

Xing, Yuqing; Pradhananga, Manisha

Working Paper

How important are exports and foreign direct investment for economic growth in the People's Republic of China?

ADB Working Paper, No. 427

Provided in Cooperation with:

Asian Development Bank Institute (ADBI), Tokyo

Suggested Citation: Xing, Yuqing; Pradhananga, Manisha (2013) : How important are exports and foreign direct investment for economic growth in the People's Republic of China?, ADB Working Paper, No. 427, Asian Development Bank Institute (ADBI), Tokyo

This Version is available at:

<https://hdl.handle.net/10419/101204>

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.



ADB Working Paper Series

How Important are Exports and Foreign Direct Investment for Economic Growth in the People's Republic of China?

Yuqing Xing and
Manisha Pradhananga

No. 427
July 2013

Asian Development Bank Institute

Yuqing Xing is director, Capacity Building and Training, Asian Development Bank Institute, Tokyo, and professor of economics, National Graduate Institute for Policy Studies, Tokyo. Manisha Pradhananga is research associate, Asian Development Bank Institute, and PhD candidate, University of Massachusetts Amherst.

The views expressed in this paper are the views of the author and do not necessarily reflect the views or policies of ADBI, the ADB, its Board of Directors, or the governments they represent. ADBI does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequences of their use. Terminology used may not necessarily be consistent with ADB official terms.

The Working Paper series is a continuation of the formerly named Discussion Paper series; the numbering of the papers continued without interruption or change. ADBI's working papers reflect initial ideas on a topic and are posted online for discussion. ADBI encourages readers to post their comments on the main page for each working paper (given in the citation below). Some working papers may develop into other forms of publication.

Suggested citation:

Xing, Y., and M. Pradhananga. 2013. How Important are Exports and Foreign Direct Investment for Economic Growth in the People's Republic of China? ADBI Working Paper 427. Tokyo: Asian Development Bank Institute. Available: <http://www.adbi.org/working-paper/2013/07/01/5774.exports.fdi.economic.growth.prc/>

Please contact the authors for information about this paper.

Email: yxing@adbi.org

Asian Development Bank Institute
Kasumigaseki Building 8F
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500
Fax: +81-3-3593-5571
URL: www.adbi.org
E-mail: info@adbi.org

© 2013 Asian Development Bank Institute

Abstract

The global financial crisis and the recent growth slowdown in the People's Republic of China (PRC) have led to questions about the sustainability of PRC growth. The argument is that the PRC is too dependent on external demand and that it needs to rebalance its economy toward domestic consumption. However, conventional measures of external demand—share of net exports and exports as a share of gross domestic product (GDP)—are biased and do not accurately measure the contribution of external demand to GDP growth. In this paper, we propose two measures that are simple modifications of the conventional measures. We argue that our proposed measures provide a more accurate estimate of the vulnerability of the PRC economy to external shocks, in the form of sudden drops in exports and foreign direct investment (FDI). Our estimates show that in 2001 exports and FDI accounted for 18.2% of GDP growth and by 2004 the share had risen to 49%. During 2005–07, the contribution of exports and FDI to growth remained 38%–40%. Our estimates also show that the impressive recovery of the PRC economy in the post-crisis period owed at least 53% of its growth to exports and FDI. Based on these results, we conclude that the PRC economy remains highly dependent on external demand in the form of exports and FDI, and rebalancing the economy toward domestic demand has not yet been achieved.

JEL Classification: F43, E01

Contents

1.	Introduction.....	3
2.	Literature Review.....	4
3.	Flaws of Conventional Measures of External Demand.....	5
4.	Alternative Measures of External Demand.....	7
5.	Our Estimates.....	9
6.	Testing the Reliability of the Estimates	11
7.	Concluding Remarks	14
	References	15

1. INTRODUCTION

Since 1980 the economy of the People's Republic of China (PRC) has grown at about 10% annually. In 2010, it overtook Japan as the second largest economy in the world. Exports and foreign direct investment (FDI) have been performing a critical role in powering this rapid economic growth. The PRC economy has been regarded as the new success story of the export-led growth strategy, after Japan and the four Asian tigers—Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China. A plethora of literature exists on the export and/or FDI and growth nexus in the context of the PRC economy, concluding that PRC economic growth has been highly dependent on external demand. The global financial crisis and the eurozone crisis have revealed the vulnerability of the export-oriented growth model and have led to questions about the sustainability of the PRC's rapid growth. Rebalancing—reorienting the PRC economy from external demand to domestic demand, especially household consumption—has been proposed as a strategy for mitigating external shocks and maintaining long-term sustainable growth (International Monetary Fund [IMF] 2010; Asian Development Bank [ADB] 2009).

Despite much discussion, few studies provide an accurate numerical measure of the contribution of external demand to the PRC economy. Investigating the exact contribution of external demand to the PRC's gross domestic product (GDP) growth is crucial for understanding the urgency of rebalancing and the challenges of structural reform. Traditionally, net exports as a share of GDP and exports as a share of GDP have been used as quantitative measures of the contribution of external demand to the economy.¹ In this paper, we will argue that both of these measures are biased. Net exports underestimate the contribution of external demand to economic growth as this assumes all imports are for exports. This is the reason why *The Economist* (2007) claimed that the dependence of the PRC on external demand is a myth and that a United States (US) downturn is unlikely to have a particularly negative effect on the PRC economy. On the contrary, the 2008 financial crisis that started in the US, led to a sharp slowdown in PRC economy. The second measure of external demand, share of exports in GDP, ignores the foreign content of exports, and allocates all foreign value-added to the final exporting country. This leads to an overestimation of the contribution of external demand to GDP. This problem is especially critical for the PRC, which imported \$322 billion worth of intermediate inputs to produce its exports in 2011.

