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China's Path to Sustainable and Balanced Growth

Dirk Muir, Natalija Novta, and Anne Oeking

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China's Path to Sustainable and Balanced Growth

Prepared by Dirk Muir, Natalija Novta, and Anne Oeking*

Authorized for distribution by Sonali Jain-Chandra and Rafael Portillo
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ABSTRACT: After decades of high growth, the Chinese economy is facing headwinds from slowing productivity growth and a declining workforce that are projected to lower potential growth substantially in the longer term. We project China's potential growth over the medium to long term, showing that potential growth could slow to around 3.8 percent on average between 2025-30 and to around 2.8 percent on average over 2031-40 in the absence of major reforms. We present a reform scenario with structural reforms to lift productivity growth and rebalancing China's growth towards more consumption, that would help China transition to "high-quality"—balanced, inclusive, and green—growth. We use production function and general equilibrium modelling approaches to show that potential growth could remain at around 4.3 percent between 2025-40 under the reform scenario.

JEL Classification Numbers:	E17, E21, E22, E23, O4, J11
Keywords:	Potential growth; investment-led growth; rebalancing; demographic trends; structural reforms
Author's E-Mail Address:	dmuir@imf.org, nnovta@imf.org, aoeking@imf.org

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1. Introduction

After decades of high growth, the Chinese economy has started slowing and is facing headwinds that are projected to lower potential growth substantially in the medium- and long-term. First, with its rapidly aging population, the Chinese economy is expected to have fewer people entering the labor force, which will diminish growth prospects (IMF, 2017). Second, productivity growth has slowed significantly. As China eventually edges closer to advanced economy status and the technology frontier, its aggregate productivity growth is expected to decline further (Madsen and others, 2010). What is unique in the case of China is the additional pressure from diminishing returns from investment-led growth, as excessive investment—driven by record-high domestic savings—has been channeled towards relatively less productive SOEs, activities such as real estate, which are less growth-enhancing over the longer term, and to further increase China's already comparatively very large public capital stock. Intensifying industrial policies can also contribute to misallocation of capital and slowing productivity growth. High investment in China has sped up the decline in aggregate productivity, and hence, potential growth, and raises sustainability concerns regarding the investment-led growth model amid high levels of debt across all sectors of the economy.

Structural reforms and rebalancing China's growth towards a more consumption-based growth path would help transition to "high-quality"—balanced, inclusive, and green—growth. This paper provides projections of China's potential growth over the medium to long-term using a production function and a general equilibrium modelling approach. We establish a baseline scenario of China's growth prospects, showing that in the absence of reforms, potential growth could slow to around 3.8 percent on average between 2025-30 and to 2.8 percent on average over 2031-40. These projections focus on a broad continuation of current trends. However, the approach has limitations, including by relying on only one specific set of assumptions and ignoring the interaction between the implied output gaps and inflation dynamics. Using the two approaches to study an illustrative reform scenario and its beneficial impact on potential growth, we show that potential growth could remain at around 4.7 percent between 2023-38. In addition, we find that reforms to foster rebalancing would enhance welfare while being GDP neutral over the long term. Reforms that simultaneously enhance productivity growth, facilitate rebalancing towards consumption, and steer against the demographic headwinds are the most promising.

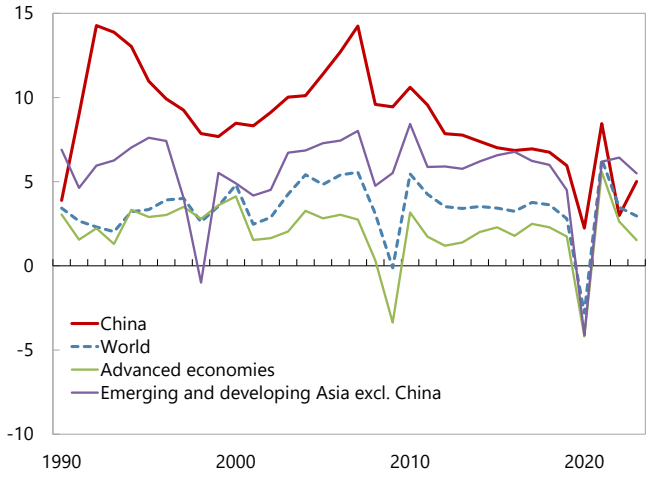
The rest of the paper is structured as follows. Section 2 will provide some background on China's economic growth, its drivers, and its structural transformation in the past decades. Section 3 will use a production function approach to derive historical productivity growth rates in China and construct historical potential growth rates. Section 4 will use the same production function approach to derive a baseline forecast scenario of China's potential growth over the medium to long term, assuming no significant structural reforms. Section 5 will focus on a reform scenario, estimating potential growth by relying on both the production function as well as a dynamic stochastic general equilibrium model to further study some of the forecast assumptions. Finally, section 6 will conclude.

