

Johnston, Lauren A.

Working Paper

China's Economic Demography Transition Strategy: A Population Weighted Approach to the Economy and Policy

GLO Discussion Paper, No. 593

Provided in Cooperation with:

Global Labor Organization (GLO)

Suggested Citation: Johnston, Lauren A. (2020) : China's Economic Demography Transition Strategy: A Population Weighted Approach to the Economy and Policy, GLO Discussion Paper, No. 593, Global Labor Organization (GLO), Essen

This Version is available at:

<https://hdl.handle.net/10419/222235>

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.

China's Economic Demography Transition Strategy: A Population Weighted Approach to the Economy and Policy

Lauren A. Johnston

Abstract

The first pandemic of the 21st century has brought Pyrrhic attention to one of the era's greatest mega-trends – population ageing. Today rich countries are disproportionately affected but increasingly the world's elderly are residents of developing countries. In rich and poor countries alike, a policy approach that explicitly accounts for the interdependence of economic and demographic change – an economic demography transition approach - has never been more pressing. Thanks partly to the tragedy of history's greatest Malthusian stagnation, that of mid-20th century China, Chinese policymakers implemented draconian population control measures alongside dramatic economic reforms from around 1980. This paper elaborates China's consequential and ongoing economic demography transition strategy within the economic and development policy discourse. Amid epochal demographic, public health, and geo-economic change, this economic demography perspective is timely, unique and useful in extrapolation across all economies.

Lauren A. Johnston
Research Associate
China Institute
School of Oriental and African Studies
University of London
lj11@soas.ac.uk

Key Words

Population ageing; Economic Demography; Demographic Transition; China

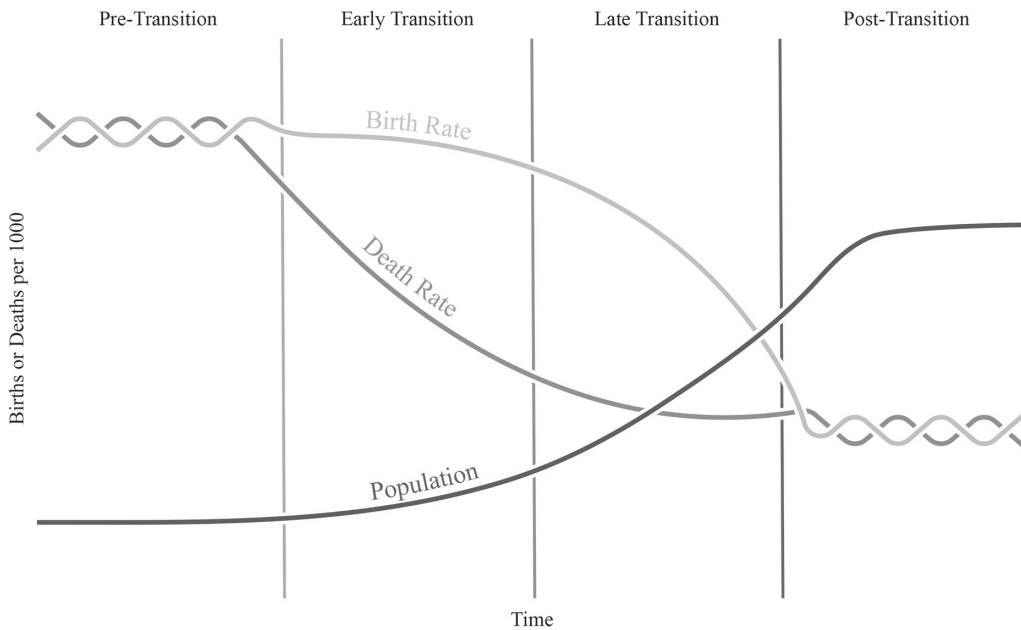
JEL Codes J11 J18 N35 O20

I. INTRODUCTION

The COVID19 pandemic of early 2020 has drawn attention to the trend of population ageing and to China's role as the dominant manufacturer of the world economy. On the former, COVID19 fatality rates are found to be especially high among the elderly. Since richer countries tend to be older countries, and also more connected to global value chains and transport networks, fatality rates have been especially high in selective high-income countries, France, Italy, the United Kingdom and United States of America notably (see Glynn, 2020; Remuzzi and Remuzzi, 2020).

This in turn has drawn direct attention to what are dramatic trends in global demographic change. In 2018, for the first time, the world became home to more persons aged over 64 than under five (World Bank, 2020). The proportion of people in the world aged over 60 is growing more quickly than any other age group (ibid). This epochal demographic change reflects the underlying momentum of demographic transition: the process through which the total fertility rate and mortality rates fall, the former of which is also associated with rising life expectancy (Figure 1) (see Lee, 2003; Wilson, 2011).

Figure 1: The Demographic Transition

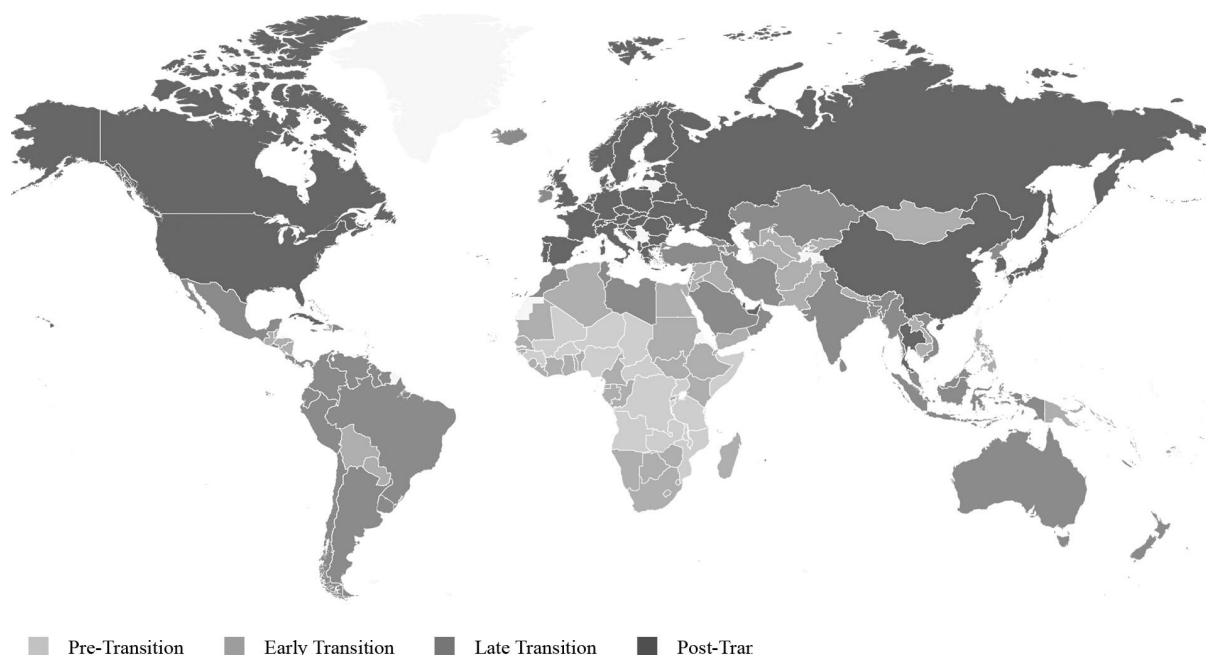


Source: Adapted from [IUSSP \(2020\)](#). Author's own copyright.

Demographic transition is understood as having four phases in an economic context: pre-transition, early transition, late transition, post-transition (Figure 1). The important factor lies in the economic potential of the demographic dividend - the productivity potential of the elevated working-age population share. Each phase brings different economic and demographic challenges and opportunities (elaborated in Section 2).

Among the four phases, post-demographic transition is characterised by a new process of intensifying population ageing. Population ageing therein is typically empirically measured around one of the following thresholds: 1) a share of population aged 65 years and over of 7 percent or higher; 2) share of population aged 14 years and under of less than 30 percent; and 3) ratio of old to young exceeding 0.3 (Siegal, 1980). By the second of these, child share, almost three-quarters of the world's countries already fall into the 'ageing' category (Figure 2).

Figure 2: World map by demographic transition phase (child population share indicator, %, 2018)



Data source: World Bank, *World Development Indicators* (2020).

The OECD, a group comprising most of the world's largest economies, are generally in the post-demographic transition phase (post transition herein) of the demographic transition. In turn, some 80 per cent of world GDP overall is now generated in countries that are home to ageing populations (World Bank, 2020). Japan, the world's third largest economy is home to the world's oldest population. A quarter of the population is aged 65 and over: the country's working-age population share peaked in 1995 and is the world's lowest (UN, 2019). The population has been in decline since 2011 (ibid).

In this context it is worth re-visiting that almost a century ago Keynes (1937, cited in Keynes, 1978) delivered a speech titled "*Some Economic Consequences of a Declining Population*". He warned that once population growth was controlled there would come a new risk – "*if we are careless*" – that unemployment would arise as a consequence of lower aggregate demand, lower aggregate savings, less capital accumulation (ibid: 517). Amid broader demographic and public health trends and given that prediction, it is timely to re-visit issues in economic demography: new perspectives that may

facilitate understanding of how to best understand and prepare for predictable and unpredictable links between economic and demographic change especially.

This point is even most true in light of increasingly rapid population ageing in developing countries. Thanks to affordable improvements in public health and other factors driving demographic transition in recent decades this is being instigated at increasingly low per capita income levels (Johnston, 2019a). By 2050 some 80 percent of people aged 60 and over will be living in developing countries (UN, 2015).¹ Credit Suisse suggests that ageing in developing countries is a new - and under-recognised - mega-trend (Asian Private Banker, 2020). Upper-middle income China is already home to some quarter of a billion retirees. Turkey, Brazil, Thailand and much of Eastern Europe and Central Asia are other ageing middle-income countries (see Johnston, 2019a; Johnston, forthcoming 2020).

Aid agency support programmes for the elderly poor in developing countries have begun. Irish Aid funds Age Action in conjunction with Help Age International, for example, to empower and work with older people's groups in Mozambique, Tanzania, Malawi and Ethiopia (Age Action, 2020). The World Bank advises China on options for elderly care (World Bank, 2018a). Japan International Cooperation Agency (JICA) has for some years supported policy makers in population-ageing Thailand, Vietnam and China to implement the relevant reforms and policies (JICA, 2013). The demand for equivalent services in future, however, could overwhelm if countries - rich and poor - fail to prepare: related risks will be compounded where population ageing stalls aggregate demand in rich countries as Keynes feared it might (1937, cited in Keynes, 1978).

As a result of the late 1970s policy perspective that led both to and also followed the imposition of the One Child Policy from 1980, China offers a unique and timely related long-run policy case study. China's policy makers, that is, have been preparing explicitly for the later era of population ageing from the 1980s - when the country was demographically young and low-income per capita. The underpinning strategy was a continuously cointegrated approach to demographic and economic change - an economic demography transition strategy (Johnston, 2019a & 2019b). It is an approach that, as outlined herein, offers a relevant reference point for all countries, rich or poor and young or old.

Positioned to relatively accurately forecast the demographic dividend duration thanks to the One Child Policy, policymakers were also implicitly incentivized to capture the related economic potential (Section Three). The economic potential of the dividend, further elaborated in Section Two, relates to the productivity potential of the elevated working-age population share, which can be especially transformative in developing countries (Lewis, 1954).

¹ The proportion of people aged 60 and over is growing faster than any other age group worldwide. The older adult population will be approximately 1.2 billion in 2025 and 2 billion by 2050, with 80% of them living in developing countries (WHO, 2018).

For China that imperative became even more true once, in the mid-1980s, economic demography projections identified no feasible economic growth rate at which China could get rich before getting old (Wu, 1980 and 1986). Rich is generally understood as becoming a high per capita income country, defined in 2018 by the World Bank as a country with a gross national income per capita of US\$12,376 or more (Atlas method, World Bank, 2020). In those footsteps it was feared that this would mean China may never get rich. In sum, fiscal and human resources would need to be re-directed to economically unproductive caring roles and sectors; China would lose its cheap labour advantages ahead of being able to replace them with capital advantages; Japan and other advanced economies in the region had all matured economically before population ageing had set it (see Johnston, 2019a).

More recently, however, there is some good news with respect to China's old before rich fears. Not only is China a norm within a new norm of 'old' developing countries, but, since the mid-1990s most countries entering the high per capita income were then 'old' already (Johnston, 2019a). A recent general exception, however, has been the case of successful resource-rich exporters, whose place in the high-income group is also more volatile. Concurrently, there are many increasingly 'old' countries appearing to have no evident imminent prospect of entering the high-income group. In such cases and future equivalents, the relative lack of preparedness for ageing at low and middle-income per capita levels is likely to mean many millions of impoverished older persons. Moreover, where ageing itself has direct and indirect adverse impacts on the economy, this is likely to produce something of a vicious circle - for all generations.

The context of Keynes' (1937) warning is more relevant than ever in the shadow of the COVID19 pandemic and dramatic underlying population ageing trends in rich and poor countries alike. Into that, this article adds a timely granular elaboration of China's unique and ongoing economic demography transition strategy to the economics and development policy literature accordingly.

The rest of this paper is structured as follows: The second section elaborates the theory and literature across the different phases of the demographic transition and discusses their economic challenges and opportunities. The third section provides an overview of related 'non-careless' Chinese policy making in each of the pre-transition, early transition, late transition and post-transition demographic dividend phases. The discussion and conclusion provide the related policy overview; discusses the limitations of China's approach and this article; wraps up and offers suggestions for further research accordingly.

II. DEVELOPMENT CHALLENGES AND PROSPECTS OF DEMOGRAPHIC DIVIDEND PHASES

This section elaborates the demographic characteristics and country classifications of each of the demographic transition, in demographic dividend context, and also briefly sets out the related economic literature. The phases of the demographic transition in a demographic dividend context used therein are defined by the empirical thresholds as set out in Table 1. All countries are listed by child and elder population shares in Appendices A and B.

Table 1: Demographic Dividend Phases (indicator thresholds reflect year 2019).