In this paper, we seek to reconcile this data inconsistency. We propose two approaches based on a simple GDP accounting technique for the PRC that will more precisely measure the contribution of external demand to GDP growth, and reflect the nature of the PRC's vulnerability to external shocks. In the next section, we provide a brief literature review on the PRC's export-led growth hypothesis. In section 3, we elaborate on the problems with conventional methods of measuring external demand. Finally, in section 4, we introduce two related approaches that will more accurately measure the contribution of exports and FDI to GDP. Using this framework also allows us to assess the PRC's efforts to rebalance its economy away from exports to domestic demand.

¹ These measures are also reported in the national accounts of most countries as a way to determine the dependence of the economy on external demand.

2. LITERATURE REVIEW

There is no theoretical consensus on the role of exports and FDI in economic growth. It is indeed one of the most debated issues in the growth and development literature. In a Keynesian national accounts framework, net exports represent external demand for the country's output. Strictly speaking, this relationship between net exports and GDP is an accounting identity and does not imply causal relations. Various channels have been identified between exports and/or FDI and growth, which have led to the export-led growth hypothesis and the thesis that an outward-oriented economy promotes growth. Exports are expected to promote growth by relaxing balance of payments constraints, enhancing the country's capacity to import essential intermediate and capital goods, and promote specialization and productivity gains through access to knowledge spillovers, advanced technologies, learning by doing, and better management practices. (Thirlwall 1979; Melitz 2003; Helpman and Krugman 1985).

The most important critique of the export- and FDI-led growth hypothesis is the argument that any correlation between FDI and/or exports and GDP growth might be due to reverse causality. Countries that are growing at a rapid rate, by definition, produce more goods and services and thus export more. Similarly, countries with a high rate of GDP growth attract more FDI seeking high returns. Another important critique of export-led growth that has gained much traction in today's global environment is that the export-led growth strategy suffers from the fallacy of composition—all developing countries cannot simultaneously pursue an export-led growth strategy unless there is a comparable increase in demand from developed countries. Furthermore, the financial and sovereign debt crises in the US and European Union (EU) have highlighted risks associated with high exposure to the volatility of world markets. These arguments have been emphasized in the case of the PRC—a large economy that does not have the constraints of a small domestic market, like most other economies.

Empirical evidence from the export-led growth hypothesis is mixed. Tingvall and Ljungwall (2012) use a multi-country meta-analysis, and conclude that exports have contributed to the growth of the PRC economy more than in other countries. Shan and Sun (1998) examine data over 1987 and 1996 using an augmented growth equation, and results show bidirectional Granger causality between exports and real industrial output in the PRC. Similarly, Lui, Burridge, and Sinclair (2002) find bidirectional causality between trade, FDI, and economic growth. Others like Jin, Lee, and Kim (2008) argue that the role of exports and foreign investment in the PRC's growth has been changing. They were more important from the mid-1980s to the early 1990s; however, from the 1990s to 2003, knowledge and innovation variables have become more important. Tsen (2010) examines the relative importance of exports and domestic demand to economic growth for the PRC between 1978 and 2002. He concludes that there is bidirectional causality between external demand (measured by exports), domestic demand (measured by consumption and investment), and economic growth.

The evidence for the FDI–growth relationship is similarly mixed. Some have found causality running from FDI to economic growth. For example, Dees (2001) finds positive effects of FDI on growth for 1984–95. Similarly, Tang, Selvanathan, and Selvanathan (2008) find that FDI complemented domestic investment and promoted growth in the PRC between 1978 and 2003. Other studies point to the reverse causality of economic growth attracting FDI into the PRC. For example, Mah (2010) finds that FDI did not cause growth over 1983–2001, but that the PRC's growth attracted FDI to the country. Similarly, Zhao and Du (2007) find that FDI was attracted to the PRC as a result of high growth, instead of the other way round.

Causality or not, exports and FDI account for a large share of the PRC's GDP, while domestic consumption, especially household consumption, has been falling over the years. Household

consumption declined from over 45% of GDP in the 1990s to 33% in 2010.² This implies that a sudden drop in exports and/or FDI will have a large negative impact on the PRC's GDP and thus its growth rate. In this paper, we will propose two measures that seek to measure this dependence of the PRC on exports and FDI. As mentioned above, conventional measures of external demand are biased; our proposed measures will seek to correct this bias and provide a more accurate estimate. In the next section, we will discuss in detail the problems with conventional measures of external demand that lead to either an underestimation or overestimation of their importance to GDP growth.

