



Does it matter if China gets old before it gets rich?

It is well known that China faces an aging problem. The popular narrative has it that China surged up the growth league tables on the back of its giant population, reaping years of demographic dividends to become the world's second largest economy. In this narrative, China's population is now aging and so this growth story must come to an end. We think this is only partly right; there is no question that China is aging, but we disagree that this necessarily spells a disaster for growth or investors.

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China has managed to grow, and can continue to grow, at a robust pace independently of the evolution in the size of its labor force. The aging of the workforce will take time to become a noticeable drag and can be partially offset by labor market reforms aimed at boosting participation rates among older workers.

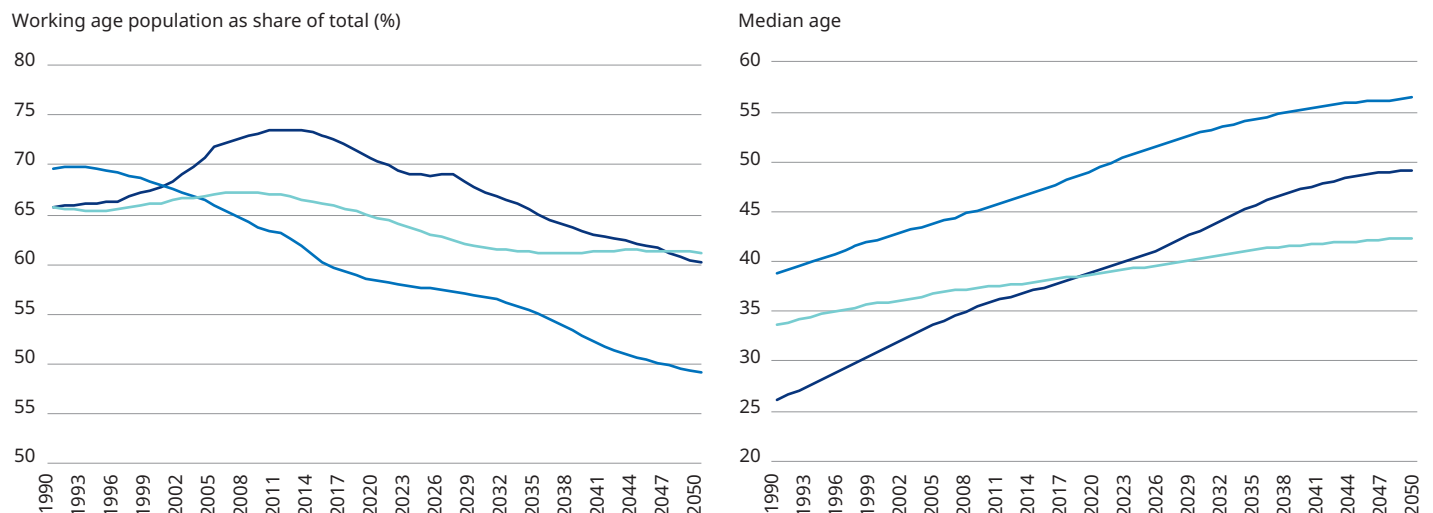
Far more important for the Chinese growth story is the productivity of the workforce, not its size. Reforms which boost the amount each worker contributes to the economy will be crucial. Chinese industrial policy is explicitly geared toward this aim, and understanding how key this is to China's success should help us understand China's negotiating position in the trade dispute with the US. It simply cannot afford to back down.

Farewell to the days of innocence

As visible in Figure 1, China's youth has bloomed and is beginning to fade. The peak in the working age population has come and gone, and from here the workforce will shrink in absolute terms, and as a share of the total population, which will itself decline from 2027¹. This will make it harder to generate economic growth, and increase the fiscal burden on the state as the dependency ratio climbs. On current projections, China will reach Japan's current dependency ratio by around 2050. Worse, the dependency ratio actually flatters China; the one child policy helps keep dependency ratios lower for a while by

