its East Asian neighbors. Such contrast not only made Chinese leaders embarrassing but also gave them a sense of urgency that it was imperative to improve Chinese economy as quick as possible because otherwise the Party might lose legitimacy of governing the country and Chinese people might reject its ruling. Maintaining high economic growth as a goal is justified as the CCP believes development is the only hard truth[57].

One way to evaluate China's effectiveness in maintaining high economic growth is to examine to what extent China has met the GDP growth targets set by its Five Year Plans and long term plans. Five year plan is a characteristic of the Soviet style planned economy. When the CCP came to power in 1949, China learned from the Soviet Union to make its own Five Year Plans. During Mao's time, China adopted five Five Year Plans in the period after 1953. The first Plan (1953-1957) was successfully implemented with the Soviet aid. Unfortunately, China under Mao's leadership went on to the Great Leap Forward in 1958, which caused disastrous Great Famine (1959-1961), which was followed by political struggles and ten year of Cultural Revolution (1966-1976). So, except the First Five Year Plan, the other four Plans have never been published. In the reform era after Mao's death, China has so far made six Five Year Plans starting from the year of1981. From Table 5.1 we can see, for all the six Plans, China has successfully met and over accomplished the GDP growth targets of all the first five Plans and is expected to over fulfill the target of the current Eleventh Five Year Plan (2006-2010) as well.

Table 5.1 The GDP growth targets set by China's Five Year Plans

	Average annual GDP growth during the five year period	
	target	realized
Sixth Plan (1981-1985)	4.0%	10.0%
Seventh Plan (1986-1990)	7.5%	7.8%
Eighth Plan (1991-1995)	6.0%	12.0%
Ninth Plan (1996-2000)	8.0%	8.3%
Tenth Plan (2001-2005)	7.0%	9.5%
Eleventh Plan (2006-2010)	7.5%	

Source: The official documents of the various Five Year Plans

[57] In his plenary speech at the World Economic Forum Annual Meeting of the New Champions 2010 in Tianjing, China's Premier Wen Jiabao said 'for a country like China with 1.3 billion people, without a certain rate of economic growth, full employment and people's well-being can only be empty talk'. See, http://www.gov.cn/english/2010-09/13/content_1701807.htm

Table 5.2 gives us more details on China's annual GDP growth in its reform era. From the Table, we can see, over the past three decades since 1979, Chinese economy has been growing very fast, with a 9.45% average annual growth rate (Fan, 2010), making the world's new record for high growth over an extended period. From 1979 to 1982, due to the abolishment of People's Commune system and installation of Household Responsibility Contract System (HRCS) in rural countryside, China's agricultural sector grew very fast. From 1983 to 1988 except the year of 1986, China gained double-digital GDP growth due to the development of township and village enterprises (TVEs), the first wave of foreign investment into China, and the start of state enterprise reforms with the introduction of the Contract Management Responsibility System (CMRS). In the summer of 1988, Chinese leaders, with the strong support of Deng Xiaoping, decided to push for a wholesale price reform aiming at liberalizing within 3-5 years the prices of commodities which were controlled by the state, but the planned reform caused panic buying and bank run once it was announced so that the government had to abandon the reform plan. This failed reform produced runaway inflation in the second half of 1988 and Chinese government braked the overheating economy to stabilize prices and contain inflation by cancelling large fixed investment projects and other measures. This 'hard landing' caused the economic growth to slow down severely in 1989. Moreover, the crackdown of the June Fourth Tiananmen pro-democracy student movement in 1989 cost China a high price: foreign investment fell off and international sanctions followed right after, and anti-reform policies were carried out after the conservative faction of the CCP gained more power. China's GDP growth rate fell to 4.1% and 3.8% in 1989 and 1990 but bounced back to 9.2% in 1991.

After Deng's Southern Tour in the Spring of 1992, Chinese leaders returned back to the line of reform and opening up. In October 1992, a new and clearer vision of CCP was formulated at the Party's Fourteenth Congress, according to which, the direction of the reform is to establish a socialist market economy in China (Cheng, 1994: 7). From 1992 to 1996, China once again harvested double digit annual growth before the break of 1997 Asian Financial Crisis. During the Crisis, Chinese government set an 8% annual GDP growth target and China has well met this target since then except the first two years when the growth rate was slightly below the target, 7.8% and 7.6% for 1998 and 1999 respectively. China's economic growth gained momentum from 2003 to 2007 during which China achieved double-digital growth until the break of 2008 Global Financial Crisis. To respond to the worst crisis after the Great Depression of 1930s, China once again set the target of 8% GDP growth rate and implemented a 4 trillion Chinese Yuan (CNY) fiscal stimulus package to battle the negative impact of global recession on Chinese economy. Whilst the US, the EU and Japan are yet to recover from the global recession, China has effectively maintained high growth, 9%, 9.1%, and 10.3% for 2008, 2009 and 2010 respectively.

Table 5.2 China's GDP growth 1979 – 2009 (billion CNY)

Year	GDP	Growth	Year	GDP	Growth	Year	GDP	Growth
1979	406.26	7.6%						
1980	454.56	7.8%	1990	1866.78	3.8%	2000	9921.46	8.4%
1981	489.16	5.2%	1991	2178.15	9.2%	2001	10965.52	8.3%
1982	532.34	9.1%	1992	2692.35	14.2%	2002	12033.27	9.1%
1983	596.27	10.9%	1993	3533.39	14.0%	2003	13582.28	10.0%
1984	720.81	15.2%	1994	4819.79	13.1%	2004	15987.83	10.1%
1985	901.60	13.5%	1995	6079.37	10.9%	2005	18321.74	10.4%

1986	1027.52	8.8%	1996	7117.66	10.0%	2006	21192.35	11.6%
1987	1205.86	11.6%	1997	7897.30	9.3%	2007	25730.56	13.0%
1988	1504.28	11.3%	1998	8440.23	7.8%	2008	30067.00	9.0%
1989	1699.23	4.1%	1999	8967.71	7.6%	2009	34050.70	9.1%

Data source: China Statistical Yearbook 2009; 2009 figure is from National Bureau of Statistics of China. Note: GDP figures are calculated at current prices while growth rate figures are calculated at constant prices with preceding year as the base year.

In early 1980s, Deng Xiaoping conceived a grand blueprint of China's modernization process which was later on officially adopted as China's long term strategy of economic and social development by the CCP's Thirteenth Congress[58] in 1987. According to this grand strategy, China will basically achieve the goal of modernization through three steps[59]: the first step is to double its GDP by 1990 from its 1980 level; the second step is to quadruple its GDP by 2000 from its 1980 level; and the third step is to quadruple its per capita GDP by 2030 at the earliest and 2050 at the latest from its 2000 level. In terms of per capita GDP, this means, based on China's 1980 level of per capita GDP (roughly 250 USD), China aims to reach a 500 USD per capita GDP by 1990, 1000 USD by 2000, and 4000 USD by 2030 at the earliest and 2050 at the latest, respectively. Deng and his colleagues seemed to be prudent when making these targets as Deng often reiterated that the later two steps in general and the third step in particular would be very tough to accomplish and Deng urged his fellow countrymen to work hard to pursue these goals.

The track record of China's economic development has shown that China has been very effective in achieving its strategic goals of the 'three step grand strategy'. According to China National Bureau of Statistic (NBS) , China's average annual per capita GDP growth rate was 8.6% for the period of 1979-2008[60]. Table 5.3 shows the details of China's per capita GDP growth from 1980 to 2009. According to *China Economic Growth Report 2010* [61], in 1987, China's GDP at constant prices was 2.04 times of its 1980 level, 3 years ahead of the goal of the 'first step'; in 1995, the figure was 4.33 times of that of 1980, 5 years ahead of the goal of the 'second step'; and in 2009, China's GDP was 15.54 times of its 1980 level[62] and its per capita GDP reached 3744 USD at nominal value[63] and 6770 USD in purchasing power parity (PPP) terms[64]. Now, China has overtaken Japan as the world's second largest economy[65]. As a result of the rapid growth, by the end of 2010, China will have achieved the goal of the 'third step' of the grand strategy. This means China would have realized the entire goals of its 'three step' long term plan 20-40 years ahead of initial expectation.

[58] See, http://news.xinhuanet.com/ziliao/2009-10/30/content_12361800.htm.
[59] In 1982, an earlier 'two step strategy' was officially adopted by the CCP's Twelfth Congress. The 1987 'three step strategy' is based on and an extension of the 'two step strategy'.
[60] See, http://www.stats.gov.cn/tjfx/ztfx/qzxzgcl60zn/t20090907_402584869.htm
[61] See, http://news.xinhuanet.com/politics/2010-05/09/c_1281470.htm
[62] See, http://news.xinhuanet.com/politics/2010-05/09/c_1281470.htm
[63] Data source: the World Bank. See, http://data.worldbank.org/indicator/NY.GDP.PCAP.CD
[64] Data source: the World Bank. See, http://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD
[65] http://www.bloomberg.com/news/2010-08-16/china-economy-passes-japan-s-in-second-quarter-capping-three-decade-rise.html

Table 5.3 China's per capita GDP growth 1980-2009 (CNY)

Year	GDP per capita	growth rate	Year	GDP per capita	growth rate	Year	GDP per capita	growth rate
1979	419	6.1%						
1980	463	6.5%	1990	1644	2.3%	2000	7858	7.6%
1981	492	3.9%	1991	1893	7.7%	2001	8622	7.5%
1982	528	7.5%	1992	2311	12.8%	2002	9398	8.4%
1983	583	9.3%	1993	2998	12.7%	2003	10542	9.3%
1984	695	13.7%	1994	4044	11.8%	2004	12336	9.4%
1985	858	11.9%	1995	5046	9.7%	2005	14053	9.8%
1986	963	7.2%	1996	5846	8.9%	2006	16165	11.0%
1987	1112	9.8%	1997	6420	8.2%	2007	19524	12.5%
1988	1366	9.5%	1998	6796	6.8%	2008	22698	8.4%
1989	1519	2.5%	1999	7159	6.7%	2009		

Data source: China Statistical Yearbook 2009. Note: GDP per capita figures are calculated at current prices while growth rate figures are calculated at constant prices with preceding year as the base year.

Why is China so effective in maintaining such high GDP growth since 1978? I identify three major reasons. The first reason is the pressures and incentives on the part of Chinese government officials for making high economic growth. Since the promotion of local officials is directly linked to GDP growth performance, there is a huge competitive pressure for Chinese officials at all levels to do their best to make local economy to grow if they want to outcompete other officials for promotion. This is why Chinese officials in charge of economic issues are very busy in attracting investments, domestic and foreign, because more investments produce more employments and generate more GDP. This is the good situation since doing so can bring real economic progress and prosperity to the people. Yet, the flip side of the story is that competition for attracting investments can bring three types of problems. The first is it can induce redundant investments across regions, which in turn can result in excess productive capacity and local protectionism. I will talk more about this in Chapter 6 on China's efficiency dimension. The second problem is that in order to make GDP grow, Chinese leaders at all levels are inclined to do the so-called 'image projects' or 'face projects', i.e., projects that seem like great but do not bring benefit to the people or do not make good return on investments. Chinese leaders like 'image projects' because those projects can not only generate GDP figures but also physically symbolize their achievements. This is why China builds big squares, wide roads, tall buildings, super speed magnetic suspension train, splendid theaters, and so on. The third problem caused by the competition for investment is the so-called 'race to the bottom', namely, When competition becomes fierce between nations (or regions within a nation) over investments, countries (or regions within the same country) are given increased incentive to loosen or dismantle currently existing regulatory standards, such as environment and labor rights protection regulations. In Chapter 7, I will return to this point when I analyze China's sustainability dimension.

There is another bad situation. If the real GDP growth does not meet the target, there is sufficient incentive for the local officials to over report the GDP figure. The accuracy of China's official GDP statistics was seriously doubted by some China study scholars like Thomas G. Rawski (2001) and Xiaolu Wang (1999). Although Chinese officials defended themselves (J.-P. Zheng, 2001), in reality the problems exist and persist. For example, the sum of China's 31 provincial GDP figures has always exceeded its central government statistic since 1985. In 2004, the difference was even 3

trillion CNY, accounting for a 19.3% of its national GDP. See Table 5.4 for more detail on the comparison of the provincial sum and the national figure.

Table 5.4 Comparison of Chinese GDP statistics: provincial versus national

	Sum of 31 provincial GDP figures	National GDP statistic figure	The gap between the two	The gap/national GDP ratio
1985				
2004			3 trillion CNY	19.3%
2005				
2006			0.8 trillion CNY	3.84%
2007			1.2 trillion CNY	5.1%
2008			2.6 trillion CNY	8.8%

Data source: Chinese news reports, available at: http://news.sina.com.cn/c/2010-01-29/030517010521s.shtml

The second reason why China is effective in maintaining high GDP growth is that China is in the process of urbanization and modernization which generates huge domestic demand and hence endogenous economic growth. From Table 5.5 we can see Chinese household ownerships of durable goods, like computers, cars, washing machines, and refrigerators, are still low, especially in the rural households, compared to the developed countries. Another demand of great potential is housing provision. China's average urban living space has increased from 8.6 square meters per person in 1985 to 23 square meters per person in 2008, while the rural counterpart figure has increased from 8.1 square meters in 1978 to 32.4 square meters in 2008[66]. Compared to average 30-45 square meter living space per person in advanced countries, Chinese people's demand for better housing is huge. Therefore, China's real estate industry has been booming and will continue to boom. Moreover, in China there is a big demand for more and better infrastructures, like high speed rail network, which will generate large GDP. To meet the domestic demands for durable goods, houses, and infrastructures, China's basic industry has grown rapidly. For example, China has become the world's largest cement- and steel-producing nation since 1985 and 1996 respectively. In 2009, China's crude steel output reached 568 million tones, which is 2.2 times of the sum of the outputs of the four countries that followed behind China, i.e., Japan, Russia, US, and India. China's produced 1.63 billion tones cement in 2009, an 16.43% increase from previous year. This is largely due to the 4 trillion fiscal stimulus package Chinese government quickly implemented after the break of the 2008 Global Financial Crisis.

The third reason why China can effectively maintain high GDP growth is that China has successfully grasped the opportunities created by economic globalization and the international relocation of productions to expand its manufactured exports to the world. To meet the vast external demands for cheaply made goods, China has effectively mobilized its vast surplus rural labors to work in labor-intensive assembly lines. Due to cheap labor cost, lax regulations on environment and labor rights protection, preferential tax incentives, good infrastructures and stable political environment, China stands out among the developing countries to have attracted a very large proportion of the global outsourced and offshored manufacturing jobs. Therefore, China is called as

[66] Data source: http://www.stats.gov.cn/tjfx/ztfx/qzxzgcl60zn/t20090910_402585849.htm

the world's assembly line. Now I turn to the next section to discuss how effective has China been in creating more employment.

Table 5.5 Durable goods ownership per 100 household

	Urban households		Rural households	
		2008		2008
Color TV	0.6 (1981)	132.9	0.39 (1980)	99.2
Washing machine	6.3 (1981)	94.7	1.9 (1985)	49.1
Refrigerator	0.2 (1981)	93.6	0.06 (1985)	30.2
Air conditioner	0.1 (1985)	100.3		
computer	5.9 (1999)	59.3		
Car	0.3 (1999)	8.8		
Motor bike			0.89 (1990)	52.5

Data source: China National Bureau of Statistics website, 7 September 2009, available at: http://www.stats.gov.cn/tjfx/ztfx/qzxzgcl60zn/t20090907_402584869.htm

5.2 Creating more employment

Creating more employment is China's second most important macroeconomic goal while some scholars even argue it should be treated as the first priority by the government. This is understandable because of China's huge population and hence the heavy pressure on China's leaders to meet the demand for employment opportunities.

According to China Labour Statistical Yearbooks, from 2000 to 2008, China's total population has increased from 1.267 billion to 1.328 billion, among which above-16 population has increased from 941 million to 1.058 billion, which means an average growth rate of 14.62 million per year. Among the increased above-16 population, 90% are economically active population (16-64 age range) who demand for employment. Due to China's rural-urban dual structure, urban citizens normally have higher demands for employment than rural population. For the same period, China's urban population has increased from 459 million to 607 million, among which above-16 population has increased 141 million, an average increase of 18 million per year (also see Y. Hu, 2009). Besides, China has a huge amount of rural surplus labors, a large number of which come to the urban cities to look for jobs every year. Those people are called migrant workers because while they migrate to cities for working their families normally stay in their hometowns and these migrant workers normally only go back to their hometowns for family reunion during the Chinese New Year holidays. According to China's National Bureau of Statistic (NBS)[67], there were 145.33 million migrant workers in 2009, an increase of 4.92 million from 2008. Moreover, due to the expansion of China's education, there are millions of students graduating from higher education institutions (HEIs) and secondary vocational schools (SVSs) who look for jobs as well. According to China Education Yearbook 2009, in 2008, China' HEI graduates include 43,759 doctoral students, 301,066 master's degree students and 2,256,783 bachelor degree and 2,862,715 college diploma students. There were in addition 5,806,595 students graduated from SVSs.

These data clearly show how heavy the employment pressure China's government shoulders. According to US's former President George W. Bush's memoir *Decision Point*, when asked what

[67] http://www.stats.gov.cn/tjfx/fxbg/t20100319_402628281.htm

kept him awake at night, China's President Hu Jintao's answer was how to create 25 million new jobs a year[68]. Then, how effective is China in creating more employment? According to China Labor Statistical Yearbook 2009, in 1978, China's population was 962.59 million among which 410.24 million were employed. By the end of 2009, China's population reached to 1334.74 million and employment rose to 779.95 million. This means since the reform and opening, while China's population has increased 372.15 million, China has created 369.71 million more employment, an average of 11.93 million increase per year.

This is a very impressive achievement. Yet China's employment growth distributes unevenly over the last 30 years since 1978, namely, China's employment grew rapidly up till 1990 and the growth slowed down afterwards. From Table 5.6 we can see, from 1978 to 1990, China's employment grew rapidly with an average 4.06% annual growth, i.e., an average 20.50 million more employment created per year; while the growth slowed down from 1991 to 2009 with an average 0.98% annual growth rate, i.e., 6.97 million more jobs created per year. From 1978 to 1990, China's total employment increased from 401.52 million to 647.49 million, meaning China created 245.97 million more employment in the first 12 years, accounting for 66.53% of the total employment creation over the entire period since its reform and opening up.

According to Okun's Law (Okun, 1962), economic growth will expand the scale and scope of economy therefore creating more employment opportunities. However, China's economic growth contradicts to the standard economic law. From Table 5.7 we can see, during China's Sixth Five-Year Period (1981-1985), China's average annual GDP growth rate was 10% while its employment growth rate was 3.32%; during its Seventh Five-Year Period (1986-1990), the GDP growth rate was slower than previous five year, but the employment growth rate was higher than before, at 5.36%. This was the golden time for China's employment growth. However, since 1991, while China has maintained a close to 10% annual GDP growth, the employment growth nevertheless slowed down clearly. In the Eighth Fiver-Year Period (1991-1995), China made an average 12% annual GDP growth, rising from previous period's 7.8%, but its employment growth rate dropped from previous period's 5.36% to 1%. For the next two five year periods (1996-2005), China's average annual GDP growth rates were 8.3% and 9.5%, while the employment growth rates kept roughly the same as that of the previous five-year period, 1.15% and 1.02% respectively. The current Eleventh Five Year Period (2006-2010) sees the slowest employment growth at an average annual growth rate at 0.57% while China has maintained a 10.69% average annual GDP growth. So, clearly, since 1991, while China has been very effective in maintaining high GDP growth, it has been very ineffective in creating more employment.

Table 5.6 China's employment growth

Period	Average annual employment growth	Average Annual growth rate
1978-1990	20.50 million	4.06%
1991-2009	6.97 million	0.98%

Source: the author's own calculation

[68] http://www.economist.com/node/17463207

Table 5.7 China's GDP growth versus employment growth

Period	Average annual GDP growth rate	Average annual employment growth rate
Sixth Plan (1981-1985)	10%	3.32%
Seventh Plan (1986-1990)	7.8%	5.36%
Eighth Plan (1991-1995)	12%	1.00%
Ninth Plan (1996-2000)	8.3%	1.15%
Tenth Plan (2001-2005)	9.5%	1.02%
Eleventh Plan (2006-2010)	10.69% (2006-2009)	0.57% (2006-2009)
1978-1990	About 8%	4.06%
1991-2009	About 10%	0.98%

Source: the official documents of China's various Five Year Plans; growth rates for the three periods of 1978-1990, 1991-2009, and 2006-2009 are author's own calculations.

To make the issue more complex, there is a rising unemployment problem in China since 1990s. According to China's official statistics (see Table 5.8), China's urban registered unemployment rate has been relatively low, less than 4.3% since 1981, if compared to the advanced countries. However, China's unemployment statistic is different from the international standard, i.e., the definition used by the International Labor Organization (ILO). Firstly, China's unemployment figure only covers those urban citizens whose have urban *hukou*[69] therefore unemployed migrant workers are not included even if they have lived in the cities for long time. Secondly, China's urban registered unemployment statistics only count those urban citizens who have registered as unemployed with the government's labor department. Many unemployed people may not bother to register when they become unemployed for different reasons. Thirdly, China's unemployment statistics only covers a narrower age range compared to the international standard, namely, China only count those unemployed males within the age range 16-50 and female within the age range 16-45.Therefore, China's official unemployment rate tends to underreport the real unemployment. Even so, we can still see that China's official unemployment rate has been rising since 1985 from 1.8% to 4.3% in 2009.

However, researches have shown that the real unemployment rate is much higher than the official figure. China since 1996 has been doing labor force survey which adopts ILO's definitions of employment and unemployment. Although such surveys can generate reliable and internationally comparable unemployment data, Chinese government has never published those survey results. Zhang (2003) points out that China's population census data can be a reliable source for calculating the real unemployment rate, but the population census is done every ten years. According to Cai and Wang (2003), China's fifth population census data published in 2002 show that China's real urban unemployment rate of the 15-64 age group was 8.3% in 2000. In contrast, China's official urban registered unemployment in 2000 was 3.1%. So, there was a 5.2% gap. Given the fact that there were 459.06 million urban citizens in 2000, then, a 5.2% unemployment rate gap means 14.70 million unemployed urban people were not reported by the official unemployment statistic in

[69] In China, there is a *hukou* system. A Chinese citizen is officially registered as either rural or urban *hukou*. Chinese government prioritizes urban citizens over rural citizens in many welfare areas based on their respective hukou registration. And this is why the Chinese government only publishes the urban registered unemployment rate statistics.

2000[70]. According to the surveys done by the Institute of Population and Labor Economics of Chinese Academy of Social Sciences (CASS), since September 1996 the respective unemployment rates of China's five major cities (Shenyang in the Northeast, Wuhan and Xi'an in the Middle and West, and Shanghai and Fuzhou in the Coastal East) have always been higher than 8% (Cai and Wang, 2003) and are continuously increasing.

Table 5.8 China's registered urban unemployment rate (million persons)

Year	Unemployed	rate	Year	Unemployed	rate	Year	Unemployed	rate
1980	5.415	4.9%	1990	3.832	2.5%	2000	5.950	3.1%
1981	4.395	3.8%	1991	3.522	2.3%	2001	6.810	3.6%
1982	3.794	3.2%	1992	3.639	2.3%	2002	7.700	4.0%
1983	2.714	2.3%	1993	4.201	2.6%	2003	8.000	4.3%
1984	2.357	1.9%	1994	4.764	2.8%	2004	8.270	4.2%
1985	2.385	1.8%	1995	5.196	2.9%	2005	8.390	4.2%
1986	2.644	2.0%	1996	5.528	3.0%	2006	8.470	4.1%
1987	2.766	2.0%	1997	5.768	3.1%	2007	8.300	4.0%
1988	2.962	2.0%	1998	5.710	3.1%	2008	8.860	4.2%
1989	3.779	2.6%	1999	5.750	3.1%	2009	9.210	4.3%

Source: China Labor Statistical Yearbook 2009; China National Bureau of Statistics website

Therefore, in China, there coexist high GDP growth, low employment growth, and high unemployment rate. In the words of Stephen Roach, Chairman of Morgan Stanley Asia, China's GDP growth comes at the sacrifice of employment growth[71]. How can we explain this? There are several reasons.

Firstly, let's look at the primary industry and the rural employment. From 1978 to 1990, there was 75.27 million urban employment increase and 170.70 million rural employment increase (see Table 5.9). Clearly, during this period, it is the rural employment increase that contributes most to (i.e., 69.40% of) the total employment increase while the urban employment increase accounts for 30.60%. However, the employment growth pattern changed dramatically since 1990. From 1990 onwards, the rural employment grew very slowly up till 1997 with a total increase of 13.31 million and then slowly decreased since then except the year of 2001. Over the 19 years, the rural employment has decreased 4.38 million while the urban employment has increased 131.69 million. This essentially means while rural employment increased dramatically in the early phase of the reform (i.e., before 1992), the rural sector of the Chinese economy has lost its ability to create more employment. There are at least three reasons for this. The first is that the labor productivity in the primary industry is relatively low compared to the secondary and tertiary industries. While the primary industry only accounts for 11.3% of national output in 2008, it hosts 39.6% of China's total employment (see Table 5.10 and Table 5.11). The second reason is the decline of the township and village enterprises (TVEs) since mid-1990s. TVEs played an important role in the early stage of China's economic reform in absorbing rural surplus labor and boosting rural labor productivity. From Table 5.12 we can see, TVE employment grew rapidly from 32.35 million in 1983 to 135.08

[70] The calculation is: 459.06*79.66%*77.31%*5.2% = 14.70. Here, 79.66% is the ratio of the above-16 population to the total population in 2008. Due to the availability problem, I assume this ratio was similar in 2000. 77.31% is the labor force participation ratio which is the ratio of the economically active population to the above-16 population.
[71] http://finance.people.com.cn/GB/51844/51850/184279/184289/11193694.html

million in 1996, a 102.73 million increase over 13 years, which accounts for 71.65% of the total 143.38 million rural employment increase during that period. However, with the development of urban economy and especially the foreign investing enterprises, the importance of TVEs in Chinese economy has declined. TVE employment decreased in 1997 and 1998 to 125.37 million and recovered to 1996 level in 2003 and then slowly increased to 154.51 million by the end of 2008 (China Labor Statistical Yearbook 2009:438). The third reason might be that there has been a lack of investments in the rural economy due to Chinese government's focus on urban economy.

Table 5.9 China's employment growth 1978-2008 (million persons)

Year	population	Total Employment	Growth	Urban employed	Growth	Rural employed	Growth
1978	962.59	401.52		95.14		306.38	
1979	975.42	410.24	2,17%	99.99	5,10%	310.25	1,26%
1980	987.05	423.61	3,26%	105.25	5,26%	318.36	2,61%
1981	1000.72	437.25	3,22%	110.53	5,02%	326.72	2,63%
1982	1016.54	452.95	3,59%	114.28	3,39%	338.67	3,66%
1983	1030.08	464.36	2,52%	117.46	2,78%	346.90	2,43%
1984	1043.57	481.97	3,79%	122.29	4,11%	359.68	3,68%
1985	1058.51	498.73	3,48%	128.08	4,73%	370.65	3,05%
1986	1075.07	512.82	2,83%	132.92	3,78%	379.90	2,50%
1987	1093.00	527.83	2,93%	137.83	3,69%	390.00	2,66%
1988	1110.26	543.34	2,94%	142.67	3,51%	400.67	2,74%
1989	1127.04	553.29	1,83%	143.90	0,86%	409.39	2,18%
1990	1143.33	647.49	17,03%	170.41	18,42%	477.08	16,53%
1991	1158.23	654.91	1,15%	174.65	2,49%	480.26	0,67%
1992	1171.71	661.52	1,01%	178.61	2,27%	482.91	0,55%
1993	1185.17	668.08	0,99%	182.62	2,25%	485.46	0,53%
1994	1198.50	674.55	0,97%	186.53	2,14%	488.02	0,53%
1995	1211.21	680.65	0,90%	190.40	2,07%	490.25	0,46%
1996	1223.89	689.50	1,30%	199.22	4,63%	490.28	0,01%
1997	1236.26	698.20	1,26%	207.81	4,31%	490.39	0,02%
1998	1247.61	706.37	1,17%	216.16	4,02%	490.21	-0,04%
1999	1257.86	713.94	1,07%	224.12	3,68%	489.82	-0,08%
2000	1267.43	720.85	0,97%	231.51	3,30%	489.34	-0,10%
2001	1276.27	730.25	1,30%	239.40	3,41%	490.85	0,31%
2002	1284.53	737.40	0,98%	247.80	3,51%	489.60	-0,25%
2003	1292.27	744.32	0,94%	256.39	3,47%	487.93	-0,34%
2004	1299.88	752.00	1,03%	264.76	3,26%	487.24	-0,14%
2005	1307.56	758.25	0,83%	273.31	3,23%	484.94	-0,47%
2006	1314.48	764.00	0,76%	283.10	3,58%	480.90	-0,83%
2007	1321.29	769.90	0,77%	293.50	3,67%	476.40	-0,94%
2008	1328.02	774.80	0,64%	302.10	2,93%	472.70	-0,78%

Source: China Labor Statistical Yearbook 2009; China National Bureau of Statistics website

Table 5.10 China's employment by three industry types 1978-2008 (million persons)

Year	Employment		Grouped by industry					
	Total Employed	growth rate	Primary Industry	growth rate	Secondary Industry	growth rate	Tertiary Industry	growth rate
1978	401.52		283.18		69.45		48.90	
1979	410.24	2,17%	286.34	1,12%	72.14	3,87%	51.77	5,87%
1980	423.61	3,26%	291.22	1,70%	77.07	6,83%	55.32	6,86%
1981	437.25	3,22%	297.77	2,25%	80.03	3,84%	59.45	7,47%
1982	452.95	3,59%	308.59	3,63%	83.46	4,29%	60.90	2,44%
1983	464.36	2,52%	311.51	0,95%	86.79	3,99%	66.06	8,47%
1984	481.97	3,79%	308.68	-0,91%	95.90	10,50%	77.39	17,15%
1985	498.73	3,48%	311.30	0,85%	103.84	8,28%	83.59	8,01%
1986	512.82	2,83%	312.54	0,40%	112.16	8,01%	88.11	5,41%
1987	527.83	2,93%	316.63	1,31%	117.26	4,55%	93.95	6,63%
1988	543.34	2,94%	322.49	1,85%	121.52	3,63%	99.33	5,73%
1989	553.29	1,83%	332.25	3,03%	119.76	-1,45%	101.29	1,97%
1990	647.49	17,03%	389.14	17,12%	138.56	15,70%	119.79	18,26%
1991	654.91	1,15%	390.98	0,47%	140.15	1,15%	123.78	3,33%
1992	661.52	1,01%	386.99	-1,02%	143.55	2,43%	130.98	5,82%
1993	668.08	0,99%	376.80	-2,63%	149.65	4,25%	141.63	8,13%
1994	674.55	0,97%	366.28	-2,79%	153.12	2,32%	155.15	9,54%
1995	680.65	0,90%	355.30	-3,00%	156.55	2,24%	168.80	8,80%
1996	689.50	1,30%	348.20	-2,00%	162.03	3,50%	179.27	6,20%
1997	698.20	1,26%	348.40	0,06%	165.47	2,12%	184.32	2,82%
1998	706.37	1,17%	351.77	0,97%	166.00	0,32%	188.60	2,32%
1999	713.94	1,07%	357.68	1,68%	164.21	-1,08%	192.05	1,83%
2000	720.85	0,97%	360.43	0,77%	162.19	-1,23%	198.23	3,22%
2001	730.25	1,30%	365.13	1,31%	162.84	0,40%	202.28	2,04%
2002	737.40	0,98%	368.70	0,98%	157.80	-3,10%	210.90	4,26%
2003	744.32	0,94%	365.46	-0,88%	160.77	1,88%	218.09	3,41%
2004	752.00	1,03%	352.69	-3,49%	169.20	5,24%	230.11	5,51%
2005	758.25	0,83%	339.70	-3,68%	180.84	6,88%	237.71	3,30%
2006	764.00	0,76%	325.61	-4,15%	192.25	6,31%	246.14	3,55%
2007	769.90	0,77%	314.44	-3,43%	206.29	7,30%	249.17	1,23%
2008	774.80	0,64%	306.54	-2,51%	211.09	2,33%	257.17	3,21%

Source: China Labor Statistical Yearbook 2009; China National Bureau of Statistics website

Table 5.11 China's GDP structure by three industry types (%)

Year	Primary industry's GDP share	Primary industry's employment share	Secondary industry's GDP share	Secondary industry's employment share	Tertiary industry's GDP share	Tertiary industry's employment share
1990	26.9	60.1	41.3	21.4	31.8	18.5
1991	24.3	59.7	41.8	21.4	33.9	18.9
1992	21.5	58.5	43.5	21.7	35.0	19.8
1993	19.5	56.4	46.6	22.4	33.9	21.2
1994	19.7	54.3	46.6	22.7	33.8	23.0
1995	19.8	52.2	47.2	23.0	33.1	24.8
1996	19.5	50.5	47.5	23.5	33.0	26.0
1997	18.1	49.9	47.5	23.7	34.4	26.4
1998	17.3	49.8	46.2	23.5	36.5	26.7
1999	16.2	50.1	45.8	23.0	38.0	26.9
2000	14.8	50.0	45.9	22.5	39.3	27.5
2001	14.4	50.0	45.1	22.3	40.5	27.7
2002	13.7	50.0	44.8	21.4	41.5	28.6
2003	12.8	49.1	46.0	21.6	41.2	29.3
2004	13.4	46.9	46.2	22.5	40.4	30.6
2005	12.2	44.8	47.7	23.8	40.1	31.4
2006	11.3	42.6	48.7	25.2	40.0	32.2
2007	11.1	40.8	48.5	26.8	40.4	32.4
2008	11.3	39.6	48.6	27.2	40.1	33.2

Source: China Statistical Yearbook 2009; China Labor Statistical Yearbook 2009

Table 5.12 TVE employment 1978-2008 (million persons)

Year	Number	Year	Number	Year	Number	Year	Number
1978	28.27	1986	79.37	1994	12017	2002	132.88
1979	29.09	1987	88.05	1995	12862	2003	135.73
1980	30.00	1988	95.45	1996	13508	2004	138.66
1981	29.70	1989	93.67	1997	9158	2005	142.72
1982	31.13	1990	92.65	1998	12537	2006	146.80
1983	32.35	1991	96.09	1999	12704	2007	150.90
1984	52.08	1992	106.25	2000	12820	2008	154.51
1985	69.79	1993	123.45	2001	13086		

Source: China Labor Statistical Yearbook 2009, page 438

Secondly, let's look at the secondary industry and its employment growth pattern. From Table 5.10 and Table 5.11, we can see that while the secondary industry has the largest share of Chinese economy, i.e., 48.6% in 2008, its share in the total employment has been the smallest since 1995. From 1995 to 2002, its employment share continuously fell from 23.0% to 21.4% while its GDP share stayed at about 46%. This is mainly due to large laying-off redundant workers by the SOEs during the second phase of the SOE reform from 1993 to 2003. According to Chinese government's

White Paper[72], from 1998 to 2003, SOEs laid off 28.18 million workers in total. As a result, China's SOE employment has drastically reduced from 75.44 million in 1995 to 25.01 million in 2008. To ensure social stability, the Chinese government made great efforts to help the SOE laid-off workers to be re-employed (i.e., to find new jobs). However, many of those laid-off workers are in their 40s (for females) or 50s (for males)[73] therefore they find themselves very difficult to be re-employed. From Table 5.13, we can see, among the re-employed laid-off workers, only a small fraction are '40-50' people.

Table 5.13 China's SOE lay-offs (million persons)

Year	More Laid off workers	Re-employed workers	Re-employment rate	Year	More Laid off workers	Re-employed workers	'40-50' re-employed
1997	5.86			2003	2.60	4.40	1.20
1998	6.10	6.09	50%	2004	1.53	5.10	1.40
1999	6.52	4.92	42%	2005	0.61	5.10	1.30
2000	6.57	3.61	35.4%	2006	n/a	5.05	1.47
2001	5.15	2.27	30.6%	2007	n/a	5.15	1.53
2002	4.10	1.20	26.2%	2008	n/a	5.00	1.43
				2009	n/a	5.14	1.64

Data source: http://w1.mohrss.gov.cn/gb/zwxx/node_5436.htm 中国年度劳动和社会保障事业发展统计公报 (Report on the development of labor and social security in China) (1998-2009)

As a result of Chinese government's 're-employment project', from 2003 to 2008, the secondary industry's employment share rose slowly from 21.6% to 27.2%. There is another reason for this slow growth, namely, Chinese manufacturing industry has had a 'jobless growth' since 1995[74]. According to Wang, Cai and Lin (2008), from 1995 to 2005, China's manufacturing industry has made a rapid growth, with average annual growth at 12.9%, 2.8% higher than GDP growth rate of the same period. Manufacturing output accounted for about 80% of the total added value of all industrial sectors, so manufacturing industry has been the engine of strong Chinese economic growth. However, high manufacturing output growth does not coincide with high manufacturing employment growth. In fact, after steady growth in 1980s and first half of 1990s, manufacturing employment peaked at 98.03 million in 1995 and then continued to decline to the trough at 80.43 million in 2000. This figure increased in the following two year but it was still much lower than the 1995 level (see Table 5.14). One important reason for this slow manufacturing employment growth is that due to advancement of technological capabilities and the rising labor costs, Chinese manufacturing enterprises have been trying to replace labor by capital (i.e., machines or production automation).

[72] http2001://www.china.com.cn/ch-book/20040426/3.htm《中国的就业状况和政策》(China's employment situation and policy)
[73] Those laid-off workers are called '40-50' people.
[74] Wang, Dewen, Cai, Fang, and Lin, Songhua (2008) 'The jobless growth puzzle of manufacturing employment in china', http://www.wise.xmu.edu.cn/Master/News/NewsPic/200811485411701.pdf

Table 5.14 China's manufacturing employment 1978-2002 (million persons)

Year	total	Year	total	Year	total	Year	total
1978	53.32	1988	86.52	1993	92.95	1998	83.19
1980	58.99	1989	85.47	1994	96.13	1999	81.09
1985	74.12	1990	86.24	1995	98.03	2000	80.43
1986	80.19	1991	88.39	1996	97.63	2001	80.83
1987	83.59	1992	91.06	1997	96.12	2002	83.07

Source: China Labor Statistical Yearbook 2009, page 8

Thirdly, let's look at the tertiary industry's employment situation. From Table 5.10 and Table 5.11, we can see that China's tertiary industry has grown rapidly since 1978, however, its share of Chinese GDP is still low, i.e., 40.1% in 2008, relative to that of advanced economies, i.e., 60-70%. Worse still, China's tertiary industry's employment share (33.2% in 2008) is lower than its GDP share. In advanced economy, the tertiary industry is normally the largest employer. So, the under-development of Chinese tertiary industry has been an important reason of China's slow growth of employment.

5.3 Ensuring price stability

Prices are at the core of a market-based economic system. According to standard economics, prices help to determine what goods and services are demanded and what are supplied. Price stability provides certainty while price fluctuation generates uncertainty. At the micro level, when prices across the economy are fairly stable, specific changes in the prices of individual goods and services provide signals to help economic agents (i.e., firms and individuals) to make decisions on resource allocation, namely, how much to produce, how much to consume, how much to invest, and how much to save or borrow, etc. In contrast, when the prices across the economy are rising, i.e., having inflation, it is more difficult for economic agents to know if the price changes of particular goods or services are due to the imbalances between supply and demand of those products or part of the general increase in prices across the economy; so, the signaling function of price in resource allocation weakens. At the macro level, price stability means the stability of currency value. Namely, what $1 will be able to buy tomorrow or next month will be roughly the same as what it can buy today. If people expect the value of their money to fall, i.e., having inflation, this undermines the role of money as a measuring rod for the value of goods and services in the economy. The currency no longer acts as a standard and stable measure of value, because its own value is falling and uncertain. At worst, when confidence in a currency deteriorates completely, people can stop using the currency as a means of exchange. Therefore, the goal of price stability has become widely accepted as the appropriate objective of monetary policy[75] and is now one of the primary considerations of central governments around the world. China is no exception.

In theory, price stability means that changes in the general level of prices across the economy are relatively small and gradual - in other words, prices do not rise by much from month to month and from year to year. In practice, price stability equates to low and stable inflation. There are a number of measures of inflation in use today. The most familiar one used in China is the Consumer Price Index (CPI). Table 5.15 shows the China's CPIs of different years from 1980 to 2009.

[75] http://www.bankofengland.co.uk/education/targettwopointzero/inflation/whatsInflation.htm

Table 5.15 China's CPIs 1980-2009 (%)

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
CPI	7.5	2.4	1.9	1.5	2.8	9.3	6.5	7.3	18.8	18.0
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
CPI	3.1	3.4	6.4	14.7	24.1	17.1	8.3	2.8	-0.8	-1.4
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
CPI	0.4	0.7	-0.8	1.2	3.90	1.8	1.5	4.8	5.9	-0.7

Source: China Statistical Yearbook, various years

Chinese economy was highly centrally planned in Mao's time. The aim of the reform started in 1978 was to transform China's planned economic system to a market-oriented one. At the core of such transition is to let the market to decide the prices of goods and services. This transition has been very long and still not yet completed, which means that Chinese government still controls the prices of some commodities and services, such as natural resources and land. Therefore, problems are inevitable along the process of transition. From Table 5.15, we can see that there have been five periods when the CPIs were very high and three periods when the CPIs were negative in China since 1978. Accordingly, we can say China has had 5 major inflations and one deflation from 1997 to 2002 since the start of reform and opening (cf. Kennedy, 2003). This clearly shows China's ineffectiveness in ensuring price stability. Let me explain them and their causes one by one.

The first inflation occurred in 1979-1980. There are two reasons causing this inflation. The first is that Chinese central government raised the purchasing prices of agricultural products in 1979 in order to improve peasants' income and therefore living standard. The raise of agricultural products' purchasing prices pushed the retail prices up. The second reason is that Chinese government printed money to finance its fiscal deficit, which caused imbalance between supply and demand. There are two major sources of the fiscal deficit. On the one hand, while the purchasing prices of agricultural products were raised, the urban workers' salaries were still low and not raised accordingly, so, the agricultural products were sold to urban citizens cheaper than the purchasing prices. Since the central government monopolized purchasing and selling of agricultural products, therefore, the central government had a fiscal deficit. On the other hand, in order to end the economic depression caused by the Cultural Revolution, Chinese government invested in many big projects and imported a lot in short period of time, which caused a fiscal deficit.

In order to finance the fiscal deficit, the central government asked the central bank to print money. Initially this did not cause much problem because the deficit was small. However, Chinese government continuously relied on money-printing to finance its fiscal deficit for the following few years. According to Monetarism[76], inflation is always and everywhere a monetary phenomenon and excess issuing of money will ultimately cause inflation. This argument was proven by China's high inflation in 1985, which was the second inflation.

There was another reason for the 1985 inflation. In 1984, China's urban economic reform started with a handful of new policies, such as, fiscal contracts, 'dual-track prices', increasing enterprise autonomy, etc. Stimulated by the reformist measures coupled with the soft budget constraint, China's SOEs quickly expanded their investments in basic construction and technological upgrading. Large investments and excess money supply accumulated from previous years together

[76] Friedman, Milton and Schwartz, Anna (1963) *A Monetary History of the United States, 1867-1960*. Princeton University Press

pushed the CPI to 9.3% in 1985. To contain the inflation, Chinese government started to control the scale of bank credit.

The third inflation occurred in 1988-1989, which is mainly caused by the failed 'wholesale price reform' in 1988. The negative impact of 1985 inflation is that the CPIs in following years kept going high. In 1988, Chinese government had to face the problem of rising price level and they decided to implement a 'wholesale price reform' which meant to liberalize the prices of most commodities in a short period of time. Before the announcement of the reform, the prices of some commodities such like famous liqueur and cigarette were liberalized. The market prices were several times higher than previous prices that were set by the government. So, the general public had such a rough impression that they had to pay several times higher prices once the prices are liberalized. Therefore, this price reform plan immediately caused panic buying and bank run upon its announcement, which pushed the CPIs up to as high as 18.8% and 18% in 1988 and 1989. This was a terrible inflation in the history of PRC, which indirectly caused the 1989 June Fourth Tiananmen Student Movement.

The fourth inflation occurred in 1993-1996. The background of this inflation was as follows. To battle with the inflation of 1988-1989, Chinese government took so bold measures to cut fiscal spending and tighten bank credit that the economic growth rapidly slowed down in 1990. During 1990-1991, there was also a debate whether the reform was socialist or capitalist and the conservative faction of the Party gained more power. To turn around the situation, Deng Xiaoping made his famous 'Southern Tour' in the spring of 1992. Supported by the military, Deng once again put the country on the track of reform and opening with a CCP resolution to establish a socialist market economy in October 1992. Encouraged by the political decision, there came an investment fever of development zones and real estates. The scale of bank credit expanded rapidly. In addition, all sorts of privately fund-raising emerged outside the state-controlled finance sector. So, there was excess money supply in the economy, which caused high inflation from 1993 to 1996. In 1994, the growth of money supply was as high as 34% and the CPI peaked at 24.1%.

This inflation was the worst one since 1978. To tackle the problem, the then vice Premier Zhu Rongji was appointed as the president of the central bank from 2 July 1993 to 30 June 1995. As called as China's 'economic tsar', Zhu took very strict measures to take back the excess money supply and initiated the central bank law and commercial bank law both of which were passed in 1995 (Chow, 1999). The central bank law bans the central bank from making an overdraft for the government, which is significant for the economy because the government is forced to be disciplined, namely, government's fiscal spending since then can only be financed by taxes and bonds, not printing money. The commercial bank law is also beneficial because it allows China's four major state-owned banks to transform from previously the cashier of Chinese government into real commercial banks that operate on for-profit basis.

Zhu's macroeconomic management engineered Chinese economy a 'highly successful soft landing' (Fewsmith, 1999: 103) between 1993 and 1997, namely, to reduce inflation rate from over 20% to just 0.8% by the end of 1997 without suppressing economic growth (GDP growth rate was reduced from an overheated 13.96% in 1993 to a still impressive 9.3% in 1997). However, this 'soft landing' was soon dwarfed by the severe deflation in 1998-1999. This deflation then made the CPIs in 2000 and 2001 running lower than 1% and turning negative in 2002 for the whole year, so that scholars like Woo (2006) treat the whole period from 1998 to 2002 as one of deflation. There are several causes of this deflation, one of which is the external shocks, i.e., the 1997 Asian Financial Crisis, which caused sharp fall of export growth due to decreased external demands, build-up of inventories as domestic consumers spent only cautiously, and the decline of FDI growth owing to

the deepening crisis in Southeast Asia and elsewhere. However, Guerineau and Guillamont Jeanneney (2005) point out that the deflation is due more to domestic economic policy than to external shocks.

Retrospectively, the chief cause of this deflation is the contraction of bank credit in 1998-1999. Several factors contributed to this credit contraction. The first is the consequence of the tight monetary policy adopted during the inflationary period 1993-1996. After 1996 when the CPI was largely reduced, the central bank adopted a 'moderately loose' monetary policy; however, this new policy did not succeed to stimulate growth of bank credit soon after. The second factor is the lack of willingness of the four commercial banks to make loans to the inefficient and highly indebted SOEs. In 1998, Chinese government started the SOE restructuring program. Merger and acquisition, 'grabbing the big ones and letting go the small ones', and laid-off workers are the buzzwords of those days. In the aftermath of the 97 Asian Financial Crisis, the SOEs had a really tough time and hunger for investments and bank credits. However, the financial crisis helped Chinese government to realize the deep problems and high risks of Chinese banks' non-performing loans. So, on the one hand, the central government had to balance between more GDP and more non-performing loans; on the other hand, as the commercial bank law was passed in 1995, the banks now became very cautious about the high risk of adding more non-performing loans. Therefore, even when the central bank un-openly encouraged the commercial banks to make loans in 1998, the four banks were very reluctant to do so because they did not want to bear the responsibilities of creating more non-performing loans.

From Table 5.15, it seems that the inflation was low from 2000 to 2006 as the CPIs were below 2% except 2004 (3.9%). Therefore, the fifth inflation in the reform era did not occur until 2007 when the CPIs went up to 4.8% and 5.9% in 2008, which are much lower than the previous four inflations. However, scholars have pointed out that Chinese CPI statistics have underestimated the real inflations since 2003 due to the outdated design of Chinese CPI. Compared to the compositions of CPI of advanced economies, the food prices have a too large weight (32.79%) in Chinese CPI while the housing prices only account for 14.69%[77]. According to the Blue Book of China's Society 2011 of Chinese Academy of Social Science, China's Engel's Coefficients of 2010 are about 35% and 40% for the urban and rural households respectively[78]. This seems to justify the 32.79% weight of food prices in the Chinese CPI, however, the high urban Engel's Coefficient might be caused by the fact that urban household spending on non-food items has been suppressed due to the rising house prices and costs of education and health care. On the other hand, the 14.69% housing prices only include house-renting prices but not house-purchasing prices. Therefore, the continuous rise of house prices since China's second housing reform of 2003 has not been reflected in China's CPI statistics. So, although we don't have a reliable figure of the real inflation in China in recent years, there is a wide consensus that the official CPI figures underestimate the real situation. According to a survey done by China Central TV station (CCTV) in 2010, 73% of 100 economists and business managers surveyed believe that China now has a severe inflation[79], while the percentage of people surveyed who believed China was in severe inflation last year, surveyed by the same team in 2009, was 33%[80].

Scholars and Chinese officials have argued for several reasons for the current high inflation, such as, the surging world food prices in 2007-2008, the rising international oil prices since 2007, and the

[77] http://finance.people.com.cn/GB/13399070.html
[78] http://www.china.com.cn/zhibo/2010-12/15/content_21517416.htm
[79] http://jingji.cntv.cn/20101208/113115.shtml 2010-12-08
[80] http://space.tv.cctv.com/video/VIDE1259936245654884 2009-12-04

increased labor costs in China in recent years. However, a consensus seems to have emerged that the major cause is the excess money supply and therefore excess liquidity in Chinese economy. There are several factors contributing to the oversupply of money, such as the four trillion stimulus package the Chinese government implemented right after the 2008 global financial crisis in order to maintain high GDP growth in the midst of global recession, and the expansion of bank credit of Chinese banks under the government's 'moderately loose - essentially ultra-loose - monetary policy' (Yi, 2010) adopted since the outbreak of the Crisis, but the most important factor contributing to the excess money supply is in fact the 'passive oversupply of money' by China's central bank, i.e., the central bank has had to issue Chinese currency to buy in a large amount of foreign exchange flowing into China due to China's 'twin surplus' of balance of payment. I now turn to next section to discuss China's effectiveness in pursuing balance of international payments.

5.4 Pursuing balance of international payments

A country's balance of payments (BOP) sheet records all of the many transactions between its consumers, businesses and government with the rest of the world. The BOP sheet has two major components, i.e., current account and capital account[81]. The current account mainly records the trade balance, i.e., the export minus import. The capital account mainly records financial transactions like direct investments and portfolio investments. The pursuit of balance of international payments is normally one of the four macroeconomic objectives of an economy[82], because large BOP imbalance can cause macroeconomic instability. For instance, large current account deficit may result in debt crisis and currency crisis (also called balance-of-payments crisis). On the other hand, large and persistent BOP surplus is also a form of BOP imbalance which can be detrimental to the economic health of a country.

Chinese government's BOP objective has been clear and consistent since the start of reform and opening up, which is to pursue a basic balance of international payments, i.e. having a small surplus and sufficient foreign exchange reserves. Has China achieved this objective? From Table 5.16, we can see that from 1982 to 2009, China has continuously maintained a favorable balance of payments (i.e., BOP surplus) except four years, which are 1985, 1986, 1989, and 1992. From 1994 to 2009 except 1998[83], China has also continuously maintained a 'twin surplus', i.e., current account surplus and capital account surplus, and especially from 2001 to 2009, the scale of China's twin surplus has been large and growing. This reflects, on the one hand, the growing international competitiveness of Chinese exports and the attractiveness of China as an investment destination, and on the other hand, the growing external imbalance of Chinese economy, which is the result of as well as a contributor to the internal imbalance of Chinese economy.

Table 5.16 China's balance of payments 1982-2009 (million USD)

Year	Overall BOP	Current account	Capital account	Foreign reserve
1982	6,291	5,674	338	-6,291
1983	4,131	4,240	-226	-4,131
1984	95	2,030	-1,003	-95
1985	-2,353	-11,417	8,972	2,353

[81] The term 'capital account' used in this thesis refers to the IMF's term 'capital and financial account'.
[82] The four macroeconomic objectives are economic growth, full employment, price stability and balance of international payments.
[83] China's capital account was in a small deficit in 1998 after the 1997 Asian Financial Crisis.

1986	-1,954	-7,035	5,944	1,954
1987	4,931	300	6,002	-4,931
1988	2,318	-3,803	7,132	-2,318
1989	-503	-4,317	3,724	503
1990	12,118	11,997	3,255	-12,118
1991	14,554	13,270	8,032	-14,554
1992	-2,102	6,401	-251	2,102
1993	1,767	-11,903	23,474	-1,767
1994	30,527	7,658	32,644	-30,527
1995	22,481	1,618	38,675	-22,481
1996	31,643	7,242	39,967	-31,643
1997	35,724	36,963	21,015	-35,724
1998	6,426	31,471	-6,321	-6,426
1999	8,505	21,114	5,180	-8,505
2000	10,548	20,519	1,922	-10,548
2001	47,325	17,405	34,775	-47,325
2002	75,507	35,422	32,291	-75,507
2003	117,023	45,875	52,726	-117,023
2004	206,364	68,659	110,660	-206,364
2005	207,016	160,818	62,964	-207,016
2006	246,981	253,268	6,662	-246,981
2007	461,744	371,833	73,509	-461,744
2008	418,978	426,107	18,964	-418,978
2009	398,400	297,100	144,800	-398,400

Data source: China's Balance of Payments sheets 1982-2009, from the official website of the State Administration of Foreign Exchange (SAFE) of China

Why is China ineffective in pursuing balance of international payments? The 'twin surplus' can be argued as mainly a result of China's policy. Among the four macroeconomic objectives, Chinese government treats the balance of payments as the least important and secondary while the other three (especially the goal of economic growth) primary. Although China's official statements say China pursues a basic balance of international payment, in reality, there is a strong mentality that it is better to pursue a favorable balance of payments (i.e., surplus) and to accumulate more foreign exchange reserves. This mentality was reinforced by the 1997 Asian Financial Crisis which seemed to have taught Chinese people that only countries that have sufficient foreign exchange reserve can prevent or battle with such a currency crisis. In practice, in order to accumulate foreign exchange, Chinese government promotes exports in pursuit of trade surplus and encourages foreign exchange inflow and restrict foreign exchange outflow. Obviously, when there are competing objectives, it is impossible to achieve all objectives simultaneously. While China has been effective in expanding its foreign trade and trade surplus and attracting foreign direct investment, it can hardly be effective in pursuing balance of payments. Now, I will discuss expansion of China's foreign trade and China's absorption of FDI which are the two main items contributing to the 'twin surplus'.

China seeks to expand foreign trade for several reasons. The first is that it can help China to break its isolation state after the Cultural Revolution. The second reason is that China needs to import advanced technologies and products to facilitate domestic economic construction. To pay for imports China needs foreign exchanges which China lacked in the early years after the start of

reform and opening. Thus, 'exporting for generating foreign exchange' has been a clear policy since the start of the reform. The third reason is that expanding foreign trade, especially processing trade, can generate more employment to absorb large amount of rural surplus labors migrating to cities for jobs. The fourth reason is that engaging in foreign trade can force China's domestic firms to internationalize therefore to improve their competitiveness in order to compete not only for international market but also for domestic market.

Overall, China has been very effective in expanding its foreign trade since its reform and opening up. China's total trade value has increased from 20.6 billion USD in 1978 to 2561.6 billion USD in 2008, registering an average annual growth rate at 18.1% for the period 1978-2008[84]. Especially, China's foreign trade growth has accelerated since its accession to the World Trade Organization (WTO) in 2001, at an average annual growth rate 25.94% for the period 2001-2008 (see Table 5.17). In 2009, due to the 2008 Global Financial Crisis, China's total trade value dropped 13.9% to 2207.27 billion USD[85]. In 2010, China's total trade value regained high growth to reach 29727.6 billion USD, a 34.7% growth from[86].

Table 5.17 China's foreign trade growth 2001-2009 (billion USD)

Year	Total trade		Export		Import		Net export
	Value	Growth	Value	Growth	Value	Growth	Value
2001	509.651	7.5%	266.098	6.8%	243.553	8.2%	22.545
2002	620.766	21.8%	325.596	22.4%	295.170	21.2%	30.426
2003	851.207	37.1%	438.371	34.6%	412.836	39.9%	25.534
2004	1154.792	35.7%	593.369	35.4%	561.423	36.0%	31.946
2005	1422.118	23.2%	761.999	28.4%	660.118	17.6%	101.881
2006	1760.686	23.8%	969.073	27.2%	791.614	20.0%	177.459
2007	2173.833	23.5%	1218.015	25.7%	955.818	20.8%	262.196
2008	2561.632	17.8%	1428.546	17.2%	1133.086	18.5%	295.459
2009	2207.219	-13.9%	1201.663	-16.0%	1005.555	-11.2%	196.108
2010	2972.760	34.7%	1577.930	31.3%	1394.830	38.7%	183.100

Data source: Ministry of Commerce of China, available at: http://zhs.mofcom.gov.cn/aarticle/cbw/201004/20100406888112.html

In terms of export, China has been very effective in expanding its exports. Table 5.18 shows China's exports share and ranking in world total export since 1980, from which we can see that China's share in world exports was only 0.9%, being the world's 26th largest exporter in 1980. However, China has rapidly expanded its export over the last three decades. It took China 17 years to move from the 26th position to the 10th position in 1997, and from 1997 on, China roughly moved one position upward every year. In 2009 China overtook Germany to become the world's biggest exporter[87] and second largest trading nation next to the US. With regard to China's trade relationships with the US-EU-Japan triad, in 2009, China was the US's second largest trading partner with a total bilateral trade value 366bn USD, and the largest importer with 296.4bn USD

[84] http://www.stats.gov.cn/tjfx/ztfx/qzxzgcl60zn/t20090916_402587600.htm
[85] http://zhs.mofcom.gov.cn/aarticle/Nocategory/201001/20100106747574.html
[86] http://finance.sina.com.cn/china/hgjj/20110110/11039227074.shtml
[87] http://www.businessweek.com/globalbiz/content/feb2010/gb20100210_998970.htm

Chinese export to the US[88]; in spite of 13% decrease of China's export to Europe from previous year, China still exported a €215bn worth of goods to Europe, making it Europe's biggest source of manufactured imports[89]; and China remains Japan's largest trading partner in terms of imports, exports and total trade[90]. According to a report of Korea International Trade Association (KITA)[91], in 2005, the number of made-in-China products having the largest world market shares is 958, making China on the top position in the league table of countries that have the most market-leading products. China (958) was followed by Germany (815), the U.S. (678), Italy (304) and Japan (280).