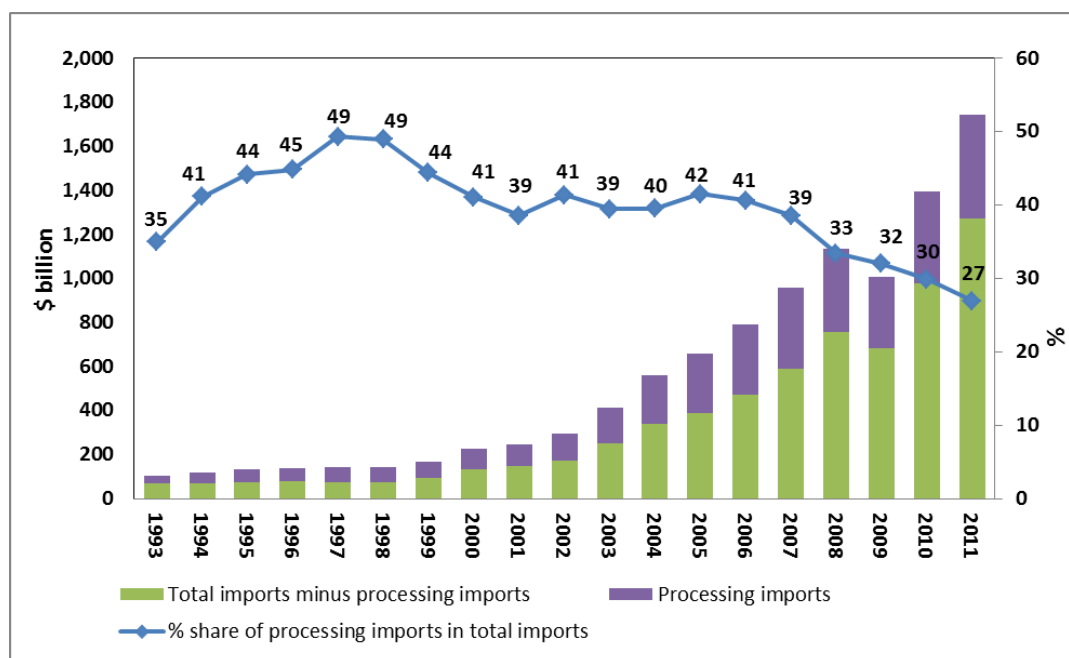
3. FLAWS OF CONVENTIONAL MEASURES OF EXTERNAL DEMAND

In standard national accounts, two measures—(i) share of net exports in GDP and (ii) share of exports in GDP—are used as proxies to measure the contribution of external demand to the economy. These measures either underestimate or overestimate the contribution of external demand to GDP and are thus biased. Using net exports as a proxy for external demand simply assumes that all imports of goods and services are for exports, although some imports might be for consumption and investment. It thus ascribes all leakages from the economy through foreign goods and services to exports, and ignores the leakage through consumption and investment. As a result, the contribution of external demand to economic growth is underestimated while that of consumption and investment is exaggerated. For instance, from 2001 to 2011, PRC exports grew at about 22% annually, but external demand only contributed from –3.5 to 2.6 percentage points to growth per year (National Bureau of Statistics of China 2012). The apparently low contribution contradicts assertions about the PRC's export-driven economic growth.

Using exports over GDP, the second measure, causes the opposite problem. If all value-added and inputs of the economy's exports were produced domestically, the ratio could be used as a direct measurement of the contribution of external demand to GDP. However, modern international trade in manufacturing products is accomplished through global supply chains, in which companies located in various countries contribute to manufacturing a single product. Gross exports often include values for parts and components imported from other countries, failing to take into account the foreign content of exports. This is especially true for the PRC because of its central role in the East Asian production network. Many of the manufactured products exported by the PRC, in particular information and communication technology products such as computers and mobiles phones, are made of imported parts and components (Xing 2012). Processing imports—imported intermediate inputs for producing exports—have been a substantial part of the PRC's total imports. The share of processing imports was as high as 49% in 1997, which declined gradually and fell to 27% in 2011 (Figure 1). In 2011, the PRC imported over \$322 billion as intermediate inputs for producing its exports. The iPhone trade is a typical example. Although PRC workers contribute only \$6.5 to the manufacture of an iPhone 3G, \$179 is credited to the PRC's gross exports whenever an iPhone 3G is shipped abroad (Xing and Detert 2010). Finally, both net exports and exports ignore the contribution of foreign investment to the economy.

² National Bureau of Statistics of China. China Statistical Yearbook (various years).

<http://www.stats.gov.cn/english/statisticaldata/yearlydata/>.

Figure 1: Processing Imports and its Share in Total Imports

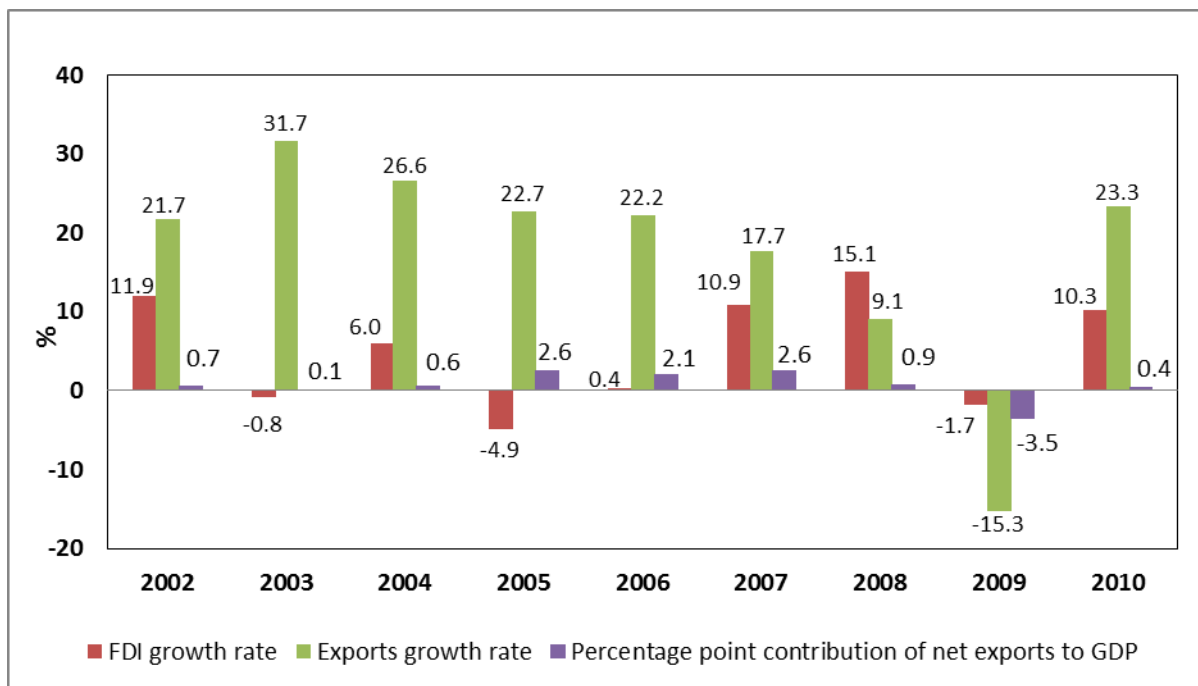
Source: Authors' calculations based on data from the General Administration of Customs of the PRC.