	Total Fertility Rate (no. children/woman)	Child Share (% pop.)	Elder Share (% pop.)
Pre-Dividend (High Fertility Rate Society)	> 5.0	> 43.5	< 2.8
Early Dividend (Pre-Demographic Dividend)	2.4 - 5.0	28.9 - 43.5	2.8 - 5.8
Late Dividend (Demographic Dividend Era)	1.7 - 2.4	19.0 - 28.9	5.8 - 10.7
Post-Dividend (Low Fertility Rate Society)	< 1.7	< 19.0	> 10.7

Source: Indicator thresholds from *World Development Indicators*, World Bank (2020). See also Johnston (2020a).

II-I Pre-Demographic Dividend Phase

The pre-demographic dividend phase is characterised by high birth rates, high and fluctuating death rates, and high child and low elder population shares. In the literature, this phase is most prominently linked to the work of Robert Malthus' (1798) *An Essay on the Principle of Population* (see Malthus, Winch and James, 1992). In the decades before that publication Europe had experienced famine. Malthus explained this to derive from the fact that population rises exponentially but food production output only arithmetically. And hence inadequate food supply is, *ceteris paribus*, inevitable. He argued that famine or such events as wars and pestilence, served to bring the population and agricultural output into equilibrium.

A situation in which population growth exceeds productivity growth remains known as the Malthusian Trap, or Malthusian stagnation. Although agricultural productivity growth exceeded Malthus' expectations, the idea of the Malthusian Stagnation (where agricultural productivity has failed to take-off) remains a central element of unified growth theory and related literature growth and development (eg. Galor and Weil, 2000; Hansen and Prescott, 2002; Galor, 2011; Strulik and Weisdorf, 2008, 2014).

In the contemporary economics literature, the Solow model (1956) purports that the level of economic growth, including agricultural output growth, is a function of the rate of technological progress, alongside population growth rate and savings rate change. In the case of an acceleration in the

population growth rate, a greater level of investment (savings) is required to maintain the level of capital per capita. In the presence of constant savings, population growth will, however, serve to reduce per capita investment. The resulting persistent diminishing per capita technological progress rate induces Malthusian stagnation. The modern development traps literature explores associated phenomenon, including famine, war and pestilence shocks (eg. Berthelemy, 2006, Collier 2003). The ongoing failure of many developing countries to attain sustained increases in per capita incomes means broader Malthusian population dynamics remain relevant to the literature on poverty and economic development (eg. Madsen and Robertson, 2019).

Table 2 lists pre-demographic dividend phase countries by the child-share and seniors-share indicators for the year 2018. The number of countries in the pre-dividend phase is diminishing yet remains significant. By the child-share indicator, pre-dividend countries are all in sub-Saharan Africa, and Niger is the world's youngest country (Appendix A). By seniors-share, the picture is more geographically mixed. The presence of migrant workers has elevated the working-age population share in some Middle Eastern countries. Hence such countries also have a low elderly population share. Equivalently some countries classified as pre-transition by child-share are classified as early transition by senior share. The latter is thanks to a significant population share of those of working age working as migrants in other countries. Somalia is one such case.

II-II Early Demographic Dividend Phase

The early demographic dividend phase is primarily characterised by the death rate beginning to fall, itself often the result of improvements in public health. Since birth rates remain high, however, the population starts to grow rapidly. The resulting increasing dependency ratio calls for increasing investment in health and education as the population share of school-aged children increases. Low levels of fiscal resources, however, make this a challenge (eg. Fosu, 2007).

Concurrently, for poor households there is a high opportunity cost of education (eg. Akabayashi and Psacharopoulos (1999) for the case of Tanzania; Hannum (1999) for the case of China). That trade-off ultimately itself intensifies the trade-off between child quantity and education (see Becker and Lewis, 1973), which in turn forms “a crucial ingredient of unified growth models that explain the transition from Malthusian stagnation to modern growth” (Becker, Cinnirella and Woessmann, 2010: ii; see Galor, 2005). Families, that is, hence opt to have fewer children so as to be able to invest more in each of them and reducing the dependency ratio and fiscal pressures in the process. This tightrope produces the conditions for transition into the late demographic dividend phase.

The early demographic dividend phase is the category that the highest number of countries presently fall into (Appendix A & B), though not including China and India, the world's two largest national populations.² Overall, there is promise in the density of countries in this category: this signals these countries have embarked on the demographic transition, and hence have probable prospects of escaping the Malthusian stagnation.

II-III Late Demographic Dividend Transition Phase

In line with the pressures of the early transition phase, the late demographic transition phase is marked by the ensuing TFR falls and a deceleration of the rate of population growth. This phase hence offers the prospects of a demographic dividend - the per capita productivity potential of the transitory elevation of working-age population share. Countries in this phase by elder population share are listed in Appendix A.

For developing countries, the demographic dividend offers an important yet passing window for rapid development. The process is elaborated by Arthur Lewis's (1954) *Economic development with unlimited supplies of labour*. That is, in a dual economy comprised of a small, urban, industrial sector and a large, rural, informal agricultural sector, a gradual transfer of informal (low-cost) agricultural labour from the informal rural sector into the formal urban industrial sector therein produces rapid income and productivity gains – in the presence of low inflation.

The late demographic dividend period – in combination with a Lewisian development process especially - offers a typically several-decade long window for development, but which is fleeting and rare. “This opportunity comes but once in the life of any nation. It came in the life of every nation and those which rode the wave, managed to grow massively, reduce poverty and also structurally transform their economies away from agriculture towards industry and then services. Those that did not ride that wave have been stuck at relatively low levels of per capita income and human development” (Jose, 2020).

Across a Lewis sectoral labour transfer process, the point at which informal rural labour is exhausted is known as the Lewisian Turning Point (LTP). Following the LTP increasing labour scarcity adds pressure to wages and hence new drivers of productivity growth must be identified to continue an equivalent process of development. Congruent with endogenous growth theory (see Romer, 1994), from this point the quality instead of quantity of labour increasingly drives the economy.

² In a corollary to Table 2, in Table 3, countries listed with a relatively high population share of old for the category are those tending to send migrant workers to other countries, and hence having a diminished home resident working-age population.

By extrapolation, an important element of a successful shift to new growth drivers beyond the LTP is how efficiently income gains during the demographic dividend period of growth have been invested in the quality of next cohort of workers. And yet, “most investments in human capital both raise observed earnings at older ages, because returns are added to earnings then, and lower them at younger ages, because costs are deducted from earnings then.” (Becker, 1962: 48). Investing in education of youth in poor countries has an especially high opportunity cost, where every source of income, including labour of youths, counts at the household level. And where the national fiscal constraint can be too tight to support wide public funding of education.

A similar logic applies in an over-lapping generations context through a process of demographic transition and development – especially in the case where the LTP (the exhaustion of surplus rural labour) closely coincides the passing of the demographic dividend and the onset of population. That combination puts significant pressure on wages, a combination that is ideally at least partially addressed by earlier investments in the human capital of the next, smaller, generation of workers. For the nation, in the next period, earlier and new levels of investment in education push out the productivity potential frontier just as the demographic dividend growth model comes under pressure.

In democracies especially, there is likely to be a justifiable role for international development agencies to help incentivise and support these long-run oriented educational investments: failure to make what are high present opportunity cost-educational investments through the late transition phase comes with a high long-run opportunity cost. That is, if the smaller future working-age cohort is not endowed with the relative human capital to push out the national productivity frontier as the working-age population falls, there is a risk of falling per capita living standards. This late phase elderly dependency-ratio-induced stagnation, a corollary to the Malthusian Trap, has been identified as the Johnston Trap (see Johnston, 2019a; Johnston, 2020a).

II-IV Post-Demographic Dividend Phase

The post-demographic dividend phase is characterized by low birth and low death rates. In the absence of immigration, population growth is negligible, or even goes into a decline. The ongoing process of population ageing has significant macroeconomic implications. For example, fewer workers means that output, *ceteris paribus*, will shrink. Alongside, a rising elder dependency ratio – the ratio of persons aged 65 and over persons of working age – will also put pressure on output per capita since it will re-direct resources, human and financial, away from productive sectors (eg. see Bloom, Canning and Fink, 2012; Nagarajan, Teixeira and Silva, 2017).

Yet if such also instigates, for example a newly productive level of investment in automation, these effects may be offset. Similarly, the degree of old age labour force participation will depend upon the pension system, and also affect the pension system. That in turn will impact public and private savings and investment, the interest rate (eg. Antolin, Schich and Yermo, 2011; Rohde, 2019), and so on. In Section Four the particular point of how timing of population ageing in the national economic development process can also affect how different economic channels affect economic equilibrium will be also elaborated.

Meantime, that complex macroeconomic environment is reality for a growing list of countries (Appendix A and B; Table 2). Since 2010 twenty-seven countries or areas have experienced population reduction by one per cent or more, a trend in some locations that is exaggerated by emigration, but not in all (UN, 2019). By mid-century, the trend of population decline (of one per cent or more) is projected for some 55 countries or areas, with 26 possibly experiencing a reduction of 10 per cent or more (UN, 2019).

Countries listed in Table 2 are the world's oldest, in particular countries that are post demographic dividend phase by both child and seniors-share measures: Japan, Italy, Portugal, Greece, Germany, Bulgaria, Croatia, Malta, Lithuania, Slovenia, Czech Republic, Spain and Hungary. These countries are the world's ageing frontier set of countries. Modern economics may have dealt with population decline shocks, such as war or famine, but it has not yet systematically addressed a gradual and system population decline that is the result of the post-demographic transition phase. With a focus on the ageing frontier, Japan, there is however, increasing effort to address this shortfall (eg. Colacelli and Corugedo, 2018, IMF, 2020).

Table 2: Post demographic transition countries (selected indicators, % of total population, 2018)

Child-share (population ages 0-14 years)
Hong Kong, SAR (11.9); Singapore (12.3); Japan (12.7); Korea (13.0); Italy (13.3); Portugal (13.5); Qatar (13.5); Germany (13.6); Macao (13.7); Greece (14.1); Malta (14.3); Austria (14.3); Hungary (14.4); Croatia (14.5); Bulgaria (14.6); UAE (14.6); Spain (14.7); Bosnia & Herzegovina (14.8); Lithuania (14.9); Switzerland (14.9); Slovenia (15.0); Poland (15.1); Slovak Rep. (15.5); Romania (15.5); Czech Rep. (15.6); Serbia (15.7); Ukraine (15.8); Moldova (15.9); Canada (15.9); Luxembourg (15.9).
Seniors-share (population ages 65 and above)
Japan (27.6); Italy (22.8); Portugal (22.0); Finland (21.7); Greece (21.7); Germany (21.5); Bulgaria (21.0); Croatia (20.5); Malta (20.4); Sweden (20.1); Latvia (20.0); France (20.0); Denmark (19.8); Lithuania (19.7); Estonia (19.6); Slovenia (19.6); Czech Rep. (19.4); Spain (19.4); Netherlands (19.2); Hungary (19.2).

Source: World Bank, *World Development Indicators* (2020). See Table 1 for phase thresholds.

More optimistically the post-demographic dividend phase is understood as the period offering the potential of a much less commonly discussed ‘second’ demographic dividend (see Lee & Mason, 2006). In sum, as a population becomes concentrated in the older working age cohort and faces an extended period of retirement, they are incentivized to accumulate assets. Rising national savings, whether invested domestically or abroad, offer increased national income. It is not given, however, that this income offsets the loss of the growth arising from the first dividend alongside the costs of the rising dependency burden attached to population ageing.

Lewis (1954) famously mapped out how to grasp the first. The equivalent conceptual understanding for economic demography phase is less established. The long-run economic demography transition of approach of China herein, is interesting to draw upon. China entered the post demographic transition as an upper-middle country and has been planning to continue its modernization agenda through intensive population ageing for decades, as is next elaborated.

In principle China’s case continues to follow the broad thesis of the unified growth theory: an escape from under-development via technological change and economic growth, eventually leading to deeper investment in human capital, and a higher income steady stage of growth under conditions of more advanced demographic transition (eg. Galor and Weil, 2000; Galor, 2005). A closer look, however, reveals greater nuance in China’s approach. Thanks to the draconian One Child Policy Chinese policy makers evolved an early understanding of the interdependent importance to policy and economic outcomes of the relative speed of each of demographic and economic change therein.

III CHINA IN PRE- AND EARLY DEMOGRAPHIC DIVIDEND PHASE

When the People’s Republic of China was formed in 1949 the TFR in rural areas – where more than four-fifths of the population lived – was high, at around 6 births per woman (Babiarz, Ma, Miller and Song, 2018:5). Consistent with Malthus’ (1798) view that where population growth outstrips (fixed) agricultural productivity, the result will be stagnation, pestilence, famine and under-development. China indeed suffered a terrible famine (1959-1961), which coincided with the Great Leap Forward and led to a transitory drop of the TFR to around 3, only to return to levels of around 6 by the late 1960s (ibid).

From 1970, and especially under the Fourth Five Year plan (1971-1975), China instigated official birth planning targets. The ‘Longer Later Fewer’ (LLF) policy was first and sought to reduce crude birth rates in rural areas to 15 per 1,000 population (Greenhalgh, 2008). This was to be realised by, and as the name implies, encouraging 1) ‘later’ marriage (delaying marriage to 23 and 25 for rural women and

men respectively; 2) ‘longer’ birth intervals (increasing the interval between children from two to four years minimum); 3) ‘fewer’ lifetime births (to 2-3 children per couple).

It was under the LLF, and not the more infamous later One Child Policy, that China experienced its greatest TFR decline (see Whyte, Feng & Cai, 2015; Zhang, 2017). From a peak of more than six children per woman in the mid-1960s, in 1980 the total fertility rate (TFR) had fallen to 2.65 per woman (Figure 3). China’s TFR was, however, still above the replacement level of 2.1 children per woman until around 1990. Nonetheless it was hence this period that produced the initial conditions for China’s dramatic – world economy-reshaping - ensuing demographic dividend period.