Table 5.18 China's exports share and ranking in world total export 1980-2009 (billion USD).

Year	World exports	China's exportS	China's share in world exports	ranking
1980	1990.6	18.27	0.9%	26
1986	2115.7	30.94	1.5%	16
1992	3700.0	84.94	2.3%	11
1997	5455.0	182.79	3.3%	10
1998	5405.0	183.71	3.4%	9
2000	6358.0	249.2	3.9%	7
2001	6162.4	266.1	4.3%	6
2002	6432.9	325.57	5.1%	5
2003	7482.0	438.37	5.9%	4
2004	9123.5	593.36	6.5%	3
2007	13570.0	1218.01	8.8%	2
2009			11%	1

Data source: China Commerce Yearbook 2009; 2009 figure of China's share in world total exports is from: http://trade.ec.europa.eu/doclib/docs/2009/september/tradoc_144591.pdf

As a result of rapid export growth, China has been continuously making trade surplus since 1990 except 1993. From Table 5.19 we can see that the trade in goods surplus has been the dominant contributor to China's current account surplus in recent years. Noticeably, while China's trade in goods has been in surplus, its trade in services has been in deficit.

Table 5.19 China's current account 2000-2009 (billion USD)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Current account	20.52	17.41	35.42	45.88	68.66	160.82	253.27	371.83	426.11	297.1
Trade in Goods	34.47	34.02	44.17	44.65	58.98	134.19	217.75	315.38	348.87	249.5
Trade in Services	-5.60	-5.93	-6.78	-8.57	-9.70	-9.39	-8.83	-7.91	-11.81	-29.4
Income	-14.67	-19.17	-14.95	-7.84	-3.52	10.64	15.16	25.69	31.44	43.3

[88] http://www.census.gov/foreign-trade/statistics/highlights/top/top0912yr.html
[89] http://trade.ec.europa.eu/doclib/docs/2009/september/tradoc_144591.pdf
[90] http://www.jetro.go.jp/en/news/releases/20100818310-news
[91] http://global.kita.net/news/02/1188600_1687.jsp

Source: China's Balance of International Payment sheets (2000-2009), on the website of the People's Bank of China (PBoC)

Attracting foreign direct investments (FDI) has also been an important economic goal of China. In the early stage of China's reform, the main purpose of attracting FDI was to fill the foreign exchange gap and domestic savings gap in order to boast Chinese economy. At later stage, the main purpose became utilizing foreign capital, technology and management skills to upgrade China's domestic industries. To attract foreign direct investments, Chinese government offers preferential policies on taxation, environment protection and labor rights. In addition, Chinese government sets FDI targets in their Five Year Plans. Chinese officials at all levels take the task of attracting FDI seriously because the performance is linked to their evaluation.

From Table 5.20 we can see China has been very effective in attracting FDIs. Since 1992, China's FDI inflow has grown rapidly and China has been the most attractive destination worldwide for several years. The total amount of China's utilized FDI from 1979 to 2009 has reached 942.65 billion USD, making China the second-largest FDI recipient after the United States[92]. From Table 5.21 we can see China's inward foreign direct investment (FDI) has been a major contributor to China's capital account surplus in recent years.

Table 5.20 China's inward FDIs 1979-2009 (billion USD)

Year	Contracted FDI	Utilized FDI	Year	Contracted FDI	Utilized FDI
1979-1984	9.750	4.104	1997	51.003	45.257
1985	6.333	1.956	1998	52.102	45.463
1986	3.330	2.244	1999	41.223	40.319
1987	3.709	2.314	2000	62.380	40.715
1988	5.297	3.194	2001	69.195	46.878
1989	5.600	3.392	2002	82.768	52.743
1990	6.596	3.487	2003	115.069	53.505
1991	11.977	4.366	2004	153.479	60.630
1992	58.124	11.008	2005	189.065	60.325
1993	111.436	27.515	2006	193.727	63.021
1994	82.680	33.767	2007		74.768
1995	91.282	37.521	2008		92.395
1996	73.276	41.726	1979-2008	1479.401	942.646
			2009		90.033

Source: China Statistical Yearbook 2009, page 745; 2009 data is from the Ministry of Commerce of China

Table 5.21 China's capital account 2002-2009 (billion USD)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Capital account	1.92	34.78	32.29	52.73	110.66	62.96	6.66	73.51	18.97	148.8
Inward	38.40	44.24	49.31	47.08	54.94	79.13	78.10	138.41	147.79	78.2

[92] http://www.asiaone.com/Business/News/Story/A1Story20100907-235999.html

FDI										
Portfolio investment	-3.99	-19.41	-10.34	11.43	19.69	-4.93	-67.56	18.67	42.66	38.7
Other investment	-31.53	16.88	-4.11	-5.88	37.91	-4.03	13.31	-69.68	-121.07	67.9

Source: China's Balance of International Payment sheets (2000-2009), on the website of the People's Bank of China (PBoC)

As a result of the twin surplus, China has built up a huge foreign exchange reserve over time with a stock of 2.65 trillion USD at the end of September 2010, more than the foreign reserves of Japan, the EU and the US combined, making China the biggest foreign reserve holder in the world (see Table 5.22). This large amount of foreign exchange reserve can prevent China from balance of payment crisis and improve China's sovereign credit. However, the excess foreign reserve puts pressure on Chinese currency to appreciate. Due to China's exchange rate policy and control of foreign exchange, China's central bank has to issue renminbi to buy in foreign exchange inflow. The renminbi paid out, recorded as 'funds outstanding for foreign exchange' on the central bank's balance sheet, becomes the basic money (M0) to be circulated in the economy, which will create much more money by the multiplier effect. Continuously inflow of foreign exchange forces China's central bank to continuously issue basic money, which causes the 'passive oversupply of money'. By the end of November 2010, China's broad money (M2) balance has reached 71.03 trillion CNY. China's M2/GDP ratio is estimated to be 2.59[93], which is much higher than those of advanced countries. According to Monetarism, oversupply of money can cause inflation. In fact, as many scholars have pointed out, the high inflation in recent years in China is mainly caused by the excess liquidity which is in turn mainly caused by China's money oversupply.

Table 5.22 China's foreign exchange reserves 1980-2009 (billion USD)

Year	Amount	Year	Amount	Year	Amount
1980	-1.296	1990	11.093	2000	165.574
1981	2.708	1991	21.712	2001	212.165
1982	6.986	1992	19.443	2002	286.407
1983	8.901	1993	21.199	2003	403.251
1984	8.220	1994	51.620	2004	609.932
1985	2.644	1995	73.597	2005	818.872
1986	2.072	1996	105.029	2006	1,066.334
1987	2.923	1997	139.890	2007	1,528.249
1988	3.372	1998	144.959	2008	1,946.030
1989	5.550	1999	154.675	2009	2,399.152

Source: China's Balance of International Payment sheets (2000-2009), on the website of the People's Bank of China (PBoC)

Chinese government has been aware of the negative impacts of the twin surplus on China's domestic economy and trade relations with major economies, from 2007, Chinese government seeks to balance its international payments. There are many ways to do so, e.g., by importing more to

[93] http://dengruo.info/201011/the-proposed-super-yuan/

reduce trade surplus and by expanding outward FDI to reduce capital account surplus. From Table 5.17, we can see it is difficult for China to reduce trade surplus in short run. There are three reasons for this. One is that China has higher savings rate than investment rate, so, the savings-investment gap has to be filled by trade surplus. Due to lack of social security net, Chinese people have a high saving propensity which cannot be solved in short run. The second reason is that Chinese economy's export dependency is a structural problem (Y.-D. Yu, 2009), i.e., China needs a large export sector that employes scores of millions of workers, it is a dilemma for China's leaders to balance between reducing trade dependency and providing employment for China's large labor force. The third reason is that as China claims it cannot get those high-tech products and technologies it wants to import from advanced countries.

In terms of outward FDI, starting from virtually no outward FDI in 1979, China has become an important source of outward FDI (see Table 5.23). In 2000, China adopted a 'go global' strategy. Since then, China's outward FDI has grown rapidly. China's outward FDI flow in 2009 reached 56.53 billion USD which accounts for 5.1% of world total, making China the 5th largest investor in the world and the largest among developing countries. However, in terms of outward FDI stock, by the end of 2009, China has accumulated over US$ 245.75 billion of outward FDI, which accounts for only 1.3% of the world total. Therefore, it seems it is difficult for China to reduce capital account surplus in short run as well.

Table 5.23 China's outward FDI 1990-2009 (billion USD)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Amount	0.9	1.0	4.0	4.3	2.0	2.0	2.1	2.6	2.7	1.9
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Amount	1.0	6.9	2.7	2.85	5.5	12.27	21.16	26.51	55.91	56.53

Source: China Commerce Yearbook 2009; 2009 data is from the Ministry of Commerce

In sum, in this chapter, I analyze China's effectiveness in achieving the four macroeconomic goals. From the above analysis, we can see that China has been very effective in maintaining high economic growth but less effective in creating more employment though it has created a great amount of employment over the last three decades since its reform and opening up. China is not effective in ensuring price stability as we see much price fluctuation since 1979. China is not effective in pursuing balance of international payments mainly because it has not taken this objective seriously until recent years.

Chapter 6: The efficiency dimension

In this chapter, I discuss the efficiency dimension of China's national competitiveness. As mentioned in the Analytical Framework chapter, I will analyze the efficiency of use of economic resources/input factors (i.e., labor, capital, natural resources, and all of them combined) in China. For each of them, I will look at the two aspects: technical efficiency and allocative efficiency.

Economists normally measure the technical efficiency of use of input factors by calculating their productivities. Like competitiveness, the concept of productivity is also a very popular word; yet different people use the term to mean different things (Oyeranti, 2000). The least controversial definition of productivity is that it is a quantitative relationship between output and input (Iyaniwura and Osoba, 1983, Antle and Capalbo, 1988; cited in Oyeranti, 2000). However, the difficulties in making accurate calculations of productivity are well known (Shelton, 1967), e.g., how to compare outputs when the product mixes differ; how to measure the quality of output; how to isolate the impact created by such things as new equipment; how to adjust for the fact that the use of raw materials and fuel per unit of output may not be standardized. Those difficulties, nevertheless, have not prevented economists from conducting productivity researches one after another. The commonly used technical efficiency measures include labor productivity, capital productivity, energy efficiency, and multiple factor productivity (MFP) or total factor productivity (TFP).

I argue, the technical efficiency measures do not give us a complete picture of how efficiently a country is using its economic resources; we should also discuss the allocative efficiency of use of each of the three input factors and all of them combined. For example, when talking about the efficient use of labor, we should also examine the employment structure, labor wage level and working conditions. If a large proportion of labor force is working in low-productivity sector like traditional agriculture or working for low-wage jobs and in bad working conditions, then it indicates allocative inefficiency because labors will move to high-productivity, high-wage, and good-working condition jobs if the labor market/the economy is efficient. Also, when talking about the efficient use of capital, we should also look at the profitability of capital investments which concerns three groups of stakeholders, the households who put part of their income into banks or other financial institutions, the banks and other financial institutions who lend money to enterprises, and the enterprises who need capital for investment. In fact, all of the three groups (households, banks and financial institutions, and enterprises) are investing/using capitals, how efficiently are they using/investing is a legitimate concern.

Similarly, we can talk about the allocative efficiency of natural resources (in the form of materials, energies, and lands), for example, if a country exports natural resources and primary goods without deep processing, it indicates allocative inefficiency because an efficient economy will use these scarce natural resources more wisely and more efficiently. Likewise, since land is also very scarce resource, we should care about the efficient allocation of land for various types of use, i.e., for farming, for factories, or for real estate. Finally, compared to the other three, it is more difficult to talk about the overall allocative efficiency of the economy. One plausible, though not perfect, indicator can be the nation's terms of trade (TOT). Although declining TOT per se may not indicate declining efficiency, and in fact it can be caused by increasing productive efficiency, i.e., increasing productive efficiency causes falling production costs which provides a basis for falling prices, the decline of TOT may be also caused by increasing competition coupled with weak bargaining power. In this sense, if a country has declining TOT for a long time, it can be a sign of allocative inefficiency, i.e., the country has not efficiently allocated/used its resources (e.g., in other activities/products characterized by rising TOT).Table 6.1 summarizes above analysis.

In the following sections, I will analyze the technical and allocative efficiencies of use of labor, capital, natural resources, and all of them combined in China one by one. Due to the technical complexity of calculating productivity and the well recognized problems associated, e.g., how to accurately calculate capital input, I will not make the calculations myself here, but instead, I will rely on the existing empirical literature to give the readers some indicative information.

Table 6.1 The measures and indicators of efficiency of national economy

	Use of labor	Use of capital	Use of natural resources	Overall/comprehensive
Technical efficiency	Labor productivity: GDP/person employed or GDP/hour worked	Capital productivity: Incremental capital output ratio (ICOR), marginal product of capital (MPK), capital-output ratio (COR)	Material productivity: (GDP/DMI, GDP/TMR) Energy efficiency Land productivity	Multiple factor productivity (MFP) or Total factor productivity (TFP)
Allocative efficiency	Employment structure (primary/ secondary/ tertiary), wage levels, working conditions	Profitability: average profit rate, incremental profit rate (ICPR), non-performing loans (NPLs) of banking sector	Percentage of resource/primary product vs deep processing manufactured in total export Different uses of land: farming, factories, or real estate	Terms of trade (TOT)

6.1 China's efficiency of use of labor

Let's start with the technical efficiency of use of Chinese labor, i.e., the labor productivity. Among the partial productivity measures, labor productivity is the most commonly used, which can be justified by three reasons (Oyeranti, 2000: 13), first, labor is regarded as the most important factor of production, second, it is the most easily quantified input factor, third, it is the only factor of production that has conscious control over its contribution to output. Economists see labor productivity as an important indicator of economic health, a key source of economic growth and a determinant, in the long run, of wage levels, prices and, subsequently, the living standards of a nation's population (ILO, 2009). The two commonly used labor productivity measures are GDP per person employed and GDP per hour worked.

According to the International Labor Organization's Key Indicators of the Labor Market (ILO KILM, sixth edition), from 1980 to 2008, China's labor productivity measured by GDP per person engaged has risen from 1,655 USD to 10,378 USD (constant 1990 USD at PPP at), i.e., an increase

by a factor of 6.27 which translates into a 6.78% annual growth rate for the entire period. Table 6.2 shows the historical records of China's GDP per person employed from 1980 to 2008. As a fact, among the 123 economies covered by ILO KILM, China has had the highest growth rate of GDP per person employed, which is 405.1% based on 1990 level, in comparison, most of the developed countries have enjoyed a growth rate within the range of 110% to 150%, e.g., 136.7% for the US, see Table 6.3. Unfortunately, while most of the OECD countries have submitted their data of GDP per hour worked to the ILO, there is no such data from China reported in the ILO KILM.

Table 6.2: China's labor productivity measured by GDP per person engaged and its growth index

Year	GDP per person employed (constant 1990 US$ at PPP)	GDP per person employed index (1990=100%)
1980	1655.32	64.6%
1981	1701.21	66.4%
1982	1772.34	69.2%
1983	1866.61	72.9%
1984	2038.05	79.5%
1985	2180.34	85.1%
1986	2259.83	88.2%
1987	2431.23	94.9%
1988	2537.57	99.1%
1989	2524.79	98.6%
1990	2562.33	100%
1991	2690.69	105.0%
1992	2920.86	114.0%
1993	3171.84	123.8%
1994	3455.49	134.9%
1995	3940.92	153.8%
1996	3978.20	155.3%
1997	4134.82	161.4%
1998	4096.96	159.9%
1999	4317.59	168.5%
2000	4660.15	181.9%
2001	5100.04	199.1%
2002	5668.24	221.2%
2003	6464.78	252.3%
2004	7048.28	275.1%
2005	7709.52	300.9%
2006	8536.47	333.2%
2007	9573.96	373.7%
2008	10377.86	405.1%

Data source: International Labor Organization's Key Indicators of the Labor Market (2009, sixth edition)

How has China made such improvement in its labor productivity? Economists often use decomposition analysis to indentify the sources that contributing to the output growth, one being input factor growth, another being productivity growth. For example, Dekle and Vandenbroucke (2010) decompose China's annual 8.4% GDP growth for the period of 1978-2003 into contributions made from growth in labor supply (contributing for 2.5 percentage point in GDP growth) and from growth in labor productivity (contributing for 5.7 percentage point in GDP growth). They further decompose the 5.7% GDP growth contributed by labor productivity growth into two parts: growth in total factor productivity (contributing for 4.1 percentage point in GDP growth) and efficiency improvement due to reallocation of labor between sectors (contributing for 1.6 percentage point in GDP growth). Of the 4.1% GDP growth made from TFP growth, the shares of contribution from agricultural, non-agricultural public sector and non-agricultural private sector's labor productivity growth are respectively 19.51%, 39.02%, and 41.47%. Of the 1.6% GDP growth made from labor reallocation, 93.75% is due to labor reallocation from agricultural sector to non-agricultural sector (contributing to 1.5 percentage point in GDP growth) and 6.25% is due to labor reallocation from public sector to private sector (contributing to 0.1 percentage point in GDP growth).

Theoretically, the reallocation of labor from low productivity sectors to high productivity sectors is an important channel of improving overall labor productivity. Yao (2010) makes an systematic analysis of the contribution of factor reallocation to aggregate productivity growth rate from 1985 to 2007 and finds that the labor reallocation effect is considerably larger in reallocation across six major sectors (primary, industry, construction, transportation, wholesale, and other services) than in reallocation across 14 major manufacturing industries, indicating there may be more labor flow restrictions existed in the manufacturing sectors than in the six sectors of the whole economy partly due to the specialized skills needed for each industries. Yao (2010: 52) provides another possible explanation that is Chinese manufacturing industries has been in a process of capital deepening and technological progress since the late 1990s.

Kuijs and Wang (2006) also decompose China's GDP growth in the period of 1978 to 2004 into two components: growth in employment and labor productivity. They split the whole period into two sub-periods 1978-1993 and 1993-2004. This split is meaningful as we have seen in the preceding chapter that China's employment growth has slowed down since mid-1990s. According to Kuijs and Wang (2006), for the period1978-1993, China's average annual GDP growth was 9.7%, of which employment growth contributed 2.5% and labor productivity growth contributed 7.0%. They further decompose the 7.0% labor productivity growth into 3.7% TFP growth and 3.2% growth in capital per labor ratio. In comparison, for the period of 1993 to 2004, China's GDP growth was 9.0%, to which employment growth contributed 1.1% and labor productivity growth contributed the 7.8%. The labor productivity growth contribution is further decomposed into 2.7% contribution from TFP growth and 5.1% contribution from the improved capital/labor ratio. The big difference in the contribution made from the capital/labor ratio improvement reflects China's rapid investment in fixed assets since late 1990s.

Although China's growth in its labor productivity is phenomenal, its labor productivity level is still very low by international standard. Jefferson, Hu, and Su (2006) point out that there is still a large international gap between Chinese labor productivity and the world's frontier. They argue, in 2002, the highest labor productivity in China (which is for advanced industrial sector in China's coastal East) was still less than one quarter of the international frontier. Deng and Jefferson's (2010) assessment is that China's labor productivity of the entire manufacturing sector was only 15.8% of that of the US although this difference represents a substantial gain compared with 1995 level which was just 5.6%). According to ILO KILM, China ranked 86 out of 123 economies in terms of the level of GDP per person employed. Table 6.2 shows the top 30 countries in terms of GDP per

person employed. We can see, China's labor productivity in terms of GDP per person employed is only 15.85% of that of the US, 20.07% of that of the UK, 20.92% of that of Australia, 22.77% of that of Japan, and 24.02% of that of Israel.

Table 6.3 Top 20 countries in terms of GDP per person employed (constant 1990 US$ at PPP)

Ranking	Country	GDP per person engaged	China's Labor productivity as a percentage of this country's	GDP per person engaged Index (1990=100%)
1	United States	65480.42	15.85%	136.7%
2	Ireland	56700.52	18.30%	158.2%
3	Belgium	55448.02	18.72%	124.4%
4	Luxembourg	54511.03	19.04%	116.2%
5	Trinidad and Tobago	53011.70	19.58%	178.5%
6	Norway	51735.64	20.06%	136.0%
7	United Kingdom	51696.87	20.07%	147.4%
8	Finland	50559.54	20.53%	149.1%
9	Australia	49614.91	20.92%	135.1%
10	Canada	49076.76	21.15%	123.2%
11	Sweden	48987.43	21.18%	147.9%
12	Austria	48121.25	21.57%	131.7%
13	Netherlands	47016.82	22.07%	122.0%
14	Taiwan, China	46729.65	22.21%	193.1%
15	Denmark	46257.83	22.43%	129.0%
16	Italy	45932.11	22.59%	112.2%
17	Singapore	45786.45	22.67%	162.4%
18	Iceland	45613.93	22.75%	135.9%
19	Japan	45586.85	22.77%	122.7%
20	Israel	43201.87	24.02%	121.7%
86	China	10377.86	100%	405.1%

Data source: International Labor Organization's Key Indicators of the Labor Market (2009, sixth edition)

Besides this international productivity gap, China has also internal productivity gap across sectors and regions (Deng and Jefferson, 2010; Jefferson et al., 2006; Zhang and Tan, 2007). Jefferson et al. (2006) find that there was a large agricultural-industrial productivity gap in China, too. The ratio of industrial to agricultural labor productivity had shrunk from 6.09 in 1980 to 4.56 in 1985 to 4.32 in 1990 before it continuously rose from 4.32 in 1990 to 5.42 in 1995 to 6.88 in 2000 to 7.11 in 2005. They also report agricultural labor productivity disparity across regions. In 2004, the industrial to agricultural labor productivity in China's western, central, and northeastern region was 14.02, 10.50, 6.94, and 6.90 times of that of the coastal region respectively. Xin and Liu (2008) argue the regional disparity of factor endowment is an important reason for agricultural labor productivity gaps between regions, the other factor is the output elasticities of the input factors. At the industrial front, Deng and Jefferson (2010) find that in 1995 the industrial labor productivities in China's western,

central, and northeast regions were only 46%, 52%, and 42% of that of China's coastal region respectively. But with a relatively faster growth rates, such productivity gaps have been reducing. By 2004, the gaps were 71%, 61%, and 85% respectively.

Now, let's look at the allocative efficiency of use of Chinese labor, i.e., the employment structure, labor wage, and working conditions.

The employment structure first. From Table 5-11 in the previous chapter, we can see, although China has effectively reduced the share of agricultural labors in the total labor force since its reform in 1978. In 2008, China still has 39.6% of total labor force employed in the primary industry which only accounts for 11.3% of Chinese GDP, and only 33.2% of labor force is employed in the tertiary industry which generates 40.1% of Chinese GDP. This clearly indicates a low allocative efficiency of use of Chinese labor.

At the labor wage front, Table 6.4 shows the structure of urban employment and the wage level by sectors. We can see, the two largest employing sectors behind the education sector and governmental sector are the manufacturing and construction industries, which employ 28.2% and 8.8% of urban employees; however their wage levels are the lowest except the primary industry, hospitality, the public facilities, and resident services sectors.

Lastly, the working conditions. It is no secrecy that the working conditions in China's labor-intensive mining, construction, and manufacturing industries are poor. Long working hours, low health and safety standard, and prohibition of labor unionization are common practices in these sectors which employ 41.4% of Chinese urban labors. One case is indicative. On 15 February 2011, Apple released its 2010 Progress Report on Apply Supplier Responsibility, which publicly acknowledged for the first time that 137 employees from one of Apple's Chinese suppliers were disabled from toxic hazards in the workplace where a chemical called n-hexane is used without sufficient ventilation [94]. If big MNCs like Apply cannot prevent Chinese labor-intensive manufacturing enterprises from asking people working in poor working conditions, it is very hard to believe the other Chinese SMEs are self-disciplined to not do so.

Table 6.4 The structure and wage levels of urban employment in China in 2008

	Share of employment	Wage level (CNY)		Share of employment	Wage level (CNY)
national		28898	Financial	3.4%	53897
Primary	3.4%	12560	Real estate	1.4%	30118
Mining	4.4%	34233	Leasing	2.3%	32915
Manufacturing	28.2%	24404	Scientific research	2.1%	45512
utilities	2.5%	38515	Public facilities	1.6%	21103
construction	8.8%	21223	Resident services	0.5%	22858
Transportation	5.1%	32041	Education	12.6%	29831
IT	1.3%	54906	Health care	4.65	32185
wholesale	4.2%	25818	Cultural	1.0%	34158

[94] See, http://english.people.com.cn/90001/90776/90882/7291502.html; also, see, http://images.apple.com/supplierresponsibility/pdf/Apple_SR_2011_Progress_Report.pdf

hospitality	1.6%	19321	governmental	10.9%	32296

Data source: China Labor Statistical Yearbook 2009

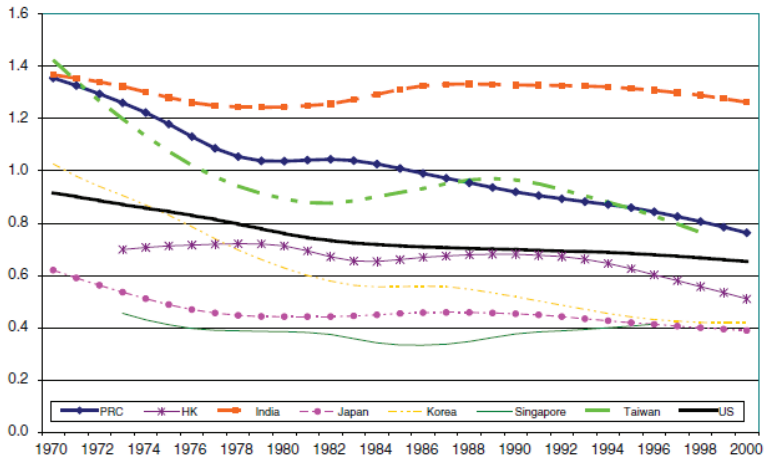
In sum, although China has dramatically improved its labor productivity over the decades since its reform in 1978, its allocative efficiency of use of labor is still low due to large share of agricultural employment, low wage levels and working conditions for the manufacturing and construction sectors which employ 37% of Chinese urban labor force.

6.2 China's efficiency of use of capital

While the importance of labor productivity has been widely recognized, the relevance of capital productivity has not yet been established (Felipe, Lavina, and Fan, 2008:753). One possible reason is that it is more difficult to calculate capital productivity than to calculate labor productivity because the total labor inputs is easier to calculate (if we ignore the quality of labor issue which can make labor input calculation also difficult) than total capital input, namely, capital stocks will depreciate at different rates and new capital equipments are generally more productive than old ones so it is a practical problem how to aggregate all the capital stock and inflow together to precisely calculate the total capital inputs. However, since capital is often, especially for developing countries, relatively scarce resource compared to labor, the efficient use of capital should be very important to economic development. Lewis (2004: 253) points out that 'the more efficiently we use capital, the less capital we need to create additional capacity and new jobs for growth'. People may have an intuition that capital productivity should, like labor productivity, increase over time as the country develops. However, this is not the case.

As Karl Marx first noted (Felipe, Lavina, and Fan, 2008:755) technical change will bring rising labor productivity and capital-labor ratio but declining capital productivity. Such a process is called by Foley and Michl (1999) as Marx-biased technical change, which is theoretically unavoidable because labor productivity is equal to capital productivity multiplied by capital-labor ratio (i.e., Y/L = Y/K * K/L, or LP = KP * K/L). Using the extended Penn World Table data, Felipe, Lavina, and Fan (2008: 755) draw the historical changes of capital productivity of several countries including China, which confirms this Marx-biased technical change pattern (see Figure 6.1).

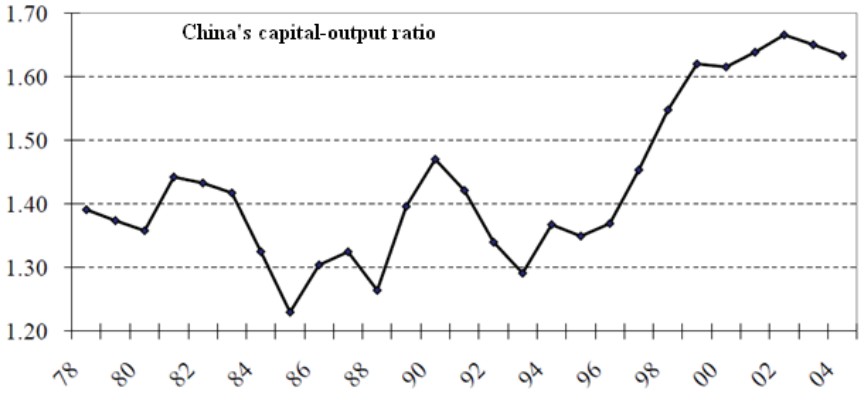
Figure 6.1 China's capital productivity in comparison with some selected economies



Note: data in 1996 USD in PPP terms; Source: Felipe, Lavina, and Fan (2008: 755, Figure 11)

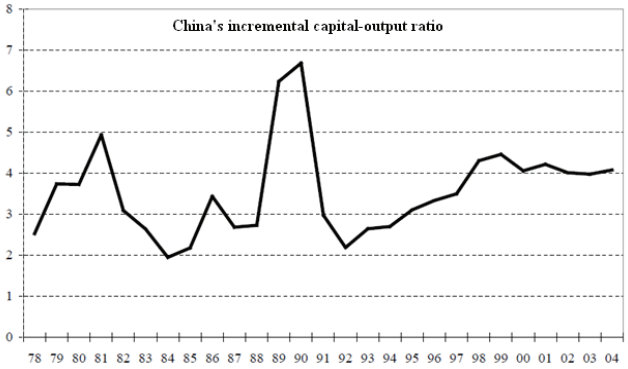
From Figure 6.1 we can see clearly that all the economies except India's have had declining capital productivity over the decades. The change in capital productivity can be demonstrated by the changes in capital output ratio (COR), marginal product of capital (MPK) and incremental capital-output ratio (ICOR). COR measures the total capital stock involved in generate economic output. MPK measures the additional output resulting from the use of an additional unit of capital. ICOR measures how much capital is needed to generate an additional unit of output. A rise in COR and ICOR or a decline in MPK means a decline in capital productivity. Empirical data on these three measures support the argument that China's capital productivity has been declining. For example, Barnett and Brooks (2006:6, figure 3) argues that over the period 1990 to 2005, China's COR has risen substantially to more than 2.4 for the non-farm sector, while the MPK fell over the same period. Bai, Hsieh, and Qian (2006) also show that recent years China's COR and ICOR were both rising (see Figure 6.2 and Figure 6.3). Siebert (2007: 898) argues that China's ICOR has risen from 3 in the 1980s to 4.5 in the early 1990s while McKinsey Global Institute (2006) provides another estimate on China's ICOR that has increased from 3.3 in the first half of the 1990s to 4.9 after 2001, which is 40 percent more than the amount required by other Asian Tigers in their high-growth periods. All these data clearly demonstrate the decline in China's capital productivity.

Figure 6.2 China's capital-output ratio

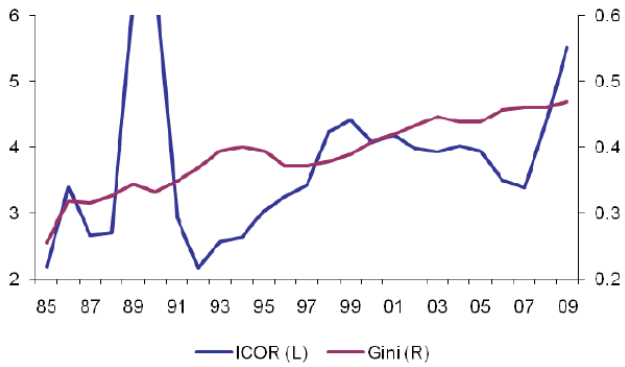


Source: Bai, Hsieh, and Qian (2006: 41, Figure 16)

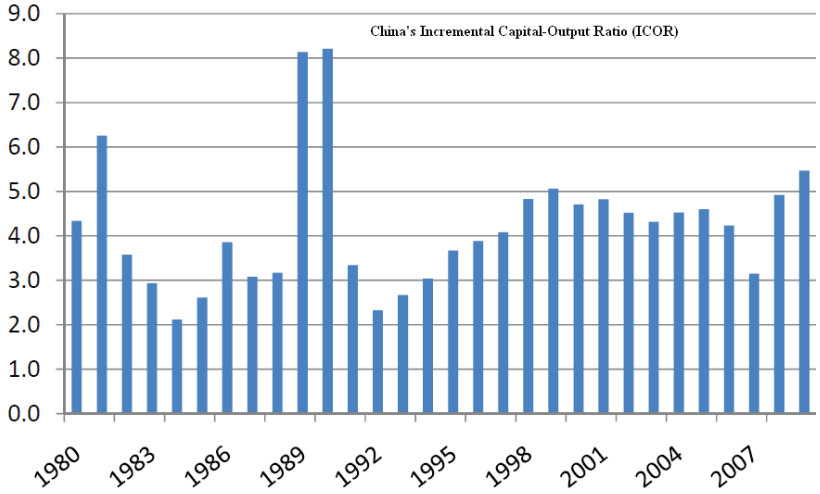
Figure 6.3 China's Incremental Capital-Output Ratio



Source: Bai, Hsieh, and Qian (2006: 40, Figure 15)



Source: Huang (2009: 5, Chart 1)



Source: Beim (2011: 21, Figure 3)

Besides this relatively low and declining capital productivity, there are internal gaps of capital productivity across regions and sectors in China. For example, Zhang and Tan (2007: 285-286) provide their own calculation of the internal capital productivity gaps in China from 1978 to 2001, see Table 6.5. Based on a recent World Bank investment climate survey data in China, Xu (2008) argues that the interquartile range of marginal product of capital (MPK) is almost 6 and identifies some factors explaining such huge variations in MPK as well as capital flow across regions in China, including substantial regional protectionism, human capital stocks, regional differences in infrastructure or geography, inefficiency of China's financial system, and regional tax burden differences.

Table 6.5 China's capital productivity across regions and sectors (1978 constant Yuan output per 100 Yuan capital stock)

	national	East	Central	West	Northeast	Agriculture	Rural nonfarm	Urban industry	Urban service
1978	36	41	38	25	45	52	22	46	19
1984	42	45	43	32	47	74	30	45	26
1990	41	42	42	36	43	78	59	38	30
1995	53	56	55	43	51	74	121	45	33
2001	52	52	54	47	57	57	192	51	25
growth	1.6%	1.0%	1.5%	2.7%	1.1%	0.4%	9.8%	0.5%	1.1%

Data source: Zhang and Tan (2007: 285-286, Table 1, Table 2)

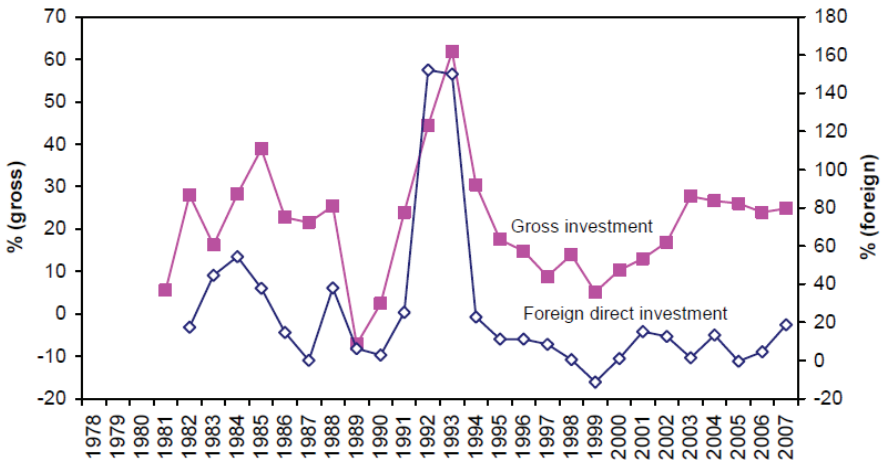
Felipe, Lavina, and Fan (2008) observe an interesting contrast between China and India in terms of return on investment. They find that the average profit rate in China has declined from 13.5% in 1980 to 8.5% in 2003 while in India it has increased from 11.5% in 1980 to 16.5% in 1999. They also find that the incremental profit rate (ICPR), which is more a measure of short-term profitability, is higher for India (average 10.4% for 1981-1999) than for China (average 6.6% for 1978–2003) since early 1990s. Although capital productivity and profitability tends to decline as economic development proceeds (India was anomalous in this sense), the speed of this decline may be a cause

of concern in China (ibid.: 763). Lin (2001, Table 7.2, p. 185) argues that there is a sharp decrease in average profit rates in China across a number of products during the period 1985-1995, for example, a decrease from 44.9% to 0.2% for bicycles, from 18.4% to 8.6% for motor cycles, from 41.6% to 18.3% for sedan cars, from 40.1% to -0.3% for buses, from 32.2% to 8.1% for refrigerators, from 30.0% to 2.9% for washing machines, from 30.0% to 6.4% for air-conditioning units, and from 24.2% to 2.5% for beer. Lardy (2002, p. 14) provided estimates of China's profit rate for the state owned industry for the period 1978 – 1999 which show a very large decline in profitability, from about 25% to about 5%.

Since China's accession to the WTO in 2001, there has been a sharp increase in Chinese exports, however, the average profit rates of many Chinese export industries are quite low. Much of the price competitiveness of Chinese exported goods is due to relatively low exchange rate and export subsidies from Chinese government. According to Chinese official news report[95], the average profit rate of Chinese light industry is just 2-5%, so, if Chinese currency appreciates 3%, the profits of many export industries like white goods, cars, mobile phones will shrink 30-50%. In 2010, the profit sum of China's 77 biggest steel firms was less than that of Rio Tinto, the Australian corporation who supplies iron ore to Chinese steel industry[96].

However, despite relative low profitability in China, China has very high investment ratio and growth of capital stock. Wu (2009) points out that China has had an average 21.2% annual growth investment during the period of 1981-2007 (see Figure 6.4), and as a result the gross capital formation (GKF) as a proportion of China's GDP has maintained at a robustly high level, i.e., average at 37.5% for the period 1978-2007 (see Figure 6.5), which is much higher than that of other countries at the similar stage of development such as Japan (35.8% for 1961-1970), Korea (29% for 1969-1983) and Brazil (21.4% for 1962-1979).

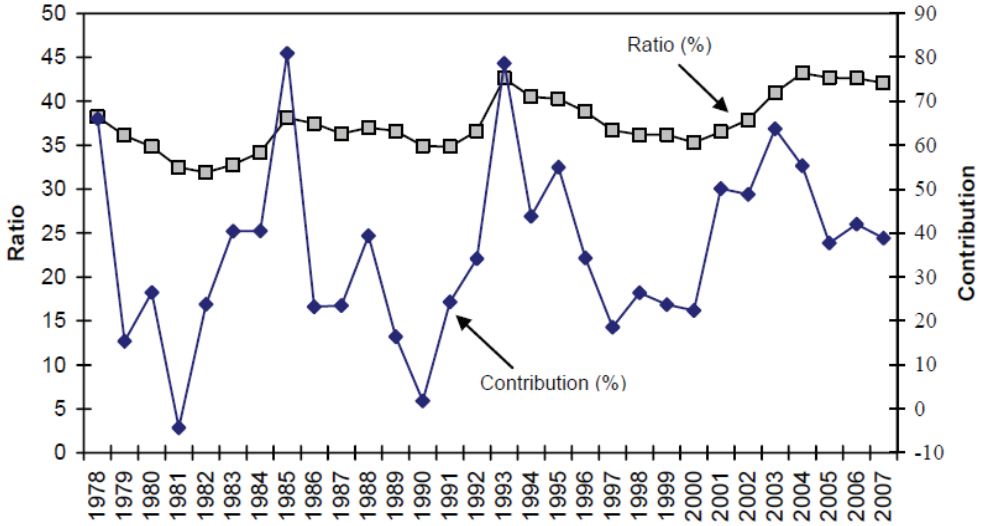
Figure 6.4 Growth rates of China's gross investment and FDI (1981-2007)



Source: Wu (2009: 2, Chart 1)

[95] See, http://forex.finance.people.com.cn/GB/11440427.html
[96] See, http://news.xinhuanet.com/fortune/2011-02/13/c_121070985.htm

Figure 6.5 The ratio of gross capital formation to GDP in China (1978-2007)



Source: Wu (2009: 4, Chart 2)

The standard economics theory tells us that the profit rate is a key variable that shapes investment decision as Balakrishnan and Babu (2003: 4001) point out that 'sustained investment cannot really be divorced from profits in any meaningful way'. Then what explains the puzzling coexistence of high level and growth of investment and low and declining profitability? One intuitive answer might be China has overinvested and Chinese investments are inefficient. Wolf (2005a, 2005b) argues that given the opportunities China enjoyed and its high investment effort, China should have grown even faster, based on which, Wolf argues Chinese economy is highly inefficient, which is echoed by Shan (2006) who points out that China's low-profit growth is costly, wasteful and inefficient. There are many reasons to explain such low efficiency of capital investment, e.g., inefficiency of the financial sector[97] and overcapacity caused by excess investments, which I will briefly discuss below.

McKinsey Global Institute (2005) points out that China's financial markets are underdeveloped. In Chinese financial system, banks play an unusually large role, namely, banks intermediate nearly 75% of the capital in the economy, nearly twice as high as other developing countries in Asia. However, Chinese banks are in general operationally weak and prone to government interventions. One indicator of such weakness is the non-performing loans (NPLs) of Chinese banks. Table 6.6 shows the changes of China's officially reported NPL figures. From this table we can see that Chinese banks had very high level of NPLs at the turn of century. Over the decade, Chinese government has helped to substantially reduce NPLs by transferring NPLs from banks to assets management companies (AMCs) and by injecting capitals to recapitalize the banks (Yao and Han, 2007). In 1999, Chinese government established four AMCs to take over 1.4 trillion Chinese Yuan (CNY) NPLs from the four big state-owned banks. By the end of the first quarter of 2006, the four AMCs have disposed 866.34bn CNY non-performing assets with a 20.84% cash recovery rate.

[97] Lardy (2008) points out that, on the one hand, by most metrics, the financial performance of Chinese banking sector has improved; on the other hand, in one critical respect, the financial system appears to have retrogressed, namely, China's cental bank has been controlling interest rates in a way that has led to significant financial repression as inflation has risen in recent years. Here, financial repression is defined as the low and even negative real return on deposits.

Another solution for managing the non-performing assets is the debt-equity swap (DES) between the AMCs and the borrowing SOEs. However, the change of equity structure does not really change the corporate governance of the SOEs involving DES. Although by the end of 2010, the official figure of the NPLs is very low, at 1.14% of total loans, there exist doubts about the accuracy of the official statistics, for example Ernst & young's estimate of Chinese NPLs was much higher than Chinese official figures in 2001 and 2005 (cf. Lu, Fausten, and Smyth, 2007:231; Richter, 2008) . Also, Fitch, a credit-ratings firm, has long argued that falling non-performing loans do not indicate that banks' asset quality is improving and says China's banks are showing early signs of asset-quality deterioration amid a torrent of lending to help fund government stimulus projects after the global financial crisis in 2008 (Leow, 2009).

Table 6.6 China's official non-performing loans 2001-2010 (billion CNY)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Amount	1800	2632.2	2440.6	1717.6	1313.4	1254.9	1268.4	560.25	497.33	429.30
Of total	25.4%	23.12%	17.8%	13.21%	8.61%	7.09%	6.17%	2.42%	1.58%	1.14%

Source: Report of Non-Performing Loans of Chinese Commercial Banks, various years, available at the website of China Banking Regulatory Commission

Compared to banking sector, China's equity and debt markets are very small and underdeveloped. Therefore, China's financial system offers large companies few alternative sources of funds to banks, which forces large corporations (mainly SOEs) to rely on banks for funds. A direct result of this is that private small and medium enterprises (SMEs) are crowded out for bank loans and credits. McKinsey Global Institute (2005) points out that while private companies produce 52% of GDP but only account for 27% of outstanding bank loans in 2003, in the meantime, the state-owned and collective enterprises absorb 63% of funds from the financial system while they only produce 48% of GDP; and given the fact that the productivity level of SOEs as a group is much lower than that of private companies, this pattern of bank lending has lowered the overall productivity of Chinese economy.

In sharp contrast to making massive losses and suffering from falling profitability in 1990s (Ash and He, 1998), in recent years, Chinese SOEs have substantially improved its financial performances. On 3 August 2010, China's State-owned Assets Supervision and Administration Committee (SASAC) released its 2009 review of the performances of 108 of the 129 SOEs under state level supervision (hereafter China's Central SOEs). According to this review[98], from 2002 to 2009, Central SOEs' total assets increased from 7.13 trillion CNY to 21 trillion CNY with an average annual growth at 16.74%, their sales revenues increased from 3.36 trillion CNY to 12.63 trillion CNY with average annual growth at 20.8%, and their operating profits increased from 240.5bn CNY to 815.1bn CNY with an average annual growth at 19%. And the latest data shows the Central SOEs' total profits for the first time exceeded 1 trillion CNY to reach 1.13 trillion CNY[99]. In contrast, in 2009, the total profits of the top 500 private enterprises were less than that of the 2 top SOEs combined, China Mobile and China Petroleum. However, many Chinese scholars have argued that the major reason for the profit gap between SOEs and private enterprises has been SOEs' monopoly and their low or no costs to access to national natural resources while private

[98] See, http://www.sasac.gov.cn/2010rdzt/yjj/2009hg.pdf
[99] See, http://ccnews.people.com.cn/GB/142056/142071/13980582.html

firms have to buy resources at the market prices; and many scholars believe that SOEs are less competitive than private firms in competitive industries (e.g., Chen, 2010).

Apart from lax risk management, policy lending to SOEs is another major reason for the high level of NPLs in Chinese banks in the 1990s. Chinese governments at different levels often intervene in bank lending to support SOEs for several reasons. One is to boost state-owned economy to generate high economic growth; another one is to prevent insolvent SOEs from going bankruptcy which will cause unemployment problems. With soft budget constraints, Chinese SOEs tend to over invest. Also, Chinese governments at different levels often carry out so-called 'image projects' that look very impressive but do not bring much real benefits to the people. Many image projects such like Shanghai magnetic levitation rail are wasteful investments from a financial point of view. Recently, there has been debate on China's ambitious construction plan of high speed rail network (Zhao, 2010). Due to high construction costs and therefore high ticket prices, many people doubt whether such a vast investment is financially worthwhile; and some scholars worry about the financial fragility of the Ministry of Railway, a wholly SOE in the sense it monopolies construction and operation of Chinese railways.

China's overcapacity problem is certainly not a new phenomenon. According to a report titled 'Overcapacity in China: Causes, Impacts and Recommendations' published by EU Chamber of Commerce in China (EUCCC) in November 2009, as early as in the 1990s, China faced a staggering challenge of overcapacity with excess capacities existing in almost all sectors of the economy. Capacity utilisation rates of 35% to 45% were common in many industrial sectors. Zhu Rongji, the then Premier, took bold measures to restructure the SOEs in order to combat the over-investment problem, causing Chinese growth to slow down for several years. After 2002, Chinese government placed an emphasis on the development of heavy industries (such as (steel, metals and chemicals, wind energy, paper production, all electricity-intensive sectors) and infrastructures including railway network, which contributed significantly to the overcapacity problem. Resources are being wasted if the capacities are under-utilized. With overcapacity, firms will suffer from low profits and in order to maintain profit margins, firms may have to cut costs by maintaining low wage levels and disregarding environmental, health and safety standards and circumvent labour and social laws. Due to lack of funds for R&D, these firms cannot move up the value chain and may feel forced to further increase capacity in the hope of increasing their overall competitive situation (EUCCC, 2009), which is then a vicious circle of excess capacity (Artus, 2009).

Given the fact that Chinese households hold 86 percent of their financial assets in bank deposits and in cash, McKinsey Global Institute (2005: 16) argues that the misallocation of capital and comparatively high cost of financial intermediation have limited the returns on financial assets owned by Chinese households, namely, over the past ten years, returns on Chinese households' financial assets increased just 0.5% a year after inflation in contrast to 1.8% in South Korea. McKinsey argues that if real returns in China were closer to South Korean returns, Chinese households would earn $20 billion more annually; and if China further reform its financial sector to enable banks to channel a larger share of funding to more productive private enterprises, it could greatly increase the average productivity in the economy, as much as 13% of GDP.

6.3 China's efficiency of use of natural resources

As introduced before, natural resources as an input factor can take three forms: materials, energies, and lands. In this section, I will discuss the efficiency of use of material, energy, and land one by one.

6.3.1 Material efficiency

Natural resources are an indispensable input for economic production and form the interface between the natural environment and the economy. There are two plain facts about natural resources. On the one hand, natural resources are not infinitely provided by the environment. On the other, the use of natural resources causes a range of environmental impacts from extraction of raw materials to disposal of wastes (Liu, Duan, and Sun, 2009). Therefore, the efficient use of finite natural resources is very important for building a sustainable economy and society. This concern of efficient use of natural resources gives rise to the emergence and development of industrial ecology (Frosch and Gallopoulos, 1989). One branch of industrial ecology is the material flow analysis (MFA) to analyze the flow of materials, quantify the physical dimension of economy, and recognize early environmental problems (Liu, Duan, and Sun, 2009). Although the MFA can be traced back to Ayres and Kneese (1968, 1969), it took another 25 years before this approach became one of the most important paradigms in 1990s for the empirical analysis of the society-nature-interaction, or the so-called 'society's metabolism' (Fischer-Kowalski, 1998).

The economy-wide material flow analysis (EW-MFA), promoted by Eurostat, has unified international standard therefore is widely adopted in the EU and the OECD countries. The EW-MFA approach treats the economic system as an embedded subsystem of the ecosystem in which materials are tracked from the extraction of natural resources to consumption and transformation within the economy, and finally to disposal of wastes and emission into the environment (Xu and Zhang, 2007). The major indicators of the EW-MFA, among others, include: DEU (domestic extraction used) measuring the total domestically extracted material that are directly used in the national economy, DMI (direct material input) measure the total materials directly used in the economy which equals to DEU plus material imported, TMR (total material requirement) measuring the total material base of the economy, DPO (domestic processed output) measuring the materials consumed domestically, and TDO (total domestic output) which equals to DPO plus the unused domestic extraction (UDE). To evaluate the efficiency or productivity of material input, we can calculate the ratio of GDP to DMI or the ratio of GDP to TMR, similar to the ratio of GDP to capital stock.

While many advanced countries like Germany, Japan and Austria have incorporated such overall materials flow statistics on a regular basis into their standard public statistics (Fischer-Kowalski and Hunter, 1998: 112), very little work has been done for China (Xu and Zhang, 2007) and the only relevant indicator in China's official statistics is the energy consumption per unit GDP (Wang and Yu, 2010). Shi, Moriguichi, and Yang (2003a, 2003b) argue that this is so because 'Chinese industry has not been widely aware of or convinced of the value of industrial ecology and has not been prepared to fund research and practice on the development of industrial ecology tools while Chinese government agencies have not been sensitized to the public goods effects and urgent demands of industrial development in China and have other funding priorities rather than industrial-ecology related research' although Deli Xi offered the course 'Pollution-Free Industrial Process' in Tsinghua University in 1988 published his monograph *Pollution-Free Industrial Processes: A New Paradigm for Industrial Development* in 1990 which introduces the term of industrial ecology (Shi et al., 2003a, 2003b).

In 1994, Chinese government published *China's Agenda 21—White Paper on China's Population, Environment, and Development in the 21st Century*, which regards sustainable development as an increasingly important issue. This White Paper also has raised Chinese scholars' awareness of the importance of industrial ecology research. Since 1995, a number of materials life-cycle assessments (MLCAs) have been conducted. In 2000, with collaboration with a consortium of European

institutions led by the German Wuppertal Institute and funded by the European Commission, Chen and Qiao (2000, 2001), two scholars at Beijing University conducted the first Chinese MFA study. They calculated TMR, DMI, MCI (material consumption intensity), and MP (material productivity) in China for the period 1990 – 1996. According to their calculation, in 1994, China's material productivity, in terms of the ratio of GNP to DMI, was 18.5% of that of the US. But, in terms of the ratio of GNP to TMR, Chinese material productivity was only 5.54%, 4.71%, and 2.23% of that of US, Germany, and Japan respectively, which shows China's low efficiency of use of materials. Liu et al. (2005) also reveal China's low material efficiency in spite of high growth. Their calculation shows in 1996 China's MP in terms of GDP/DMI was 204 USD/t, which was about 1/5, 1/6, 1/7, 1/7, and 1/11 of that of the Netherlands, Germany, Austria, the UK, and Japan respectively while Li (2004) argues that China's MP in terms of GDP/TMR in 1996 was 14.8 USD/t only about 1.9%, 4.0%, 4.3%, and 4.7% of that of Japan, Germany, the Netherlands, and the US respectively.

Xu and Zhang (2007) in later study give more thorough calculation of the material inputs and outputs in Chinese economy. They find that from 1990 to 2002, the annual material consumption in China continuously increased except for a slump around 1998. Also revealed is that the material productivity exhibited a three-phase trend reflecting different national policies of the Eighth, Ninth, and Tenth Five Year Plans. According to their calculation, China's GDP per DMI grew from 143USD/t in 1990 to 178USD/t in 2002 while its GDP per TMR increased from 32 USD/t to 50 USD/t for the same period. China's two material efficiency indicators (GDP/TMR and GDP/DMI) were much lower than those of the US, Japan, and Western Europe. Nevertheless, as several studies have pointed out that over the last three decades China has substantially improved its material efficiency. For example, Wang and Yu (2010) in a latest research thoroughly analyzed the material flows in Chinese economy. Based on data from 1981 to 2008, they found that there has been a relative dematerialization process in Chinese economic development as there is a general decreasing trend of material use for per unit GDP and the speed of dematerialization has been accelerating after 2005. However, as Wang and Yu (2010) point out, while China's material efficiency/productivity has been improving, the scale of Chinese economy is also expanding quickly and there is no sign evidence that absolute dematerialization will appear, therefore, Chinese economic growth will be subjected to tremendous environmental stress.

When it comes to the allocative efficiency of materials, we can use the Physical Trade Balance (PTB) as an useful indicator. The PTB records a country's import, export, and trade balance of physical material trade. In this context, a surplus refers to net import while a deficit refers to net export, which is opposite to the traditional (monetary) trade balance concept. This counter-intuition, or opposite definition of physical trade balance, indicates an important idea, which is it is better to use foreign natural resources for the sake of maintaining a sustainable home eco-system because the ecological burden is outsourced to foreign countries when importing natural resources. In a sense, this can be called 'ecological mercantilism'. Countries may engage in ecological mercantilism if they import certain types of natural resources, the extraction of which can cause serious environmental burdens, or if they import foreign resources to fill their national reserves.

Xu and Zhang (2007) calculate China's PTB and reveal that Chinese PTB showed a decreasing deficit from 5 million tones (teragrams or Tg) in 1990 to 1.81 Tg in 1992, and then a decrease 45 Tg surplus in 1993 to a 54 Tg deficit in 1998, and then an increasing physical surplus from 1999 to 2002. Also reported is that from 1990 to 2001, China's export of coal increased from 17 Tg to 90 Tg. Li (2004) points out that there is huge hidden material flow associated with energy (especially coal) export, therefore, from 1995 to 2002, although the level of China's direct material export was not big, but the hidden flow was very big and China paid much larger ecological environmental costs for such material exports.

An indicative case is China's rare earth export. In the 1980s the US was the world's leading producer of rare earth while sizable deposits are known to exist also in Canada, Australia, India and Brazil, among other places. In the 1990s, rare earth mines in the US were out-competed by Chinese producers who undercut world prices (Livergood, 2010). According to Bradsher (2010), China now produces over 95% of the world's rare earth supply even though it has only 37% of proven reserves, and China's dominance in the global rare earths market is 'not just because of geologic good fortune, although there is some of that, but because the country has been willing to do dirty, toxic and often radioactive work that the rest of the world has long shunned'. From an allocative efficiency perspective, Chinese export of rare earth has been a case of high allocative inefficiency because of not only cheap pricing for precious resources but also the serious environmental consequences and the hidden costs of human health.

6.3.2 Energy efficiency

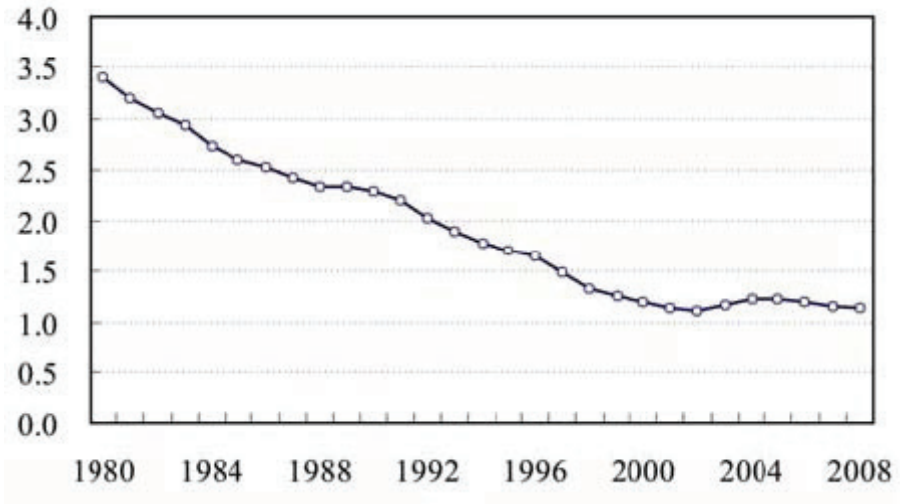
Energy is a particular type of material. Although the MFA approach takes into consideration of all materials include energies (in the form of fossil fuels), energy efficiency as a separate measure of economic efficiency has been widely used in national statistics and academic researches. So, in this section, I will talk about China's energy efficiency.

