

## Demographics and China

- A shrinking working age population is often considered one of the main challenges China will face in the coming years.
- This decrease is limited, both in absolute value and from a historical perspective, as it follows a decades-long demographic transition that gave China one of the lowest dependency ratios in the world.
- We estimate that the impact of a decreasing working age population on GDP growth will be about -0.35pp per year between 2015 and 2020. However, this is an upper bound estimate. Higher education, which improves the quality of a labor force, and higher participation rates as a behavioral response to an aging population, will mitigate the crude effect of having a lower number of working age people.
- We argue that other demographic factors, such as the sex ratio and internal migration, pose serious challenges, which merit further consideration.

### The demographic transition

There is much discussion about the deteriorating demographic conditions in China, especially the decline of the labor force, and the impact that this can have on the economy. The following presents the facts in more detail.

#### ■ Fact 1: decline of working age population

The absolute number of working age people in China is going to decline in the next 15 years (Table 1). Among 15-64 year olds, the overall decline is projected to be 4.5%, while among 20-69-year-olds, the cumulative decrease is expected to be 1.2%.

It is important to stress that a decline in the working age population does not translate directly into a decline in the labor force. As a population ages, behavioral responses to this – including a rise in female and elderly participation rates – mitigate the impact of a working age population's decline.

**TABLE 1: CHINA'S DECLINING WORKING AGE POPULATION**

China's working age population (thousands)

	15-64	20-69	% change 15-64	% change 20-69
2015	1 007 504	979 735		
2020	993 101	989 908	-1.4%	1.0%
2025	984 213	976 286	-0.9%	-1.4%
2030	962 628	967 429	-2.2%	-0.9%

Source: United Nations; UniCredit Research

#### ■ Fact 2: rebound after a long demographic transition

The decline in the labor force should be viewed from a historical perspective. China has been going through a terrific demographic transition since the 1970s. This has been driven firstly by the two-child policy, which was in place between early 1970 and 1979, and then by the one-child policy, which took effect in 1979.



**Dr. Fadi Hassan\*, Economist – Consultant**  
 (UniCredit Bank London)  
 +44 207 826-1209  
 fhassan.external@unicredit.eu

\*Fadi Hassan is an Assistant Professor of Economics at Trinity College Dublin and a Consultant for UniCredit Bank AG

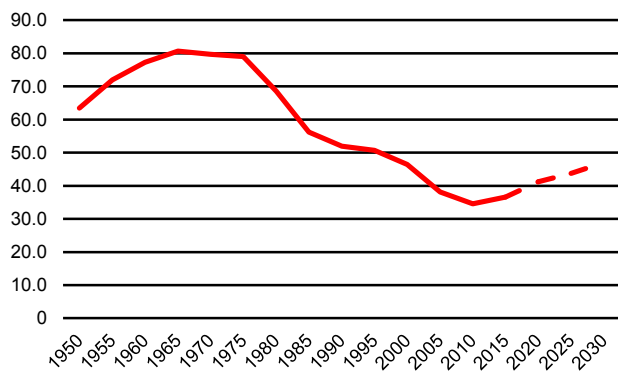
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Between 1970 and 2015, China's fertility rate declined from 5.5 children per woman to 1.6. This led to a sharp decline of the dependency ratio (chart 1), which is the ratio of the non-working age population (0-14, 65+) over the working age population (15-64). Excluding small countries<sup>1</sup>, China has the lowest dependency ratio in the world after Moldova (chart 2). This implies that the slight contraction of the working age population can be seen as a rebound towards more natural dependency ratios.