2. Background

China's economy grew rapidly over the past three decades, with average real GDP growth rates of around 10 percent in the 1990s and 2000s (Figure 1). According to IMF (2023), China's growth was 5.5 percentage points higher on average per year than other countries' growth rates at similar levels of economic development between 1990 and 2019. This above-average growth made China the second largest economy in the world, accounting for around 19 percent of the global economy measured in market US dollar exchange rates in 2023.

Figure 1: Real GDP Growth

(In percent)



Sources: IMF WEO; and authors' calculations.

China's high growth rates in the early 2000s were largely driven by increases in productivity following the WTO accession and rapid accumulation of capital from the supply-side. However, China's high growth was also accompanied by increasing imbalances, initially external (with very large current account surpluses), and later internal (with low consumption relative to investment), as described in Zhang (2016). In the decade before the pandemic, productivity growth slowed, including because of increasingly less productive investment, and domestic demand-side imbalances further increased (see below).

On the demand side, Chinese households have historically had an exceptionally high savings rate. High household savings have been driven by precautionary savings due to gaps in the social protection system and falling job security, in addition to China's aging population (IMF, 2022; and Zhang and others, 2018). During the pandemic, recurrent COVID outbreaks and lockdowns further increased household savings amid high uncertainty, weaker labor markets, and subdued private consumption. The household savings rate declined to pre-pandemic levels throughout 2023, thus remaining extremely high by international standards (Figure 2a).

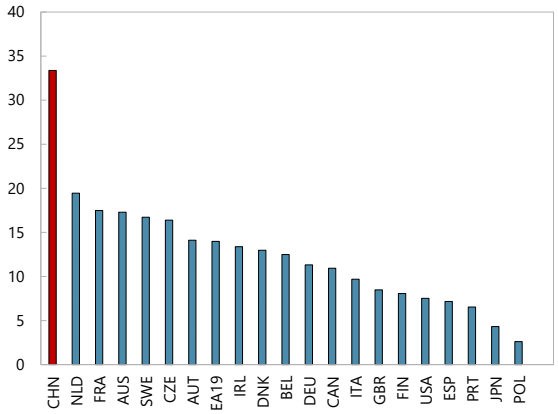
This high savings rate is reflected in China's low and falling share of consumption, coupled with a rising share of investment in GDP over time (Figure 2b). High savings have been linked to external and internal imbalances, with the role of the two varying over time. External imbalances have decreased over time, with the current

account falling from around 10 percent of GDP in 2007 to 1.5 percent in 2023. Instead, high savings have increasingly financed domestic investment, subject to decreasing returns, and contributing to growing internal imbalances.

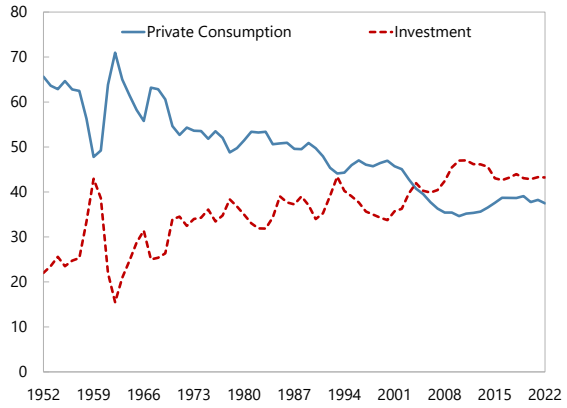
Figure 2: Savings, Investment and Private Consumption

(In percent of GDP)

(a) Household Savings Rate Across Countries, 2022



(b) China: Investment and Private Consumption Over Time

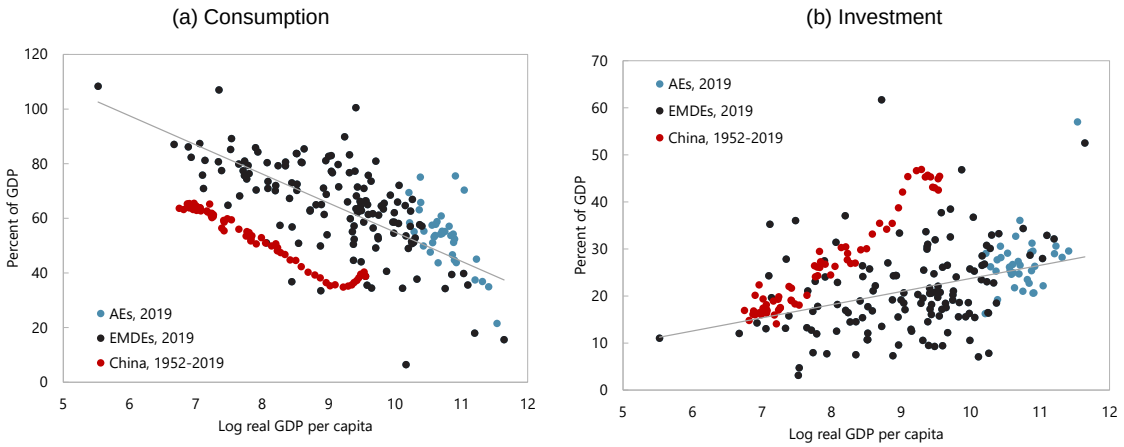


Sources: Penn World Tables, Haver Analytics: National Bureau of Statistics China, and authors' calculations.