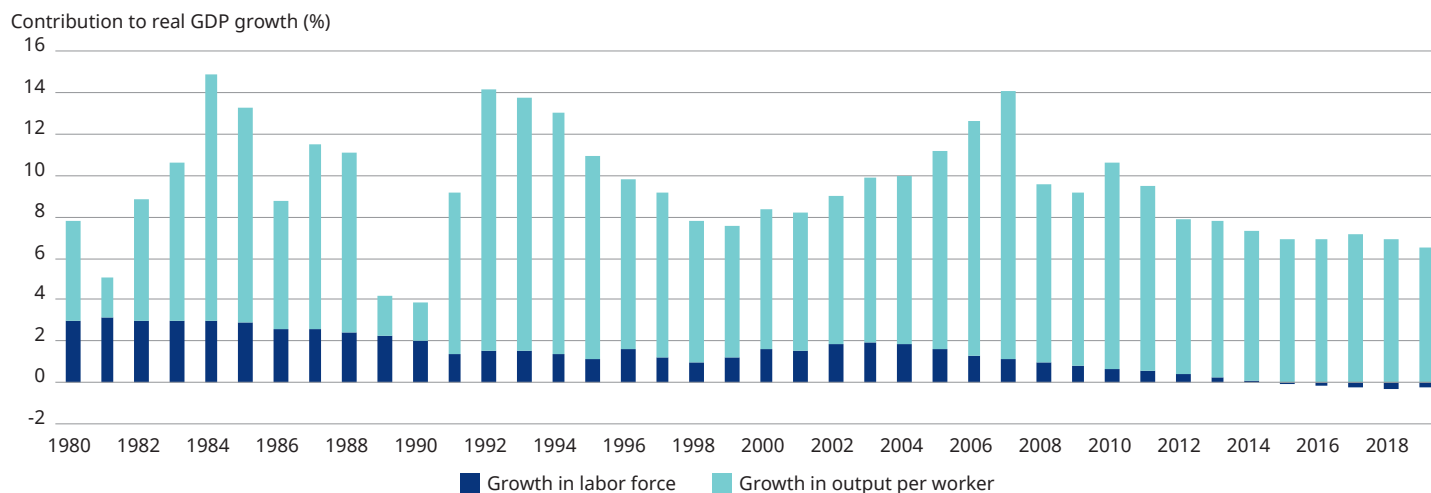
¹ Source: US Census Bureau projections 2019.

Figure 1: China is already aging



Source: US Census Bureau, Schroders Economics Group. February 13, 2019

Figure 2: Labor has long ceased to be critical to growth



Source: Thomson Datastream, World Bank, Schroders Economics Group. February 13, 2019.

reducing dependents under the age of 16². A look at the median age over time reveals how rapidly China has aged, and will continue to age. On this measure, China will become older than the US in 2021, and will be as old as Japan is today by 2045.

Whether this means China grows old before it grows rich is subjective, in that it depends on your definition for both old and rich. Current GDP per capita is a little under \$10,000, against \$40,000 in Japan, and \$60,000 in the US. With its current median age, China is the world's 67th oldest country³, and a median age of 45 would make it the 6th oldest country in the world today, which seems a good criteria for being "old" in absolute terms. China hits this age around 2035. Defining "rich" is also difficult, but taking the poorest Western European economy as an example would require GDP per capita of around \$20,000. Reaching \$20,000 GDP per capita in real terms by 2035 would require annual income growth of nearly 5%, when growth is at 6.5% and slowing. Raising the income threshold to \$30,000 would need annual growth of 8%, and \$40,000 (modern Japan) would require 10% growth. Achieving US levels of \$60,000 would require a herculean 13% rate. It seems highly likely that China will indeed become old before it becomes rich.

So far, so bad. But just because a country is old before it is rich, does not mean it can never become rich. Economic growth is derived from labor, capital, and technological progress, with the latter affecting how much output labor and capital are capable of producing. Just because labor enters decline does not mean growth has to stand still or decline. China can still rely on capital growth and technological progress to grow richer.

2 Though the one child policy was relaxed in 2013, and became a "two child policy" in 2016, it will take time (i.e. at least 16 years) for this to result in a boost to the working age population, even if effective. So far, the signs are that it has not resulted in a significant increase in birth rates.