Figure 3: Total fertility rate (births/woman)³

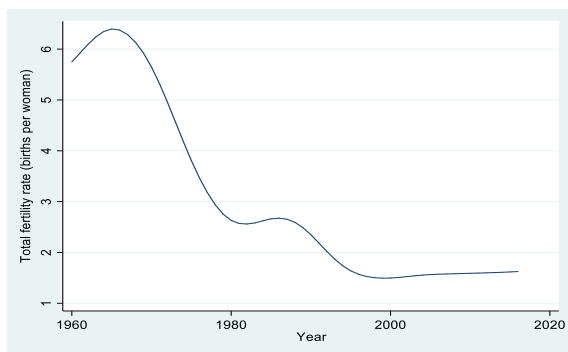
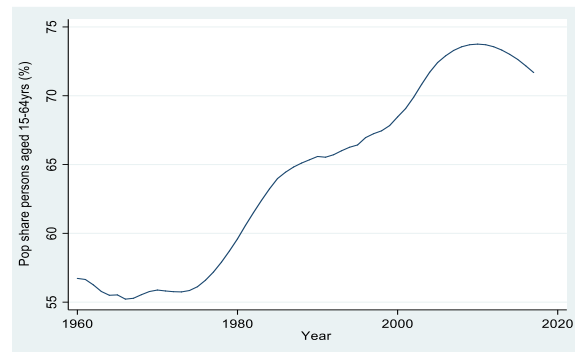


Figure 4: Workforce-aged population share (%)⁴



Data source (Figures 3 & 4): World Bank, *World Development Indicators* (2019).

With the potential of the world’s largest-ever demographic dividend on the horizon, and amid political instability and economic stagnation, a “reform and opening” agenda launched by paramount leader Deng Xiaoping in December 1978. The agenda sought to realise lasting national social and economic modernization. That intent would be marked by two fundamental “centennial” goal posts. First, by 2021, the hundred-year anniversary of the founding of the Chinese Communist Party, all Chinese would enjoy moderate prosperity (*xiaokang* in Chinese). *Xiaokang* is commonly understood as something resembling lower-middle per capita income levels. Secondly, by the hundred-year anniversary of the founding of the People’s Republic of China, in 2049, China would be an all-round modern state, and hence have reclaimed an earlier more frontier role in the world economy and global affairs.

In late 1979 although China’s demographic transition had begun, and consistent with Malthus and Solow, the above replacement rate of population growth nonetheless necessitated high rates of growth

³ The TFR is the expected number of children a woman who survives to the end of the reproductive age span will have during her lifetime if she experiences the given age-specific rates (UN Data, 2016).

⁴ For implicit international comparability World Bank data is presented. In China, however, the retirement age is 60 years for men and lower again for women, inferring that China’s actual workforce population share may be lower than presented.

to achieve the intended living standards per capita gains. Amid an intensive political push to modernize the view that “*the greatest obstacle to production and income per capita growth is population growth*” (Wu, 1980: 38) became influential in policy circles. The 1980 *Open Letter of the Central Committee of the Communist Party of China to the General Membership of the Communist Party and the Membership of the Chinese Communist Youth League on the Problem of Controlling Population Growth in Our Country* therein marked the instigation of a “One-Child-Per-Couple” policy (see Jiang, Li and Feldman, 2013).

The aim of reducing population growth was primarily to reduce population-related pressures, but there is evidence of discussion as to how the ensuing demographic transition could also be used to facilitate economic and social modernization (eg. Wu, 1980). That aspiration would moreover seek to build upon average per capita health and educational gains in China over the decades following the formation of Communist China in 1949 (eg. see Hesketh and Wei, 1997). Indeed, as China’s population entered the late demographic transition phase, give the logic of Malthus, Lewis, Solow, Becker and a body of knowledge between, it may have been understood as a case of now or never for China’s modernization and rejuvenation prospects.

It has, meantime, been argued that the One Child Policy was unnecessary for a continuation of China’s demographic transition (see Whyte, Feng and Cai, 2015). What its implementation appears to have achieved with more certainly, however, is innovative thinking around and policy concern for the dynamics of the relationship between economic and demographic change. This itself echoes the view that the inability of demographers to predict western birth rates accurately in the post-War period had a salutary influence on demographic research (Becker, 1960:209).

Prominent within that literature and policy thinking is the work of demographer Wu Cangping (eg. Wu, 1980; Wu, 1986; Wu and Mu, 1996; Wu, 2006; Wu and Du, 2006). Wu’s (1980) work projecting how fertility rate variation would impact per capita income growth given different capital investment rates retrospectively helps to understand China’s choice of population policy given then aspirations for more imminent economic modernization. Wu’s (1986) identification that sustained fertility rate decline at low per capita incomes would, within all reasonable expectation, result in China being demographically old before economically rich per capita, similarly retrospectively sheds light on China’s unique ensuing economic demography transition approach to development.

Table 3: The Economic Demography Matrix (EDM)

		Demographic Transition	
		Early	Low
Economic Transition	High-Income per capita	Rich and Young (RY)	Rich and Old (RO)
	Low & Middle-Income per capita	Poor and Young (PY)	Poor and Old (PO)

Sources: Johnston, Liu, Yang and Zhang (2016); Johnston (2018). See also Johnston (2012).

Being old before rich concerned policy makers in 1980s China first thanks to the absence of a regional roadmap: Hong Kong, Japan, Macao, Singapore and Taiwan had all got rich before getting old. The development experience of these economies served as an important reference for China's own development planning. In the context of the Economic Demography Matrix (Table 3), these countries moved straight from the PY corner to the RY corner, and ultimately on to the RO corner. In China's case it would need, differently, to work out a PY-PO-RO route.

Not only would this in turn mean China had to rely more on informing its own journey, but it was considered this would also make the journey relatively treacherous. Alongside, a falling working-age population would inflate wages in advance of China having reached a parallel international level of competitiveness. The latter would be compounded the larger elderly dependency ratio re-directing financial and human resources away from economic modernization. Moreover, China may not be able to be ready to sufficiently provide for their needs (eg. see Cai, 2012; Johnston, 2019a). As Wu (1986) put it, China would suffer a (then) developed country disease (population ageing) as a developing country. That in turn, may jeopardize China's prospects of ever being able to achieve its modernization goals. What followed offers arguably valuable and timely lessons for all economies, but especially developing countries near or having just entered the late demographic dividend phase.

IV. CHINA'S LATE DIVIDEND ECONOMIC DEMOGRAPHY TRANSITION STRATEGY

In response to those premature ageing fears China's policy makers appear to have evolved a rapid-demographic-transition complementary development strategy. That is, an intensified and targeted Lewisian development process built upon a relatively fixed-period demographic dividend. Indeed, China enjoyed a 42-year demographic dividend, from 1972 to 2014 (Figure 4). It is estimated this boosted growth by as much as 1.4% annually (see Mason, Lee, Abrigo and Lee (2017) and Garnaut, Song and Fang (2018)).

The broader reform and opening agenda that was instigated in late 1978 (eg. see Huang, 2012; Hofman, 2018), is, in economic demography context, is simplified herein as an important two-tier strategy. The first-tier concerns identifying and implementing policies to capture the demographic dividend window for national development. The second tier concerns early planning for later intensive population ageing, including via institutional frameworks for aged care and basic pensions, and investments in education and science.

IV-I Maximising the Development Potential of a Demographic Dividend

The first tier can be summarized as a set of incentives for labour-intensive and industrial value-chain investors to establish enterprises, labour-intensive industrial factories especially, along China's coast. Also, a parallel new freedom for waves of migrant rural labour to move from informal employment in the countryside to more structured employment in towns and emerging industrial and export-oriented coastal hot spots (see Fang and Yang, 2011).

The launch of the Reform and Opening era began with paramount leader Deng Xiaoping's speech, "Emancipate the mind, seeking truth from fact, and unite as one to face the future", to the Central Economic Work Conference of December 1978 (see people.com.cn, 2000). Different to the vast majority of low-income countries today, however, China then was a closed economy and hence had no formal regulations regarding foreign investment. The first policy steps thereafter focused on setting up an institutional framework, that would attract foreign investors to invest in China's low-wage demographic dividend. In doing so those investors would not only help to incrementally modernize China's economy and improve livelihoods, but also enhance their own profit margins.

Examples of institutional change include the ground-breaking "Law on Chinese-Foreign Equity Joint Ventures" of 1979 (Huang, 1995). This committed the state to a greater level protection of foreign property. Alongside, State Council issued the "Trial Measures on Using Imports to Support Exports" in 1979, which saw the introduction of a favourable trade/exchange regime for imports toward supporting the development of China's export base (Yang, 1991). In August 1980, the "Guangdong Special Economic Zones (SEZs) Regulations" were approved, leading to inauguration of SEZs in Shenzhen, Zhuhai, Shantou and Xiamen. These marked the start of China's now world-trade-reshaping export-powerhouse coastal SEZs that sparked FDI and export-led growth along China's coast (Liang, 1999).

The Coastal Development Strategy (CDS), which extended the principle of China's SEZs to twelve coastal provinces, was approved by State Council in February 1988 as the "Outward-oriented

Development Strategy in the Coastal Areas” (see Yang, 1991).⁵ By opening up China’s more prosperous coastal provinces to position themselves to more fully participate in international trade, China also sought both to create jobs for a rising labour force share, and in so doing to capture its demographic dividend and realise a process of FDI-facilitated geographically sequenced industrial growth.⁶ The Western Development Strategy would follow the Coastal Development Strategy from around 2000, and focus investment incentives on China’s then much-lesser developed hinterland regions (see Lai, 2002). Three decades later, by 2020, although China as a nation remains a middle-income country, China’s coastal provinces, and especially those that were the focus of the CDS, are today mostly high-per capita income sub-regions, including Beijing, Tianjin, Jiangsu, Shanghai, Zhejiang and Fujian (alongside Guangdong) (National Bureau of Statistics (NBS), 2020).

Underpinning this process of ‘reform and opening’ was a record-breaking Lewisian process that saw the transfer of hundreds of millions of low-wage informal rural labour into the industrial sector along China’s coast, but also to towns in inland regions (see Tung and Cho, 2000). Cai et al (2009: 220, cited in Garnaut, Song and Fang, 2018:17) estimate that over years 1997–2004 the number of migrant workers (rural labourers working in cities for at least six months) increased from less than 40 million to over 100 million. Consistent with Lewis (1954), while there was no significant increase in the real wage rate, total wages grew at an annual rate of 14.9 per cent in real terms. The share of wages in rural households’ income increased from 24.6 per cent to 34 per cent (ibid). Labour transfer from agricultural to non-agricultural sectors is estimated to have constituted the majority of total factor productivity growth and 21 per cent of per capita GDP growth in the period 1978–98 (see Garnaut, Song and Fang, 2018: Figure 1.6). This too under-pinned the greatest-ever story of poverty reduction.

A working-age population boom, however, eventually fades when the larger population cohort gradually moves into retirement and is replaced by a proportionately smaller working-age cohort. China’s workforce population share peaked around the year 2011 (Figure 2). Instead of being a rich in youthful low-wage workers China is now home to a shrinking workforce and rapidly rising pensioner population). The median population age is up from up 21.9 years in 1980 to some 38.4 years in 2020 (UN, 2019b, estimates).

Eventually, with the arrival of the LTP, surplus labour too is exhausted. In China’s case the time gap between China passing peak workforce population share and passing the LTP was less than a decade. From 2004 the wages of ordinary workers began to increase rapidly (Garnaut and Huang, 2006); over

⁵ Those twelve provinces were Liaoning, Beijing, Tianjin, Hebei, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangxi, and Hainan.

⁶ The Western Development Strategy would follow the Coastal Development Strategy from around 2000, and focus investment incentives on China’s then much-lesser developed hinterland regions (see Lai, 2002).

years 2003-2016, the average migrant worker's income in real terms grew at a rate of 10.1 per cent (Cai, Garnaut and Song, 2018).

Understanding how the passing of the LTP but population ageing in particular, might affect China's long-run growth prospects requires understanding China's economic demography transition strategy. That is, that throughout the reform and opening agenda there was a parallel setting up of frameworks to prepare for the economy after the passing of the LTP. Policy makers were, in other words, incrementally continuously preparing for sustainable growth in the post-demographic transition phase.

IV-II Preparing for the Post-Demographic Dividend Phase in advance

A prominent feature off the post-demographic transition phase is a declining work-aged population share. Should constant output be sought through that transition without retirement-aged people continuing to work, elevated productivity per worker is required (see Maestas and Zissimopoulos, 2010). In China's case, it was realised early in the demographic transition that by the time China reached the post-demographic transition phase it would not yet be a high-income advanced economy. Given this as a national goal, and also that China's leadership had promised to improve the lives of all (including pensioners), this period would hence require significantly elevated productivity per capita. China's long-run economic demography transition strategy hence seems to have accounted for this later challenge - early.

IV-II-I Ageing-related Institutions

Soon after imposing the One Child Policy in 1980, and in the same year as the World Assembly on Ageing was held in Vienna China set up the China National Committee on Ageing (National Committee) in 1982.⁷ The National Committee was the first dedicated to issues relating to the elderly. Equivalent committees were subsequently inaugurated at the provincial, municipal, county and township levels.

The current structure, the National Working Committee on Ageing, is responsible for national ageing development strategy formulation, related policy research and development, coordination across relevant organisations, and also for advocacy for the interests and rights of the elderly (Deng and Cheng, 2019). Table 2 lists selected major ageing-related policy initiatives over the decades since.

⁷ First named the China Council of the World Assembly on Ageing, which was held in Vienna in mid-1982.

