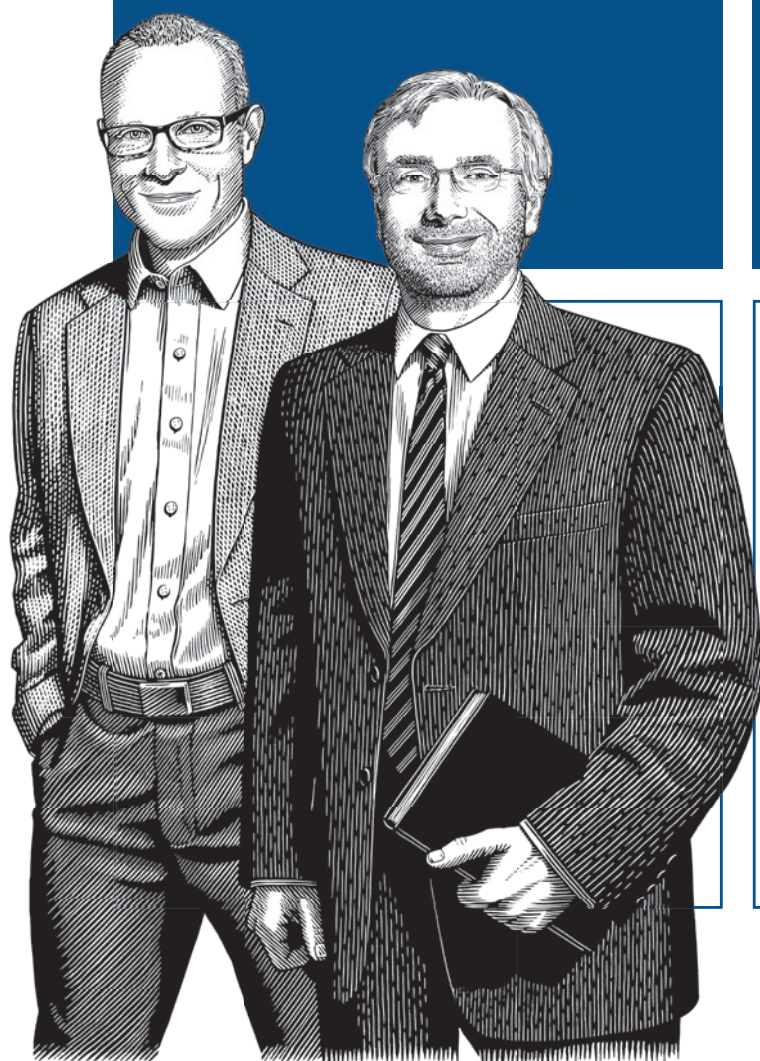


UBS Center  
Public Paper #1

# China's Great Convergence and Beyond



Kjetil Storesletten  
Fabrizio Zilibotti

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# Editorial



**Prof. Ernst Fehr**  
Director of the  
UBS International Center  
of Economics in Society

## Dear reader

It is a great pleasure to present the first UBS Center Public Paper entitled "China's Great Convergence and Beyond".

The launch of this new Public Paper series is a central initiative within the UBS Center's aspiration to provide new relevant research findings on key economic topics of our time to a broad audience. As the name implies, these papers are directed to the interested public at large. While the authors will always be international top specialists on the topics covered, the Public Papers are written in a clear, compact, and highly readable format, free of academic jargon and understandable without prior knowledge about the subject.

And what better topic for the first Public Paper than the (re-) emergence of China as a world economic power? The ascent of China is one of the most important features in today's global economic and political landscape. In this public paper, the authors present the latest academic insights into what lies behind China's fast rise and discuss the factors which can sustain or jeopardize its future growth.

You will receive the answers to these and related questions from two globally leading specialists on the Chinese economy, Prof. Kjetil Storesletten and Prof. Fabrizio Zilibotti. In 2012, they were the first western scholars to be awarded the highest ranked Chinese award for economists, the Sun Yefang Economic Science Award.

All that remains is for me to wish you much interest while reading it!



# About the Authors

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He has recently been elected President of the European Economic Association for the year 2016. He is the Chief Editor of the Journal of the European Economic Association, and a Fellow of the Econometric Society.

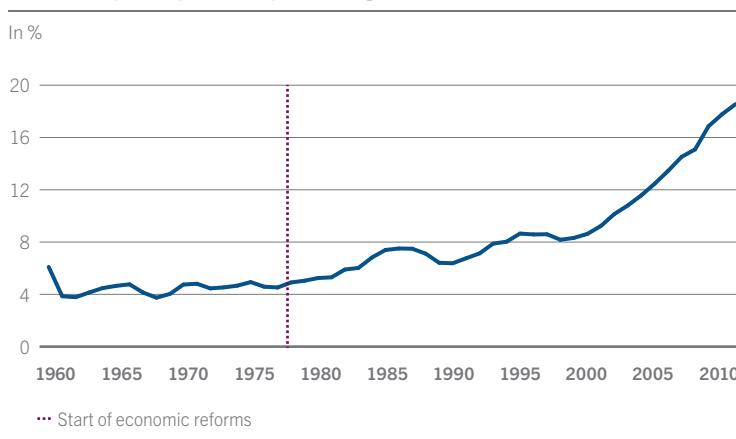
His research focuses on macroeconomics, economic growth and development, and the Chinese economy. Professor Zilibotti has published articles in several journals including American Economic Review, Econometrica, Journal of Political Economy, Quarterly Journal of Economics, and Review of Economic Studies. He is the recipient of the Yrjö Jahnsson 2009 Medal as the best economist in Europe under the age of 45, and of the Sun Yefang Award 2012.

# China's Great Convergence and Beyond

China is today one of the world's most powerful nations. China's population of 1.36 billion exceeds that of industrialized democratic nations, and the country is today the world's second largest economy and the largest exporter.<sup>1</sup>

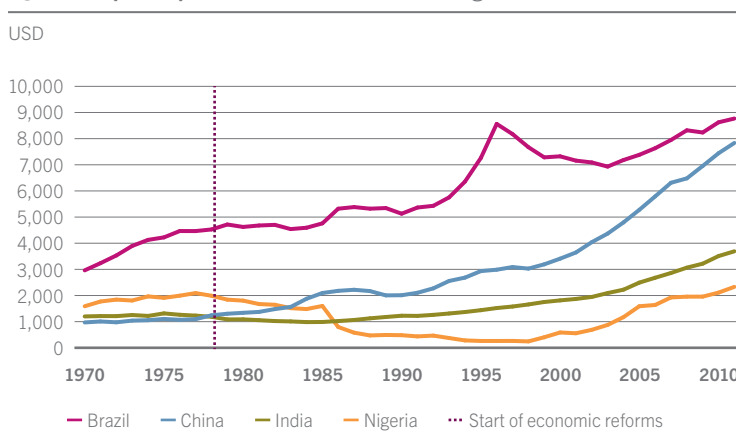
However, until the late 1970s, China was a very poor and closed country, with an income per capita of just above 4% of the US level (Figure 1), and poorer than low-income countries such as India and Nigeria (Figure 2). The process of economic reform, which started in the 1980s and accelerated in the 1990s, catapulted China into a trajectory of stellar growth. Over the first decade of the 21st century, China's GDP per capita grew at an annual 9.5% rate. Today, China's GDP per capita is more than twice as high as India's, and about four times as large as Nigeria's today. Its development is comparable to that of Brazil, a country with an income about 3.5 larger than China in the late 1970s.

Fig. 1 GDP per capita as a percentage of the US



Source: Penn World Table 8.0

Fig. 2 GDP per capita in selected countries (logarithmic scale)



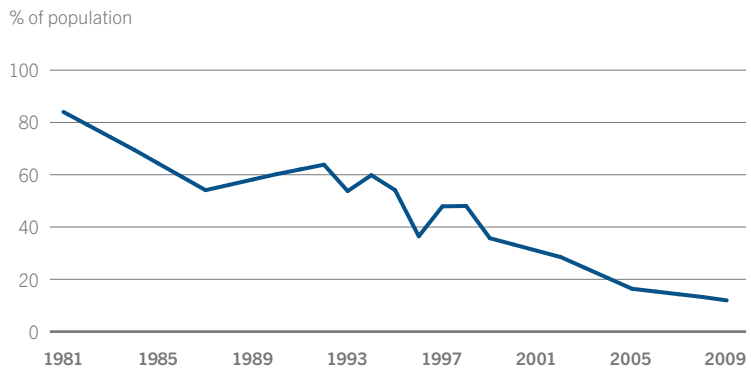
Source: Penn World Table 8.0

This is a discussion paper version of the article: Storesletten K, Zilibotti F. 2014. China's Great Convergence and Beyond. Annu. Rev. Econ. 6: Submitted. Doi: 10.1146/annurev-economics-080213-041050.