3 CIA World Factbook.

To demonstrate this, first consider Figure 2, which decomposes historic Chinese growth into the contribution from labor and "everything else". It is undeniable that labor growth has made some sizeable contributions to Chinese GDP in the past, but more recently it has been a negligible component of the Chinese growth story. Clearly, advances in productivity, and heavy investment in capital, have been more important.

One boost to labor productivity over time has been the urbanization process. Urban workers are typically much more productive than their rural counterparts, with manufacturing a more productive sector than agriculture, which is held back by restrictions on private land ownership, a theme we will return to later. Based on official data, workers in the primary sector contribute, on average, a little under 19,000 RMB (Renminbi) to gross domestic product. Workers in the secondary and tertiary sectors, meanwhile, contribute 177,000 RMB per head. That implies, moving from rural China to urban China boosts productivity nearly ten times.

Of course, it is unrealistic to assume that the entirety of the agricultural workforce will be transferred to factories, if only because the country needs to produce some food. With that in mind, it would be useful to find some way of estimating the limits of urbanization. Fortunately, China is far from the first country to undergo this process, and so we can turn to history for a guide (Figure 3).

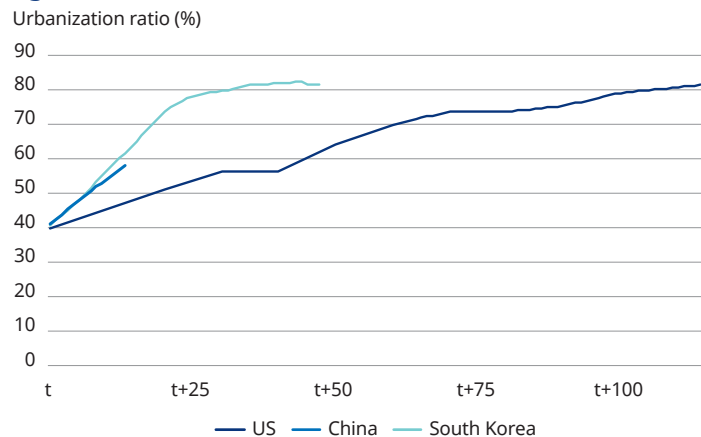
In general, an urbanization ratio of around 80% seems to be the ceiling, though we do find some exceptions. Japan, for example, is over 90% urban. However, this is likely to be due to factors unique to Japan rather than a likely end point for China, so we will focus on other, more relevant, examples. Figure 3 shows the experience of the US (which has a similar geographical scale to China) and Korea (which provides the most recent example), both of which more or less topped out at 80%, so let us assume the same applies to China. Beyond this end point, it would also be helpful to estimate how rapidly the process will occur, as this has further growth implications.

We have rebased Figure 3 such that each country starts from the same level of urbanization, to compare relative progress. Evidently, the US urbanized much more slowly than did Korea, and without looking at the Chinese data one might expect China to be similar, given that Korea is far more compact. Yet it turns out that China has so far followed the Korean path very closely. We suspect this at least partially reflects the advances in transportation and telecommunications technology since America's urbanization process. The World Bank forecasts that China will reach a 70% urbanization ratio by 2030, implying a roughly 0.9% urbanization rate per annum. This is lower than the Korean experience would imply, so we adopt this as a cautious estimate. It is not implausible that China would face greater difficulties over time, given the vastly larger land area relative to Korea.

However, this is not the only consideration. Another limiting factor for urbanization's growth contribution is what economists call the "Lewis Turning Point". At some point during the urbanization process, the agricultural sector cannot lose further workers to the rest of the economy without experiencing a labor shortage. Wages then climb in both agriculture and industry, outpacing improvements in productivity and so squeezing industrial profits and investment. This necessitates a change in the growth model, requiring a shift to a greater reliance on productivity growth rather than amassing production inputs. This is also the point at which growth likely slows markedly, and is the nub of many of the bear arguments.

A 2013 International Monetary Fund (IMF) paper⁴ provides some idea of when this turning point will be reached in China. The authors estimate surplus labor will be exhausted between 2020 and 2025, with the exact date depending on which scenario plays out. Boosting labor force participation would push the fateful date back to 2025, for example. So, we should expect to see a marked slowdown in Chinese trend growth by this time, if not sooner. Interestingly, this coincides with the time at which the Korean urbanization path would also imply a slowdown.