Table 2: Selective major ageing-related policy initiatives, China (1982-present)

Year of issue	Policy/Issue	Description
1982	National Committee on Ageing inaugurated	First national agency dedicated to ageing issues, with parallel entities across levels of government
1983	Identifying key ageing-related issues	Identifying important issues and setting foundations for national ageing-related architecture
1994	The Seven-Year Development Outline on China's Work on Aging (1994-2000)	Putting forward the general objectives of China's work on aging, establishing an aging work system, including aging-related items within the overall plan for national economic and social development
1996	The Law of Safeguarding Rights and Interests of the Elderly	Identified that the state is responsible for establishing an old-age insurance system, safeguarding the basic livelihoods of the elderly (first legal recognition of elderly rights).
2000	CPC Central Committee and State Council Decision on Strengthening the Work on Aging	Safeguarding rights and interests of the elderly, developing the service sector for the elderly, ensuring related funding and infrastructure; carrying out advocacy for the elderly.
2001	Outline of the Tenth Five-Year Plan for China's Work on Aging (2001-2005)	Establishing an urban-rural old-age security system; establishing a community-based elderly management and service system; broadening the activities for the elderly; advocacy; establishing a normal investment mechanism for the work on aging; improving the work system on aging
2006	The Eleventh Five-Year Plan for China's Work on Aging (2006-2010)	Establishing an elderly social security system compatible with the economy and the society and with other security systems; establishing a relatively complete system of policies and regulations on aging; actively promoting construction of elderly-friendly infrastructure.
2011	The Twelfth Five-Year Plan for China's Work on Aging (2011-2015)	Establish basic strategic framework around aging; improving the urban-rural social old-age security system; improve basic elderly medical care system; enhance home-based and community-based care networks; promote planning and construction standards for elderly-friendly infrastructure; increasing amenities for elderly culture, education and fitness activities.
2015	Opinions on Encouraging Private Capital to Participate in the Development of Pension Services (Minfa [2015] No. 33)	The aged care sector was opened up to greater private investment, including from foreign investors. The policy marked the beginning of a greater role for private investors in areas such as operating residential homes, pension funds, as well as links between the medical sector and medical training sector and aged care services.
2017	The Thirteenth Five-Year Plan for National Work on Aging and Elderly Care System Construction	Improve the multi-pillar, inclusive, fair and sustainable social security system; improve home care, community support, institutional back-up and medical-nursing care integration; enable institutional structure to facilitate government and market roles; create a social environment that is congenial to work on aging and old-age care system.
2017	Opinions of the General Office of the State Council on the Formulation and Implementation of Elderly Care Service Projects	Establish a subsidy system for financially strapped and incapacitated seniors; develop home-based old-age care services; enforce the migration of household registration of the elderly who move to their children's place; promote the construction of elderly-friendly communities and cities; further expand coverage of legal aid; increase integration of medical and nursing care.
2019	Opinions on promoting the development of aged-care services"	A comprehensive agenda for advancing every aspect of aged care, for staffing to land for age-related infrastructure, and bond-related and foreign investment in pension-related financial services.
2020	Guiding Opinions on Promoting the Development of the Aged Products Industry	Encourage all economic sectors to be innovative and productive in sectors of importance to older populations. Eg. mobility-related technology products, health-care products, and related communication-facilitating technologies.

Sources: gov.cn (2000); former National Population and Family Commission (various years).

IV-II-II Social Security-related Institutions

Instigating some form of social security was in fact one of the early regulatory acts of Mao era China, via the *Regulation on Labour Insurance of the People's Republic of China* of 1951 (Xing-Yuan and Sheng-Lan, 1995). Since reform and opening, China's urban pension system has undergone a series of reforms. The pre-1980s system was exclusively pay-as-you-go and covered the state and urban collective sectors only. By the 1997s coverage had expanded, and individual accounts – individual rather than pooled pay-as-go-funded accounts – had been set up selectively. The “new rural insurance” combined individual contribution, collective pooling and government subsidy (Hui-yuan, 2012). Although significant reforms have taken place, the pension system through the first two decades of reform was described as “plagued with widespread non-compliance and evasion, resulting in renewed financial crisis and high administrative costs” (Shao and Xu, 2001).

Continuous evaluation of the sustainability of the system, and examples of actual sustainability issues, led to issue of the “System of Basic Old-age Insurance for Urban and Residents” (Guo Fa [2014] No. 8), which served to unify the basic urban and rural old-age insurance systems. By 2018, China's old-age insurance system covered some 890mn persons, was described as the largest government project in the world. If, not unlike in most countries (eg. Barr, 2006), the system remains both complex and riddled with challenges (eg. Dorfman, Holzmann, O'Keefe, Wang, Sin and Hinz, 2013; Liu and Sun, 2016; Yuan, Li and Johnston, 2018; Zhao and Mi, 2019). For example, the pay-as-you-go structure is under pressure: it places a progressively higher burden on the smaller working-ageing population cohort (eg. Fang and Feng, 2018). Reform of the system, however, brings many multiplier consequences and incentives shifts, and hence is odious. China's relatively early retirement age is another such complex point of discussion.⁸

That China's pension system remains such a work-in-progress – despite relatively deep administrative capacity and a long-run and modest promises approach - highlights the pressing need for poor countries to start early in setting up a sustainable pension model - and sustainable old-age social security expectations also.

IV-II-III Human Capital Investments

From early in the ‘reform and opening’ agenda, commitment to universal education was signalled from early on. In particular, the December 1980 “Resolution Regarding Certain Questions in Popularizing Elementary Education”, which called for the realization of universal (6 year) elementary education by the end of the decade (Zhang (eds), 2011). Financing for this commitment was, however, a challenge,

⁸ UNESCAP (2020: Box 4: 32) provides discussion of reform of China's relatively low retirement age.

with the rural poor facing high direct monetary costs and indirect opportunity costs of education (Popper 1990).

In 1986, at the Fourth Session of the Sixth NPC, the Compulsory (obligatory) Education Law of the PRC was adopted. This Law sought to achieve the ‘two basics’: 1) extending compulsory education among the school-aged population to nine years; 2) achieving literacy among those less than 20 years old, and brought mixed returns (Fang, Eggleston, Rizzo, Rozelle and Zeckhauser, 2012). Alongside, and over decades, substantial incremental investments have been made in the quality of teachers in Chinese schools, as well as in encouraging the best teachers to spend time teaching in poor areas.

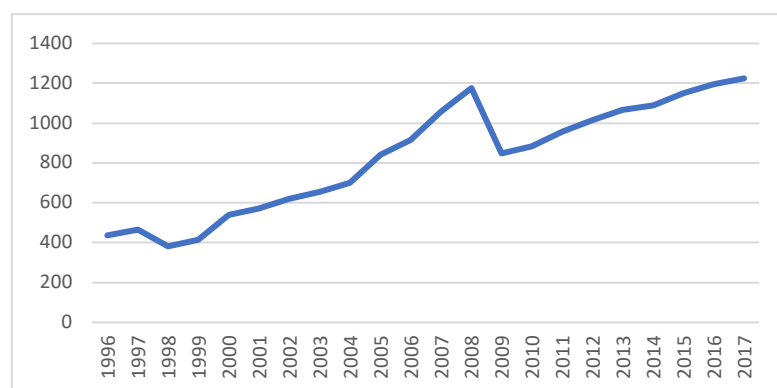
At the tertiary educational level, an effort to paint vocational education in a more equitable light, was also initiated, in the form of the “five-four system”, which referred to five years of elementary and what is in essence a four-year combined academic/vocational junior secondary school (and reflecting a shift from ‘six-three’). Alongside, the quality of Chinese universities has been fostered via scholarships for graduate study in frontier educational environments, and also in the infrastructure, physical and human, in China’s own universities. Two projects of the 1990s, Project 211 of 1995 and Project 985 of 1998, received significant public investment toward nurturing the emergence of a cluster of world-class Chinese universities (see Mohrman and Wang, 2010).

The late 1990s were an opportune time for such deepened university sector investment. Central authorities were in a fiscally stronger position both thanks to solid recent growth and also the benefits of fiscal reforms that took place in the mid-1990s (see Dollar and Hofman, 2008). Expansion of the sector and place numbers also coincided with arrival of the first children of the One Child Policy era reaching university age. Consistent with the strategic aim of ensuring the smaller future workforce was better skilled so as to continue to push the productivity frontier beyond the LTP and despite the adverse shift in the dependency ratio, enrolment rates subsequently surged (Xinhuanet, 2019). This also enabled a continuum of the deeper educational investments that had itself been enabled in this cohort by the combination of rising household incomes and smaller family size.

In general, the value of China’s total real human capital is estimated to have increased from 26.98 billion Renminbi (RMB) in 1985 to 118.75 billion RMB in 2007, around the end of the Lewisian turning period. This implies an average annual growth rate of 6.78 per cent, and a rate that has itself accelerated over this period (Li, Fraumeni, Liu and Wang, 2009). Endogenous to this, China’s literacy rate as a share of the population aged 15 years and over has increased from 65.5 per cent to 96.8 per cent between 1982 and 2018 (World Bank, 2020). State media reports that by 2018, more than 45 per cent of new entrants to the labour force had a tertiary-level qualification and reflecting a share of 18-22-year-olds enrolled in post-secondary vocational colleges and universities of 45.7 per cent (Xinhuanet, 2019). A

disproportionate share of these are science and technology (STEM) subject area graduates: over the most recent decade China produced more than twice as many STEM undergraduate graduates as the United States (American Institute of Physics, 2018).⁹

Figure 5: Researchers in Research and Development (per million people)



Source: World Bank, *World Development Indicators* (2020).

Since the mid-1990s, improvements in education is increasingly reflected in the composition of the labor force: the number of researchers in research and development (R&D) per million of population rose from 438 per million people in 1996 to 1225 per million people (World Bank, 2020) (Figure 5). It is in this broader set of newly human capital-invested workers that China's policy makers have pinned their hopes of a shift from a low-wage demographic dividend to more of a human capital and innovation-driven model of growth (see Li, Loyalka, Rozelle and Wu, 2017; Wei, Xie and Zhang, 2017).

A final caveat for this section is that China's top-down and very intrusive late 20th century family planning policy approach has brought adverse consequences, including, for example, the world's most skewed gender balance at birth (in favour of male births) (eg. Bhattacharjya, Sudarshan, Tuljapurkar, Shachter and Feldman, 2008; and Greenhalgh, 2013). The reference point offered herein is not that of a replica of China's family planning policies but that of China's more generic proactive demographic transition-weighted continuous and long-run approach to development. That is, its explicit economic demography transition strategy. That approach is likely one that all countries can learn from (see Johnston, 2020 for the particular case of transition economies).

The next section hence outlines how China is approaching an intended process of continued national development amid intensifying population ageing. That is, its economic demography transition strategy for the upper-middle-income-based post-demographic transition phase.

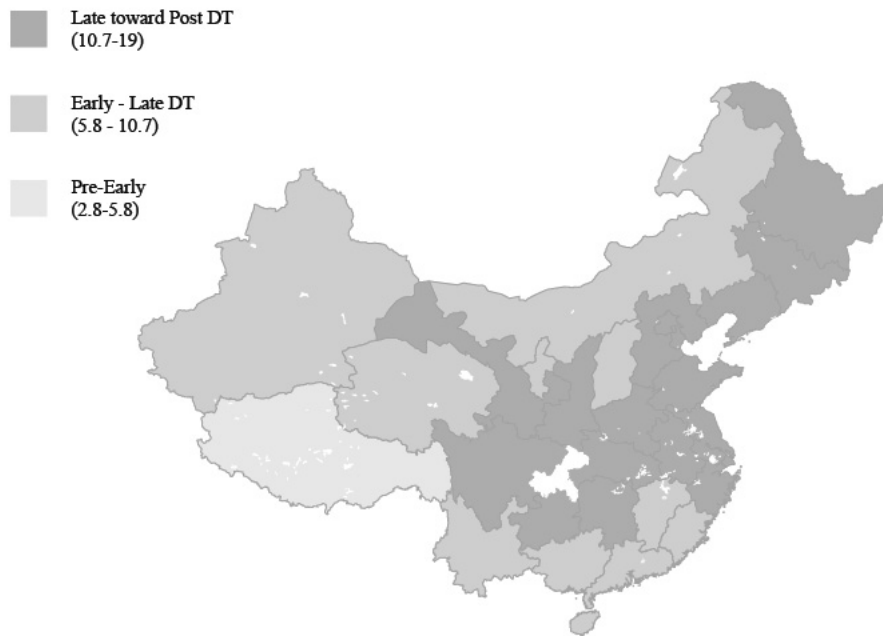
⁹ Lai et al (2014) and Li et al (2017) draw attention to issues in average educational quality in China. It is not known if the share of quality of human capital, at the average level and in terms of the required total for modernization, will be sufficient for China's ambitious modernization agenda.

V. CHINA'S EMERGING POST-DEMOGRAPHIC DIVIDEND STRATEGY

V-I Poor-Old Contemporary China

China passed the three fundamental ageing-related thresholds as follows: population share aged 14 years and under of less than 30 per cent in 1987; population share aged 65 years and over of 7 per cent or higher in 2002; and the ratio of old to young exceeding 0.3 in 2002 (World Bank, 2020). The ageing process has, however, been lumpy across the country, thanks to variation in life expectancy, total fertility rate, and other factors. For example, the demographic transition is more advanced in China's richer and north-eastern regions. Continued intra-regional migration means that China's southern coastal provinces especially, but also Beijing and Tianjin, are 'younger' (Figure 6).

Figure 6: Demographic transition phase by sub-region, China (2018)



Data source: NBS, China. Excludes special administrative regions. Data for Chongqing (white) unavailable.
Image: Author's own copyright.

This demographic transition lumpiness is endogenous to China's unique Lewis Turning *Period* (see Garnaut, 2010), roughly over years 2001 to 2013 (Kwan, Wu and Zhuo, 2018). In a parallel to migration patterns across Europe (Coleman, 2008), underlying it also is the movement of migrant labour from on average 'younger' and poorer regions moving to more developed coastal and urban regions so as to elevate their own marginal productivity and income accordingly.

Over recent five years, more than 10 million people every year are have been turning 60 (Xinhua, 2020). In 2019 more than 254mn people were aged over 60 years old, some 18.1 per cent of the population, with 176mn, or 12.6% of those aged 65 and over. Although none of China's provinces or provincial equivalents are in the post-demographic transition phase as measured by elder population share (a share

19 per cent or greater) China's pensioner numbers are swelling; demographic momentum will change this over the coming decade. An aged population is now a fundamental characteristic of the national economy, comprising a test for social security and old-age services (Xinhua, 2020).