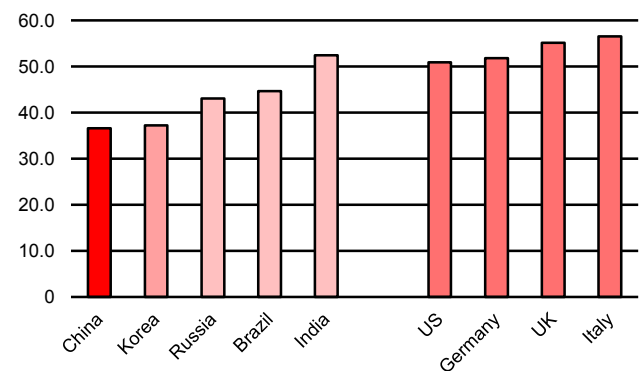
**CHART 1: DEPENDENCY RATIO: DECLINE AND ADJUSTMENT**

China's dependency ratio 1950-2030



**CHART 2: EXTREMELY LOW DEPENDENCY RATIO**

Dependency ratios across emerging and advanced economies



Source: United Nations; UniCredit Research

■ **Fact 3: it is not just China, look at Korea**

The decline of the labor force is not unique to China. Korea has an equally low dependency ratio and is expected to go through the same type of adjustment in the next few years (Table 2). In Korea, the working age population is expected to decline even more sharply than in China: 9.62% for the 15-64 cohort and 2.3% for the 20-69 cohort. This reinforces the point that the decline in the labor force is a natural pattern of demographic adjustment, given such low levels of dependency ratios.

**TABLE 2: KOREA'S DECLINING LABOR FORCE**

Korea's working age population (thousands)

	15-64	20-69	% change 15-
2015	36,654	35,508	
2020	36,304	36,436	-1.0%
2025	34,841	36,105	-4.0%
2030	33,128	34,686	-4.9%

Source: United Nations; UniCredit Research

■ **Fact 4: it is not a shocking adjustment, and China's new two-child policy will kick in**

Given the demographic transition that China went through in recent decades, the expected decline looks like a minor adjustment (chart 3). Moreover, according to projections, China's demographic pyramid of 2030 is still well shaped with a large working age population and a relatively small amount of elderly citizens, compared, for instance, to the US (chart 4).

<sup>1</sup>Small countries are defined as those with a population of less than three million in the year 2000.

Moreover, the 13<sup>th</sup> five-year plan, presented in November 2015, put an end to the one-child policy in favor of a new two-child policy.<sup>2</sup> The new policy is likely to raise the fertility rate in China in the coming years so that, by 2035-40, China's working age population will larger than currently projected.<sup>3</sup>

CHART 3: A MINOR ADJUSTMENT HISTORICALLY

China's working age population 15-64 (standardized 1950-2030)

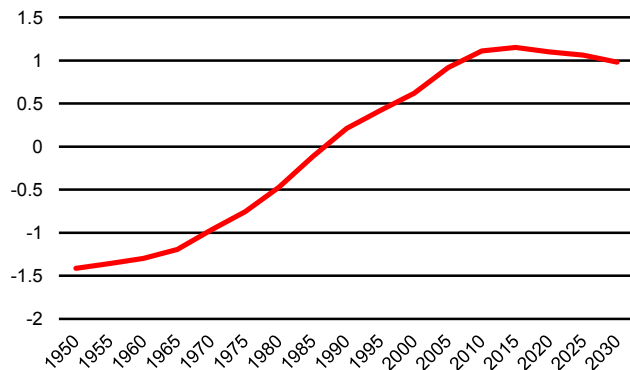
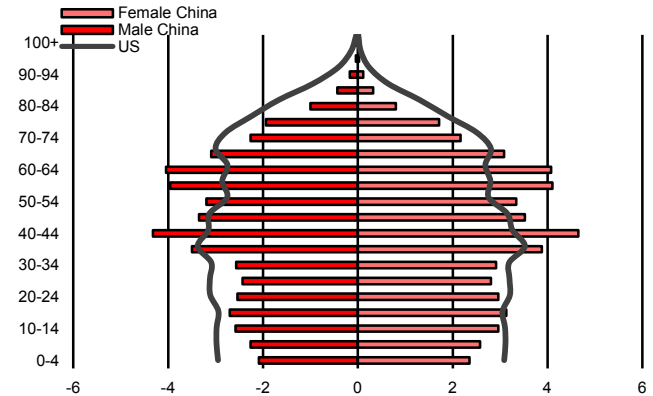


CHART 4: DEMOGRAPHIC PYRAMID STILL IN GOOD SHAPE

China and US, demographic pyramid 2030 (% by age cohort)