Compared with material efficiency, China is much more aware of the importance of efficient use of energy because China's per capita energy reserves is very low in the world and the extraction costs of domestic energy resources are relatively high. In 1993, China became a net importing country of crude oil. In 2002, China became the world's second largest energy consuming country next to the US. Coincident with the high growth of economy is a high growth of energy demand. So China's leaders are very concerned about the national energy security. Wang (2011) points out two basic facts about China's energy efficiency. One is that China has significantly improved its energy efficiency since 1978 (cf. Fan, Liao, and Wei, 2007). The other is that China's energy productivity is relatively low and far below than that in industrial countries.

Li, Wang, and Wang (2010) reveal a general decreasing trend in China's energy consumption intensity (ECI, inverse of energy efficiency/productivity) since 1980 (see Figure 6.6). Zhou, Levine, and Price (2010) identify three phases in which China's energy efficiency changes, the first being from 1980 to 2001 where China's ECI (energy use per unit of GDP) declined by approximately 5% per year, the second being from 2002 to 2005 where the ECI increased 3.8% annually, and the third phase being from 2006 to 2010 where Chinese government had a mandatory goal of 20% reduction of energy intensity in its 11th Five Year Plan. Through aggressive energy-efficiency policies and program, by the end of 2010, China has basically met this target[100] (19.06% reduction realized[101]) due to a reduction of 1.79% in 2006, 4.04% in 2007, 4.59% in 2008, 5% in 2009 (He, 2010), and 4.01% in 2010[102] respectively. Wang (2011) attributes China's energy efficiency improvement to changes in capital-energy ratio, output structure, and technological change.

[100] See, http://news.xinhuanet.com/politics/2011-01/06/c_12953828.htm
[101] See, http://env.people.com.cn/GB/13892587.html
[102] See, http://news.sina.com.cn/c/2011-03-01/031022029718.shtml

Figure 6.6 China's energy consumption intensity 1980-2008 (tce/10,000 CNY)



Source: Li, Wang, and Wang (2010: 734, Figure 1). Note: the data is based on 2005 constant prices)

However, China's energy efficiency is still low compared to advanced countries. One report says that China remains among the world's 30 worst countries in terms of energy efficiency[103]. From Table 6.7 we can see China's energy intensity in Agriculture is lower than that of the US, the EU, and Japan. This is mainly because of the low degree/level of China's agricultural mechanization. In the traditional agricultural production mode, fuel-consuming machineries are substituted by manual labor therefore energy can be saved. Except agricultural sector, China's energy intensity is in general higher than that of advanced countries except the US. The US had been the world's biggest energy consuming country before China overtook it in 2010, according to the latest data from China Energy Research Society[104]. China's primary energy consumption in 2010 was 3.25bn tce (tonne of coal equivalent), a 6% growth from previous year. According to China Energy Research Society, China's energy intensity in 2010 was still 3 times and 5 times of that of the US and Japan respectively. This shows China's relatively low energy efficiency compared to the developed countries.

[103] See, BOFIT Weekly, No 10, 11 March 2011, available at: http://www.suomenpankki.fi/bofit_en/seuranta/viikkokatsaus/Documents/w201110.pdf
[104] See, http://finance.sina.com.cn/roll/20110226/01559436540.shtml

Table 6.7 China's energy consumption intensity as a percentage of other countries' in 2007

	Agriculture	Industry	Manufacturing	Transporation	Services
China	0.043 kgoe/$PPP	0.1 kgoe/$PPP	0.131 kgoe/$PPP	0.012 kgoe/$PPP	0.032 kgoe/$PPP (electricity intensity 157 kWh/$PPP)
World average		86.21%	76.16%	36%	(129%)
U. S.	48%	84.03%	74.86%	24%	
U. K.		136.99%	112.93%		
Germany		116.28%	122.43%		
EU	45%	102.04%	94.93%	43%	201% (180%)
France		120.48%	110.08%		
Japan	70%	113.64%	109.17%	55%	(121%)
South Korea		88.50%	112.08%		

Data source: Li, Wang, and Wang (2010)

6.3.3 Land efficiency

According to China Environment Report 2000[105], although China, as the world's third largest country, has 9.60 million square kilometers land, China's per capita land was only one third of the world's average while its per capita arable land was less than half of the world's average[106]. So, land is a relatively scarce resource in China compared to labor. However, as Ash and Edmonds (1998) point out that, 'even allowing for serious under-reporting in official statistics, China's arable land base and water resources have continued to contract'. According to China's Vice Minister of Agriculture Wei Chaoan[107], China's arable land totaled 1.83 billion mu (122 million hectares) in 2009, close to the bottom line set at 1.8 billion mu. So, the efficiency of use of land is very important for Chinese economy. However, according to Wang (2008a, 2008b), China's urban use of land is basically of extensive use mode and its usage efficiency, in terms of a combination of social, economic, and environmental performance indicators, is very low compared that of developed countries (see Table 6.8, Table 6.9). This low efficiency of land use argument is overwhelmingly supported by many Chinese scholars, e.g., Song, Song, and Song (2006).

[105] See, http://cer.jlu.edu.cn/shuiwen/Hygb/hjzkgb/2000CER.pdf
[106] According to Fei Xiaotong (or Fei Hsiao-t'ung) (1982), a prominent sociologist in China, the average cultivated land per capita in China was about 1/7 of a hectare.
[107] See, http://www.chinadaily.com.cn/bizchina/2010-03/10/content_9569181.htm

Table 6.8 China's efficiency of land use (internal and international comparison)

Efficiency indicators		Beijing	Tianjin	Shanghai	Chongqing	Shenyang	Nanjing	Wuhan	Guangzhou	NewYork	London	Hongkong
Social performance	land used per capita	145.75	97.22	53.66	100.87	65.08	120.04	45.48	133.06	140	78.7	35
	overall plot ratio	0.388	0.3437	0.9635	0.5445	0.385	0.7284	0.411	0.5225	1.23	0.68	0.75
	living space per capita	15	18	20. 4	21	15	16	17	17	55	45	7.1
	road area per capita	8.56	7.23	12.92	4.24	6.7	12.13	4.16	11.16	19.8	18.7	16.5
Economic performance	GDP/squre km land	30146.3	44600.41	112377.1	26081.04	53284.19	32506.71	76952.76	52428.4	337179	126133	104083
	GDP per capita	31892	28625	48506	11403	28443	29381	21457	54391	459158	317107	204043
environment performance	green area coverage	40.90%	31.01%	35.99%	18.06%	32.89%	34.51%	34.92%	34.19%	52%	63%	70%
	green area per capita	11.25	6.67	7.35	3.22	6.77	10.02	8.32	9.44	19.02	22.8	11.6
	wastewater treatment	50.06%	43.94%	82.61%	25.12%	32.12%	43.51%	21.40%	31.16%	100.00%	100.00%	91.20%

Data source: Wang (2008a: 81, Table 3.6). Notes: in Table 6.9, land usage per capital, living space per capita, road area per capita, and green area per capita are in square meter per person; GDP per squre kilometer land is in 10,000 CNY/km^2 for Chinese cities while in 10,000 USD/km^2. GDP per capita is in CNY/person.

Table 6.9 China's efficiency index of land use (internal and international comparison)

city	Beijing	Tianjin	Shanghai	Chongqing	Shengyang	Nanjing	Wuhan	Guangzhou	New York	London	Hong Kong
Overall index	0.1533	0.1077	0.3199	0.0336	0.1130	0.1797	0.1402	0.1710	0.9405	0.6331	0.4397

Data source: Wang (2008a: 83, Table 3.13)

The fundamental reason for the low efficiency of land use in China has been the public property rights of land. In China, urban land property rights are held by the 'nation' while the rural land property rights are in the hand of rural 'collective', i.e., the village. This unique land property rights system stipulates in theory that the urban lands are owned by all urban citizens while the rural lands are owned by the village members. However, in practice there is a lack of real ownership of land which causes a lot of problems in urbanization and marketization of lands.

In Mao's planned economy time, urban lands were applied by state-owned working units (SOEs and governmental organizations) and given by the central and local governments after approval. Due to lack of incentives for improving land efficiency, working units often applied more land than needed if used efficiently. So lands were used in general inefficiently and the urbanization process was carried out with wasteful use of land. After Deng's reform in 1979, China gradually started the marketization reform of land. In 1986 China made its Land Management Law and in 1988 Chinese Constitution was amended to allow transfer of land use rights. In 1991 Chinese government promulgated a State Council statute on urban land use rights transfer, which made possible and reality the separation of land ownership and use rights.

Under the 1991 statute, urban organizations who demand land can buy land from the governments and can transfer their use rights of land to other organizations based on market prices. Some organizations may get discounted and even free-of-charge lands from the governments if the

purposes of land use are for public goods and social welfare. Under the law and statute, Chinese governments can requisition rural collective lands when needed. However, there is an upper limit for compensation for requisitioned land which is often far less than the market value of the land after converted into non-agricultural land, which is made possible by the collective rural land property rights system in which the villagers collectively own the lands in theory but do not own anything in practice. Since there are huge economic gains by requisitioning land and selling on the market, local governments have huge incentives to do so, therefore, China urbanization has been rapid since mid-1990s. Due to Chinese *hukou* system in which a Chinese citizen is registered as either an urban citizen or rural citizen, rural citizens are discouraged and restricted to some extent migrating from rural area to urban cities. So, since mid-1990s, China's urbanization speed has been faster than the growth of urban population, which indicates the low efficiency of urban land use.

Another reason for this low efficiency of land use has been China's blind pursuit of GDP growth. local government officials are promoted by making high GDP growth, which gives them high incentive to urbanization and industrialization. In 1980s and 1990s there were fever of development zones which caused huge waste of lands that were granted for development zone projects but left idle for many years. In 1997 Chinese government decided to freeze land application for one year. After the restriction was lifted, within the next seven years, more than 100 million mu (or 6.67 million hectare) of Chinese farm lands were transferred for urban use (Zhang et al., 2005). From this, we can see China's rapid expansion of urban land uses is of extensive growth mode. Especially after 2003 when Chinese government treated real estate industry as one of China's pillar industry, Chinese real estate industry has been growing rapidly, which generate not only high GDP growth but also fiscal revenues for local governments. Therefore, we see the reality in China that local governments and real estate developers are colluding with each other to creating a huge real estate bulb in which the vast majority of China's still poor citizens have to bear super high housing prices. While many people cannot afford a flat, many houses are bought for speculations rather than for living by a relatively small group of rich people.

6.4 The overall efficiency of Chinese economy

As discussed before, economists often use multiple factor productivity (MFP) or total factor productivity (TFP) to measure the overall or comprehensive efficiency of an economy, in contrast to the partial productivity measures like labor productivity and capital productivity.

There exist three main approaches to measuring TFP growth: the growth accounting approach, the index number approach, and the distance function approach (Carlaw and Lipsey, 2003). Although initially the most common approach was growth accounting method originated in Solow (1957), the index number and distance function approaches are becoming more common (Carlaw and Lipsey, 2003). Mawson et al. (2003) also identify another approach which is the econometric approach pioneered by Berndt and Christensen (1973). Here, I briefly introduce the three main approaches and the major problems associated with them.

6.4.1 The growth accounting approach to TFP

The growth accounting approach is based on the idea as follows, namely, if all input factors in the production process are correctly accounted for, TFP growth can be then viewed as the part of growth in real output that is not accounted for by the growth in input factors. Therefore, in this approach the TFP growth is a residual that is normally called Solow residual in honor of Solow's (1957) seminal work.

For a general expression, we can write the economic production function as Y= Af(L, K, R), where Y is the output, L is labor input, K is capital input, R is natural resources input, f is the production function which specify how the input factors (L, K, R) will be converted into the output Y, and A is the productivity level which determinates how much output Y can be produced by a unit of the input factor (L, K, R) combined.

From the production function Y= F(X) = Af(L, K, R) we can get TFP = A = Y/f(L, K, R). To measure TFP and its growth rate, we need to specify the production function f and to calculate the aggregated outputs and inputs. The simple Cobb-Douglas production function states

$$Y = A * L^a * K^b, (a+b=1) \quad (1)$$

where *L* is an index of aggregate labor inputs, *K* is an index of aggregate capital inputs, 'a' and 'b' are the share of output/income paid to labor and capital, then we can express the level of TFP as

$$TFP = A = Y / L^a * K^b \quad (2)$$

Then, the growth rate of TFP is calculated as an arithmetic index generated by taking time derivatives of both sides of the TFP expression

$$\Delta TFP = \Delta A = \Delta Y - a * \Delta L - b * \Delta K \quad (3)$$

where the dot superscript denotes the time derivative.

In theory, there are several problems associated with the growth accounting approach that uses a production function as Carlaw and Lipsey (2003) have pointed out. Firstly, they doubt the strong assumption that we can separate the production function f and the productivity factor A by assuming production function remains stable with productivity-increasing changes in technology being registered solely by productivity increases. Secondly, they are skeptical about the strong assumption that we can meaningfully measure the total inputs of factors over long periods and across very different technologies. Thirdly, they see serious problems in the aggregation from the production functions for individual products to the economy-wide production function used to calculate the TFP, which is impossible when the markets contain the mixture of monopoly, oligopoly, monopolistic and perfect competition.

In practice, there are two problems with the use of growth accounting approach. The first is, if we use a different aggregate production function than the Cobb-Douglas version, the TFP growth may be different. For example, Lipsey and Carlaw (2000) suggest the following production function with an explicit consideration of natural resources as an input factor besides the traditional inputs labor and capital.

$$Y = A * L^a * K^b * R^c, (a+b+c=1) \quad (4)$$

The second problem lies in the assumption that a+b=1, which may not be true. Mawson et al. (2003) point out a and b actually are the elasticities of output with respect to labor and capital, which are typically not readily available and need to be estimated.

Solow (1957: 312) uses the term 'technical change' as a 'shorthand expression for any kind of shift in the production function', i.e., the TFP growth. However, Carlaw and Lipsey (2003) argue that TFP is not a measure of technological change and only under ideal conditions does it measure the supernormal profits associated with technological change. Abramovitz (1956) points out that since we know little about the causes of productivity increase, the TFP growth may be taken as some sort

of 'measure of our ignorance', which still seems to remain true today as economists are still struggling with how to precisely calculate TFP growth.

6.4.2 The index number approach to TFP

The index number approach is widely used by statistical agencies that produce regular productivity statistics (Mawson et al., 2003). For example, the Australian Bureau of Statistics calculates market sector MFP using the index number approach based on a Tornqvist index, as does the US Bureau of Labor Statistics.

The index number approach produces a TFP index by dividing an output quantity index by an input quantity index. The quantity index is a measure reflecting the average of the proportionate changes in the quantities of a specified set of goods and services between two periods of time, which has no meaning from an economic point of view if it involves adding quantities that are not commensurate, although it is often used as a proxy for a volume index[108]. There exist various indexes, four most commonly used are the Laspeyres index, Paasche index, Fisher index and Tornqvist index.

Suppose that the production process uses N inputs to produce M outputs in each accounting period. Denote the quantity of output m produced in period t by y_m^t for m = 1, 2…, M, and denote the quantity of input n used in period t by x_n^t for n = 1, 2…, N.

With vectors of prices $\underline{p}^t = (p_1^t, p_2^t, \ldots, p_m^t)$ and quantities $\underline{y}^t = (y_1^t, y_2^t, \ldots, y_m^t)$ for the m different outputs produced in an economy at time t = (0, 1), the Laspeyres, Paasche, Fisher and Tornqvist indexes are computed respectively as

$$Q_L(p^0, p^1, y^0, y^1) \equiv p^0 \cdot y^1 / p^0 \cdot y^0 = \sum_{m=1}^{M} s_m^0 (y_m^1 / y_m^0);$$

$$Q_P(p^0, p^1, y^0, y^1) \equiv p^1 \cdot y^1 / p^1 \cdot y^0 = \left[\sum_{m=1}^{M} s_m^1 (y_m^1 / y_m^0)^{-1}\right]^{-1};$$

$$Q_F(p^0, p^1, y^0, y^1) \equiv \left[Q_L(p^0, p^1, y^0, y^1) Q_P(p^0, p^1, y^0, y^1)\right]^{0.5};$$

$$Q_T(p^0, p^1, y^0, y^1) \equiv \prod_{m=1}^{M} (y_m^1 / y_m^0)^{0.5(s_m^0 + s_m^1)};$$

where the period *t* revenue share for output m s_m^t is defined as

$$s_m^t \equiv p_m^t y_m^t / \sum_{i=1}^{m} p_i^t y_i^t; \quad m = 1, \ldots, M$$

which is used to weight the individual output growth rates, where p_m^t is the average selling price for output m in period t.

Similarly, with the input price vector w_n^t and input quantity vector x_n^t we can get the counterpart input quantity indexes respectively as

[108] See, http://stats.oecd.org/glossary/detail.asp?ID=2221

$$I_L(w^0, w^1, x^0, x^1) \equiv w^0 \cdot x^1 / w^0 \cdot x^0 = \sum_{n=1}^{N} s_n^0 (x_n^1 / x_n^0);$$

$$I_P(w^0, w^1, x^0, x^1) \equiv w^1 \cdot x^1 / w^1 \cdot x^0 = \left[\sum_{n=1}^{N} s_n^1 (x_n^1 / x_n^0)^{-1}\right]^{-1};$$

$$I_F(w^0, w^1, x^0, x^1) \equiv \left[I_L(w^0, w^1, x^0, x^1) I_P(w^0, w^1, x^0, x^1)\right]^{0.5};$$

$$I_T(w^0, w^1, x^0, x^1) \equiv \prod_{n=1}^{N} (x_n^1 / x_n^0)^{0.5(s_n^0 + s_n^1)};$$

Where the period t cost share for input n is defined as

$$s_n^t \equiv w_n^t x_n^t / \sum_{i=1}^{N} w_i^t x_i^t; \quad n = 1, \ldots, N.$$

Now, a productivity index can is defined as and calculated by an output quantity index $Q(p^0, p^1, y^0, y^1)$ divided by an input quantity index $I(w^0, w^1, x^0, x^1)$.

Although the idea of calculating productivity index is straightforward, there are several problems associated with this approach. The first one is in the choice of what type of index to use. There are two approaches for index selection, the economic and the axiomatic. The economic approach selects index number formulation on the basis of an assumed underlying production function and assumed price taking profit maximizing behavior on the part of produces. Carlaw and Lipsey (2003) point out that some of the assumptions are based on the abstract and unreal world of end-state staionary general equilibrium and have no counterpart in the reality of process competition with path dependent and uncertain technological change. The axiomatic approach compares the properties of the index number formulations with 'desirable properties' and the index number that has the largest number of desirable properties is then selected. Carlaw and Lipsey (2003) point out among the four indexes only the Fisher index has all of desirable properties outlined in the axiomatic approach, thus selecting an index other than Fisher index may not meet the criteria of the axiomatic approach.

The second problem with the index number approach lies in the aggregation problem, i.e., the importance of share weights on the aggregation procedure. Fox (2004) illustrates the aggregation problem by presenting a 'productivity paradox' which shows that in cross country productivity comparison it is possible for one country to have higher productivity in all sectors than another country and yet have lower aggregate productivity due to the affect of sectoral share weights on the aggregation procedure. This 'productivity paradox' can happen within countries as well when individual firms or sectors productivity may increase yet at the aggregate level productivity can still fall (ibid.).

The third problem is how to obtain the necessary price and quantity data in order to construct the indexes. The problem is especially serious when making international productivity comparison for two reasons, one being that different countries may price differently for same/similar inputs and outputs, the other being that different countries use different currencies whose real purchasing powers are different from their nominal exchange rates. To remedy the problem, some scholars use the 'internationally harmonized' prices (e.g., Jorgenson, 2003; Schreyer, 2000) when calculating the indexes for international comparison.

6.4.3 The distance function approach to TFP

The distance function approach uses an output distance function to measure how close a particular level of output is to the maximum attainable level of output that could be obtained from the same level of inputs if production is technically efficient (Mawson et al., 2003). To implement this technique, one must precisely identify the state of technology or production frontier at every point in time and at every level of aggregation. Unfortunately, as Carlaw and Lipsey (2003) point out that this is not possible given the data available. Like measuring technical efficiency at the microeconomic level, researchers have used DEA (data envelopment analysis) technique to estimate the production frontier (e.g., Fare et al., 1994). However, some scholars like Diewert and Lawrence (1999) and Carlaw and Lipsey (2003) have expressed skepticism about the practical merit of the DEA approach to identifying an economy-wide or world-wide production frontier. As Carlaw and Lipsey (2003) point out that there is an implicit assumption underlying the technique that all units being compared, countries or industries, have the same aggregate production function relating inputs to outputs, however, identical production function across industries and countries is not an acceptable assumption as evidence suggests that even firms within one industry do not have identical functions as the productivity and profitability levels varies greatly across firms.

The major measurement problems associated with measuring TFP have been well identified by scholars. For example, Griliches (1987) outlines eight conceptual and empirical problems including: (1) a relevant concept of capital, (2) measurement of output, (3) measurement of inputs, (4) the place of R&D and public infrastructure, (5) missing or inappropriate data, (6) weights for indices, (7) theoretical specifications of relations between inputs, technology and aggregate production functions, and (8) aggregation over heterogeneity (cited in Carlaw and Lipsey, 2003). Yet, these problems have not prevented scholars from doing productivity research and making comparison within or across countries. It is beyond the scope of the current study to discuss how to better measure productivity. Also, due to the technical complexities and the underlying problems of the existing approaches to measuring productivity, I will not calculate but instead make reference to the existing studies on China's productivity in this research.

6.4.4 China's total factor productivity

From above analysis of the three major approaches we can see that there are many problems with using these approaches and therefore different scholars may come up with different calculations if they use different approaches, and even if they use the same approach but they may come up with different results if they calculate the capital stock in different ways or if they incorporate different combinations of input factors, such as labor, capital, human capital, materials, energies, and lands. So, in the extant literature on China's TFP, we find many competing arguments. On the one hand, some scholars argue Chinese growth was largely due to growth of input factors rather than growth of TFP, e.g., Young (1995) and Krugman (2000), therefore, growth of 'extensive' nature (e.g., Wu Jinglian). On the other hand, some scholars argue Chinese economic growth is due to not only input factor growth but also TFP growth. For instance, Yi, Fan, and Li (2003) argue that it is unimaginable that Chinese TFP has not improved given the following four factors: institutional change due to reform, technological advancement, accumulation of human capital due to educational investment, and Chinese currency exchange rate trend and increasing official foreign exchange reserves. Li and Chen (2006) support Yi, Fan, and Li's (2003) argument by adding another factor: the structural change of China's dual economy. Liang (2006) argues that the TFP growth has been the largest contributor to the GDP growth 1979-2005 in China (see Table 6.10).

Due to the problems associated with TFP calculation, I cannot judge with confidence which study gives more accurate result. However, my guess is that China's economic growth cannot be

attributed solely to the growth of input factor, in other words, China's TFP has been improving. However, how much of Chinese TFP growth is far from clear and certain.

Table 6.10 Liang's (2006) attribution of Chinese economic growth

Productivity gains contributed the most to China's economic growth

Contribution to growth adjusted for census results (K0 =1411 Rmb bn, α=0.4)	Average Growth (1979-2005) (% chg yoy)	Contribution (percentage point)	Contribution (% share)
GDP (% yoy)	9.7		
Capital Stock (α=0.4)	8.8	3.5	36.5
Labour	1.9	1.2	12.4
Educational Attainment	2.1	1.3	13.7
Total Factor Productivity (TFP)	3.5	3.6	37.3

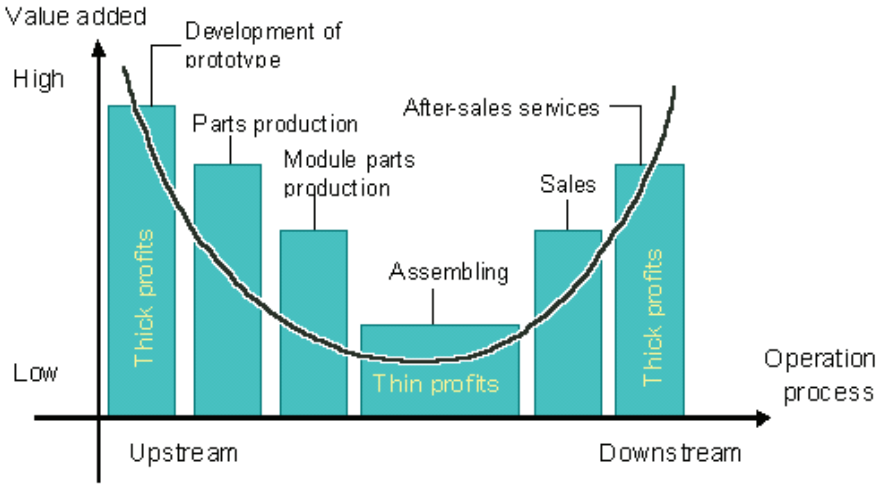
* Based on revised GDP data

6.4.5 China's terms of trade

As explained before, a country's terms of trade (TOT) may offer some information about a country's overall efficiency. According to Gaulier (2006), it would be expected that export prices of an industrializing country like China would gradually catch up and thus improve its TOT, however, this is not the case, and in fact, China's TOT have been sharply degraded over recent years (18% drop for the period 1998-2004) and Chinese export prices dropped more than 15% between 1995 and 2002. Kwan (2002) observes that while China has become the 'factory of the world', the value-added segments accessible to China (as well as other developing countries) are largely limited to the part around the tip of the 'smiling curve' (see Figure 6.7), i.e., fields where value added is the lowest. Kwan points out that the smiling curve has been getting steeper and steeper for China. With a declining TOT, China may be trapped in a grave situation of 'immiserizing growth' in the sense that an increase in production has not necessarily led to an increase in real income.

This is resulted both from very high productivity growth in Chinese manufacturing sector and from intensified competition among other price-competitors. China's declining TOT can be seen as a result of allocative inefficiency for the following reason. China has built up excess capacities in almost all industrial sectors. With high savings rate, China has to rely on foreign demands to absorb these excess capacities. With intensifying competition from other price-competitors, Chinese producers have to rely on price competition due to lack of core technologies and brands, therefore, Chinese export prices decline relative to Chinese import. If China were able to increase domestic demand or to curb the overcapacity problems in the first place, China would have not faced such intense price competition in the export markets. In this sense, China has overall misallocated its resources. To improve China's allocative efficiency, China has to address the structural problems its economy faces. I will discuss more about this issue in the next chapter.

Figure 6.7: The 'smiling curve' of value-added chain



Source: Kwan (2002) http://www.rieti.go.jp/en/china/02081601.html

Chapter 7: The sustainability dimension

In this chapter, I discuss the sustainability dimension of China's national competitiveness. As mentioned in the Analytical Framework chapter, we can assess the sustainability of a country's economic growth/competitiveness by asking if the country is or will be facing any economic, environmental, social and demographic constraints. Here, the economic constraints are mainly about structural problems of the economy, i.e., internal and external imbalances; environmental constraints are mainly about environment pollutions and natural resources (materials and energies) constraints; social constraints are mainly about social tensions, domestic as well as international; and demographic constraints are about the problems of aging population and shortage of labor supply.

In recent years, many scholars, outside and inside China, have argued that China's economic growth has been largely investment and export driven, and the so-called Chinese economic 'miracle' is in fact a myth and the real truth is that Chinese economic development is of extensive growth nature, i.e., large consumption of input factors with relatively low productive efficiency[109]. Therefore, they argue that China's growth or competitiveness is not sustainable (e.g., Huang, 2011; Yu, 2010), and some people even argued that China was facing a coming collapse (Goldstone, 1995; Chang, 2000). This 'China collapse' view might be of over-exaggeration, however, the challenges Chinese economy is facing today is formidable. Chinese Premier Wen Jiabao has openly expressed his deep concerns about sustainability of Chinese growth[110].

In the following sections, I will discuss the deep economic, environmental, social (Nolan, 2005) and demographic challenges China is and will be facing. It is worth noting here that the presence of sustainability challenges does not imply non-sustainability because whether the economy can sustain depends on how the nation copes with those challenges.

7.1 The economic constraints – the structural imbalances of Chinese economy

Despite rapid growth in the past three decades since 1978, there are problems of structural nature (Woo, 2006) facing Chinese economy. China's growth, according to Wen Jiabao, is unstable because of very high rate investment growth, too much of bank credit, excess liquidity, and too large trade and BOP surplus; it is unbalanced because of urban-rural inequality, regional inequality, and imbalance between economic and social developments; and it is uncoordinated because of sectoral imbalances in primary, secondary, and tertiary industries as well as investment-consumption imbalance. So, we see there are many internal and external imbalances (Bergsten et al., 2008; Fan, Wei, and Liu, 2010), which I am going to briefly analyze.

7.1.1 Internal imbalances

Along with rapid economic growth since 1978, China has seen widening regional disparities (Saich, 2011:190), which has caused great concern about both the sustainability of economic development and social stability in China (Liu et al., 2011). Many studies have shown a clear change pattern in

[109] A prominent Chinese economist with this extensive growth view is Wu Jinglian. See Wu, J.-L. (2004) '注重经济增长方式转变，谨防结构调整中出现片面追求重型化的倾向' (To pay attention to the transformation of economic growth mode, and to be cautious about the tendency of over-pursuing heavy industries in the structural adjustment', available at: 'http://www.hongfan.org.cn/file/upload/2009/07/31/1280596502.pdf

[110] See, Wen's press conference during The Fifth Plenary Session of China's Tenth National People's Congress on 16 March 2007, available at: http://npc.people.com.cn/GB/28320/78072/78081/5480100.html

China's regional inequality, namely, from 1978 to 1990, the regional gaps of per capita GDP declined evidently (Jian, Sachs, and Warner, 1996; Li, Feng, and Hou, 2004; Natrajan, 2006); however, since 1990, the trend has been reversed and the regional inequality has continuously increased while the speed of widening has slowed down since 2000 (Xu and Li, 2006).

Table 7.1 presents the regional shares of GDP and population of China's East, Center, West, and Northeast. From this table we can see that from 1980 to 2005 China's East has increased its GDP share from 43.8% to 55.3% while the GDP shares of all the other three regions have decreased. Figure 7.1 shows the regional per capita GDP comparison in China (in terms of the ratio of per capita per capita GDP of the other three regions to that of China's East). Figure 7.2 shows the absolute per capita GDP gaps in China's four regions. All these data show clearly a rising trend in China's regional inequality.

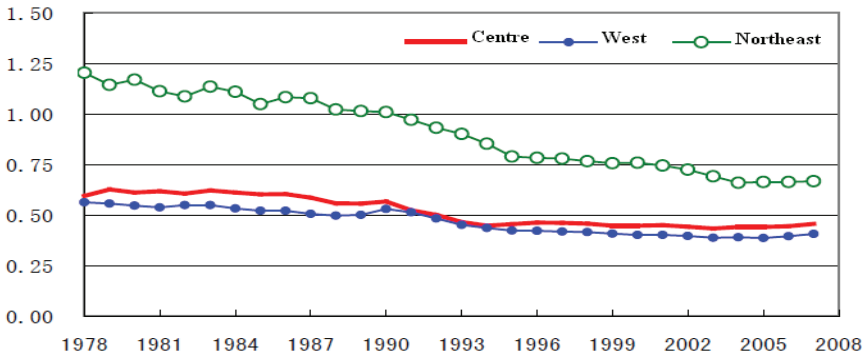
Table 7.1 China's GDP and population structure by regions (%)

	1980		1990		2000		2005	
	GDP	Population	GDP	Population	GDP	Population	GDP	Population
East	43.8	33.9	45.9	34.1	53.5	35.1	55.3	36.4
Centre	22.3	28.3	21.8	28.5	19.2	28.1	18.9	27.2
West	20.2	28.7	20.3	28.5	17.3	28.3	17.4	28.1
Northeast	13.7	9.1	11.9	8.8	9.9	8.6	8.5	8.4

Data source: Li and Xu (2008: 4, Table 1.1)

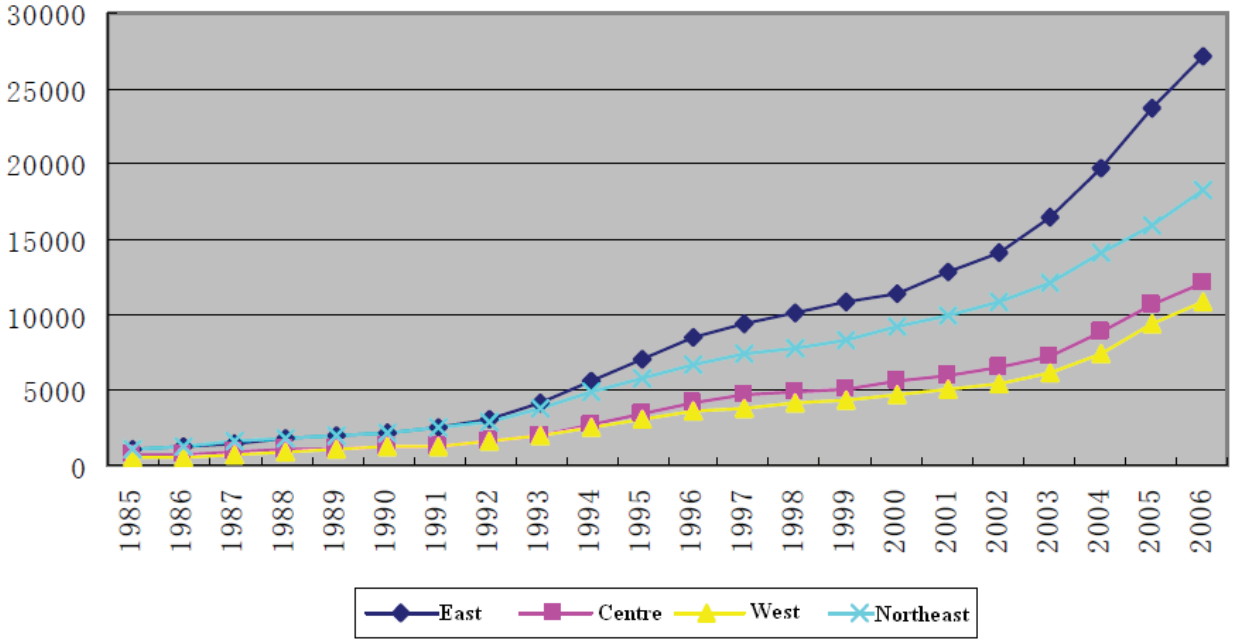
Many explanations have been provided for China's rising regional disparity (Liu et al., 2011), such as natural resource endowments (Zhang et al., 2008), factor market distortions (Lu, 2008), exports, trade liberalization, and globalization (Sha, Naudé, and Viviers, 2007), policies (Chen and Zheng, 2008), technological changes in different regions (Liu et al., 2001). Based on decomposing the Chinese Gini coefficient from 1978 to 2006, Chen et al. (2010) argue that the key factor of income disparity comes from the widening urban-rural income disparity.

Figure 7.1 China's regional per capita GDP comparison (compared to per capita GDP of the Eastern region)



Source: Li and Xu (2008: 5, Figure 2.1)

Figure 7.2: The absolute per capita GDP gaps in China's four regions (CNY)



Source: Wu (2007: 11, Figure 1)

According to China's official figures[111] (see Table 7.2), in 1978, the urban-rural income ratio was 2.56:1 when urban and rural average incomes stood at 343 and 134 CNY respectively. After China introduced the household contract responsibility system (HCRS) to countryside in 1978, Chinese rural economy started to grow rapidly and rural income was quickly catching up with urban income level before Chinese government started urban reform in 1984. In 1983 the urban-rural income ratio was reduced to its narrowest at 1.82:1 in the post-reform period when the urban and rural average incomes were 564 and 310 CNY respectively. However, after the focus of economic reform moved from countryside to the cities in mid-1980s, the income growth of rural residents slowed and the urban-rural income gap widened. In 2000, the income ratio exceeded the 1978 level and it went up to 3.33:1 in 2009. If we take into consideration of other government services such as education and health care benefit, the urban citizens are six time better off than rural residents, according to one estimate [112]. showing widening urban-rural income gap, indicating an unbalanced social development. Figure 7.3 shows the change and trend of China's urban-rural income and Gini coefficient since 1978.

[111] See, Xinhua News Agency (2010) 'China's urban, rural income gap widens', *China Daily*, 22 January, available at: http://www.chinadaily.com.cn/bizchina/2010-01/22/content_9361049.htm

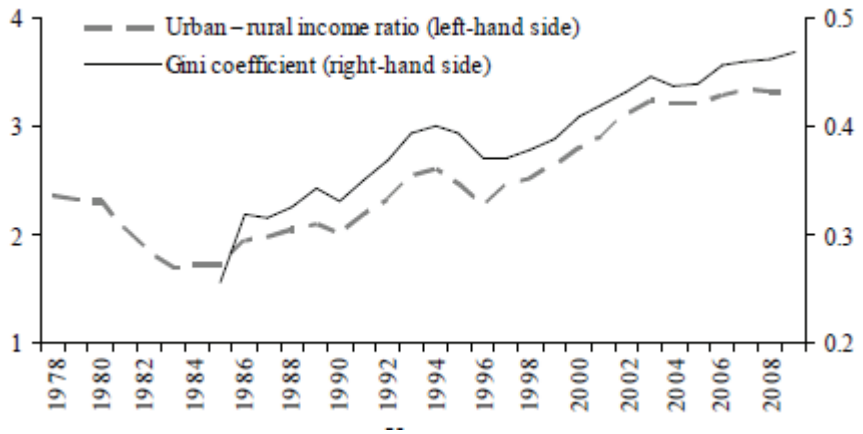
[112] Wei Houkai, a professor of Chinese Academy of Social Science, argued that the real urban-rural income ratio should be 4-6 if the comparability factor is taken into consideration. See, http://www.chinanews.com/cj/cj-gncj/news/2009/06-15/1734339.shtml; also, see Ma, Josephine (2005) 'Wealth gap fueling instability', *South China Morning Post*, 22 December.

Table 7.2: China's urban-rural income gap 1978-2009 (CNY)

	1978	1983	1990	1997	2000	2004	2007	2008	2009
Urban income	341	564	1510	5160	6280	9422	13786	15781	17175
Rural income	134	310	686	2090	2253	2936	4140	4761	5153
Urban rural gap	207	254	824	3070	4027	6486	9646	11020	12022
Urban/rural income ratio	2.56	1.82	2.20	2.47	2.79	3.21	3.33	3.31	3.33

Data source: China Statistic Yearbooks 2010

Figure 7.3: China's Urban-rural income ratio and Gini coefficient



Source: Huang and Wang (2010a:8, Figure 6)

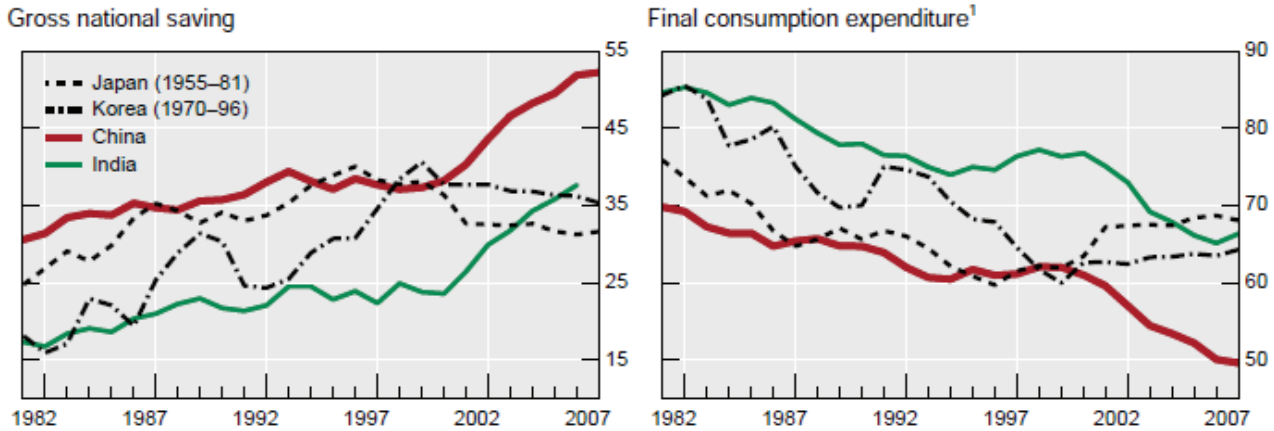
The urban-rural income disparity is to a large degree a result of the sectoral imbalances in the development of China's primary, secondary and tertiary industries. At the beginning of the economic reform and opening in 1978, China's primary industry and tertiary industry accounted for 28.2% and 23.9% of the national GDP respectively while the secondary industry (industry and construction sectors) accounted for 47.9% of the GDP. Over the last three decades, China's primary industry's share of GDP declined to 11.3% and the tertiary industry's share of GDP rose to 40.1% while the secondary industry stayed roughly the same percentage at 48.6% in 2008. Although, with the decline of primary industrial GDP share, China's primary industrial employment share was dramatically reduced (from 70.5% in 1978), China today still has 39.6% of its work force employed by the primary industry (see Table 5-11). According to China's National Bureau of Statistics (NBS) report on 30 years of reform and opening[113], from 1978 to 2007, the average annual growth rates for China's primary, secondary, and tertiary industries are 4.6%, 11.6%, and 10.8% respectively. In addition, for the same period, while China's per capita GDP has grown at an average 8.6%, the growth rate of the average Chinese peasant net income is 7.1%. It is clear that while the secondary

[113] See, http://www.stats.gov.cn/tjfx/ztfx/jnggkf30n/t20081027_402512199.htm

and tertiary industries have grown rapidly in the post-reform era, China's primary industry has lagged behind.

The widening regional and urban-rural disparities and the slow growth in rural income have constrained China's domestic consumption (and therefore consumption-saving imbalance). Figure 7.4 contrasts the changes in China's national savings rate and final consumption rate (as a percentage of China's GDP). By 2007, China's final consumption as a percentage of its GDP was about less than 50% while its savings rate stood at 54.3% of its national GDP in 2008 (Ma and Yi, 2010). Table 7.3 provides an international comparison of national savings rates. Although Asian countries tend to have a relatively high savings rate compared to other countries, China's savings rate is still staggeringly high given its GDP size.

Figure 7.4: China's gross national saving and final consumption expenditure (%GDP)



Source: Ma and Yi (2010: 6, Graph 2)

Table 7.3: International comparison of gross national saving (%GDP)

	1990	1995	2000	2005	2008
China	39.2	42.1	36.8	51.2	54.3
India	23.0	24.5	23.8	34.3	33.6
Japan	33.2	29.3	27.5	26.8	
Korea	37.7	36.2	33.6	32.7	31.9
Mexico	23.6	21.1	23.8	23.3	
Singapore	43.6	49.3	46.9	48.7	48.3
Austrilia	18.6	18.7	19.7	21.6	
Canada	17.3	18.3	23.6	23.8	
France	20.8	19.1	21.6	18.5	18.9
Germany	25.3	21.0	20.2	22.2	26.0
Italy	20.8	22.0	20.6	19.5	18.2
Switzerland	33.1	29.6	34.7	36.9	
UK	16.4	15.9	15.0	14.6	
US	15.3	15.5	17.7	14.6	12.1

Data source: Ma and Yi (2010: 5, Table 1)

Chinese household savings as a share of the disposable income nearly doubled from 16% in 1990 to 30% in 2007 (Wei and Zhang, 2009). There are several theories explaining savings behaviors in economic literature (Wei and Zhang, 2009), such as cultural norm theory which argues some cultures encourage thrift and savings, life cycle theory which predicts that the savings rate rises with the share of working age population in the total population (Modigliani, 1970; Modigliani and Cao, 2004), precautionary savings motive (Blanchard and Giavazzi, 2005; Chamon and Prasad, 2008), and low level of financial development which limits investment opportunities. It is true that Confucian culture treats thrift as a virtue and therefore encourages hard work and saving. From Table 7.3 we can see all the Confucian-influenced countries (Japan, Korea, and Singapore) have a relatively high savings rate compared to other economies. In China, there is a cultural tradition that parents save for their children. However, cultural norms tend to be persistent and therefore can hardly explain the visible rise in the savings rate over the last two decades in China (Wei and Zhang, 2009). So apart from this cultural tradition, there are other factors contributing to China's high saving pattern.

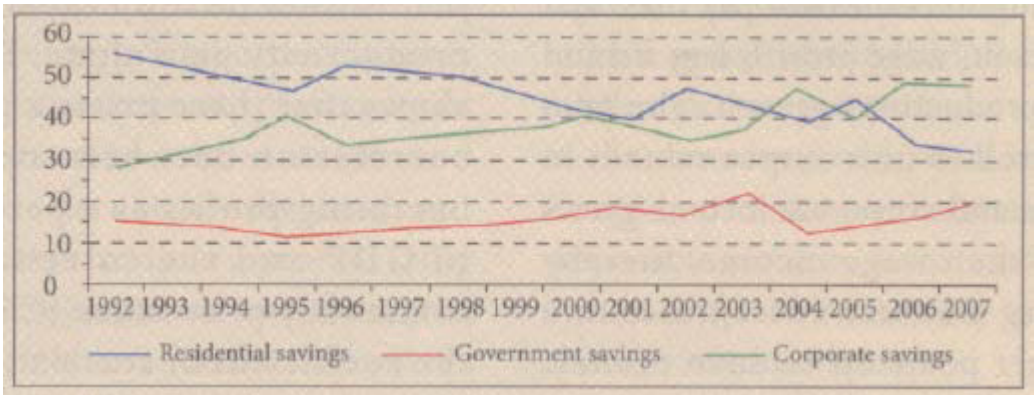
One institutional factor is the lack of social security net in Chinese society, due to which Chinese people often have preventive savings, namely, they save for the future's needs such as health care, retirement, children's education and marriage, and other unexpected. China has a unique household registration system, i.e., *hukou*, which divides Chinese citizens into urban and rural ones (Chan and Buckingham, 2008). In Mao's time, rural citizens were restricted to migrating to cities without official approval and they did not have much social welfare benefit. In the reform era, social security benefits have been largely limited to urban citizens although the Hu-Wen Administration has extended some social welfare to rural population in recent years, such as the new rural cooperative medical insurance scheme. However, over the past 15 years, China's SOE sector has undergone drastic restructuring process. As a result of this SOE restructuring, 50.43 million SOE employees have been downsized in the period 1995-2008 with very low lay-off compensations. The feeling of job insecurity and future uncertainty has contributed to the perceived needs of preventive saving for future.

Another social factor is identified by Wei and Zhang (2009) that Chinese people increasingly engage in competitive saving under rising sex ratio. Due to China's 'one child policy' and Chinese traditional preference for a son over a daughter, China's sex ratio (boys: girls) at birth has risen from 106:100 in 1980 to 122: 100 in 1997 to about 120: 100 by 2007 (Wei and Zhang, 2009). In 2008, China has 683.57 million males and 644.45 million females, i.e., 39.12 million more males than females. This sex imbalance gives rise to intense competition in the 'marriage market', which in turn gives incentive for Chinese parents to save in order to improve their son's attractiveness for marriage. Wei and Zhang (2009) argue that this competitive saving motive factor can potentially account for about half of the actual increase in the Chinese household savings rate during 1990-2007. This argument, if valid, has important implication because the sex ratio imbalance is of structural nature, i.e., it cannot be solved in short run. Indeed, we have been witnessing a societal transformation in which many traditional Chinese values are given way to consumerism and materialism (money-worship) which are prevailing in today's China. These days, many Chinese girls expect their boyfriends to have a flat and a car before they can get married. For many people, such an expectation is impossible to meet because of the high and rising housing prices which are out of ordinary Chinese people's affordability.

Household savings is only part of the story because it is just close to half of Chinese national savings (Wei and Zhang, 2009). Fan, Wei, and Liu (2010: 8) point out that from 1992 to 2007 the main contributor to China's rising savings rate has been the corporate savings. From Figure 7.5 we can see that the share of household savings in China's national savings declined from 56% in 1992

to 32% in 2007 while the government savings changed relatively little and hovered around 16%. In contrast, the corporate savings has jumped from 28.7% in 1992 to 48.7% in 2007. Ma and Yi (2010) provide another different calculation for the same period. Their data show the household savings share declined from 55.77% to 42.86%; corporate savings share increased from 32.14% to 36.29%; and the government savings share increased from 12.09% to 20.85%.

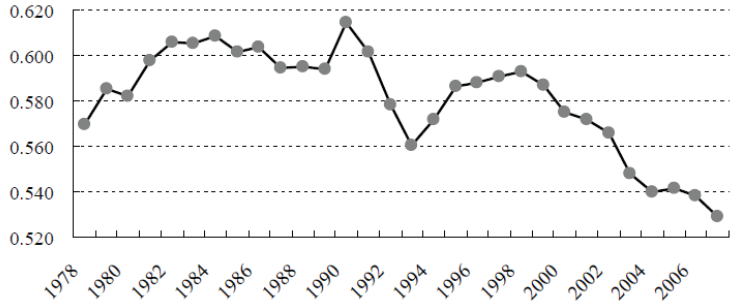
Figure 7.5: The structure of China's national savings



Source: Fan, Wei, and Liu (2010: 9, Figure 4)

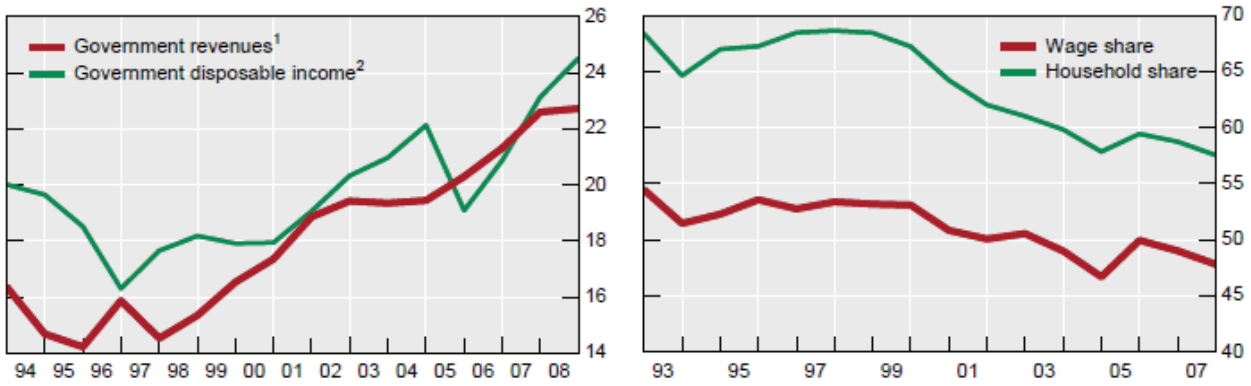
Fan et al. (2010) argue that the fundamental cause of the change of savings structure in China is the change in income structure. According to their data, the ratio of the disposable income of residents to the disposable income of business and government entities has declined from 2.27 in 1992 to 1.36 by 2007. Figure 7.6 shows the movement of labor's share of GDP, from which we can see that labor's share experienced an increase from 57% in 1978 to 60.9% in 1984, and then a small down turn from 1986 to 1989 and jump the peak point in 1990 and then had a big slump during the period 1990-1993 and then rose again to 59.3% in 1998 and since then it has continuously declined. Along with the decline of labor share of GDP is the increase of government revenue and corporate earnings (see Figure 7.7 and Figure 7.8). According to Fan et al. (2010), there are many reasons for the rise of corporate earnings, one being technological advancement and productivity gain, another one being labor wage growth lower than labor productivity growth, and another important one being the strong growth of SOE profits. Chinese Central SOEs (i.e., supervised by the SASAC) as a group has increased their total profit from 240.5 bn CNY in 2002 to 1131.5 bn CNY in 2010, with an average growth rate at 21.36%. While SOEs have improved their efficiency by laying off redundant workers and investing in new technologies and equipments, the main reasons for their high growth and high profitability has been their monopolistic advantages, their access to preferential bank loans, resource SOEs' low and even no costs of using national natural resources, and having paid little dividends to the nominal shareholder the state (Kuijs, Mako, and Zhang, 2005)

Figure 7.6: Movement of labor's share of GDP in China 1978-2007



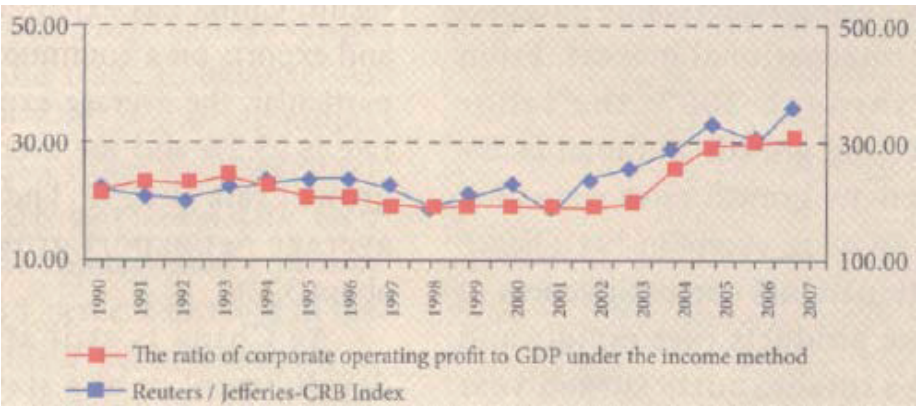
Source: Zhou, Xiao, and Yao (2010, Figure 1)

Figure 7.7: The change of household and government income in China (as a percentage of GDP)



Source: Ma and Yi (2010, Graph 14 and Graph 11)

Figure 7.8: The ratio of corporate operating profit to GDP in China

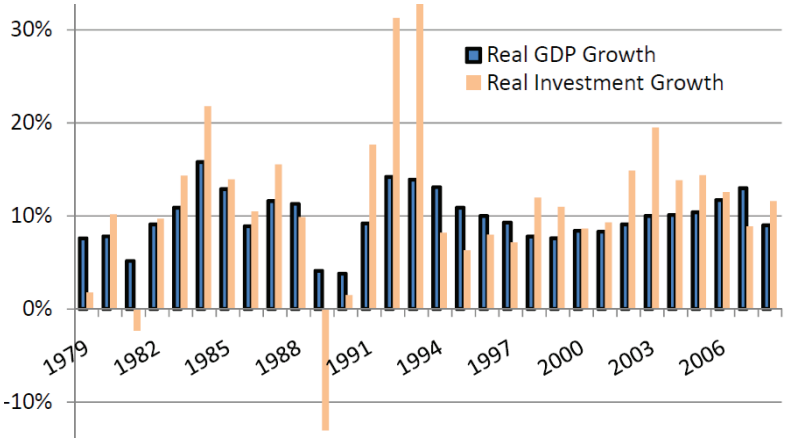


Source: Fan, Wei, and Liu (2010: 10, Figure 8)

China's high savings rate makes high investment rate possible. Figure 7.9 shows the growth of China's investment since 1979. Indeed, China's growth has been investment-driven (Beim, 2011: 4) and therefore is characterized by serious consumption-investment imbalance. From Figure 7.10 we

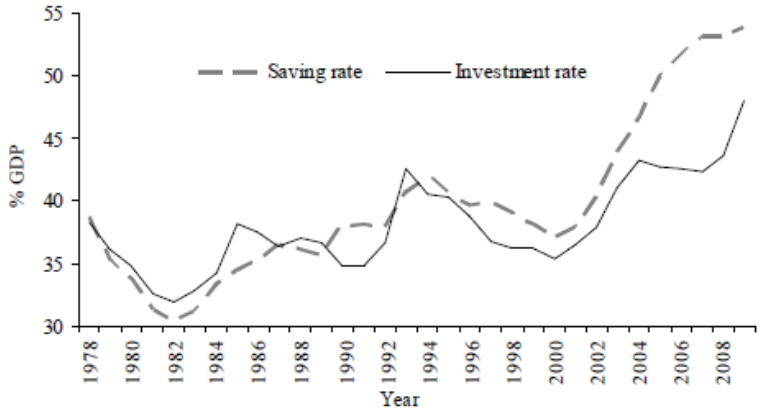
can see China's investment rate has always been above 30% of its GDP since 1978. According to Ye Tan[114], an influential economist in China, China's average investment rate is 37.4% for the period 1978-2008 and from 2003 it has been continuously over 40%, almost twice as the world average rate of investment (22.7% since 1980s).

Figure 7.9: China's real investment growth 1979-2008



Source: Beim (2011: 19, Figure 1)

Figure 7.10 China's savings rate and investment rate 1978-2009



Source: Huang and Wang (2010a:7, Figure 4)

7.1.2 External imbalance

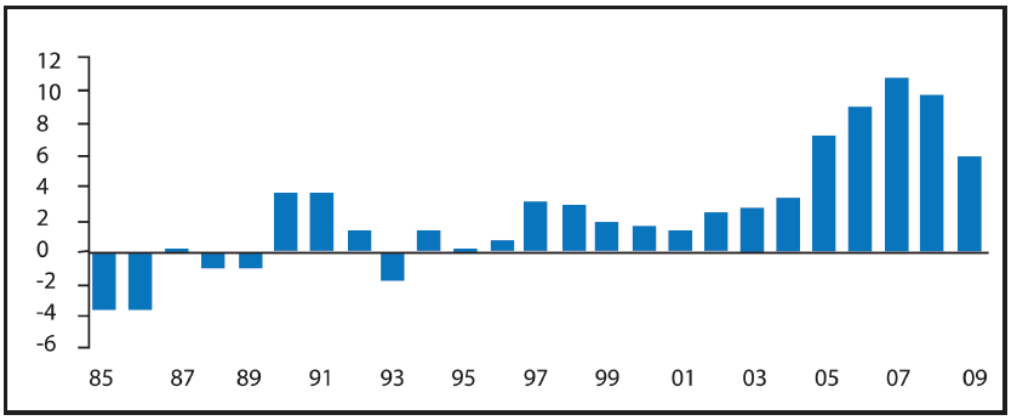
From Figure 7.10, we can also see that since 1994, China's savings rate has been always higher than its investment rate. According to economic theory, the savings-investment gap will be expressed by

[114] See, Ye Tan's blog http://blog.qq.com/qzone/622004674/1277920677.htm

the net export[115]. Correspondingly, China's trade balance has always been in surplus since 1994 and it grew rapidly from 2004 to 2008 (at 295.45bn USD) before the global financial crisis hit the global economy and reversed the growth trend of Chinese net export. Even so, China's net export stood at 196.1bn USD in 2009 and 183.1bn USD in 2010 respectively (see Table 5-17 in Chapter 5). An important reason for China's growing trade surplus during the period of 1994-2008 is China's export-promotion industrialization strategy learned from the East Asian development experience. This strategy succeeded in creating jobs to absorb China's vast army of rural surplus labor, attracting foreign direct investments in processing trades, and earning China massive foreign exchange reserves.