That population structure is expected to be a long-term feature of China, despite recent moves to end strict family planning restrictions. Consistent with many high-income countries especially, sustained below replacement rate fertility behaviour preference means that the ageing trend is expected to be sustained for decades forth (Rizvi, 2020). Population ageing, in other words, is a 21st century mega-trend – and hence is one that China is actively seeking new comparative advantage in. The once ominously powerful National Family Planning Commission was absorbed by a broader ministry in 2018, with the One Child Policy having been ended in place of a two-child policy, in 2015 (Wall Street Journal, 2018).

The necessary shift of China's growth model away from low-cost and labour-intensive sectors and towards more capital and innovation-intensive sectors and services is underway (Garnaut, Johnston and Song, 2017). On the external side, these trends are fostered by China's Belt and Road Initiative targeting investments in poorer-younger countries (Johnston 2019c and 2019d) – an agenda that may be supported by the China-US trade war instigated by United States President Trump in 2018. Similarly so by the COVID19 pandemic, which may increase the speed with which China's economy moves away from being something of a monopolist as the world's factory – and hence into other economic spheres. Supporting that intended transition, and in line with China's economic demography transition strategy, over the next decade - thanks to economic demography momentum - the share of university graduates among China's working-age population will increase dramatically (Schleidner, 2016).

Into that political economy mix and within the broader five-year planning cycle, policy makers have their eye on forging new comparative advantage in emerging areas of high national need and high market demand. In general, that includes expertise in robotics, artificial intelligence, and frontier technologies. But it also includes a focus on the ageing-sector itself – from pension finance, to aged-care products and services. In the footsteps of deeper investments in the university sector and general incremental industrial upgrade, a series of high-tech sector policies initiated in the 2000s especially directly began this process. In particular the 2006 announced Fifteen Year Plan for Science and Technology (see Serger and Briedne, 2007).

V-II China's Strategy for Later Demographic Dividend Phases

Table 2 set out selected recent institutional milestones in China's approach to accommodating increasingly rapid population ageing. Very recently, a flurry of announcements has directly targeted the economics of ageing. For example, the Government's 2019 Work Report promised to reform the management of aged-care insurance funds and guaranteed the payment of pensions on time and in full (Zhou, 2019). In March 2019, meantime, amid fears that some of China's state pension funds is struggling, the Ministry of Finance transferred a nearly 7% stake in the People's Insurance Company of China into the state pension fund (He, 2019). The financial services sector is also selectively being opened to foreign investment, a point highlighted in elements of the April 2019 "Opinions on promoting the development of aged-care services" (Guobanfa [2019] No.5) (gov.cn, 2019).

The April 2019 Opinions set out 28 policy proposals for addressing a breadth of issues presently or imminently expected to affect 'ageing' China, under six themes: 1) Deepening reform and deregulation of services (the services sector in general); 2) Broaden investment and financing channels for ageing-related services; 3) Expansion of employment and entrepreneurship in ageing-related services; 4) Expansion of consumption of old-age services; 5) Promote the development of high-quality aged-care services; 6) Promote the construction of aged-care-related infrastructure. The sub-sections cover everything from allocation of land for age-cared related facilities, to aged-care supply chain constraints, to bond issuance and foreign investment in the pension funds industry (see Guobanfa [2019] No.5) (gov.cn, 2019).

The umbrella announcement drawing these plans together is that issued by the Central Committee of the Communist Party of China and State Council in November 2019, the 'Mid- and Long-Term National Plan for Actively Responding to Population Aging'. The plan sets out a series of phased strategic goals for the country to actively respond to population aging by 2022, 2035, and the middle of this century (www.gov.cn, 2019). It forms China's economy-wide agenda for co-navigating a process of economic development and later phase demographic transition toward the middle of the century, by when China hopes to have realised its second, 'national rejuvenation', centennial goal. That is, it emphasizes the push from labour to capital-intensive sectors. It also emphasises preparations for aged care, including not just commercial product and services markets, but also the need to ensure a sufficient number of carers. Overall, it heeds the message that society must accommodate the ageing shift – without this adversely affecting the long-term health of the economy and China's modernization agenda.

Amid the dramatic COVID19 lockdown, in January 2020 five central departments issued the "Guiding Opinions on Promoting the Development of the Aged Products Industry" (gov.cn, 2020). The Opinions explicitly encourage all actors in the economy to be innovative and productive in sectors of importance

to older populations. Such areas include mobility-related technology products, health-care products, and communication-facilitating technologies that are especially useful for elderly users. The digital economy fast-forward instigated by the COVID10 shutdown may offer a silver lining of having fostered the greater use of these technologies and service delivery means (Johnston, 2020b).

More specific related announcements include the State Council-issued ‘Opinions on Promoting the Development of Elderly Care Services’, and the ‘Implementation Opinions on Further Enlarging the Supply of Elderly Care Service’s by the Ministry of Civil Affairs (Beijing Municipal Civil Affairs Bureau, 2019). Where some quarter of China’s 250-million strong citizenry aged 65 and over require some form of assistance, there are only 300,000 certified caregivers in China (Reuters, 2019). By lowering the minimum related training requirements and also instigating new official training programs, China hopes, for example, to elevate that number to 2mn.

V-III Will it be enough?

Even if most countries now entering the high-income group are first old (Johnston, 2019a), this does not mean that China will join them. Moreover, it is projected that China’s population size will peak at 1.44 billion in 2029 and enter a long period of decline thereafter (Du and Yang, 2014). As Keynes (1937) foresaw, population decline brings a number of economic challenges. Macroeconomic policy research, into both the effects of population ageing and population decline, is intensifying (eg. Katagiri, Konishi, Ueda, 2019; Del Negro, M., Giannone, D., Giannoni, M. P., & Tambalotti, A. (2019).

Population ageing, for example, is found to have played a significant role in dampening interest rates in Japan over recent decades – but this effect is expected to diminish over coming decades: a slower rate of ageing will likely mean that interest rates are not equivalently affected (Sudo and Takizuka, 2018). General equilibrium modelling, that is, should constantly factor not just the availability and quality of labour, but the respective national and cross-country economic demography transition. The economics of ageing, that is, are likely to be very different in old-before-rich China, and old-as-rich South Korea, in terms of pension levels promised, educational shifts between generations, and the political and economic empowerment of the old also. In the same way, where consumption was a driver of growth in recent high-income country demographic dividend years, this was not true in China’s case. Contemporary China in turn, may suffer less of a working-age-population-share-adjusted drop in consumption as its population ages accordingly (Johnston, 2018; Johnston, 2019a).

When, nearly a century ago, Keynes’ (1937) feared that population decline would produce a ‘fiercer’ and ‘more intractable’ unemployment challenge - in the ‘careless’ case – he perhaps also assumed a

relatively fixed version of employment as compared to employment forms that modern technology and contractual forms have enabled. Equivalently, in contemporary Japan, the ensuing ‘unemployment’ could be more a case of ‘under-employment’. Or simply under-stability of employment whereby a continual series of contracts may deliver equivalent income - but diminish the propensity to confidently consume and invest (see Song, 2017) nonetheless. This would reflect a more insidious precariousness and consequential fall in aggregate demand – and hence employment opportunities also, in turn further compounding the elderly dependency challenge.

Such affects are undoubtedly compounded where population ageing adversely affects the rate of innovation, productivity, etc. (eg. Goto, 2000). Meantime, Italy, the oldest country in Europe, spends more than four times as much on pensions as on education of the young (The Economist, 2018), suggestive of compounding productivity challenges over time, at least in the absence of significant productivity gains over generations. Seeking to “mitigate the headwinds of a declining and ageing population by (and for example) using machines to substitute for human labour or by promoting innovation” (Kuroda, 2018) may be one such example of managing the pressures of the economic demography transition. Despite its older population share being relatively ‘cheap’ in terms of the low level of pension promised, China has an explicit policy agenda aiming to foster a technology-intensified economic growth strategy through the risk that population ageing and population decline lead to stagnation (Cheng, Jia, Li and Li, 2019).

Unlike China, most countries experiencing rapid population ageing appear to be only more recently beginning to comprehensively absorb the enormity of the passing of the population pyramid concept. Whether China’s early unified preparatory strategy better ultimately positions it to accommodate the ensuing challenges and go on to realise its modernization agenda accordingly awaits to be seen. It is, however, nonetheless a deliberate and experimental attempt to avoid a ‘careless’ sleep-walk into population ageing and population decline-induced intractable unemployment and falling living standards.

Toward that goal, it is likely to be useful for the literature to more explicitly and consistently distinguish between use of ‘ageing population’ and ‘ageing economy’. The ageing of a population is a demographic phenomenon through which the share of old in a population increase over time. The term ageing economy logically implies a similar structural ageing or atrophy. Yet, it is not given that an ageing population must so atrophy, or age, an economy – in the absence of ‘carelessness’. To that end, the term ‘ageing economy’ may better be used explicitly to categories nations that are failing to adjust to late- and post-demographic transition, and hence which have fallen into a late-phase equivalent Malthusian stagnation - the Johnston stagnation.

V-IV The Economic Demography Transition Strategy – Within and Between Countries

China, home of the world's largest-scaled Malthusian stagnation in the middle of last century, adopted an extreme population policy over decades thereafter. In the absence of such a draconian policy, and thanks to the advantages of backwardness in terms of access to technologies and healthcare, other poor countries are more recently experiencing demographic transition at low per capita incomes. Most will hence soon enough also be demographically old and not (yet) economically per capita rich. OECD countries, most of which got old after getting rich, face their own economic demography transition-related challenges. Whatever the stage of demographic transition or level of per capita income – or their respective speeds of change - there may be lessons to draw from China's interdependent economic demography approach.

Table 3 offers a generalized overview of the broad policy steps and focus for each of the four demographic transition stages respectively.¹⁰ A caveat, moreover, is that the same priorities may be useful as a reference point at least for international development agencies. The literature has not, for example, identified if the absence of policy differentiation in terms of relative health and educational spending focus between pre-, early and late demographic transition developing countries, may have shifted the development effectiveness of the spending. It may be the case that health spending and support programmes should more explicitly gradually give way to education sector equivalents, *ceteris paribus*, as the demographic transition evolves through pre to the early phases of late transition. Further research is required.

¹⁰ Appendix C lists selected policy suggestions for addressing population ageing-related challenges in the contemporary – poor-old – Chinese context.

Table 3: Policy priorities demographic transition phases¹¹

<i>“Younger” population countries (poor-young and rich-young)</i>	
High Fertility Rate	Sparking the demographic transition
	Improving human development (health and education) outcomes to accelerate the fertility decline and create a population age structure with fewer child dependents as well as a larger working-age share of the population.
Early demographic dividend	Accelerate job creation
	Creating increasingly productive jobs for the growing share of the population in working ages to reap the demographic dividend. This requires appropriate macro-fiscal and labour frameworks, including making it easier for parents to work formally.
<i>“Older” population countries (poor-old and rich-old countries)</i>	
Late Demographic dividend	Sustaining productivity growth
	Creating conditions necessary to reap the second demographic dividend and beginning to prepare for ageing. At this stage, countries typically need to deepen the sustainable shaping of retirement policies. Concurrently they should ensure that the smaller share of youth is not disadvantaged over generations but instead are positioned to be extremely productive given the adverse dependency ratio shifts. Incentives to direct the savings of the elderly into the most productive areas need to be crafted.
Low Fertility Rate	Adapting to ageing; avoiding late-phase stagnation
	Maintaining and improving welfare in the context of declining workforce population share and a growing old-age share. Attitudes to the elderly and their productive engagement of the economy and dependency expectations — and ensuring that their “weight” does not dampen the next generations’ productivity directly or indirectly — is fundamental.

* Rich-young countries have a different set of challenges to the more classic poor-young countries in terms of reaping the potential of a demographic dividend. These countries typically encounter challenges in resource-rent management and distribution. With the exception of Equatorial Guinea, most such countries are in the Middle East and South-east Asia, not Africa (see also Johnston, Liu, Yang and Zhang, 2016). See Table 2 for empirical definitions of each society (demographic) type. Source: Adapted from Johnston (2020a); World Bank (2019).

Table 3 introduces country-level economic demography transition strategy fundamentals. The global context of the economic demography transition strategy is, however, also relevant. Thanks to 20th century history, China, for example, experienced its low-wage demographic dividend era broadly at the same time as the high-wage demographic dividend era of OECD countries. Also, those of important investor near neighbor economies Hong Kong, Singapore and Taiwan.

A second point is also that same priorities may also be useful as a reference point for international development agencies. It is possible, for example, that the absence of policy focus differentiation between pre, early and late demographic transition countries (and rather the more exclusive focus on per capita income) has so far undermined development assistance effectiveness. For example, health investments may be relatively important in the former, education in the latter, and a mix between. In

¹¹ The same priorities may also be useful as a reference point for international development agencies. It is possible, for example, that the absence of policy focus differentiation between pre, early and late demographic transition countries (and rather the more exclusive focus on per capita income) has so far undermined development assistance effectiveness. For example, health investments may be relatively important in the former, education in the latter, and a combination in between. In other words, it could be that a more nuanced economic demography development policy approach may be more effective.

other words, it could be that a more nuanced economic demography development policy approach may be better adjusted to local economic demography circumstance.

That high and low-wage demographic dividend, meantime, provided a powerful complementary window for China to become the world's factory. That is, for China to produce a seemingly limitless flow of low-cost manufactured goods for export. Those exports, mostly to then 'rich-young' high-income countries supported mutual high growth in the presence of relatively low-inflation and enabled high-income countries to specialize in high-technology goods and services, reduce environmental damage, and so forth. Johnston (2018) called this parallel phenomenon a 'double demographic dividend'.

As working aged population shares now diminish, however, there is a risk that 'careless' policy making, within and between countries, could add to global economic tensions, and this serve to worsen respective economic performance. This would in turn further compound resource scarcity just as the resource envelope is under rising stress. It would be something of the 'careless' outcome that Keynes (1937) had presciently feared.