High domestic savings have financed increasingly unsustainable levels of investment. With rising per capita income, countries tend to move to a lower share of consumption and a higher share of investment in GDP. For China, however, the reduction in the share of consumption and the increase in the share of investment by far exceed the changes implied by the level of its GDP per capita observed elsewhere (Figures 3a and 3b), leaving China with one of the highest investment-to-GDP ratios and a particularly low consumption-to-GDP share in international comparison. The extraordinarily high amount of savings has been channeled into investments that helped support high growth rates, especially in the 2000s. Later, however, a substantial amount of investment went to relatively less productive sectors which, beyond the short-term effect on GDP, provided diminishing support to China's growth potential over the long term.

Figure 3: Investment and Consumption Across Countries vs. China Over Time

(In percent)



Sources: Penn World Tables, and authors' calculations.

Notes: AEs = Advanced economies; EMDEs = emerging market and developing economies.

Following the Global Financial Crisis (GFC), China's growth became increasingly dependent on investment in infrastructure and housing. To maintain high growth rates in the wake of the global recession, the authorities ramped up infrastructure investment. In addition, households channeled their high savings increasingly towards housing, including for speculative motives, and real estate investment became one of the main drivers of growth, with the real estate sector accounting for around 20 percent of China's GDP pre-pandemic.[1] This was made possible by high savings and excessive credit growth (Figure 4) accompanied by sharply rising debt levels across the economy.

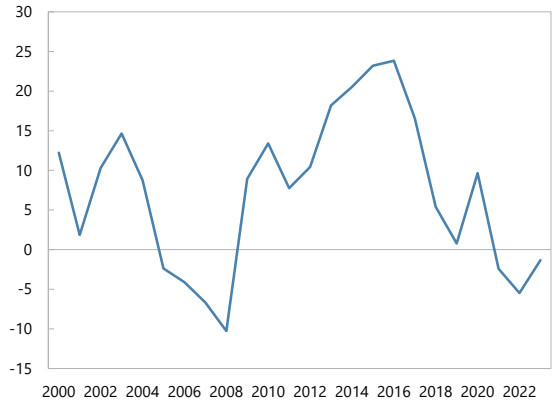
During this period, considerable vulnerabilities were built up. Excessive investment in infrastructure and housing led to rising debt levels among property developers, local governments, and local government financing vehicles. Overall, the augmented government debt-to-GDP ratio is estimated to have reached 117 percent by end-2023.[2] While the government has taken steps to contain developer leverage, this has been accompanied by significant adjustment in the real estate sector which has weighed on economic activity. Local governments have faced financing strains amid large local fiscal gaps, heightened by falling land sales revenues amid the property market correction.

[1] Estimates based on NBS data and the OECD's 2015 inter-country input-output data.

[2] Augmented debt is comprised of official general government debt (central and explicit local government debt, including general and special local government bonds and other recognized off-budget liabilities incurred by end-2014) and off-budget liabilities estimated by staff (debt of local government financing vehicles, government-guided funds, and special construction funds).

Figure 4: Credit-to-GDP Gap

(In percent of GDP)

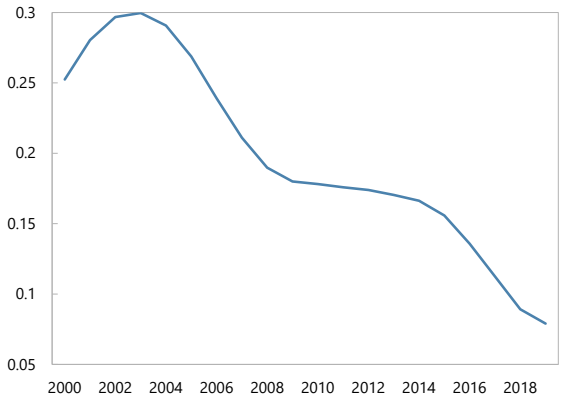


Sources: BIS and authors' calculations.

Notes: The credit-to-GDP gap shows the deviation of credit from all sectors to the private non-financial sector from its HP-filtered trend. Annual averages over quarterly data.

Figure 5: Marginal Product of Capital

(Ratio)



Sources: Penn World Tables, and authors' calculations.

Notes: Marginal product of capital = ratio of change in output to change in capital stock. Ratio has been smoothed using HP filter.