As China's trade balance dominates its current account balance, China has maintained a large current account surplus. Figure 7.11 shows China's current account balance as a percentage of its GDP, from which we can see China's current account surplus in 2007 was above 10% of its GDP. Indeed, in 2007, China's current account surplus amounted to more than 50% of the US current account deficit. Yu (2007) argues that growing external imbalances were not in the interest of China. Running persistent current account surplus, according to Yu, means China as a low-income economy is exporting capital to rich countries. This is so because of China's control of foreign reserves. Foreign reserves earned and received by Chinese firms and people must sell to the state. Therefore, with continuous inflow of trade surplus and FDI, Chinese state has accumulated a large reserve of foreign exchange. To maintain and increase the value of the reserve, Chinese government has invested a substantial portion of the reserve (about 1 trillion USD by 2010) in the US Treasury bonds. By buying US Treasury bonds, Chinese government is essentially exporting financial capital to the US. In addition, compared to the double digital return on foreign investment in China, China's purchasing in US T-bonds is very low-yield investment. If we consider devaluation of the US dollar due to US's quantitative easing monetary policy, China's holding of huge foreign exchange reserve (2.84 trillion USD by the end of 2010) is not beneficial.

Figure 7.11 China's current account balance 1985-2009 (as a percentage of GDP)

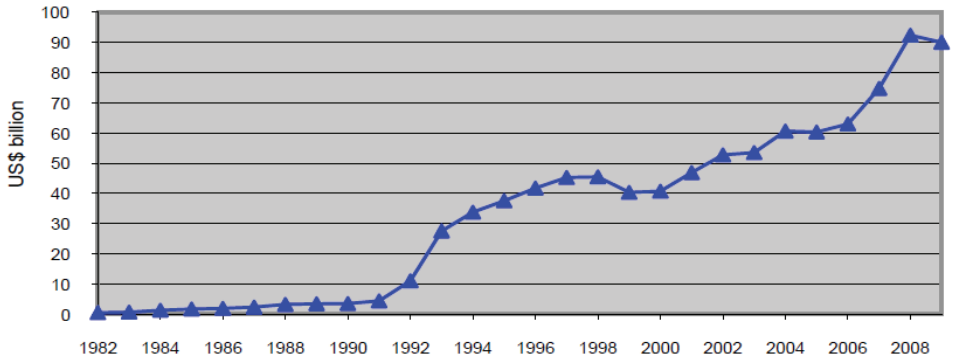


Source: Huang and Tao (2010, Chart 1)

[115] This is because the national GDP equals to consumption plus savings (i.e., non-consumption) while GDP is also equal to the sum of consumption, investment, and net export. In equation format, Y = S + C, and Y = C + I + NX. Therefore, S – I = NX.

Besides the current account surplus, China has always had a capital account surplus since 1985 except 1992 and 1998. The most important contributor to China's capital account surplus is FDI inflows into China (see Figure 7.12). Therefore, China has had continuously a 'twin surplus' since 1994. Such a persistent external imbalance in Chinese economy has been under serious criticisms inside and outside China. In spite of Chinese government's great efforts, this external imbalance can hardly be solved in short run. As scholars have pointed out, the external imbalance has been a result of the internal imbalances such as consumption-investment imbalance, which is caused by high savings rate, which in turn is caused by many structural problems. Therefore, in order to make Chinese growth sustainable, Chinese government has to solve those structural problems, which is by no means an easy task.

Figure 7.12 FDI inflow into China (at current prices)



Source: Chen (2010: 223, Figure 11.1)

7.2 The environmental constraints

China is and will be facing serious environmental constraints at two fronts (Saich, 2011: 364): one, environment pollutions and ecological destruction, the other, natural resource constraints (including water, energy, and land).

7.2.1 Environment pollutions and ecological destruction

China's past economic growth mode has been characterized by high consumption of natural resources and high emission of industrial wastes. Rapid economic growth has given rise to problems of environmental pollution and ecological destruction at home, cross-border pollution, and mounting carbon dioxide (CO2) emissions (Li, 2003). While China has maintained about average 10% annual growth for the past three decades since its reform and opening, China's environment pollution and ecological destruction problem has become increasingly severe and one of important constraints that will hold Chinese economic growth back in the future.

Table 7.4 shows China's industrial waste discharges during the period of 2000-2008. From which we can see, over the last decade, China's total volume of waste water discharge increased from 41.5bn tons in 2000 to 58.9bn tons in 2009 with an average annual growth rate at 3.97%. While China's industrial waste water discharge peaked at 2007 at 24.7bn tons, China's residential waste water discharge has continuously increased from 22.1bn tons in 2000 to 35.5bn tons with an average annual growth rate at 5.41%. In the meantime, China's waste gas emission also has

dramatically increased from 13814.5bn cubic meter in 2000 to 40386.6bn cubic meter in 2008 with an average annual growth rate at 14.35%. The high growth of industrial wastes discharge creates serious concerns about China's environment pollutions. Zhou (2007) points out that while positive progress has been made in environment protection, China's environmental situation still remains grave.

Table 7.4 China's waste discharges during the period of 2000-2009

	Waste water (billion tons)				Waste gas (billion cubic meter)					Solid waste
	Total	growth	Industrial	Residential	Total	growth	SO2 (million tons)	Soot (million tons)	Industrial dust (million tons)	(million tons)
2000	41.5	4.34%	19.4	22.1	13814.5		19.95	11.65	10.92	31.86
2001	43.3	1.62%	20.3	23.0	16086.3	16.45%	19.47	10.69	9.91	28.94
2002	44.0	4.32%	20.7	23.2	17525.7	8.95%	19.26	10.13	9.41	26.35
2003	45.9	5.01%	21.2	24.7	19890.6	13.49%	21.59	10.49	10.21	19.41
2004	48.2	8.92%	22.1	26.1	23769.6	19.50%	22.55	10.95	9.05	17.62
2005	52.5	2.29%	24.3	28.1	26898.8	13.16%	25.49	11.83	9.11	16.55
2006	53.7	3.72%	24.0	29.7	33099.0	23.05%	25.89	10.89	8.08	13.02
2007	55.7	2.69%	24.7	31.0	38816.9	17.28%	24.68	9.87	6.99	11.97
2008	57.2	2.97%	24.2	33.0	40386.6	4.04%	23.21	9.02	5.85	7.82
2009	58.9	4.34%	23.4	35.5			22.14	8.47	5.24	7.11

Data source: China Statistical Yearbook on Enviornment (various years); China State of the Environment Report 2009

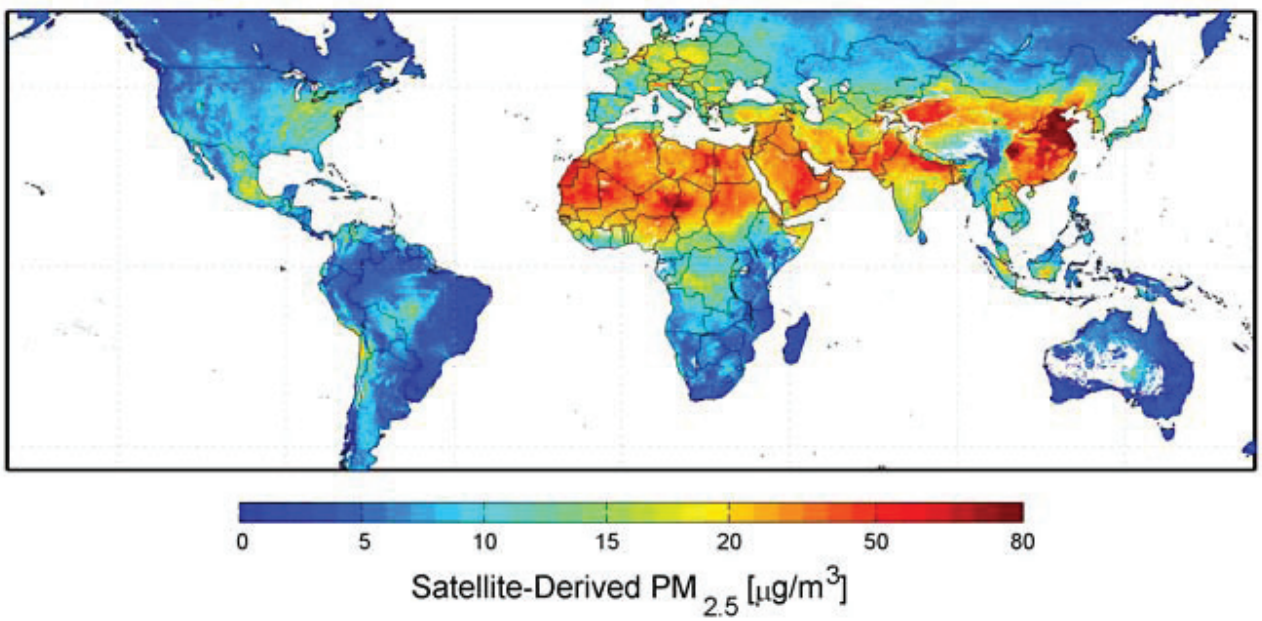
China is now facing severe problem of water pollution. According to a World Bank's (2007) publication *Costs of Pollution in China*, China's pollution of river, lake, and sea waters is very serious. In the period between 2001 and 2005, on average about 54 percent of the seven main rivers in China contained water deemed unsafe for human consumption, a 12% increase since the early 1990s (ibid.: ix-x); in 2004, about 25,000 km of Chinese rivers failed to meet the water quality standards for aquatic life and many of the most polluted rivers have been void of fish for many years; about 90 percent of the sections of rivers around urban areas were seriously polluted (ibid.: 6). In China about seventy-five percent of the lakes exhibit some degree of eutrophication which may cause negative ecological impacts such as decreased biodiversity, changes in species composition and dominance, and toxicity effects. Among the 27 major lakes and reservoirs monitored in 2004, only seven (26 percent) met the water standards suitable for human consumption, among which, none met the highest Grade I quality standard, two (7.5 percent) met the Grade II standard, and five (18.5 percent) met the Grade III standard. All the other 17 sites have lower quality levels than Grade III, among which four (14.8 percent) met Grade IV standard, six (22.2 percent) met Grade V, and ten (37.0 percent) failed to meet the Grade V standard. In addition to the river and lake water pollution, sea water is also subject to serious pollution as thirty percent of sites under sea water quality monitoring have quality poorer than Grade III (i.e., not suitable for human consumption).

The principal driver of severe water pollution in China has been the growing industrial and residential waste water discharges coupled with limited waste water treatment capacity (Wang et al., 2008). Compared to a comparatively success in urban areas, China's environmental policy is not effective in reaching the rural areas (Jahiel, 1997). Most of waste water discharged into rivers, lakes, and the sea derives comes from rural industries that have been widely criticized for their waste of natural resources including water resources owing to the use of substandard equipment and basic technology (ibid.) despite their huge success in creating jobs and generating economic growth. Wang et al. (2008) identify several reasons for the failure of restraining water pollution by rural enterprises. First, Chinese rural enterprises are in general small and the average size was only six employees in 2003. Most rural enterprises are indeed family run and they often use outdated production method and primitive production technology with low energy and resources efficiency and high pollution (Liu, 1992). Second, the rural enterprises are spatially dispersed. There are close to 26 million rural enterprises spread widely in 34301 towns and 603589 villages in 2008. Such a pattern of enterprises scattered in townships and villages make environmental monitoring difficult. Third, rural enterprises are often the source of local tax revenues and local governments have close financial links to them, which limit the effectiveness of environmental regulations' enforcement in the rural area. Last, China's vertical and horizontal dual institutional structure for environmental protection is segmented and uncoordinated. There are several ministries having certain responsibilities in environmental protection. Due to conflict of departmental interests, such an institutional design makes environmental policy implementation often ineffective and inefficient.

China is also facing severe air pollution. Although levels of SO2 and particulates have declined since the 1980s, China's cities still rank among the most polluted in the world (World Bank, 2007: 2). In 2006, a total of 16 of the world's top 20 most polluted cities are in china and the number one on the World Bank list was Linfen City in China's Shanxi Province that is known for its coal industry[116]. Today, seven of the world's 10 most-polluted cities are in China, according to the United Nations' General Secretary [117]. In a recent issue of *Environmental Health Perspectives*[118], Canadian researchers van Donkelaar and Martin at Dalhousie University and their collaborators created a global $PM_{2.5}$ map by utilizing datasets from two NASA (National Aeronautics and Space Administration) satellites[119] (see Figure 7.13). On this map, the red parts represent the areas with the highest levels of particulate matter (PM) in the atmosphere, while the darker blue areas represent the world's least polluted zones in terms of air quality. As commented by the *Wall Street Journal*[120], 'eastern China's industrial area is just about the reddest part of the map, meaning it has the highest concentration of particulates'.

[116] See, http://www.cbsnews.com/stories/2007/06/06/eveningnews/main2895653.shtml
[117] See, http://news.xinhuanet.com/english2010/china/2010-11/01/c_13584615.htm
[118] Environ Health Perspect, 2010 June; 118(6): 847–855. See, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2898863/
[119] PM2.5 particles are air pollutants with a diameter of 2.5 micrometers or less, small enough to invade even the smallest airways. These particles generally come from activities that burn fossil fuels, such as traffic, smelting, and metal processing. This map is republished on NASA's website, see http://www.nasa.gov/topics/earth/features/health-sapping.html
[120] See, Wall Street Journal, 27 September 2010, available at: http://blogs.wsj.com/chinarealtime/2010/09/27/an-overhead-view-of-chinas-pollution/

Figure 7.13 Global satellite-derived map of $PM_{2.5}$ averaged over 2001-2006



Source: NASA, available at: http://www.nasa.gov/topics/earth/features/health-sapping.html

Energy consumption, especially coal consumption, is the main source of air pollutants such as particles, SO2, NOx, and CO in most cities of China. From Table 7.5 we can see China's total energy consumption has increased from 585.87 million tonne of coal equivalent (tce) in 1980 to 2775.15 million tce in 2008, with an average annual growth rate at 5.71%. According to China Energy Statistical Yearbook 2009, coal, as China's primary energy source, has always accounted for above 70 percent of total energy consumption since 1980 and accounted for 79.5% in 1994. Coal production (mining) is a highly damaging and relatively unregulated industry in China. Coal consumption has caused many environmental and human health problems due to lack of widespread coal-washing infrastructure and scrubbers at Chinese industrial facilities and power plants.

Table 7.5 China's energy consumption and composition (10^4 tce)

	Total energy consumption	Growth rate	Coal (%)	Petroleum (%)	Natural gas (%)
1980	58587		74.2	21.4	3.2
1981	57577	-1.72%	75.1	20.6	2.9
1982	59966	4.15%	76.3	19.6	2.6
1983	63635	6.12%	77.0	18.8	2.5
1984	68495	7.64%	77.8	18.1	2.5
1985	74112	8.20%	78.5	17.7	2.3
1986	77776	4.94%	78.2	17.9	2.4
1987	83850	7.81%	78.7	17.6	2.2
1988	89963	7.29%	78.8	17.6	2.1
1989	93666	4.12%	79.3	17.1	2.0
1990	95384	1.83%	79.0	17.2	2.1
1991	100413	5.27%	78.7	17.7	2.1

1992	105602	5.17%	78.3	18.1	2.0
1993	111490	5.58%	79.0	17.1	2.1
1994	118071	5.90%	79.5	16.2	2.2
1995	123471	4.57%	77.0	18.6	1.9
1996	129665	5.02%	76.7	19.5	1.9
1997	130082	0.32%	74.9	21.3	1.8
1998	130260	0.14%	74.2	21.8	1.9
1999	135132	3.74%	73.6	22.3	2.1
2000	139445	3.19%	72.4	23.1	2.3
2001	142972	2.53%	71.9	23.0	2.6
2002	151789	6.17%	71.5	23.4	2.6
2003	176074	16.00%	73.1	22.1	2.6
2004	204219	15.98%	72.8	22.2	2.6
2005	225781	10.56%	74.1	20.7	2.8
2006	247562	9.65%	74.3	20.2	3.0
2007	268413	8.42%	74.3	19.7	3.5
2008	277515	3.39%	74.9	19.2	2.9

Data source: China Energy Statistical Yearbook 2009

Besides water and air pollutions, China's high economic growth has been coincided with sever ecological destruction like deforestation, soil erosion, and desertification. Although China's forest coverage rate has increased from 16.5% in 1999 to 20.36% in 2009[121], deforestation continues to be a major problem facing China's environment, according to China's vice minister of forestry Lei Jiafu[122] who pointed out that the increase is largely due to recent reforestation efforts so trees are immature and the quality of forest cover is low; therefore, on one hand, the resources available for harvesting are inadequate; on the other hand, excess quota logging is still extremely serious. Deforestation leads to severe environmental problems such as mudslide, famine, flooding, CO2 release, desertification, and species extinction. According to Xie Zhenhua, the former minister of State Environment Protection Administration (SEPA), area of soil erosion in China is about 3.56 million square kilometers with 15000 square kilometer growth pear year; and every year an extra 3436 square kilometer land is desertificated[123]. The economic costs associated with ecological destruction in China are very high. According to Chinese Environmental and Economic Accounting Report 2008, the costs of environmental degradation and ecological destruction reached 1.27 trillion CNY, accounting for 3.9% of China's GDP in 2008. The costs of environmental degradation were 894.74bn CNY, accounting for 70.2% of the total costs; while the costs of ecological destruction were 379.82bn CNY, accounting for 29.8% of the total costs. It is worth noting that the costs of environmental degradation in 2008 were 22% higher than that figure in 2007. This accounting result may underestimate the real costs of environmental and ecological damage. According to Nolan (2009: 46), 'China's Vice-Minister of the State Environmental Protection Agency (SEPA) assesses that "China's economic miracle is a myth", since environmental degradation is costing the country nearly 8 percent of its annual GDP'. Other estimations by researchers at Chinese Academy of Science show the total costs of environmental and ecological damage including losses of natural

[121] http://politics.people.com.cn/GB/1026/10397213.html
[122] http://www.terradaily.com/2005/050118102656.tgm9j244.html
[123] http://news.gucas.ac.cn/detail.asp?newsid=10466

resources amounted to 15% of China's GDP in 2003[124] and 13.5% in 2005[125]. These costs do not include the health damages of Chinese people who are exposed to the environmental pollutions. A 2007 World Bank study said each year 460,000 Chinese die prematurely from breathing polluted air and drinking toxic water[126].

7.2.2 Natural resource constraints

Let's start with the constraint of water shortage (Gleick, 2008). According to China's official data[127], China's per capita water resources is only 2300 cubic meter per person, only one fourth of the world's average. In comparison, India and the US's per capital water availability were 1719 and 10231 cubic meter/person/year (Gleick, 2008: 84). In addition, the distribution of China's water resources is highly uneven, 81% of Chinese water resources is located in regions along and south to the Yangtz River where 54% of Chinese population reside, while only 19% of water resources is located in Northern region where 46% of Chinese population live[128]. Due to human and industrial activities, the geographic imbalance of water resources distribution in China has intensified in recent years. Since 1970s, water shortage has been a real problem in China and China's groundwater table is falling by 3-5 meters annually in some parts of China (World Bank 2007: 9). According to an official of the Ministry of Water Resources, about 50% of China's provinces, 76% of China's cities, and 54% of China's population are facing water shortage or constrained water supply problem[129]. China's water shortage amounts to 50bn cubic meter per normal year[130]. An early estimation shows that about 2-2.6 million square kilometer area is subject to drought; about 70 million people face difficulty of drinking water; and the economic costs of the water shortage are about 15-20 million tons of grain output and 200bn CNY industrial output[131].

The irony is that, on the one hand, China is a country with severe water shortage; on the other, China is the largest water-consuming country. In 2002, China consumed 549.7bn cubic meter, accounting for 13% of the global water consumption. From 1949 to 2002, China's annual total amount of water use increased 400bn cubic meter, which is 100bn cubic meter increase for every 10 years. During the period 1980-2001, the growth rate of annual water use has slowed down, but still every year there was on average 6bn cubic meter growth. Table 7.6 shows China's water supply and water use during the period 2001-2008. From this table, we can see that the growth of annual water use has further slowed down at 4.89bn cubic meter increase per year, i.e., an average 0.86% growth. Most of growth comes from the growth of industrial use of water which averages at 3.65bn cubic meter (i.e., 2.92% growth annually).

According to World Bank report *Addressing China's Water Scarcity*, the current policy failures in China's water management include an underdeveloped system of water rights administration, weakness in water demand control, lack of market-based instruments and insufficient financing for pollution control[132]. One important reason for weakness in water demand control is China's water price distortion. In China's major cities, water for residential use is priced between 1 and 3 CNY per cubic meter. This price is low compared with water price between $0.65 to $ 0.80 per cubic meter

[124] http://news.gucas.ac.cn/detail.asp?newsid=10466
[125] http://finance.ifeng.com/roll/20100225/1854472.shtml
[126] http://www.reuters.com/article/2007/07/17/environment-china-environment-worldbank-idUSHKG10337220070717
[127] http://news.xinhuanet.com/fortune/2005-09/19/content_3512629.htm
[128] http://news.xinhuanet.com/fortune/2005-09/19/content_3512629.htm
[129] www.chinawater.net.cn/waterforum/news/1.pdf
[130] According to China's Minister of Water Resources, see, http://www.chinanews.com/gn/2011/03-16/2910556.shtml
[131] http://news.xinhuanet.com/fortune/2005-09/19/content_3512629.htm
[132] http://www.chinadaily.com.cn/bizchina/2009-02/09/content_7455718.htm

in Brazil and between $2.2 and $ 2.7 in England and Wales. In order to provide appropriate incentives for adopting water saving technologies and behaviors, as the world bank report suggests, Chinese government needs to raise water prices to reflect its full scarcity value'.

Table 7.6: China's water supply and water use 2001-2008 (1bn cubic meter)

	Total amount of water use	Agriculture use of water	Industrial use of water	Surface water supply	Ground water supply
2001	556.74	382.57	114.18	445.07	109.49
2002	549.73	373.62	114.24	440.44	107.24
2003	532.04	343.28	117.72	428.60	101.81
2004	554.78	358.57	122.89	450.42	102.64
2005	563.30	358.80	128.52	457.22	103.88
2006	579.50	366.44	134.38	470.67	106.55
2007	581.87	359.95	140.30	472.39	106.91
2008	591.00	366.35	139.71	479.64	108.48

Data source: China Statistical Yearbook on Environment 2009

China may also be constrained by other natural resources such as timber, minerals and energies. Yang, Nie, and Ji (2010) point out that China's timber supply is inadequate in terms of both resource demand and sustainable ecological variety, with resources lacking both in quantity and quality. Due to the thriving economy and decreasing domestic timer supply, timber importation is considered to be the primary solution to fill the widening demand-supply gap. Today China is the world's largest timber importer and a major exporter of timber products[133]. According to Chinese Academy of Geological Sciences, China is facing a serious shortage of mineral resources and all of China's mineral resources are in short supply except for coal. It is also estimated that within the next 20 years, China will need to buy an extra three billion tons of iron, 500 million tons of copper and 100 million tons of aluminum[134].

High dependency on foreign resources not only poses national security risk but also making Chinese manufactures vulnerable to the rise of international commodity price. A case in point is China's import of iron ore for steel making. China has been the world's largest importer of iron ore. In 2000, China's import of iron ore was only 69 million tons and this figure ballooned to 627 million tons, i.e., an average annual growth at 27.79%. Coincided with the increase of China's import has been a rapid rise of iron ore price. From 2005 to 2010, the international iron ore prices increased 116% while China's steel price index has just increased 33%[135]. Being too much dependent on importation of foreign iron ore and a weak bargaining power in international iron ore pricing negotiation, Chinese steel industry, in spite of being the world's largest, is exposed to high rise of resource constraint. A report estimate Chinese steel industry has in total paid 700bn CNY more to the foreign iron ore suppliers over the eight years since 2002[136], as a result, Chinese steel makers' profit margins have been squeezed seriously. In 2010, China's 77 largest steel enterprises

[133] http://sd.defra.gov.uk/2010/03/helping-china-cut-imports-of-illegal-timber/
[134] http://www.china.org.cn/english/China/53520.htm
[135] http://news.xinhuanet.com/fortune/2010-12/19/c_13655639.htm
[136] http://news.163.com/09/0724/06/5EVFLB6P000120GR.html

made a total profit of 89.7bn CNY, less than that of Austrilian Rio Tinto who supplies iron ore to Chinese steel firms[137].

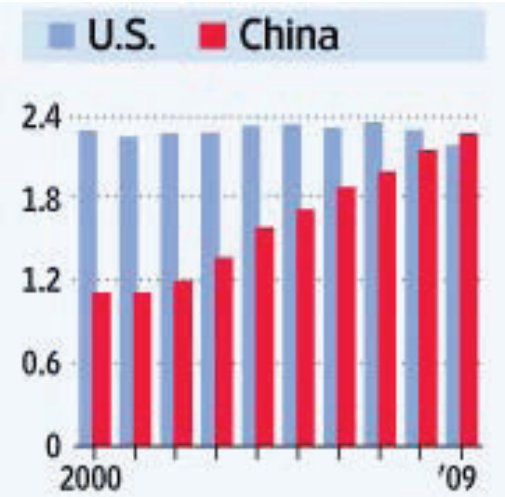
China is now facing an energy shortage problem. With the fast growing economy, China's energy demand and consumption have grown rapidly (see Table 7.5). In 2002, China became the world's second largest energy consuming country next to the US. With an average annual 10.58% growth during the period 2002-2008, China's energy consumption was quickly catching up with that of the US (see Figure 7.14). In 2010, China became the world's largest energy consuming country. In 1993, China became a net importing country of crude oil. Table 7.7 shows China's net import of oil during the period 2002-2007, from which we can see that China's net import of oil more than doubled within 5 years. In 2009, China's total oil imports reached 204 million tons while its domestic oil production was 190 million tons, making China's foreign crude oil dependency ratio stand at an alarming level of 52%[138], compared to 45% in 2006. This growing dependency on foreign oil raises concern about China's energy security as all major oil fields in China are close to running dry and Chinese Academy of Science estimates that China will need to import 70 percent of its crude oil (or 500 million tons) and half of its gas requirements (or 100 billion cubic meters) by 2020[139].

Table 7.7 China's net import of oil (million tons of oil equivalent)

Year	2002	2003	2004	2005	2006	2007
Amount	79.8	106.16	148.29	143.52	168.56	183.83
Growth		33.03%	39.69%	-3.22%	17.45%	9.06%

Data source: China Energy Statistical Yearbook 2009

Figure 7.14 Total primary energy consumption in China and the US (in billions of metric tons of oil equivalent)



Source: International Energy Agency 2010

[137] http://news.xinhuanet.com/fortune/2011-02/17/c_121091245.htm
[138] http://www.chinadaily.com.cn/bizchina/2010-01/14/content_9317926.htm
[139] http://www.china.org.cn/english/China/53520.htm

A third category of natural resource constraint is China's decreasing stock of arable land. China's arable land accounts for 7% of the world total while it has 22% of world's population. China's per capita arable land resources is only 40% of the world's average. Therefore, China has a structural contradiction between large and growing population and limited and decreasing arable land. This contradiction urged Lester R. Brown (1995) to ask the question 'who will feed China?'. Given the severe challenges and imperative of arable land protection, Chinese economic planners made a bottom line of preserving 1800 million mu[140] of arable land in the Eleventh Five Year Plan (2006-2010). However, with rapid industrialization and urbanization, China's arable land stock has been shrinking rapidly. Within 13 years from 1997 to 2010, China's arable land decreased from 1949 million mu to 1826 million mu, which means an average annual decrease of 9.46 million mu[141].

The official figure is very close to the 'red line' of 1.8 billion mu[142]. But there are reasons for doubting the reliability of reported figures as illegal occupation of arable land is common in China and local government officials often report fake figures due to different reasons. For instance, in many localities small factories are built by 'renting' arable lands which are still reported as arable land but they are not arable any more. In addition, local officials may under report the arable land figure so that they will have more flexibility in the future when land for industrial use is needed; on the other hand, local officials may over report because they are afraid of being criticized and punished by losing control of land use. China's most famous agricultural scientist Yuan Longping believes the red line has already been broken[143].

An important reason for the rapid decrease of arable land has been the fact that many local governments rely on selling land to generate fiscal revenue, the so called 'land financing' phenomenon. After the 1994 tax reform (cf. Tsang and Cheng, 1994), although Chinese government's tax revenue has grown rapidly, the share allocated to local governments is limited. According to the tax sharing agreement between the central and local governments, incomes generated from land transfer belong to local governments. Therefore, local governments have huge incentives to convert agricultural land to industrial land and sell to industrialists. In 2010, the total fees of land use rights transfer amounted to 2.91 trillion CNY, accounting for 7.31% of China's GDP.

There are at least two serious consequences of rapid decrease of arable land. One is that there will be less land available for urban and industrial expansion in the future as the stock of arable land approaches to the 'red line'. This will not only constrain China's urbanization but also make the local governments less capable of generating fiscal revenue by selling land in the future. On the other hand, decreasing stock of arable land coupled with environmental and ecological destruction will make China's grain output growth more and more difficult. Table 7.8 shows China's grain output from 1978 to 2008, from which we can see China's grain output fluctuates over the period and decreased from 508.38 million tons in 1999 to 430.69 million tons and then recovered to 501.60 million tons in 2007 and only exceeded the 1999 level to reach 528.71 million ton in 2008. This period (1999-2007) is also one when China's arable land stock rapidly shrunk. Although grain output is also affected by many other factors such as weather, water, and use of fertilizer, we can still see a correlation between China's grain output stagnation and the decrease of arable land during the period of 1999-2007.

[140] 1 acre = 6.07 mu
[141] http://news.xinhuanet.com/politics/2011-02/24/c_121119918.htm
[142] As of 2011, the official data is about 1826 million mu. See, http://politics.people.com.cn/GB/1026/14000189.html
[143] http://news.xinhuanet.com/comments/2009-04/09/content_11153104.htm

Table 7.8 China's grain output and growth rate 1978-2008 (million tons)

Year	1978	1980	1985	1990	1991	1992	1993	1994	1995	1996	1997
Output	304.77	320.56	379.11	446.24	435.29	442.66	456.49	445.10	466.62	504.54	494.17
Growth rate					-2.45 %	1.69 %	3.12 %	-2.49 %	4.83 %	8.13 %	-2.05 %
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Output	512.30	508.39	462.18	452.64	457.06	430.70	469.47	484.02	498.04	501.60	528.71
Growth rate	3.67 %	-0.76 %	-9.09 %	-2.06 %	0.98 %	-5.77 %	9.00 %	3.10 %	2.90 %	0.71 %	5.40 %

Source: China Agricultural Yearbook 2009

7.3 The social constraints

7.3.1 Domestic social constraints

Three decades of high economic growth has drastically changed China's economic conditions and the global economic landscape. While China's economic development has successfully raised Chinese people's living standard and lifted some 400 million people out of poverty (Woetzel, 2006), China's economic growth has simultaneously changed its domestic social situation. Over the last three decades, China has rapidly transformed itself from an extremely egalitarian society in Mao's time into one of the world's highly unequal society in the reform era. With widening urban-rural divide, income disparity, social injustice, rampant corruption, and rising unemployment coupled with lack of social safety net, China is witnessing rising domestic social tensions and social unrest. Such domestic social tension not only can constrain economic development but also challenge political stability (Ash, 2006) of China.

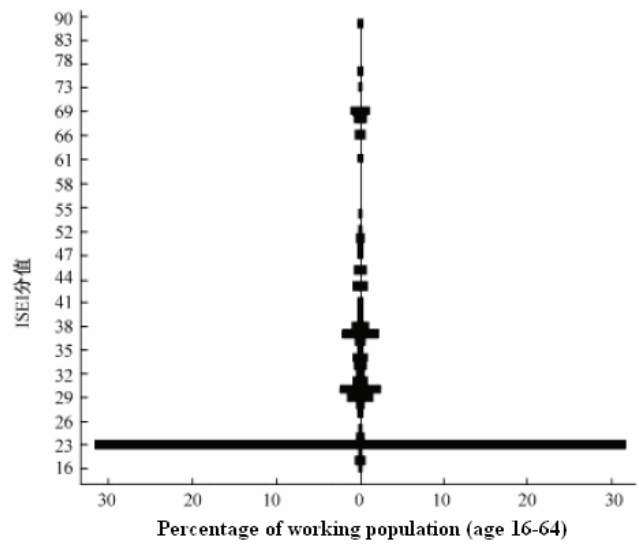
Why are there rising social tensions in China? One important reason is the rapid change structure of benefit distribution due to the reforms and the consequent change of social stratification in China over the past three decades. In Mao's time, the goal of policies emphasized equality in outcome, for instance, equal distribution of land to peasants and equalization of housing welfare for urban citizens. During the Cultural Revolution, the level of social equality in China was further raised. In terms of national income distribution, the lowest 20% income group received 6-7% national total income before the Cultural Revolution, while their income share increased to 9-10% during the Cultural Revolution (Li, 2007). So, during Mao's time, Chinese society valued more equality than efficiency and indeed Maoist China was one of the most egalitarian societies. However, when Deng Xiaoping came to power, he allowed a part of Chinese people to get rich first in pursuit of economic efficiency. Under this principle, China's reform policies switched to favor efficiency over equality. This switch quickly caused many problems generating social tensions which ultimately led to 1989 Tiananmen Incident. After Deng's famous Southern Tour in 1992, China's reform and opening policy was reaffirmed and the mentality of efficiency higher than equality was reinforced, which

would profoundly affect structure of benefit distribution and ultimately the social stratification in China since then.

Take the SOE reform in 1990s for example. In pursuit of efficiency, the government made policies to break the 'iron bowl' and lay off redundant workers. The new policies were in favor of the managerial and technical personnel rather than the majority of ordinary workers in the SOE sector, which was in sharp contrast to the situation in the early 1980s when peasants and workers benefited evidently. SOE workers, once 'bought out' out their years of service in their work units, would lose their social welfare such like unemployment benefit, medical insurance, and pension. In such a SOE restructuring process, tens of millions of Chinese workers have been socially marginalized (Zhang, 2006). Another case is the housing reform. Before mid-1990s China had a house welfare system in urban cities in which urban workers would be allocated state-built flats according to their ranks and seniorities. However, in 1999 Chinese government made a policy to dismantle housing welfare system and leave the housing task to the market. This policy stimulated the development of real estate industry which created a lot of employment and generated much GDP. However, this policy makes the young people and poor people unaffordable of a home due to rapid rise of house prices. In contrast, a small group of rich people are made advantageous by the policy because they can buy several houses for speculation.

Due to many market-oriented reform policies, which are often in favor of elite groups (like officials, business owners, and high-income professionals), the vast majority of Chinese people have not equally benefited from the reform and economic growth. The clear signs of this judgment include, widening urban-rural gap, increasing income disparity, and rising regional inequality, etc. According to Li Qiang, an sociologist at Tsinghua University in Beijing, after 30 years of reform, China's social stratification is neither pyramid-share nor olive-shape, instead it is like ⊥ shape based on ISEI index, namely, 63.2% of total working force (age 16-64) form the huge bottom base of the society while all the other groups are very small (see Figure 7.15). According to Q. Li (2005), this ⊥ shape social structure is even worse than the pyramid type because this bottom group is too big which makes sharply contrast between this group and the others, indicating clear difference between this group and the rest of the society. Correspondingly, China's four-class structure in Mao's time, i.e., Chinese society being made of workers, peasants, intellectuals and officials, has been fundamentally transformed. Although Chinese government classifies Chinese society into three income-groups including high-income, middle-income, and low-income group, there are other academic analysis of China's social stratification. One argument is that China now has ten classes including officials, managers, private business owners, technical professionals, civil servants, sole proprietors, service workers, industrial workers, famers, and unemployed; while another analysis argues that China has a new four-class structure based on whether their interests are strengthened or hurt and the four classes are special interests group, ordinary interests-enhanced group, relative interests-hurt group, and societal bottom group (cited in Q. Li, 2007). No matter which classification to use, the reality is clear that some groups of people are made better off while some others worse off (absolutely or relatively) by the reform, which is the root cause of the rising social tensions.

Figure 7.15 China social-economic status structure based on ISEI index



Source: Q. Li (2005, Figure 1)

The clear signs of the rising social tensions are the frequent and widespread occurrence of 'mass incidents'[144] in China in the last decade. From Table 7.9, we can see the total number of mass incidents in China in 1993 was 8700. But this number has increase 10 folds within 12 years to reach 83600 in 2005. After 2005, Chinese government no longer publishes the figure. But an unconfirmed estimate says the number in 2008 was about 120,000 (Tong and Lei, 2010a). There are broadly four types of mass incidents[145]. One is rights-fighting dispute. This is the biggest type, roughly accounting for 80% of all mass incidents. This type of mass incidents is normally launched by disadvantaged social groups/people who fight for their rights to subsistence (Tong and Lei, 2010a: 30). The usual disputes include labor disputes (SOE laid-off workers and non-SOE workers), land and relocation disputes (peasants who lost their land and urban citizens whose homes are demolished and forced to relocate), environment pollution disputes, and so on. The second type is normal social disputes, which accounts for 10%. The third type is social disturbances, which accounts for 5%. The fourth type is riots and organized crimes, which accounts for 5%.

Table 7.9 Incidents of 'Mass Disturbances' in China

Year	1993	1994	1995	1996	1997	1998	1999	2000
Incidents	8,700	10,000	11,000	12,000	15,000	25,000	32,000	40,000
Growth		15%	10%	9%	25%	67%	28%	25%
Year	2001	2002	2003	2004	2005	2006	2007	2008
Incidents	n/a	50,400	58,000	74,000	83,600	(90,000)		(120,000)
Growth		12%	15%	28%	13%			

Source: Keidel (2006: 3, Table 1) 2006-2008 data are unconfirmed estimates (Tong and Lei, 2010a)

[144] Chinese government has never had a publicized official definition of mass incidents. But 's internet-based sources show that it is broadly defined as any social dispute involving 5 or more people against the government and interests group with government links.

[145] According to an influential Chinese scholar, Yu, Jianrong, who specialize in Chinese mass incidents. See, http://www.ccwe.org.cn/journal/8/23.pdf

Due to rising social tension and grievance, the anger of many disadvantaged groups/people may be ignited by some small-scale mass incidents which then may be quickly turned into larger-scale mass incidents or even disturbances. Many disadvantaged people are just angry and discontent therefore may take some mass incidence as an opportunity to vent their frustrations against the authorities (Tong and Lei, 2010a: 32). Tong and Lei (2010a) have recorded 248 large-scale mass incidents during the period of 2003-2009. Among the 248 large-scale mass incidents, 108 incidents were about labor disputes (64 SOE: 44 non-SOE), 26 about land disputes, 12 about pollution disputes, 7 about student incidents, 6 about ethnic disputes.

Table 7.10 Large-scale mass incidents in China, 2003-2009

Year	2003	2004	2005	2006	2007	2008	2009	Total
Cases	9	20	9	25	63	76	46	248

Data source: Tong and Lei (2010b, Table 1)

Contrary to the conventional view that authoritarian regimes tend to suppress social protects by force, Tong and Lei (2010b) argue, Chinese government has tolerated most large-scale mass incidents (60% of their recorded cases) and accommodated close to 30% of the recorded large-scale mass incidents. The central government reminded the local governments to dispatch police forces (policemen and armed police) with caution. However this does not mean Chinese government has no teeth as the government applied force in 4% of the recorded cases.

Although some scholars argue the threats to political stability posed by the increasingly severe social and economic tensions remain, for the time being, potential more than real (Ash, 2006) as most of the incidents are of non-political nature. The economic costs of these mass incidents are very high. According to China's Ministry of Finance, the national spending on public security in 2010 amounted to 549bn CNY, a 15.6% increase from previous year and exceeding the public security budget for 34.6bn CNY; while China's national defense expenditure was 533.4bn CNY, a 7.8% increase from the previous year. For 2011, the national budget for public security was set 624bn CNY, which is higher than the national defense budget (602bn CNY)[146], also higher than the total budget for education (296.36bn CNY), health care (172.76bn CNY), and housing (129.27bn CNY)[147].

7.3.2 International relations constraints

Besides domestic social constraints, China will face increasing international relations constraints due to trade frictions, exchange rate issue, and CO2 emissions, etc.

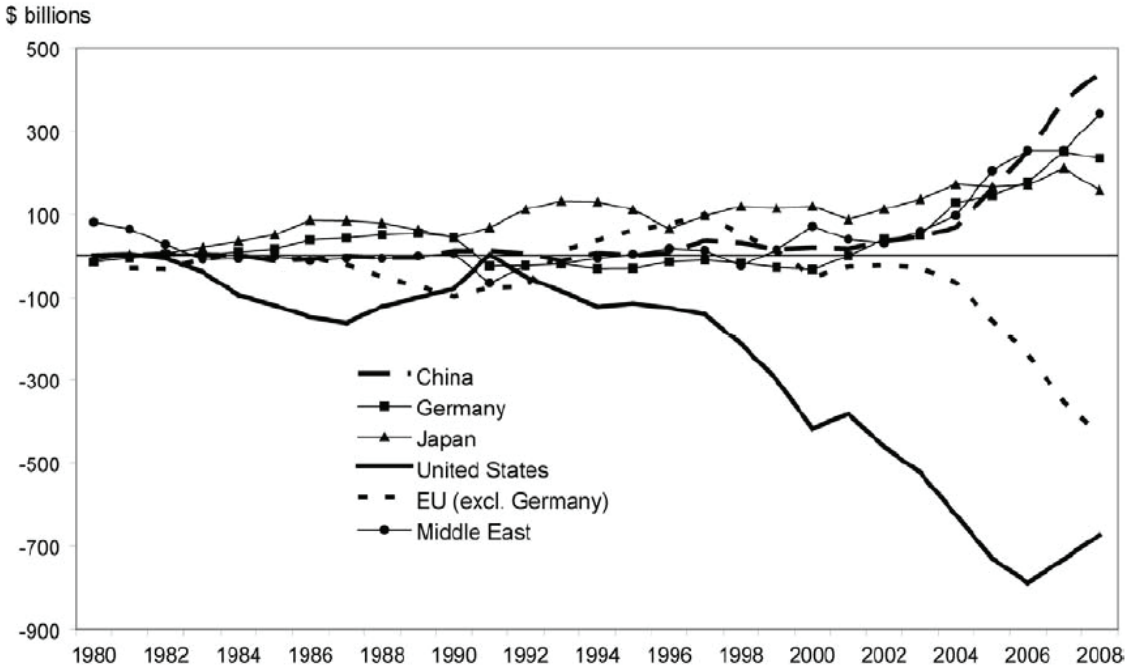
China's huge trade surplus has been a primary target of international criticism. It has been put in the context of global imbalances where China, Middle East, Germany and Japan are the major surplus nations/regions while the US and the EU (excluding Germany) are the biggest deficits country/region (see Figure 7.16). China was blamed for its role in the 2008-2010 Global Financial Crisis, view best represented by current U.S. Federal Reserve Chairman Ben Bernanke who sees savings glut from countries like China as a cause of the low savings rate and the property bubble in

[146] See, http://www.bbc.co.uk/zhongwen/simp/china/2011/03/110307_china_securityspending.shtml
[147] Data source: http://news.xinhuanet.com/politics/2011-03/10/c_121169869.htm

the United States (Bernanke, 2005). The former US Treasury Secretary Hank Paulson was said to have similar kind of view as Bernanke's in a *Financial Times* article on 1 January 2009, which quoted Paulson saying 'the crisis was partly the result of a collective failure to come to terms with the way the rise of emerging markets was reshaping the global financial system'[148]. Although Paulson later on explained he was wrongly portrayed as he believed that no single country is to blame for the imbalances[149].

Also, China's huge trade surpluses in recent years have been argued as a result of mercantilism supported by currency manipulation. The most severe criticism on China's currency policy might be from Paul Krugman, the Nobel Prize winner in economics of 2008, who argued that Chinese government manipulates the exchange rate of Chinese currency and by doing so China 'is siphoning some of that inadequate demand away from other nations, which is hurting growth almost everywhere' and the biggest victims of China's beggar-thy-neighbor policies are probably workers in other poor countries. This harsh criticism soon became widespread and influential, which have in some way made many countries, developed as well as developing, to start to doubt and challenge China's currency policy too. Since then China has been under increasing international pressure to appreciate its currency, for which China had consistently rejected until China finally made an important compromise[150] at the G20 Meeting of Finance Ministers and Central Bank Governors in Paris during 18-19 February 2011, where, after a tough negotiation, China agreed that the external imbalance composed of the trade balance and net investment income flows and transfers be monitored 'taking due consideration of exchange rate, fiscal, monetary and other policies'[151].

Figure 7.16 Current accounts, major countries/regions



Source: Walter (2009: 6, Figure 1)

[148] http://www.ft.com/cms/s/0/ff671f66-d838-11dd-bcc0-000077b07658.html#axzz1GDSE1R2o
[149] http://news.xinhuanet.com/english/2009-02/04/content_10763651.htm
[150] http://www.nytimes.com/2011/02/20/business/global/20euro.html
[151] http://www.g20.org/Documents2011/02/COMMUNIQUE-G20_MGM%20_18-19_February_2011.pdf

China's compromise at the G20 finance ministers and central bank governors meeting may have an important consequence in international politics in the future, namely, many countries now know that if they work together to press China for something, China may have to make compromise because China does not want to give the international society an impression that China is the single actor responsible for some failure as China desperately wants to build an image of 'responsible stakeholder' in international community. This psychology may influence China's barraging power in climate change negotiations in the future as we have seen that the unitarily of the Group of 77 plus China alliance was shaken in Copenhagen Summit in 2009. One may expect that China may be under more and more pressure for revising its CO2 emission policy in the future.

During the 2008 global financial crisis, many exporting enterprises in China were forced to closed down due to decrease of international orders, as a result, some 20 million migrant workers suddenly lost their jobs[152]. As we know that many export-oriented labor-intensive industries in China have very slim profit margin due to lack of core competence and intense competition, if Chinese currency is forced to appreciate 10-25%, then many exporting enterprises would have a problem of survival. However, these exporting industries employ a huge number of workers, if their employers are suddenly forced to shut down, it will generate huge economic and social problems. Similarly, if China is forced to dramatically reduce its CO2 emission, many low-efficiency and high-emission firms would have to be closed, as we have seen that in some regions in China local governments make deliberate power cut for factories in order to meet the target of emission reduction[153].

Besides above analyzed international constraints due to economic reasons, China may face more and more international constraints due to political reasons, such as human rights, international aid, IPR protection. In 2010, China out-competed the World Bank in lending to developing world. According to *Financial Times*[154], China Development Bank and China Export-Import Bank made at least $110bn (£70bn) loans to other developing countries in 2009 and 2010, while the equivalent arms of the World Bank loaned $100.3bn from mid-2008 to mid-2010. This news generated a lot of attentions and some people are asking whether China is the new World Bank[155]. In addition, some scholars argue that China, with its growing international aid to the developing countries, has been undermining the OECD policy of promoting strong liberal democratic institutions with its aid because China has emphasized its aid without interference doctrine, which is welcomed by the developing countries governments but generates ongoing frustration for the traditional aid donors (Kilby, 2010).

Some scholars argue that the rise of a new power will ultimately challenge the incumbent-leader and the incumbent may try to contain the rise of the challenger. Indeed, in the US, there has been the debate whether the US should engage or contain China (Shambaugh, 1996). Although we cannot be sure whether the US government intends to contain China or not, there seem to be signs that the US is taking on China as a serious competitor and trying its best to keep its lead. For instance, the US and the EU have set high-tech export controls targeting China[156]. The US government has also blocked few acquisition deals in which Chinese corporations bade for acquiring American firms, such as the China National Offshore Oil Company (CNOOC)'s

[152] http://news.xinhuanet.com/newscenter/2009-02/10/content_10794679.htm
[153] http://finance.ifeng.com/news/special/2011lianghui/20110306/3575270.shtml
[154] http://www.ft.com/cms/s/0/488c60f4-2281-11e0-b6a2-00144feab49a.html#axzz1GDSE1R2o
[155] http://www.project-syndicate.org/commentary/rosario1/English, and also, http://www.pri.org/business/global-development/china-the-new-world-bank2567.html
[156] http://www.chinadaily.com.cn/china/2010-12/22/content_11736375.htm

withdrawal of Unocal bid and Haier's withdrawal of Maytag bid in 2005. In 2008, Huawei, A Chinese telecommunication equipment vendor, gave up its bid for 3Com because some US politicians' charge that Huawei has some links with Chinese military (which Huawei has denied) and such an acquisition deal may pose risk to the US's national security. For the same national security argument, Huawei once again was forced to withdraw from 3Leaf acquisition in Feburary 2011[157].

7.4 The Demographic constraints

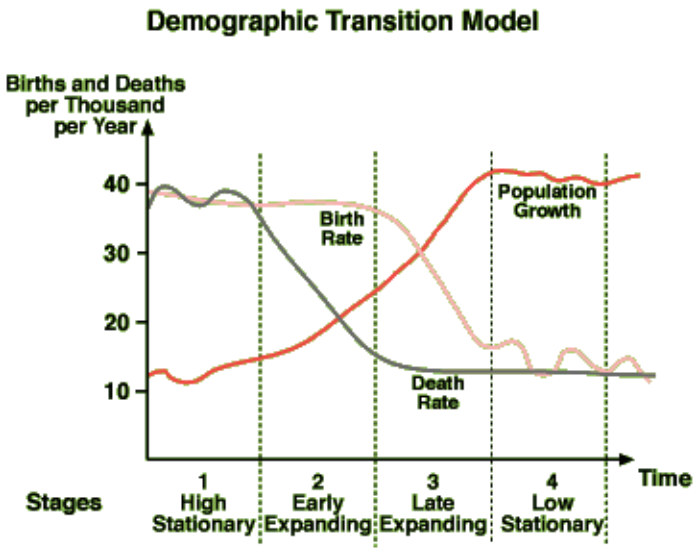
China is a country with abundant labors. China's rapid growth since 1978 can be attributed to many reasons, one of which is China's effective mobilization of the vast army of cheap labor in labor-intensive export-oriented manufacturing industries that produce internationally competitive manufactured goods and therefore generate GDP. China is now the 'world's factory' owing to China's comparative advantage in labor intensive activities, which is in turn due to China's labor abundance.

However, China will be facing a demographic constraint due to aging and potential labor shortage. According to United Nations' standard, if the proportion of over 65 age people exceeds 7% of a country's total population, the country is an aging society. If this standard is adopt, China has already entered the state of aging society in 2000 when China's fifth census data show China's over 65 age population has reached 7% of total population (the figure was 4.4% in 1953, 3.6% in 1964, 4.9% in 1982, 5.6% in 1990, according to the previous census data).

According to the demographic transition theory (Landry, 1934; Notestein, 1945; Thompson, 1929), the population growth of a country normally follows three broad stages (see Figure 7.17). In the first stage, both the birth rate and death rate are high, so the natural growth rate of population is low. In the second stage, the birth rate is higher than the death rate, the population will rapidly expand. In the third stage, both birth rate and death rate are low, so the natural growth rate of population is low. Normally, a pre-industrial society is in the first stage, a developing country is in the second stage, while an industrial country is in the third stage. And the transition from the second stage to the third stage, according to the historic evidence of today's industrial countries, would take more than 100 years. Since China is a developing country, we would expect China's population growth is still in the second stage, however, since the reform at the end of 1970s, China has rapidly transited from the second stage to the third stage of population development (Cai and Wang, 2006). In 1971, China's national total fertility rate was 5.4, which means the average number of children that would be born to a Chinese woman over her lifetime was 5.4 in 1971. However, this figure has rapidly declined over the last three decades to 1.7 nowadays (see Figure 7.18), far lower than the average level of developing countries, and is like the developed countries' average level in 1990s (ibid.). Meanwhile, China's life expectancy at birth has dramatically increased from 41 in early 1950s to 73 in 2005 (see Figure 7.19). As a consequence, since 1998, China's natural growth of population has always been less than 10‰ and declined less than 6‰ (ibid.). Figure 7.20 shows China's population growth.

[157] http://www.reuters.com/article/2011/02/19/huawei-3leaf-idUSN1913461820110219

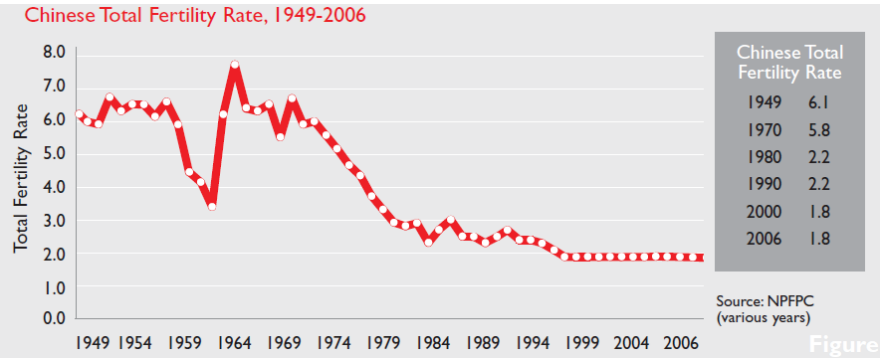
Figure 7.17 The demographic transition model



Source: http://geographyfieldwork.com/DemographicTransition.htm.

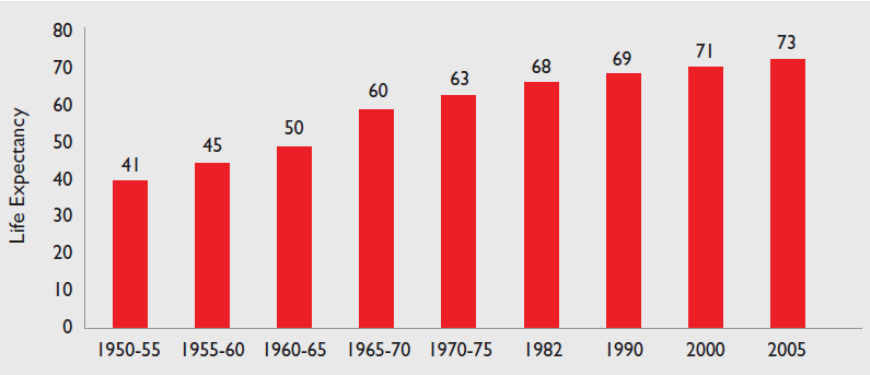
Note: the phase 2 and phase 3 can be grouped together as stage 2 in which population is expanding.

Figure 7.18 China's total fertility rate



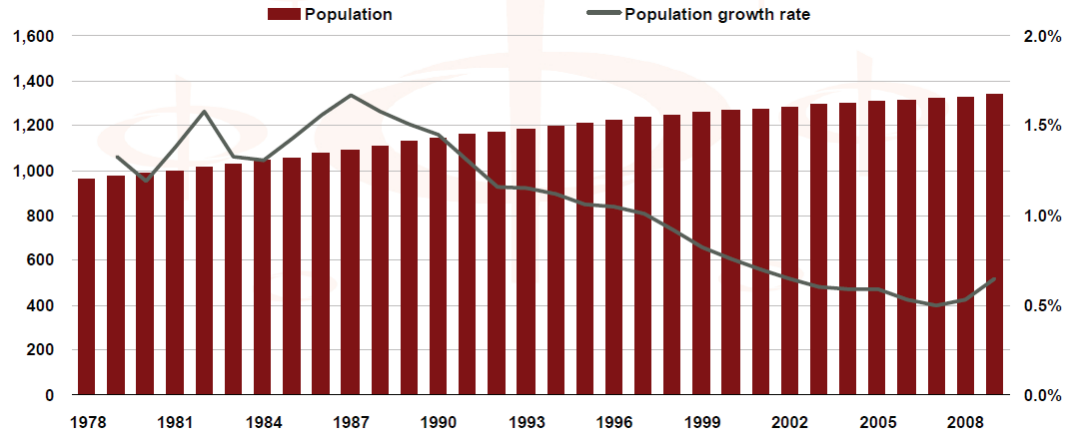
Source: Jackson, Nakashima, and & Howe (2009)

Figure 7.19 China's life expectancy at birth



Source: Jackson, Nakashima, and & Howe (2009)

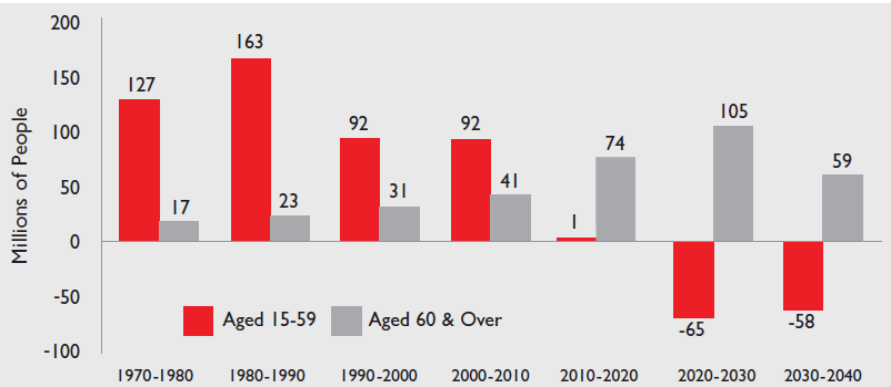
Figure 7.20 China's population growth (million persons)



Source: The Beijing Axis (2010: 86)

The chief cause for this unusual demographic transition in China has been the 'one child' policy adopted by Chinese government at the beginning of the economic reform. While China's 'one child' policy has served China well in controlling the rapid growth of population, this population policy will face a consequence of increase of elderly people and labor shortage in medium term. According to United Nations' (2005) *World Population Prospects*, by 2030, the proportion of the over 60 age population in China is projected to double; and China's working population will peak at 1 billion in 2015 and then gradually decline (see Figure 7.21). A forecast made by Population Development Studies Centre, an authoritative research institute on population development funded by Chinese government, has confirmed the UN's analysis. According to this forecast says that China's working population will peak at 997 million around 2016[158]. This means a significant turning point in China (Golley and Tyers, 2006), which is called by some Chinese scholar as the 'Lewis turning point' (Huang and Jiang, 2010). Some scholars even argue that China has reached the Lewis turning point (e.g., Zhang, Yang, and Wang, 2010).

Figure 7.21 UN's forecast of the change of China's population structure



Source: Jackson, Nakashima, and & Howe (2009), based on United Nation (2007)

[158] See, http://www.cdss.gov.cn/ZJZL/GNZJ/caifang/201101/4327.html

Of course, there are debates whether China is approaching or has arrived at the Lewis turning point[159], and some scholars like Yao Yang do not agree. However, one disputable fact is that China's labor wage level has gone up, which is taken by some scholar as a supportive argument for the approaching Lewis turning point argument. For example, some surveys show that migrant worker's wage level has increased by 20% in the first half of 2010[160]. The rise of wage level may pose a challenge to China's competitiveness in labor-intensive manufactures. Indeed, a *New York Times* report[161] shows that as labor costs have risen in China, China is slowly losing labor-intensive jobs to countries like Bangladeshi, Vietnam and Cambodia, at least for those goods like casual clothes, toys and simple electronics that do not necessarily require literate workers and can tolerate unreliable transportation systems and electrical grids.