<http://english.customs.gov.cn/publish/portal191/>.

The above discussion implies that both conventional measures of external demand are biased. Figure 2 compares real annual growth of FDI and exports to percentage point contribution of net exports to the economy from 2002 to 2010. In 2002, exports grew 21.7% in real terms and FDI grew 11.9% in real terms, but net exports was estimated to contribute merely 0.7 percentage points to the 9.1% GDP growth. The estimated contributions of net exports are absurd and inconsistent with the persistent high growth, and fail to support the consensus on the important role of exports and FDI in the PRC's growth. It is misleading to use both net exports and exports to gauge the contribution of external demand to growth, and it is imperative to come up with a more accurate measure to understand the role of external demand in the PRC economy.

A few others have recognized this measurement error. For example, Akyuz (2011) suggests estimating import intensities of consumption, investment, and exports to obtain a more accurate estimate of the contribution of external demand to GDP growth. In the next section, we propose two simple GDP accounting techniques for the PRC that utilize available data and will more precisely measure the contribution of exports and FDI to GDP (Xing 2009).

Figure 2: Growth of Exports and Foreign Direct Investment and the Contribution of Net Exports to Gross Domestic Product



FDI = foreign direct investment, GDP = gross domestic product.

Source: Authors' calculation based on the data from National Bureau of Statistics of China. China Statistical Yearbook (various years). <http://www.stats.gov.cn/english/statisticaldata/yearlydata/>.

4. ALTERNATIVE MEASURES OF EXTERNAL DEMAND

In this section, we will propose two measures that are a better measure of the contribution of exports and FDI to the PRC's growth. We will use the standard Keynesian GDP accounting method, which is often used by national accounts statisticians to analyze the contribution of consumption, investment, and exports to GDP. As emphasized above, these are accounting techniques, and do not imply any causal relations between the variables.

The standard demand-side GDP accounting decomposes aggregate demand into consumption, investment, and net exports:

$$GDP_t \equiv C_t + I_t + (EX_t - IM_t) \quad (1)$$

Where, C_t is consumption, I_t investment, EX_t exports, and IM_t imports.

Net exports ($EX_t - IM_t$) and exports (EX_t) are usually taken as a measure of the contribution of external demand to GDP. However, as discussed above, exports need to be adjusted for their import content. Fortunately, for the PRC, trade data are divided into two parts: processing and ordinary. All imported intermediate inputs used for producing exports are recorded as processing imports. We can separate imports servicing domestic demand from imports for producing exports. Following this classification, we divide total imports into—processing and ordinary:

$$IM_t = IM_t^p + IM_t^o \quad (2)$$

Where, IM^P denotes processing imports and IM^D ordinary imports to meet the demand of domestic consumption and investment.

The first measure of external demand that we propose is,

$$ED\ 1: \quad EX_t - IM_t^P \quad (3)$$

This modification allows us to account for processing imports while sticking closely with the conventional measure. As mentioned above, this accounting modification is important, especially in the case of the PRC, as at its peak processing imports accounted for close to 50% of its imports. We believe this will give us a lower bound on the contribution of external demand to the PRC economy as it ignores the role of FDI.

Besides exports, FDI to the PRC can be considered an important component of external demand. As FDI is a significant component of the PRC's GDP, fluctuations in FDI can have a large impact on GDP. To take into account this vulnerability of the PRC to external shocks through FDI, we will include FDI in our second measure. Including investment in external demand raises a knotty issue: in essence, we would be assuming that all investments made by foreign funds are used to manufacture goods and services for foreign consumption, while investments made by domestic funds are used to produce goods for domestic consumption. However, this is increasingly untrue as many companies invest in the PRC not just for its abundance of cheap labor but also to access its large market. The PRC has emerged as the largest market for consumer vehicles, with foreign brands dominating about 70% of the market. Similarly, the PRC is an important market for consumer electronics: it is the second largest market for Apple, and is expected to overtake the US as the largest market.³

There are also issues related to secondary or multiplier effects of foreign-consumption-based investment in the economy. For example, increased employment generated by establishing a new factory would raise the disposable income of the workers employed and thus demand for goods and services, which will have a positive impact on GDP. It is very difficult to calculate the contribution of investment to GDP, and this is complicated by the growing importance of the PRC as a market rather than a world factory. We neither have firm-level data to estimate the share of FDI and domestic investment that is used to manufacture goods for domestic consumption, nor do we have estimates of the multiplier effects of FDI. Given these data limitations, we again use the simple GDP accounting framework to estimate the primary impact of an external shock through exports and FDI to the PRC's GDP.