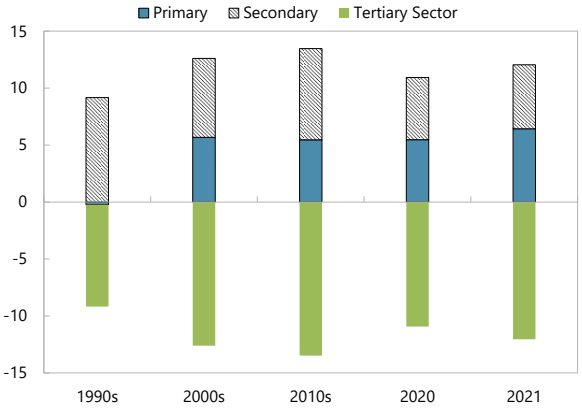
China's investment-led growth strategy has been facing rapidly diminishing returns. In addition to rising vulnerabilities, strong investment in infrastructure and housing has been associated with falling returns to capital (Brandt and others, 2020). The marginal product of capital, in aggregate, has been falling sharply (Figure 5). While China's capital stock is still considerably below that of advanced economies, these factors suggest resource misallocation and build-up of excess capacity in some sectors of the economy, possibly crowding out more productive investment in other areas.

The flipside to this demand structure of high investment in infrastructure and housing and weak private consumption has been a comparatively small services sector on the supply side. As countries develop, labor usually moves from the primary to the secondary and eventually the tertiary sector.[3] One explanation is differences in income elasticities across sectoral demand, being the lowest for primary sector goods and the highest for tertiary sector services. Any increase in income would thus be associated with a larger increase in services demand and thus services output, with an associated increase in labor. The increase in labor per additional unit in sectoral output, in turn, can be explained by differences in sectoral labor productivity. In China's case, some of this structural transformation has been delayed by its investment-driven growth model. A simple unconditional regression of sectoral labor shares on the level of development suggests that China's tertiary sector is still relatively smaller than its per capita GDP levels would suggest (Figure 6).

[3] This goes back to the pioneering work of Fisher (1939) and Clark (1940).

Figure 6: China – Residuals from Unconditional Regression on Labor Share and Development

(In percentage points)



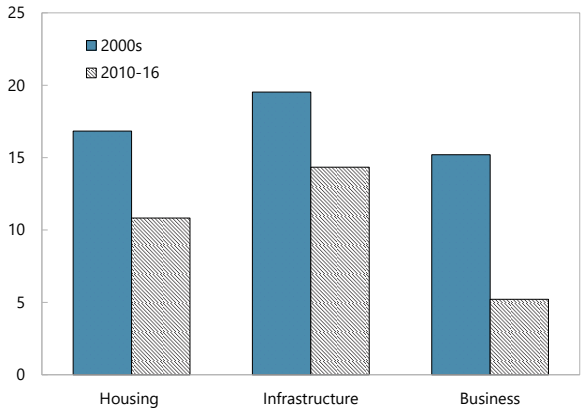
Sources: World Development Indicators; and authors' calculations.

Note: Regressions of sectoral employment share on per capita GDP purchasing power parity (log) for 175 countries.

In the relatively larger secondary sector, productivity growth has been falling amid a large SOE presence. Compared to infrastructure and real estate investment, manufacturing investment has grown more slowly in the previous decade with less evidence of excess (Figure 7). Yet several studies show that China's manufacturing productivity growth slowed considerably following the global financial crisis (Brandt and others, 2020; and Cerdeiro and Ruane, 2022), linked to declining business dynamism and a significant presence of less-productive state-owned enterprises (SOEs). Detailed analysis using manufacturing firm-level data indicates that the responsiveness of capital growth to the marginal product of capital has declined in recent years, suggesting that investment has been channeled less into areas that will enhance long-term productivity and sustainability. It also shows that large productivity gaps between SOEs and private firms persist (Jurzyk and Ruane, 2021; and Cerdeiro and Ruane, 2022).

Figure 7: Average Growth Rate of Sectoral Investment

(In percent)



Sources: Herd (2020); and authors' calculations.

Taking these factors together, China's growth rates have been falling in the past years. Ongoing demand side imbalances and supply side misallocations suggest further slowing of its potential growth rates. The next sections will decompose China's historical growth rates into its supply side factors before providing projections of its potential growth in the medium to long term.

3. Historical Decomposition of Growth

a. The Production Function Approach

We rely on a standard supply-side production function approach to estimate historical potential growth. Standard growth accounting frameworks decompose output into contributions from physical capital, labor, human capital (i.e., the skill-level of the labor force) and total factor productivity (TFP). TFP measures an economies' efficiency, i.e., the output produced for a given level of inputs. Our potential growth estimates are based on a standard Cobb-Douglas production function:

$$Y_t = A_t K_t^{\alpha} (L_t h_t)^{1-\alpha} \quad (1)$$

with *Y* = real GDP, *A* = TFP, *K* = capital stock (derived from investment *I* and depreciation rate *δ* via the perpetual inventory method), *L* = labor, *h* = human capital, *α* = elasticity of output to capital, *1–α* = elasticity of output to labor, and *t* = years.