A great deal more research is required to understand the economic demography transition within and between countries and potential or structural complementarities accordingly. This would not only identify examples of how population ageing timing within an economic context instigates different economic effects, but also lessons for the economic demography transition within countries. In old-before-rich China for example, greater resource transfer to low-income retirees from working-age and state-owned economy may be an optimal allocation of resources. But, in old-after-rich OECD countries, it is at least comparatively probable that greater resource transfer from wealthy retirees to the state and to younger cohorts may be required for a higher-productivity steady-state outcome.

To that end also, the tax structure may also need to continually adjust with the economic demography transition. This would reflect the share of population paying income tax, the life-span adjusted cohort distribution of capital, and so on. Since even the propensity to move also changes across the lifespan, even property-related tax mechanisms may also need to be appropriately adjusted within respective economic demography transitions, including to accommodate different patterns in home ownership and capital gains over time. The point at which a working-age population begins to decline may be a useful transition point, at the latest, at which the policy makers of any country should re-calibrate economic and social policy around the shifting economic demography fundamentals (Johnston, 2020a).

In a global development context, for today's poor countries, early adoption of an economic demography transition strategy, and support in doing so, may be also prudent. It would in fact be similarly if differently 'careless' - perhaps with greater human consequences - to not prepare long in advance for a rise in elderly as a share of population in developing countries. For this task, there arguably is no greater contemporary reference than China, even though the example itself is also layered with challenges and uniqueness.

More generically Table 3 highlighted policy priorities through the different phases of the demographic transition. This too could be endogenized into development assistance approaches, which have hitherto, possibly to their efficiency detriment, tended to directly focus more exclusively on per capita income levels and dynamics. For countries already or approaching experiencing population decline, a useful broader reference point for the task is formed by China's push into comparative advantage in ageing-related industries and also in labour-reducing technologies and less labour-intensive sectors.

At the conceptual level, it may also be timely to apply the principles of Becker and colleagues (eg. 1960, 1962, 1973 & 2010) with respect to how both households and by extrapolation economies adjusted from quality to quantity of children. As working-age populations fall in size, and ultimately an increasing number of national populations decline, a corollary form of adjustment may be required at the national level. Something of an equivalent shift from quantity to quality economics and growth. As outlined herein, China has been explicitly, and for example, deepening its human capital relative to earlier larger generations in explicit preparation for this type of shift. Each country will have its own economic demography transition context and strategy. The literature elaborated herein aims to help.

V. CONCLUSION

The 21st century's first pandemic, COVID19, has offered the world economy its largest shock since World War II. It has also drawn timely attention to demographics in that elderly citizens incurred a significantly higher fatality rate than younger citizens.

Almost a century ago Keynes (1973) drew attention the interconnectedness of demographics and the economy in his "*Some Economic Consequences of a Declining Population*" speech. He spoke of his fear that should policy makers be 'careless' in responding to population decline this could induce an intractable new problem – unemployment as a result of lower aggregate demand, lower aggregate savings and less capital accumulation. With policy makers now more cognizant of the particular need to protect the – rising number of - aged within their populations concurrent with facing the need to re-

boot their economies, this is a powerful time to better understand the economic demography transition – the interaction of economics and demography in continuous time.

Thanks to suffering a dramatic Malthusian stagnation in the mid-20th century, followed by a draconian family policy planning over three decades until recently, China's policy makers and researchers have a unique and explicit approach to the economic demography transition. To that end, for four decades, through each of the phases of the demographic transition, economic policies have been continually adjusted to ensure that the economy adjusts, in the short and long-term, to the shifting opportunities and dependency weight of the population.

That economic demography transition strategy was a response to fears that China becoming old before becoming rich would derail the longer-term national modernization agenda. By extrapolation, it offers a useful reference point for all countries, young and old, rich and poor. For development agencies also, there may be some use in undertaking further research to assess how aid priorities may better weight economic demography variables and not just per capita income. Such a process could ultimately shift the weight between health and education spending. As noted with respect to health being fundamental to reducing morbidity rates in the pre and early transition phase, followed by education, the cost of education especially, being important to short but long-run development in early and late transition phases.

All countries, that is, may benefit from evolving something of a more explicit economic demography transition strategy so as to better optimize their growth path over time. This may not only prevent ageing populations inducing a post-demographic transition-induced stagnation, the Johnston Trap, but could also contribute to the emergence of additional opportunity for cross-country economic policy coordination and complementarity.

Future research will hopefully not only help to prevent population ageing and population decline-induced economic stagnation, but also help to reduce, if not prevent, old age poverty across a more globally ageing population. It will ideally also prove that the economics community was not 'careless' when approaching the otherwise potential economic demography precipice of population decline, let alone population ageing.

References

- Age Action, 2020. Ageing in Developing Countries. *Ageing Action*. Available: <https://www.ageaction.ie/how-we-can-help/ageing-in-the-developing-world> (accessed April 30, 2020)
- Akabayashi, H. and Psacharopoulos, G., 1999. The trade-off between child labour and human capital formation: A Tanzanian case study. *The Journal of Development Studies*, 35(5), pp.120-140.
- American Institute of Physics, 2018. Rapid Rise of China's STEM Graduates Chartered by National Science Board Report. *Science Policy News Bulletin*, American Institute of Physics. Available: <https://www.aip.org/fyi/2018/rapid-rise-china%E2%80%99s-stem-workforce-charted-national-science-board-report>
- Antolin, P., Schich, S. and Yermo, J., 2011. The economic impact of protracted low interest rates on pension funds and insurance companies. *OECD Journal: Financial Market Trends*, 2011(1), pp.237-256.
- Asian Private Banker, 2020. Credit Suisse refreshes its five super-trends and launches new theme. May 6, 2020. Available: <https://asianprivatebanker.com/cio/credit-suisse-refreshes-its-five-supertrends-and-launches-new-theme/> (accessed May 10, 2020)
- Babiarz, K.S., Ma, P., Miller, G. and Song, S., 2018. The limits (and Harms) of population policy: Fertility decline and sex selection in China under Mao. *NBER working paper*, (25130).
- Barr, N., 2006. Pensions: Overview of the issues. *Oxford Review of Economic Policy*, 22(1), pp.1-14.
- Becker, G.S., 1960. An Economic Analysis of Fertility, Demographic and economic change in developed countries: a conference of the Universities. *National Bureau Committee for Economic Research*, 209.
- Becker, G.S., 1962. Investment in human capital: A theoretical analysis. *Journal of political economy*, 70(5, Part 2), pp.9-49.
- Becker, S.O., Cinnirella, F. and Woessmann, L., 2010. The trade-off between fertility and education: evidence from before the demographic transition. *Journal of Economic Growth*, 15(3), pp.177-204.
- Becker, G.S. and Lewis, H.G., 1973. On the Interaction between the Quantity and Quality of Children. *Journal of political Economy*, 81(2, Part 2), pp.S279-S288.
- Beijing Municipal Civil Affairs Bureau, 2019. Notice on Public Consultation on 'Implementation Plan for Accelerating the Development of Pension Services'. Available: http://mzj.beijing.gov.cn/art/2019/11/28/art_371_295436.html (accessed May 10 2020).
- Berthélemy, J.C., 2006, January. Convergence and development traps: how did emerging economies escape the underdevelopment trap. In *Growth and Integration: Annual World Bank Conference on Development Economics* (pp. 127-156).
- Bhattacharjya, D., Sudarshan, A., Tuljapurkar, S., Shachter, R. and Feldman, M., 2008. How can economic schemes curtail the increasing sex ratio at birth in China?. *Demographic research*, 19(54), p.1831.
- Bloom, D.E., Canning, D. and Fink, G., 2010. Implications of population ageing for economic growth. *Oxford Review of Economic Policy*, 26(4), pp.583-612.

- Cai, F. and Wang, M., 2010. Growth and structural changes in employment in transition China. *Journal of Comparative Economics*, 38(1), pp.71-81.
- Cai, F. (2012). Is there a “Middle-income Trap”? theories, experiences and relevance to China. *China & World Economy*, 20(1), 49-61.
- Cheng, H., Jia, R., Li, D. and Li, H., 2019. The rise of robots in china. *Journal of Economic Perspectives*, 33(2), pp.71-88.
- Coleman, D., 2008. The demographic effects of international migration in Europe. *Oxford Review of Economic Policy*, 24(3), pp.452-476.
- Collier, P., 2003. *Breaking the conflict trap: Civil war and development policy*. World Bank Publications.
- Colacelli, M. and Corugedo, E.F., 2018. *Macroeconomic Effects of Japan's Demographics: Can Structural Reforms Reverse Them?*. International Monetary Fund.
- Del Negro, M., Giannone, D., Giannoni, M.P. and Tambalotti, A., 2019. Global trends in interest rates. *Journal of International Economics*, 118, pp.248-262.
- Deng, L. and Chang, J., 2019. Research on Population Aging and Social Security System Construction. Available: https://webofproceedings.org/proceedings_series/ECOM/ICEBFM%202019/ICEBFM19036.pdf
- Dollar, D., & Hofman, B. (2008). Intergovernmental fiscal reforms, expenditure assignment, and governance. *Public finance in China: Reform and growth for a harmonious society*, 39-51.
- Dorfman, M.C., Holzmann, R., O'keefe, P., Wang, D., Sin, Y. and Hinz, R., 2013. *China's pension system: A vision*. The World Bank.
- Du, Y. and Yang, C., 2014. Demographic transition and labour market changes: implications for economic development in China. *Journal of Economic Surveys*, 28(4), pp.617-635.
- Fang, C., & Yang, D. U. (2011). Wage increases, wage convergence, and the Lewis turning point in China. *China Economic Review*, 22(4), 601-610.
- Fang, H. and Feng, J., 2018. *The Chinese pension system* (No. w25088). National Bureau of Economic Research. Available: <http://www.nber.org/papers/w25088>
- Fang, H., Eggleston, K.N., Rizzo, J.A., Rozelle, S. and Zeckhauser, R.J., 2012. *The returns to education in China: Evidence from the 1986 compulsory education law* (No. w18189). National Bureau of Economic Research. Available: <https://www.nber.org/papers/w18189>
- Fosu, A.K., 2007. Fiscal allocation for education in sub-Saharan Africa: implications of the external debt service constraint. *World Development*, 35(4), pp.702-713.
- Galor, O., 2005. From stagnation to growth: unified growth theory. *Handbook of economic growth*, 1, pp.171-293.
- Galor, O., 2011. *Unified growth theory*. Princeton University Press.
- Galor, O. and Weil, D.N., 2000. Population, technology, and growth: From Malthusian stagnation to the demographic transition and beyond. *American economic review*, 90(4), pp.806-828.

Garnaut, R., 2010. Macro-economic implications of the turning point. *China Economic Journal*, 3(2), pp.181-190.

Garnaut, R. and Huang, Y., 2006. Continued rapid growth and the turning point in China's development. *The Turning Point in China's Economic Development*, Asia Pacific Press, Canberra, pp.12-34.

Garnaut, R., Song, L. and Fang, C. eds., 2018. *China's 40 years of reform and development: 1978–2018*. ANU Press.

Glynn, J.R., 2020. Protecting workers aged 60–69 years from COVID-19. *The Lancet Infectious Diseases*.

gov.cn, 2019. Opinions on promoting the development of elderly care services. Issued by the General Office of State Council. Available: http://www.gov.cn/zhengce/content/2019-04/16/content_5383270.htm (accessed April 27, 2020).

gov.cn (2020. Human capital sufficiency given a huge boost, March 9. Available: http://www.gov.cn/xinwen/2020-03/09/content_5488844.htm (accessed April 24, 2020).

Goto, A., 2000. Japan's national innovation system: Current status and problems. *Oxford Review of Economic Policy*, 16(2), pp.103-113.

Greenhalgh, S., 2008. Just One Child: Science and Policy in Deng's China. Berkeley: University of California.

Greenhalgh, S., 2013. Patriarchal demographics? China's sex ratio reconsidered. *Population and Development Review*, 38, pp.130-149.

Hannum, E., 1999. Political change and the urban-rural gap in basic education in China, 1949-1990. *Comparative education review*, 43(2), pp.193-211.

Hansen, G.D. and Prescott, E.C., 2002. Malthus to solow. *American economic review*, 92(4), pp.1205-1217.

He, L., 2019. China transfers US\$4.7bn of PICC shares to state pension fund, part of a programme to shift assets to make up for shortfall. *South China Morning Post*, March 13. Available: <https://www.scmp.com/business/china-business/article/3001402/china-transfers-us47-billion-picc-shares-state-pension-fund> (accessed May 11, 2020).

Hesketh, T. and Wei, X.Z., 1997. Health in China: from Mao to market reform. *BMJ*, 314(7093), p.1543.

Hofman, B., 2018. 3. Reflections on 40 years of China's reforms. *China's 40 years of Reform and Development*, ANU Press, 53-66.

Huang, J. Z., 1995. An introduction to foreign investment laws in the People's Republic of China. *J. Marshall L. Rev.*, 28, pp.471-471.

Huang, Y., 2012. How did China take off?. *Journal of Economic Perspectives*, 26(4), pp.147-70.

Hui-yuan, X.U.E., 2012. Can New Rural Social Old-age Insurance Meet the Basic Living Needs of Farmers?. *China Population, Resources and Environment*, 10, pp.170-176.

IMF, 2020. Japan: Demographic Shift Opens Door to Reforms, February 10. Available: <https://www.imf.org/en/News/Articles/2020/02/10/na021020-japan-demographic-shift-opens-door-to-reforms> (accessed March 3, 2020).

IUSSP, 2020. Population Analysis for Policies and Programmes: The demographic transition. Available: https://papp.iussp.org/sessions/papp101_s01/PAPP101_s01_090_010.html (accessed May 8, 2020).

JICA, 2013. JICA Helps Thailand Deal with Rapid Population Ageing, *JICA*, September 30. Available: https://www.jica.go.jp/english/news/field/2013/130930_01.html (accessed May 9, 2020).

Jiang, Q., Li, S. and Feldman, M.W., 2013. China's population policy at the crossroads: social impacts and prospects. *Asian journal of social science*, 41(2), pp.193-218.