Continuing our framework, we divide total investment in the economy into two parts—investment through foreign funds and domestic funds:

$$I_t = I_t^f + I_t^d. \quad (4)$$

Substituting (2) and (4) into (1) and rearranging the terms yields:

$$GDP_t \equiv (C_t + I_t^d - IM_t^D) + (EX_t + I_t^f - IM_t^P). \quad (5)$$

The first term $(C_t + I_t^d - IM_t^D)$ is domestic consumption and investment adjusted for leakage via imports. It measures the actual demand of domestic consumption and investment for domestic outputs. The second term represents the share of exports and foreign investment in the PRC's GDP, and is the proposed second measure of the PRC's vulnerability to external shock.

$$ED\ 2: \quad EX_t + I_t^f - IM_t^P \quad (6)$$

³ Bradshaw (2013). The recent apology by the chief executive officer of Apple for the company's warranty and repair policies in the PRC, highlights the growing importance of the PRC market (Satariano 2013).

If Domestic demand: $DD_t = C_t + I_t^d - IM_t^o$ and

External demand: $ED_t = EX_t + I_t^f - IM_t^p$, then identity (4) can be simplified as:

$$GDP_t \equiv DD_t + ED_t. \quad (7)$$

The real GDP growth rate g_t can be calculated as

$$g_t = (1 - \alpha_{t-1})g_t^d + \alpha_{t-1}g_t^e \quad (8)$$

Where,

$$g_t = \frac{GDP_t - GDP_{t-1}}{GDP_{t-1}}, \text{ real growth rate of GDP at year } t;$$

$$g_t^d = \frac{DD_t - DD_{t-1}}{DD_{t-1}}, \text{ real growth rate of domestic demand in year } t;$$

$$g_t^e = \frac{ED_t - ED_{t-1}}{ED_{t-1}}, \text{ real growth rate of external demand in year } t;$$

$$\alpha_{t-1} = \frac{ED_{t-1}}{GDP_{t-1}}, \text{ weight of external demand in the GDP in year } t-1; \text{ and}$$

$$(1 - \alpha_{t-1}) = \frac{DD_{t-1}}{GDP_{t-1}}, \text{ weight of domestic demand in the GDP in year } t-1.$$

Equation (8) decomposes the GDP growth of the PRC economy into two measurable components: $\alpha_{t-1} \cdot g_t^e$ measures the percentage point contribution of exports and FDI to GDP growth, while $(1 - \alpha_{t-1}) \cdot g_t^d$ is the percentage point contribution of domestic demand to GDP growth.

5. OUR ESTIMATES

In this section, we present estimates of our proposed measures (ED1 and ED2) and compare them to conventional measures of external demand. We apply actually utilized FDI as a proxy for foreign investment (I_t^f)⁴. Data for GDP, consumption, gross capital formation, exports, and imports are retrieved from various issues of the *China Statistical Yearbook*. Data for processing imports IM_t are provided by the General Administration of Customs.

Fluctuations of the exchange rates between the yuan and the US dollar affect estimated growth rates of external demand. Specifically, when the yuan depreciates against the US dollar, the calculated growth of external demand tends to be higher in yuan than in US dollars. Since the variables measured in yuan (consumption and domestic investment) are larger in magnitude than variables measured in US dollars (FDI and processing trade), to minimize the error caused by exchange rate fluctuations, we convert all variables into yuan. Average exchanges rates of the yuan to the US dollar published in the *China Statistical Yearbook* are used for the conversion.

⁴ Actually utilized foreign investment is divided into three components: FDI, foreign loans, and other foreign investment. Data for foreign loans are not available from 2001. To keep the data consistent, we use FDI as a proxy for foreign investment. FDI made up 78%–99% of annual foreign investment during 1994–2011.

Table 1 compares the conventional measures of external demand with our measures ED1 and ED2 as a share of GDP. As expected, our estimates are lower than estimates using exports/GDP and higher than estimates using net exports/GDP. Our results suggest that the PRC economy remains highly dependent on exports and FDI. The economy is extremely vulnerable to external shocks; any significant external shock could slow down the economy substantially. Given the high level of growth dependence of the economy on external demand, it is unrealistic to expect the PRC economy to be reoriented to domestic demand in the short run.

Table 1: Conventional Measures versus Our Estimates

Year	Exports/GDP	ED2/GDP	ED1/GDP	Net Exports/ GDP
1994	20.75	18.73	12.93	0.92
1995	19.70	16.30	11.35	2.22
1996	16.96	15.25	10.57	1.37
1997	18.57	16.27	11.68	4.11
1998	17.59	15.42	11.07	4.16
1999	17.73	14.84	11.17	2.66
2000	20.90	16.95	13.54	2.02
2001	20.20	17.05	13.49	1.71
2002	22.37	18.07	14.45	2.09
2003	26.56	20.57	17.33	1.53
2004	30.51	23.20	20.08	1.66
2005	33.43	25.07	22.43	4.47
2006	34.84	26.68	24.43	6.39
2007	35.10	27.90	25.77	7.60
2008	31.77	26.55	24.52	6.60
2009	23.52	19.44	17.67	3.85
2010	26.57	22.02	20.24	3.06
2011	26.46	22.00	20.39	2.16

GDP = gross domestic product, ED1= exports-processing imports, ED2= exports + FDI-processing imports.