By log-linearizing and taking first differences, we can express equation (1) in growth rates, with $\hat{X}$ denoting the growth rate of variable X:

$$\hat{Y}_t = \hat{A}_t + \alpha \hat{K}_t + (1-\alpha)\hat{L}_t + (1-\alpha)\hat{h}_t \quad (2)$$

Potential growth $\widehat{\tilde{Y}_t}$ is thus defined by the following equation, with the trend $\tilde{X}$ of each variable X (derived through a Hodrick-Prescott filter) to abstract from the business cycle:

$$\widehat{\tilde{Y}_t} = \widehat{\tilde{A}_t} + \alpha\widehat{\tilde{K}_t} + (1-\alpha)\widehat{\tilde{L}_t} + (1-\alpha)\widehat{\tilde{h}_t} \tag{3}$$

In the historical decomposition, TFP is derived as the residual of the production function:

$$\hat{A}_t = \hat{Y}_t - \alpha\hat{K}_t - (1-\alpha)\hat{L}_t - (1-\alpha)\hat{h}_t \tag{4}$$

One adjustment to the standard approach is a sectoral decomposition to capture the impact of sectoral reallocation. We incorporate sectoral factor reallocation between the primary, secondary and tertiary sectors, and split total TFP into within-sector productivity and productivity gains from sectoral reallocation.[4] Data constraints do not allow us modelling the real estate sector separately. Instead, the sector is incorporated as part of the secondary sector. To add the sectoral composition, we adjust equation (3), with each sector $i =$ primary, secondary, tertiary sector described by a Cobb-Douglas production function analogous to the economy-wide function:

$$Y_{i,t} = A_{i,t}K_{i,t}^{\alpha}(L_{i,t}h_{i,t})^{(1-\alpha)} \tag{5}$$

With $Y_t = \sum_{i=1}^{3} Y_{i,t}$ and $\hat{Y}_{i,t} = \hat{A}_{i,t} + \alpha\hat{K}_{i,t} + (1-\alpha)\hat{L}_{i,t} + (1-\alpha)\hat{h}_{i,t}$, assuming α the same across all sectors and human capital $\widehat{h_{i,t}} = \widehat{h_t}$, we can decompose overall TFP from equation (4) into a within-sector TFP growth component and a reallocation factor:

$$\hat{A}_t = \underbrace{\sum_{i=1}^{3}\left(\frac{Y_i}{Y}\right)\widehat{A_i}}_{\text{Within-sector TFP growth}} + \underbrace{\alpha\sum_{i=1}^{3}\left(\frac{Y_i}{Y} - \frac{K_i}{K}\right)\widehat{K_i} + (1-\alpha)\sum_{i=1}^{3}\left(\frac{Y_i}{Y} - \frac{L_i}{L}\right)\widehat{L_i}}_{\text{Factor reallocation across sectors}} \tag{6}$$

And can thus express potential growth as:

$$\widehat{\tilde{Y}_t} = \widehat{\tilde{A}_t^{within}} + \widehat{\tilde{A}_t^{reallocation}} + \alpha\widehat{\tilde{K}_t} + (1-\alpha)\widehat{\tilde{L}_t} + (1-\alpha)\widehat{\tilde{h}_t}. \tag{7}$$

We make the simplifying assumption that parameter α remains constant. The elasticity of output to input factors is oftentimes approximated by their shares in incomes, as this is the case when firms are profit-maximizing under perfect competition and the production function has constant returns to scale. However, given labor and capital misallocations in China (see e.g., Hsieh and Klenow, 2009), factor prices might not adequately represent their marginal productivities. In line with the literature (see Albert and others, 2015), we thus use conventional coefficients $\alpha = 0.4$ and $1 - \alpha = 0.6$.

[4] The primary sector encompasses agriculture, forestry, animal husbandry and fishery industries, the secondary sector includes manufacturing, construction, mining and quarrying, and production and supply of utilities. The tertiary sector encompasses all other industries.

b. Historical Decomposition

We use the following data to derive historical TFP growth.

- *Y, Y_i* : Real GDP growth is sourced from China's National Bureau of Statistics (NBS). Sectoral GDP shares are calculated from sectoral real GDP levels.

- *K, K_i* : Total capital stock is sourced from Herd (2020), extended by the perpetual inventory method using real gross fixed capital formation (staff estimates based on NBS data) and depreciation rates from Herd (2020). Sectoral capital stocks are based on Wu (2016) for the initial period and subsequent investment shares based on sectoral shares in fixed asset investment (NBS). This data is based on urban investment and thus likely underestimates investment in the primary sector.

- *L, L_i:* Labor is proxied by the working age population (15-59 for males, 15-54 for females), sourced from the UN's World Population Prospects 2022. Sectoral labor is based on employment shares by sector, sourced from NBS.