Johnston, L., 2012. Getting old after getting rich: Comparing China with Japan. East Asia Forum (December 22). Available: <https://www.eastasiaforum.org/2012/12/22/getting-old-after-getting-rich-comparing-china-with-japan/>

Johnston, L., Liu, X., Yang, M. and Zhang, X., 2016. Getting rich after getting old: China's demographic and economic transition in dynamic international context. *China's New Sources of Economic Growth*, 1, pp.215-46.

Johnston, L.A., 2018. East Asia's Demographic Dividend. Asia Pacific and Society Policy Forum (May 9, 2018). Available: <https://www.policyforum.net/east-asias-demographic-dividend/>

Johnston, L.A., 2019a. The Economic Demography Transition: Is China's 'Not Rich, First Old' Circumstance a Barrier to Growth?. *Australian Economic Review*, 52(4), pp.406-426.

Johnston, L.A., 2019b. A Timely Economic Demography Lesson from China for the G20. *Institute For Global Dialogue Occasional Paper No. 75*, South Africa. Available: <https://www.africaportal.org/publications/timely-economic-demography-lesson-china-g20/>

Johnston, L.A., 2019c. The Belt and Road Initiative: What is in it for China?. *Asia & the Pacific Policy Studies*, 6(1), pp.40-58.

Johnston, L. A., 2019d. An economic demography explanation for China's 'Maritime Silk Road' interest in Indian Ocean countries. *Journal of the Indian Ocean Region*, 15(1), 97-112.

Johnston, L.A., 2020a. Africa is Youth-rich but Demographic Dividend-poor: The case for an Economic demography transition approach. Chapter in 2nd Murdoch University Africa Commission. Expected to be launched in September 2020 (subject to uncertainty).

Johnston, L., 2020b (forthcoming). Understanding Contemporary Transition Economy Demographic Challenges via China: The Economic Demography Transition Approach. In Douarin E. and Havrylyshyn O. (Eds) *Handbook of Comparative Economics*, Palgrave Macmillan.

Johnston, L., 2020b. Does Coronavirus have a silver lining? Asia & the Pacific Policy Society Policy Forum, March 4. Available: <https://www.policyforum.net/does-coronavirus-have-a-silver-lining/> (accessed April 28, 2020).

Jose, J., 2020. India will become an ageing society by 2040. *The Hindu Business Line*, April 27. Available: <https://www.thehindubusinessline.com/opinion/books/india-is-due-to-will-become-an-ageing-society-by-2040/article31438532.ece> (accessed May 9, 2020).

- Jose, J., 2020. India will become an ageing society by 2040. The Hindu Business online, April 26. Available: <https://www.thehindubusinessline.com/opinion/books/india-is-due-to-will-become-an-ageing-society-by-2040/article31438532.ece> (accessed May 8, 2020).
- Katagiri, M., Konishi, H., & Ueda, K., 2019. Aging and deflation from a fiscal perspective. *Journal of Monetary Economics*, 111: 1-15.
- Keynes, J.M., 1978. Some economic consequences of a declining population. *Population and Development Review*, 4(3), pp.517-523.
- Kuroda, H., 2018. Demographic Changes and Challenges for Financial Sector. Remarks at the Paris Europlace Financial Forum, Tokyo, November 19, 2018. Available: https://www.boj.or.jp/en/announcements/press/koen_2018/ko181119a.htm/ (accessed May 3, 2020).
- Kwan, F., Wu, Y., & Zhuo, S., 2018. Surplus agricultural labour and China's Lewis turning point. *China Economic Review*, 48, 244-257.
- Lai, H. H., 2002. China's western development program: Its rationale, implementation, and prospects. *Modern China*, 28(4), 432-466.
- Lai, F., C. Liu, R. Luo, L. Zhang, X. Ma, Y. Bai, B. Sharbono, & S. Rozelle. "The education of China's migrant children: The missing link in China's education system." *International Journal of Educational Development* 37 (2014): 68-77.
- Lee, R., 2003. The demographic transition: three centuries of fundamental change. *Journal of Economic Perspectives*, 17(4), 167-190.
- Lee, R. and Mason, A., 2006. What is the demographic dividend?. *Finance and Development*, 43(3), p.16.
- Lewis, W. A., 1954. Economic development with unlimited supplies of labour, The Manchester School, vol. 22, pp. 139– 191.
- Li, H., Fraumeni, B. M., Liu, Z., & Wang, X., 2009. *Human capital in China* (No. w15500). National Bureau of Economic Research.
- Li, H., Loyalka, P., Rozelle, S. and Wu, B., 2017. Human capital and China's future growth. *Journal of Economic Perspectives*, 31(1), pp.25-48.
- Liang, Z., 1999. Foreign investment, economic growth, and temporary migration: The case of Shenzhen special economic zone, China. *Development and Society*.
- Liu, T., & Sun, L., 2016. Pension reform in China. *Journal of Aging & Social Policy*, 28(1), 15-28. IMF 2006: <https://www.imf.org/external/pubs/ft/fandd/2006/09/basics.htm>
- Madsen, J. B., Robertson, P. E., & Ye, L., 2019. Malthus was right: Explaining a millennium of stagnation. *European Economic Review*, 118, 51-68.
- Malthus, T. R., Winch, D., & James, P., 1992. *Malthus: 'An Essay on the Principle of Population'*. Cambridge University Press.
- Maestas, N. and Zissimopoulos, J., 2010. How longer work lives ease the crunch of population aging. *Journal of Economic Perspectives*, 24(1), pp.139-60.

- Mason, A., Lee, R., Abrigo, M. and Lee, S.H., 2017. Support ratios and demographic dividends: Estimates for the World. *New York (NY): Population Division, United Nations*.
- Mohrman, K., & Wang, Y. (2010). China's drive for world-class universities. In *Higher education, policy, and the global competition phenomenon* (pp. 161-176). Palgrave Macmillan, New York.
- Nagarajan, R., Teixeira, A. A., & Silva, S., 2017. The impact of population ageing on economic growth: a bibliometric survey. *The Singapore Economic Review*, 62(02), 275-296.
- Naughton, B., 1993. Deng Xiaoping: the economist. *The China Quarterly*, 135, 491-514.
- NBS, 2020. National Bureau of Statistics National Data (online). Available: <http://data.stats.gov.cn/english/easyquery.htm?cn=E0103> (accessed April 28, 2020).
- People.com.cn, 2020. Deng Xiaoping: Emancipate the mind, seek truth from facts, unite and look forward (speech from December 13, 1978), *People.com.cn*, Available: <http://www.people.com.cn/GB/channel1/10/20000529/80792.html> (accessed May 4, 2020).
- Remuzzi, A. and Remuzzi, G., 2020. COVID-19 and Italy: What Next?. *The Lancet*.
- Reuters, 2019. China seeks to boost certified elderly caregivers by 2 million. Reuters World News, October 18. Available: <https://www.reuters.com/article/us-china-healthcare-elderly/china-seeks-to-boost-certified-elderly-caregivers-by-2-million-idUSKBN1WX12P> (accessed March 27, 2020).
- Rivzi, A. 2020. Will the world population be in decline within fifty years? *Inside Story*, May 4. Available: <https://insidestory.org.au/will-the-world-population-be-in-decline-within-fifty-years/> (accessed May 18, 2020).
- Rohde, L., 2019. Challenges for the pension sector in a low interest rate environment. Keynote speech, Governor Lars Rohde, Investment & Pensions Europe Conference, Copenhagen, December 3. Available: <https://www.bis.org/review/r191203c.pdf> (accessed March 28, 2020).
- Romer, P. M., 1994. The origins of endogenous growth. *Journal of Economic Perspectives*, 8(1), 3-22.
- Schleicher, A., 2016. China opens a new university every week. BBC News online, March 16. Available: <https://www.bbc.com/news/business-35776555> (accessed May 11, 2020).
- Serger, S. S., & Breidne, M. (2007). China's fifteen-year plan for science and technology: an assessment. *Asia Policy*, (4), 135-164.
- Shao, Y. and Xu, J., 2001. China's urban pension system: Reforms and problems. *Cato J.*, 21, p.395.
- Siegel, J.S., 1980. On the demography of aging. *Demography*, 17(4), pp.345-364.
- Solow, Robert M., 1956. A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics* 70: 65-94.
- Song, J., 2018. Young people, precarious work, and the development of youth employment policies in Japan. *Japanese Journal of Political Science*, 19(3), 444-460.
- Strulik, H., & Weisdorf, J., 2008. Population, food, and knowledge: a simple unified growth theory. *Journal of Economic growth*, 13(3), 195.

- Strulik, H., & Weisdorf, J., 2014. How child costs and survival shaped the industrial revolution and the demographic transition. *Macroeconomic Dynamics*, 18(1), 114-144.
- Sudo, N. and Y. Takizuka, 2018. Population Aging and the Real Interest Rate in the Last and Next 50 Years. *Bank of Japan Working Paper Series*, 18-E-1.
- The Economist, 2018. Why Italy's budget plan is so worrying, *The Economist*, 6 October. Available: <https://www.economist.com/leaders/2018/10/06/why-italys-budget-plan-is-so-worrying> (accessed March 2019).
- Tung, S. and Cho, S., 2000. The impact of tax incentives on foreign direct investment in China. *Journal of International Accounting, Auditing and Taxation*, 9(2), pp.105-135.
- UNa, 2019. Growing at a slower pace, world population is expected to reach 9.7 billion in 2050 and could peak at nearly 11 billion around 2100. Available: <https://www.un.org/development/desa/en/news/population/world-population-prospects-2019.html> (accessed March 28, 2020).
- UN 2019b. World Population Prospects 2019: Highlights. *New York (US): United Nations Department for Economic and Social Affairs*.
- UN 2015, Department of Economic and Social Affairs, Population Division, 2015. World population ageing 2015 report. *ST/ESA/SER. A/390*. https://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015_Report.pdf.
- UNESCAP, 2020. Ageing and its Economic Implications. *Social Development Policy Papers 2020/01*. Available: <https://www.unescap.org/sites/default/files/Ageing%20and%20its%20economic%20implications.pdf> (accessed May 12, 2020).
- Wall Street Journal, 2018. China's Notorious Family Planning Agency Fades into History. *Wall Street Journal* (March 14): <https://www.wsj.com/articles/china-signals-shift-away-from-birth-restrictions-as-population-ages-1521027577> (accessed March 26, 2020).
- Wei, S.J., Xie, Z. and Zhang, X., 2017. From "Made in China" to "Innovated in China": Necessity, prospect, and challenges. *Journal of Economic Perspectives*, 31(1), pp.49-70.
- Whyte, M. K., Feng, W., & Cai, Y., 2015. Challenging myths about China's one-child policy. *The China Journal*, (74), 144-159.
- Wilson, C., 2011. Understanding global demographic convergence since 1950. *Population and Development Review*, 37(2), 375-388.
- World Bank, 2018a. World Bank Report Offers Options for Elderly Care in China. Available: <https://www.worldbank.org/en/news/press-release/2018/12/13/world-bank-report-offers-options-for-elderly-care-in-china> (accessed March 26, 2020).
- WHO, 2018. Ageing and Health. *World Health Organisation Fact Sheet* (February 8). Available: <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>
- World Bank, 2019. Operational Tool for Pre-Dividend Countries. Available: <http://documents.worldbank.org/curated/en/781891550815372274/pdf/Demographic-Dividend-Operational-Tool-for-Pre-Dividend-Countries.pdf>

World Bank, 2020. *World development indicators*. World Bank. Available: <https://databank.worldbank.org/source/world-development-indicators>

Wu, C. 1980, The objective criterion to measure the adaptation of population development and economic development: The economic basis for advocating a couple to have only one child at the current stage in China, *Population Research*, 1, 32– 38 (in Chinese).

Wu, C. 1986, Population Ageing Discussion, Liaoning People's Publishing House, Shenyang (in Chinese).

Wu, C., and Mu, G., 1996. Low fertility rate, market economy and poor-old population control in China. *China Poor-old population Science*, vol. 3, pp.1-10 (in Chinese).

Wu, C., 2006. Population as a consistent challenge in sustained economic growth, *Population Research*, 30(2), pp.2-9.

Wu, C.P. and P. Du, 2006. 'Population Ageing in China: Changes and Challenges'. China Population Publishing House, Beijing (published in Chinese).

Xinhuanet, 2019. Chinese university graduates rise exponentially, have diverse career options, June 24. Available: http://www.xinhuanet.com/english/2019-06/24/c_138169311.htm (accessed May 8, 2020).

Xinhua, 2020. Banks should make efforts to innovate pension financial services, April 27. Available: <http://rmb.xinhua08.com/a/20200427/1933052.shtml> (accessed May 10, 2020).

Xing-Yuan, G., & Sheng-Lan, T., 1995. Reform of the Chinese health care financing system. *Health Policy*, 32(1-3), 181-191.

Yang, D. L., 1991. China adjusts to the world economy: the political economy of China's coastal development strategy. *Pacific Affairs*, 42-64.

Yuan, C., Li, C., & Johnston, L. A., 2018. The intergenerational education spillovers of pension reform in China. *Journal of Population Economics*, 31(3), 671-701.

Zhao, Q., & Mi, H., 2019. Evaluation on the Sustainability of Urban Public Pension System in China. *Sustainability*, 11(5), 1418.

Zhang, J., 2017. The evolution of China's one-child policy and its effects on family outcomes. *Journal of Economic Perspectives*, 31(1), pp.141-60.

Zhang, X. (Ed.), 2011. *China's Education Development and Policy, 1978-2008*. Brill.

Zhou, J., 2019. China's 2019 government work report echoes NPC deputies' concerns. CGTN news online. Available: <https://news.cgtn.com/news/3d3d674d3255544d33457a6333566d54/index.html> (7 March) (Accessed 11 May 2020).