The resulting reduction in poverty is equally impressive: the fraction of the Chinese population living in extreme poverty plummeted from 84% in 1981 to 13% in 2008 (Figure 3).<sup>2</sup> Such a rapid improvement in living conditions for such a large share of the world population is unprecedented in history. But while China is much richer today than it was thirty years ago, its income per capita is still less than 20% of the US (Figure 1).

In this paper we address three related questions: First, why was China so poor in the 1970s? Second, why was growth so rapid after 1979? And third, what factors can sustain and what can jeopardize the future growth of China?

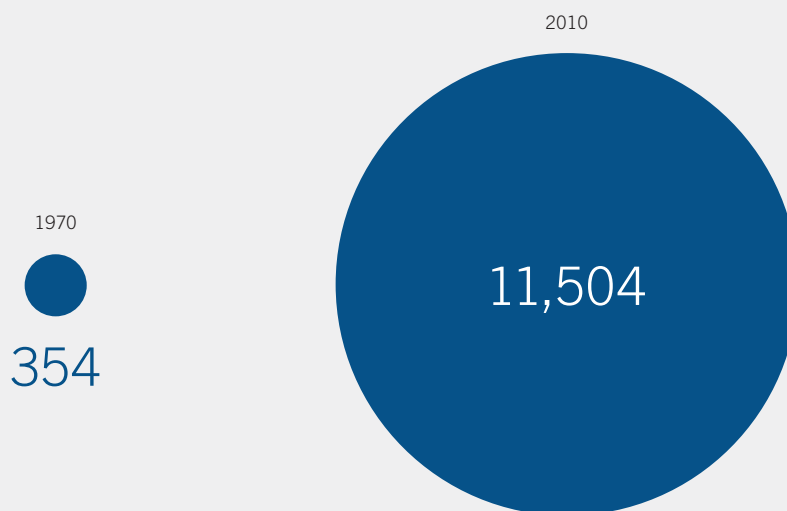
Fig. 3 Percentage of the Chinese population living in extreme poverty\*



\* Living with less than USD 1.25, daily. Source: World Bank

## The real great leap forward

China's real GDP (in bn 2005 USD)



Source: Penn World Table 8.0

# Historical Background

## Imperial China

Between 1000 and 1500 AD, China was the most technologically advanced region worldwide. Prosperity stretched from the Song period (960–1279) to the commercial development under the Ming dynasty (1368–1644), when sea explorations led Chinese traders all the way to the coasts of Africa. During this period China introduced many important inventions that would become known in Europe only a few centuries later. The so-called four great inventions – printing, gunpowder, paper making and the compass – were only some of the major innovations introduced during the Song period (or even earlier). Under that same dynasty, the central administration started issuing paper money, again well ahead of Europe. As long-distance trade with Europe developed in the 16th century, China exported technology-intensive goods in exchange for silver and primary commodities. The demographic evolution kept pace with the general prosperity: by 1100 the Chinese population rose to over 100 million, reaching 160 million at the time of the Ming dynasty.<sup>3</sup>

After the Ming splendor, power was seized by the Qing dynasty (1644 to 1912 AD) – native of Manchuria. It took the new rulers about four decades to conquer the whole country and to crush the Ming resistance. The conflict plunged the country into a severe economic downturn. Yet, China recovered, and by the end of the 17th century the economy was flourishing again. The living standards in the richest Chinese city – Beijing –

were already below those of London and Amsterdam in the 18th century, but were still comparable to those in cities such as Leipzig and Milan.<sup>4</sup>

The great divergence between China and Europe started in the 19th century. Hostile to Western influence, the imperial government imposed heavy barriers to the commercial relationships with Europe. The ensuing conflict with the Western colonial powers led to a sequence of wars ending in military defeats for China (e.g., the Opium Wars of 1839–1842 and 1856–1860). In turn, these undermined severely the legitimacy of the imperial government. Unrest erupted, most notably the Taiping Rebellion, an outright civil war, which brought the Manchurian rulers to confront surging Han nationalism between 1851 and 1864.<sup>5</sup> The revolt ended in bloodshed. Between 20 and 30 million people are estimated to have died as the army repressed the revolt with the help of the French and English armies.

The landmark economic event was the British industrial revolution. China benefited, as did Britain, from important technological improvements in agriculture. The control of river floods caused a surge in food production, which in turn induced a demographic boom: between 1680 and 1820, the population tripled. However, unlike in the West, progress in agriculture did not pave the way to industrialization and urbanization. In Britain these improvements precluded the breakdown of the Malthusian equilibrium. Fertility started to decline and income per capita to grow. China, in contrast, remained a rural country, with a stagnating income per capita.



## The four leaders of China in the 20th century



Sun Yat-sen  
1866–1925



Chiang Kai-shek  
1887–1975



Mao Zedong  
1893–1976



Deng Xiaoping  
1904–1997

## The Republic and the People's Republic of China

The divergence accelerated when Chinese political institutions collapsed in the early 20th century. A revolution in 1911 led to the proclamation of the republic under the presidency of Sun Yat-sen. However, the new state was weak and precipitated into a period of wars and anarchy.

In 1949, after the end of the Sino-Japanese war, the communist uprising, and the defeat of Chiang Kai-shek's nationalistic forces, the People's Republic of China (PRC) was founded under the leadership of Mao Zedong, chairman of the Chinese Communist Party (CCP thereafter). The PRC was a vastly impoverished country, dominated by traditional subsistence activities. From 1951 and onward, industry and agriculture were collectivized. Dissatisfied with the slow speed of progress, Mao launched in 1956 the "Hundred Flowers Campaign" inviting intellectuals and ordinary people to voice their open criticism of the Party's policies and bureaucracy. This window for open debate was soon closed, and replaced by the call for a "Great Leap Forward",

an ambitious (and improvised) plan intended to turn the People's Republic into a modern industrial collectivized country. Its implementation contributed to the ensuing famine that killed about 30 million people.<sup>6</sup> After an ephemeral reform-oriented stage under the aegis of Liu Shaoqi and Deng Xiaoping (1962–1964) a new wave of radicalism erupted with the start of the "Cultural Revolution", which was supposed to cleanse the society of capitalism and traditional Chinese values. During this tormented period, Liu Shaoqi was jailed and died in prison, while Deng Xiaoping fell into disgrace.

After Mao's death in 1976 and the liquidation of the "Gang of Four" – a group of leftist party officials, including Mao's wife – Deng Xiaoping became the de-facto leader of the Communist Party. He quickly repudiated the Cultural Revolution, and in 1978 launched a program of pragmatic economic reforms whose primary goal was to increase the persistent low productivity in agriculture.<sup>7</sup>



Flag of the Republic of China



Flag of the People's Republic of China

# The Great Convergence

## The 1980s: experimenting with economic reforms

After thirty years of central planning, China gradually adopted a set of market-oriented reforms. Land collectivization was replaced by the principle of “household responsibility” in agriculture, while the role of local governments was enhanced by the creation of township and village enterprises. The government experimented with a new industrial policy granting a special status to a few selected Special Economic Zones (SEZ). The decade marked the start of a rapid structural transformation from agriculture to industry and services: between 1978 and 2003 the employment share of agriculture fell from over 70 percent to less than 50 percent.

SEZ were especially important. They received preferential treatment in terms of tax deduction, custom duty deduction, reduced land-use price, and flexibility in labor and financial contracts. SEZ opened a hitherto isolated economy to foreign investments and the associated flow of technical knowledge. Initially, four SEZ were established: Shenzhen, Zhuhai and Shantou in the Guangdong Province and Xiamen in the Fujian Province. The success of the experiment led to a progressive expansion of Chinese industrial policy: in 1984 fourteen cities on the East Coast, and later two provinces and three delta areas became SEZ. Then, in 1992, 1998 and 2005 the SEZ status was extended to inland cities; first capitals, then median cities.