Source: Authors' calculations.

In Table 2, we report estimates of the contribution of the newly defined external demand (ED2), which is the sum of adjusted exports and FDI inflows as a share of the PRC's growth rate for 1994–2010. In 1994, ED2 rose by over 62% and accounted for almost 64% of the PRC's GDP growth. The exceptionally high external growth was partially caused by the sharp devaluation of the yuan, from CNY5.8 = \$1.0 to CNY8.6 = \$1.0 in 1993–1994. The devaluation magnified the annual increase of both exports and FDI inflows when measured in yuan. The PRC joined the World Trade Organization (WTO) in 2001. Until then, the growth of external demand had been quite volatile and the dependence of the economy on external demand moderate. In 1995, although exports and FDI expanded, so did nominal external demand. However, a high inflation rate translated to negative growth for external demand. The high contribution of external demand to GDP growth (51%) in 2000 was due to a rapid expansion of exports—PRC exports grew by more than 28% in nominal terms in 2000. We can also observe that the economy's dependence on external demand gradually increased in the post-WTO accession era.

Table 2: Contribution of External Demand (ED2) to Gross Domestic Product Growth in the People's Republic of China

Year	ED2/ GDP (α_{t-1})	ED2 Growth (\dot{g}_t^E)	% Point Contribution of ED2 to GDP Growth ($\alpha_{t-1} \cdot \dot{g}_t^E$)	GDP Growth (\dot{g}_t)	% Contribution of ED2 to GDP Growth ($\alpha_{t-1} \cdot \dot{g}_t^E / \dot{g}_t$)
1994	0.13	62.5	8.1	12.7	63.9
1995	0.19	(3.6)	(0.7)	10.7	(6.4)
1996	0.16	3.1	0.5	10.2	4.9
1997	0.15	15.8	2.4	8.5	28.4
1998	0.16	1.3	0.2	6.9	3.0
1999	0.15	2.7	0.4	6.7	6.1
2000	0.15	21.3	3.2	6.2	51.0
2001	0.17	8.8	1.5	8.2	18.2
2002	0.17	16.5	2.8	9.8	28.5
2003	0.18	25.8	4.7	10.5	44.3
2004	0.21	24.3	5.0	10.2	49.0
2005	0.23	21.1	4.9	12.1	40.6
2006	0.25	21.9	5.5	14.5	37.9
2007	0.27	16.3	4.3	11.2	38.8
2008	0.28	4.6	1.3	10.0	13.0
2009	0.27	(18.7)	(5.0)	11.1	(44.9)
2010	0.19	22.7	4.4	8.3	53.1
2011	0.22	7.2	1.6	7.3	21.8

() = negative, ED = external demand, GDP = gross domestic product.

Source: Authors' calculations.

ED2 grew steadily and maintained a two-digit annual growth rate until the global financial crisis in 2008. The estimates suggest that the weight of ED2 on the economy increased gradually during this period—in 2001 it accounted for 18.3% of GDP growth; by 2004, almost half of the 10.2% GDP growth could be attributed to ED2. During 2005–07, the share of ED2 dropped slightly, but remained 38%–40%. In the second half of 2008, the global financial crisis disrupted the PRC's exports and inflows of FDI. Consequently, ED2 grew by merely 4.6% and its contribution to overall economic growth fell sharply, to 13%. Global economic turmoil continued into 2009, and drove ED2 to fall by 18.7%. In 2010, ED2 recovered and rose by 22.7%, accounting for 53% of economic growth that year.

6. TESTING THE RELIABILITY OF THE ESTIMATES

How reliable are the estimates? As our decomposition approach is derived from the standard GDP accounting framework, theoretically there should be no concerns. It is possible that significant discrepancy may exist as a result of exchange rates and other data inaccuracies. To test the reliability of our approach and estimates, we first estimate the growth rate of external and domestic demand separately, then calculate the corresponding GDP growth (\dot{g}_t) (Table 3). The estimated \dot{g}_t is compared with the growth rate calculated directly from the GDP data by the expenditure method published in the *China Statistical Yearbook*. As expected, the two growth rates match exactly.