Figure 3: Urbanization has much further to run



Source: Thomson Datastream, Schrodgers Economics Group. February 13, 2019

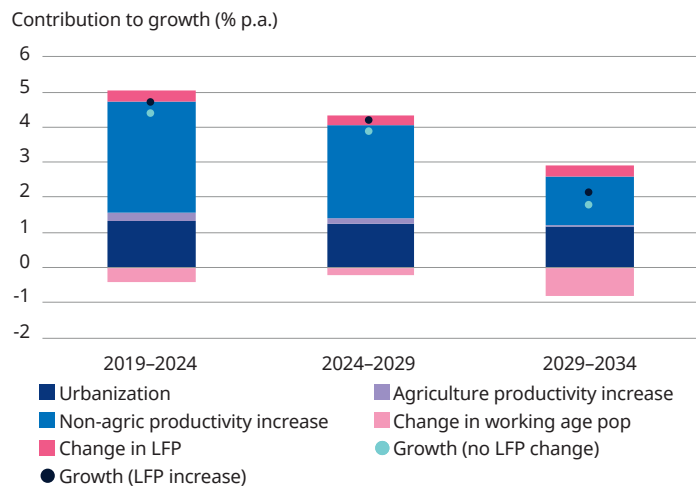
4 Das, M., N'Diaye, P. "Chronicle of a Decline Foretold: Has China Reached the Lewis Turning Point?" IMF Working Paper 13/26.

One final ingredient needed before we can model trend GDP growth is some assumption for labor productivity growth; a major driver for GDP growth in Figure 2. Using data from the St Louis Federal Reserve on capital stock and labor productivity, China today resembles Korea in the late 1990s in terms of its capital stock per worker. We therefore assume China roughly follows the Korean path and sees a gradual reduction in labor productivity gains, an assumption which imposes the Lewis Turning Point we discussed above and implicitly includes a reduction in the rate of capital accumulation.

Combining these assumptions, we have a forecast for Chinese trend growth based on demographic considerations (Figure 4). We also model a scenario in which China slowly raises its labor force participation (LFP) rate to Korean levels over the 15-year period. Labor force participation rates are reasonably high in China as a whole, but are below Korean and Western levels for the over 50s. Complete convergence would see an addition of around 50 million workers in 2030, or 5% of the forecast workforce. There may be a range of reasons for this disparity. We would speculate, for example, that it is harder to employ older workers in an economy with fewer service sector (and less physically demanding) jobs. Hence we model only a gradual convergence to Korean participation rates. As we do not see the two economies becoming structurally identical in the timeframe, this may be too optimistic, and so we should regard our LFP estimates as being something of an upper limit.

In the "no LFP change" scenario, trend growth is estimated at around 4.8% today and forecast to fall to 2.5% by 2034. While undeniably a slowdown, it is probably not the apocalyptic scenario often imagined. Furthermore, when we look at the breakdown, it is clear that the declining population is not a significant driver until the tail end of the period, when it shaves around 0.8 percentage points from the growth rate. The model also suggests that reforms aimed at boosting labor force participation would balance out the declining population until 2029/2030, so a declining population does not represent an existential threat to Chinese growth in the medium term. Instead, the real challenge lies in the falling productivity growth, which accounts for almost all the fall in total GDP growth. Unfortunately for China, there are few policy tools available to fend off this decline, which is an inevitable end point for any emerging market economy experiencing "catch up" growth. Schrodgers' Emerging Markets Equity strategist, Nicholas Field, discussed this at length in a previous note, but we can also spend a little time in this paper looking at some of the specifics for China.