A recent empirical study tried to quantify the effects of SEZ on the economic development of China. The establishment of SEZ was staggered over time and space. The study exploits this variation across 276 Chinese cities over the period 1988–2010 to estimate econometrically the effect of the industrial policy. Their main finding is that becoming a SEZ increases the city's GDP per capita by 20% after fifteen years, suggesting that the industrial policy indeed was effective in promoting economic development. SEZ were also important as their experiment strengthened the confidence of the political leadership that opening the Chinese economy to markets and trade was essential to achieve industrialization and economic development.<sup>8</sup>

In summary, the 1980s were an important decade of experimentation in economic reform. Development took off as productivity in agriculture soared and domestic and foreign investments poured into the SEZ. Nevertheless, most of the country remained subject to a centralized planning system. By the end of the decade, growth slowed down and popular discontent grew as widespread corruption within the political elite was exposed. Street demonstrations after the death of the reformist leader Hu Yaobang in 1987 were followed two years later by the student protest, violently repressed, in Tiananmen Square. Divisions fermented within the Commu-



nist Party as its conservative faction challenged the whole process of economic reform.

## The 1990s: China becomes a market economy

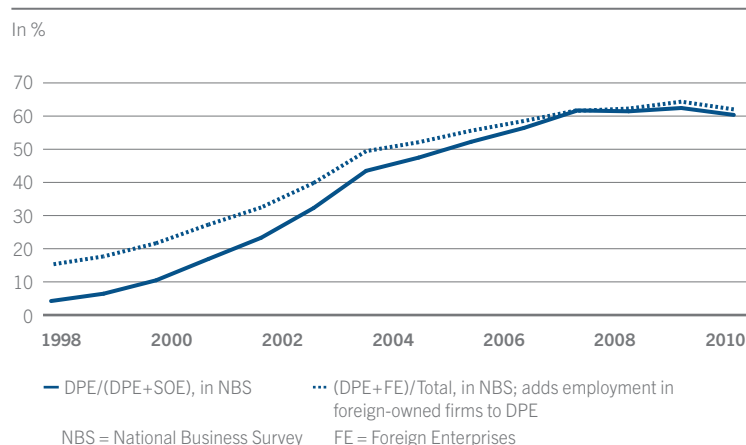
The early 1990s were marked by great uncertainty. Eventually, the pro-reform faction won, and the reform process resumed. The turning point was Deng Xiaoping's "Southern Tour" of 1992 – a series of informal speeches laying out the Party's new course and gathering support for deeper economic reforms that would transform China irreversibly. In 1992, the Shanghai Stock Exchange re-opened. State-owned enterprises (SOE thereafter) were subjected to market competition with inefficient and unprofitable entities forced to either restructure or shut down. Many SOE were privatized or formed joint ventures with foreign firms. Wholly private enterprises owned by Chinese

entrepreneurs were created and received the official blessing of the CCP in 1997. China embraced a process of export-led growth, culminating in accession to the World Trade Organization in 2001. It is often argued that the growth in the 1990s was largely investment-driven. Indeed, investment rates were sustained at a very high level, well over 30%. However, the economic transformation was more than mere capital accumulation: it brought about major changes in the sectoral composition of output, urbanization, and a growing importance of markets, technology adoption and entrepreneurial skills. If part of China's success can be explained by the adoption of new technologies from existing firms, reallocation has been a key driver of the growth process. Recent studies document that up to two-thirds of the aggregate productivity growth in manufacturing was due to selection, i.e., high-productivity firms entering and low productivity firms exiting the market.

The lion's share of this reallocation process is the exit of low-productivity state-owned enterprises (SOE) and their replacement with new domestic private enterprises (DPE). Figure 4 shows the private employment share in manufacturing, mining and construction, including both domestic private enterprises and foreign-owned enterprises.<sup>9</sup> In 1994, private enterprises accounted for about 10% of total employment. By 2007, their share exceeded 50%. A number of empirical studies document that SOE are, on average, significantly less productive than DPE. Thus, the process of reallocation is related intimately to the progressive privatization of the Chinese economy.

Another salient feature of the Chinese transition is the low wage growth. The average real annual growth of wages in the urban manufacturing sector was 7.6% from 1992 to 2007, whereas the average growth rate in the urban real GDP per capita during the same period was above 10%. Moreover, part of the measured wage growth stems from a composition

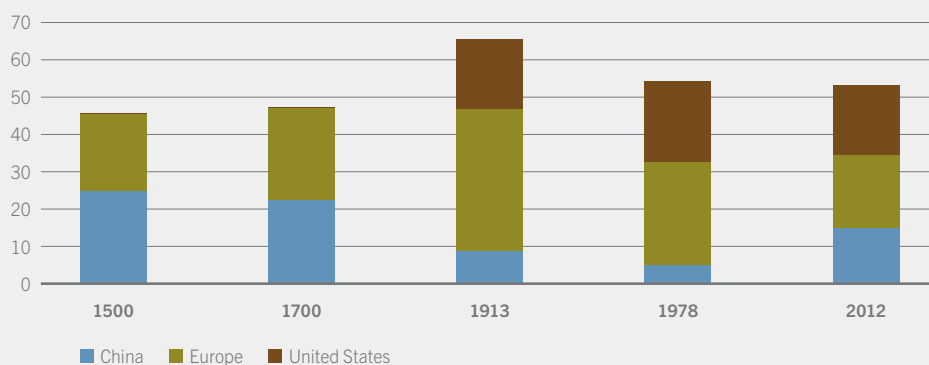
Fig. 4 Employment share of domestic private enterprises (DPE) in manufacturing, mining and construction



Source: China Statistical Yearbook

## Back again: China's long re-rise as a world power

Share of world GDP in %



Sources: 1500–1978: Angus Maddison, *Historical Statistics of the World Economy*; 2012: International Monetary Fund, *World Economic Outlook Database*, October 2012.

effect as the share of educated workers has risen. There is also evidence of a falling labor share of aggregate output, from 50% in 1992 to 41% in 2005. The moderate wage growth, combined with the economic success of a thriving class of new entrepreneurs, has contributed to the rising inequality in China.

Finally, China was (and is) characterized by pervasive credit and financial market imperfections. A symptom of these imper-

fections is the large gap between high corporate returns and very low returns on savings: the average real rate of return on bank deposits, the main financial investment of Chinese households, was close to zero. Firms are credit constrained, and private firms more so than SOE. The discrimination against private enterprises is reflected in the evidence that DPE finance a substantially smaller share of their new investments through external channels (bank loans or equity).<sup>10</sup>

## “Growing like China”

In one of our recent studies<sup>11</sup>, we propose a theory consistent with the empirical regularities outlined above: high output growth, sustained returns on capital investment, an extensive reallocation within the manufacturing sector, and a falling labor share. The building blocks of the theory are financial imperfections and differences in productivity across firms. Some (mostly privately owned) firms use more productive technologies, but less productive (mostly state-owned) firms survive because of a better access to

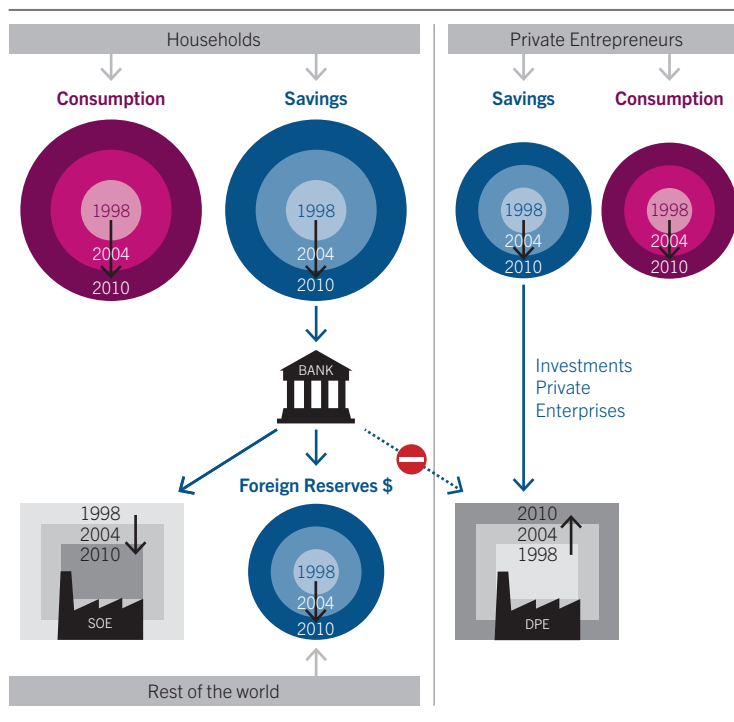
credit markets. Due to credit constraints, private firms must be financed out of internal savings. If these savings are sufficiently large, the high-productivity private firms outgrow the low-productivity state-owned firms and attract an increasing employment share. This reallocation is a source of productivity growth at the aggregate level.