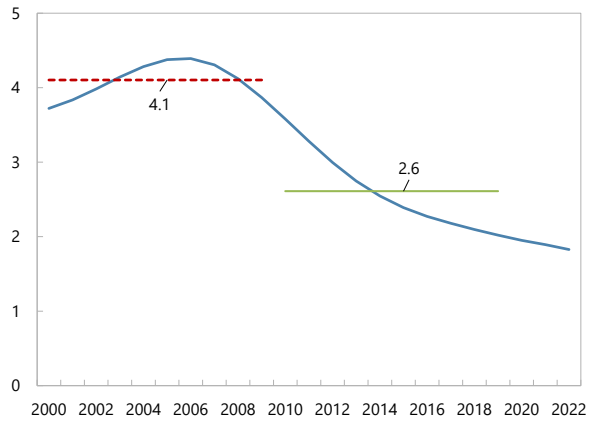
- *H:* Human capital is based on an index from Penn World Tables 10.01, based on average years of schooling and returns to education. For 2020-22, we extend the index by assuming the same growth rate as in previous years, i.e., assuming no scarring from the pandemic.

TFP growth fell sharply over the last decade. We derive historical TFP growth as the residual of the production function based on the historical levels of GDP growth. The decomposition shows that aggregate TFP growth sharply fell from 4.1 percent in the 2000s to 2.6 percent in the 2010s (Figure 8). Since peaking in 2006, aggregate TFP growth has been on a downward trend. Other estimates of aggregate TFP growth in the literature and the Penn World Tables also identify this significant slowdown (Figure 9).

These findings might overestimate actual productivity growth by not accounting for sustainable levels of output. Sustainable output can be thought of as the level of GDP that an economy can sustainably produce over the medium term in the absence of imbalances. For example, Chen and Kang (2018) define sustainable GDP growth as growth without excessive credit expansion. Similarly, Albert et al. (2015) argue that excessive credit dynamics have been responsible for overinvestment in China, artificially inflating GDP levels. Post-GFC, when Chinese GDP and investment growth were supported by excessive credit growth, the nonfinancial private sector credit-to-GDP ratio increased by 45 percentage points during 2012-2016. Without this excessive credit growth, Chen and Kang (2018) estimate that nonfinancial private sector credit-to-GDP would have increased by only around 10 percentage points over the same period. They note that credit efficiency—the amount of credit needed for a unit increase in nominal GDP—deteriorated sharply during the post-GFC period, pointing to growing resource misallocation as capital increasingly grew in relatively less productive sectors, such as real estate. Thus, sustainable real GDP growth, especially during the post-GFC period, might have been lower than actual real GDP growth.

Figure 8: Estimated Aggregate TFP Growth

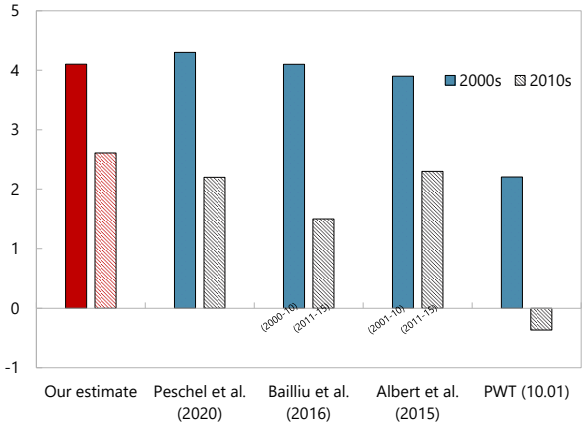
(In percent, detrended)



Sources: Authors' estimates.

Figure 9: Comparison of Aggregate TFP Growth Rates

(In percent)

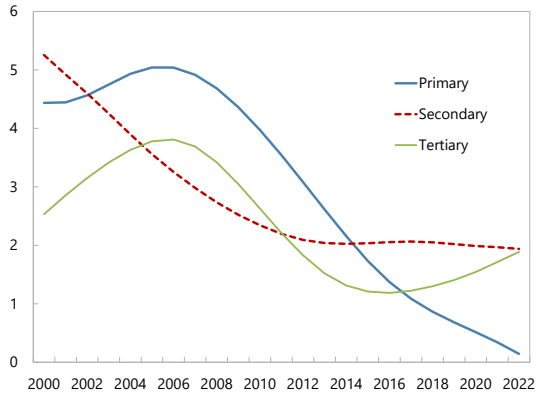


Sources: Penn World Tables, authors cited above, and authors' estimates.

Within-sector TFP growth rates have also fallen across all sectors since the 2000s, similar to aggregate TFP growth rates. Our sectoral decomposition shows that within-sector TFP growth fell from averages of around 3-5 percent in the 2000s to 2 percent or less in the 2010s (Figure 10). We find the highest TFP levels in the secondary sector. During the 2010s, our estimates find that TFP levels in the primary sector and tertiary sector were about 78 percent and 81 percent, respectively, of those in the secondary sector (Figure 11). As more labor resources moved out of the primary sector and into the more productive secondary sector, factor reallocation has been contributing toward aggregate TFP growth (Figure 12). Aggregate TFP growth has thus exceeded within-sector TFP growth rates, though the effect has been fading in line with a more constant share of employment in the secondary sector (Figure 13).