Figure 4: Productivity, not demographics, is the key growth driver



Source: Thomson Datastream, Schroders Economics Group. February 14, 2019

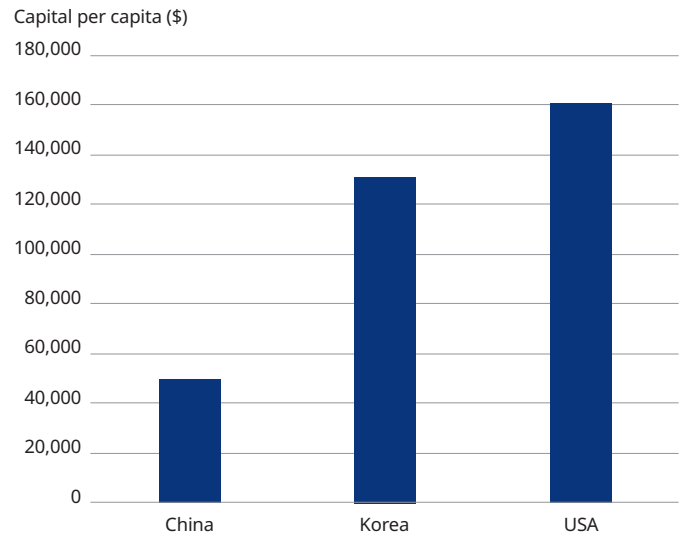
Chinese trend growth: the Solow perspective

We have concluded that an aging workforce, on its own, does not necessarily mean China can never become rich. As we saw, the bigger hurdle for China is the issue of productivity. Provided labor productivity is high enough, growth can be maintained in the face of a declining pool of labor.

For the workforce, productivity can be boosted by the simple expedient of adding more capital (while technological progress is also an important driver particularly in more advanced economies). To give a hugely simplified example, more machines mean workers can produce more goods. This then raises the question of how much capital can be added, and for what return. Clearly, at some point the addition of more machines in a factory would not raise the output per worker, because each worker would already be fully occupied utilizing the existing machinery. We might then suppose there is some optimum level of capital per worker, beyond which it does not pay to invest in additional units. This is the starting point of the Solow growth model.

In the Solow growth model, economic growth is driven by the accumulation of physical capital until this optimum level of capital per worker, the so-called “steady state”, is reached. The steady state itself is determined by labor force growth, the savings rate, and the rate of depreciation. The model predicts more rapid growth when the level of physical capital per capita is low, something often referred to as “catch up” growth. When the steady state is reached, growth in per capita incomes is determined entirely by technological progress. All things being equal, therefore, the model predicts that emerging markets should grow faster than developed markets, and this is generally what we see. So what does the model predict for China?

Figure 5: Capital stocks per worker in selected countries



Source: Penn World Table, Federal Reserve of St Louis, World Bank, Schroders Economics Group. February 11, 2019

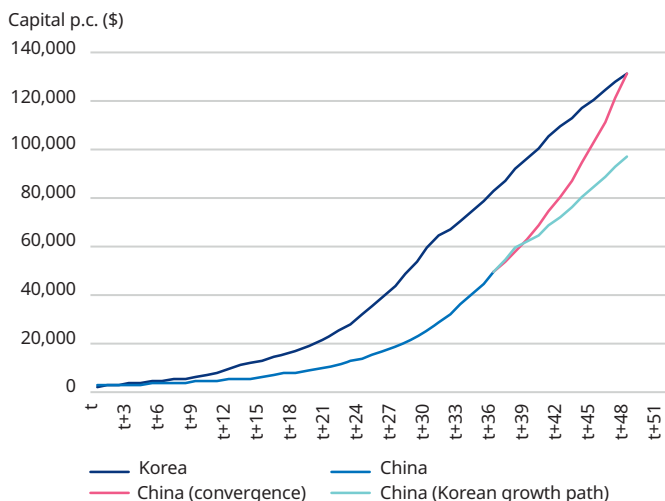
In the simplest form of the Solow model, we would assume China’s convergence over time with the US, which implies that there is a great deal of investment left to go, given a gap of \$110,000 per head. Yet it is possible that the US is the wrong example to choose for China; the countries have different savings rates in both physical and human capital, so convergence is not assured. We might instead look at Korea, which bears greater similarities to China in a number of ways.

An important similarity is the pattern of fertility and saving, rendering it a more likely point for convergence. It turns out that the scope for catch up is still significant, so again Solow’s model implies a growth rate above that seen in developed markets for as long as it takes to close the gap. We would also argue that the disparity in capital stocks demonstrates very clearly that China has not exhausted its investment opportunities, as some claim.