Figure 5 sketches the mechanics of the model used in that study. Banks collect resources by offering households deposit

accounts. On the liability side of their balance sheets, they have loans to domestic firms and foreign bonds.<sup>12</sup> However, as the figure emphasizes graphically, banks do not lend to DPE. Thus, the growth of DPE hinges on the personal savings and investments of their owners (entrepreneurs).<sup>13</sup> Since DPE are more productive, absent credit market imperfections, banks should instead lend mostly to DPE. If this had occurred, DPE would have swiftly pushed the SOE out of the market. So, credit market frictions guarantee the survival of bad firms. In addition, they originate a “saving glut” that feeds the accumulation of foreign reserves. As the figure hints, in 1997, the economy was dominated by SOE, with only a small share of workers employed by DPE. At the time, the foreign surplus is small. However, thanks to their higher productivity, DPE grew faster than did SOE. Thus, the demand of loans from SOE shrank over time, whereas savings continued to grow. Hence, the saving glut: the downsizing of the state-owned firms forced a growing share of domestic savings to be invested in foreign assets, generating a booming accumulation of foreign reserves. We will return to this issue in the following section below.

Figure 5 describes the mechanics of the Chinese economic transition. However, what was the trigger of the transition? Part of the answer lies in the industrial policies started in the 1980s and expanded throughout the 1990s, such as the SEZ discussed above. Another important policy change was the new strategy laid out by the Ninth Five-Year Plan in 1997, which gave the official green light to privatization. The new strategy also specified the limits to privatization, by requiring that a strong state presence should be retained in some key sectors. In those industries, the system of SOE should be rationalized rather than let die. The slogan was “*Grab the large and release the small firm*”.

Fig. 5 “Growing Like China”



The data confirm that 1997 was a turning point. Since then, the role of SOE has declined substantially in many sectors, especially labor-intensive ones, while it has remained dominant in other more capital-intensive industries (e.g., electrical and heating power or transport equipment). In these industries, the government promoted the merger and restructuring of SOE into large transregional groups. Surviving SOE enjoyed rising profits. This is due in part to productivity improvements within surviving SOE and in part to the “survival of the fittest”: the least productive SOE exited the market or were forced to merge or restructure, whereas the most productive (typically, large) SOE continued and expanded their activity. In many instances, the increasing profitability of surviving SOE is due to increasing monopoly power. These firms did not only remain dominant in their industries, but also benefit from the increased efficiency of the rest of the manufacturing industries which were liberalized.<sup>14</sup>

## The foreign surplus

High growth in China has been accompanied by a persistent trade surplus (Figure 6) and the accumulation of foreign reserves which swelled from USD 21 billion in 1992 (5% of its GDP) to USD 3500 billion in June 2013 (over 40% of its GDP), see Figure 7.

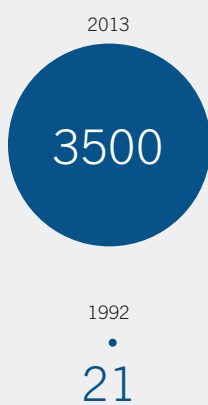
The recent literature has noted that this is a common feature to other fast-growing emerging economies (though there are exceptions, such as India). These economies have a large foreign surplus, in spite of the higher return on investments enjoyed by local firms relative to the rest of the world.<sup>15</sup> While China is not unique in this respect, it is the largest exporting nation. Thus, the Chinese foreign surplus has been the object of far greater public attention than any other country's in recent years. A concern is that cheap Chinese exports harm domestic firms and cause job losses in the West, in line with the evidence for the US.<sup>16</sup>

A popular argument is that trade surpluses are engineered by the Chinese government through a systematic exchange rate manipulation, i.e., by pegging the RMB to the dollar at a low value. This view has dubious foundations. While the Chinese surplus has persisted for almost two decades, after a period of mild depreciation, the real exchange rate has been appreciating since 2003.<sup>17</sup> A misaligned exchange rate should feed domestic inflation, e.g., by increasing the demand of non-traded goods and stimulating domestic wage pressure. However, until very recently it does not appear as if China has experienced any major inflationary pressure – between 1997 and 2007 the inflation rate was on average about the same as in the US.

We provide an alternative, structural explanation for the imbalance.<sup>18</sup> This

### The world's banker ...

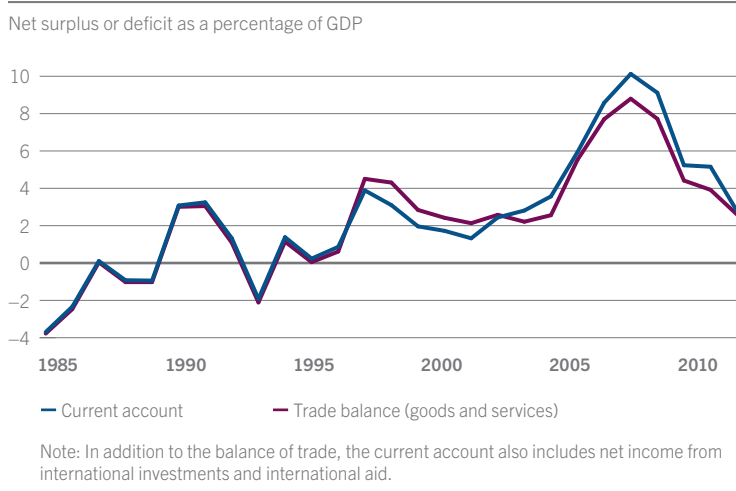
Chinese foreign reserves (in bn USD)



Source: China Statistical Yearbook.

explanation is consistent with the evidence in Figure 7 that the difference between total deposit and loans tracks very closely the accumulation of foreign reserves. This is consistent with the saving glut explanation outlined in the previous section. To see the same point from a different angle it is useful to consider the macroeconomics identity according to which the trade surplus equals the gap between domestic savings and investments. During the last fifteen years, China has experienced large investment rates, but even larger saving rates. Since 1997 domestic savings have exceeded domestic investments (Figure 8). To understand better what has happened, it is useful to decompose the savings gap between the household, corporate, and government sectors, see Figure 9. As can be expected, households are net suppliers of savings, while firms demand external resources to finance investments. The net position of the households (i.e., the gap between households' savings and investments) has

Fig. 6 Trade balance and current account of China: 1985–2011

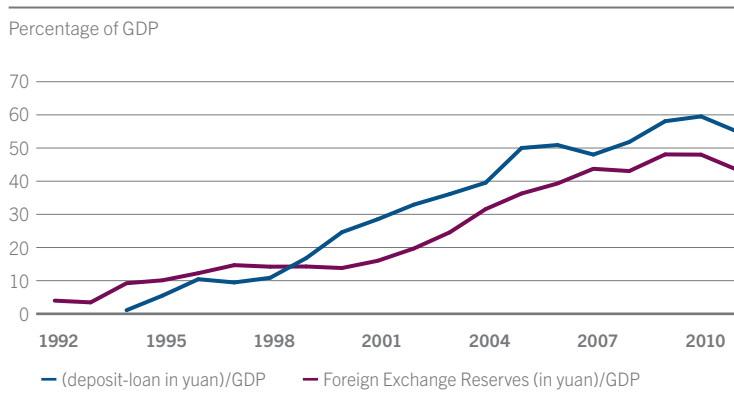


Source: State Administration of Foreign Exchange (SAFE) of China

increased slightly between 1992 and 2009.<sup>19</sup> In contrast, the net demand of external funds from firms, i.e., corporate investments minus savings, has been declining sharply as a share of the GDP since 1992. This means that the corporate sector has been financing a larger and larger share of their investments through retained earnings and less from household savings (which must be mediated through the financial sector). The government played a less important role in accounting for the aggregate savings gap.