Figure 10: Within-sector TFP Growth

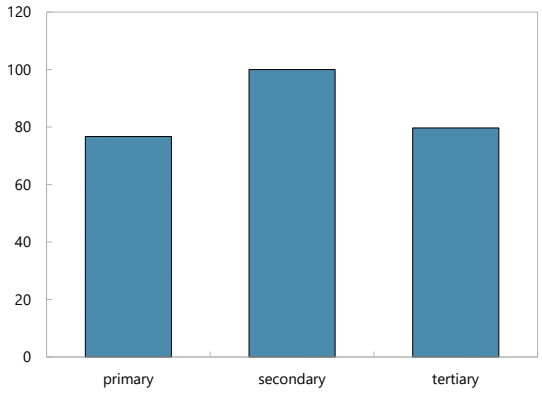
(In percent, detrended)



Sources: Authors' estimates.

Figure 11: Sectoral TFP Level Estimates

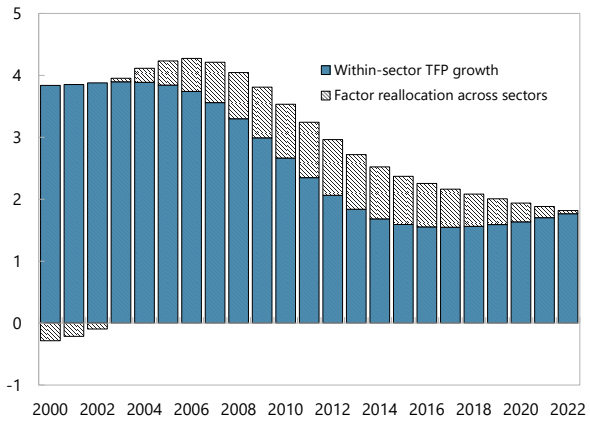
(Secondary sector TFP level = 100; 2010-22 averages)



Sources: Authors' estimates.

Figure 12: Sectoral TFP Composition

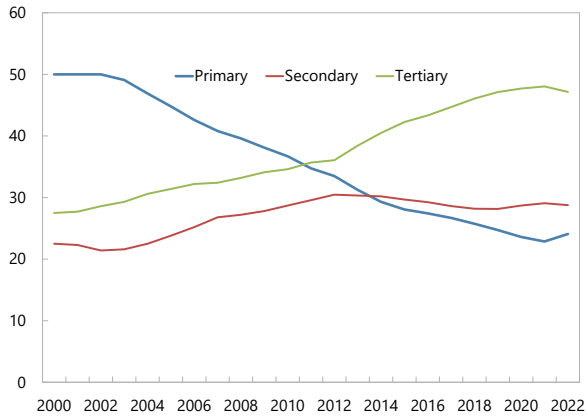
(In percent)



Sources: Authors' estimates.

Figure 13: Sectoral Employment Shares

(In percent of total employment)

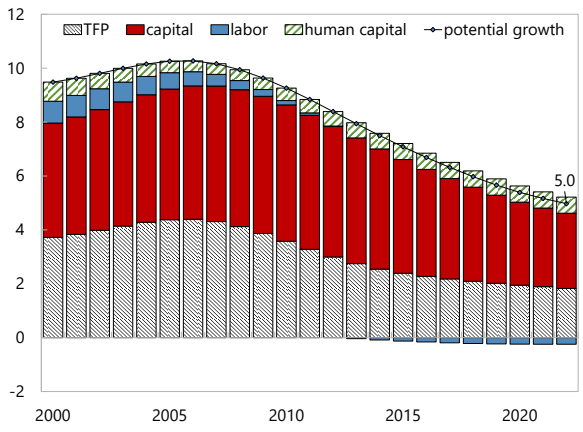


Sources: NBS; and authors' estimates.

Overall, we find that China's potential growth has fallen from a peak of around 10 percent in 2006 to around 5 percent in 2022. The historical decomposition shows China's potential growth peaked in 2005-06 and has fallen since in line with weaker productivity growth, less productive capital, and a shrinking workforce (Figure 14). For 2022, we estimate potential growth of 5 percent, with weaker TFP growth explaining the largest part of the drop from its peak.[5]

Figure 14: Potential Growth

(In percent)



Sources: Authors' estimates.

[5] Due to data availability, the historical decomposition for 2023 was not yet possible at time of publication. 2023 is included in the projections.

4. Baseline Scenario

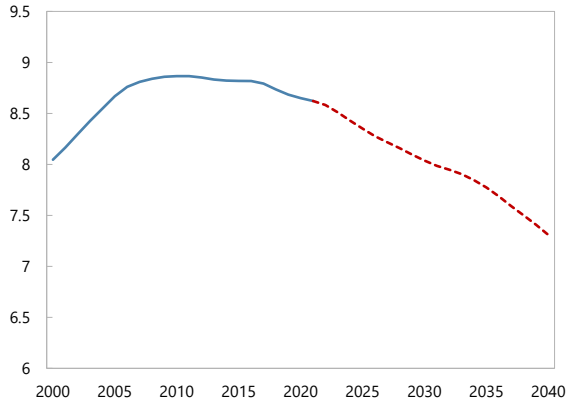
We provide projections of China's potential growth over the medium to long term under a baseline and a reform scenario, conditional on a bottom-up approach to forecast each of the factors in our production function. Forecast scenarios are derived by projecting and changing assumptions of the input factors to the production function.