China has some work to do, however, if it is going to catch up to Korea. Historical data is imprecise and subject to revision, but on the latest estimates it would seem China is trailing the Korean experience. Figure 6 shows the per person capital stocks in both economies, starting in both cases when those stocks stood at around \$2,500 of capital per head. China lagged the Korean experience early in the process (the 1980s in China), but has since accelerated to match the Korean capital accumulation rate at the same level of capital stock.

If China is to catch up to Korea’s historical example, it would need to grow its per capita capital stock by a little over 8% a year for the next ten years, compared to a rate of 10% growth or higher for the last decade. A more cautious forecast would see China’s capital stock grow at the rate of Korea’s at the same level, closer to 4% a year over the same period.

Figure 6: Capital accumulation in China and Korea



Source: Penn World Table, St Louis Fed, Schroders Economics Group. February 15, 2019

The path China follows will be key to its future growth. Following the Solow approach, for example, we decompose growth into three main elements: growth in the labor force, growth in the capital stock, and growth in what is commonly called total factor productivity (TFP); essentially the efficiency with which we combine labor and capital, and which is boosted by technological progress.

We have two forecasts for capital growth, obtained from the analysis in the chart above. From our work on demographics, we have a forecast for labor growth. The final piece is perhaps the most contentious, as measuring TFP is difficult. We draw on data from the Penn World Table, which suggests that TFP growth in China has recently slowed to 1% from 2-3% before the crisis. For the US and Korea, TFP growth is 0.5-1% post crisis, which gives us an idea of the longer term productivity growth rate for China. As China's level of technology catches up, the scope for additional gains becomes more limited.

Recall that we described TFP as the efficiency with which inputs are combined into outputs. While technology undoubtedly plays a large role in this, government regulation also has an effect particularly given its impact on the efficiency of resource allocation. In this simple model, the resources in question are labor and capital.

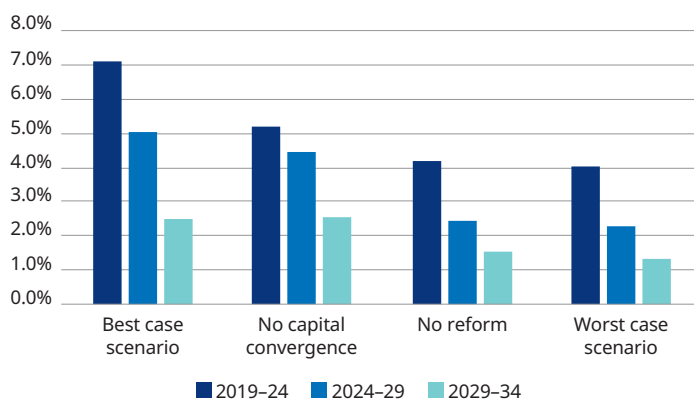
On labor, restrictions on labor mobility (in the form of the hukou registration system) will reduce efficiency and hinder TFP. On capital, a system under which credit is directed by a series of quotas and mandated lending is also likely to lead to inefficient allocation, as is evidenced by the excess capacity in China's heavy industry and property sectors. Reforms on both fronts can therefore boost TFP; the success or failure of market friendly reforms could have significant growth consequences. The trend in recent years for greater centralization and state control, to our minds, raises threats to hopes for TFP growth.

In Figure 7, we explore a few different scenarios for labor, capital and productivity growth. In a 'best case' scenario, we assume China converges to today's Korea (in terms of

capital stocks), and enjoys strong TFP growth by developed market standards, of 2%, until convergence occurs, thanks to ongoing reforms, at which point it slows to Korean rates of around 1%. Meanwhile, we assume labor markets alter such that labor force participation is boosted, particularly among the older members of the workforce. This optimistic scenario delivers an accordingly cheery picture of trend growth prospects; 7.1% for the next five years, slowing to 5% and then slowing more dramatically to 2.5% real growth, reflecting "catch up" to more mature economies, and the modest drag from an aging workforce.