Table 3: Testing the Reliability of the Estimates

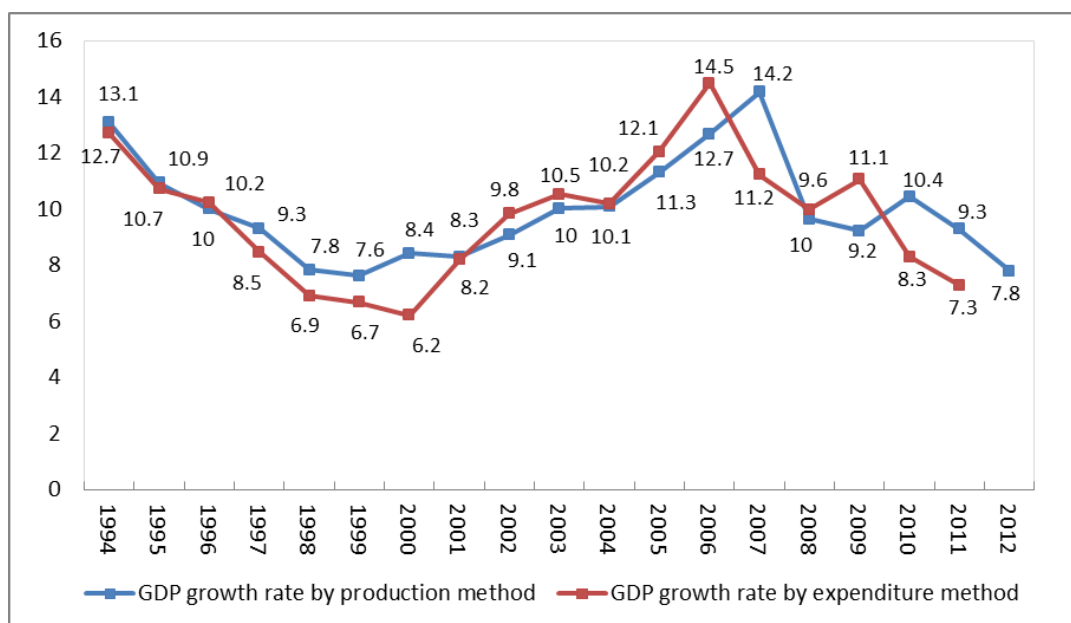
Year	% point contribution of ED2 to GDP growth $(\alpha_{t-1}) \cdot g_t^e$	% point contribution of DD to GDP growth $(1 - \alpha_{t-1}) \cdot g_t^d$	GDP growth g_t
1994	8.12	4.58	12.7
1995	(0.68)	11.39	10.7
1996	0.50	9.73	10.2
1997	2.40	6.06	8.5
1998	0.21	6.71	6.9
1999	0.41	6.26	6.7
2000	3.16	3.04	6.2
2001	1.49	6.70	8.2
2002	2.81	7.03	9.8
2003	4.66	5.87	10.5
2004	4.99	5.20	10.2
2005	4.89	7.16	12.1
2006	5.48	8.99	14.5
2007	4.35	6.86	11.2
2008	1.30	8.68	10.0
2009	(4.96)	16.02	11.1
2010	4.41	3.89	8.3
2011	1.59	5.70	7.3

() = negative. DD = domestic demand, ED2 = external demand2, GDP = gross domestic product.

Source: Authors' calculations.

As mentioned above, we follow the expenditure approach to GDP accounting. The National Bureau of Statistics of China calculates GDP growth using the production method, although it publishes GDP figures based on both the expenditure and production methods. It is an interesting exercise to compare the growth rates calculated from the two different approaches. The comparison may provide further evidence on the reliability of our estimates. Figure 3 compares the growth rates between 1994 and 2011 based on the two approaches. As we can see, the difference between the approaches is quite large, especially in recent years. It is common to have some discrepancies between GDP calculations using different methods. There may be several reasons for this, for example because they are based on different data sources and thus face different limitations in data collection. However, if we examine Figure 3 closely, we can observe a clear lag effect between the expenditure approach and the production approach.

Figure 3: Gross Domestic Product Growth Rates by Expenditure and Production Methods



GDP = gross domestic product.

Source: Authors' calculation based on National Bureau of Statistics of China. China Statistical Yearbook (various years). <http://www.stats.gov.cn/english/statisticaldata/yearlydata/>.

Specifically, low growth in expenditure is consistently followed by low growth in output. The lag effect is consistent with standard dynamics of macroeconomics models. From a policy standpoint, this is reasonable to expect as government interventions through monetary or fiscal policy may show up in the expenditure data faster, but may take a while to affect output.

For example, in November 2008 the Government of the PRC announced a massive economic stimulus package of CNY4 trillion, equivalent to about 16% of the PRC's GDP. The effect of this stimulus package can be seen in the 2009 expenditure data; expenditure-based GDP grew 11.2% while output-based GDP rose by only 9.2%, 0.8 percentage points lower than the preceding year. As there may be a lag for this fiscal intervention to affect output, it shows up in the 2010 production data; output-based GDP grew 10.4% in 2010, 1.2 percentage points higher than the previous year. Similarly, in 2007 the PRC carried out a series of contractionary monetary policies to slow down the overheated economy. The deposit interest rate was progressively increased, from 2.52% in August 2006 to 4.14% by the end of 2007. In addition, the required reserve ratio was increased by 0.5% 10 times, from November 2006 to December 2007, to jump from a low 8.5% to 13.5%. Again, this radical deceleration of the economy shows up in the 2007 expenditure data as it immediately reduced both supply and demand of bank loans, and dampened overall expenditure, in particular investment spending, but not in the 2007 production data. This explains the big difference in growth rates between the two methods in 2007—expenditure-based GDP growth dropped sharply, to 11.2% compared with 14.5% the preceding year, while growth of output-based GDP accelerated to 14.2%.

7. CONCLUDING REMARKS

In the post-crisis environment, the sustainability of the PRC's growth pattern has been much debated. The argument is that the PRC is too dependent on external demand and that it needs to rebalance its economy toward domestic consumption. However, the commonly used ways of measuring the contribution of external demand to the economy are biased. Net exports underestimate the contribution of external demand as imports are deducted from exports, even though they are used in part for domestic consumption and investment. Exports overestimate the contribution of external demand by assuming the entire value-added of exports is produced domestically. In this paper, we propose two measures that are based on simple modification of the conventional measures. We argue that our proposed measures provide a more accurate measure of the vulnerability of the PRC economy to fluctuations in exports and FDI. Our estimate suggests that the dependence of the PRC economy on exports and FDI increased significantly after its entry to the WTO in 2001. The contribution of exports and FDI to the growth of the economy rose from 18% in 2001 to its peak of 49% in 2004. As the growth of exports and FDI slowed down in 2008, the growth rate of GDP fell sharply. However, in the post-crisis period, the PRC economy remained highly dependent on external demand. Exports and FDI together contributed over 53% to the impressive recovery of the PRC economy in 2010. Our results are important in the context of present debates on the sustainability of the PRC's growth as they imply that the PRC is still highly vulnerable to fluctuations in external demand, in terms of both exports and FDI, and rebalancing of the economy toward domestic demand has not yet been achieved.