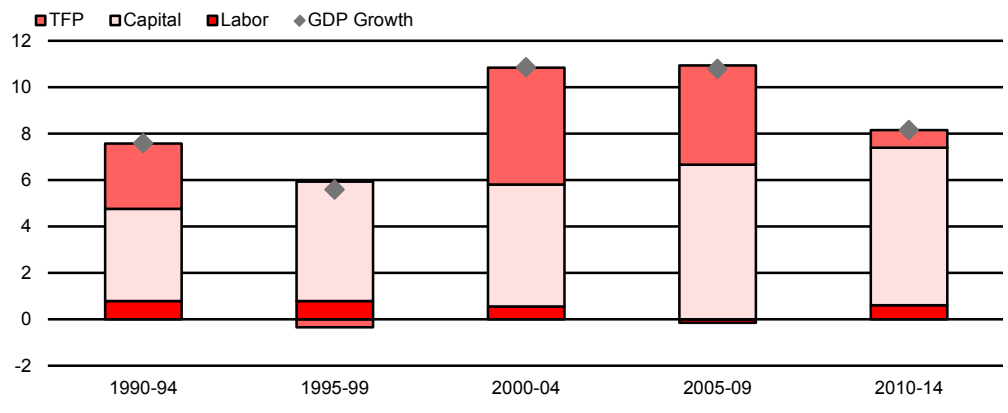
Source: United Nations; UniCredit Research

■ **Fact 5: the impact on GDP growth will be low**

We estimate that the impact from the smaller working age population on GDP growth will be -0.35pp per year. We used a standard growth accounting approach, where GDP growth is broken down into contribution-of-labor, capital and total factor productivity (TFP) (Box 1). Chart 5 shows the contribution of labor to GDP growth over the last 25 years. The contribution was about 0.78pp in early 1990s. This turned negative in 2005-09 (-0.15pp) because of higher unemployment during the financial crisis; it was 0.6pp between 2010 and 2014.

CHART 5: LABOR ONLY MATTERS marginally

A breakdown of Chinese growth



Source: Total Economy Database, UniCredit Research

<sup>2</sup>This decision will be ratified by the National People's Congress in March 2016.

<sup>3</sup>The UN projections utilized do not yet include the effects of the new two-child policy.

Over the last 15 years, the average annual growth rate of the 15-64 working age population was 1.02%, while the contribution of labor to GDP growth was 0.33pp. The UN estimates presented in Table 1 forecast a -0.3% annual growth rate for the population of 15-64-year-olds. Therefore, in the next 15 years, China will experience an overall demographic adjustment of -1.32% among 15-64-year-olds. If we assume a constant participation and employment rate, the impact of the demographic transition on GDP growth will be -0.35pp per year.<sup>4</sup> If we believe that the relevant working age population is 20-69, the impact of the demographic adjustment on GDP will be very similar and account for -0.34pp.

Nevertheless, these estimates are an upper bound because they do not account for the behavioral response of the population and for the increasing level of education of the labor force. Even if the total number of people aged 15-64 declines, 1. the stock of available workers can increase if the participation rate rises in response to the aging population, and 2. the quality of the stock of workers will improve thanks to higher education. These two elements will mitigate the crude impact from a decline in the population of those aged 15-64.

#### BOX 1: growth accounting

Assuming a standard neoclassical production function, aggregate GDP growth can be broken down into the contribution of aggregate capital (K), aggregate labor (L) and aggregate TFP (A):

$$\Delta \ln GDP_t = \alpha_{L,t} \Delta \ln L_t + (1 - \alpha_{L,t}) \Delta \ln K_t + \Delta \ln A_t \quad (1)$$

Where  $\alpha_{L,t}$  is the share of capital compensation in GDP averaged over the current and previous year.

Chart 5 shows the overall GDP growth and the first term of the breakdown of equation (1).

#### ■ Fact 6: other demographic issues are critical (gender ratio and internal migration)

Concerns about China's demography should focus not only on the size of its labor force but also on its sex ratio and on internal migration. According to World Bank estimates, China has the highest male-to-female ratio at birth in the world. This ratio is 1.19 in China, whereas the standard value is 1.05. This reflects the preference for males among Chinese households under the one-child policy.

This demographic factor can have critical macroeconomic consequences. Chart 6 shows how the rise in the sex ratio at birth is associated with the rise in the savings rate.<sup>5</sup> Wei and Zhang (2011)<sup>6</sup> argue that the increase in the sex ratio has increased competition for marriage. Hence, people save more in response to higher pressure in the marriage market. Wei and Zhang (2011) show that this channel can account for about half the increase in household savings after 1990.

<sup>4</sup>The overall demographic adjustment will be -1.3%. If we assume a constant participation and employment rate, based on the 2000-15 average, the stock of labor will decline by 0.91% per year (about 70% of the 15-64-year-old population was part of the work force). Assuming a constant elasticity of labor to growth, as in 2000-15, the demographic adjustment will have an impact on GDP growth of -0.35pp per year.