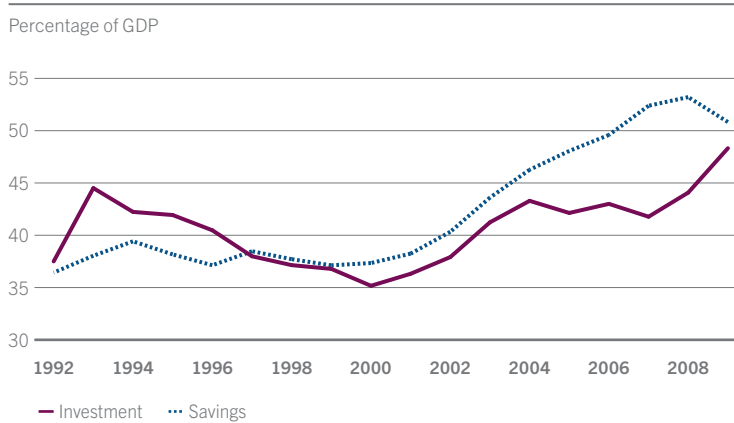
In summary, the gap between households' savings and investment has increased over time, while the demand of funds of domestic firms has fallen, arguably due to the Chinese banks' reluctance to finance the growing private firms. The result is a large gap between savings and investment, implying a large current account surplus. The exchange rate of the RMB plays no explicit role in this explanation.<sup>20</sup>

Fig. 7 Foreign reserves and gap between deposits and loans



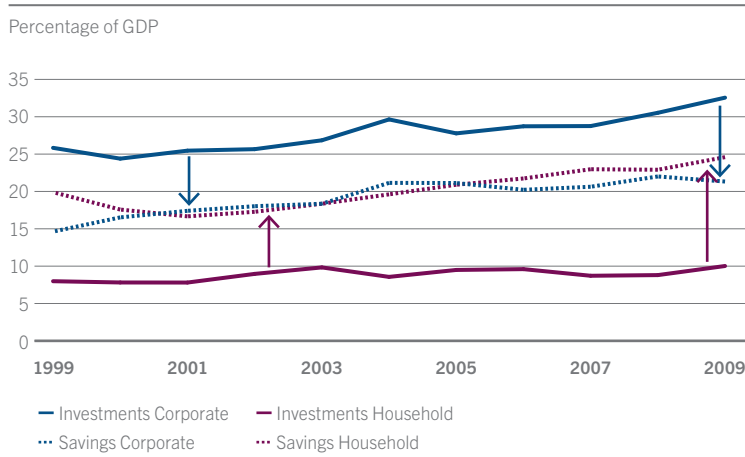
Source: China Statistical Yearbook

Fig. 8 Aggregate savings and investment in China: 1992–2009



Source: State Administration of Foreign Exchange (SAFE) of China

Fig. 9 Disaggregated savings and investment in China: 1999–2009



Source: State Administration of Foreign Exchange (SAFE) of China

## The savings puzzle

China's massive foreign surplus points to another puzzling aspect of China's transformation: its huge propensity to save. The aggregate saving rate has been above 35% of GDP since the 1980s, and has risen further after 2000, exceeding 50% in recent years. Household savings as a fraction of disposable income has increased from 16% in 1990 to over 30% nowadays. This is a much higher propensity to save than in any industrialized nation.

Why have Chinese households saved so much, given the fast income growth observed since the 1980s? A lot of recent research has attempted to answer this question. In a recent study, Marcos Chamon and Eswar Prasad document a large increase in saving rates for all cohorts and age groups, especially the young and the elderly.<sup>21</sup> They argue that a key driver of high savings is the shifting burden of health and education expenditures from the state to individuals, a change that has induced young households to save for their children's education, and elderly households to save for retirement and health care needs. The end of the so-called "iron rice bowl" had a particularly large effect on the savings of

ownership rate from 17% in 1990 to 86% in 2005, played an important role. Namely, the reform increased house prices and the number of potential buyers. Given the down-payment constraints and financial frictions, the savings had to increase.<sup>22</sup>

Yet other authors argue that savings rates in China may be high because of precautionary motives. They document that Chinese households face more severe income uncertainty than do US households, and hence save more.<sup>23</sup> A concern with this explanation is that while household saving rose sharply after 2000 (see Figures 8 and 9), it is difficult to point to a large empirical increase in individual risk during this period. For instance, pension coverage increased over that decade.

An important policy change that may have affected saving behavior is the sequence of family planning policies introduced in the 1970s, culminating with the 1979 one-child policy. This policy imposes draconian sanctions on urban couples who have more than one child and rural couples who have more than two children – with exemptions for

“The one-child policy may have increased savings since it reduced the number of children who can potentially provide old-age transfers when parents retire.”

the generations more directly affected by the reforms – i.e., those who were in their 40s and 50s in 1990. Other researchers argue that the large-scale privatization of houses, which triggered an increase in the

special groups and ethnic minorities. As a consequence, the total fertility rate (TFR) fell sharply. For instance, in urban areas, the number of surviving children fell from 3.2 in 1970 to less than 1.3 in



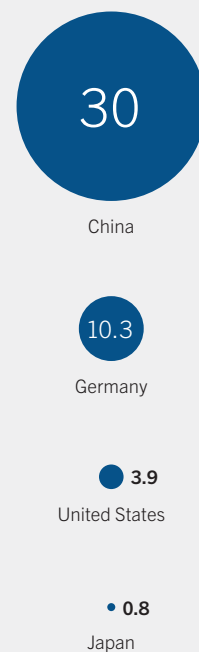
1982. Recent studies argue that the policy's introduction may have increased savings since it reduced the number of children who can potentially provide old-age transfers when parents retire.

Among them, Abhijit Banerjee and his co-authors' study looks at the effect of the family planning policies introduced in 1972 under Chairman Mao on the savings behavior of today's retirees.<sup>24</sup> These policies encouraged an increase in birth spacing of three to four years. The researchers find that families subject to family planning policy have a saving rate 5.7 percentage points higher than those not affected. The difference is almost entirely accounted for by families whose first child is a daughter born in 1972 or later. For these families saving rates increased by 9.7 percentage points, whereas there is no significant effect of the 1972 family-planning policies on families whose first child is a son. They relate this finding to the Chinese tradition that sons provide more support to elder parents than do daughters. Thus, the policy had its strongest effect on the savings of families who had a daughter and were unexpectedly barred from having another child. These couples could not expect much help from their child, and therefore save more for retirement. Another recent study documents similar effects of the one-child policy on households with dependent children.<sup>25</sup>

Looking at a different channel, Shang-Jin Wei and Xiaobo Zhang argue that the increase in savings is related to the growing sex imbalance at birth. The sex ratio – i.e., the number of men per woman – has increased dramatically over the last three decades in China, from 106 boys for 100 girls in 1980 to 120 boys per 100 girls in 2005. This is due to the joint effects of the one-child policy, the traditional preference for a male offspring, and the access to selective abortion technology. These changes stiffened the competition among boys in the marriage market. They argue that, in

## Save, save, save ...

Saving rates, percentage of disposable household income



Sources: OECD; IMF

response, households with a son will increase their savings in order to make their boys more competitive in the marriage market. In support of this theory, they document that households with a son have a higher average propensity to save than households with a daughter. Moreover, the savings of households with a son increased more in regions with a greater sex imbalance. Finally, saving rates tend to be higher in regions and years with a greater local sex imbalance.<sup>26</sup>

The studies reviewed above suggest that demographic changes can be important for savings. However, changes in fertility may have different effects on savings at different stages of the life cycle. Due to data limitations, we do not yet know how the one-child policy will eventually affect savings for all age groups.

# The Future of China

What does the future bode? A common view in the West is that China's growth trajectory is unsustainable, due to the persistence of a nondemocratic institutional framework, different from those that promoted prosperity in the West. The extractive Chinese institutions – it is argued – can possibly sustain catch-up at an early stage of development, but will eventually become a burden and China will be caught in the “middle-income trap”.<sup>27</sup> Others argue that China's hybrid form of “state capitalism” can become a successful new model of economic growth, possibly exportable to other developing nations. Due of the lack of historical precedents, this debate is necessarily speculative.

In light of the recent economic literature, this section reviews factors influencing China's future economic development. We start with some impetuses, then discuss some obstacles.