Many economists who have studied the demographic transition agree that one of the factor underpinning China's stunning economic rise is its unusually large demographic dividend (Jackson, Nakashima, and and Howe, 2009: 15). Cai and Wang (2006) point out, in the globalized world, despite the increased mobility of commodity and capital, the international mobility of labor as an important input factor is still restricted, therefore, China's comparative advantage is well embodied in its abundant labors. China's labor-intensive manufacturing industries will still play an important role in Chinese economy and China's international competitiveness. Therefore, for a long period of time, the economic development of China will still need large number of labor. However, as China's labor supply has been transiting from unlimited supply to limited surplus (ibid.), although we cannot say China will have a labor shortage problem in absolute terms, the projected decline of working population after around 2015, or the diminishing population dividend, means China will have certain demographic constraints in the future.

[159] http://www.economist.com/blogs/freeexchange/2010/07/china
[160] http://www.economist.com/blogs/freeexchange/2010/07/china
[161] http://www.nytimes.com/2010/07/17/business/global/17textile.html?_r=3&hp

Chapter 8: The Potentiality Dimension

In this chapter, I discuss the potentiality dimension of China's national competitiveness. In a more intuitive way, the potentiality dimension examines, for a leading country, its potential for forging ahead and leaving the following countries further behind, and for a following country, its potential for catching up, overtaking, or leapfrogging the leading country. Since in a competition there is normally only one leader (or very few co-leaders) and the majority of the competitors are followers, so the question of how followers catch up or leapfrog the leader(s) is more interesting and important than how the leader forges ahead. So, in this chapter, I will focus on the potential for catching-up or leapfrogging issue.

While the discussions of Chapter 5 (on effectiveness dimension), Chapter 6 (on efficiency dimension), and Chapter 7 (on sustainability dimension) are empirical in nature, this chapter will be more of theoretical than empirical nature as I want to make a contribution to the catching-up and leapfrogging literature by proposing a theoretical argument on the *potential* of a developing country for catching up the more advanced countries.

To the study of national competition[162], I adopt a technology-based view (Hobday, 1995; Kim, 1997; OECD, 1992; Porter, 1990) in general and technological capability approach (Dahlman et al., 1985; Lall, 2004; Lee, 1997) in particular. The technological capability approach assumes that the dynamics of competition among nations depends, in most occasions, on the speed of technological progress of the competing countries. The technological progress is underpinned by technological capabilities of a country, which is in turn derived from and enhanced by technological learning engaged by the people and firms in the country. I posit, except by luck or war, the only route for a developing country to catch up or leapfrog a developed country is through technological progress[163]. Then the question boils down to, first, how to make technological progress, and second, what factors contribute to technological progress? I will address these two questions in detail in the following sections.

8.1 Toward a theory of potential for catching up

8.1.1 Catching-up and leapfrogging

The term of catching-up is straightforward and easy to understand in a racing competition sitting where catching-up occurs when a follower shortens the distance between him and the leader. In the sitting of economic competition between firms or nations, the notion of catching-up is more complex.

Lee and Lim (2001: 461) identify two types of catching-up, namely, technological catching-up and market share catching-up. They argue these two types of catching-up are not identical but related to

[162] It is worth noting that, although we talk about national competition and a nation catching up with others, the real catching-up is taking place at the industrial level and ultimately at the firm level. We can see a nation as a portfolio of industries within that nation while an industry as a portfolio of firms within that industry. A nation catches up with the leading nations when a large enough number of industries of this nation catch up with those industries of the leading nations. Likewise, an industry of a nation catches up with that of leading nations when a large enough number of firms within that industry of the nation catch up with those firms of the leading nations.

[163] I will discuss later in this chapter that, at the firm level, to catch-up, individual firms have to simultaneously consider their technological and marketing strategies rather than just focus on technological catching-up. However, I do agree that at the national level, technological catching-up is the most important factor contributing to the ultimate success of a nation in competition with other nations.

each other. This is because, on the one hand, a latecomer can increase their market share without enhancing their technological capabilities (say by importing foreign technologies and taking advantage of cheap local labor), on the other hand, without technological catching-up, sustained long-term market share catching-up is very difficult because it will become more and more difficult and expensive to buy technologies needed for higher level of market share. Thus, market share catching-up can be said as the ultimate market success (i.e., the end) while technological catching-up as an important contributing factor (i.e., the means) toward the ultimate success. This means-end relationship is indeed reflected in Lee and Lim's (2001) model of technological and market catch-up in which the label 'market success' is placed at the end of the chain of arrows.

Therefore, in economic competition among firms or nations, we can say catching-up takes place when a follower or latecomer firm or nation shorten the gap in economic performance (e.g., market share) between itself and the leading firm or nation. Such a market share catching-up (i.e., economic success) may be due to technological catching-up or other factors such as better marketing strategies. Indeed, at the firm level, individual firms have to simultaneously consider their technological and marketing strategies when competing with incumbents. Thus, I find Lee and Lim (2001) have had a bias toward technological catching-up and neglected the importance of marketing strategies that may play a crucial role in the ultimate success of individual firms. Nevertheless, I do agree that, at the national level, technological catching-up by strengthening one's own technological capabilities rather than buying others' technologies is crucial to the sustained market share catching-up. Much of the following discussion in this chapter is related to technological catching-up issue.

The term of leapfrogging[164] has two different meanings, one process-related, one outcome-related. For the process-related situation, leapfrogging takes place in the process of catching-up, i.e., along the catching-up process, one proceeds by continuous or occasional leapfrogging some steps or stages. For the outcome-related situation, leapfrogging occurs when the follower or latecomer overtakes the leader without getting the leader caught up, i.e., a direct overtaking by leapfrogging the leader. To make this distinction clearer, I label the process-related one as 'catching-up by leapfrogging' and the outcome-related as 'overtaking by leapfrogging'. With this distinction in mind, we can better understand the extant literature on catching-up and leapfrogging I will introduce now.

For the process of technological catching-up, Lee and Lim (2001) identify three patterns (or strategies) of catching-up, namely, path-following, path/stage-skipping, and path-creating. Path-following catching-up means that the latecomer follows the same technological progress path as taken by the forerunners but the latecomer goes along the path more speedy than the forerunner did due to the latecomer advantage (Gerschenkron, 1962). Path/stage-skipping catching-up means the latecomer still follows the technological progress path to an extent but skip some stage(s) to save time and therefore proceeds more speedy than the forerunner did. Path-creating catching-up means the latecomer explore their own path of technological development. Lee and Lim (2001: 465) treat the path-following as a more traditional pattern while the path-skipping and path-creating containing some aspects of leapfrogging.

Obviously, Lee and Lim (2001) talk about leapfrogging in a process-related sense rather than the outcome-related sense, because the types of leapfrogging in their framework are all about the process of catching up the leader, nothing to do with the outcome of overtaking the leader (i.e., leapfrogging in the outcome-related sense).

[164] There exist a literature of leapfrogging, such as Perez (1988), Perez and Soete (1988), Hobday (1995), Lee and Lim (2001), and Lee et al. (2005). Their viewpoints of leapfrogging differ.

Within their three patterns of catching-up, I suggest the first two should be treated as one type (i.e., path-following) as Lee and Lim (2001: 465) themselves have pointed out that 'technological catching-up, more often than not, involves certain aspect of stage-skipping'. In addition, as I mentioned above that at the firm level individual firms have to simultaneously consider their technological as well as marketing strategies. Therefore, I posit that catching-up has two broad types: technology-driven and market-driven. The distinction between these two is technology-driven catching-up focuses on technology while market-driven catching-up prioritizes the needs of markets or customers. Since the three patterns of catching-up in Lee and Lim's (2001) model are all technology-driven, their model is incomplete in the sense it does not touch market-driven catching-up. Thus, I propose a new model of catching-up patterns which incorporates Lee and Lim's (2001) model while adds a new component of market-driven catching-up (see Figure 8.1).

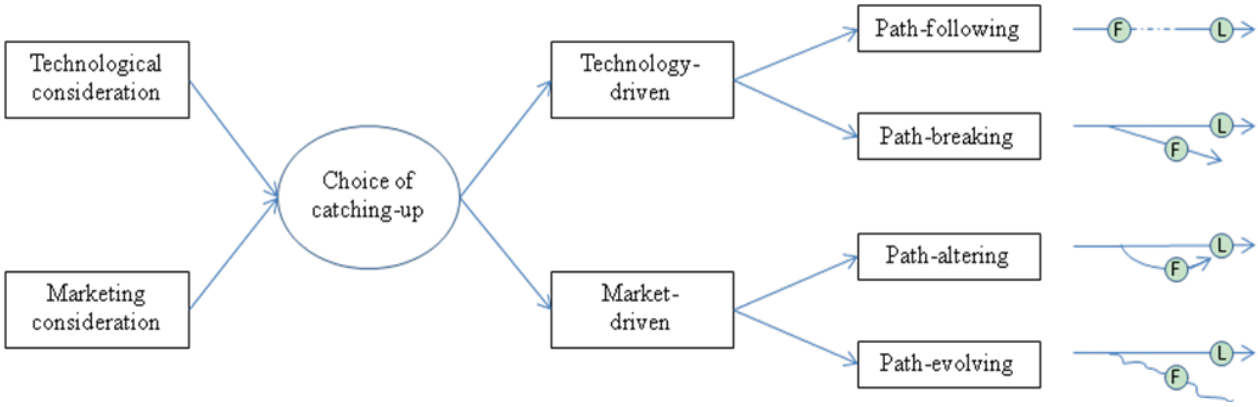
In my model, I treat Lee and Lim's (2001) path-following and path-creating as the two types of technology-driven catching-up, and I relabeled their path-creating as path-breaking. The world 'breaking' implies that path-breaking in technology often makes the traditional path obsolete while the path-altering in marketing often eventually ends up converging to the same technology and market segments the leader is leading and serving. Simply put, path-breaking implies creating a different path to different point while path-altering implies alternative path to the common point. For example, Apple breaks away from the traditional mobile phone technological path (i.e., Nokia) by creating a new technological path of smart phone.

The two types of market-driven catching-up in my model are termed as 'path-altering' and 'path-evolving'. The path-altering catching-up means the follower/latecomer catching up with the leader by serving different market segments the leader ignores or does not serve well. At the technological front, the follower may follow the same technological path of the leader. Take the mobile phone industry for example, if the leader focuses on the urban rich people, then the latecomer can take an alternative path by focus on the urban poor or rural people. Doing so may enable a latecomer to quickly catch up the leader in terms of market share. China's *shanzhai*[165] mobile phone makers are using this catching-up strategy.

The path-evolving catching-up is similar to path-altering catching-up in the sense that the follower/latecomer catching-up with the leader by serving different market segments the leader ignores or does not serve well. However, they are different because path-evolving catching-up does not follow the same technological path of the leader as path-altering catching-up does. Since path-evolving catching-up is market-driven, the technologies the follower provides to its customers may be customized technologies or co-designed by the follower and its customers. Therefore, the technological path cannot be determined a prior, rather it will evolve over time along the interaction and cooperation between the follower and its customers.

[165] Shaizhai refers to Chinese imitation and pirated brands and goods, particularly electronics. Many shaizhai mobile phone makers target the rural migrant workers and urban poors.

Figure 8.1 Four generic patterns of catching-up

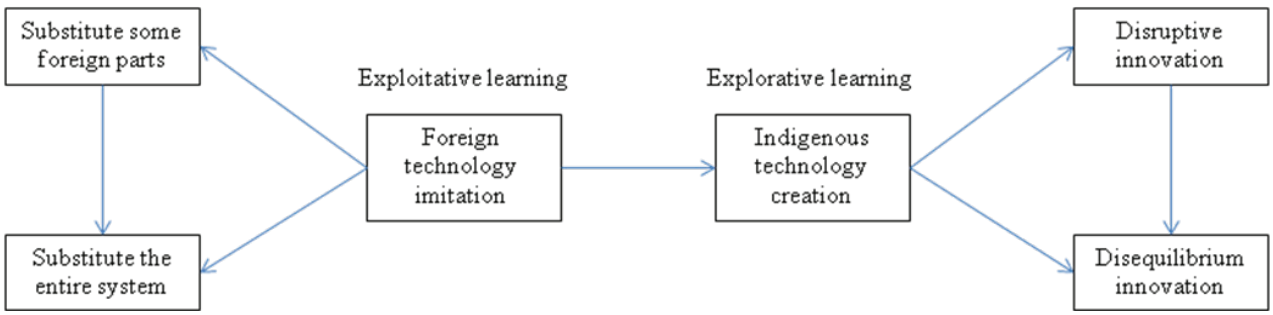


Note: Ⓛ denotes the position of the leading firm/nation while Ⓕ denotes the position of the following firm/nation.

8.1.2 Two basic routes for technological progress

There are two basic routes for technological progress (i.e., enhancing technological capabilities by technological learning) in a country (see Figure 8.2). One is foreign technology imitation, i.e., acquisition and imitation of existing technologies developed in the outside world, and the other is indigenous technology creation, i.e., creation of new technologies from within the country (including collaboration with foreigners) (cf. Kim, 1997).

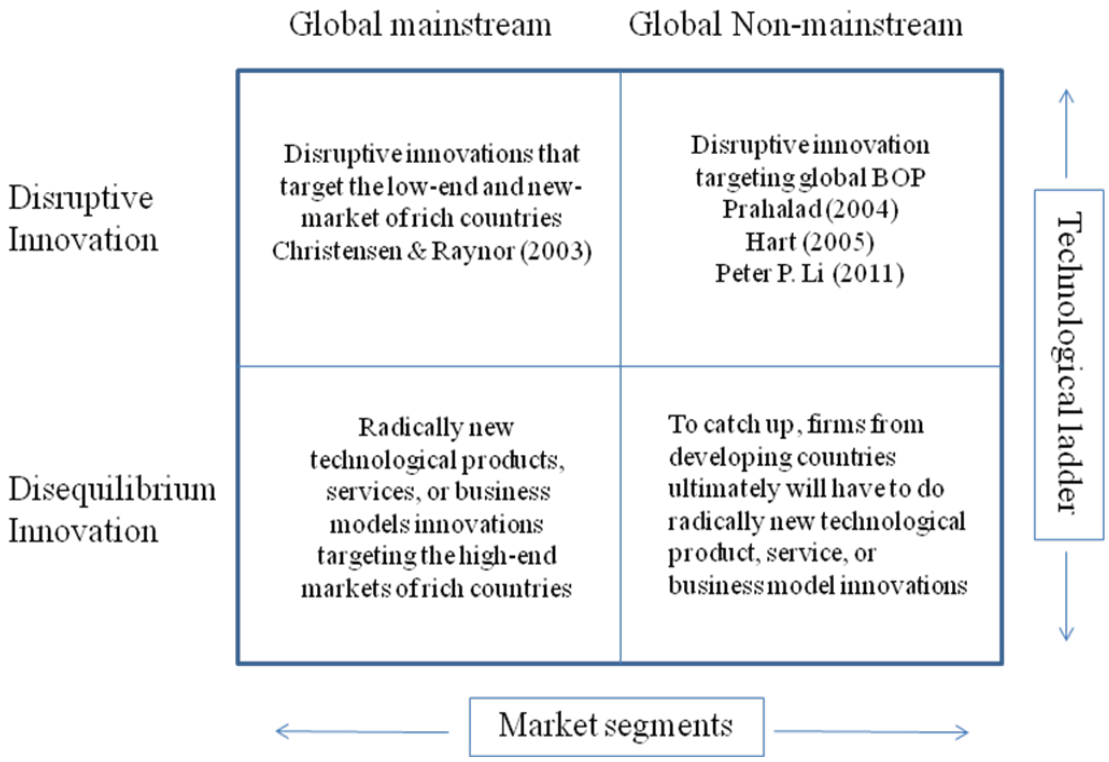
Figure 8.2 A model of technological learning in developing countries



In the process of acquisition of a foreign technology, technological learning takes places when the importer of the technology tries to learn and grasp that technology by first substituting some parts of that foreign technology by domestically produced ones and then substituting the entire system of that technology by domestically produced one. It is worth noting that technology importation may not necessarily cause technological learning and catching-up, if the follower simply installs imported equipment but not to try to learn how to substitute such a technology.

In the process of indigenous technology creation, technological learning takes two forms of indigenous innovation, disruptive and disequilibrium innovations. The term of disruptive innovation is coined and theorized by Christensen (1997) and Christensen and Raynor (2003), while the term of disequilibrium innovation is coined by me to describe innovations that are not characterized by disruptive innovation. See Figure 8.3 for a typology of indigenous innovation/creative destruction.

Figure 8.3 A typology of indigenous innovation/creative destruction



As Yu and Huang (2009) have reviewed, Christensen's disruptive innovation theory has aroused plenty of rich debate on what disruptive technology/innovation is, and the copious literature on disruptive innovation has a conflicting nature. A useful measure is provided by Govindarajan and Kopalle (2006) who argue that a disruptive innovation should (i) be inferior on the attributes that mainstream customer value; (ii) offer new value propositions to attract a new customer segment or the more price sensitive mainstream market; (iii) be sold at a lower price; (iv) penetrate the market from niche to mainstream (cited in Yu and Huang, 2009: 3). Christensen and Raynor (2003) refined the theory of disruptive innovation by widening the application of the theory include not only disruptive technological products but also services and business models innovation. They also emphasized that disruptive innovation could be broadly classified into low-end and new-market disruptive innovations (cited in Yu and Huang, 2009: 3).

If disruptive innovation aims at creating disruptive technologies that are not 'radically new from a technological point of view but have superior performance trajectories along critical dimensions that customers value' (Bower and Christensen, 1995), then disequilibrium innovation aims at creating radically new technology or radically new product that integrate several existing technologies in a creative way. Radically new technology innovation can be evaluated from a purely technological point of view, for example, the digital camera technology was radically new compared to traditional film camera technology. Radically new product innovation that integrates several existing technologies is more marketing-driven than technology-driven. It is more difficult to define compared to radically new technology innovation. Two good examples are Apple's iPod and iPhone, both of which are not radically new technologies but utilize several existing

technologies in a such a creative way that their advent immediately dis-equilibrates the existing competitive structure of the respective industry.

Obviously, technology imitation is the easiest type, disruptive innovation is more difficult type, and disequilibrium innovation is the most difficult type of technological learning. Therefore, we have a hierarchy of technological learning in which the technology imitation is at the low level, disruptive innovation is at the middle level, and disequilibrium innovation is at the high level. Now, I will briefly discuss disruptive innovation that a developing country (and its firms) may find natural to start with when moving up the hierarchical scale of technological learning.

Prahalad (2004/2009) argued that the business reality has been most of the businesses in the advanced countries are focusing on and serving for the wealthy people around the world at the top of the pyramid of society (TOP), a small fraction of world's whole population. Therefore the vast majority of the world's population, i.e., who are in the bottom of the pyramid (BOP), are either un-/under-served or unsatisfactorily served. So, if the developing country firm can target the BOP and make products and services valued by people at the BOP, then the developing country firm may find the BOP not only feasible but also profitable segment. According to Peter P. Li (2011), due to lack of core competence (Hamel and prahalad, 1990) compared to the leading firm from the developed country, the developing country firm finds the most plausible way to compete with and grab market share from the foreign leading firm is to win those customers ignored and unsatisfactorily served customers in the home market of the developing country or in other developing countries. Once the developing country firm succeeds in serving the BOP and gaining more experience and capabilities, it may move upward to compete in the TOP.

I identify at least four strategies of disruptive innovation, namely, customization, compatibility, miniaturization, and modularization. Customization means a focus on trying the best to meet customer's demand and expectation as the business wisdom goes 'customer is king'. Compatibility means a focus on how to produce innovative products that can be compatible to the customer's existing and often old technologies therefore to help customer reduce switching costs. Miniaturization means a focus on making ever smaller sized products therefore to help the customer save space resources and even make products portable. Modularization means to design and manufacture products by using exchangeable parts therefore making the production and maintenance costs low. Each of the four strategies creates customer values and therefore has more potential for success.

8.1.3 Three levels of Technological learning: balance and upgrading

Figure 8.3 indicates that, in order to catch up, the developing countries (by their firms) must ultimately engage in highest level technological learning (i.e., disequilibrium innovations). Then, some questions follow: first, how to balance between low and high levels of technological learning as they are often in a trade-off between exploitative vs. explorative learning (March, 1991; P.P. Li, 2010), and second, how to upgrade from lower to higher level of technological learning as they require different level of technological capabilities?

The balance question is very important. Each level of learning has its uncertainty, risk, cost, and benefit. Obviously, lower level of technological learning is less uncertain and less costly than higher level of technological learning, and therefore it involves lower expected return/benefit due to less risk than higher level of technological learning. On the other hand, a higher level of technological learning is more uncertain and more costly, and therefore it involves higher expected return/benefit due to high risk. A delicate balance between the three levels of technological learning can bring the

learning firm/nation the optimal net benefit (i.e., total benefits minus total costs associated with all levels of technological learning the firm/nation is engaging).

The upgrading question is also very important because upgrading will not automatically take place. Upgrading from lower level to higher level of technological learning requires many conditions, such as a firm/nation's strategic intent (Hamel and Prahalad, 1989) of becoming a disequilibrium innovator, willingness to reduce current consumption/profit and make investment for the future, and willingness to take risk of failure and tolerate a long period of loss-making. To upgrade from a technology imitator to a indigenous innovator or to upgrade from a disruptive innovator to a disequilibrium innovator, a firm/nation should exploit current 'cash cow' activities (current disruptive innovations) to generate cash flows in order to divert some of the cash flows to milk 'tomorrow's star' (new risky disequilibrium innovation project).

To succeed in upgrading, a firm/nation should be willing and good at making collaborations with others who have relevant expertise. In addition, it should be good at utilizing talents, domestic and foreign, by hiring experts or/and setting up R&D facilities in advance countries. Foreign direct investment (FDI) by MNEs from developed countries will have an important role in helping the host developing country/and its firms upgrade their technological learning through the spill-over effect.

FDI spill-over effect on indigenous innovation

Attraction of FDI by global multinational enterprises (MNEs) may help the host country to speed up the technological learning with the FDI spill-over effect (Blomstrom and Kokko, 1998). I identify roughly three stages of FDI development by global MNEs in developing countries (see Figure 8.4). In the first stage, a MNE sets up offshore strategic business unit (SBU) in a developing host country to carry out the labor-intensive manufacturing and servicing activities to take advantage of the cheap labors of that country (some MNEs may choose outsource those activities to original equipment manufacturer (OEM) clients in a host country rather than offshore SBU with the same psychology of arbitraging the different labor costs). The offshore SBUs import parts and components from the MNE's global suppliers and assemble them into final or semi-final products that are then re-exported from the host market. Therefore the offshore SBU (strategic business unit) is just serving as an assembly line function of the whole value chain of the MNE. In both the OEM and offshore SBU modes of FDI, there is limited spill-over effect of technology transfer.

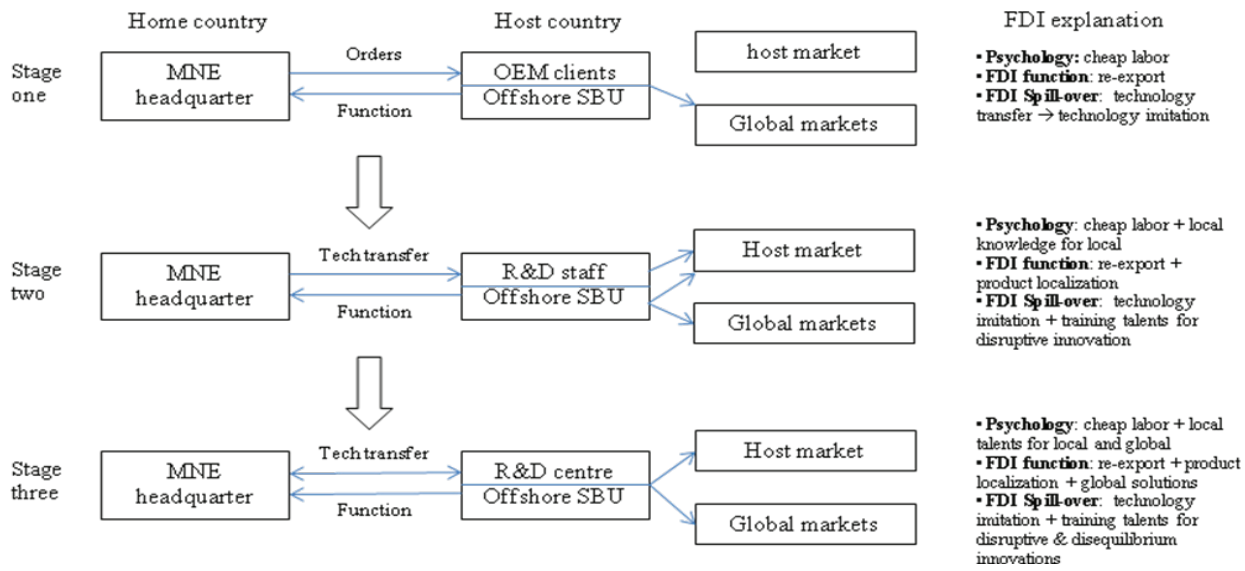
In the second stage, the MNEs may find the developing country's domestic market also attractive to compete therefore they will, alongside the re-exportation, keep some proportion of the final goods assembled in their offshore SBUs for selling in the host country. Gradually, they may find local customers may have different demands and preferences for the products they make. So, in order to win in such a situation, the MNEs may hire some local talents to carry out research and development (R&D) to localize their products. But, the R&D activities are only for local market of the host country, which has nothing to do with the MNEs' global R&D strategy. This is due to the psychology of the MNEs that the local talents in developing countries are not capable of carrying out R&D for the MNEs' global solution. In this stage, the spill-over effect is larger than that in the first stage because the MNEs hire local R&D staff who may one day leave and join domestic firms of the host country.

In the third stage, the MNEs may find the local talents in the developing host countries are competent enough for carrying out some R&D activities for their global product solutions. This is increasingly the case that many global technologic MNEs like Microsoft set up R&D centre in China and India to take advantage of the cheaper but equally competent local scientific and

technological talents (as well as engineers). In this stage, the MNEs may still keep their offshore SBUs in the developing host country to continue to do the labor-intensive assembling and manufacturing activities. In this stage, the spill-over effect will be further increased due to the training of advanced R&D staff who may one day leave and join domestic firms in the host countries.

With this three stage model of development of FDI mode, I assume, in order to speed up the indigenous innovation, the host country should try their best to attract technological FDIs and use such FDIs as an approach to carry out technological learning. In the meantime, the local domestic firms should try their best to attract R&D staff members of the MNEs' to join their firms so that they can utilize their talents to strengthen their own R&D capabilities. If the domestic firms have such strategic intent, they may have a good chance to improve their technological innovation capabilities so that gradually they can engage in disruptive and then disequilibrium innovations.

Figure 8.4 Three stage model of FDI mode development



8.1.4 Three scenarios of catching-up potential

Based on above analysis, I identify three scenarios of competitive dynamics (or potential for catching-up), each of which relates to different mode of technological learning. For simplicity, let's use the term developing country as the follower and the term developed country as the leader.

The first scenario is one with *no potential* for catching-up. In this scenario, the technological learning is limited to foreign technology imitation, i.e., without engaging in indigenous technology creation. In such a scenario, the developing country can still make technological progress by a two-stage learning process. In the first stage, it learns to substitute foreign parts with domestically manufactured ones, and in the second stage, it learns to design and substitute the entire system (Kim, 1997; cited in Choi, 2007). As the developing country enjoys a latecomer advantage, it can learn and grasp the imported technology in a relatively shorter time period than the developed country did before.

However, in this scenario, even if the developing country can skip some stages in learning the technology imported from the developed country, it can only follow after the developed country but

will never be able to get the developed country caught up. This is because in such a situation the developing country's technological progress is dependent on and controlled by the developed in that it is the developed country who decides what kinds of technology to export and what not to export. In today's world, there is a techno-nationalism due to which the developed countries protect and restrict selling their key technologies to potential challenging competitors (Lall, 2004). Such a no potential for catching-up scenario can be thought as the 'flying geese pattern' (Akamatsu, 1962) in which the followers always follow the 'leading geese' with some insurmountable distance.

So, the path-following pattern in Lee and Lim (2001) belongs to this no potential scenario. In my model, the path-altering pattern can also be said to belong to this scenario because following the same technological path of the leader, even if the latecomer choose to serve different market segment, they may find their catching-up in market share will slow down and become more and more difficult after a certain time period. This is due to two reasons. For one, if those market segments become profitable, the incumbent leader may enter and outcompete the latecomers. For another, if those market segments are not profitable, the followers cannot generate sufficient cash flow to fuel their further increases in market shares.

The second scenario is one with *low potential* for catching-up. In this scenario, the latecomer firm/nation engages in technological learning that is characterized by a combination of foreign technology imitation and indigenous disruptive innovation. In so doing, the latecomer has a *potential* for breaking away from the 'flying geese pattern' and therefore a *potential* for catching-up the leading geese (i.e., the leader). Prahalad (2004) points out that the 'bottom of the pyramid' of human society (BOP) is a huge market ignored or underserved by the leading MNEs from developed countries, and if companies target this untapped market with adapted technologies/products which are attractive to the customers there, they may make a fortune at the BOP. Peter P. Li (2011) argues that disruptive innovation at the bottom of pyramid by developing country firms is a mechanism for catching-up. This argument can be supported by the path-evolving catching-up patterns presented in Figure 8.1, namely, the latecomer firms from the following country target un-served or underserved market segments of the leading firms from the leading countries by providing customized technologies or co-design technologies and products with their customers.

According to Peter P. Li (private communication, 10 March 2011), there are two situations in which disruptive innovations may help a latecomer to catch up. In the first situation, the incumbent leader ignores such disruptive innovations due to lack of awareness that such innovations may pose competitive threat in the future and it becomes too late when it really see such innovations a threat. In the second, although the incumbent does not ignore and wants to imitate such innovations itself, the incumbent fails in imitating such innovations due to its organizational inertia. Such organizational inertia enables resistance from within the organization to fully embrace such innovation. Christensen (1997) mentioned two preconditions for such a market disruption to occur, one of which is the 'asymmetric incentives between existing healthy business and potential disruptive business' (cited in Yu and Chang, 2010: 3). Such asymmetry in incentives tends to be high when there is 'paradigm conflict' (in Peter P. Li's term) between the old and new models. High asymmetry in incentives may often cause internal fight for power and resources between people stick to the old business model and those support the new model. For instance, digital camera as a new technological innovation will make the old film camera technology largely obsolete.

The third scenario is one with *high potential* for catching-up. Peter P. Li (private communication, 10 March 2011) argues that disruptive innovation at BOP may enable a latecomer to not only catch-

up but even leapfrog the leading firms of advanced countries. I disagree with this argument because I see disruptive innovation may be a necessary but not sufficient condition for even catching-up, needless to say leapfrogging, the leading firm/nation. Another necessary condition is the follower also engaging in disequilibrium innovations. Engaging in disruptive and disequilibrium innovations gives a latecomer a high potential for catching-up, which is underpinned by the path-breaking pattern of catching-up.

However, it is worth noting that having high potential for catching-up does not necessarily mean such potential will always be actualized, i.e., really getting the leading firm/nation caught up, because the competitive dynamics depends on both sides of the competition. Now, I will discuss two situations in which the leading firm/nation may *potentially* forge ahead and leave the challengers further behind.

In the first situation, the incumbent leader succeeds in imitating the disruptive innovations of its challengers. The incumbent may succeed if it does not ignore the disruptive innovations, or it can overcome such organizational inertia (i.e., resistance from within for fully embracing such disruptive innovations due to asymmetry in incentives and internal fight). If the incumbent succeed in imitating the disruptive innovations, with its existing competitive advantages over the challengers, it will forge ahead and leave the challengers further behind.

In the second situation, the incumbent does not simply imitate the disruptive innovations of the challengers but engages in disequilibrium innovations. Then the dynamics of competition cannot be determined ex ante because there are two possibilities that the incumbent may out-compete the challengers. The first possibility is that the incumbent may break the technological bottleneck before the challenger succeeds in disrupting the incumbent by disruptive innovations. The second possibility is that the incumbent may be moving on to some higher profit industries while the average profit margin of the current industry is being continuously pulled down by the challengers with their disruptive competition strategies (disruptive innovators often pursue low profit margins for grabbing more market shares from the incumbent). This is to say, the incumbent may be looking for a 'blue ocean' industry (Kim and Mauborgne, 2004; 2005) while the challenger is engaging in disruptive innovation in the 'red ocean' industry, and there is a possibility that the incumbent may succeed in moving onto the 'blue ocean' before the challenger succeeds in disrupting the incumbent in the current 'red ocean'. If this possibility is actualized, then the incumbent will forge ahead and leave the challenger further behind.

In sum, so far, I have proposed a theory of potential for catching-up. Table 8.1 summarize the links among the various types of technology learning, FDI spill-over effects, catching-up pattern, and potential for catching up.

Table 8.1 The links among technological learning, FDI spill-over effect and catching up

Hierarchy of Technological learning	Technological learning pattern of developing country	FDI spill-over effects on upgrading learning	Catching-up pattern	Potential for catching-up
Low level: Technology imitation	Technology imitation only	MNEs' OEMs or offshoring only	Path-following Path-altering	No
Middle level: Disruptive	Imitation + disruptive innovation	OEMs or offshoring + R&D	Path-evolving	Low

innovation		staff		
High level: Disequilibrium innovation	Imitation + disruptive + disequilibrium innovations	OEMs or offshoring + R&D staff + R&D centre	Path-breaking	High

8.2 Factors underlying technological catching-up

8.2.1 The four basic factors underlying technological progress

I posit there are at least four factors contributing to technological progress: first, capital (especially human) deepening (Solow, 1956, 1957; Romer, 1986, 1990; Lucas, 1988) which provides the necessary material and knowledge bases for engaging in indigenous innovation; second, institutions supporting innovative entrepreneurship (Schultz, 1968; North and Thomas, 1973; North, 1981, 1990; Acemoglu, Johnson and Robinson, 2005), e.g., intellectual property rights (IPR) protection; third, national innovation system (Lundvall, 1992) which provides an environment and platform for innovation activities, individually and collaboratively; and fourth, innovative entrepreneurship (Schumpeter, 1912/1934, 1942; Baumol, 1990, 2008, 2010) which makes indigenous innovation happen. New Institutional Economics (NIE) asserts institution is the fundamental factor influence many social phenomena, e.g., growth. However, I would argue, in the case of technological progress, institution is a factor supportive or constraining innovative entrepreneurship that directly makes technological progress happen. So, I see the key factor underlying technological progress as innovative entrepreneurship while all the other three are necessary but insufficient conditions. Here, I will discuss entrepreneurship in more detail.

In economics literature on economic growth, there are four basic engines of growth: first, capital accumulation and deepening (Domar, 1946; Harrod, 1948; Solow, 1956), second, technological progress (Solow, 1956, 1957; Romer, 1986, 1990), third, institutional improvement (Schultz, 1968; North and Thomas, 1973; North, 1981, 1990; Acemoglu, Johnson and Robinson, 2005), and fourth, entrepreneurship (Schumpeter, 1912/1934, 1942; Kirzner, 1979; Baumol, 1990, 2008, 2010). While the first three are widely accepted in economics, entrepreneurship has not well examined by economists (Baumol, 2006a) although some scholars argue entrepreneur is the 'fourth factor of production' [166] (e.g., Baumol, 2006a) and 'entrepreneurship is a mechanism by which society converts technical information into these products and services' (Shane and Venkataraman, 2000: 219). Therefore, there is a paradox that 'the entrepreneur is virtually never mentioned[167] in modern theory of the firm and distribution' (Baumol, 2006b) although economists would view entrepreneurship as important (Leibenstein, 1988). There are at least two reasons for this paradox, one is that there is no room/need for entrepreneurship in the neoclassical tradition of economics (Baumol, 2006b; Leibenstein, 1968) because 'the firm is then taken to perform a mathematical

[166] We can see an entrepreneur is a person who combines other necessary factors of production, i.e., labor, capital, and land, to make production happen. In this sense, entrepreneur is the fourth factor of production because without entrepreneur, there would be no production at all (except for self-sufficiency). Mainstream economist may defend by saying labor as a factor of production encompasses entrepreneur. If so, like capital is divided into physical, financial, and human capitals, we can divide labor into generic, managerial, and entrepreneurial labor. With the recognition that the roles of the three types of labor are very different, it is legitimate to argue that we should not treat entrepreneurial labor in the way of measuring generic labor by aggregating the total labor hours worked. Since entrepreneur is very important, it is better to treat it as a factor of production in its own.

[167] Although economists does use the word 'entrepreneur', the neoclassical economists in fact use the terms "entrepreneur" and "manager" interchangeably, as Lazonick (1991: 309, cited in Wennekers and Thurik, 1999: 52) points out.

calculation which yields optimal (i.e., profit maximizing) values for all of its decision variables' (Baumol, 1968: 67) and 'any attempt to introduce the entrepreneur into this theoretical structure destroys the internal consistency of the [neoclassical] model (Barreto, 1989: 2); the other is that although Austrian tradition of economics places huge emphasis on entrepreneurship, the general approach taken by the Austrian tradition is purely literary, i.e., both model building and empirical testing are rejected, which makes it difficult to appreciate and follow in the mainstream of economics (Leibenstein, 1988).

8.2.2 Entrepreneur and entrepreneurship

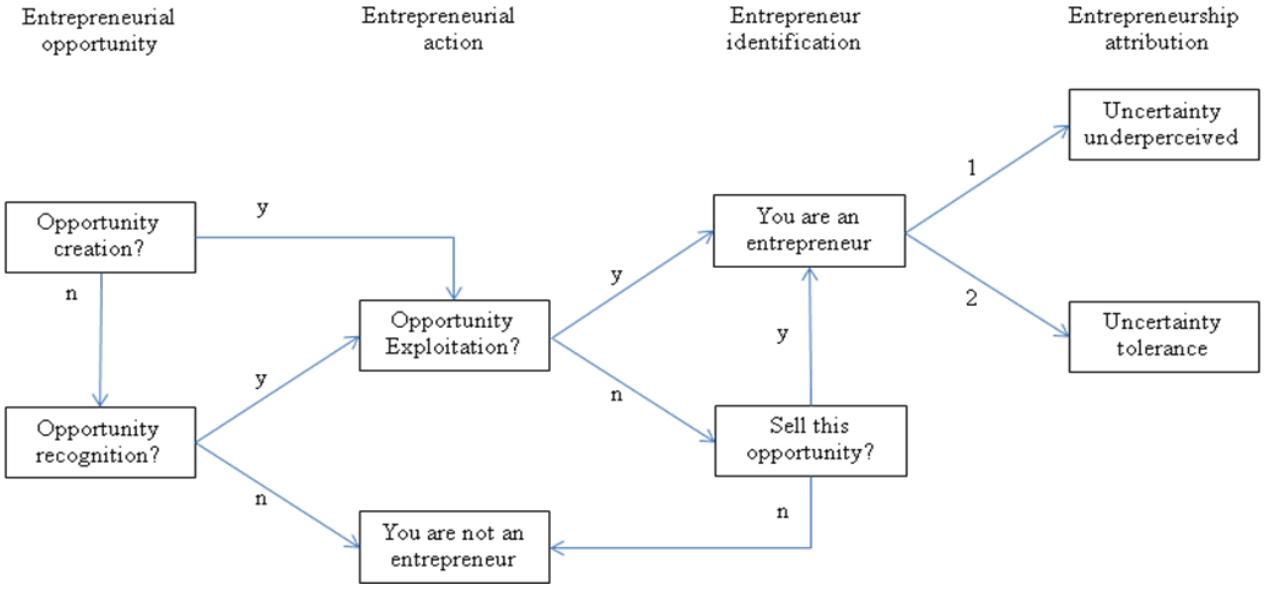
What is the definition of an entrepreneur? The term entrepreneur first appeared in the works of Cantillon (1680-1734) who identified three types of economic agents, i.e., landowners, entrepreneurs, and employees and saw entrepreneur as someone exercises business engagement in the face of uncertainty (cited in Wennekers and Thurik, 1999: 31). While others have also talked about entrepreneur, Schumpeter might be the most respected figure for making a distinctive contribution to idea that entrepreneurship is the essence and engine of capitalist economic development. According to Schumpeter (1911/1934, 1942), an entrepreneur is an innovator who disrupt the equilibrium in an economy by introducing new goods or new methods of production. To Schumpeter, due to the entrepreneurial activities of all entrepreneurs, there is a process in a capitalist economy that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. Such a process keeps the capitalist economic growth happening, therefore a 'creative destruction'. If the Schumpeterian entrepreneur is a disequilibriating force which keeps breaking equilibrium towards disequilibrium, then Kirzner's (1979) conception of entrepreneur is the counterbalancing force as he sees entrepreneurs as an arbitrager who are alert to opportunities existed in the disequilibrium, and due to the arbitraging actions of many entrepreneurs the economy tends to go back toward equilibrium.

According to Casson (1987), the disequilibrating and equilibrating views of entrepreneurs are not irreconcilable because the opportunity explored by one entrepreneur through an innovation may be exploited by not only the innovator himself but also other entrepreneurs who can see and use such opportunities for profit making. For Kirzner (1985) himself there are two roles of entrepreneurship, first, to expand the Social Production Possibility Frontier (SPPF) upwards and rightwards, second, to realize the move from an economically inefficient point under the SPPF towards the most economically and technically efficient production point on the SPPF (cited in Wu and Huang, 2006).

Then, what are the defining characteristics of entrepreneur that separate them from non-entrepreneurs? According to Schumpeter (1911/1934: 88), innovative entrepreneurs are driven 'more by will than by intellect', i.e., they are characterized by their 'free spirits' that allow them to make things work, i.e., to create wealth-generation opportunities that did not exist before. In comparison, Kirzener (1979) sees it is the alertness of the entrepreneur that allows them to recognize wealth-creation opportunities that have already existed in the market but cannot be seen by non-entrepreneurs. However, no matter for opportunity creation or recognition, entrepreneurship requires action (McMullen and Shepherd, 2006) and all entrepreneurial actions involve certain uncertainties (Mises, 1949). If an entrepreneur tolerates uncertainty when making decision, he/she will take action after a wealth-creation opportunity is created or recognized. Otherwise, if no action is taken after opportunity is created or recognized, he will not be qualified as entrepreneur. In general, there are two general types of entrepreneurial action for an entrepreneur to take: to realize the opportunity by himself/herself or to sell the opportunity information to others for making wealth. There are two basic reasons identified in the management literature on entrepreneurship that prevent

a potential entrepreneur from taking action to realize the opportunity: either he/she has over-perceived the uncertainty or he/she is not willing to tolerate such uncertainty perceived. So, based on the existing literature, I have come up with an integrative model of entrepreneur (see Figure 8.5).

Figure 8.5 An integrative model of entrepreneur



There exist different definitions of entrepreneurship so that readers can be easily confused. Drawing on extant literature, I define entrepreneurship as the spirit, ability, and action of recognizing or creating and then take action to realize the wealth-creation opportunity by the entrepreneur.

There are two basic types of entrepreneurship, explorative and exploitive, identified in the literature. The explorative entrepreneurship is, in the Schumpeterian spirit, an incessant exploration (creation) of opportunities through innovation to disrupt the current economic order (e.g., equilibrium) in order to create wealth. The consequence of such an explorative entrepreneurship, i.e., creative destruction or disequilibrium, is not only economic growth (i.e., creative) but also economic redistribution (i.e., destruction) because as Schumpeter (1942) argues that without creative destruction wealth would become increasingly concentrated in the hands of a few large firms and this would destabilize society. The exploitive entrepreneurship is, in the Kirznerian spirit, an incessant (discovery/recognition) exploitation of opportunities (i.e., arbitraging) generated and spilled out from the innovations made by the explorative entrepreneurs in order to create wealth. The more such exploitive entrepreneurship, the less profit the follow-suit entrepreneurs can make, therefore, the economy will tend to return to equilibrium.

In the management literature on entrepreneurship, there exist debates about the relationship between these two types of entrepreneurship (Alvarez and Barney, 2010). Some scholars argue the explorative entrepreneurship is just a special case of exploitative entrepreneurship (Eckhardt and Ciuchta, 2008) while others argue the other way around (e.g., Luksha, 2008). While some scholars argue these two approaches can be integrated into a broader overall framework (e.g., Zahra, 2008), Alvarez and Barney (2010: 575) suggest the effort to develop a single theory of both types of

entrepreneurial opportunity may be like mixing oil and water due to the different philosophical underpinnings of these two, namely, the opportunity creation (i.e., explorative entrepreneurship) view is underpinned by a evolutionary realist epistemology while the opportunity discovery (i.e., exploitative entrepreneurship) is underpinned by a critical realist epistemology.

However, I see there is a way to integrate these two approaches into a single framework. One effective solution for integration two totally opposite view is to find a third view that bridges between the two opposites. In addition to these two basic types of entrepreneurship, I argue there is another, often neglected, kind of entrepreneurship in between the explorative and exploitative entrepreneurships, which I term as re-explorative entrepreneurship. We can understand explorative entrepreneurship as purposefully creating opportunity (i.e., the opportunity does not exist beforehand) and then realizing such opportunity while exploitative entrepreneurship as alertly recognizing opportunity that already exists in the market and then realizing such opportunity. However, for the explorative entrepreneurship, there is a possibility that the explorative entrepreneur under-evaluates the potential value of the opportunity he himself created so that he would not fully exploit such opportunity before he moves on to another exploration or exploitation of opportunities created by other entrepreneurs. In such a situation, the re-explorative entrepreneurship comes in to further exploit as well as re-explore the under-exploited opportunity left over by its initial creator.

Let me give an imagined case to illustrate the three types of entrepreneurship. There are three entrepreneurs living in Las Vegas. Let's give them different titles, the first one as explorative entrepreneur, the second one is the exploitative entrepreneur, and the third one as the re-explorative entrepreneur. While the other two entrepreneurs were looking for opportunities in the gambling city, the explorative entrepreneur purposefully switched his attention to the desert outside the city and he started to explore the desert and finally he found out that there was a gold mine in the desert. So he created the opportunity that did not exist before. He then started to exploit such an opportunity by mining the gold mine. Gradually, the other two entrepreneurs found out this success story. One of them, the exploitative entrepreneur, realized there was an opportunity for making a profit by buying the gold from the mining entrepreneur and sell to others. While the other one, the re-explorative entrepreneur, sensed there might be under-exploited treasure underneath the gold mine found by the explorative entrepreneur. So he had two options: one, buying the mine from the explorative (mining) entrepreneur, the other, waiting till the mining entrepreneur believes there is no further value to dig there and leaving the mine for another opportunity exploration/exploitation. Then the third entrepreneur started to re-explore the mine left to him by the first entrepreneur and finally he found a diamond mine underneath the gold mine. In this illustrative story, all of the three entrepreneurs have had their own opportunities for making wealth, however, their approaches are very different. Table 8.2 summarizes the differences of the three types of entrepreneurship.

Table 8.2 The three types of entrepreneurship

	Key literature	Epistemology	Opportunity source	Attribution	Consequence
Explorative	Schumpeter (1911/1934)	Evolutionary realism	Creation	Free spirits	Disequilibrium
Re-explorative		Complementarism (of Neils Bohr)	Recognition + creation	Alertness + free spirits	Equilibrium + disequilibrium
Exploitative	Kirzner (1979)	Critical realism	Recognition	Alertness	Equilibrium

8.2.3 The links between entrepreneurship, economic development, and business cycle

Now, let me address the linkage between entrepreneurship and development (Leibenstein, 1968; Wennekers and Thurik, 1999). According to Adam Smith (1776), the two core questions economists concerns about economy are, one, how wealth is created, the other, how wealth is created. To Smith, wealth is created by improving the efficiency of production though division of labor and specialization, while wealth is better distributed by free market. Adam Smith praised the virtue of free market for both wealth creation and distribution by arguing there is the 'invisible hand' making free market well-functioning and self-adjusting. It seems to me that Smith did not have a clear answer why free market could function and self-adjust therefore he mystified the mechanism as an 'invisible hand', of, in essence, God. Schumpeter's creative destruction theory can serve as a perfect explanation of Smith's invisible hand, namely, Schumpeterian entrepreneurs are all self-interested and are willing to take action to maximize their won benefits even at the great costs (i.e., destruction) of others, however, all entrepreneurial activities combined will creatively destruct the existing economic structure and establish a new one, the outcome of such creative destruction is the increase of the total social welfare (i.e., more new wealth is created than the wealth destroyed). If Schumpeterian entrepreneurs often disrupt an established economic structure (i.e., equilibrium) and such entrepreneurship only results in disequilibrium, then Kirznerian entrepreneurs then exploit opportunities existed in a disequilibrium situation and arbitrage in order to make profits and such entrepreneurship tends to equilibrate the economy.

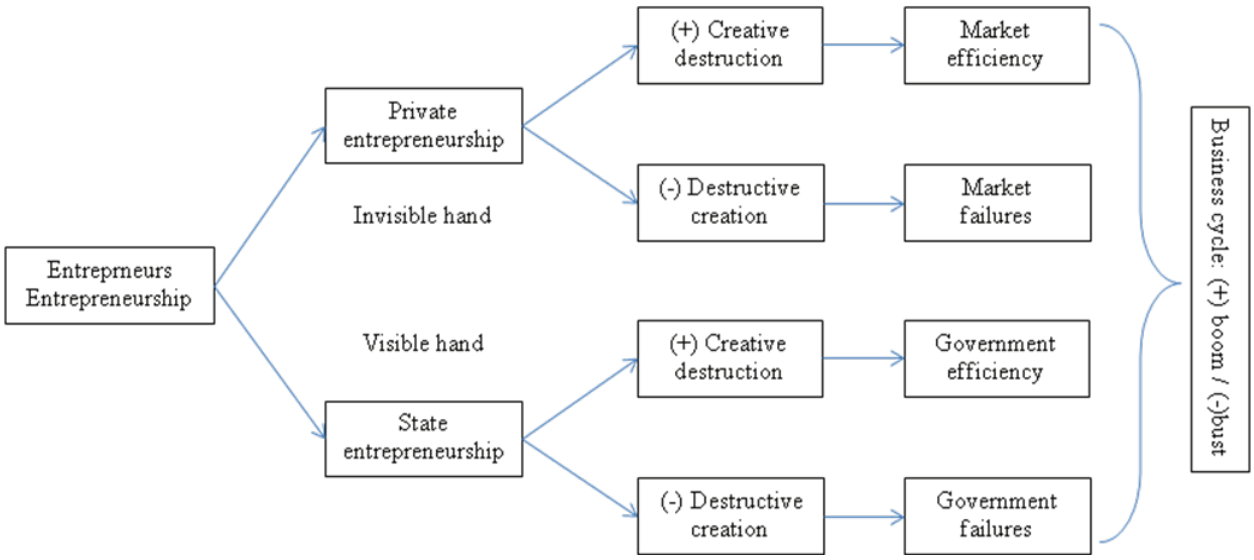
However, if both Schumpeterian and Kirznerian entrepreneurships work side by side to push forward the economic development, under the guide of an 'invisible hand', then how come there have been boom and bust business cycles? This question really challenges the 'efficient and self-adjusting market thesis'. There are many competing explanations in the economics literature, such as the Keynes's (1936) theory of aggregate demand, Friedman's monetarist theory (Friedman and Schwartz, 1963), Minsky's (1992) financial instability hypothesis, and Perez's (2002) theory of excess speculation. Without denying the insights all these theories provide, I propose another entrepreneurship hypothesis for business cycles.

According to Baumol (1990), the exercise of entrepreneurship can be productive, unproductive and destructive depending heavily on the structure of payoffs in the economy, i.e., the rules of the game. This essentially challenges Schumpeter's 'creative destruction' thesis. So, I assume, if more destructive entrepreneurship than productive entrepreneurship is engaged, then the outcome of all entrepreneurship may be described as 'destructive creation', a term I coined to indicate the situation in which many selfish entrepreneurs engage in destructive entrepreneurship with the intention of wealth *creation* for themselves and their entrepreneurial actions together result in destruction of social welfare/wealth. An illuminating example is the financial innovation entrepreneurship resulting in 2008 global financial crisis.

I see a business cycle as the ongoing fight between these two forces: creative destruction vs. destructive creation. If the former outweigh the latter, then economy booms, otherwise the economy busts. In a free market, without state intervention, two types of unfettered entrepreneurship will be flourishing, so the business cycle cannot be stopped by the market forces per se. If the government intervenes in a bust phase by stimulating the aggregate demand (Keynes, 1936), we can say the government is also engaging in entrepreneurship. Let's call it *state entrepreneurship*. Similarly, like private entrepreneurship, the state entrepreneurship can be productive, unproductive, and destructive. So, state intervention may succeed as well as fail, just like the market mechanism may

succeed as well as fail. Therefore, market and the state are like the 'invisible hand' and the 'visible hand', both private (market) entrepreneurship and state entrepreneurship can result in creative destruction and destructive creation, therefore, it is the net force of the four types of entrepreneurship that determines whether the economy is to boom or bust (see Figure 8.6).

Figure 8.6 The links between entrepreneurship and business cycle



8.3 A theoretical justification of state entrepreneurship

8.3.1 The proper role of the state cannot be determined a priori

The role of the state in the economy is a fundamental question in economics. There have been ongoing debates on the normative role of the state (cf. Musgrave, 1956/1957, 1959) while the real roles of the state have been changing (Tanzi, 1997). While some economists try their best to establish theoretical foundations for small government and others for big government, Paul Samuelson (1963), one of the greatest economists of the twentieth century, pointed out almost half century ago that 'there are no rules concerning the proper role of government that can be established by a priori reasoning' (also, see Samuelson, 1954). I subscribe to such 'Samuelson's Law' (ibid.: 37). It is said the French poet, Paul Valery, believed that 'if the state is strong, it will crush us; if it is weak, we will perish' (cited in Bardhan (1996: 11), based on which, Tanzi (1997: 4) claims that 'the ideal role must, therefore, between these two extremes', i.e., the state complementing to the market, which I agree and would call a 'state and market partnership' (SMP).

I posit what role of the state is appropriate is dependent on the nation's development stage and contingent on the real circumstances the country faces domestically and internationally.

In the Literature Review chapter, I identified three broad stages of economic development in which the state has changing roles to play (cf. Tanzi, 1997: 7-8). In the first, underdeveloped, stage, the state should led the market because the private sector is too weak to undertake or simply there is no market for certain kinds of innovative activities, the state may act as an entrepreneur to initiate such

innovations or subsidize private firms to carry out such innovations. What is important is that, as Hausmann and Rodrik (2003) has pointed out, state subsidies should only be used to motivate the first mover, but not the followers, to undertake such an innovation which would not be done otherwise.

In the second, transitional, stage, the state should gradually reduce its involvement in or intervention to market. In this stage, we can see both private (market) and state entrepreneurships, so it is a dual-track stage. The state can play an important role for making and changing the rules of the game in order to stimulate productive/constructive entrepreneurship, restrict unproductive entrepreneurship, e.g., arbitraging to take advantage of the institutional deficiencies, and punish destructive entrepreneurship.

In the third, developed, stage, market should be the principal mechanism for resource allocation and entrepreneurship while the state keeps a very small scale and scope in entrepreneurship. In this stage, the state should also further stimulate productive entrepreneurship while restrict unproductive and even destructive entrepreneurship, such as financial innovation and speculation.

8.3.2 State intervention: market failures or patience costs

In the mainstream economics, state intervention is limited to correcting 'market failures' (Arrow, 1969; Bator, 1958) such as natural monopolies, external economies, public goods, and information asymmetry (Ledyard, 2008). Except these, there is no more space for state intervention in the market. State intervention can rely on budgetary instruments (i.e., taxation and public spending) and non-budgetary instruments such as regulations (e.g., granting natural monopoly to one market player).

Yet, I identify another rationale for state intervention, which I call patience costs. There are two types of patience costs. One is costs of non-action in a crisis sitting when state intervention is needed to either restore market confidence or to protect public interests[168] that may be hurt by the collapse of markets. Another is costs of opportunity loss in a non-crisis sitting when state intervention may make a positive gain.

For patience costs of non-action in the crisis sitting, one example is the collapse of Lehman Brothers. Before its final collapse on 15 September 2008, Lehman Brothers, under intensified financial stress due to the subprime mortgage crisis, asked for the US federal government's financial support. However, 'the US Treasury was unwilling to put more taxpayer money at risk after saving Bear Stearns, Fannie Mae and Freddie Mac', as BBC news later revealed[169]. However, the collapse of triggered a rapid escalation of the credit crisis which later turned into a global financial crisis due to the collapse of market confidence. The deepening of the financial crisis later forced the US government and governments around the world to inject hundreds of billions of dollars into the banking system in the fear of the collapse of the whole system. The point is that the crisis would have not gone so server if the US government intervened in the right time when such state intervention is needed with the rationale of protecting public interests (i.e., those many small shareholders and creditors of Lehman Brothers).

For the economic costs, one example is industrial development in a developing country. Stiglitz (1998:27) points out two specific market failures in developing countries, namely, 'left to itself, the

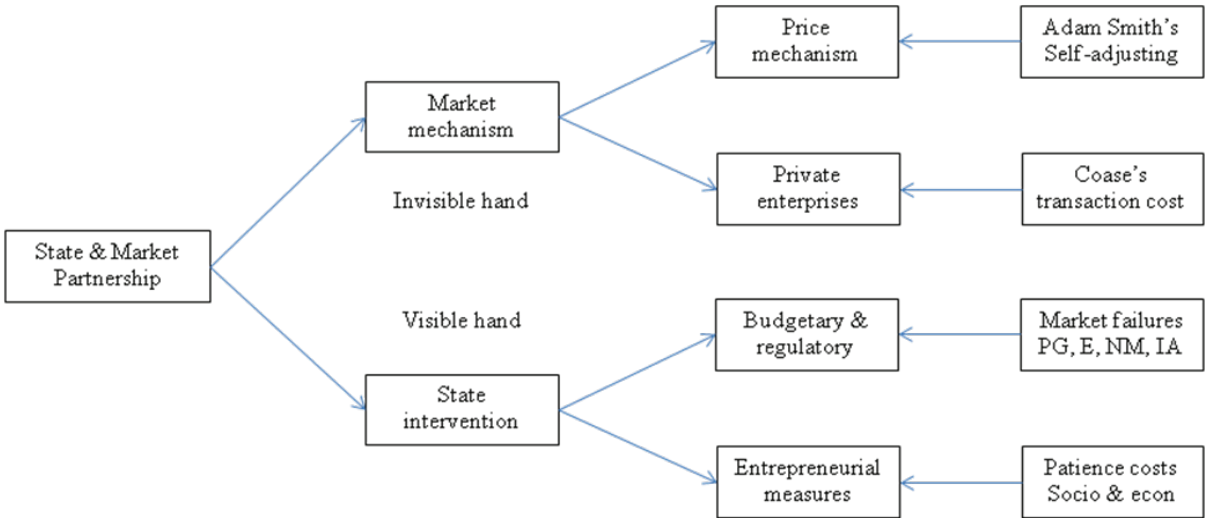
[168] Thanks go to Sushil Khanna, an Indian visiting professor at my research centre, who mentioned there are social costs of market failure in addition to the other types of patience cost I have identified.
[169] http://news.bbc.co.uk/2/hi/business/7745592.stm

market will tend to underprovide human capital' and 'technology', which are crucial factors for economic development. To develop a new industry, we need patient capital for the gradual development of the technological capabilities required for that industry, which often takes long period of time. However, market (i.e., the private sector) may either fail to supply such patient capital or takes a long period of time to wait for a ripe opportunity for such patient investment. In the first situation, it is the market failure (i.e., lack of supply of patient capital) that calls for state intervention. In the second situation, it is the waiting (or patience) costs, accrued to the waiting/patience for the market itself to work out eventually for the supply of patient capital, that calls for state intervention.