An alternative approach, based on determining GDP per capita, delivers very similar results: consider the identity  $\left(\frac{Y}{P}\right) = \left(\frac{Y}{L}\right) + \left(\frac{L}{P}\right) + \left(\frac{F}{P}\right)$ , where Y is GDP, P is total population, L is labor, F is working age population and the hat indicates percentage changes. This expression tells us that the growth rate of GDP per capita will be equal to the sum of the growth rate of labor productivity (Y/L), labor participation (L/F) and the share of working age population (F/P). Assuming a unitary elasticity between GDP per capita and the work-force's share of the population, the decline in the amount of 15-64-year-olds will drag China's GDP per capita down by 6% in the next 15 years. Given an expected increase of total population of 0.84%, this implies that the impact of the shrinking share of 15-64 population is going to be -0.335pp of GDP per year, which is very close to the results of previous methodology.

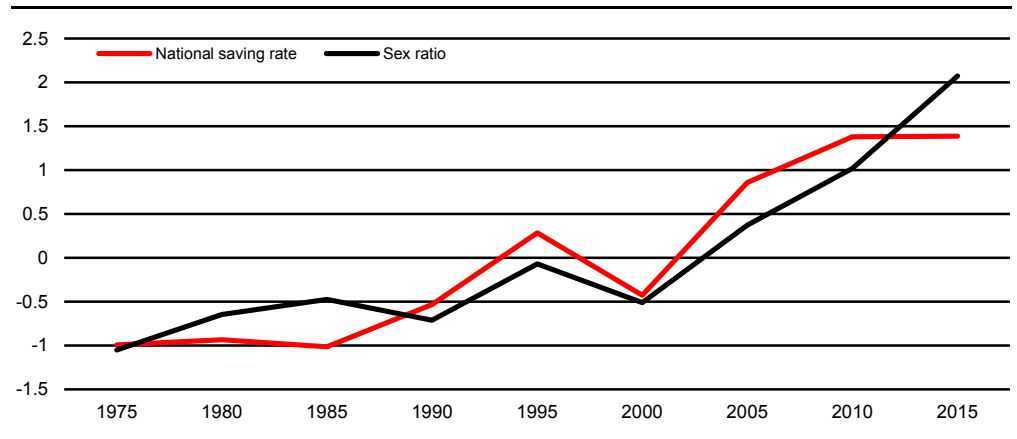
<sup>5</sup> Chart 6 standardized values of saving rate as a % of GDP and sex ratio at birth. The sex ratio is lagged by 20 years as women's median age of first marriage is 20.

<sup>6</sup> See Wei, Shang-Jin and Xiaobo Zhang, 2011. "The competitive saving motive: evidence from rising sex ratios and saving rates in China". *Journal of Political Economy*, 119 (3): 511-564.

This implies that increasing private consumption, which is a key aspect of China’s growth policy, can be particularly challenging because of this demographic factor.

**CHART 6: GENDER RATIO , MARRIAGE COMPETITION, AND SAVINGS**

China’s saving rate and sex ratio at birth



Standardized values. Sex ratio at birth refers to 20 years earlier.

Source: United Nations, World Bank, Wei and Zhang (2011), UniCredit Research

Another important demographic issue in China is internal migration. The latest figure (Cai et al. 2011) shows the current stock of rural migrant workers at about 158 million. The number of additional rural migrants who settle in cities every year, while hard to estimate, is about eight million per year. This is as if a city with the population of London is created in China every year.

This is challenging, not only for the urbanization process per se but also for social stability. The so called “Hukou” system restricts the ability of internal migrants to officially register their residency in a new province, excludes them from local services (like education) and prevents them from obtaining many jobs. This creates a so called “floating population” and generates a shadow society. China’s slowdown will make it harder to absorb such large flows of internal migrants, and this poses a serious challenge, one which China’s government will have to manage.