## Impetus for sustained growth: R&D and human-capital accumulation

The mere *adoption of technologies* already in use abroad is likely to be a powerful engine of growth for at least another decade. China is still a relatively poor country, with an average productivity of firms and workers far below that of industrialized nations. Therefore, the potential for technological catch-up is

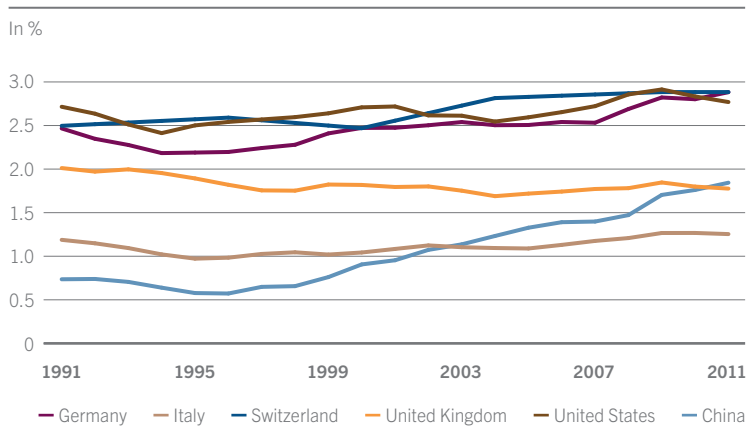
still enormous. To draw a comparison, in 2010 the GDP per capita of Russia was more than twice that of China. Given the current rates of productivity growth and fast technology adoption, it seems unlikely that China's institutions could prevent it from reaching Russia's current level of development.

Perhaps more important, China is transforming itself into an innovation-oriented economy. Foreign direct investments have been a major driver of technology transfer.<sup>28</sup> In addition, China has also invested large resources to develop a strong local innovation capability. The R&D investment share of GDP has increased steeply, from 0.7% in the 1990s to 1.84% in 2011. Today's figure is close to the average for the European Union (1.94%), although still lower than that of the United States, Germany and Switzerland (Figure 10). China has already surpassed rich economies such as Canada, Italy, Spain and the UK, and spends substantially more on R&D than do other emerging economies. The comparison is even more impressive if one restricts attention to industry-related R&D investments: China invests 1.36% compared with 1.66% of the US and 1.02% of the EU. Finally, looking at the number of patents in 2011, the Chinese patent office granted 172,000 patents, compared with 225,000 and 152,000 patents granted respectively by the US Patent and Trademark Office and the European Patent Office. In summary, China is a very innovative economy, far ahead other countries at a comparable development stage. Economic theories highlighting the risk of middle-income traps emphasize the inability for countries with rigid institutions to promote a transition from an investment-driven to an innovation-

driven growth.<sup>29</sup> There is no evidence so far indicating that China is getting stuck into a low-innovation equilibrium.

Next, China is making large *human-capital investments*. The average years of education in the population over 25 are now 7.5, twice as high as in 1980.<sup>30</sup> Assuming a rate of return to education of, say, 10% per year, this increase in educational attainment implies an increase in average labor productivity of 43% due to human-capital accumulation alone. The increase in the proportion of the population with some tertiary education is even faster: 6% today against 1% in 1980. The current enrollment rate in tertiary education (27%, according to World Bank 2013) implies steep increases in future educational attainment. The boom in higher education is a recent phenomenon: between 1979 and 1995, tertiary school enrollment rates were below 2.5%, and the increasing shortage of high-skill workers was reflected in a rapid rise in the return to education.<sup>31</sup> This trend was followed by a rapid expansion in higher education during the last decade, bringing the number of fresh college graduates from less than a million in 2001 to over six million in 2010. This was accompanied by a booming number of students studying overseas: Chinese students rep-

Fig. 10 R&D as percentage of GDP (selected countries)



Source: OECD Research and Development Statistics

times – especially during the cultural revolution – schools at all levels emphasized ideological learning. In all likelihood the market values this knowledge lower than it values the skills students obtain in the current schooling system. In 2009, Shanghai came out as the leader in the PISA study, outperforming by a wide margin Western countries. Interestingly, Shanghai students’ scores were far less correlated with their socioeconomic background than in OECD countries. Thus, schools appear to be a vehicle of social mobility in China.

“The potential for technological catch-up is still enormous. The mere adoption of technologies already in use abroad is likely to be a powerful engine of growth for at least another decade.”

resent today 18.2% of all international students enrolled in OECD countries.<sup>32</sup> Changes in the quantity of education likely underestimate the actual human-capital accumulation. During pre-reform

Human-capital accumulation, investments in technology adoption and industrial policies (such as Special Economic Zones) have come hand in hand with an increasing technology intensity of indus-

trial production. Over the last decade China has become increasingly less specialized in labor-intensive and low value-added industries (e.g., textiles), shifting its production and export structure towards high-tech sectors.

Finally, an important, yet largely unexploited potential source of future growth is the *reduction of the pervasive financial frictions*. As discussed above, these are responsible for severe misallocations. Thus, reforms aimed at reducing the market power of the large state banks, for instance by allowing banks to compete in offering deposit and lending rates (so far heavily regulated), and at improving the legal system (contract enforcement, investor protection, etc.) can have large effects on productivity.<sup>33</sup> The opening of the capital account and the convertibility of the RMB, currently under discussion, are an opportunity for such reforms.

## Inequality, aging population and pension system

Despite China's potential promise, there are looming issues that could potentially stall the reform process and threaten the future economic development. We discuss here four salient factors: the rising economic inequality; the aging population; the environmental toll of rapid economic growth and its negative impact on quality of life; and the fragility of the political equilibrium.

Economic inequality and the aging of the population are perhaps the most acute challenges to social cohesion and the status quo in China. Fast growth has been accompanied by a rapid increase of income inequality. Starting poor but equal, China has evolved into a highly

unequal society. The Gini coefficient of income has risen from 0.36 in 1992 to 0.47 in 2012, roughly comparable to that of the US, and much higher than that of any Western European country. The top 10% income share rose from 19% to 28% between 1990 and 2003. The sources of increasing inequality are manifold: age (i.e., younger cohorts are much richer than older ones), education, dispersion across regions and between rural and urban areas, resident and non-resident workers, capitalists and workers, etc. To the extent that a continued reform process – the status quo – requires social cohesion, the growing disparities pose a real risk. In absolute terms, growth has benefitted both the rich and the poor. As discussed above, the poverty rates have fallen dramatically after 1980. Over the same period, life expectancy has risen by approximately 10 percentage points, reaching 74 years in 2011. But while growth has benefitted the Chinese population overall, inequality may pose a threat to social cohesion, and has become increasingly salient in the discourse of the political leadership. In a 2012 press conference, the former premier of the State Council Wen Jiabao declared: “*I know that social inequities ... have caused the dissatisfaction of the masses. We must push forward the work on promoting social equity ... The first issue is the overall development of the reform of the income distribution system.*”

The looming aging of the population is another such critical issue. The total dependency ratio has fallen from 75% in 1975 to just 37% in 2010. This is due to the combination of high fertility in the 1960s – when China's total fertility rate (TFR, henceforth) was between five and six – and the family planning policies introduced in the 1970s, culminating with the one-child policy. As a result, a very large share of the Chinese population is of working age today. The expanding share of working people has contributed to economic growth in the two past decades. However, China has now reached a turn-

ing point: the old-age dependency ratio will increase from the current 12% to 39% in 2040. Figure 11 shows the evolution of the dependency ratio (i.e., the ratio between the number of people not in working age – children and elderly – and the number of people in working age) for

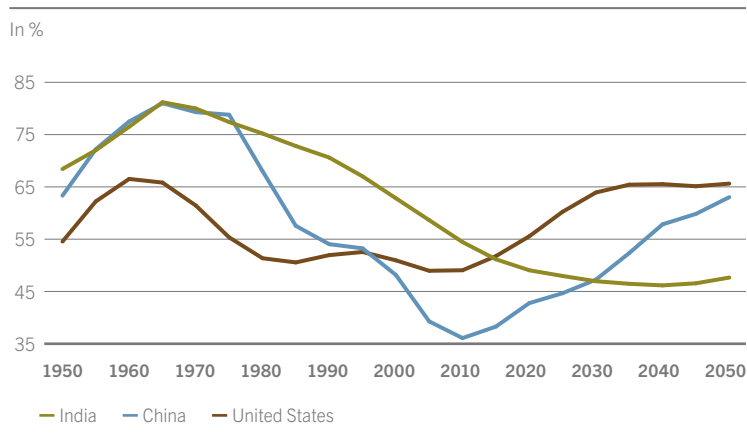
other emerging economies that are today richer than China, such as Brazil and Russia, have low TFR (equal to 1.8 and 1.7, respectively). Regions culturally similar to mainland China, such as Hong Kong, Taiwan, Macau and Singapore have TFR of 1.2 or lower.