To go one step further, I contend the argument of market failures can be fully explained by the argument of patience costs. Some economists legitimize state intervention under market failures. However, other market fundamentalist economists would probably reject such market failures argument by arguing that the market will self-adjust to correct the market failures by the market itself, due to the 'invisible hand', and hence no need for state intervention at all. Kirzner's (1979) theory of arbitraging entrepreneurship can provide an effective mechanism for such free-market self-adjusting argument. Namely, private entrepreneurs are alert to wealth-creation opportunities existed in disequilibrium (i.e., where there are market failures) and their arbitraging entrepreneurial activities will ultimately equilibrate the market (i.e., correcting market failures). For instance, in the case of public goods, due to the free riding problem, public goods are undersupplied or will not be supplied at all by the private sector. However, due to high demand for and the associated wealth-creating opportunities in such goods like roads, private entrepreneurs may take such opportunities by building fee-charging roads. Therefore, it is not because of the market failure (e.g., no or under supply of roads) per se that calls for state intervention, but the patience costs (i.e., costs of waiting for opportunity alert private entrepreneurs to emerge) that call for state interventions.

The patience costs argument can be understood in connection to Coase's (1937) transaction costs theory. Coase (1937) challenged the 'efficient price mechanism thesis' by asking why on earth the firm came to exist if price mechanism of the free market is so efficient. Coase's answer is that there are transaction costs of using price mechanism and therefore the firm comes to minimize transaction costs by internalizing some market transactions and coordinating them within the firm by fiat. Likewise, we can ask once again why on earth we need the state intervention if the market (i.e., price mechanism plus private firms) works so smoothly and efficiently. With the above analysis, we can easily offer the answer, namely, state intervention is needed because of the patience costs of solely relying on the market to self-adjust to correct its failures or work out the timing for patient investments. Figure 8.7 summarizes the justifications for market mechanism and state intervention.

Figure 8.7 The justifications for market mechanism and state intervention



Note: the box of Market failures (PG, E, NM, IA) denotes the four types of market failures, i.e., public goods, externalities, natural monopoly, and information asymmetry.

8.3.3 State entrepreneurship: A portfolio selection perspective

I assume that, in a developing country, the patience costs of non-intervention in technological catching-up is so high that state intervention (with entrepreneurial rather than budgetary or regulatory instruments) is justified. In section 8.2, I have identified four factors underlying technological catching-up, I suggest that the state can have more roles in economy, especially in pushing forward technological catching-up. For instance, the state can play an important role in improving the four basic factors underlying technological progress, namely, the state can invest in education to make human capital deepening; the state can improve institutions supportive to technological works; the state can help establish a national innovation system; and the state can encourage productive entrepreneurship, restrict unproductive entrepreneurship, and punish destructive entrepreneurship.

What is more, I posit that the state should also engage in state entrepreneurship to complement to private entrepreneurship in pushing forward technological catching-up. By state entrepreneurship, I mean entrepreneurial activities undertaken by the state, which, apart from the provision of public goods recognized in the traditional economics literature, includes the following components: (1) making industrial policies (Amsden, 1989; Wade, 1990); (2) funding basic researches; (3) providing patient capital for industrial development; (4) owning state-owned enterprises that are not *primarily* profit-driven. Here, the SOEs may be justified by natural monopolies in utilities (e.g., water supply, electricity grid, railway and telecommunication network), information asymmetry in financial sector (e.g., state-owned banks), public interests (e.g., public health, public housing, public pensions), and the *higher expected returns* associated with *higher risk* of state investments which I will discuss below.

The 'high risk high expected return' justification works as follows. Due to the nature of risk aversion, private firms and private entrepreneurs on the market are often not willing to take some high-risk projects, such like the 'big aircraft project' in China, and sometimes, even if they are

interested in but they lack of financial capacities for undertaking such high-risk investments. Under such situation, the state (via SOEs) steps in to undertake such high-risk investments.

Neoclassical economists who oppose state entrepreneurship may reject the risk justification for two reasons. One is the necessity of undertaking such high-risk investments if the market is not willing to undertake. The other is the format of undertaking such high-risk investments.

Neoclassical economists reject the idea that state should undertake high-risk investments that are avoided by the private sector by preaching the comparative advantage theory. In addition to the existing criticisms of comparative advantage theory, such as its static nature, I have two more criticisms.

The first one is that the policy prescription of 'sticking to your comparative advantage' is in direct conflict with Adam Smith's free market thesis. Namely, the essence of free market is the freedom of choice, do whatever you want as long as it is not illegal. If freedom of choice is granted, then every person and nation should make their own choice what to do and how to do and be not intervened or dictated by any other person and organization. Due to the 'invisible hand', whatever they do in pursuit of their self-interests, they will in the end cause maximized social welfare. Even if individuals may fail in some situation, they may succeed in others. At the aggregation level, the 'invisible hand' of free market will eventually cause maximized social welfare. However, the comparative advantage theory's policy prescription 'stick to your comparative advantage' essentially forbids the freedom of choice of individual person and nation what they should do. It works in a way like centralizing rather than decentralizing decision making of individual person and nation.

The second is that the policy prescription of 'stick to your comparative advantage' is in direct conflict with the conventional wisdom of 'don't put all your eggs in one basket'. From a modern portfolio theoretical (MPT, cf. Markowitz, 1952, 1959) perspective, we can view individual person, firm, and nation are always face the portfolio selection problem, namely, how to allocate our time, energy, and financial resources between alternative uses. For a nation, 'stick to your comparative advantage' prescription essentially advices a nation to allocate its national resources into only the risk-free portfolio because this portfolio's expected return is certain and therefore risk-free. If a nation does not stick to its comparative advantage but diversify into other risky investments (i.e., where the nation does not currently have comparative advantage), it means the nation is willing to take risk and therefore its expected return of the new portfolio is higher than the return from 'sticking to your comparative advantage' portfolio. And according to the Markowitz's (1952, 1959) portfolio selection theory, there is an optimal portfolio that is characterized by the overall risk-reward characteristic, provided the degree of risk aversion of the investor.

At the core of the Modern Portfolio Theory is the idea that the risk of a portfolio can be reduced through the impact of diversification (Chen et al., 2010). At another front, Wade (2006:4) has pointed out the nature of the process of economic development is product diversification, namely, 'rich countries produce different kinds of goods and services than poor countries' and therefore to catch up or 'to become richer poor countries have to raise the share of total production comprised of richer country goods'.

Neoclassical economists who subscribe to comparative advantage theory may make a defense by arguing that comparative advantage theory is not necessarily static. They would argue, when wage level rises, a country may gradually lose its comparative advantage in previously specialized industries/activities, then the country's comparative advantage will change and evolve. Therefore, the market itself will self-adjust to the changing comparative advantage. However, the problem with

this 'evolving comparative advantage' view is that there is an implicit assumption that switching from one industry/activity to another when the comparative advantage is lost in the industry is costless and smooth.

However, such an assumption is unrealistic and wrong. Hausmann and Klinger (2006, 2007: 2-3) have empirically examined the factors underlying the evolution of comparative advantage and revealed that 'changes over time in the revealed comparative advantage of individual nations are associated with the pattern of relatedness across products' and 'as countries change their export mix there is a strong tendency to move towards related goods rather than to goods that are less related'. This means there is a strong path-dependency in the evolution of a country's comparative advantage. Put simply, without state intervention and left to the market alone, a country can only diversify to new products/industries/activities related to its previous ones.

Even if they can compromise to accept the necessity of undertaking high-risk investments, neoclassical economists would still reject the idea that state should carry out such high-risk investments by itself. Therefore, neoclassical economists resort to the question of the format of undertaking such high-risk investments. They may suggest the state simply provides the patient capital and give to one or many private enterprises to carry out such high-risk investments. This is because neoclassical economists deeply believe the bureaucrats and SOE managers cannot use the taxpayers' money efficiently.

However, this argument of 'state simply providing patient capital to private enterprises to undertake high-risk investment' will encounter the problem of the efficiency-equity trade-off. It might be true that private enterprises are often efficient than SOEs, however, there is an equity issue of giving taxpayers' money to individual private enterprises that are self-interested and profit-driven in nature. That public money should be owned by the public is a rightful argument in itself. Nevertheless, if the private enterprises get the state subsidies for the purpose of undertaking high-risk investments but fail to do so in pursuit of self interests, then the public interests will be hurt. Due to information asymmetry, this is very likely. In such a situation, we can argue a public ownership of such high-risk investment (i.e., SOE) may be more appropriate from an equity point of view.

8.3.4 State & Market Partnership: A Third Way forward?

With the above analysis, I suggest the state and market should engage in a partnership in economic development, which I call State & Market Partnership (SMP).

In general, I suggest that SOEs should not be *primarily* profit-driven. The word 'primarily' indicates that profit-making by SOEs should be allowed only as the means to the end of partnering with private sector to push forward economic development and therefore maximize social welfare. The SOEs should only compete in those areas that private sector is not willing to enter and is not capable of undertaking. When the private enterprises want to enter into the markets that developed by the SOEs through patient investments, there should be dual-track phase in which the state should allow for competition between the SOEs and private enterprises for improving efficiency purpose, and after a certain time period of the dual-track transition phase, the SOEs should gradually exit when the private enterprises gradually mature.

A special function of the SOEs in the SMP model is that they should focus their attentions to those projects that are both of high-risk and significance from a technology innovation point of view. This is because the state is a special 'entrepreneur' who can be most patient investor and who can take the highest risk to undertake such high-risk projects when no any single private firm is willing or capable to do so due to the financial pressures, short-termism, and lack of financial capabilities.

Such a role of 'SOEs making patient industrial investment and significant technological innovations' is especially needed in developing countries. This is because without certain state assistances, the private sectors of the developing countries alone cannot compete with the global MNEs that have overwhelming competitive advantages in finance, technologies, brands, and management. The competitive disadvantages of private sectors of the developing countries are made more accentuated by the global business revolution since 1980 and the rapid 'cascade effect' in supply chains of sector after sector (Nolan and Hasecic, 2000; Nolan, 2002; Nolan, Sutherland, and Zhang, 2002; Nolan and Zhang, 2002, 2003; Nolan and Rui, 2004). In such a changing global competitive landscape, a developing country has to 'create' some form of big business groups if it wants to compete with global giants. Forming big SOEs might be a proper or 'choice of no choice' solution, especially from a technological point of view.

In sum, in this section, I have argued that for a developing country to catch up the developed countries, the only route is through technological learning to enhance technological capabilities in order to advance technological progress. Especially important is the developing country engaging in innovative entrepreneurship (i.e., indigenous innovations). In order to stimulate innovative entrepreneurship, there should be other supportive conditions such as human capital deepening, efficient and effective institutions, and a well-functioning national innovation system, to all of which the state can play an important role and contribute.

While private entrepreneurship should be encouraged and promoted by the state at any stage of development, the state has also important roles to play in stimulating entrepreneurship. Namely, on the one hand, the state should improve institutions that not only facilitate productive private entrepreneurship but also restrict and punish unproductive and destructive private entrepreneurship, on the other, the state can engage in state entrepreneurship in making industrial policies, funding basic researches, providing patient capital for industrial development, and owning state-owned enterprises that are *primarily* public interest-driven.

This specific positioning of the role of state entrepreneurship indicates that the state entrepreneurship is not to compete with private sector in pursuit of self-interests but to partner with (i.e., in coordination with) private sector to push forward economic development and therefore maximize social welfare. State entrepreneurship is aimed to steering the technological development directions at the national level and, at the industry level, to assuming the responsibilities of undertaking some high-risk and high-significance technological innovation projects that no private entrepreneurs are willing to undertake or capable of undertaking.

What is important for the government of a developing country is that the government must have a well-designed national competitive strategy (e.g., national science and technology strategy and industrial policies) and make a delicate balance of market mechanism and state activism, i.e., a delicate balance between private and state entrepreneurships. Such a vision of State & Market Partnership (SMP), in Nolan's (2005: 18) words 'creative symbiotic interrelationship between state and market', can be viewed as a Third Way (ibid.), in comparison to the free-market capitalism and state-control Communism.

In fact, Nolan (2004, 2005: 18) argues that while Europe has in recent decades been groping its own way towards a 'Third Way', China practiced its own 'Third Way' for 2000 years and that was the very foundation of its hugely impressive long-run economic and social development (cf. Needham, 1954). According to Nolan, Confucianism has a deeply developed concept of 'duty', which stipulates their duties of all strata of Chinese society, and the Chinese 'Third Way' was 'a complete philosophy that combined concrete ways of both stimulating and controlling the market [by the state], with a deeply thought out system of morality for rulers, bureaucrats and ordinary people.

When the system worked well, the philosophical foundation was supplemented by non-ideological state actions to try to solve practical problems that the market could not solve', and when the state and market partnership worked effectively, there was 'great harmony', i.e., a prosperous economy and a stable society, and otherwise, there was 'great turmoil', i.e., economic retrogression and social disorder.

Then how should we go about for such a state and market partnership? There is no simple solution. Every country has to find out its own answer, perhaps by 'crossing the river by feeling the stones'. However, there is a general principal in the State & Market Partnership, as Nolan (2005: 19) points out, that the state 'uses the market as the servant of the development process, not the master'. In other words, the free market fundamentalism offers no hope to developing countries for sustainable development, therefore, state improvement, rather than state desertion, alongside promotion of private sector, is the only rational goal for economic system reforms in developing countries.

8.4 China's potential for catching up

In this section, I will briefly analyze four factors that are very important to China's moving up the technological ladder, which are human capital deepening, institutional improvement, national innovation system, and entrepreneurship. We will see the Chinese state has been playing very important roles in all of these four areas.

8.4.1 Human capital deepening

Since the beginning of China's reform and opening era, Chinese government has been emphasizing on the importance of science and technology progress and the labor quality improvement. In 1977, Deng Xiaoping came up with an idea that the key to the realization of China's 'four modernization' was science and technology while the basis was education. In 1992, at the CCP's Fourteenth National Congress, Jiang Zemin pointed out that China must switch to a development route that emphasizes advancement of science and technology and improvement of working force's qualities. With the guidance of Jiang's speech, Chinese government made its first Science and Technology Progress Law of PRC in 1993 and its first Education Law of PRC in 1995. In 1995, the strategy of 'revitalizing China by science and technology and education' was officially proposed, which was adopted and written into China's Ninth Five Year Plan (1996-2000) and Long-term Plan (1996-2010)[170]. In 1998, the National Leading Group for Science, Techology and Education was formed, which in its first meeting requested the nation to increase the investment in science and technology and education.

China has dramatically increased its investment in education and therefore there has been a rapid human capital deepening process in China. Let's look at its higher education first. In 1949, China only had 21,000 new graduates from universities. In 1952, China established a National Higher Education Entrance Exam system. In 1952, China had 66,000 new students enrolled in universities. During Cultural Revolution, China stopped this national exam for university enrollment. In 1978, China, under Deng Xiaoping's leadership, restored the national exam system for university enrollment. In 1988, China's new intake for universities was 1.08 million students. In 1999, Chinese government decided to expand the scope of university enrollment. In 2008, China had 6.07 million new students enrolled in universities and colleges, with 20.21 million total enrollment in universities and colleges plus 1.28 million postgraduates in master and doctoral programs. In addition to the higher education, China has 8.1 million new students and 20.21 million students in

[170] http://news.xinhuanet.com/zhengfu/2003-02/09/content_720066.htm

total enrolled in vocational secondary education schools. In the meantime, China has in total 24.76 million, 55.74 million, and 103.32 million students enrolled in senior secondary education, junior secondary education, and primary education in 2008. Table 8.2 shows the student structure of Chinese education system in 2008.

So, we have seen an evident human capital deepening trend in China. Wang, Fan, and Liu (2007: 23-24) compiled a table of China's capital stock including human capital and year of schooling per laborer from 1952 to 2005. According to their data, China's human capital formation increased from 747.27 million person year in 1952 to 6963.27 million person year in 2005, with an annual increase 4.30%, while the year of schooling per laborer has increased from 3.61 in 1952 to 9.18 in 2005, with an annual growth 1.75%. Holz (2005: 44) has made a projection of the improvement of labor quality in China up to 2025. According to his data, China's average years of schooling per laborer was 8.91 in 2000 and 8.53 in 2005 and this figure will increase to 9.66, 10.29, and 10.84 in 2015, 2020, and 2025 respectively, while the number of Chinese laborer will increase from 0.744419bn in 2005 to peak at 0.780788bn in 2013 and then slowly fall to 0.725704bn in 2025. Therefore, China's human capital formation will increase from 6346.57 million person year in 2005 to 7865.55 million person year in 2025, with an annual increase of 1.08%.

Table 8.2 The student structure of Chinese education system in 2008

	2008 new entrants	2008 graduation no.	2008 enrollment no.
Postgraduate	446,000	345,000	1,283,000
Undergraduate *	6,077,000	5,120,000	20,210,000
Vocational Secondary Education	8,100,000	5,706,000	20,563,000
Senior Secondary education	8,370,000	8,361,000	24,763,000
Junior Secondary education	18,562,000	18,629,000	55,742,000
Primary Education	16,957,000	18,650,000	103,315,000
Special Education **	62,000		417,000
Kindergarten			24,750,000

Source: China Education Yearbook 2009; the official website of China National Bureau of Statistics; Notes: * Undergraduates include 4-year Full Undergraduate Courses students and 3-year Specialized Courses students; ** Special education is the education of students with special needs

8.4.2 Institutional improvement

To advance technology progress, human capital deepening is a necessary but not a sufficient condition. Beside human resources, a country needs to have some supportive institutions in place in order to provide an incentive system for technological innovations. Fairly speaking, there are many institutional deficiencies in all spheres of Chinese society, e.g., in economic and political areas. There are many institutions in urgent need of reform, such as the hukou system, the land management system, the social security system, and the financial system, etc. Without improvement in those institutions, China's entrepreneurship in its general public will be seriously constrained. Nevertheless, here I will focus on one particular institution: the state's policy toward private

economy, because as I have argued that private entrepreneurship is extremely important for a country's technological progress. If the state suppresses the private economy, then the private entrepreneurship will be reduced, and if the state promotes it, then the private entrepreneurship will be flourishing.

The attitude of Chinese Communist Party (CCP) toward private economy has gone through an evolution from 'the tail of capitalism' to 'a complement to the socialist public economy' to 'an important component of the socialist market economy' [171]. In Mao's era (1949-1976), private economy were treated as 'the tail of capitalism' to be cut and eventually almost abolished. When Deng Xiaoping started the reform and opening up in 1978, Chinese government started to allow private economy to exist alongside the dominating public economy. In 1980, China issued the first license of individual business operator (with less than 8 employees). In 1982 edition of China's National Constitution, individual economy was recognized as 'a complement to the socialist public economy' (i.e., state-owned and collective-owned enterprises). In 1988, Chinese government amended its National Constitution to establish the legal status of private economy in China. In the same year, Chinese government started to register private-owned enterprises (POEs). During the period from 1989 to 1991, due to the negative impact of the Tiananmen Incident in 1989, the legitimacy of Chinese private economy was doubted and the development suppressed. In 1992, Deng Xiaoping, the chief architect of China's reform and opening, made his famous 'Southern Tour' to push forward the reform agenda. In the same year, The CCP held its Fourteenth National Congress which made a decision to support private economy and not to discriminate non-public economy. In 1997, on the CCP's Fifteenth National Congress, the status of private economy was raised to 'an important component of socialist market economy'. In 2002, on the CCP's Sixteenth National Congress, the Party made a commitment to unshakably encourage and support the development of non-public economy (including individual business operators, private-owned enterprises, and foreign-invested enterprises including those invested by Taiwanese, Hong Kong and Macao Chinese). In 2004, Chinese government amended its National Constitution which states that the nation protects private property rights of Chinese citizens. This Constitutional Amendment has had a profound impact on the development of private economy in China.

With policy changes, Chinese private economy has grown rapidly. By the end of China's tenth five year plan period (2001-2005), the private economy has accounted for 60% of China's total industrial value added, 65% of China's GDP, and 60% of tax revenues of local governments; in addition, more than 75% of China's urban employment was provided by the private economy[172]. Nevertheless, there have still been many institutional obstacles, such as market entry barriers to many industries and difficulties in getting finance, which constrain the development of private economy in China. To remedy the problems in order to promote private economy, in 2005, Chinese government issued its first ever policy document whose theme was solely about promoting private economy, which was dubbed as '36 clauses guideline on non-public economy'[173]. This guideline lowered the entry barriers to allow the POEs to enter into areas that Chinese laws and regulations do not prohibit them from entering, including monopolized industries such like electricity, airline, telecommunication, and petroleum. This guideline requests local governments to give fiscal and tax supports to private economy, and the financial sector to give financial support to private economy as well.

[171] See, http://news.xinhuanet.com/ziliao/2009-08/12/content_11870155.htm
[172] http://news.xinhuanet.com/fortune/2006-02/05/content_4136042.htm
[173] See, http://www.gov.cn/zwgk/2005-08/12/content_21691.htm

The '36 clauses guideline' can be said as a milestone policy document which provided Chinese private economy a basis for development. However, as Yujun Bao, the president of China Private Business Economic Research Council, pointed out, this policy has basically not been implemented[174] because of strong resistance from the vested interests groups. On 18 December 2006, the State-owned Assets Supervision and Administration Commission (SASAC) of China's State Council issued a guideline on SOE restructuring, which for the first time explicitly stated that some key industries must be controlled by public economy[175]. According to Bao, this SASAC guideline has essentially nullified the '36 clauses guideline on non-public economy'. In November 2008, after outburst of global financial crisis, Chinese government quickly implemented the 'four trillion investment stimulus package'. Due to the fact the largest share of benefits of such stimulus package was taken by SOEs rather than POEs, this stimulus plan generated heated debate whether 'the state sector advances as the private sector retreats' in China[176], which reflected people's concern about the development of Chinese private economy. In 2009, the total profits of China's 500 largest POEs were less than that of two biggest SOEs[177], indicating the harsh competitive environment of Chinese private enterprises. Being squeezed by SOEs and foreign-invested enterprises (FIEs), many POEs have diverted their capitals into speculative activities, from stocks to real estate market and to agricultural products such as green bean and garlic. Partly due to the speculations, China's inflation has been pushed high in recent years.

Such a situation is not healthy and sustainable. To remedy the problems, in May 2010, Chinese government issued a 'new 36 clauses guideline' on promoting private economy, which is more concrete than the previous '36 clauses guideline'. The new guideline aims to further lower the entry barriers for POEs to enter many monopolized industries and to channel financial supports to private economy and small and medium enterprises (SMEs). However, since the vested interests groups are very strong and resistant, there remains uncertainty whether the new guideline will make a real difference. This issue was raised during Chinese Premier Wen Jiabao's press conference after China's National People's Congress on 14 March 2011. Wen pointed out the central government is working on the concrete plan of implementing the new guideline and he believes the two guidelines will further promote Chinese private economy. It seems that China's central government is committed to promoting private economy as its newly passed Twelfth Five Year Plan clearly states 'to eliminate institutional obstacles constraining the development of private economy' and 'to forcefully promote private economy and small and medium enterprises'[178]. If Chinese private economy is really to be treated equally as public economy, allowed to enter the monopolized industries and given non-discriminated financial supports, the monopoly of Chinese SOEs in many strategic industries will be ultimately broken, the competition in those industries will be intensified, therefore, the efficiency and dynamism of Chinese economy will be greatly improved in the future.

8.4.3 National innovation system

In 1997, Chinese Academy of Science (CAS) submitted a report to the Chinese government, which proposed the establishment of a national innovation system (NIS). Chinese government accepted the proposal[179]. After some experimentation and preparation efforts, Chinese government officially set the establishment of national innovation system as one of strategic goals of its Tenth Five Year

[174] See, http://www.caijing.com.cn/2008-07-18/100075396.html
[175] See, http://www.gov.cn/gongbao/content/2007/content_503385.htm
[176] http://ccnews.people.com.cn/GB/10971502.html
[177] http://news.xinhuanet.com/fortune/2010-08/30/c_12496387.htm
[178] http://politics.people.com.cn/GB/1026/14159537.html
[179] http://www.china.com.cn/chinese/zhuanti/296501.htm

Plan (2001-2005) and its Medium- and Long-term National Plan for Science and Technology Development (2006-2020)[180].

To establish a national innovation system in China, the government has to reform its science and technology (S&T) system. China's S&T system in Mao's time was in a central planning style in which the S&T works were disconnected with economy and the S&T personnel were controlled by the state therefore the performance of the S&T system was not good. When Deng Xiaoping started the reform and opening up, S&T system reform has become an integral part of the reform process. According to Fang (2010), China's S&T reform has gone through four stages. The first stage is from 1985 to1992, marked by the release of the policy document titled 'The Decision of CPC Central Committee on the Reform of Science and Technology' in 1985. The main reform programs included reforming the funding system, establishing the technology market, adjusting the organizational structure, reforming the personnel system, establishing pilot development areas for high-tech industries, and supporting and encouraging private S&T enterprise, etc. The second stage is from 1992 to 1998, during which Chinese government issued the policy document titled 'The Decision on Accelerating the Progress of Science and Technology' in May 1995. The main reform programs included increasing S&T investment, adjusting the organizational structure of research institutions, opening up all types of research institutions that directly serve the economic construction and social development, promoting commercialization of S&T research results, etc. The third stage is from 1998 to 2006. In this period, 'revitalizing China by science and technology and education' became a national strategy, therefore, strengthening the national innovation system and speeding up the commercialization of S&T fruits became the main policy direction. The fourth stage is from 2006 to the present time marked by the release of China's Medium- and Long-term national Plan for Science and Technology Development in February 2006 which emphasizes the importance of indigenous innovation.

With all these S&T system reform efforts, now China has established a basic national innovation system in which enterprises, universities and research institutions are connected in a partnership. Schaaper (2009: 18) summarizes some general characteristics of the three key performers in China's national innovation system (see Table 8.3). From this Table, we can see enterprises have become the main driving force of Chinese NIS as the private enterprises now account for 65.7% of the total full-time R&D personnel and 71.1% of the total R&D expenditure.

With such a private enterprise-centered NIS[181], China's gross and per capita domestic expenditure on R&D activities have been increasing rapidly in last two decades (see Figure 8.5 and Figure 8.6). As a result, China's technological capabilities have been enhanced and intellectual property became an important factor in economic and social development. According to the Ministry of Science and Technology (MOST), from 2006 to 2010 which is China's Eleventh Five-Year-Plan period, China's patent applications maintained high growth, with the annual average growth of patent applications and grants for inventions being 24.4% and 33.5% respectively. The annual average growth of patent applications for inventions from enterprises reached 28.7%. Statistics from China's State Intellectual property Office (SIPO) show China approved 582,000 of 977,000 domestic patent applications in 2009, a 41.2% increase from previous year. In 2009 domestic patent grants for inventions, accounting for 59.3% of the total amount[182], for the first time, exceeded foreign patent grants.

[180] http://www.gov.cn/jrzg/2006-02/09/content_183787.htm
[181] See OECD Review of Innovation Policy: China (2007) for more information on the evolution of China's national innovation system.
[182] http://www.chinaipr.gov.cn/newsarticle/news/government/201103/1212020_1.html

Table 8.3 The three key performers of China's national innovation system

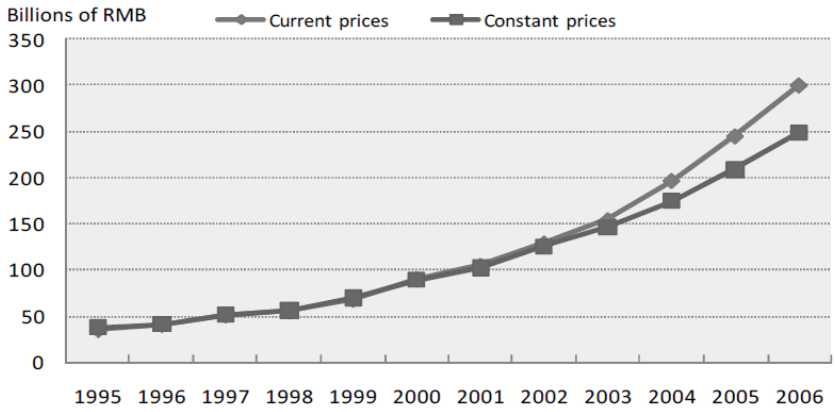
	Research institutes	Universities	Enterprises
Role in the NIS	Basic and applied researches	Suppliers of S&T human resources, applied researches dominate	Developmental and applied researches, the emerging driving force, core of the NIS
Number of units	3901 research institutes	1792 universities and colleges	28567 large and medium enterprises, of which 6775 have S&T units; 248813 small enterprises (in 2004), of which 22307 have S&T activities.
Share of full-time R&D personnel	18.1%	16.1%	65.7%
Funding sources	Mainly from the state	Diversified sources, mainly from the state and business sectors, also foreign funding	Self-financing
Share of government funding	66.5%	20.4%	13.0%
R&D expenditure	Average annual growth 9.7% (2000-2006, constant prices)	Average annual growth 20.0% (2000-2006, constant prices)	Average annual growth 22.0% (2000-2006, constant prices)
Share of R&D expenditure	19.7%	9.2%	71.1%
Share of (service) patent application	10.8%	23.5%	64.6%

Source: Schaaper, M. (2009: 18-19)

In terms of international patent applications, China has made 'astonishing' progress over the past 30 years since it became a member of the World Intellectual Property Organization (WIPO) in 1970. The number of China's international patent Applications was only 103 in 1994 when China approved the Patent Cooperation Treaty of 1970 designed to protect inventions with a unified patent application procedures. This number rose to 7900 in 2009. In 2010, China's international patent application made a 56.2% growth to reach 12337 applications[183]. Another indicator of China's rising technological capabilities is the citations in scientific literature. According to a BBC report on 28 March 2011[184], in 1996, the US published 292,513 papers in internationally recognized journals, which is more than 10 times China's 25,474, however, by 2008, while the US total had increased very slightly to 316,317, China's published paper number had surged more than seven-fold to 184,080. Given such a rapid development, the Royal Society of England made a project that in 2013 China may overtake the US to become the leading producer of scientific research.

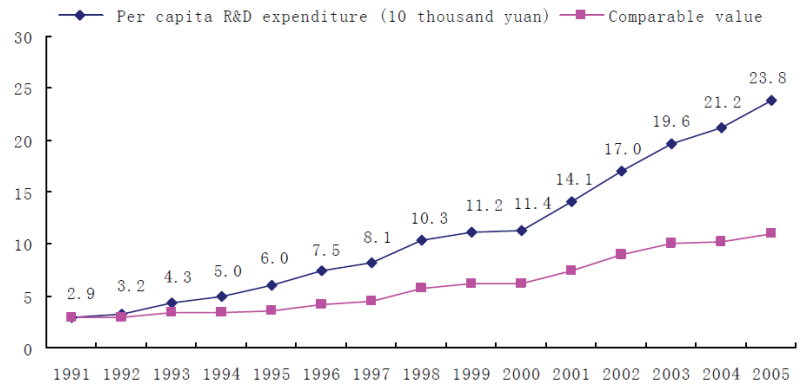
[183] http://english.peopledaily.com.cn/90001/90776/90881/7282696.html
[184] http://www.bbc.co.uk/news/science-environment-12885271

Figure 8.5 China's gross domestic expenditure on R&D activities (1995-2006)



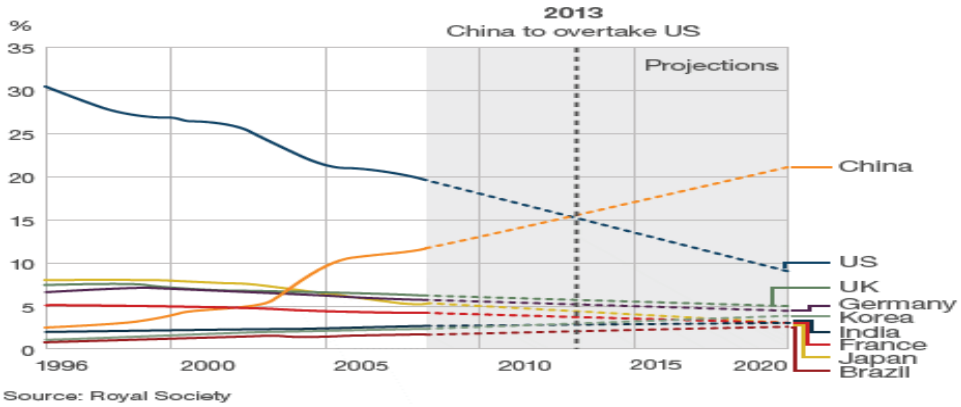
Source: Schaaper, M. (2009: 18-19)

Figure 8.6 China's per capita domestic expenditure on R&D activities



Source: Sun and Luo[185]

Figure 8.7: The projected growth in citations in scientific literature



[185] Sun, M. and Luo, H. 'Impact of China's Science and Technology System Reform on Rural Development and Poverty Reduction', Case study report prepared for. UNAPCAEM, available at: http://www.unapcaem.org/Activities%20Files/A0704/PPT04.pdf

Nevertheless, it is worth noting that there are still many problems and challenges in China's national innovation system. For instance, the three key performers are doing their innovation jobs in a rather isolative fashion; therefore, the collaboration between enterprise, research institutes, and universities should be strengthened. In addition, China's education system does not encourage critical thinking and Chinese students dare not to challenge teachers, therefore Chinese students' potential for creativity has been undermined, compared to the American and European systems. What is the worst is, the academic culture and climate are not encouraging due to prevailing money-worship, plagiarism, and guanxi practices. In 2008, Chinese authors published 271,000 papers according to Science Citation Index (SCI) and other resources, roughly 11.5% of the world's total, which can be said a really big achievement. However, in 2009, a big scientific scandal by Chinese scholars was uncovered by the international journal *Acta Crystallographica Section E* that at least 70 false crystal structures were reported during the two years from 2007 to 2008, mainly from two researchers at Jinggangshan University in China. And all authors of those published papers have agreed to retract 41 papers published by one author and 29 by another author. According to Lancet[186], 'it is rather surprising that wrongdoing on such a scale evaded detection during peer review and, considering that crystal structures are deposited in public databases upon publication'. Such a high risk-taking scientific fraud behavior might be explained by the pressure to rack up publications in high-impact journals, i.e., a 'publish or perish' culture, encouraging misconduct, according to a paper published in Nature[187]. Internationally authoritative scientific journals like Lancet, Nature, and Science[188] have urged the Chinese government to take urgent actions to combat scientific frauds and misconducts, given China's determination of building an innovative nation and becoming a research superpower by 2020. Therefore, there is still a long way for China to go before it can have a truly effective, efficient, and competitive national innovation system.

8.4.4 Entrepreneurship: state & market partnership in China?

In business literature, entrepreneurship has two broad types: business venturing and innovations. In terms of business venturing, Chinese people do not lack of entrepreneurship, and indeed, the country has a strong entrepreneurial spirit. According to Mr. Huang Mengfu[189], the Chairman of All-China Ferderation of Industry & Commerce (ACFIC), that during the Eleventh Five Year period (2006-2010), the number of registered private enterprises increased 95% to 8.40 million, accounting for 74% of all enterprises registered in China; the registered capital of all Chinese private enterprises grew 20.1% annually to reach from 19 trillion CNY in 2010; the urban fixed assets investment by private enterprises increased 34.5% annually to reach at 12 trillion CNY in 2010. In the meantime, the number of registered individual business operators (with less than 8 employees) exceeded 34 million with a total1.3 trillion CNY registered capital, 40.9% and 133% growth respectively from 2005. This can be partly attributed to Chinese government's promotion of private economy as I analyzed before.

---

[186] The Lancet (2010) 'Scientific fraud: action needed in China', 375(9709): 94, 9 January 2010, available at: http://download.thelancet.com/pdfs/journals/lancet/PIIS014067361060030X.pdf

[187] Qiu, J. (2010) 'Publish or perish in China', Nature, 463: 142-143, 12 January 2010, available at: http://www.nature.com/news/2010/100112/full/463142a.html

188 Xin, H. (2006) 'Scientific misconduct: Scandals shake Chinese science', Science, 312(5779): 1464-1466, 9 June 2006, available at: http://www.sciencemag.org/content/312/5779/1464.citation; also, Shi, Y. and Rao, Y. (2010) 'China's Research Culture', Science, 329(5996): 1128, 3 September 2010, available at: http://www.sciencemag.org/content/329/5996/1128.summary

[189] http://www.china.com.cn/economic/txt/2011-01/19/content_21767363.htm

In comparison, in terms of innovative entrepreneurship, Chinese people can be said less entrepreneurial, compared to the Americans, Europeans, and their East Asian neighbors (Japanese and Koreans). This lack of innovative entrepreneurship can be partly explained by China's stage of development, and partly due to the competitive relationship between China's private sector and state sector (i.e., state-owned enterprises). Simply put, the SOEs are competing with the private enterprises for market share and profits. If this competition were fair, then it would be all right since more competition in principle should increase innovative pressures therefore improve the economic efficiency. However, in China, this is not the case. SOEs control and even monopolize many strategic industries, access to preferential state-owned bank credits, pay little dividends to their nominal shareholder (i.e., the state), use the nation's natural resources with very low prices or even for free, and have laid off more than 50 million workers with very low compensations during the period from 1995 to 2008. As a result, according to SASAC 2009 review of the performances of 108 of the 129 SOEs under state level supervision (hereafter China's Central SOEs)[190], from 2002 to 2009, Central SOEs' total assets increased from 7.13 trillion CNY to 21 trillion CNY with an average annual growth at 16.74%, their sales revenues increased from 3.36 trillion CNY to 12.63 trillion CNY with average annual growth at 20.8%, and their operating profits increased from 240.5bn CNY to 815.1bn CNY with an average annual growth at 19%. And the latest data shows the Central SOEs' total profits for the first time exceeded 1 trillion CNY to reach 1.13 trillion CNY[191]. In contrast, in 2009, the total profits of the top 500 private enterprises were less than that of the 2 top SOEs combined, China Mobile and China Petroleum.

Many people argue that the relationship between state sector and the private sector is in a competitive relationship, i.e., win-lose situation. Recent years, some scholars have argued that there is a phenomenon of 'SOEs advancing while POEs retreating', causing a debate that is fueled again by the 'four trillion stimulus package' implemented by Chinese government after the 2008 global financial crisis. No matter how Chinese officials defend, the situation for Chinese private economy in general and small and medium enterprises is not encouraging as they are being squeezed by both SOEs and foreign invested enterprises. In such a situation, many private business owners have been diverting their capital from real economy to speculative economy. This is partly why there are too many speculations in China's stock market and housing market, which make the virtue economy's bubble growing and push up the inflation, which undermines the Chinese economy.

Where is the way out? My own solution is as follows. Chinese government has to make its mind to push forward the SOE reform and financial system reform. For the SOE reform, Chinese government needs to reduce the number of SASAC-supervised central SOEs, let's say 20-50 by merger and acquisition or 'grasp the big and let go the small', despite the huge resistance from the vested interests groups. By doing so, Chinese government can not only create some internationally competitive big business groups but also leave more space for private sector. Meanwhile, Chinese government should change their mind about the function of the SOEs. The SOEs' priority should not be to make profits for the state, the nominal shareholder of SOEs, rather, the SOEs should be given a principal mandate, that is to undertake some high-risk and high-uncertainty innovation projects and to make significant technological breakthroughs. Although the SOEs will have to operate in normal competitive way, their purpose is not to competing with domestic private enterprises and to grab market share or profits from the domestic private enterprises.

If Chinese government can switch to such a state & market partnership (SMP), i.e., on the one hand, to promote the private entrepreneurship, and on the other, to direct the state entrepreneurship (via

[190] See, http://www.sasac.gov.cn/2010rdzt/yjj/2009hg.pdf
[191] See, http://ccnews.people.com.cn/GB/142056/142071/13980582.html

SOEs) toward significant technological breakthroughs, China can really unleash its entrepreneurial potential for advancing technological progress. China's state entrepreneurship can achieve and contribute a lot to the economic development due to its *juguo tizhi*, i.e., the state can effectively mobilize resources and personnel from all over the country to carry out one very big project, like the high speed rail and the spaceship projects. Chinese government can engage in such state entrepreneurship not only because it is an authoritarian regime but also the Chinese people's enthusiasm and passion to make their own contributions toward the common goal of revitalizing China.

Chapter 9: Conclusion

9.1 China's overall national competitiveness

In this PhD thesis, based on the literature view in Chapter 2 and discussion of the methodological issue in Chapter 3, I have proposed an integrative framework of national competitiveness in Chapter 4. This framework conceptualizes the notion of national competitiveness as a four-dimensional concept. I posit national competitiveness, a nation's ability to compete in the simplest sense, is a multifaceted phenomenon that includes four different dimensions, i.e., effectiveness, efficiency, sustainability, and potentiality. Each of the four dimensions, within the integrative framework, is further broken down into four sub-dimensions.

In the empirical part of the PhD thesis, the integrative framework was adopted to conduct the case study on China's national competitiveness. Each of the four dimensions of China's national competitiveness is examined one by one in the four chapters from Chapter 5 to Chapter 8.

The main findings are as follows. In terms of effectiveness, while China is effective in maintaining economic growth, and to a less degree in creating employment, China is very ineffective in ensuring price stability and pursuing balance of international payment. In terms of efficiency, in spite of its rapid improvements since 1978, China's efficiencies of use of labor, capital, and natural resources are still very low compared to those of developed countries. What is more, China's economic miracle has come at high expenses of environmental problems and social injustices, and therefore it is and will be facing tremendous sustainability challenges. On the other hand, from a technological capability point of view, China has a big potential for making technological progress that may enable it to catch up with the developed countries in the future.

By looking at these four dimensions, we can see that the current state of China's national competitiveness, if any, is spurious as opposed to authentic (cf. Fajnzylber, 1988).

In terms of the future prospect, it is an open question whether China can cope with the sustainability challenges and fully unleash its potential. How China's national competitiveness will evolve depends on, first of all, how deeply the Chinese government understands the problems of Chinese development model; secondly, what actions Chinese government will take to tackle those problems; and thirdly, how local government officials and ordinary people respond to the decisions and directives coming from the central government.

China is still a transitional economy in which politics still plays an important role. It seems that Chinese government is pursuing different objectives that sometimes conflict with one another; for example, the objective of maintaining high economic growth still overshadows the objectives such as environment protection. Such a bias in policy objectives makes it difficult for the Chinese government to effectively address the problems inherent in the past economic development model and to switch onto a sustainable development trajectory.

In 2006, Chinese government officially adopted the strategy of 'building socialist harmonious society' which emphasizes 'putting people first' and 'ensuring social justice'[192]. While there are signs of social and environmental improvements, the implementation of the new strategy has been constrained by the vested interests. For example, facing rising house prices and widespread discontent in public, Chinese central government has implemented several macro-control policies in order to cool the real estate market and to contain the rise of house prices. However, the effects of these policies have not been satisfactory. Many Chinese scholars have pointed out that the root

[192] http://news.xinhuanet.com/politics/2006-10/18/content_5218639.htm

cause of rising house prices is the rise of land prices, caused by local governments' self-interests in generating fiscal revenues from selling lands to real estate developers, the so-called 'land financing' phenomenon. Thus, we can see conflicting objectives are pursued and political games are played by Chinese central and local governments which make the implementation of 'harmonious society' strategy difficult. On the one hand, the central government needs to attend to the people's complaints; on the other hand, the central government also needs to rely on local governments to generate economic growth. Therefore, even though the central government is well aware of the problem of 'fiscal revenue by selling land', it does not directly confront this problem when making policies to control the rise of house prices caused by that very problem.

Nevertheless, there is an external force that is pushing Chinese government to advance reform, and this is the power of the public. The Chinese public have been complaining and urging the government to take actions to combat corruption, environmental pollution, and address social injustice, etc. The rapid development of Internet has given Chinese people a powerful tool to express their voices. Bad behaviors, wrongdoings, and scandals of local governmental officials, once exposed on Internet, can be spread all over the country in a very short period of time. Due to the negative impact, higher-level governments will soon respond to the Internet exposed news. Sometimes, the power of the netizens (i.e., Internet users) is big enough to even challenge vested interests. For example, in 2009, there was a debate on the Internet on the issue of whether 'the state economy advances while private economy retreats'. One of the arguments was that SOEs were competing with private enterprises and grabbing market shares from them even in real estate industry. Faced with the huge pressure from the Internet, the SASAC responded by ordering 78 central SOEs whose core business are not real estate to exit the real estate industry.

Based on this, it is too early to predict how China's national competitiveness will evolve. However, considering the progress the Chinese have made thus far in comparison to other developing countries, "there is hope for cautious optimism."

9.2 The global implications of the rise of China

That China is on the rise economically has been widely recognized (Bergsten et al., 2008). Many people are concerned about the question whether a rising China is an opportunity or threat? Some people tend to give either-or answers, which I suspect can hardly capture the complexity of the issue. In the Literature Review chapter, I have analyzed that there are different types of inter-country economic relationships between the three categories of countries (Core, Semi-periphery, and Periphery) and the different consequences of competition among countries with different inter-country economic relationships. Therefore, I tend to believe that the rise of China, as an industrial power, will have different impacts on the competitive performances of countries in different categories.

For advanced countries in the Core, the rise of China may be more of opportunity than threat. China's rise in its manufacturing power offers great opportunities for the MNEs of advanced countries to outsource or offshore the assembling or manufacturing activities to China to take advantage of China's low labor costs. In doing so, the MNEs can not only reduce the assembling or manufacturing costs but also specialize in the high value-capturing activities such as R&D, design, and branding, etc., while China can create more employment, generate more growth, and improve its technological capabilities. The outsourcing and offshoring by MNEs will of course cause job losses in their home countries; however, as long as the total benefits gained by the MNEs can more than compensate the costs of job losses, such a relationship between China and the advanced countries will be an overall win-win situation.

For countries in the Periphery such as Sub-Sahara African countries, the rise of China may also be more of an opportunity than threat because the economic relationships between China and those countries are more of complementary nature than characterized by competition. Due to the rapid development of Chinese economy, China's demands for commodities such as minerals, energies, and soybeans have been driving high growth in not only advanced countries such as Australia but also in underdeveloped countries such as Angola and Nigeria that are endowed with abundant natural resources. Increasingly, China's overseas direct investments in the Third World countries (such as in Africa) are accompanied by infrastructure projects financed by China, which offers an important opportunity for the region (Foster et al., 2008). In an article published by *The Economist* on 6 January 2011, Africa is reported as one of the world's fastest-growing regions in the world with promising future prospect; it is also pointed out that 'Africa's changing fortunes have largely been driven by China's surging demand for raw materials and higher commodity prices'[193].

For countries in the Semi-periphery category to which China belongs, the situation may be different from those analyzed above. As explained in the Literature Review chapter, inter-country economic relationship between countries within the same category are characterized more by competition than by cooperation, therefore, China is in direct competition with other countries which also belong to the Semi-periphery category such as Mexico and India. These countries are competing for labor-intensive assembling and low-end manufacturing jobs. The rise of China as a manufacturing powerhouse poses more challenges or threats to those peer competitor countries. Indeed, Lall and Weiss (2005: 184) have pointed out that 'China is becoming increasingly competitive in a range of both low and high technology products and shifting its export specialization rapidly to the latter'; the bilateral trade between China and Latin American countries (LACs) has been increasingly characterized by a pattern in which China specializes in manufactured goods while the LACs focus on primary and resource-based products. Given China's size and rapid growth, intensified competition from China is forcing the LACs to move down the technological scale.

Therefore, the effect of China's rise as an industrial power on the rest of the world is mixed. Whether China's economic rise provides an opportunity rather than a threat or a threat rather than an opportunity, depends on the specific circumstances of the affected country in question. For China itself, the rapid development has caused poverty reduction at a massive scale. For many countries, the rise of China benefits their consumers due to the import of cheap products made in China. For those countries that are facing competitive threats from China, what they should do urgently is not to blame China but to improve their competitiveness by strengthening their technological capabilities. This is because even without China there might be other competitors rising to challenge them if they do not strive to improve their own competitiveness. What is more, the rise of China can offer some important lessons for the developing world about how to develop and catch up as the Chinese development experience has been distinct from the orthodox view on development.

9.3 The applicability of the proposed integrative framework

In this PhD research, I have proposed an integrative framework for doing national competitiveness research. The framework was developed from a case study of China in the first stage. Then, in the second stage, I have applied the integrative framework to conduct an illustrative case study, again using China as the case.

[193] The Economist, 'A more hopeful continent: The lion kings?', 6 January 2011, available at: http://www.economist.com/node/17853324

An important question to concern is the applicability of the proposed integrative framework. My own understanding is this framework has high applicability because of two main reasons. The first reason is that although the framework was built from the case of China, it was designed in a context-free manner, i.e., the final integrative framework being not China-specific. The second reason is that the design of the framework strictly followed a specific principle, namely, the dimensions and their sub-dimensions should be exhaustive yet parsimonious. Let me explain the practice of the principle in more detail as follows.

The dimensionalization of the national competitiveness concept follows this exhaustive yet parsimonious principle. The concept was first dimensionalized into two dimensions, current state and future prospect. Although one may argue this dimensionalization is not exhaustive because it should include an extra dimension, i.e., the past record, I was aware of this but nevertheless excluded the construct of 'past record' from the framework because what are most interesting to and important to scholars are the current state and future prospect, not the past record. Then each of the two dimensions was further dimensionalized into two, resulting in four dimensions of the concept of national competitiveness, i.e., effectiveness, efficiency, sustainability, and potentiality.

The selections of the sub-elements of each of the four dimensions also follow the same exhaustive yet parsimonious principle.

For the dimension of effectiveness, the four sub-elements of the effectiveness are the four standard macroeconomic objectives commonly accepted and adopted by many countries; the four sub-elements of the efficiency dimension are self-evident because the three input factors are labor, capital, and natural resources, and the overall efficiency indicator is a comprehensive efficiency indicator complementary to the other three partial ones; the sub-elements of the sustainability dimension encompass the conventional 'three pillars' plus a demographic element which I find appropriate and necessary in the context of economic development. The sub-elements of the potentiality dimension may be debatable because it seems subjective or speculative to talk about the potential of a country. Nevertheless, the choices of the sub-elements were made with a clear logic in the sense I adopted the technological capability approach to the potentiality issue and choose the four arguably most important factors contributing to technological progress. The importance of the four factors is justified from the economic growth theory perspective. Also, the importance of the four factors I chose is self-evident. Deepening human capital provides the human resources necessary to technological work; improving institutions shape the incentive structure for carrying out technological work; national innovation system provides the platform for technological works; and entrepreneurship is the activity underpinning technological progress.

Therefore, the integrative framework can be said to be universally applicable and thus generalizable because every country's competitiveness can be analyzed by its current state and future prospect. The current state can be evaluated from the quantitative (or effectiveness) and qualitative (or efficiency) angles, while the future prospect can be predicted from the maintenance (or sustainability) and improvement (or potentiality) angles. Sometimes, countries may perform well at one or more dimensions but not all of them. For instance, while Japanese economy is of high efficiency, it has been less effective for the past two decades compared to other developed countries. The US economy is effective as well as efficient compared to the other developed countries; however it has sustainability problem due to its 'twin deficits' (budget deficit and trade deficit).

I find the WEF/IMD rankings of global competitiveness problematic because their indexes do not provide sufficient information about the sustainability of the competitiveness of a country being ranked and therefore their rankings may be misleading. For instance, before the 2008 global financial crisis, Iceland was ranked by the IMD as the 4th and 7th in 2006 and 2007. Although the

WEF ranked Iceland much lower than IMD did, it nevertheless raised Iceland's position from 23rd in 2007 to 20th in 2008. However, the outbreak of the 2008 global financial crisis has revealed the sustainability problems of Iceland's competitiveness; it also revealed the inability of any single index of competitiveness to capture the multifacetedness of the complex phenomenon.

I also find the WEF/IMD rankings problematic because their indexes do not take into consideration the importance of the size of economy. We often see small countries/economies like Switzerland, Singapore, and Hong Kong being ranked at top positions. However, small economies may have a particular type of effectiveness problem, i.e., the effectiveness of the economy to survive a financial or economic crisis? Take Hong Kong for example, during the 1997 Asian financial crisis, without the strong financial support from mainland China's central government, it would not be able to survive the financial attacks by the international financial 'crocodiles' (i.e., speculators). If that was the case, Hong Kong would be unlikely to remain on the top positions on WEF/IMD's rankings.

9.4 Contributions, limitations, and future research

9.4.1 The four contributions

In conclusion, this PhD research has realized its aim laid out in the Introduction chapter. The current PhD thesis contributes to scholarly knowledge in four aspects.

The first contribution is a conceptual one. I have conceptualized the notion of national competitiveness into a four-dimensional concept. I contend that national competitiveness has four dimensions, i.e., effectiveness, efficiency, sustainability, and potentiality.

The second contribution is an analytical one, namely, I have operationalized the four-dimensional concept into an integrative and holistic framework of national competitiveness. This integrative framework provides an alternative approach to the commonly used quantitative indexing-and-ranking method for doing qualitative research on national competitiveness.

The third contribution is a theoretical one. In Chapter 8, I have proposed a theoretical framework for analyzing the potentiality dimension of national competitiveness, which is defined as the potential of a country for improving its national competitiveness. For a developing country, we examine its potential for catching up with the advanced countries; while for a developed country, we examine its potential for forging ahead and leaving the following countries further behind.

The fourth contribution is the empirical in-depth case study of China's national competitiveness.

9.4.2 The three limitations

There are three limitations in the current PhD research project.

The first limitation is, the empirical study is a single case study and therefore there is no systematic comparison of China with other countries in terms of their relative national competitiveness. The choice of a single case was made because of the specific aim of the PhD project, i.e., firstly, to design an integrative framework of national competitiveness that can capture the different aspects of the phenomenon and integrate some of the existing literature; secondly, to propose a theoretical framework for analyzing the dynamic aspect of national competitiveness which is often neglected in the literature; and thirdly, to apply the integrative framework I have proposed to conduct an in-depth analysis of the national competitiveness of China.

The second limitation is, the empirical study is done at the national level rather than the industry level where the *more* concrete competitions among nations are taken place. Again, the choice of a national level analysis is made because of the specific aim of the PhD research and the purpose of the case study. This is to say, while empirical study at industry level will be valuable, the empirical study at national level is equally valuable and justifiable if the aim of the research is to design an integrative framework for doing competitiveness research at *national* level.

The third limitation is that the integrative framework of national competitiveness is an analytical rather than a theoretical framework. The choice of an analytical framework rather than a theoretical framework is justified by two reasons. The first reason is the natural sequence of theory building. To build a theory we need an understanding of the basics of the researched phenomenon first. The reality is that the notion of competitiveness is not well understood although many quantitative researches have been done. So, in order to build a theory or theoretical framework for national competitiveness, it is necessary to start with some basic though simple tasks. Progress can then be made in later stages by building on the earlier works. The second reason is the lack of knowledge about the very complex phenomenon we are researching. What explain a nation's competitiveness is far from well understood. Therefore, there is a long way to go before we can have sufficient knowledge for building theories of national competitiveness.

9.4.3 Suggestions for future research

In the future, more empirical researches are needed, such as multiple-case studies aiming at making systematic comparison between multiple countries, industrial case studies aiming at making detailed analyses on how countries compete and improve their competitiveness at industry level, and empirical testing whether the evolution of a country's national competitiveness can be explained by the theory I have proposed in the Chapter 8 on the potentiality dimension.

Also needed are theoretical researches, such as researches aiming at examining the inter-relationships between the four dimensions, how to improve each of the four dimensions, and the role of state in national competitiveness, how such a state & market partnership should work, etc. Other theoretical researches aiming at proposing different analytical frameworks are also needed so that better frameworks can replace the old ones.

References

Abdelal, R. (2007) Capital rules: The construction of global finance. Cambridge, MA: Harvard University Press

Abercrombie, N., Hill, S., and Turner, B. S. (1984) *Dictionary of sociology*. Harmondsworth, UK: Penguin

Abramovitz, M. (1956) 'Resources and output trends in the U.S. since 1870', *American Economic Review*, 46(2): 5-23

Acemoglu, D., Johnsona, S., and Robinson, James A. (2005) 'Institutions as a Fundamental Cause of Long-Run Growth', in Aghion, P. and Durlauf, Steven N. (eds.), *Handbook of Economic Growth*, Volume 1, Part 1, pp. 385-472

Adams, F. G., Gangnes, B., and Shachmurove, Y. (2006) 'Why Is China So Competitive? Measuring and Explaining China's Competitiveness', *The World economy*, Vol, 29 No. 2, pp. 95 -122

Adelman, I. (1999) 'The role of government in economic development', Working Paper No. 890, Department of Agricultural and Resource Economics and Policy, Division of Agricultural and natural Resources, University of California at Berkeley

Adelman, I. (2000) 'Fifty years of economic development: What have we learned?', Paper presented at the Annual Conference on Economic Development, World Bank, 2000

Afriat, S. N. (1972) 'Efficiency estimation of production functions', *International Economic Review*, 13(3): 568-598

Aiginger, K. (1998) 'A framework for evaluating the dynamic competitiveness of countries', *Structural Change and Economic Dynamics*, vol. 9, no. 2, pp. 159-188

Aigner, D. J. and Chu, S. F. (1968) 'On estimating the industry production function', *American Economic Review*, 58(4): 826-839

Aigner, D. J., Lovell, C. A . K., and Schmidt, P. (1977) 'Formulation and estimation of stochastic frontier production functions', *Journal of Econometrics*, 6:21-37

Akamatsu, K. (1962) 'A historical pattern of economic growth in developing countries', *Journal of Developing Economies*, 1(1):3-25

Allen, G. C. (1981) *The Japanese Economy*. London: Weidenfeld and Nicolson

Alvarado, I., Molina, K., and Ac Bola, E. (2008) 'Determination of the competitiveness linkages through the agricultural associative enterprises: The case of the communities on the Parismina River basin in Costa Rica', *Ecological Engineering*, vol. 34, no. 4, pp. 373-381

Alvarez, S. A. and Barney, J. B. (2010) 'Entrepreneurship and epistemology: The philosophic Underpinnings of the Study of Entrepreneurial Opportunities', *Academy of Management Annals*, 4(1): 557–583

Amsden, Alice H. (1989) *Asia's Next Giant: South Korea and Late Industrialization*. Oxford University Press, New York, 1989

Anderson, R. and Dunnett, A. (1987) 'Modeling the behavior of export volumes of manufacturers: An evaluation of the performance of different measures of international competitiveness', *National Institute Economic Review*. 121(August): 46-52

Andrews, P. (1949) *Manufacturing Business*. London: McMillan

Antle, M. J.and Capalbo, S.M. (l988) 'An Introduction to Recent Development in Production Theory and Productivity Measurement', in Capalbo, S.M. and Antle, M.J. *Agricultural Productivity: Measurement and Explanation*. Washington, DC: Resources For the Future, Inc.