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Erik F. Nielsen  
Group Chief Economist  
Global Head of CIB Research  
+44 207 826-1765  
erik.nielsen@unicredit.eu

Dr. Ingo Heimig  
Head of Research Operations  
+49 89 378-13952  
ingo.heimig@unicredit.de

**Economics & FI/FX Research**
**Economics Research**
**European Economics**

Marco Valli, Chief Eurozone Economist  
+39 02 8862-0537  
marco.valli@unicredit.eu

Dr. Andreas Rees, Chief German Economist  
+49 69 2717-2074  
andreas.rees@unicredit.de

Stefan Bruckbauer, Chief Austrian Economist  
+43 50505-41951  
stefan.bruckbauer@unicreditgroup.at

Tullia Bucco, Economist  
+39 02 8862-0532  
tullia.bucco@unicredit.eu

Edoardo Campanella, Economist  
+39 02 8862-0522  
edoardo.campanella@unicredit.eu

Dr. Loredana Federico, Economist  
+39 02 8862-0534  
loredanamaria.federico@unicredit.eu

Dr. Tobias Rühl, Economist  
+49 89 378-12560  
tobias.ruehl@unicredit.de

Chiara Silvestre, Economist  
chiara.silvestre@unicredit.eu

Dr. Thomas Strobel, Economist  
+49 89 378-13013  
thomas.strobel@unicredit.de

Daniel Vernazza, Ph.D., Lead UK Economist  
+44 207 826-7805  
daniel.vernazza@unicredit.eu

**US Economics**

Dr. Harm Bandholz, CFA, Chief US Economist  
+1 212 672-5957  
harm.bandholz@unicredit.eu

**EEMEA Economics & FI/FX Strategy**

Lubomir Mitov, Chief CEE Economist  
+44 207 826-1772  
lubomir.mitov@unicredit.eu

Artem Arkhipov, Head, Macroeconomic Analysis  
and Research, Russia  
+7 495 258-7258  
artem.arkhipov@unicredit.ru

Anca Maria Aron, Senior Economist, Romania  
+40 21 200-1377  
anca.aron@unicredit.ro

Anna Bogdyukevich, CFA, Russia  
+7 495 258-7258 ext. 11-7562  
anna.bogdyukevich@unicredit.ru

Dan Bucsa, Economist  
+44 207 826-7954  
dan.bucsa@unicredit.eu

Hrvoje Dolenc, Chief Economist, Croatia  
+385 1 6006 678  
hrvoje.dolenc@unicreditgroup.zaba.hr

Lubomír Koršňák, Chief Economist, Slovakia  
+421 2 4950 2427  
lubomir.korsnak@unicreditgroup.sk

Marcin Mrowiec, Chief Economist, Poland  
+48 22 524-5914  
marcin.mrowiec@pekao.com.pl

Kristofor Pavlov, Chief Economist, Bulgaria  
+359 2 9269-390  
kristofor.pavlov@unicreditgroup.bg

Pavel Sobisek, Chief Economist, Czech Republic  
+420 955 960-716  
pavel.sobisek@unicreditgroup.cz

Dumitru Vicol, Economist  
+44 207 826-6081  
dumitru.vicol@unicredit.eu

**Global FI Strategy**

Michael Rottmann, Head, FI Strategy  
+49 89 378-15121  
michael.rottmann1@unicredit.de

Dr. Luca Cazzulani, Deputy Head, FI Strategy  
+39 02 8862-0640  
luca.cazzulani@unicredit.eu

Chiara Cremonesi, FI Strategy  
+44 207 826-1771  
chiara.cremonesi@unicredit.eu

Elia Lattuga, FI Strategy  
elia.lattuga@unicredit.eu

Kornelius Purps, FI Strategy  
+49 89 378-12753  
kornelius.purps@unicredit.de

Herbert Stocker, Technical Analysis  
+49 89 378-14305  
herbert.stocker@unicredit.de

**Global FX Strategy**

Dr. Vasileios Gkionakis, Global Head, FX Strategy  
+44 207 826-7951  
vasileios.gkionakis@unicredit.eu

Kathrin Goretzki, CFA, FX Strategy  
+44 207 826-6076  
kathrin.goretzki@unicredit.eu

Kiran Kowshik, EM FX Strategy  
+44 207 826-6080  
kiran.kowshik@unicredit.eu

Roberto Mialich, FX Strategy  
+39 02 8862-0658  
roberto.mialich@unicredit.eu

**Publication Address**

**UniCredit Research**  
Corporate & Investment Banking  
UniCredit Bank AG  
Arabellastrasse 12  
D-81925 Munich  
globalresearch@unicredit.de

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www.research.unicredit.eu

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