## “Economic inequality and the aging of the population are perhaps the most acute challenges to social cohesion and the status quo in China.”

China, India and the United States. The increase of the dependency ratio in China is faster than that in the US. India, in contrast, has a declining dependency ratio until 2040, due to its higher current fertility. The Chinese increasing trend is likely to continue well beyond 2040, since the

Some commentators warn that an aging population might harm economic growth, pointing to the experience of Japan: future saving rates may decline (though this is unlikely to be a major issue for China); the society may turn less forward-looking and innovative; and, most importantly, the government’s future tax base and, hence, its ability to finance social policies, will be compromised. Thus, an aging population will make it increasingly difficult to mitigate China’s income disparities.

Fig. 11 Total dependency ratios of China, India and the US



Source: United Nations Population Division

current TFR (estimated to be around 1.6) is below the replacement level. Even if the one-child policy were relaxed, it is unclear to what extent this would increase the TFR, at least in urban areas. For instance,

In no setting is the dual challenge of inequality and aging more evident than in China’s pension system. Historically, pension systems have been a powerful vehicle of intergenerational redistribution in Western economies, and this “social contract” has been a force for social cohesion. Its introduction bailed out the unlucky generations that were hit by the Great Depression and World War II. Arguably, a similar case can be made for the current elderly Chinese workers who were impoverished by the tragic experiences of the Great Famine and the Cultural Revolution. Indeed, intergenerational inequality is a very important part of total inequality in China. Due to high growth, the present value of earnings for a worker entering the labor force in 2000 is, on average, about six times as large as

that of a worker who entered in 1970.<sup>34</sup> Poverty among the elderly is a major social issue, especially in rural areas. One might object that the elderly can be bailed out by their own children. However, the traditional family insurance system relying on transfers and support from children (especially, sons) is under strain, due to the smaller number of children, increasing geographic mobility, and the decline of traditional values.<sup>35</sup> In this context, pension transfers seem critical for mitigating inequality and poverty.

Given these issues, it is natural that the pension system is a key policy issue for China. We now review China's current pension system, and then analyze how it should be changed, in light of our preceding discussion on inequality and aging.

China has an urban pension system, originally introduced in 1986 and then reformed in 1997. Rural residents earn no pensions, although a limited rural pension system has been introduced recently. Prior to 1986, urban firms were committed to paying pensions to their retired employees. This system ceased to be viable in a market economy with firm and worker turnover. The 1986 reform transferred responsibility for pensions to local municipalities. However, private firms were typically evading contributions, and many urban workers did not accumulate pension rights. Municipalities came under financial distress and had to be bailed out by the central government. The 1997 reform reduced the generosity of pensions, and strengthened the enforcement of contribution. Subsequently, the coverage of the system has now risen from 44% in 1992 to over 60% today. However, the current system is not financially sustainable. In one of our recent studies we find that given the demographic outlook of China, the present value of the future contributions falls short of the present value of the promised pension payments. We estimate that if one were to achieve sustainability by adjusting the replacement rate as of

2013, a permanent cut from the current 60% to 40% would be required.

However, we argue that an immediate adjustment is not desirable from a social welfare perspective. Even a society placing a very high weight on future generations should defer the reform until, at least, year 2040. The reason is that future wages can be expected to be very high compared to the current wages, so large sacrifices by today's workers and retirees will amount to very little in comparison to the future wages. Note that a generous pension system today bails out the current generations of poor old workers and retirees, by transferring to them resources that would otherwise accrue to richer future generations. Even though delaying the (necessary) pension reform will cost the future generations in terms of even lower pensions, these generations will have very high wages and can save for their old age at a low cost. For the same reason, the analysis shows that even a reform that would replace the current system with a fully-funded system – similar to the Chilean reform of 1980 – would not be advisable, due the high social costs for the poorer early generations. We also analyze the welfare implications of turning the Chinese pension system into a universal system, pooling all Chinese workers and retirees – in both rural and urban areas – into one common pension system. We find that this could lead to large welfare gains, at only a modest cost for the future generations.<sup>36</sup>

These normative predictions run against the popular argument among economists that reforming the pension system in a pre-funded direction is the appropriate response for emerging economies with an aging population but are instead broadly in line with recent policy recommendations by Nicholas Barr and Peter Diamond.<sup>37</sup>

Our study mentioned above provides a rationale for using a temporarily unbalanced pension system to bail out the poor generations that are currently middle-



aged and older. This can be a vehicle of social cohesion in China, especially if it is extended to cover all Chinese citizens. Carrying out an immediate fiscal consolidation of the pension system would require substantial government savings today to finance future transfers. Given the large wealth that China has already amassed (e.g., in the form of foreign reserves), this does not seem a top priority. To the opposite, this wealth could be used to finance policies and institutions aimed at reducing inequality and making the growth process more inclusive. As China develops, the citizens' demand for more extensive welfare policies is likely to grow. A large share of citizens, such as the rural and the non-resident migrant population, can be expected to seek access to social insurance from which they have been largely excluded in the past.

## The environmental disaster: pollution for promotion

One of the big open questions for China is the bias of its growth process towards quantity relative to quality. Environmental degradation casts a shadow over China. A New York Times article read: "Chinese cities often seem wrapped in a toxic gray shroud. Only 1 percent of the country's 560 million city dwellers breathe air considered safe by the European Union."<sup>38</sup> Medium-size cities such as Linfen and Tianying lead the sad ranking of the most polluted cities worldwide, due to coal and heavy metals contamination, respectively. Water pollution is an equally severe problem. China relies on dirty technologies to a larger extent than do other countries of a similar development level. Why has the problem grown so rampant?

According to Ruixue Jia the answer lies in the system of promotion incentives within the Chinese Communist Party that induces local political leaders to disregard environmental considerations in order to achieve maximum growth. The promotion of provincial governors wishing to climb the Party's hierarchy ladder hinges on the growth performance of their province. This inhibits politicians from taking or enforcing measures that would limit the use of cheap polluting technologies.

Jia shows that when a provincial governor stands a serious chance of promotion, he tends to disregard environmental concerns. In other words, if a career opportunity opens up to a provincial leader, his region will experience an increase in both the use of dirty technologies and economic growth. She focuses on the connections between provincial governors and members of the Politburo Standing Committee, who are responsible for the promotion of provincial governors to higher positions within the Communist Party. She assumes that a governor and a Standing Committee member are connected whenever they either were work colleagues, studied at the same university, or originate from the same province. She estimates how the performance at the provincial level changes when a politician to which the provincial leader is connected ascends to the Politburo Standing Committee. She finds that when a governor becomes connected, industrial growth increases in his province relative to the rest of China. However, the environmental toll is heavy: both water contamination from industrial waste and air pollutant emissions increase, respectively, by about 25% and 10%.<sup>39</sup>

Jia's findings support the hypothesis that career concerns explain why China is so heavily polluted today. This suggests that political reforms should focus not only on passing new laws and financing programs to stop the environmental degra-

dation, but also on changing the informal rules and incentives within the Communist Party – establishing good environmental standards as an explicit measure of political success. Another implication is that a more environmentally balanced approach may require some sacrifice in terms of growth rates. If such policy changes can avert environmental disasters, they may improve welfare for millions of people.

## State capitalism and political reforms

Political incentives also are at the core of another topical question: Will economic growth bring about democratization or will the current political system be resilient to changes? If so, will political distortions curtail economic development? In a recent study conducted at the University of Zurich, Yikai Wang addresses these important questions by proposing and testing a game-theoretic model of state capitalism where a self-interested political elite controls state-owned enterprises and can impose taxes on private

equilibrium so as to grant sufficient privileges to its supporters.

More precisely, the elite distorts the market equilibrium by creating a dual labor market where the employees of the state sector enjoy a wage premium that turns them into supporters of the nondemocratic system. In contrast, the wage paid by private firms is determined by competitive market forces. Under democracy, all workers can influence the outcome of the political process. Thus, in a democratic regime, taxes are imposed on all firms and the tax revenue is distributed back to citizens as social transfers.