Arrow, Kenneth J. (1969) 'The Organization of Economic Activity: Issues Pertinent to the Choice of Market versus Non-market Allocations', in *Analysis and Evaluation of Public Expenditures:*

The PPP System. Washington, D.C., Joint Economic Committee of Congress, available at: http://www.econ.ucsb.edu/~tedb/Courses/UCSBpf/readings/ArrowNonMktActivity1969.pdf

Artus, P. (2009) 'China: The vicious circle of excess capacity', *Flash*, 11 March, No. 115

Aryes, R. U. and Kneese, A. V. (1968) 'Environmental Pollution', in *Federal Programs for the Development of Human Resources, Vol. 2*, U.S. Congress, Joint Economic Committee, Washington

Aryes, R. U. and Kneese, A. V. (1969) 'Production, consumption, and externalities', *American Economic Review*, 59(3): 282-29

Ash, R. (2006) 'The long-term outlook for economic reform in China', *Asia-Europe Journal*, 4 (2): 177-196

Ash, R. F. and Edmonds, R. L. (1998) 'China's Land Resources, Environment and Agricultural Production', *The China Quarterly*, No. 156, Special Issue: China's Environment, pp. 836-879

Ash, R. F. and He, L.-P. (1998) 'Loss-making and the financial performance of China's industrial enterprises: Data from the new accounting and statistical system', *Journal of Contemporary China,* 7(17): 5-20

Asian Development Bank (2003) 'Special chapter: Competitiveness in developing Asia', *Asian Development Outlook 2003*, Oxford University Press

Bai, C.-E., Hsieh, C.-T., and Qian, Y. (2006) 'Returns to capital in China', NBER Working Paper No. 12755, Cambridge, MA: National Bureau of Economic Research

Balakrishnan, P., and Babu, M. S. (2003) 'Growth and distribution in Indian industry in the nineties', *Economic and Political Weekly*, (20 September), 3997–4005

Bannock, G., Baxter, R. E. and Davis, E. (1998) *The Penguin Dictionary of Economics*. London: Penguin

Baran, Paul A. (1957) *The Political Economy of Growth*. New York: Monthly Review Press,

Baran, Paul A. & Sweezy, Paul M. (1966) *Monopoly capital: An essay on the American economic and social order*. New York: Monthly Review Press

Bardhan, P. (1996) 'The Nature of Institutional Impediments to Economic Development', Center for International and Development Economics Research (CIDER) Working Papers C96-066, University of California at Berkeley

Barreto, H. (1989) *The Entrepreneur in Microeconomic Theory: Disappearance and Explanation*. London: Routledge

Bator, F. M. (1958) 'The anatomy of market failure', *Quarterly Journal of Economics*, 72: 351–379

Baumol, Willam J. (1990) 'Entrepreneurship: Productive, unproductive, and destructive', *Journal of Political Economy*, 98(5): 893-921

Baumol, William J. (1990) 'Entrepreneurship: Productive, Unproductive, and Destructive', *Journal of Political Economy*, 98(5): 893-921

Baumol, William J. (2006a) 'Entrepreneurship and Innovation: The (Micro) Theory of Price and Profit', paper presented at William Baumol Special Session on Entrepreneurship, Innovation and Growth at 2006 American Economic Association Meeting, on January 8, 2006, Boston, USA

Baumol, William J. (2006b) 'Return of the Invisible Men: The Microeconomic Value Theory of Inventors and Entrepreneurs', paper presented at 2006 American Economic Association Meeting, on January 8, 2006, Boston, USA

Baumol, William J. (2008) 'Entrepreneurship and innovation: The (Micro) theory of price and profit', paper presented at the 2008 American Economic Association conference, available at: http://www.aeaweb.org/annual_mtg_papers/2008/2008_345.pdf

Baumol, William J. (2010) *The Microtheory of Innovative Entrepreneurship*. Princeton: Princeton University Press

Belkacem, L. (2002) 'Meaning and definitions of competitiveness', paper posting at eConference on Arab Competitiveness, The Arab Planning Institute, Kuwait, available at www.arab-api.org/ecac/posting_e2.htm (accessed: 16 April 2004)

Beim, David O. (2011) 'The Future of Chinese Growth', available at SSRN: http://ssrn.com/abstract=1635400

Beinhocker, Eric D. (2006) *The Origin of Wealth*. Boston, MA: Harvard Business School Press

Beller, M. (1999) *Quantum dialogue: The making of a revolution*. Chicago: University of Chicago Press

Bergsten, C. F., Freeman, C., Lardy, N. and Mitchell, D. J. (2008) *China's Rise: Challenges and Opportunities*. Washington D.C.: Peterson Institute of International Economics

Bernanke, B. (2005) 'The Global Saving Glut and the U.S. Current Account Deficit', The Sandridge Lecture, Virginia Association of Economists, 10 March, Richmond, Virginia, the US

Berndt, E. R. and Christensen, L. R. (1973) 'The Translog Function and the Substitution of Equipment, Structures, and Labour in U. S. Manufacturing: 1929-1968', *Journal of Econometrics*, 1(1): 81-114

Bhagwati, J. (2007) In defense of globalization. New York: Oxford University Press

Bhagwati, J., Panagariya, A. and Srinivasan, T. N. (2004) 'The Muddles over Outsourcing', *Journal of Economic Perspectives*, Vol. 18, No. 4, pp. 93-114

Bieńkowski, W. (2006) 'How much are studies of competitiveness worth? Some critical theoretical reflections on the issue', paper presented on the Second Economic Forum on 'New Europe', Lancut, 28-29 April 2006

Blanchard, Olivier J. and Giavazzi, F. (2005) 'Rebalancing Growth in China: A Three-Handed Approach', MIT Department of Economics Working Paper No. 05-32

Blomstrom, M. and Kokko, A. (1998) 'Multinational corporations and spillovers', *Journal of Economic survey*, 12(2): 1-31

Boltho, A. (1996) 'The assessment: International competitiveness', *Oxford Review of Economic Policy*, Vol. 12, No. 3, pp. 1-16

Bowen, H. P. and Moesen, W. (2007) 'Benchmarking the performance of nations: non-uniform weighting and non-economic dimensions', *Corporate Governance*, 7(1): 6-16

Bower, J. L. and Christensen, C. M. (1995) 'Disruptive Technologies: Catching the Wave', *Harvard Business Review*, 73(1): 43-53

Bradsher, K. (2010) 'After China's Rare Earth Embargo, a New Calculus', *New York Times*, 29 Oct. 2010

Brown, G. (2001) The conditions for high and stable growth and employment, *Economic Journal*, Vol. 111, pp. 30-44

Brown, Lester R. (1995) *Who will feed China? Wake up call for a small planet*. Worldwatch Institute; W. W. Norton & Co.

Buckley, Peter J., Passa, Christopher L., and Prescott, K. (1988) 'Measures of international competitiveness: A critical survey', *Journal of Marketing Management*, vol. 4, no. 2, pp. 175-200

Burkhead, J. and Hennigan, Patrick J. (1978) 'Productivity analysis: A search for definition and order', *Public Administration Review*, 38(1): 28-33

Burton, Daniel F. Jr. (1994) 'Competitiveness: Here to stay', *The Washington Quarterly*, 17(4): 99-109

Business Week (1986) *The hollow corporation*. Special Report. *Business Week, 3* March.

Business Week (1987) *Can America compete?* Special Report. *Business Week,* 20 April.

Cai, F. and Wang, Y.-M. (2003) 'Isn't there no urban employment growth in China?' (in Chinese, 蔡昉 & 王美艳 (2003) '中国城镇有没有就业增长?', China Economists 50 Forum, 2003-04-16, available at: http://www.50forum.org.cn/experhostpage/caifang/wz_3.htm

Cai, F. and Wang, M. (2006) 'Aging before becoming rich and labor shortage', (in Chinese), *China Open Herald*, available at: http://www.cenet.org.cn/userfiles/2009-10-17/20091017201649357.pdf

Cammack, Paul (2006) 'The politics of global competitiveness', *Papers in the Politics of Global Competitiveness*, No. 1, Institute for Global Studies, Manchester Metropolitan University, e-Space Open Access Repository.

Cantwell, J. (2004) 'Innovation and Competitiveness', in Fagerberg, J., Mowery, D.C. and Nelson, R. R. (eds) *The Oxford Handbook of Innovation*. Oxford University Press, New York

Carlaw, Kenneth I. and Lipsey, Richard G. (2003) 'Productivity, technology and economic growth: What is the relationship?', *Journal of Economic Surveys*, 17(3): 457-495

Carlaw, Kenneth I. and Lipsey, Richard G. (2003) 'Productivity, technology and economic growth: What is the relationship?', *Journal of Economic Surveys*, 17(3): 457-495

Casson, Mark C. (1998) Entrepreneurship, in John Eatwell, Murray Milgate and Peter Newman (eds.) The New Palgrave Dictionary of Economics, London: Macmillan, II, 147-149

Chamon, M. and Prasad, E. (2010) 'Why Are Saving Rates of Urban Households in China Rising?', *American Economic Journal – Macroeconomics,* 2 (1): 93-130.

Chan, K. W. and Buckingham, W. (2008) 'Is China abolishing the Hukou System?', *The China Quarterly*, 195: 582-606

Chandler, A. D. (1962) *Strategy and structure: chapters in the history of the industrial enterprise*. Cambridge, MA: The MIT Press

Chang, Gordon G. (2001) *The Coming Collapse of China*. New York: Random House

Chang, H. J. (2010) *23 Things They Don't Tell You About Capitalism*. Allen Lane

Chang, H.-J. (2003) *Kicking away the ladder: Developing strategy in historical perspective*. London: Anthem Press

Chang, H.-J. (2005) *Why developing countries need tariffs? How WTO NAMA negotiations could deny developing countries' right to a future*. The South Centre

Charnes, A., Cooper, W., and Rhodes, E. (1978) 'Measuring the efficiency of decision-making units', *European Journal of Operational Research*, 2: 429–444

Chen, C. (2010) 'Asian foreign direct investment and the "China effect"', in in Garnaut, R., Golley, J. and Song, L.-G. (eds.), *China - The next twenty years of reform and development*. ANU Press

Chen, J.-D., Dai, D., Pu, M., Hou, W.-X., and Feng, Q.-B. (2010) 'The trend of the Gini coefficient of China', BWPI Working Paper 109, Brooks World Poverty Institute, The University of Mancester, UK

Chen, M.-J. and Zheng, Y.-N. (2008) 'China's regional disparity and its policy responses', *China & World Economy*, 16(4): 16–32

Chen, P. W., Chung, H., Ho, Keng Y. and Hsu, Ling T., (2010) 'Portfolio optimization models and mean variance spanning test', in C.-F. Lee et al. (eds.), *Handbook of Quantitative Finance and Risk Management*, Part II, Spinger: 165-184

Chen, X. and Qiao, L. (2000) 'Material Flow analysis of Chinese economic-environmental system', *Journal of Natural Resources*, 15(1): 17-23 (in Chinese)

Chen, X. and Qiao, L. (2001) 'A preliminary material input analysis of China', *Population and Environment*, 23(1): 117-126

Chen, Y.-J. (2010) 'The comparison of development speed and financial performance between state-owned and private enterprises', (in Chinese: Guoyou he minying qiye fazhan sudu ji xiaoyi

zhuangkuang bijiao), available at: http://www.eeo.com.cn/Politics/beijing_news/2010/08/31/179594.shtml

Cheng, C.-Y. (1994) 'China's Economic Policies After the CCP 14th Party Congress', in Vajpeyi, D. K. (eds.), *Modernizing China*. Leidon, The Nethelands: E.J. Brill, 7-17

Chirot, Daniel and Hall, Thomas D. (1982) 'World-System Theory', *Annual Review of Sociology*, vol. 8, pp. 81-106

Cho, D.-S. (1994) 'A dynamic approach to international competitiveness: The case of Korea', *Asia Pacific Business Review*, 1(1): 17-36

Cho, D.-S. (1998) 'From national competitiveness to bloc and global competitiveness', *Competitiveness Review*, 8(1): 11-23

Cho, D.-S. and Moon, H.-C. (2000) *From Adam Smith to Michael Porter: Evolution of competitiveness theory*. Singapore: World Scientific Publishing

Choi, H. (2007) 'On Linsu Kim's Imitation to Innovation: The Dynamics of Korea's Technological Learning', *East Asian Science, Technology and Society: an International Journal*, 1:259-261

Chow, Gregory C. (1999) 'China's economy: reform and perspectives', *International Journal of Korean Studies*, 3(1): 136-147

Christensen, C. M (1997) *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Boston, MA Harvard Business School Press

Christensen, C. M. and Raynor, M. E. (2003) *The Innovator's Solution: Creating and Sustaining Successful Growth*. Boston, MA: Harvard Business School Press

Clark, J. and Guy, K. (1998) 'Innovation and competitiveness: A review', *Technology Analysis & Strategic Management*, Vol. 10, No. 3, pp. 363-395

Cohen, Stephen S. (1994) 'Speaking Freely', Foreign Affairs, Vol. 73, No. 4 (Jul. - Aug., 1994), pp. 194-197

Comission of the European Community (1993) *Growth, competitiveness and employment: The challenges and the way forward into the 21st century*. White Paper, Comission of the European Community

Competitiveness Policy Council (1993) *A competitive strategy for America*, Second Report to the President and Congress

Council on Competitiveness (2001) *U.S. Competitiveness 2001: Strength, Vulnerabilities and Long-term Priorities.* Washington, DC: *Council on Competitiveness*.

Cypher, James M. and Dietz, James L. (1998) 'Static and Dynamic Comparative Advantage: A Multi-Period Analysis with Declining Terms of Trade', *Journal of Economic Issues*, 32(2): 305-314

Dicken, P. (2003) *Global Shift: Reshaping the Global Economic Map in the 21st Century*, 4th Edition. London: Sage

Dahlman, C. ul Haque, I., and Takeucki, K. (1995) 'The world trading environment', in Haque, I. ul (eds.) *Trade, Technology, and International Competitiveness*. EDI Development Studies, The World Bank

Dahlman, C., Westphal, L.E., Kim, L., 1985. Reflections on acquisition of technological capability. In: Rosenberg, N., Frischtak, C. (eds.), International Technology Transfer: Concepts, Measures and Comparisons. Pergamon, New York

Datta-Chaudhuri, M. (1990) 'Market Failure and Government Failure', Journal of Economic Perspectives, Vol. 4, No. 3, pp. 25-39

Debreu, G. (1951) 'The coefficient of the resource utilization', *Econometrica*, 19(3): 273-292

Dekle, R. and Vandenbroucke, G. (2010) 'Whither Chinese Growth? A Sectoral Growth Accounting Approach', *Review of Development Economics*, 14(3): 487–498

Democratic Caucus, U.S. House of Representatives (1982) *Rebuilding the Road to Opportunity: A Democratic Direction for the 1980s*. September 1982

Deng, P. and Jefferson, G. (2010) 'Is inequality bad for China's economic growth?', CGC Discussion Paper Series, No. 8, China Growth Centre (CGC) at St Edmund Hall, University of Oxford, Oxford, the UK

Department of Trade and Industry (1998) *Our Competitive Future: Building the Knowledge Driven Economy*. Competitiveness White Paper. DTI, London

Department of Trade and Industry (2003a) *Prosperity for All: The Analysis*. DTI, London

Department of Trade and Industry (2003a) *Prosperity for All: The Strategy*. DTI, London

Diewert, E and Lawrence, D. (1999) 'Measuring New Zealand's productivity', New Zealand Treasury Working Paper 99/05, Wellington, New Zealand Treasury

Diewert, W. E. and Morrison, Catherine J. (1986) 'Adjusting Output and Productivity Indexes for Changes in the Terms of Trade', *The Economic Journal*, 96: 659-679

Dillon, John L. (1971) 'Allocative Efficiency, Traditional Agriculture, and Risk', *American Journal of Agricultural Economics*, 53(1): 26-32

Dixit, A. and Grossman, G. (2005) 'The Limits of Free Trade', *Journal of Economic Perspectives*, Vol. 19, No. 3 (Summer, 2005), pp. 241-242

Domar, E. D. (1946) 'Capital expansion, rate of growth and employment', *Econometrica*, 14:137–147

Dollar, D. and Wolff, N.E. (1993) *Competitiveness, Convergence and International Specialization*. Cambridge, Massachusetts: The MIT Press

Domar, E. (1946) 'Capital Expansion, Rate of Growth, and Employment', *Econometrica*, 14 (2): 137-47

Du, Q.-Y. and Wei, S.-J. (2011) 'Sex ratios and exchange rates', NBER Working Paper 16788, New York: National Bureau of Economic Research

Dunn, Malcolm H. (1994) 'Do nations compete economically? A critical comment on Prof. Krugman's essay "Competitiveness: A dangerous obsession"', *Intereconomics*, November/December, pp. 303-308

Dunning, J. (1995) 'Think again Professor Krugman: Competitiveness does matter', *The International Executive*, 37(4): 315-324

Durand, M. and Giorno, C. (1987) 'Les indicateurs de compétitivité internationale: aspects conceptuels et évaluation', *Revue économique de I'OCDE*, no 9, 165-203

Eckhardt, J. T. and Ciuchta, M. P. (2008) 'Selected variation: The population-level implications of multistage selection in entrepreneurship', *Strategic Entrepreneurship Journal*, 2(3): 209–224

Eisenhardt, K. M. (1989) 'Building theories from case study research', *Academy of Management Review,* 14 (4): 532-550

Eltis, W. and Higham, D. (1995) 'Closing the UK competitiveness gap', *National Institute Economic Review*, vol 154, no. 1, pp. 71-84

EUCCC (EU Chamber of Commerce in China) (2009) *Overcapacity in China: Causes, Impacts and Recommendations*. EU Chamber of Commerce in China

European Commission (2003) *European Competitiveness Report 2003*. EC, Luxembourg

European Commission (2010) *European Competitiveness Report 2010*. EC, Brussel

European Management Forum (1984) *Report on Industrial Competitiveness*. London: European Management Forum

European Commission (2010) *An Integrated Industrial Policy for the Globalisation Era: Putting Competitiveness and Sustainability at Centre Stage*. EC: Brussel

Fan, G. (2010) 'The Chinese economy's secrete recipe', 2010-06-29, Project Syndicate website, available at: http://www.project-syndicate.org/commentary/fan16/English

Fan, G., Wei, Q. and Liu, P. (2010) 'China's internal and external economic imbalances and fiscal reform', *China Economist*, January-February: 5-12

Fang, X. (2010) 'Re-examining the reform of China's science and technology system: a historical perspective', *Journal of Science and Technology Policy in China*, 1(1): 7-17

Fagerberg, J. (1988) 'International Competitiveness', *The Economic Journal*, vol. 98, no. 39, pp. 355-374

Fagerberg, J. (1996) 'Technology and competitiveness', *Oxford Review of Economic Policy,* Vol. 12, No. 3, pp. 39-51

Fagerberg, J., Srholec, M. and Knell, M. (2007) 'The Competitiveness of Nations: Why Some Countries Prosper While Others Fall Behind?', *World Development*, 35 (10): 1595-1620

Fajnzylber, F. (1983) *La industrializacion trunca de America Latina*. Mexico: Centro de Economia Transnacional

Fajnzylber, F. (1988) 'International competitiveness: agreed goal, hard task', CEPAL Review, No. 36, LC/G 1537-P, Santiago de Chile

Fajnzylber, F. (1988) *Industrialización e internacionalización en la América Latina*. Fondo de Cultura Economica, Mexico

Fajnzylber, F. (1990) *De la Caja Negra al Casillero Vacío*. Santiago de Chile: CEPAL, 1990.

Fan, G. (2010) 'The Chinese economy's secrete recipe', 2010-06-29, Project Syndicate website, http://www.project-syndicate.org/commentary/fan16/English

Fan, Y., Liao, H., and Wei, Y.-M. (2007) 'Can market oriented economic reforms contribute to energy efficiency improvement? Evidence from China', *Energy Policy*, 35: 2287-2295

Fare, R., Grosskopf, S., Norris, M. and Zhang, Z. (1994) 'Productivity growth, technical progress, and efficiency change in industrialized countries', *American Economic Review*, 84(1): 66-83

Farrell, M. J. (1957) 'The measurement of productive efficiency', *Journal of the Royal Statistical Society*, Series A (General), vol. 120, no. 3, pp. 253-278

Fel'dman, G. A. (1928) 'On the theory of the rates of growth of national income', Planovoe Khozyaistvo (11/12), reprinted as Fel'dman, G. A. (1964) 'On the theory of the rates of growth of national income', in Spulber, N. (eds.), *Foundations of soviet strategy for economic growth*. Bloomington IL: Indiana University Press, pp 174–199, 304–331

Fei, Hsiao-t'ung (1982) 'A Discussion of Chinese Modernisation', The Australian Journal of Chinese Affairs, No. 7: 119-124

Fewsmith, J. (1999) 'China in 1998: Tacking to stay the course', *Asian Survey*, 39(1): 99-113

Fischer-Kowalski, M. (1998) 'Society's Metabolism: The Intellectual History of Materials Flow Analysis, Part I, 1860– 1970', *Journal of Industrial Ecology*, 2(1): 61–78

Fischer-Kowalski, M. and Hüttler, W. (1998) 'Society's Metabolism: The Intellectual History of Materials Flow Analysis, Part II, 1970-1 998', *Journal of Industrial Ecology*, 2(4): 107-136

Fisher, Franklin M. and Shell, K. (1972) *The Economic Theory of Price Indices: Two Essays on the Effects of Taste, Quality, and Technological Change*. New York: Academic Press

Flyvbjerg, B. (2001) *Making Social Science Matter: Why Social Inquiry Fails and How it Can Succeed Again*, Cambridge: Cambridge University Press

Flyvbjerg, B. (2006) 'Five misunderstandings about case-study research', *Qualitative Inquiry*, 12(2): 219-245

Foley, D., and Michl, T. (1999) *Growth and distribution*. Cambridge, MA: Harvard University Press

Foster, V., Butterfield, W., Chen, C., and Pushak, N. (2008) B*uilding Bridges: China's Growing Role as Infrastructure Financier for Sub-Saharan Africa*. Washington, D.C.: The World Bank

Fox, K. J. (2004) 'Problems with (Dis)Aggregating Productivity, and Another Productivity Paradox', paper presented at workshop on Productivity: Performance, Prospects and Policies,

Wellington, July, available at: http://www.treasury.govt.nz/publications/research-policy/conferences-workshops/productivity/pdfs/pw-fox.pdf

Frank, Andre G. (1969) *Capitalism and underdevelopment in Latin America*. London: Monthly Review Press

Frantz, R. (1992) 'X-efficiency and allocative efficiency: What have we learned?', *American Economic Review: Papers and Proceedings*, vol. 82, no. 2, pp. 434-438

Frantz, R. (1998) X-Efficiency: Theory, Evidence and Applications, 2nd edition. Springer

Friedman, M. (1970) 'The Social Responsibility of Business is to Increase its Profits', *The New York Times Magazine*, September 13, 1970

Friedman, M. and Schwartz, A. (1963) *A Monetary History of the United States, 1867-1960*. Princeton University Press

Frosch, R.A. and N. Gallopoulos. (1989) 'Strategies for manufacturing', *Scientific American*, 261(3):144-152

Furtado, C. (1959) *Formação Econômica do Brasil*. Rio de Janeiro: Fundo de Cultura

Garelli, S. (2006) 'Competitiveness of nations: The fundamentals', in *IMD World Competitiveness Yearbook 2006*, Lausanne, Switzerland: International Institute for Management Development

Gaulier, G. (2006) 'China: The price of competitiveness', La Lettre Du, No. 254, March 2006, Paris: CEPII

Gee, J. (1999) *An introduction to discourse analysis*. NY: Routledge

Georgopoulos, Basil S. and Tannenbaum, Arnold S. (1957) 'A study of organizational effectiveness', *American Sociological Review*, 22(5): 534-540

Gereffi, G. (1994) 'The organization of buyer-driven global commodity chains: How U.S. retailers shape overseas production networks', pp. 95-122, in Gereffi, Gary and Korzeniewicz, Miguel (eds), *Commodity Chains and Global Capitalism*. Westport, CT: Greenwood Press

Gereffi, G. and Korzeniewicz, M. (eds) (1994) *Commodity Chains and Global Capitalism*. Westport, CT: Greenwood Press

Gerschenkron, A., (1962) *Economic Backwardness in Historical Perspective: A Book of Essays*. Cambridge: Harvard University Press

Gleick, P. H. (2008) 'China and water', in Gleick, P. H. *The World's Water 2008–2009: The Biennial Report on Freshwater Resources*, Washington D. C.: Island Press,

Gilpin, R. (1996) 'Economic Evolution of National Systems', *International Studies Quarterly*, Vol. 40, No. 3, Special Issue: Evolutionary Paradigms in the Social Sciences, pp. 411-431

Goldstone, Jack A. (1995) 'The coming Chinese collapse', *Foreign Policy*, 99: 35-53

Golley, J. and Tyers, R. (2006) 'China's growth to 2030: Demographic change and the labor supply constrinat', Working Paper No. 467, Working Papers In Economics and Econometrics, The Austrilian National University

Govindarajan, V. and Kopalle, P.K. (2006) 'The usefulness of measuring disruptiveness of innovations ex post in making ex ante predictions', *Journal of Product Innovation Management*, 23: 12–18

Grabowski, Richard (1994) 'The successful developmental state: Where does it come from?', *World Development*, vol. 22, no. 3, pp. 413-422

Griliches, Z. (1987) 'Productivity: Measurement Problems', in Eatwell, J., Milgate, M., and Newman, P. (eds.) *The New Palgrave: A Dictionary of Economics*. New York: Plagrave Macmillan, pp. 1010–1013

Guerineau, S. and Guillamont Jeanneney, S. (2005) 'Deflation in China', *China Economic Review*, 16: 336-363

Guerrieri, P. and Tylecote, A. (1994) 'National competitive advantages and microeconomic behaviour', *Economics of Innovation and New Technology*, Vol. 3, No. 1, pp. 49 – 76

Gugler, P. and Brunner, S. (2007), 'FDI effects on national competitiveness: A cluster approach', *International Advances in Economic Research*, 13(3): 268-284

H. M. Treasury (2000) *Productivity in the UK: The Evidence and the Government's Approach*, HMSO, London

Hämäläinen, Timo J. (2003) *National competitiveness and economic growth: the changing determinants of economic performance in the world economy*. Northampton, MA: Edward Elgar

Hall, Robert E. and Jones, Charles I. (1999) 'Why do some countries produce so much more output per worker than others?', *Quarterly Journal of Economics*, 114(1): 83-116

Hamel G. and Prahalad, C.K. (1989) 'Strategic intent', *Harvard Business Review*, May-June, 63-76

Hamel, G. and Prahalad, C. K. (1990) 'The Core Competence of the Corporation', *Harvard Business Review*, 68(3): 79-93

Haque, I. ul (1995) 'Introduction', in Haque, I. ul (eds.) *Trade, Technology, and International Competitiveness*. EDI Development Studies, The World Bank

Harris, N. (1986) *The end of the Third World: Newly industrializing countries and the decline of an ideology*. Harmondsworth, UK: Penguin Books

Harrod, R. F. (1939) 'An essay in dynamic theory', *Economic Journal*, 49:14–33

Harrod, R. F. (1948) *Toward a Dynamic Economics: Some Recent Developments of Economic Theory and Their Application to Policy*. London: Macmillan

Hatry, Harry P. (1978) 'The status of productivity measurement in the public sector', *Public Administration Review*, 38(1): 34-40

Hatsopoulos, G., Krugman, P., and Summers, L. (1988) 'U.S. competitiveness: Beyond the trade deficit', *Science*, 241: 299 – 307

Hatzichronoglou, T. (1996) 'Globalisation and Competitiveness: Relevant Indicators', *OECD Science, Technology and Industry Working Papers*, with number 1996/5, OECD Publishing

Hausmann, R. and Klinger, B. (2006) 'Structural Transformation and Patterns of Comparative Advantage in the Product Space', CID Working Paper No. 128, Centre for International Development, John F. Kennedy School of Government, Center, Harvard University

Hausmann, R. and Klinger, B. (2007) 'The Structure of the Product Space and the Evolution of Comparative Advantage', CID Working Paper No. 146, Centre for International Development, John F. Kennedy School of Government, Center, Harvard University

Hausmann, R. and Rodrik, D. (2003) 'Economic development as self-discovery', *Journal of Development Economics*, Vol. 72, No. 2, pp. 603-633

Hausmann, R. Hwang, J. and Rodrik, D. (2007) 'What you export matters', Journal of Economic Growth, Vol. 12, No. 1, pp. 1-25

Hayek, F. A. V. (1974) 'The Pretence of Knowledge', The Nobel Lectures, reprinted in 1989 by *American Economic Review*, 79(6): 3-7

He, Z.-X. (2010) 'The pressure of energy conservation and emission reduction in China and the solution', *natural Gas Technology*, 4(2): 1-3 (in Chinese)

Heckscher, Eli F. (1919) 'The Effect of Foreign Trade on the Distribution of Income', (originally in Swedish), *Ekonomisk Tidskrift*, pp. 497-512

Heckscher, Eli F. (1950) 'The Effect of Foreign Trade on the Distribution of Income'. In *Readings in the Theory of International Trade*, eds. Howard S. Ellis and Lloyd A. Metzler for the American Economic Association, 272–300. Homewood, IL: Irwin.

Hicks, J. (1939) 'The Foundations of Welfare Economics', *The Economic Journal*, vol. 49, no. 196, pp. 696–712

Hill, Charles W. L., Hitt, Michael A. and Hoskisson, Robert E. (1988) 'Declining U.S. competitiveness: reflections on a crisis', *Academy of Management Executive*, Vol. 2, No. 1, pp. 51-60

HMSO (1994) Competitiveness: Helping business to win. Cm 2563
HMSO (1995) Competitiveness: Forging ahead. Cm 2867
Hobday, M. (1995) *Innovation in East Asia: The Challenge to Japan*. Edward Elgar
House of Lords (1985) Report of the Select Committee of the House of Lords on Overseas Trade. London: HMSO. A warning of the damaging social and economic consequences of deindustrialization.
Hopkins, Terence K. and Wallerstein, I. (1994) 'Commodity chains: Construct and research', in Gereffi, Gary and Korzeniewicz, Miguel (eds) *Commodity Chains and Global Capitalism*. Westport, CT: Greenwood Press
Hopper, W. D. (1965) 'Allocation efficiency in a traditional Indian agriculture', *Journal of farm Economics*, 47: 611-24
Hu, Y. (2009) 'An Estimation on Economically Active Population in Urban and Rural China in the Period of 2000 to 2008', Chinese Journal of Population Science, no. 6, pp. 14-22 (in Chinese) 胡英 (2009) 2000-2008 年中国城镇、乡村经济活动人口数量估计, 《中国人口科学》, 2009 年 6 期, 第 14--22 页
Huang, Y.-P. (2010) 'Dissecting the China Puzzle: Asymmetric Liberalization and Cost Distortion', Working Paper No. E2010003 March 9, 2010, China Center for Economic Research, Peking University, Beijing, China
Huang, Y.-P. (2011) 'Rethinking the Beijing Consensus', *Asia Policy*, 11:1-26
Huang, Y.-P. and Jiang, T.-S. (2010) 'What does the Lewis turning point mean for China? A computable general equilibrium analysis', Working Paper No. E2010005, China Centre for Economic Research, Peking University, Beijing, China
Huang, Y.-P. and Tao, K.-Y. (2010) 'Causes and remedies of China's external imbalances', CCER Working Paper No. E2010002, China Center for Economic Research, Peking University, Beijing, China
Huang, Y.-P. and Wang, B.-J. (2010a) 'Cost distortions and structural imbalances in China', *China & World Economy*, 18(4): 1-17
Huang, Y.-P. and Wang, B.-J. (2010b) 'Rebalancing China's economic structure', in Garnaut, R., Golley, J. and Song, L.-G. (eds.), *China - The next twenty years of reform and development*. ANU Press
IMD (2001) 'Competitiveness of nations: the fundamentals', *World Competitiveness Yearbook*, International Institute for Management Development, Ch. De Bellerive 23, PO Box 915, CH-1001 Lausanne
Iritani, E. (2006) 'In China, a giant statistics problem: An effort is underway to unearth more reliable and timely economic information', *Los Angeles Times*, May 20
ILO (International Labor Organization) (2009) *Key Indicators of the Labor Market*. Sixth edition
Iyaniwura, O. and Osoba, A.M. (1983) 'Measuring Productivity; Conceptual and Statistical Problems: Improvement of Statistics' in Osoba A.M. (eds.) 'Productivity in Nigeria: Proceedings of a National Conference' NISER, Ibadan.
Jackson, R., Nakashima, K., and Howe, N. (2009) *China's Long March to Retirement Reform*. Washington D.C.: Center for Strategic and International Studies
Jahiel, A. R. (1997) 'The contradictory impact of reform on environmental protection in China', *China Quarterly*, 149: 81-103
Jefferson, G. H., Hu, Albert G., and Su, Jian (2006) 'The sources and sustainability of China's economic growth', *Brookings Papers on Economic Activity*, vol. 2006, No. 2, pp. 1-47
Jian, T., Sachs, J. and Warner, A. (1996) 'Trends in Regional Inequality in China', *China Economic Review*,7: 1-21

Jorgenson, Dale W. (2003) 'Information Technology and the G7 Economies', World Economics, 4(4): 139-169

Kalirajan, K. P. and Huang, Y. (1996) 'An alternative method of measuring economic efficiency: the case of grain production in China', *China Economic Review*, 7(2):193-203

Kaldor, N. (1939) 'Welfare Propositions in Economics and Interpersonal Comparisons of Utility', *The Economic Journal*, vol. 49, no. 195, pp. 549–552.

Kao, C., Wu, W.-Y., Hsieh, W.-J., Wang, T.-Y., Lin, C.-H. and Chen, L.-H. (2008) 'Measuring the national competitiveness of Southeast Asian countries', *European Journal of Operations Research*, 187: 613-628

Kathuria, V. (2002) 'Liberalization, FDI, and productivity spillovers – an analysis of Indian manufacturing firms', *Oxford Economic Papers*, 54: 688-718

Kay, J. (2005) 'The question of how countries compete', *Financial Times*, 17 May 2005

Keidel, A. (1992) 'How badly do China's national accounts underestimate China's GDP?', Roch Creek Research, mimeo

Keidel, A. (2001) 'China's GDP expenditure accounts', *China Economic Review*, 12: 355-367

Keidel, A. (2006) 'China's social unrest: The story behind the stories', Policy Brief 48, September 2006, Carnegie Endowment for International Peace

Keller, D. (1985) 'The international competitiveness of Europe, the USA and Japan', *Intereconomics*, 20(2): 59-64

Kennedy, S. (2003) 'The Price of Competition: Pricing Policies and the Struggle to Define China's Economic System', The China Journal, No. 49: 1-30

Kilby, P. (2010) 'China's aid: A challenge for new aid paradigms', November 16, 2010, available at: http://devpolicy.org/chinas-aid/

Kim, L. (1997) *Imitation to Innovation: The Dynamics of Korea's Technological Learning*. Boston: Harvard Business School Press

Kim, W. C. and Mauborgne, R. (2004) 'Blue ocean strategy', *Harvard Business Review*, October 76-84

Kim, W. C. and Mauborgne, R. (2005) *Blue ocean strategy: How to create uncontested market space and make the competition irrelevant*. Boston: Harvard Business School Press

Kirzner, Israel M. (1979) Perception, Opportunity and Profit. Chicago: University of Chicago Press

Kirzner, I.M. (1985) *Discovery and the Capitalist Process,* Chicago: The University of Chicago Press

Kitson, M., Martin, R. L. and Tyler, P. (2004) 'Regional Competitiveness: An Elusive yet Key Concept?', *Regional Studies*, vol. 38, issue 9, pp. 991-999

Konus, A. A. (1924) Problema istinnovo indeksa stoimosti zhizni Konyunkturnyi institut. Ekonomicheskii byulleten' (Economic Bulletin of the Conjuncture Institute) (Moscow) 9-10:64-71. English translation (1939) 'The problem of the true index of the cost of living', *Econometrica*, 7:10-29.

Koopmans, T. C. (1947) 'Measurement without theory', *Review of Economics and Statistics*, 29(3): 161-172

Koopmans, T. C. (1951) 'Analysis of Production as an Efficient Combination of Activities', in Koopmans, T. C. (eds.) *Activity Analysis of Production and Allocation: Proceedings of a conference*. New York: Wiley

Krippendorff, K. (2004) *Content Analysis: An Introduction to Its Methodology*. 2nd edition, Thousand Oaks, CA: Sage 2004

Krugman, P. (1979)'Increasing returns, monopolistic competition, and international trade', *Journal of International Economics*, 9: 469-479.

Krugman, P. (1980) 'Scale economies, product differentiation, and the pattern of trade', *American Economic Review*, 70: 950-959.

Krugman, P. (1981) 'Intraindustry specialization and the gains from trade', *Journal of Political Economy*, 91: 959-973

Krugman, P. (1993) 'What do undergrads need to know about trade?', *American Economic Review*, 83: 23-27

Krugman, P. (1994a) 'Europe Jobless, America Penniless?' *Foreign Policy*, 95: 19-34.

Krugman, P. (1994b) 'Competitiveness: A Dangerous Obsession', *Foreign Affairs*, 73(2), 28-44.

Krugman, P. R. (1995) 'Real men don't eat quiche', *Worldlink*, September October 1995: 47

Krugman, P. (1996) 'Cycle of conventional wisdom on economic development', *International Affairs*, 72(1): 717-732

Krugman, P. R. (1997) *Pop internationalism*. Cambridge, MA: MIT Press

Krugman, P. (2000) *The Return of Depression Economics*. W. W. Norton & Company

Krugman, P. R. and Hatsopoulos, G.N. (1987) 'The problem of U.S. competitiveness in manufacturing', *New-England Economic Review*, January/February

Kuhn, Thomas S. (1962) *The structure of scientific revolutions*. Chicago: University of Chicago Press

Kuhn, T. S. (1987) 'What are scientific revolutions?', in L. Kruger, L. J. Daston, & M. Heidelberger (Eds.), *The probabilistic revolution, Vol. 1: Ideas in history* (pp. 7-22). Cambridge, MA: MIT Press

Kuijs, L. Mako, W. and Zhang, C. L. (2005) 'SOE Dividends: How Much and to Whom?', World Bank Policy Note, October 7, 2005, available at: http://www.worldbank.org.cn/english/content/SOE_En_bill.pdf

Kuosmanen, T. and Post, T. (2001) 'Measuring economic efficiency with incomplete price information: With an application to European commercial banks', *European Journal of Operational Research*, 134**:** 43–58

Kwan, C. H. (2002) 'China's Immiserizing Growth', China In Transition, 16 August, Research Institute of Economy, Trade and Industry (RIETI), Japan, available at: http://www.rieti.go.jp/en/china/02081601.html

Lall, S. (1992) 'Technological capabilities and industrialization', *World Development*, 20 (2): 165-186

Lall, S. (2000) 'FDI and development: Research issues in the emerging context', Policy Discussion Paper No. 0020, Centre for International Economic Studies, University of Adelaide, Austrilia

Lall, S. (2001a) 'Comparing national competitive performance: An economic analysis of World Economic Forum's Competitiveness Index', working paper number 61, Queen Elizabeth House, Oxford University, Oxford, the U. K.

Lall, S. (2001b) 'Competitiveness indices and developing countries: An economic evaluation of the Global Competitiveness Report', *World Development*, 29(9): 1501-1525

Lall, S. (2001c) *Competitiveness, Technology and Skills*. Cheltenham, UK: Edward Elgar

Lall, S. (2004) 'Reinventing Industrial Strategy: The Role of Government Policy in Building Industrial Competitiveness', G-24 Discussion Paper No. 28, April 2004, United Nations Conference on Trade and Development (UNCTAD), United Nations

Lall , S. and Albaladejo, M. (2004) 'China's competitive performance: A threat to East Asian manufactured exports?', *World Development*, Vol. 32, No. 9, pp. 1441-1466

Lall, S. and Weiss, J. (2005) '*China's Competitive Threat to Latin America: An Analysis for 1990-2002', Oxford Development Studies*, 33(2): 163-194

Landau, R. (1992) 'Technology, Capital Formation and U.S. Competitiveness', in Hickman, Bert G. (eds.) *InternationalProductivity and Competitiveness*. Oxford University Press, New York, 1992

Landry, A. (1934) *La Revolution Demographique*. Paris

Lardy, N. R. (2002) *Integrating China in the global economy*. Washington, DC: Brookings Institution Press

Lardy, N. R. (2008) 'Financial repression in China', Policy Brief Number PB 08-8, September 2008, Washington D.C.: Peterson Institute for International Economics

Lau, L. J. and Yotopoulos, P. A. (1971) 'A test for relative efficiency and an application to Indian agriculture', *American Economic Review*, 61: 94-109

Lau, L. J. and Yotopoulos, P. A. (1972) 'Profit, supply, and factor demand functions with application to Indian agriculture', *American Journal of Agriculture Economics*, 54: 11-18

Lazonick, W. (1991) *Business Organization and the Myth of the Market Economy*. Cambridge, U.K.: Cambridge University Press

Ledyard, J. O. (2008) 'market failure', in Durlauf, S. N. and Blume, L. E. (eds.), *The New Palgrave Dictionary of Economics*. Second Edition. Palgrave Macmillan, available at: http://www.dictionaryofeconomics.com/article?id=pde2008_M000056

Lee, K. (eds), (1997) Technological Capability and Competitiveness of Korean Industries. Kyung-mun-sa, Seou Žin Korean.

Lee, K. and Lim, C. (2001) 'The Technological regimes, catch-up and leapfrogging: findings from the Korean industries', *Research Policy*, 30: 459-483

Lee, K., Lim, C., and Song, W. (2005) 'Emerging digital technology as a window of opportunity and technological leapfrogging: catch up in digital TV by the Korean firms', *International Journal of Technology Management*, 29 (1-2):40-63

Leibenstein, H. (1966) 'Allocative Efficiency vs. "X-Efficiency"', American Economic Review, vol. 56, no. 6, pp. 392-415

Leibenstein, H. (1968) 'Entrepreneurship and Development', *American Economic Review*, 58(2): 72-83

Leibenstein, H. (1976) *Beyond Economic Man: A new foundation for microeconomics*. Cambridge, MA: Harvard University Press

Leibenstein, H. (1978) 'On the basic proposition of X-efficiency theory', *American Economic Review: Papers and Proccedings*, 68: 328–32

Leibenstein, H. (1979) 'A branch of economics is missing: micro-micro theory' *Journal of Economic Literature*, 17: 477–502

Leibenstein, H. (1988) 'Book review: Discovery and the capitalist process, by Israel M. Kirzner', *Journal of Economic Behavior and Organization*, 9(3): 315-318

Leontief, W. (1953) 'Domestic Production and Foreign Trade: The American Capital Position Re-examined', *Proceedings of the American Philosophical Society*, 97(4):332–349.

Leontief, W. (1954) 'Domestic production and foreign trade: The American capital position re-examined', *Economia Internationale*, 7: 3-22

Leow, J. (2009) 'Fitch Sounds Alarm on Chinese Lenders', *Wall Street Journal*, 22 May, http://online.wsj.com/article/SB124288312709842515.html

Lewis, W. W. (2004) *The power of productivity*. Chicago: University of Chicago Press

Lewis, W. A. (1955) *The Theory of Economic Growth*. London: Allen and Unwin

Li, C. (2008) 'Non-discrimination and the Reform of the Chinese Hukou System in a Human Rights Perspective: A case study of farmer workers', Master degree dissertation, Faculty of Law, University of Oslo, Oslo, Norway

Li, G. (2004) 'Material flow analysis of nations based on sustainable development', *China Industrial Economy*, 11(2004): 11-18

Li, J.-W., Wang, A.-J., and Wang, G.-S. (2010) 'An analysis of China's energy efficiency and energy conservation potential', *Acta Geoscientica Sinica*, 31(5): 733-740 (in Chinese)

Li, P. P. (2010) 'Toward a learning-based view of internationalization: The accelerated trajectories of cross-border learning for latecomers', *Journal of International Management*, 16(1): 43-59

Li, P. P. (2011) 'Disruptive innovations at the bottom of the pyramid', Inaugural Lecture of Professor Peter Ping Li, Copenhagen Business School, Copenhagen, Denmark, 23 February 2011

Li, Q. (2005) 社 shape social structure and structural strain' (in Chinese), Sociological Research, Issue 2

Li, Q. (2007) 'How to view the new changes in China's social stratification' (in Chinese), available at http://www.sociology.cass.cn/shxw/xstl/nhztba2007/P020070806352866252872.pdf

Li, S.-T., Feng, J., and Hou, Y.-Z. (2004) 'Ten Major Trends for Regional Development in China', *China Development Review*, 6(1): 89-93

Li, S.-T. and Xu, Z.-Y. (2008) 'The current state and trend of China's regional disparity', China State Council Development Research Centre report, December 2008, available at: http://www.cdrf.org.cn/a/Report/50.pdf

Li, Z.-D. (2003) 'Energy and Environmental Problems behind China's High Economic Growth: A Comprehensive Study of Medium- and Long-term Problems, Measures and International Cooperation', The Institute of Energy Economics, Japan, available at: http://eneken.ieej.or.jp/en/data/pdf/188.pdf

Liang, H. (2010) 'China's investment strength is sustainable', in *BRICs and Beyond*. Goldman Sachs, pp. 61-72

Lin, Y. M. (2001) *Between politics and market: Firms, competition, and institutional change in post Mao China*. Cambridge: Cambridge University Press

Lin, J. Y.-F. (2006) 'Mainstream economics can hardly explain Chinese economic phenomena', (in Chinese), available at: http://www.snzg.cn/article/show.php?itemid-1508/page-1.html

Lipsey, R. G. and Carlaw, K. (2000) 'What does total factor productivity measure?', *International Productivity Monitor*, No. 1, Fall 2000, pp. 31-40

Liu, H. C.K. (2002) 'Dollar Hegemony Has Got To Go', *Asia Times Online*, April 11, 2002

Liu, K., Duan, N., and Sun, Q. (2009) 'A research of material input and environmental impact for Chinese economy: 1990-2005', *Ecological Economy*, 5: 349-357

Liu, J.-Z., Wang, Q., Gu, X.-W., Ding, Y., and Liu, J.-X. (2005) 'Direct material input and dematerialization analysis of Chinese economy', *Resource Science*, 27(1):46-51 (in Chinese)

Liu, X.-L. (2007) 'Path-following or Leapfrogging in Catching-up: the Case of Chinese Telecommunication Equipment Industry', Working Paper no. 2007/01, Centre for Innovation, Research and Competence in the Learning Economy (CIRCLE), Lund University, Lund, Sweden

Liu, X.-Y., Wang, X.-Q., Whalley, J., and Xin, X. (2011) 'Technological change and China's regional disparities - A calibrated equilibrium analysis', *Economic Modelling*, 28 (2011) 582–588

Liu, Y. L. (1992) 'Reform from below: the private economy and local politics in the rural industrialization of Wenzhou', *The China Quarterly*, 130: 293-316

Livergood R. (2010) 'Rare Earth Elements: A Wrench in the Supply Chain', Center for Strategic and International Studies, available at: http://csis.org/files/publication/101005_DIIG_Current_Issues_no22_Rare_earth_elements.pdf

Lu, D. (2008) 'China's regional income disparity: an alternative way to think of the sources and causes', *Economics of Transition*, 16(1): 31–58

Lu, X., Fausten, D. K., Smyth, R. (2007) 'Financial development, capital accumulation and productivity improvement: Evidence from China', *Journal of Chinese Economic and Business Studies*, 5(3): 227-242

Lucas, R. Jr., (1988) 'On the mechanics of economic development', *Journal of Monetary Economics*, 22(1): 3-42

Luksha, P. (2008) 'Niche construction: The process of opportunity creation in the environment', *Strategic Entrepreneurship Journal*, 2(4): 269–283

Lundvall, B.-A. (eds.) (1992) *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. London: Pinter

Ma, G. and Yi, W. (2010) 'China's high saving rate: myth and reality', BIS Working Papers No. 312, Basel, Switzerland: Bank for International Settlements

Maddison, A. (1997) 'Measuring Chinese economic growth and levels of performance – An assessment of the SSB estimates and a re-estimation in conformity with SNA norms', Organization for Economic Co-operation and Development, Paris

Magaziner, I. and Reich, R. (1982) *Minding America's businesses: The decline and rise of the American economy*. New York: Random House

Malmquist, S. (1953) 'Index numbers and indifference surfaces', *Trabajos de Estadistica*, 4: 209-242

March, J. G. (1991) 'Exploration and Exploitation in Organizational Learning', *Organization Science*, 2(1): 71–87

Markowitz, H. M. (1952) 'Portfolio selection', *Journal of Finance*, 7(1): 77–91.

Markowitz, H. M. (1959) Portfolio selection: efficient diversification of investments. New York: Wiley

Marton, A. M. (2000) *China's spatial development: restless landscapes in the lower Yanzi Delta*. London: Routledge

Mawson, P., Carlaw, K. I., and McLellan, N. (2003) 'Productivity measurement: Alternative approaches and estimates', Wellington, New Zealand, Treasury Working Paper No 03/12, June, available at: http://www.treasury.govt.nz/publications/research-policy/wp/2003/03-12/twp03-12.pdf

Mckean, R. N. (1965) 'The unseen hand in government', *American Economic Review*, 55(3): 496-506

McKinsey Global Institute (2006) *Putting China's Capital to Work: The Value of Financial Systems Reform*. Washington, DC: McKinsey Global Institute

McMullen, J. S. and Shepherd, D. A. (2006) 'Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur', *Academy of Managment Review*, 31(1): 132–152

Meeusen, W. and van Den Broeck, J. (1977) 'Efficiency Estimation from Cobb-Douglas Production Functions with Composed Error', *International Economic Review*, 18(2): 435-444

Minsky, H. P. (1992) 'The financial instability hypothesis', The Jerome Levy Economics Institute Working Paper No. 74

Mises, L. V. (1949) *Human action: A treatise on economics* (4th revised ed.). San Francisco: Fox & Wilkes

Mo, P.-H. and Li, S.-K. (1998) 'Contract Responsibility Systems and Productive Efficiency: A Case Study on State-Owned Enterprises in China', *Bulletin of Economic Research*, 50(4): 323–341

Modigliani, F. (1970) 'The Life Cycle Hypothesis of Saving and Intercountry Differences in the Saving Ratio', Introduction, *Growth and Trade, Essays in Honor of Sir Roy Harrod*, W.A. Elits, M.F. Scott, and J.N. Wolfe, eds. Oxford University Press.

Modigliani, F. and Cao, S. L. (2004) 'The Chinese Saving Puzzle and the Life Cycle Hypothesis', *Journal of Economic Literature,* 42: 145-170

Morgenstern, O. (1972) 'Thirteen Critical Points in Contemporary Economic Theory: An Interpretation', *Journal of Economic Literature*, Vol. 10, No. 4 (Dec., 1972), pp. 1163-1189

Muellbauer, J. (1986) 'The assessment: Productivity and competitiveness in British manuafacturing', *Oxford Review of Economic Policy*, 2(3):i-xxv

Muellbauer, J. (1991) 'Productivity and competitiveness', *Oxford Review of Economic Policy*, 7(3):99-117

Musgrave, R. (1956/1957) 'A multiple theory of budget determination', *Finanzarchiv N. F. 17*, Heft 3: 333-343

Musgrave, R. (1959) *The Theory of Public Finance*. New York: McGraw-Hill

Nalebuff, B.J. & Brandenburger, A.M. (1997) *Co-opetition*, HarperCollins

Nardo, M. and Annoni, P. (2010) 'Appendix B: The Joint Research Centre assessment of the Global Competitiveness Index', *The Global Competitiveness Report 2010-2011*, World Economic Forum, pp. 49-55

Narula, R. and Wakelin, K. (1998) 'Technological competitiveness, trade and foreign direct investment', *Structural Change and Economic Dynamics*, 9(3):373-387

National Competitiveness Council (2007) *Annual Competitiveness Report 2007*, NCC: Dublin, Ireland

Natrajan, S. (2006) 'Inter-provincial disparities in rural 'people's livelihood' in China: An empirical assessment (1980-2004)', *China Report*, 42(3): 233-255

Needham, J. (1954) *Science and Civilization in China*. Cambridge: Cambridge University Press

Nolan, P. (2001) *China and the global economy: national champions, industrial policy and the big business revolution*. Houndsmill: Palgrave

Nolan, P. (2002) 'China and the global business revolution', *Cambridge Journal of Economics*, 26(1): 119-137

Nolan, P. (2004) China at the crossroads. Cambridge, UK: Polity Press

Nolan, P. (2005) 'China at the crossroads', *Journal of Chinese Economic and Business Studies*, 3(1): 1-22

Nolan, P. (2009) *Crossroads. The End of Capitalism & The Future of Humanity*. London: Marshall Cavendish Limited

Nolan, P. and Hasecic, M. (2000) 'China, the WTO and the third industrial revolution', *Cambridge Review of International Affairs*, 13(2): 164-180

Nolan, P. and Rui, H. (2004) 'Industrial policy and global big business revolution: the case of the Chinese coal industry', *Journal of Chinese Economic and Business Studies*, 2(2): 97-113

Nolan, P., Sutherland, D. and Zhang, J. (2002) 'The challenge of the global business revolution', *Contributions to Political Economy*, 21(1): 91-110

Nolan, P. and Zhang, J. (2002) 'The challenge of globalization for large Chinese firms', *World Development*, 30(12): 2089-2107

Nolan, P. and Zhang, J. (2003) 'Globalization challenge for large firms from developing countries: China's oil and aerospace industries', *European Management Journal*, 21(3): 285-299

North, D. C. (1981) *Structure and Change in Economic History*. New York: Norton & Co.

North, D. C. (1990) *Institutions, Institutional Change, and Economic Performance.* Cambridge: Cambridge University Press.

North, D. C. and Thomas, R. P. (1973) *The Rise of the Western World: A New Economic History.* Cambridge: Cambridge University Press.