Without capital convergence, the projections immediately become more modest, with trend growth just over 5% for the next five years. Trend growth is slightly higher in the final tranche, as capital growth is not capped at developed market rates. Further negative assumptions (no TFP boosting reforms, no LFP increase) further push down trend growth estimates. The "worst case" scenario would be a disaster for China; trend growth of around 1% would be a serious challenge to the Party's legitimacy.

Figure 7: Trend growth estimates based on a Solow approach



Source: Penn World Table, St Louis Fed, Schroders' Economics Group. February 15, 2019

Policy implications and conclusions

From our analysis, a few things become apparent. First, China has managed to grow, and can continue to grow, at a robust pace independently of the evolution in the size of its labor force. The contribution to growth from gains in output per worker greatly outstrips the contribution from changes in the number of workers.

Secondly, the aging of China's labor force only becomes a noticeable drag on growth in the 2030s, but we should be careful not to obsess over it. Increased labor force participation, particularly among the older population as in Korea, can (and likely will) help offset the effects of an older workforce. This will require a raising of the current retirement age (between 50 and 60 depending on gender and occupation), and the World Bank has also recommended strengthening mid-career training and encouraging flexible working. It is likely that growth in the service sector could boost labor force participation among older workers given the lessened physical intensity. What will really matter for Chinese growth is whether the economy can achieve strong productivity growth, both in labor and for the production process as a whole.

There may not be any policy prescriptions for ensuring capital convergence with Korea (needed for the 'best case' scenario), but even with a more modest rate of capital accumulation, China can achieve strong economic growth over the next 15 years. The most important are reforms which support total factor productivity, and this is already recognized by the leadership; Made in China 2025 is an explicit attempt to move up the value chain of production, in doing so greatly boosting the productivity of both capital and labor.

A recognition of the problems lying in wait for the Chinese growth model also underpins a push for land reform in China. Agricultural productivity is held back in part because the state owns farm land and leases it to farmers on a 30 year basis. Farmers cannot sell the land or use it as collateral for loans. Stronger ownership rights might foster investment, and would also facilitate the formation of larger farms by allowing the agglomeration of multiple smaller tracts of land. The problem lies in the fundamental clash between Communist Party ideology and the concept of private land ownership.

Factor productivity would also be boosted if the state were to step back from markets, and allow an allocation of labor and capital on the basis of the returns they can generate. This was much discussed, to great global optimism, in 2013, but the impetus has since faded.

We would worry less about the supply of workers, therefore, and instead pay close attention to efforts to reform China's markets. A greater concern for us is that, under President Xi, market focused reforms seem extremely unlikely. If anything, the trend has been for greater centralization and state control. There is a non-zero probability, as a result, of the 'worst case scenario'; no reform, no gains in labor force participation, and slower accumulation of productive capital.

Given the right policy mix, China's demographic decline is less of a problem than it appears. The challenge will be achieving that policy mix under a leadership that sees part of the solution as politically unpalatable.

A brief introduction to Made in China 2025

A key pillar of Chinese industrial policy, Made in China 2025 (China 2025) is an initiative aimed at upgrading Chinese industry, moving the country's manufacturing up the value chain. Key goals include increasing the domestic content of core materials to 40% by 2020 and to 70% by 2025. China 2025 was singled out by the recent US s301 investigation into China's unfair trade practices as a prime example of foul play by Beijing.

What worries the US and others is that China 2025 calls for self sufficiency through technological substitution, and for China to become a manufacturing superpower that dominates the global market in high tech industries. Robotics, AI, aviation, and new energy vehicles are all target industries.

Domestic content quotas run up against WTO rules against technology substitution, and in China's case would be extremely painful for members of the technology global supply chain like Germany and South Korea.

There is not much the US and others can do if Chinese dominance is achieved fairly; i.e. if Chinese firms were just so much more efficient and productive that they edged competitors out. But if achieved through government policy, including forced technology transfers (under which foreign companies must agree to transfer intellectual property in exchange for market access), subsidies and commercial espionage, it becomes unacceptable to other nations.

China is of course drawing on historical example here; South Korea, Japan, the US and Germany each developed in part through "acquiring" advanced intellectual property from established rivals. Unfortunately for China this does little to mollify the US today.

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