Workers can decide either to support the existing political regime or to engage in a revolution. To avoid a democratic revolution, the elite must secure that two conditions are satisfied. First, the share of workers employed by state-owned enterprises must be sufficiently large to ensure that the status quo has enough popular support. Second, state workers must indeed be willing to support the regime: namely, they must earn a sufficiently high wage to prefer the status quo to democratization.

Wang's study rationalizes the puzzling observation that the middle class – regarded in many countries as the driving force of democratization – appears to support the nondemocratic system

“The middle class – regarded in many countries as the driving force of democratization – appears to support the nondemocratic system in China.”

firms. To stay in power the elite must shore up sufficient political support to avert a democratic revolution. It achieves this goal through a divide-and-rule strategy that involves distorting the economic

in China. In his theory, the middle class comprises state sector employees and entrepreneurs. The latter thrive because under state capitalism they can hire workers at a lower wage than they

would in an undistorted market economy with democratic institutions. Empirical studies document that state sector employees indeed earn a significant wage premium relative to workers employed in the private sector. Moreover, survey evidence indicates that state sector employees are on average less supportive of democratic values than other social groups, consistent with the view that they are an important base of support for the regime. Interestingly, in China the employment status (state or private sector) is a stronger predictor of the attitude towards democracy than that of party membership. This evidence is consistent with the predictions of Wang's theory.<sup>40</sup>

What is the effect of state capitalism on growth? At the early stage of the transition process, state capitalism can actually speed up growth by reducing wages and favoring investments in the private sector. However, as the country becomes more developed, the survival of state capitalism

requires heavier and heavier distortions to prevent the employment share of state-owned firms from falling below the critical level of political support. The distortionary policy to keep alive the state sector can then become a source of declining productivity, driving the country into a middle-income trap. Interestingly, the collapse of the growth process is no necessity in his theory. If the cost of state capitalism becomes excessively high, the elite may peacefully surrender the monopoly of power inducing a serendipitous transition to democracy. However, if state capitalism is relatively efficient, the elite may prefer to stick to power. An implication of Wang's theory is that the recent improvement in the performance of state-owned enterprises may have a dark side: it may strengthen state capitalism and induce the resilience of the non-democratic system. Thus, it could be good for economic growth in the short run, but eventually become bad for the long-run economic and institutional development of China.

## Conclusions

In this paper, we have reviewed some of the central issues in the recent economic development of China. We emphasize, with the aid of a model, the transitional nature of China's growth process over the last three decades. China now faces a dilemma: the scope for growth driven by reallocation is diminishing, making future growth more dependent on local innovation and human capital. Due to its large investments in R&D and education, China is likely to get a soft landing. While growth may slow down, we see no

indication that China will get stuck in a middle-income trap. Still, the current model of state capitalism relies on important distortions. It is an open question whether the political elite has the incentives to overcome such inefficiencies and complete the reform process (e.g., a further reduction of the state's role in economic activity), as this may trigger an increase in the demand for political changes. In the future, fostering social cohesion and averting environmental disasters will be critical policy issues.

## Endnotes

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- 1 The US, Western and Central Europe, Japan, and other Western offshoots altogether have a population of ca. 1 billion.
- 2 Using the definition of the World Bank, a person is living in extreme poverty if he or she lives on less than USD 1.25 daily.
- 3 Fairbank and Goldman (2006).
- 4 See Allen et al. (2011). Pomeranz (2000) goes beyond that and argues that, in the years from 1750 to 1800, living standards in the Yangtzi delta region were comparable to those of the most advanced European regions – i.e., England, the Netherlands.
- 5 Platt 2012.
- 6 Meng et al. (2010).
- 7 The anti-ideological and pragmatic attitude of Deng Xiaoping is summarized well by the quote: “I don’t care if it’s a white cat or a black cat. It’s a good cat so long as it catches mice”, which he is said to have pronounced in 1961, during the Great Famine, speaking in support of measures of partial decollectivization of land in order to raise agricultural production. Li (1994), p. 376.
- 8 Alder et al. (2013).
- 9 The figure shows the private share of employment in manufacturing in China (National Business Survey, 1998–2011). Two measures are plotted: First, DPE employment as a share of SOE+DPE employment, i.e., excluding foreign enterprises (FE) and collective enterprises. Second, the combined employment in DPE and FE as a share of total manufacturing employment.
- 10 See Song, Storesletten and Zilibotti (2011) for more formal evidence of the trends discussed in this section.
- 11 Song, Storesletten and Zilibotti (2011).
- 12 The central bank can be seen as an intermediary that absorbs the excess of domestic savings by offering regular banks domestic bonds, and invests the proceeds in foreign bonds.
- 13 It is of course not literally true that DPE receive no bank loans. In Special Economic Zones, we assume that DPE can borrow from banks but only up to a tight borrowing constraint. So, the investments of DPE exceed entrepreneurial savings, but not enough to compensate for the imbalance described by Figures 5 and 8.
- 14 See Song, Storesletten and Zilibotti (2011), pp. 229–231.
- 15 Gourinchas and Jeanne (2013) show that, on average, countries with fast productivity growth have large trade surpluses and capital outflows, while countries with a low productivity growth have trade deficits and capital inflows. They label this finding as the “allocation puzzle”, since it runs against the predictions of the standard economic theory according to which capital should flow to the most productive location.
- 16 Autor et al. (2013). This effect is (at least partially) offset by more jobs being created in export-oriented industries. Dauth et al. (2013) find that the positive employment effect of trade with China and Eastern Europe actually dominates in Germany.
- 17 Song et al. (2013).
- 18 See again Song, Storesletten and Zilibotti (2011).
- 19 More precisely, the households’ net position follows a non-monotonic pattern: it declines until 2001, and increases thereafter.
- 20 The picture emerging from Figures 8 and 9 is consistent with that of Figures 6 and 7: as transition goes by, credit-constrained (i.e., largely self-financed) DPE crowd out SOE. Thus, banks become awash in cash and must invest in foreign bonds.
- 21 Chamon and Prasad (2010).
- 22 Liu et al. (2013).
- 23 Fang et al. (2010).
- 24 Banerjee et al. (2013).
- 25 Choukhmane et al. (2013).
- 26 Wei and Zhang (2011).
- 27 Acemoglu and Robinson (2012).
- 28 See Acemoglu, Gancia and Zilibotti (2012).
- 29 See, e.g., Acemoglu et al. (2006).
- 30 Barro and Lee (2013).
- 31 The growth rate of wages of college graduates was 240% between 1992 and 2007 compared with 135% for workers with middle school and below (Ge and Yang 2013).
- 32 OECD (2011).
- 33 In July 2013, the People’s Bank of China (PBOC) has liberalized loan rates. Namely, banks are since then allowed to offer lower rates to attract the best firms. Even more important, in August 2013 the PBOC announced the intention to liberalize deposit rates. So far, banks have not been allowed to compete in offering higher deposit rates. This granted a major advantage to the large incumbent state-owned banks. These reforms may have far-reaching effects in reducing the credit market frictions outlined above.
- 34 Song et al. (2012).
- 35 See, e.g., Cai et al. (2006); Park et al. (2012).
- 36 Song, Storesletten, Wang and Zilibotti (2012).
- 37 For arguments for pre-funded pension systems, see for instance Feldstein and Liebman (2006) or Dunaway and Arora (2007). The study by Barr and Diamond was published in 2008.
- 38 Kahn and Yardley (2007).
- 39 Jia (2012).
- 40 Wang (2013). For an example of an empirical study documenting the wage premium of state sector employees see for instance Ge and Yang (2013).

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It was established in 2012, enabled by a founding donation by UBS, which the bank made on the occasion of its 150th anniversary. In view of the very generous donation, the university named the UBS Center after its benefactor.

The new center of excellence serves two main aims, the first of which is to finance world-class research in economics on all levels, to be conducted at the University's Department of Economics. It thereby supports the department's ambition to further strengthen its position as one of the top economics departments in Europe and to make Zurich one of the best places for research in economics in the world. The Center's other aim is to serve as a platform for dialogue between academia, business, politics, and the broader public, fostering continuous knowledge transfer in the process. Delivering on these aims will in turn also contribute to the quality of Zurich, and Switzerland more generally, as leading locations for education and business.

**For more information, please consult [www.ubscenter.uzh.ch](http://www.ubscenter.uzh.ch)**

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