Notestein, F. (1945) 'Population: The long view', in Schultz, T. (eds.), Food for the Worm. Chicago: Chicago University Press, pp. 36-57

Nurkse, R. (1953) *Problems of Capital Formation in Underdeveloped Countries*. Oxford: Blackwell

O'Mahony M. and Van Ark, B. (eds) (2003) *EU Productivity and Competitiveness: An Industry Perspective. Can Europe Resume the Catching-up Process?*. European Commission, Luxembourg

OECD (1992) *Technology and the Economy: the Key Relationships*. Paris: OECD

OECD (1996) *Industrial Competitiveness*. Paris: OECD
OECD (2007) OECD Review of Innovation Policy: China. Synthesis Report. Paris: OECD
Ohlin, Bertil. 1933. Interregional and International Trade. Cambridge, MA: Harvard University Press.
Okun, A. (1962) 'Potential GNP: Its measurement and significance', Proceedings of the Business and Economic Statistics Section of the American Statistical Association, pp. 89–104
Önsela, Ş. Ülengina, F., Ulusoyb, G. Aktaşc, E., Kabakc, Ö. and Topcuc, Y. İ. (2008) 'A new perspective on the competitiveness of nations', *Socioeconomic Planning Sciences*, 42:221-246
Oral, M. and Chabchoub, H. (1996) 'On the methodology of the World Competitiveness Report', *European Journal of Operational Research*, 90: 514-535
Ostroff, C. and Schmitt, N. (1993) 'Configurations of organizational effectiveness and efficiency', *Academy of Management Journal*, 36(6): 1345-1361
Ostry, S. (1991) 'Lessons from the Triad', in *International Competitiveness: Interaction of the Public and Private Sectors*, edited by Irfan ul Haque. Economic Development Institute Seminar Series. Washington, D.C.: World Bank.
Oyeranti, 'G. A. (2000) 'Concept and measurement of productivity', available at http://www.cenbank.org/out/Publications/occasionalpapers/rd/2000/Abe-00-1.PDF
Pack, H. and Westphal, L. E. (1986) 'Industrial strategy and technological change: theory versus reality', *Journal of Development Economics*, 22 (1): 87-128
Paine, T. (1986) [1776], Kramnick, Isaac, (eds.), *Common Sense*, New York: Penguin Classics
Pais, A. (1991) *Niels Bohr's Times: in physics, philosophy, and polity*. London: Clarendon Press
Papadakis, M. (1994) 'Did (or Does) the United States have a competitiveness crisis', *Journal of Policy Analysis and Management*, Vol. 13, No. 1, pp. 1-20
Pareto, V. (1906) *Manuale di Economia Politica*. Milano: Società Editrice Libraria
Pennings, J. M. and Goodman, P. S. (1977) 'Toward a workable framework', in Goodman, P.S. and Pennings, J.M. (eds.) *New perspectives on organizational effectiveness* (pp. 146-84). San Francisco: Jossey-Bass
Peterson, R. J. (2005) 'Letters to the editor: States do face real threat that they will disappear', *Financial Times*, 20 May 2005
Perez, C., (1988) 'New technologies and development', in Freeman, C., Lundvall, B. (eds.), *Small Countries Facing the Technological Revolution*. London: Printer Publisher
Perez, C. (2002) *Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages*. UK: Edward Elgar
Perez, C. and Soete, L. (1988) 'Catching-up in technology: entry barriers and windows of opportunity', in Dosi, et al. (eds.), *Technical Change and Economic Theory*. London, New York: Pinter Publishers
Petras, J. (1981) 'Dependency and World System Theory: A Critique and New Directions', *Latin American Perspectives*, Vol. 8, No. 3/4, pp. 148-155
Pianta, M. (1988) *New technologies across the Atlantic: US leadership or European autonomy?* Tokyo: The United Nations University
Pinto, A., (1959) *Chile: un caso de desarollo frustrado*. Santiago de Chile: Editorial Universitaria
Pitelis, C. and Antonakis, N. (2003) 'Manufacturing and competitiveness: the case of Greece', *Journal of Economic Studies*, Vol. 30, No. 5, pp. 535-547
Pitelis, C. N. and Vasilaros, V. (2010) 'The Determinants of Value and Wealth Creation at the Firm, Industry, and National Levels: A Conceptual Framework and Evidence', *Contribution to Political Economy*, 29(1): 33-58
Popper, K. (1959) *The Logic of Scientific Discovery*. New York, Basic Books (originally published in 1934 in German titled as *Logik der Forschung*)

Porter, M. E. (1980) *Competitive strategy: Techniques for analyzing industries and competitors*. New York: Free Press

Porter, M. E. (1985) *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: Free Press

Porter, M. E. (1990) *The Competitive Advantage of Nations*. New York: Free Press

Porter, M. E., Takeuchi, H., and Sakakibara, M. (2000) *Can Japan Compete?*. London: MacMillan Press

Porter, M., Ketels, C., and Delgado, M. (2007) 'The Microeconomic Foundation of Prosperity: Findings from the Business Competitiveness Index', WEF Global Competitiveness Reports 2007-2008, World Economic Forum

Potts, J. (2006) '"Efficacy" vs "X-Efficiency"', in Frantz, R. (eds.) Renaissance in Behavioral Economics: Essays in Honour of Harvey Leibenstein. Routledge

Prebisch, R. (1950) *The Economic Development of Latin America and Its Principal Problems*. New York: United Nations

Prestowitz, C. V. Jr. (1994) 'Playing to win', *Foreign Affairs*, 73(4): 186-189

Prahalad, K. C. (2004/2009) *The Fortune at the Bottom of the Pyramid (5th Edition in 2009)*. Upper Saddle River, NJ: Wharton School Publishing

Raikes, P., Jensen, Michael F., and Ponte, S. (2000) 'Global Commodity Chain Analysis and the French Filière Approach', CDR Working Paper 00.3, Centre for Development Research, Copenhagen

Rawski, T. G. (2001) 'What is happening to China's GDP statistics?', *China Economic Review*, 12(4): 347-354

Rawski, T. G. and Xiao, W. (2001) 'Roundtable on Chinese economic statistics: Introduction, *China Economic Review*, 12: 298-302

Reinert, E. S. (1994) 'Competitiveness and its predecessors – a 500-year cross-national perspective', STEP report, ISSN 0804-8185

Reinert, E. S. (1995) 'Competitiveness and its predecessors – a 500-year cross-national perspective', *Structural Change and Economic Dynamics*, 6: 23-42

Ricardo, D. (1817) On the Principles of Political Economy and Taxation. édité par R.M. HARTWELL; Harmondsworth: Penguin, 1971

Richter, J. (2008) 'Circumscribing China's NPL "puzzle"', *Wharton Research Scholars Journal*, 5-1-2008, University of Pennsylvania

Robinson, J. (1956) *The Accumulation of Capital*. London: Macmillan

Rodrik, D. (2006) 'What is so special about China's exports?', *China & World Economy*, vol. 14, no. 5, pp. 1-19

Rodrik, D. (2008) 'Industrial policy: don't ask why, ask how', *Middle East Development Journal*, Demo Issue: 1-29

Romer, P. M. (1986) 'Increasing Returns and Long-Run Growth', *Journal of Political Economy*, 94(5): 1002-1037

Romer, P. M. (1990) 'Endogenous Technological Change', *Journal of Political Economy*, 98(5): S71-S102

Rosenstein-Rodan, P. (1943) 'Problems of Industrialization of Eastern and South- Eastern Europe, *Economic Journal*, June-September

Rostow, W. W. (1959) 'The Stages of Economic Growth', *The Economic History Review*, New Series, Vol. 12, No. 1, pp. 1-16

Rostow, W. W. (1960) *The stages of economic growth: a non-communist manifesto*. New York: Cambridge University Press

Rumelt, R. P. (2003) 'What in the world is competitive advantage', Policy Working Paper 2003-105, Anderson School of Management, University of California at Los Angeles, available at http://www.anderson.ucla.edu/faculty/dick.rumelt/Docs/Papers/WhatisCA_03.pdf

Sachs, J. (1995) "Keep baby in the bath water", *World Link*, September/October 1995, pp. 49-51

Sachs, J. (1996) 'The Tankers Are Turning - Sachs on Competitiveness', *World Link*, September/October 1996

Sachs, J. (1996) 'On the Tigers Trail, - Sachs on Competitiveness', *World Link*, November/December 1996

Sachs, J. D. and Warner, A. M. (1995, revised 1997, 1999) 'Natural resource abundance and economic growth', National Bureau of Economic Research Working paper No. 5398, Cambridge, MA

Sachs, J. D. and Warner, A. M. (1999) 'The big push, natural resource booms and growth', *Journal of Development Economics*, vol. 59, pp. 43–76

Sachs, J. D. and Warner, A. M. (2001) 'The curse of natural resource', *European Economic Review*, vol. 45, no. 4-6, pp. 827-838

Samuelson, P. (1948) 'International Trade and the Equalisation of Factor Prices, The Economic Journal, Vol. 58, No. 230 (Jun., 1948), pp. 163-184

Samuelson, P. (1949) 'International Factor-Price Equalisation Once Again', The Economic Journal, Vol. 59, No. 234 (Jun., 1949), pp. 181-197

Samuelson, P. (1954) 'The pure theory of public expenditure', *Review of Economics and Statistics*, 36(4): 387-389

Samuelson, P. (1963) 'The Economic Role of Private Activity', in 'A Dialogue on the Proper Economic Role of the State by George Stigler and Paul Samuelson', Selected Papers No. 7, Graduate School of Business, University of Chicago

Samuelson, P. A. (2004) 'Where Ricardo and Mill Rebut and Confirm Arguments of Mainstream Economists Supporting Globalization', *Journal of Economic Perspectives*, Vol. 18, No. 3 (Summer, 2004), pp. 135-146

Samuelson, P. A. (2005) 'Response from Pual A. Samuelson', *Journal of Economic Perspectives*, Vol. 19, No. 3 (Summer, 2005), pp. 242-244

Sassen, S. (2006) Territory, authority, rights: From medieval to global assemblages. Princeton, NJ: Princeton University Press

Sachs, J. (2005) 'Aristotle: Motion and its Place in Nature', *Internet Encyclopedia of Philosophy*, http://www.iep.utm.edu/aris-mot/

Schultz, T. W. (1964) *Transforming Traditional Agriculture*. New Haven

Schultz, T. W. (1968) 'Institutions and the Rising Economic Value of Man', *American Journal of Agricultural Economics*, 50(5): 1113 -1122

Schrödinger, E. (1926) 'An Undulatory Theory of the Mechanics of Atoms and Molecules', *Physical Review*, 28 (6): 1049–1070

Schumpeter, J. A. (1911) *Theorie der wirtschaftlichen Entwicklung*. Leipzig: Duncker &Humblot; 2nd edition, 1926; abridged English translation, 1934, *The Theory of Economic Development*. Cambridge, MA: Harvard University Press

Schumpeter, J. A. (1942) *Capitalism, Socialism, and Democracy*. New York: Harper & Brothers

Schaaper, M. (2009) 'Measuring China's innovation system: National specificities and international comparisons', STI Working Paper 2009/1, OECD Directorate for Science, Technology and Industry

Scott, B. R. and Lodge, G. C. (1985) *US Competitiveness in the World Economy*. Boston: Harvard Business School Press

Sha, R., Naudé, W., Viviers, W. (2007) 'Income Disparities across Chinese Provinces: Revisiting the Convergence–Divergence Debate', World Institute for Development Economics Research, United Nations University, Helsinki, Finland

Shambaugh, D. (1996) 'Containment or Engagement of China? Calculating Beijing's Responses', *International Security*, 21(2): 180-209

Shan, W.-j. (2006) 'China's low-profit growth model', *Far Eastern Economic Review*, November 2006

Shane, S. and Venkataraman, S. (2000) 'The Promise of Enterpreneurship as a Field of Research', *Academy of Management Review*, 25(1): 217-226

Sharples, J. and Milham, N. (1990) *Longrun Competitiveness of Australian Agricultura*. USDA Foreign Agricultural Economic Report No. 243, December 1990, US Department of Agriculture

Shelton, J. P. (1967) 'Allocative efficiency vs. "X-efficiency": Comment', *American Economic Review*, Vol. 57, No. 5 (Dec., 1967), pp. 1252-1258

Shi, H., Moriguichi, Y., and Yang, J. (2003a) 'Industrial ecology in China, Part I', *Journal of Industrial Ecology*, 6(3-4): 7-11

Shi, H., Moriguichi, Y., and Yang, J. (2003b) 'Industrial ecology in China, Part II', *Journal of Industrial Ecology*, 7(1): 5-8

Siebert, H. (2007) 'China: Coming to grips with the new global player', *The World Economy*, 30(6): 893-922

Siggel, E. (2006) 'International competitiveness and comparative advantage: A survey and a proposal for measurement', *Journal of Industry, Competition and Trade*, 6(2): 137-159

Sinton, J. E. (2001) 'Accuracy and reliability of China's energy statistics', *China Economic Review*, 12: 373-383

Smith, A. (1776) *An inquiry into the wealth of nations*. London : Strahan and Cadell

Smith, D. and Ciccantell, P. (2008) 'Global Commodity Chains: Starting at the Source and Moving From There', Paper presented at the annual meeting of the American Sociological Association Annual Meeting, Boston, MA, Jul 31, 2008

Solow, R. M. (1956) 'A Contribution to the Theory of Economic Growth', *Quarterly Journal of Economics*, 70(1): 65-94

Solow, R. M. (1957) 'Technical change and the aggregate production function', *The Review of Economics and Statistics* 39(3): 312-320

Song, X.-C. (2007) 'Some issues and statistics about China's GDP', *Economic Research*, 8:21-30 (in Chinese)

Spence, A. M. and Hazard, H. (1988) (eds.) *International Competitiveness*. Cambridge, Massachusetts: Ballinger

Stake, R. E. (1995) The art of case study research. Thousand Oaks, CA: Sage

Stigler, G. J. (1947) *Trends in Output and Employment*, New York: National Bureau of Economic Research

Stigler, G. (1976) 'The Xistence of X-efficiency', *American Economic Review*, 66: 213-216

Stiglitz, J. E. (1996) 'The role of government in economic development', Keynote address, proceedings of Annual World Bank Conference on Development Economics, pp. 10-20

Stiglitz, J. E. (2006) Making globalization work. New York: W. W. Norton & Co.

Storper,M. (1995) 'The Resurgence of Regional Economies, Ten Years Later: The Region as a Nexus of Untraded Interdependencies', *European Urban and Regional Studies*, 2(3),191-221.

Schreyer, P. (2000) 'The Contribution of Information and Communication Technology to Output Growth: A Study of the G7 Countries', Paris, Organisation for Economic Co-operation and Development, May 23

Song, J.-T., Song, J.-Q., and Song, D.-J. (2006) 'Discriminated analysis for the efficiency of urban land use structure', *China Land Science*, 20(6): 9-15 (in Chinese)

Tanzi, V. (1997) 'The changing role of the state in the economy: A historical perspective', IMF Working Paper, WP/97/114, Washington, D.C.: International Monetary Fund

The Beijing Axis (2010) *The China compass: A country in figures*. The Beijing Axis

The Economist (1995) 'The "C" word', *The Economist*, September 9, 1995, p. 104

The Economist (1996) 'The C-word strikes back', *The Economist*, June 1, 1996, p. 86

Thompson, E. R. (2003) 'A grounded approach to identifying national competitive advantage: a preliminary exploration', *Environment and Planning A*, 35: 631-657

Thompson, E. R. (2004) 'National competitiveness: A question of cost conditions or institutional circumstances?', *British Journal of Management*, 15:197-218

Thompson, W. S. (1929) 'Population', *American Journal of Sociology*, 34: 959-975.

Thorndike, R. L. (1949) *Personnel selection: Test and measurement techniques*. New York: Wiley

Thurow, L. (1992) *Head to Head: The coming economic battle among Japan, Europe and America*. New York: William Morrow

Tinbergen, J. (1942) 'Zur Theorie der langfristigen Wirtschaftsentwicklung', Weltwirtschaftliches *Archiv*, 55(1): 511-549; English translation (1959) 'On the Theory of Trend Movements', in Leo H. Klaassen, Leendert M. Koyck and Hendrikus J. Witteveen (eds.) *Jan Tinbergen, Selected Papers*, (North-Holland, Amsterdam): 182-221.

Tong, Y. and Lei, S. (2010a) 'Large-scale mass incidents in China', *East Asia Policy*, 2(2): 23-333

Tong, Y. and Lei, S. (2010b) 'Chinese government learning to live with social protests', EAI Background Brief No. 521, East Asia Institute, National University of Singapore

Tornqvist, L. (1936) 'The Bank of Finland's Consumption Price Index', *Bank of Finland Monthly Bulletin*, No. 10: 1-8

Tsang, S.-K. and Cheng, Y.-S. (1994) 'China's tax reforms of 1994: Breakthrough or compromise?', *Asian Survey*, 34(9): 769-788

Tybout, J. R. (1992) 'Linking trade and productivity: New research directions', *The World Bank Economic Review*, 6(2): 189-211

Tyson, L. D. (1992) *Who's Bashing Whom: Trade Conflict in High-Technology Industries*. Washington, D.C.: Institute for International Economics

United Nations (2007) *World Population Prospects: The 2006 Revision*. New York: UN Population Division

United Nations General Assembly (UNGA) (1987) Report of the World Commission on Environment and Development: Our Common Future. Transmitted to the General Assembly as an Annex to document A/42/427 - Development and International Co-operation: Environment

United Nations General Assembly (UNGA) (March 20, 1987). "Report of the World Commission on Environment and Development: Our Common Future; Transmitted to the General Assembly as an Annex to document A/42/427 - Development and International Co-operation: Environment; Our Common Future, Chapter 2: Towards Sustainable Development; Paragraph 1". United Nations General Assembly. http://www.un-documents.net/ocf-02.htm. Retrieved 1 March 2010

United Nations General Assembly (UNGA) (2005). 2005 World Summit Outcome, Resolution A/60/1, adopted by the General Assembly on 15 September 2005

Vernengo, M. (2006) 'Technology, finance, and dependency: Latin American radical political economy in retrospect', *Review of Radical Political Economics*, vol. 38, no. 4, pp. 551-568

Vujovic, D. (2008) 'Challenges of integrating micro and macro aspects of competitiveness', *Ekonomika Preduzeca*, 56(5-6): 171-181

Wade, R. (1990, 2004) *Governing the market: Economic theory and the role of government in East Asian industrialization*. Princeton: Princeton University Press

Wade, R. H. (2006) 'How can developing countries catch up? The case for open-economy industrial policy', XI Congreso Internacional del CLAD sobre la Reforma del Estado y de la Administración Pública, Ciudad de Guatemala, 7 - 10 Nov. 2006, available at: https://bvc.cgu.gov.br/bitstream/123456789/2492/1/haw_can_developing_countries.pdf

Wade, R. (2010) 'After the Crisis: Industrial Policy and the Developmental State in Low-Income Countries', *Global Policy*, 1(2): 150-161

Wallerstein, I. M. (1974) *The Modern World-System, vol. I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*. New York/London: Academic Press.

Wallerstein, I. M. (1980) *The Modern World-System, vol. II: Mercantilism and the Consolidation of the European World-Economy, 1600-1750*. New York: Academic Press.

Wallerstein, I. M. (1989) *The Modern World-System, vol. III: The Second Great Expansion of the Capitalist World-Economy, 1730-1840's*. San Diego: Academic Press.

Wallerstein, I. M., Amin, S., Arrighi, G., and Frank, A. G. (1990) *Transforming the Revolution: Social Movements and the World-System*. New York: Monthly Review Press

Walter, A. (2009) 'Global Imbalances and Currency Politics: China, Europe, and the United States', available at: http://personal.lse.ac.uk/wyattwal/images/GlobalImbalances.pdf

Wang, D.-W., Cai, F., and Lin, S.-H. (2008) 'The jobless growth puzzle of manufacturing employment in china', available at: http://www.wise.xmu.edu.cn/Master/News/NewsPic/200811485411701.pdf

Wang, C. (2011) 'Sources of energy productivity growth and its distribution dynamics in China', *Resource and Energy Economics*, 33: 279–292

Wang, D.-J. (2008a) Research on the land usage efficiency in the Chinese urbanization process. PhD dissertation, The University of Liaoning, Liaoning, China

Wang, D.-J. (2008) 'An analysis of the current land usage efficiency in the Chinese urbanization process', *Liaoning Economy*, 8(2008):16

Wang, D.-W., Cai, F., and Lin, S.-H. (2008) 'The jobless growth puzzle of manufacturing employment in china', http://www.wise.xmu.edu.cn/Master/News/NewsPic/200811485411701.pdf

Wang, M., Webber, M., Finlayson, B., and Barnett, J. (2008) 'Rural industries and water pollution in China', *Journal of Environmental Management*, 86: 648-659

Wang, W.-H. (2006) *Zhongguo huji zhidu: Lishi yu zhengzhi de fenxi* (China's Hukou System: A Historicaland Political Analysis). Shanghai, China: Shanghai wenhui chubanshe

Wang, X.-L. (1999) 'Sustainability of China's economic growth', China Update 1999 conference papers, National Centre for Development Studies, November 1999

Wang, X.-L. and Meng, L. (2001) 'A reevaluation of China's economic growth', *China Economic Review*, 12: 338-346

Wang, X., Fan, G., and Liu, P. (2007) 'Pattern and Sustainability of China's Economic Growth towards 2020', presented the ACESA 2007 Conference: China's Conformity to the WTO: Progress and Challenges, available at: http://www.cerdi.org/uploads/sfCmsContent/html/203/FanGang_alii.pdf

Wang, Y.-F. and Yu, Y. (2010) 'Linking analysis on China's material dematerialization and economic growth', *China Population, Resources and Environment*, 20(7):112-119 (in Chinese)

Wang, X.-L. (1999) 'Sustainability of China's economic growth', *China Update 1999 conference papers*, National Centre for Development Studies, November 1999

Woo, W. T. (2006) 'The structural nature of internal and external imbalances in China', *Journal of Chinese Economic and Business Studies*, 4 (1): 1-19

Weaver, W. 1958. Chapter I: Science and Complexity. In 'A quarter century in the natural sciences', *The Rockefeller Foundation Annual Report 1958.*

Wei, S.-J. and Zhang, X.-B. (2009) 'The competitive saving motive: evidence from rising sex ratios and savings rates in China', NBER Working Paper 45093, New York: National Bureau of Economic Research

Wennekers, S. and Thurik, R. (1999) 'Linking Entrepreneurship and Economic Growth', *Small Business Economics*, 13: 27-55

Werner H. (1925) 'Über quantentheoretische Umdeutung kinematischer und mechanischer Beziehungen', *Zeitschrift für Physik*, 33: 879–893 (English translation as 'Quantum theoretical re-interpretation of kinematic and mechanical relations')

Westphal, L. E. (1982) 'Fostering technological mastery by means of selective infant-industry protection', in Syrquin, M. and Teitel, S. (eds.), *Trade, Stability, Technology, and Equity in Latin America*. New York: Academic Press: 255-279

Westphal, L. E. (1990) 'Industrial policy in an export-propelled economy: lessons from South Korea's experience', *Journal of Economic Perspective*, 4 (3): 41-59

Williams, E. Macdonald, K. and Kind, V. (2002) 'Unravelling the competitiveness debate', *European Environment*, 12: 284-290

Windrum, P. and Tomlinson, M. (1999) 'Knowledge-intensive services and international competitiveness: A four country comparison', *Technology Analysis & Strategic Management*, 11(3): 391-408

Woetzel, J. R. (2006) 'Checking China's vital signs: The social challenge', *The McKinsey Quarterly*, Special edition: Serving the new Chinese consumer, 16-23

Wolf, M. (2005a) 'Why is China growing so slowly?', Foreign Policy, January/February 2005

Wolf, M. (2005b) 'China has further to grow to catch up with the world', Financial Times, 13 April 2005.

Woo, W. T. (2006) 'The structural nature of internal and external imbalances in China', *Journal of Chinese Economic and Business Studies*, 4 (1): 1-19

World Bank (1995) *Trade, Technology, and International Competitiveness*. Washington D. C.: The World Bank

World Bank (2005) *Economic Growth in the 1990s: Learning from a Decade of Reform*. Washington D. C.: The World Bank

World Bank (2007) *Cost of Pollution in China: Economic Estimates of Physical Damages*. Washington D.C.: The World Bank

World Economic Forun (WEF) various years, *Global Competitiveness Report*. Geneva, Switzerland: World Economic Forum

World Economic Forum (WEF) (2010) *Global Competitiveness Report 2010-2011*. Geneva, Switzerland: World Economic Forum

Wu, H.-Y. (2007) 'Changes and trend of China's regional income disparity since the West Development Strategy', paper presented on the 22nd Economic Research Centre and KITAN International Symposium on 'Economic development and Income Disparity in China', 5-6 October, Nagoya University, Japan

Wu, J.-L. (1997) 'China's Social Security System', speech by the vice minister of State Commission for Restructuring the Economic System of China on the conference "China as a Global Economic Power: Market Reforms in the New Millennium", 16 June 1997, Cato Institute, Washington D.C., available at: http://www.cato.org/events/china/papers/jie.html

Wu, J.-L. and Huang, S.-Q. (2006) 'The entrepreneurship and institutions: a perspective to interpret China's economic growth in its transformation', Presentation at William Baumol Special Session on Entrepreneurship, Innovation and Growth at 2006 American Economic Association Meeting, on January 8, Boston, USA

Wu, Y. (2009) 'Growth and Investment Efficiency in China', EAI Background Brief No. 459, 18 June, East Asian Institute, Singapore

Xin, X. and Liu, X. (2008) 'Regional disparity of factor endowment and agricultural labor productivity in China', *Frontiers of Economics in China*, 3(3): 380-409

Xu, D.-q. and Ljungwall, C. (2008) 'What is the real size of China's economy', *China Economic Journal*, 1(1): 97-105

Xu, L. C. (2008) 'Comments on "Capital and its complements in economic growth" by J. Bradford DeLong', in Little, J. S. (eds.), *Global Imbalances and the Evolving World Economy, Boston*, MA: Federal Reserve Bank of Boston

Xu, M. and Zhang, T. (2007) 'Material flows and economic growth in developing China', *Journal of Industrial Ecology*, 11(1): 121-140

Xu, Z. and Li, S.-T. (2006) 'Analysis on the Trend of Regional Income Disparity in China', *Economic research*, 23(7): 106-116 (in Chinese Journal)

Yang, H.-Q., Nie, Y., and Ji, C.-Y. (2010) 'Study on China's timber resource shortage and import structure: Natural Forest Protection Program outlook, 1998 to 2008', *Forest Products Journal*, 60(5): 408-415

Yao, Zhanqi (2010) 'Factor reallocation effect and productivity in China's economic growth, 1985-2007', *The Chinese Economy*, 43(1): 44-70

Yao, S. and Han, Z. (2007) 'Ownership reform, foreign competition and efficiency of Chinese commercial banks: a non-parametric approach', Discussion Paper 14, China Policy Institute, The University of Nottingham, Nottingham, the UK

Yi, X.-R. (2010) 'End of loose monetary policy', *China Daily*, 17 December 2010, available at: http://www.chinadaily.com.cn/thinktank/2010-12/07/content_11661937.htm

Yi, G., Fan, G., and Li, Y. (2003) 'Theoretical reflection on China's economic growth and TFP growth', *Economic Research*, 8(2003):13-20 (in Chinese)

Yi, X.-R. (2010) 'End of loose monetary policy', China Daily, 2010-12-07, available at: http://www.chinadaily.com.cn/thinktank/2010-12/07/content_11661937.htm

Yin, R. K. (2006) 'Case study method', in Green, Judith L., Camilli, G., and Elmore, Patricia B. (eds.) *Handbook of Complementary Methods for Research in Education*, pp. 111-122. Washington, D.C.: American Educational Research Association

Yin, R. K. (2009) *Case Study Research: Design and Methods*. Fourth Edition. California: SAGE Publications.

Yotopoulos, P. A. (1967) *Allocative efficiency in economic development: A cross section analysis of Epirus farming*. Athens

Yotopoulos, P. A. (1968) 'On the efficiency of resource utilization in subsistence agriculture', *Food Research Institute Studies in Agricultural Economics, Trade, and Development*, 8:125-135

Young, A. (1995) 'The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience', *Quarterly Journal of Economics*, 110(3): 641-68

Yu, D. and Hang, C. C. (2010) 'A reflective review of disruptive innovation theory', *International Journal of Management Reviews*, 12(4): 435–452

Yu, Y.-D. (2007) 'Global Imbalances and China', Australian Economic Review, 40(1): 1-33

Yu, Y.-D. (2010) 'A different road forward', *China Daily*, 23 December 2010, see http://www.chinadaily.com.cn/opinion/2010-12/23/content_11742757.htm

Yuchtman, E. and Seashore, S. E. (1967) 'A system resource approach to organizational effectiveness', *American Sociological Review*, 32: 891-903

Zahra, S. A. (2008) 'The virtuous cycle of discovery and creation of entrepreneurial opportunities', *Strategic Entrepreneurship Journal*, 2(3): 243–258

Zanakis, S. H. and Becerra-Fernandez, I. (2005) 'Competitiveness of nations: A knowledge discovery examination', *European Journal of Operational Research*, 166: 185-211

Zhang, C.-W. (2003) 'International comparison of the definition of unemployment and China's urban unemployment rate', World Economy, no. 5, pp. 1-8 (in Chinese, 张车伟, 失业率定义的国际比较及中国城镇失业率, 《世界经济》, 2003 年第 5 期, 1-8)

Zhang, F.-G., Hao, J.-M., Jiang, G.-H., Ding, Z.-Y., Li, X.-B., and Li, T. (2005) 'Spatial-temporal variance of urban land use intensity', *China Land Science*, 19(1): 23-29 (in Chinese)

Zhang, M. (2006) 'The social marginalization of workers in China's state-owned enterprises', *Social Research*, 73(1): 159-184

Zhang, X.-B., Xing, L., Fan, S.-G., and Luo, X.-P. (2008) 'Resource abundance and regional development in China', *Economics of Transition*, 16(1): 7–29

Zhang, Yang, Wang (2010) 'China Has Reached the Lewis Turning Point', IFPRI Discussion Paper 000977, May 2010, International Food Policy Research Institute

Zhang, Z. X. (2003) 'Why did the energy intensity fall in China's industrial sector in the 1990s? The relative importance of structural change and intensity change', *Energy Economics*, *25*: 625–638

Zhang, X. and Tan, K.-Y. (2007) 'Incremental Reform and Distortions in Product and Factor Markets in China', *World Bank Economic Review*, 21(2): 279-299

Zheng, J.-P. (2001) 'China's official statistics: Growing with full vitality', *China Economic Review*, 12(4): 333-337

Zhao, J. (2010) 'Debate: high-speed rail', *China Daily*, 19 April, available at: http://www.chinadaily.com.cn/opinion/2010-04/19/content_9745174_2.htm

Zhou, G. (2007) 'China's economic development and environment protection', *China Report*, 43(2): 203-211

Zhou, M.-H., Xiao, W., and Yao, X.-G. (2010) 'Unbalanced Economic Growth and Uneven National Income Distribution: Evidence from China', IRLE Working Paper 2010-11, Institue for Research on Labor and Employment, University of California, Los Angeles

Zhou, N., Levine, M. D., and Price, L. (2010) 'Overview of current energy-efficiency policies in China', *Energy Policy*, 38:6439-645

TITLER I PH.D.SERIEN:

2004

1. Martin Grieger
Internet-based Electronic Marketplaces and Supply Chain Management

2. Thomas Basbøll
LIKENESS
A Philosophical Investigation

3. Morten Knudsen
Beslutningens vaklen
En systemteoretisk analyse of moderniseringen af et amtskommunalt sundhedsvæsen 1980-2000

4. Lars Bo Jeppesen
Organizing Consumer Innovation
A product development strategy that is based on online communities and allows some firms to benefit from a distributed process of innovation by consumers

5. Barbara Dragsted
SEGMENTATION IN TRANSLATION AND TRANSLATION MEMORY SYSTEMS
An empirical investigation of cognitive segmentation and effects of integrating a TM system into the translation process

6. Jeanet Hardis
Sociale partnerskaber
Et socialkonstruktivistisk casestudie af partnerskabsaktørers virkelighedsopfattelse mellem identitet og legitimitet

7. Henriette Hallberg Thygesen
System Dynamics in Action

8. Carsten Mejer Plath
Strategisk Økonomistyring

9. Annemette Kjærgaard
Knowledge Management as Internal Corporate Venturing
– a Field Study of the Rise and Fall of a Bottom-Up Process

10. Knut Arne Hovdal
De profesjonelle i endring
Norsk ph.d., ej til salg gennem Samfundslitteratur

11. Søren Jeppesen
Environmental Practices and Greening Strategies in Small Manufacturing Enterprises in South Africa
– A Critical Realist Approach

12. Lars Frode Frederiksen
Industriel forskningsledelse
– på sporet af mønstre og samarbejde i danske forskningsintensive virksomheder

13. Martin Jes Iversen
The Governance of GN Great Nordic
– in an age of strategic and structural transitions 1939-1988

14. Lars Pynt Andersen
The Rhetorical Strategies of Danish TV Advertising
A study of the first fifteen years with special emphasis on genre and irony

15. Jakob Rasmussen
Business Perspectives on E-learning

16. Sof Thrane
The Social and Economic Dynamics of Networks
– a Weberian Analysis of Three Formalised Horizontal Networks

17. Lene Nielsen
Engaging Personas and Narrative Scenarios – a study on how a user-centered approach influenced the perception of the design process in the e-business group at AstraZeneca

18. S.J Valstad
Organisationsidentitet
Norsk ph.d., ej til salg gennem Samfundslitteratur

19. Thomas Lyse Hansen
Six Essays on Pricing and Weather risk in Energy Markets

20. Sabine Madsen
Emerging Methods – An Interpretive Study of ISD Methods in Practice

21. Evis Sinani
The Impact of Foreign Direct Investment on Efficiency, Productivity Growth and Trade: An Empirical Investigation

22. Bent Meier Sørensen
Making Events Work Or, How to Multiply Your Crisis

23. Pernille Schnoor
Brand Ethos
Om troværdige brand- og virksomhedsidentiteter i et retorisk og diskursteoretisk perspektiv

24. Sidsel Fabech
Von welchem Österreich ist hier die Rede?
Diskursive forhandlinger og magtkampe mellem rivaliserende nationale identitetskonstruktioner i østrigske pressediskurser

25. Klavs Odgaard Christensen
Sprogpolitik og identitetsdannelse i flersprogede forbundsstater
Et komparativt studie af Schweiz og Canada

26. Dana B. Minbaeva
Human Resource Practices and Knowledge Transfer in Multinational Corporations

27. Holger Højlund
Markedets politiske fornuft
Et studie af velfærdens organisering i perioden 1990-2003

28. Christine Mølgaard Frandsen
A.s erfaring
Om mellemværendets praktik i en transformation af mennesket og subjektiviteten

29. Sine Nørholm Just
The Constitution of Meaning – A Meaningful Constitution?
Legitimacy, identity, and public opinion in the debate on the future of Europe

2005

1. Claus J. Varnes
Managing product innovation through rules – The role of formal and structured methods in product development

2. Helle Hedegaard Hein
Mellem konflikt og konsensus – Dialogudvikling på hospitalsklinikker

3. Axel Rosenø
Customer Value Driven Product Innovation – A Study of Market Learning in New Product Development

4. Søren Buhl Pedersen
Making space
An outline of place branding

5. Camilla Funck Ellehave
Differences that Matter
An analysis of practices of gender and organizing in contemporary workplaces

6. Rigmor Madeleine Lond
Styring af kommunale forvaltninger

7. Mette Aagaard Andreassen
Supply Chain versus Supply Chain Benchmarking as a Means to Managing Supply Chains

8. Caroline Aggestam-Pontoppidan
From an idea to a standard
The UN and the global governance of accountants' competence

9. Norsk ph.d.

10. Vivienne Heng Ker-ni
An Experimental Field Study on the

Effectiveness of Grocer Media Advertising
Measuring Ad Recall and Recognition, Purchase Intentions and Short-Term Sales

11. Allan Mortensen
Essays on the Pricing of Corporate Bonds and Credit Derivatives

12. Remo Stefano Chiari
Figure che fanno conoscere
Itinerario sull'idea del valore cognitivo e espressivo della metafora e di altri tropi da Aristotele e da Vico fino al cognitivismo contemporaneo

13. Anders McIlquham-Schmidt
Strategic Planning and Corporate Performance
An integrative research review and a meta-analysis of the strategic planning and corporate performance literature from 1956 to 2003

14. Jens Geersbro
The TDF – PMI Case
Making Sense of the Dynamics of Business Relationships and Networks

15 Mette Andersen
Corporate Social Responsibility in Global Supply Chains
Understanding the uniqueness of firm behaviour

16. Eva Boxenbaum
Institutional Genesis: Micro – Dynamic Foundations of Institutional Change

17. Peter Lund-Thomsen
Capacity Development, Environmental Justice NGOs, and Governance: The Case of South Africa

18. Signe Jarlov
Konstruktioner af offentlig ledelse

19. Lars Stæhr Jensen
Vocabulary Knowledge and Listening Comprehension in English as a Foreign Language
An empirical study employing data elicited from Danish EFL learners

20. Christian Nielsen
Essays on Business Reporting
Production and consumption of strategic information in the market for information

21. Marianne Thejls Fischer
Egos and Ethics of Management Consultants

22. Annie Bekke Kjær
Performance management i Proces-innovation
– belyst i et social-konstruktivistisk perspektiv

23. Suzanne Dee Pedersen
GENTAGELSENS METAMORFOSE
Om organisering af den kreative gøren i den kunstneriske arbejdspraksis

24. Benedikte Dorte Rosenbrink
Revenue Management
Økonomiske, konkurrencemæssige & organisatoriske konsekvenser

25. Thomas Riise Johansen
Written Accounts and Verbal Accounts
The Danish Case of Accounting and Accountability to Employees

26. Ann Fogelgren-Pedersen
The Mobile Internet: Pioneering Users' Adoption Decisions

27. Birgitte Rasmussen
Ledelse i fællesskab – de tillidsvalgtes fornyende rolle

28. Gitte Thit Nielsen
Remerger
– skabende ledelseskræfter i fusion og opkøb

29. Carmine Gioia
A MICROECONOMETRIC ANALYSIS OF MERGERS AND ACQUISITIONS

30. Ole Hinz
Den effektive forandringsleder: pilot, pædagog eller politiker?
Et studie i arbejdslederes meningstilskrivninger i forbindelse med vellykket gennemførelse af ledelsesinitierede forandringsprojekter

31. Kjell-Åge Gotvassli
Et praksisbasert perspektiv på dynamiske
læringsnettverk i toppidretten
Norsk ph.d., ej til salg gennem Samfundslitteratur

32. Henriette Langstrup Nielsen
Linking Healthcare
An inquiry into the changing performances of web-based technology for asthma monitoring

33. Karin Tweddell Levinsen
Virtuel Uddannelsespraksis
Master i IKT og Læring – et casestudie i hvordan proaktiv proceshåndtering kan forbedre praksis i virtuelle læringsmiljøer

34. Anika Liversage
Finding a Path
Labour Market Life Stories of Immigrant Professionals

35. Kasper Elmquist Jørgensen
Studier i samspillet mellem stat og erhvervsliv i Danmark under 1. verdenskrig

36. Finn Janning
A DIFFERENT STORY
Seduction, Conquest and Discovery

37. Patricia Ann Plackett
Strategic Management of the Radical Innovation Process
Leveraging Social Capital for Market Uncertainty Management

2006

1. Christian Vintergaard
Early Phases of Corporate Venturing

2. Niels Rom-Poulsen
Essays in Computational Finance

3. Tina Brandt Husman
Organisational Capabilities, Competitive Advantage & Project-Based Organisations
The Case of Advertising and Creative Good Production

4. Mette Rosenkrands Johansen
Practice at the top
– how top managers mobilise and use non-financial performance measures

5. Eva Parum
Corporate governance som strategisk kommunikations- og ledelsesværktøj

6. Susan Aagaard Petersen
Culture's Influence on Performance Management: The Case of a Danish Company in China

7. Thomas Nicolai Pedersen
The Discursive Constitution of Organizational Governance – Between unity and differentiation
The Case of the governance of environmental risks by World Bank environmental staff

8. Cynthia Selin
Volatile Visions: Transactons in Anticipatory Knowledge

9. Jesper Banghøj
Financial Accounting Information and Compensation in Danish Companies

10. Mikkel Lucas Overby
Strategic Alliances in Emerging High-Tech Markets: What's the Difference and does it Matter?

11. Tine Aage
External Information Acquisition of Industrial Districts and the Impact of Different Knowledge Creation Dimensions

A case study of the Fashion and Design Branch of the Industrial District of Montebelluna, NE Italy

12. Mikkel Flyverbom
Making the Global Information Society Governable
On the Governmentality of Multi-Stakeholder Networks

13. Anette Grønning
Personen bag
Tilstedevær i e-mail som interaktionsform mellem kunde og medarbejder i dansk forsikringskontekst

14. Jørn Helder
One Company – One Language?
The NN-case

15. Lars Bjerregaard Mikkelsen
Differing perceptions of customer value
Development and application of a tool for mapping perceptions of customer value at both ends of customer-supplier dyads in industrial markets

16. Lise Granerud
Exploring Learning
Technological learning within small manufacturers in South Africa

17. Esben Rahbek Pedersen
Between Hopes and Realities: Reflections on the Promises and Practices of Corporate Social Responsibility (CSR)

18. Ramona Samson
The Cultural Integration Model and European Transformation.
The Case of Romania

2007

1. Jakob Vestergaard
Discipline in The Global Economy
Panopticism and the Post-Washington Consensus

2. Heidi Lund Hansen
Spaces for learning and working
A qualitative study of change of work, management, vehicles of power and social practices in open offices

3. Sudhanshu Rai
Exploring the internal dynamics of software development teams during user analysis
A tension enabled Institutionalization Model; "Where process becomes the objective"

4. Norsk ph.d.
Ej til salg gennem Samfundslitteratur

5. Serden Ozcan
EXPLORING HETEROGENEITY IN ORGANIZATIONAL ACTIONS AND OUTCOMES
A Behavioural Perspective

6. Kim Sundtoft Hald
Inter-organizational Performance Measurement and Management in Action
– An Ethnography on the Construction of Management, Identity and Relationships

7. Tobias Lindeberg
Evaluative Technologies
Quality and the Multiplicity of Performance

8. Merete Wedell-Wedellsborg
Den globale soldat
Identitetsdannelse og identitetsledelse i multinationale militære organisationer

9. Lars Frederiksen
Open Innovation Business Models
Innovation in firm-hosted online user communities and inter-firm project ventures in the music industry
– A collection of essays

10. Jonas Gabrielsen
Retorisk toposlære – fra statisk 'sted' til persuasiv aktivitet

11. Christian Moldt-Jørgensen
Fra meningsløs til meningsfuld evaluering.
Anvendelsen af studentertilfredshedsmålinger på de korte og mellemlange videregående uddannelser set fra et psykodynamisk systemperspektiv

12. Ping Gao
Extending the application of actor-network theory
Cases of innovation in the telecommunications industry

13. Peter Mejlby
Frihed og fængsel, en del af den samme drøm?
Et phronetisk baseret casestudie af frigørelsens og kontrollens sameksistens i værdibaseret ledelse!

14. Kristina Birch
Statistical Modelling in Marketing

15. Signe Poulsen
Sense and sensibility:
The language of emotional appeals in insurance marketing

16. Anders Bjerre Trolle
Essays on derivatives pricing and dynamic asset allocation

17. Peter Feldhütter
Empirical Studies of Bond and Credit Markets

18. Jens Henrik Eggert Christensen
Default and Recovery Risk Modeling and Estimation

19. Maria Theresa Larsen
Academic Enterprise: A New Mission for Universities or a Contradiction in Terms?
Four papers on the long-term implications of increasing industry involvement and commercialization in academia

20. Morten Wellendorf
Postimplementering af teknologi i den offentlige forvaltning
Analyser af en organisations kontinuerlige arbejde med informationsteknologi

21. Ekaterina Mhaanna
Concept Relations for Terminological Process Analysis

22. Stefan Ring Thorbjørnsen
Forsvaret i forandring
Et studie i officerers kapabiliteter under påvirkning af omverdenens forandringspres mod øget styring og læring

23. Christa Breum Amhøj
Det selvskabte medlemskab om managementstaten, dens styringsteknologier og indbyggere

24. Karoline Bromose
Between Technological Turbulence and Operational Stability
– An empirical case study of corporate venturing in TDC

25. Susanne Justesen
Navigating the Paradoxes of Diversity in Innovation Practice
– A Longitudinal study of six very different innovation processes – in practice

26. Luise Noring Henler
Conceptualising successful supply chain partnerships
– Viewing supply chain partnerships from an organisational culture perspective

27. Mark Mau
Kampen om telefonen
Det danske telefonvæsen under den tyske besættelse 1940-45

28. Jakob Halskov
The semiautomatic expansion of existing terminological ontologies using knowledge patterns discovered

on the WWW – an implementation and evaluation

29. Gergana Koleva
European Policy Instruments Beyond Networks and Structure: The Innovative Medicines Initiative

30. Christian Geisler Asmussen
Global Strategy and International Diversity: A Double-Edged Sword?

31. Christina Holm-Petersen
Stolthed og fordom
Kultur- og identitetsarbejde ved skabelsen af en ny sengeafdeling gennem fusion

32. Hans Peter Olsen
Hybrid Governance of Standardized States
Causes and Contours of the Global Regulation of Government Auditing

33. Lars Bøge Sørensen
Risk Management in the Supply Chain

34. Peter Aagaard
Det unikkes dynamikker
De institutionelle mulighedsbetingelser bag den individuelle udforskning i professionelt og frivilligt arbejde

35. Yun Mi Antorini
Brand Community Innovation
An Intrinsic Case Study of the Adult Fans of LEGO Community

36. Joachim Lynggaard Boll
Labor Related Corporate Social Performance in Denmark
Organizational and Institutional Perspectives

2008

1. Frederik Christian Vinten
Essays on Private Equity

2. Jesper Clement
Visual Influence of Packaging Design on In-Store Buying Decisions

3. Marius Brostrøm Kousgaard
Tid til kvalitetsmåling?
– Studier af indrulleringsprocesser i forbindelse med introduktionen af kliniske kvalitetsdatabaser i speciallægepraksissektoren

4. Irene Skovgaard Smith
Management Consulting in Action
Value creation and ambiguity in client-consultant relations

5. Anders Rom
Management accounting and integrated information systems
How to exploit the potential for management accounting of information technology

6. Marina Candi
Aesthetic Design as an Element of Service Innovation in New Technology-based Firms

7. Morten Schnack
Teknologi og tværfaglighed
– en analyse af diskussionen omkring indførelse af EPJ på en hospitalsafdeling

8. Helene Balslev Clausen
Juntos pero no revueltos – un estudio sobre emigrantes norteamericanos en un pueblo mexicano

9. Lise Justesen
Kunsten at skrive revisionsrapporter. En beretning om forvaltningsrevisionens beretninger

10. Michael E. Hansen
The politics of corporate responsibility: CSR and the governance of child labor and core labor rights in the 1990s

11. Anne Roepstorff
Holdning for handling – en etnologisk undersøgelse af Virksomheders Sociale Ansvar/CSR

12. Claus Bajlum
Essays on Credit Risk and Credit Derivatives

13. Anders Bojesen
The Performative Power of Competence – an Inquiry into Subjectivity and Social Technologies at Work

14. Satu Reijonen
Green and Fragile
A Study on Markets and the Natural Environment

15. Ilduara Busta
Corporate Governance in Banking
A European Study

16. Kristian Anders Hvass
A Boolean Analysis Predicting Industry Change: Innovation, Imitation & Business Models
The Winning Hybrid: A case study of isomorphism in the airline industry

17. Trine Paludan
De uvidende og de udviklingsparate
Identitet som mulighed og restriktion blandt fabriksarbejdere på det aftayloriserede fabriksgulv

18. Kristian Jakobsen
Foreign market entry in transition economies: Entry timing and mode choice

19. Jakob Elming
Syntactic reordering in statistical machine translation

20. Lars Brømsøe Termansen
Regional Computable General Equilibrium Models for Denmark
Three papers laying the foundation for regional CGE models with agglomeration characteristics

21. Mia Reinholt
The Motivational Foundations of Knowledge Sharing

22. Frederikke Krogh-Meibom
The Co-Evolution of Institutions and Technology
– A Neo-Institutional Understanding of Change Processes within the Business Press – the Case Study of Financial Times

23. Peter D. Ørberg Jensen
OFFSHORING OF ADVANCED AND HIGH-VALUE TECHNICAL SERVICES: ANTECEDENTS, PROCESS DYNAMICS AND FIRMLEVEL IMPACTS

24. Pham Thi Song Hanh
Functional Upgrading, Relational Capability and Export Performance of Vietnamese Wood Furniture Producers

25. Mads Vangkilde
Why wait?
An Exploration of first-mover advantages among Danish e-grocers through a resource perspective

26. Hubert Buch-Hansen
Rethinking the History of European Level Merger Control
A Critical Political Economy Perspective

2009

1. Vivian Lindhardsen
From Independent Ratings to Communal Ratings: A Study of CWA Raters' Decision-Making Behaviours

2. Guðrið Weihe
Public-Private Partnerships: Meaning and Practice

3. Chris Nøkkentved
Enabling Supply Networks with Collaborative Information Infrastructures
An Empirical Investigation of Business Model Innovation in Supplier Relationship Management

4. Sara Louise Muhr
Wound, Interrupted – On the Vulnerability of Diversity Management

5. Christine Sestoft
Forbrugeradfærd i et Stats- og Livsformsteoretisk perspektiv

6. Michael Pedersen
Tune in, Breakdown, and Reboot: On the production of the stress-fit self-managing employee

7. Salla Lutz
Position and Reposition in Networks – Exemplified by the Transformation of the Danish Pine Furniture Manufacturers

8. Jens Forssbæck
Essays on market discipline in commercial and central banking

9. Tine Murphy
Sense from Silence – A Basis for Organised Action
How do Sensemaking Processes with Minimal Sharing Relate to the Reproduction of Organised Action?

10. Sara Malou Strandvad
Inspirations for a new sociology of art: A sociomaterial study of development processes in the Danish film industry

11. Nicolaas Mouton
On the evolution of social scientific metaphors:
A cognitive-historical enquiry into the divergent trajectories of the idea that collective entities – states and societies, cities and corporations – are biological organisms.

12. Lars Andreas Knutsen
Mobile Data Services:
Shaping of user engagements

13. Nikolaos Theodoros Korfiatis
Information Exchange and Behavior
A Multi-method Inquiry on Online Communities

14. Jens Albæk
Forestillinger om kvalitet og tværfaglighed på sygehuse
– skabelse af forestillinger i læge- og plejegrupperne angående relevans af nye idéer om kvalitetsudvikling gennem tolkningsprocesser

15. Maja Lotz
The Business of Co-Creation – and the Co-Creation of Business

16. Gitte P. Jakobsen
Narrative Construction of Leader Identity in a Leader Development Program Context

17. Dorte Hermansen
"Living the brand" som en brandorienteret dialogisk praxis:
Om udvikling af medarbejdernes brandorienterede dømmekraft

18. Aseem Kinra
Supply Chain (logistics) Environmental Complexity

19. Michael Nørager
How to manage SMEs through the transformation from non innovative to innovative?

20. Kristin Wallevik
Corporate Governance in Family Firms
The Norwegian Maritime Sector

21. Bo Hansen Hansen
Beyond the Process
Enriching Software Process Improvement with Knowledge Management

22. Annemette Skot-Hansen
Franske adjektivisk afledte adverbier, der tager præpositionssyntagmer indledt med præpositionen à som argumenter
En valensgrammatisk undersøgelse

23. Line Gry Knudsen
Collaborative R&D Capabilities
In Search of Micro-Foundations

24. Christian Scheuer
Employers meet employees
Essays on sorting and globalization

25. Rasmus Johnsen
The Great Health of Melancholy
A Study of the Pathologies of Performativity

26. Ha Thi Van Pham
Internationalization, Competitiveness Enhancement and Export Performance of Emerging Market Firms:
Evidence from Vietnam

27. Henriette Balieu
Kontrolbegrebets betydning for kausativalternationen i spansk
En kognitiv-typologisk analyse

2010

1. Yen Tran
Organizing Innovationin Turbulent Fashion Market
Four papers on how fashion firms create and appropriate innovation value

2. Anders Raastrup Kristensen
Metaphysical Labour
Flexibility, Performance and Commitment in Work-Life Management

3. Margrét Sigrún Sigurdardottir
Dependently independent
Co-existence of institutional logics in the recorded music industry

4. Ásta Dis Óladóttir
Internationalization from a small domestic base:
An empirical analysis of Economics and Management

5. Christine Secher
E-deltagelse i praksis – politikernes og forvaltningens medkonstruktion og konsekvenserne heraf

6. Marianne Stang Våland
What we talk about when we talk about space:
End User Participation between Processes of Organizational and Architectural Design

7. Rex Degnegaard
Strategic Change Management
Change Management Challenges in the Danish Police Reform

8. Ulrik Schultz Brix
Værdi i rekruttering – den sikre beslutning
En pragmatisk analyse af perception og synliggørelse af værdi i rekrutterings- og udvælgelsesarbejdet

9. Jan Ole Similä
Kontraktsledelse
Relasjonen mellom virksomhetsledelse og kontraktshåndtering, belyst via fire norske virksomheter

10. Susanne Boch Waldorff
Emerging Organizations: In between local translation, institutional logics and discourse

11. Brian Kane
Performance Talk
Next Generation Management of Organizational Performance

12. Lars Ohnemus
Brand Thrust: Strategic Branding and Shareholder Value
An Empirical Reconciliation of two Critical Concepts

13. Jesper Schlamovitz
Håndtering af usikkerhed i film- og byggeprojekter

14. Tommy Moesby-Jensen
Det faktiske livs forbindtlighed
Førsokratisk informeret, ny-aristotelisk ἦθος-tænkning hos Martin Heidegger

15. Christian Fich
Two Nations Divided by Common Values
French National Habitus and the Rejection of American Power

16. Peter Beyer
Processer, sammenhængskraft og fleksibilitet
Et empirisk casestudie af omstillingsforløb i fire virksomheder

17. Adam Buchhorn
Markets of Good Intentions Constructing and Organizing Biogas Markets Amid Fragility and Controversy

18. Cecilie K. Moesby-Jensen
Social læring og fælles praksis
Et mixed method studie, der belyser læringskonsekvenser af et lederkursus for et praksisfællesskab af offentlige mellemledere

19. Heidi Boye
Fødevarer og sundhed i senmodernismen
– En indsigt i hyggefænomenet og de relaterede fødevarepraksisser

20. Kristine Munkgård Pedersen
Flygtige forbindelser og midlertidige mobiliseringer
Om kulturel produktion på Roskilde Festival

21. Oliver Jacob Weber
Causes of Intercompany Harmony in Business Markets – An Empirical Investigation from a Dyad Perspective

22. Susanne Ekman
Authority and Autonomy Paradoxes of Modern Knowledge Work

23. Anette Frey Larsen
Kvalitetsledelse på danske hospitaler – Ledelsernes indflydelse på introduktion og vedligeholdelse af kvalitetsstrategier i det danske sundhedsvæsen

24. Toyoko Sato
Performativity and Discourse: Japanese Advertisements on the Aesthetic Education of Desire

25. Kenneth Brinch Jensen
Identifying the Last Planner System Lean management in the construction industry

26. Javier Busquets
Orchestrating Network Behavior for Innovation

27. Luke Patey
The Power of Resistance: India's National Oil Company and International Activism in Sudan

28. Mette Vedel
Value Creation in Triadic Business Relationships. Interaction, Interconnection and Position

29. Kristian Tørning
Knowledge Management Systems in Practice – A Work Place Study

30. Qingxin Shi
An Empirical Study of Thinking Aloud Usability Testing from a Cultural Perspective

31. Tanja Juul Christiansen
Corporate blogging: Medarbejderes kommunikative handlekraft

32. Malgorzata Ciesielska
Hybrid Organisations.
A study of the Open Source – business setting

33. Jens Dick-Nielsen
Three Essays on Corporate Bond Market Liquidity

34. Sabrina Speiermann
Modstandens Politik
Kampagnestyring i Velfærdsstaten.
En diskussion af trafikkampagners styringspotentiale

35. Julie Uldam
Fickle Commitment. Fostering political engagement in 'the flighty world of online activism'

36. Annegrete Juul Nielsen
Traveling technologies and transformations in health care

37. Athur Mühlen-Schulte
Organising Development
Power and Organisational Reform in the United Nations Development Programme

38. Louise Rygaard Jonas
Branding på butiksgulvet
Et case-studie af kultur- og identitetsarbejdet i Kvickly

2011

1. Stefan Fraenkel
Key Success Factors for Sales Force Readiness during New Product Launch
A Study of Product Launches in the Swedish Pharmaceutical Industry

2. Christian Plesner Rossing
International Transfer Pricing in Theory and Practice

3. Tobias Dam Hede
Samtalekunst og ledelsesdisciplin
– en analyse af coachingsdiskursens genealogi og governmentality

4. Kim Pettersson
Essays on Audit Quality, Auditor Choice, and Equity Valuation

5. Henrik Merkelsen
The expert-lay controversy in risk research and management. Effects of institutional distances. Studies of risk definitions, perceptions, management and communication

6. Simon S. Torp
Employee Stock Ownership:
Effect on Strategic Management and Performance

7. Mie Harder
Internal Antecedents of Management Innovation

8. Ole Helby Petersen
Public-Private Partnerships: Policy and Regulation – With Comparative and Multi-level Case Studies from Denmark and Ireland

9. Morten Krogh Petersen
'Good' Outcomes. Handling Multiplicity in Government Communication

10. Kristian Tangsgaard Hvelplund
Allocation of cognitive resources in translation - an eye-tracking and key-logging study

11. Moshe Yonatany
The Internationalization Process of Digital Service Providers

12. Anne Vestergaard
Distance and Suffering
Humanitarian Discourse in the age of Mediatization

13. Thorsten Mikkelsen
Personligsheds indflydelse på forretningsrelationer

14. Jane Thostrup Jagd
Hvorfor fortsætter fusionsbølgen udover "the tipping point"?
– en empirisk analyse af information og kognitioner om fusioner

15. Gregory Gimpel
Value-driven Adoption and Consumption of Technology: Understanding Technology Decision Making

16. Thomas Stengade Sønderskov
Den nye mulighed
Social innovation i en forretningsmæssig kontekst

17. Jeppe Christoffersen
Donor supported strategic alliances in developing countries

18. Vibeke Vad Baunsgaard
Dominant Ideological Modes of Rationality: Cross functional

integration in the process of product innovation

19. Throstur Olaf Sigurjonsson
Governance Failure and Icelands's Financial Collapse

20. Allan Sall Tang Andersen
Essays on the modeling of risks in interest-rate and inflation markets

21. Heidi Tscherning
Mobile Devices in Social Contexts

22. Birgitte Gorm Hansen
Adapting in the Knowledge Economy Lateral Strategies for Scientists and Those Who Study Them

23. Kristina Vaarst Andersen
Optimal Levels of Embeddedness The Contingent Value of Networked Collaboration

24. Justine Grønbæk Pors
Noisy Management A History of Danish School Governing from 1970-2010

25. Stefan Linder
Micro-foundations of Strategic Entrepreneurship Essays on Autonomous Strategic Action

26. Xin Li
Toward an Integrative Framework of National Competitiveness An application to China

TITLER I ATV PH.D.-SERIEN

1992

1. Niels Kornum
Servicesamkørsel – organisation, økonomi og planlægningsmetode

1995

2. Verner Worm
Nordiske virksomheder i Kina Kulturspecifikke interaktionsrelationer ved nordiske virksomhedsetableringer i Kina

1999

3. Mogens Bjerre
Key Account Management of Complex Strategic Relationships An Empirical Study of the Fast Moving Consumer Goods Industry

2000

4. Lotte Darsø
Innovation in the Making Interaction Research with heterogeneous Groups of Knowledge Workers creating new Knowledge and new Leads

2001

5. Peter Hobolt Jensen
Managing Strategic Design Identities The case of the Lego Developer Network

2002

6. Peter Lohmann
The Deleuzian Other of Organizational Change – Moving Perspectives of the Human

7. Anne Marie Jess Hansen
To lead from a distance: The dynamic interplay between strategy and strategizing – A case study of the strategic management process

2003

8. Lotte Henriksen
Videndeling – om organisatoriske og ledelsesmæssige udfordringer ved videndeling i praksis

9. Niels Christian Nickelsen
Arrangements of Knowing: Coordinating Procedures Tools and Bodies in Industrial Production – a case study of the collective making of new products

2005

10. Carsten Ørts Hansen
Konstruktion af ledelsesteknologier og effektivitet

TITLER I DBA PH.D.-SERIEN

2007

1. Peter Kastrup-Misir
   Endeavoring to Understand Market Orientation – and the concomitant co-mutation of the researched, the re searcher, the research itself and the truth

2009

1. Torkild Leo Thellefsen
   Fundamental Signs and Significance effects
   A Semeiotic outline of Fundamental Signs, Significance-effects, Knowledge Profiling and their use in Knowledge Organization and Branding

2. Daniel Ronzani
   When Bits Learn to Walk Don't Make Them Trip. Technological Innovation and the Role of Regulation by Law in Information Systems Research: the Case of Radio Frequency Identification (RFID)

2010

1. Alexander Carnera
   Magten over livet og livet som magt
   Studier i den biopolitiske ambivalens