REFERENCES

- Akyuz, Y. 2011. Export Dependence and Sustainability of Growth in China. *China & World Economy* 19(1): 1–23.
- Asian Development Bank (ADB). 2009. *Rebalancing Growth in PRC: Macroeconomic Policy Recommendations*. Manila: ADB.
- Bradshaw, T. 2013. Apple chief sees biggest market in China. *Financial Times*. 10 January.
- Dees, S. 2001. The Opening Policy in China: Simulations of a Macroeconometric Model. *Journal of Policy Modeling* 23(4): 397–410.
- The Economist. 2007. China's Economy: How Fit is the Panda? 27 September.
- Frankel, J.A., and D. Romer. 1999. Does Trade Cause Growth? *The American Economic Review* 89(3): 379–99.
- Giles, J., and C.L. Williams. 2000. Export-Led Growth: A Survey of the Empirical Literature and Some Non-Causality Results. Part 1. *Journal of International Trade & Economic Development* 9(3): 261–337.
- He, D., and W. Zhang. 2010. How Dependent is the Chinese Economy on Exports and in What Sense has its Growth been Export-led? *Journal of Asian Economics* 21(1): 87–104.
- Helpman, E., and P. Krugman. 1985. *Market Structure and Foreign Trade*. Cambridge, MA: Massachusetts Institute of Technology Press.
- International Monetary Fund (IMF). 2010. People's Republic of China: 2010 Article IV Consultation-Staff Report; Staff Statement; Public Information Notice on the Executive Board Discussion. IMF Country Report 10/238. 29 July.
- Jin, F., K. Lee, and Y-K. Kim. 2008. Changing Engines of Growth in China: From Exports, FDI and Marketization to Innovation and Exports. *China & World Economy* 16(2): 31–49.
- Koopman, R., Z. Wang, and S-J. Wei. 2008. How Much of Chinese Exports is Really Made in China? Assessing Domestic Value-added when Processing Trade is Pervasive. *National Bureau of Economic Research Working Paper* 14109. Cambridge, MA: NBER.
- Liu, X., P. Burridge, and P.J.N. Sinclair. 2002. Relationships Between Economic Growth, Foreign Direct Investment and Trade: Evidence From China. *Applied Economics* 34(11): 1,433–40.
- López, R.A. 2005. Trade and Growth: Reconciling the Macroeconomic and Microeconomic Evidence. *Journal of Economic Surveys* 19(4): 623–48.
- Mah, J.S. 2010. Foreign Direct Investment Inflows and Economic Growth of China. *Journal of Policy Modeling* 32: 155–58.
- Melitz, M.J. 2003. The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. *Econometrica* 71(6): 1,695–725.
- National Bureau of Statistics of China. 2012. *China Statistical Yearbook 2012*. Beijing.
- Qin, D., M.A. Cagas, P. Quising, and X. He. 2006. How Much Does Investment Drive Economic Growth in China? *Journal of Policy Modeling* 28(7): 751–74.
- Satariano, A. 2013. Apple CEO Cook Apologizes for China iPhone Warranties. Bloomberg. 2 April.

- Shan, J., and F. Sun. 1998. On the Export-led Growth Hypothesis: The Econometric Evidence from China. *Applied Economics* 30(8): 1,055–65.
- Tang, S., E. Selvanathan, and S. Selvanathan. 2008. Foreign Direct Investment, Domestic Investment and Economic Growth in China: A Time Series Analysis. *World Economy* 31(10): 1,292–309.
- Thirlwall, A.P. 1979. The Balance of Payments Constraint as an Explanation of International Growth Rate Differences. BNL Quarterly Review. *Banca Nazionale del Lavoro* 32(128): 45–53.
- Tingwall, P.G., and C. Ljungwall. 2012. Is China Different? A Meta-analysis of Export-led Growth. *Economic Letters* 115(2): 177–79.
- Tsen, W.H. 2010. Exports, Domestic Demand, and Economic Growth in China: Granger Causality Analysis. *Review of Development Economics* 14(3): 625–39.
- Weiss, J. 2005. Export Growth and Industrial Policy: Lessons from the East Asian Miracle experience. *Discussion Paper 26*. Tokyo: ADBI.
- Xing, Y. 2009. The Global Economic Recession and Challenges to China's Export-led Growth Strategy. Paper presented at the Conference on Global Financial Crisis: Industrial Restructuring. Tainan City, Taipei, China. 19–20 August.
- . 2012. Processing Trade, Exchange Rates, and China's Bilateral Trade Balances. *Journal of Asian Economics* 23(5): 540–47.
- Xing, Y., and N. Detert. 2010. How the iPhone Widens the United States Trade Deficit with the People's Republic of China. ADBI Working Paper 257. Tokyo: ADBI.
- Zhao, C., and J. Du. 2007. Causality between FDI and Economic Growth in China. *The Chinese Economy* 40(6): 68–82.