Appendix A: Child Population Share, 2019
(share of population comprising persons aged 0-14 years)*

High Fertility Rate Society		Pre-Demographic Dividend Era		Demographic Dividend Era		Post-Demographic Dividend Era		Low Fertility Rate Society	
Niger	49.8	Malawi	43.5	Cabo Verde	28.4	Bahrain	18.7	Cuba	16.0
Mali	47.3	Guinea	43.4	Libya	28.1	USA	18.5	Finland	16.0
Chad	46.8	Senegal	42.8	South Asia	28.0	St. Lucia	18.2	Ukraine	15.9
Angola	46.6	Afghanistan	42.5	Guyana	27.9	Russia	18.2	Moldova	15.9
Uganda	46.5	Cameroon	42.4	Israel	27.9	Montenegro	18.2	Netherlands	15.9
Somalia	46.4	Benin	42.2	Dominican Rep.	27.7	China	17.8	Canada	15.8
Congo, DRC	46.0	Zimbabwe	42.2	Ecuador	27.7	France	17.8	Czech Rep.	15.7
Burundi	45.4	Guinea-Bissau	42.2	Venezuela, RB	27.4	UK	17.7	Luxembourg	15.7
Burkina Faso	44.7	Sao Tome & Prin.	42.1	Bangladesh	27.2	Sweden	17.6	Romania	15.6
Zambia	44.5	Cote d'Ivoire	41.7	Morocco	27.0	Norway	17.4	Serbia	15.5
Mozambique	44.4	South Sudan	41.6	Suriname	26.9	Albania	17.4	Slovakia	15.5
Gambia, The	44.1	Congo, Rep.	41.5	El Salvador	26.9	Mauritius	17.3	Poland	15.2
Central African Rep.	43.9	Togo	41.0	Panama	26.8	Belgium	17.1	Lithuania	15.1
Tanzania	43.8	Liberia	40.8	India	26.6	Barbados	17.1	Slovenia	15.1
Nigeria	43.7	Sierra Leone	40.7	Indonesia	26.2	Belarus	17.0	Switzerland	14.9
		Madagascar	40.4	Mexico	26.2	Thailand	16.8	UAE	14.7
		Ethiopia	40.3	Myanmar	25.9	Cyprus	16.7	Bosnia & Herz.	14.7
		Sudan	40.2	Lebanon	25.6	Estonia	16.5	Bulgaria	14.7
		Solomon Islands	40.1	Bhutan	25.3	Denmark	16.4	Spain	14.6
		Mauritania	39.9	Peru	25.3	Nth Macedonia	16.4	Croatia	14.6
		Rwanda	39.8	Saudi Arabia	24.9	Latvia	16.3	Hungary	14.4
		Comoros	39.3	Iran	24.7	Puerto Rico	16.3	Austria	14.4
		Yemen, Rep.	39.2	Argentina	24.6			Malta	14.3
		Kenya	39.2	Turkey	24.3			Macao	14.0
		Vanuatu	38.7	Tunisia	24.2			Greece	13.9
		West Bank & Gaza	38.6	Guam	24.1			Germany	13.8
		Iraq	38.0	Sri Lanka	24.0			Qatar	13.6
		Samoa	37.9	Seychelles	23.7			Portugal	13.3
		Eswatini	37.8	Grenada	23.7			Italy	13.2
		Ghana	37.4	Malaysia	23.7			Korea, Rep.	12.7
		Timor-Leste	37.3	Jamaica	23.5			Japan	12.6
		Gabon	37.2	Azerbaijan	23.4			Singapore	12.3
		Tajikistan	37.1	Vietnam	23.2			Hong Kong	12.3
		Equatorial Guinea	37.0	Colombia	22.6				
		Namibia	36.9	Brunei Darussalam	22.6				
		Kiribati	35.8	French Polynesia	22.6				
		Papua New Guinea	35.5	New Caledonia	22.4				
		Tonga	35.1	Oman	22.4				
		Pakistan	35.1	St. V. & Grenadines	22.2				
		Guatemala	33.9	Bahamas	22.1				
		Egypt, Arab Rep.	33.8	Antigua & Barbuda	22.0				
		Botswana	33.8	Kuwait	21.6				
		Jordan	33.6	Ireland	21.2				
		Haiti	32.9	Costa Rica	21.1				

		Kyrgyz Republic	32.5	Brazil	21.0				
		Lesotho	32.5	Armenia	20.8				
		Lao PDR	32.3	Uruguay	20.5				
		Micronesia, Fed. Sts.	31.5	Trinidad & Tob.	20.3				
		Honduras	31.2	Georgia	20.0				
		Cambodia	31.1	Korea, DPR	20.0				
		Syria	31.1	Maldives	19.9				
		Mongolia	30.8	Iceland	19.6				
		Turkmenistan	30.8	New Zealand	19.6				
		Bolivia	30.6	Chile	19.5				
		Algeria	30.6	Australia	19.3				
		Philippines	30.5						
		Nicaragua	29.9						
		Belize	29.7						
		Nepal	29.6						
		Fiji	29.3						
		Djibouti	29.2						
		Paraguay	29.2						
		South Africa	29.0						
		Kazakhstan	28.9						
		Uzbekistan	28.8						

*Phases of demographic transition are marked by the following thresholds (% population of persons aged 0-4 years old): Pre = 43.47; Early = 28.57; Late = 18.94; Post = 16.02. Source: *World Development Indicators*, World Bank (2020).

Appendix B: Seniors Population Share, 2019
(share of population comprising persons aged > 64 years)*

High Fertility Rate Society		Pre-Demographic Dividend Era		Demographic Dividend Era		Post-Demographic Dividend Era		Low Fertility Rate Society	
UAE	1.2	Central African Republic	2.8	Myanmar	6.0	Macao	11.2	Netherlands	19.6
Qatar	1.5	Guinea-Bissau	2.9	Indonesia	6.1	Argentina	11.2	Spain	19.6
Uganda	2.0	Cote d'Ivoire	2.9	Bhutan	6.1	China	11.5	Hungary	19.7
Zambia	2.1	Mozambique	2.9	Iran	6.4	Armenia	11.5	Puerto Rico	19.7
Angola	2.2	Togo	2.9	India	6.4	Chile	11.9	Czech Rep.	19.8
Burundi	2.3	Somalia	2.9	Azerbaijan	6.4	Mauritius	12.0	Denmark	20.0
Burkina Faso	2.4	Yemen, Rep.	2.9	Algeria	6.6	Moldova	12.0	Estonia	20.0
Kenya	2.4	Guinea	2.9	Paraguay	6.6	Israel	12.2	Lithuania	20.2
Eq. Guinea	2.4	Sierra Leone	2.9	Guyana	6.7	Singapore	12.4	Slovenia	20.2
Oman	2.4	Sao Tome & Prin.	3.0	Malaysia	6.9	Thailand	12.4	Sweden	20.2
Chad	2.5	Zimbabwe	3.0	Suriname	7.0	Cyprus	14.0	Latvia	20.3
Mali	2.5	Congo DRC	3.0	Lebanon	7.3	Aruba	14.1	France	20.4
Bahrain	2.5	Rwanda	3.0	Dominican Rep.	7.3	Nth. Macedonia	14.1	Malta	20.8
Gambia	2.6	Madagascar	3.0	Morocco	7.3	Albania	14.2	Croatia	20.9
Niger	2.6	Comoros	3.1	Bolivia	7.3	Ireland	14.2	Bulgaria	21.3
Afghanistan	2.6	Tajikistan	3.1	Ecuador	7.4	Luxembourg	14.3	Germany	21.6
Tanzania	2.6	Ghana	3.1	Mexico	7.4	Uruguay	14.9	Greece	21.9
Malawi	2.6	Senegal	3.1	Bahamas	7.5	Korea, Rep.	15.1	Finland	22.1
Congo, Rep.	2.7	Mauritania	3.2	Vietnam	7.6	Georgia	15.1	Portugal	22.4
Cameroon	2.7	West Bank & Gaza	3.2	Venezuela	7.6	Russia	15.1	Italy	23.0
Nigeria	2.7	Benin	3.3	Kazakhstan	7.7	Iceland	15.2	Japan	28.0
Kuwait	2.8	Liberia	3.3	Seychelles	7.8	Belarus	15.2		
		South Sudan	3.4	Panama	8.3	Montenegro	15.4		
		Iraq	3.4	Peru	8.4	Cuba	15.6		
		Saudi Arabia	3.4	El Salvador	8.5	Australia	15.9		
		Papua New Guinea	3.5	Tunisia	8.6	New Zealand	16.0		
		Ethiopia	3.5	French Polynesia	8.7	Slovakia	16.2		
		Gabon	3.5	Turkey	8.7	United States	16.2		
		Namibia	3.6	Colombia	8.8	Barbados	16.2		
		Vanuatu	3.6	Jamaica	8.9	Ukraine	16.7		
		Sudan	3.6	Antigua & Bar.	9.1	Curacao	17.2		
		Solomon Islands	3.6	Brazil	9.3	Bosnia & Herz.	17.2		
		Maldives	3.6	Korea, DPR	9.3	Norway	17.3		
		Jordan	3.9	New Caledonia	9.4	Hong Kong	17.5		
		Eswatini	4.0	Grenada	9.7	Canada	17.6		
		Kiribati	4.1	St. V. & Gren.	9.7	Poland	18.1		
		Lao PDR	4.2	Costa Rica	9.9	UK	18.5		
		Mongolia	4.2	St. Lucia	10.0	Serbia	18.7		
		Micronesia	4.2	Guam	10.2	Romania	18.8		
		Timor-Leste	4.3	Sri Lanka	10.8	Switzerland	18.8		
		Pakistan	4.3	Trinidad & Tobago	11.1	Belgium	19.0		
		Botswana	4.4			Austria	19.1		
		Libya	4.5						
		Turkmenistan	4.6						
		Uzbekistan	4.6						

		Kyrgyz Republic	4.6						
		Djibouti	4.6						
		Syria	4.7						
		Cabo Verde	4.7						
		Cambodia	4.7						
		Honduras	4.8						
		Belize	4.9						
		Lesotho	4.9						
		Guatemala	4.9						
		Samoa	4.9						
		Haiti	5.1						
		Bangladesh	5.2						
		Brunei	5.2						
		Egypt, Arab Rep.	5.3						
		Philippines	5.3						
		South Africa	5.4						
		Nicaragua	5.5						
		Fiji	5.6						
		Nepal	5.8						
		Tonga	5.9						

*Phases of demographic transition are marked by the following thresholds: Pre = 2.77; Early- = 5.97; Late = 11.18; Post = 19.29. Source: *World Development Indicators*, World Bank (2020).

Appendix C: Potential Policy Responses to Population Ageing in Transition Economies

Area	Prospective Policy Response Details
	Incentivize entrepreneurs to evolve initiatives and innovations that reduce the fiscal and private burden, in terms of labour and monetary cost, of caring. Promote rapid uptake across countries of useful such initiatives and ideas, including technologies, living arrangements, etc.
Aged Care Costs	Similarly, foster accommodation ownership and allocation so as to maximise allocation of housing resources across generations and minimizing caring needs - for example by encouraging older persons to live together independently rather than alone in big houses that they are dis-incentivized to leave.
	For transition economies that are part of a broader economic union involving free movement of labour, it may be important to evolve tax and pension-related cost sharing. If young labour from some member countries are contributing to pension systems in one country and not directly or indirectly from this contribution in their own countries, this may not only be a source of intra-union friction but also economic inefficiencies.
Fiscal and Pension-related matters	Similarly, the point in time when a country's working-age population share begins to fall should trigger a national tax structure review. As income-tax payers become rarer, rather than increasing per-worker income taxes, it may be necessary to shift the tax burden, toward consumption, or rent-based wealth. This will depend on each country's economic demography transition but may become a useful related trigger point for such a review.
	In transition economies especially, the older cohort have had a very different lifespan to the younger cohort (a fact that may receive insufficient attention across EU countries and within reunified Germany). Fostering communication and understanding of this difference, and encouraging inter-generational communication, including between elderly homes and schools, may support community and hence economic cohesion.
Foster intra-generational communication and support	This would also implicitly recognise that in non-transition 'old' (high-income) economies, the old by comparison have had relatively comfortable lives, a fact that itself may inspire political divergence between transition and non-transition members of economic and political unions.
	In the Netherlands meantime, there are programs for university students to live for free in the homes of the elderly in return for basic support and company. Such programs, if not already in place, may also usefully be established across transition economies with rapid population ageing, and other creative house-sharing arrangements also, across and within-generations.
Foster a positive 'population decline' debate.	Persons in child-bearing ages may or may not respond to calls for them to reproduce at higher rates. It is highly probable that, without migration, many transition economies will experience rapid population decline over coming decades, if not already. Since in any case migration will become increasingly competitive, and ultimately perhaps impossible as all countries reach a more advanced stage of demographic transition, finding ways to manage population decline for the better may also be a positive step.
	Study of new welfare metrics, reduced production of lesser-necessary consumption goods, etc, may be ways to foster such a debate. Similarly, such a debate when focused on the reality of a particular geographic area within a country may also be a useful starting point.

Shift selective necessary labour-intensive industries to labour-rich economies	<p>Greater awareness of countries by EDM quadrant: rich-old, rich-young, poor-old and poor-young, may help to foster dynamic factor-endowment congruent investment across countries. In East Asia a process of gradual outsourcing across countries by investors accordingly took place over decades. The same could take place across transition economies and between transition economies and today's remaining 'poor-young' developing countries.</p>
Incentivize New Industries	<p>As the working-age population share falls, new, less-labour-intensive industries need to be sought by the market. These may need to be encouraged by government incentives. Similarly, incentives that can tap into the greater spending power of the aged cohort in most Western European and North American economies may also pay dividends. A Cold War retro tour for retired members of the Boomer era starting at the location of John F. Kennedy's famous "Berliner" speech, could be an example.</p>
Foster global economic and social dialogue on economic demography issues and lessons-sharing	<p>This dialogue, began by Japan under its 2019 G20 Presidency, should see enhanced understanding of how each country's unique 'economic demography transition' affects its economy and politics; alongside lessons rapidly shared for cost-saving and living-standards improvements.</p> <p>It must also prioritise the welfare of the young - whose voices and lifespan interests may be lost in greater discounting of the future encouraged by rapid ageing. This would also study different national approaches to ageing, including and for example, China's, since China began focussing on how the economy may be affected by the demographic transition dynamically ahead of other countries thanks to the One Child Policy being implemented; and Japan, as the most advanced in ageing of countries getting old after getting rich.</p>

Source: Johnston (2020b).