In our baseline scenario, we assume no significant structural reforms, but a return to pre-pandemic trends. Specifically, the baseline assumes the following developments (see Table 1):

- *Labor* evolves in line with the UN's medium fertility growth scenario, continuing to fall (Figure 15). This implicitly assumes that the average retirement age of 54 will remain constant. Lacking detailed data, it also does not take into account changes in labor force participation rates, especially across gender. In the absence of significant rebalancing, we assume sectoral labor shares converge to advanced economy shares by 2050.[6]

Figure 15: Estimated Workforce

(In hundred thousand people)



Sources: United Nations, Department of Economic and Social Affairs, Population Division (2022), World Population Prospects 2022; and authors' calculations.

- *Human capital* will continue growing at its current rate, i.e., we assume no lasting scarring from the pandemic.

- *Investment:* In the absence of significant reforms towards rebalancing, investment is assumed to remain a large share of GDP, even as it grows less than before. In line with trends in the household savings rate and

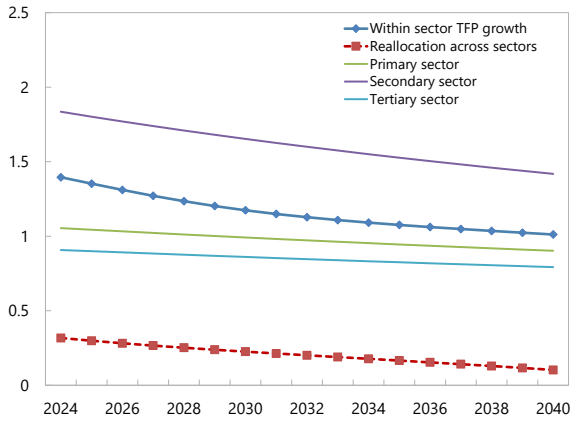
[6] Pre-pandemic, employment shares across the sectors in China were roughly 25 percent in the primary, 28 percent in the secondary, and 47 percent in the tertiary sector. On average across the G7 economies, the shares were about 2 percent, 22 percent, and 76 percent. Based on our labor share convergence regression, sectoral labor share convergence until 2050 under our baseline potential growth forecast would broadly be in line with China's per capita growth levels by that time.

demographics, we assume the investment-to-GDP ratio will fall by about 1 percentage point in the long term from its current level.[7] Accordingly, we derive the growth rate of investment via an iterative process by calculating potential growth and the resulting investment-to-GDP ratio for different investment growth rates until we find our target investment-to-GDP ratio. Slow factor reallocation implies capital stock shares converge to current advanced economy shares only by 2050.[8]

- *TFP*: Within-sector TFP levels are assumed to move in line with their pre-pandemic linear trend. This implies falling sectoral TFP growth rates (Figure 16). Additionally, sectoral reallocation will continue in line with the assumptions on labor and capital shares mentioned above, with the reallocation share in total TFP gradually falling over time.

Figure 16: TFP Growth Projections, Baseline

(In percent)



Sources: Authors' projections.

Our iterative process finds average investment growth of 2.6 percent in the baseline scenario, a considerable drop from previous rates, but in line with sustainability concerns of further investment-led growth. This investment growth assumption compares to growth in real gross fixed capital formation of 13.5 percent in the 2000s and 8.0 percent in the 2010s, though with a decline over the last few years to 3-5 percent. The deceleration is broadly in line with the slowdown in the property sector, as real estate investment—previously contributing more than 20 percent of total investment—contracted by about 25 percent over 2021-23. While we expect real estate investment to eventually stabilize, we expect its contribution to remain considerably lower than previously. The deceleration is also in line with our assumption of more sustainable investment and growth, avoiding further demand imbalances and overcapacity concerns on the supply side.

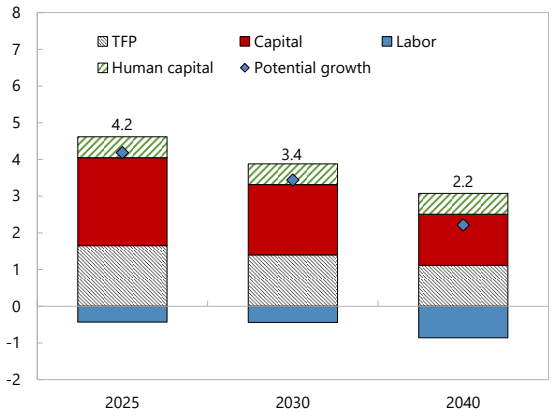
[7] We assume that age-specific savings rates remain constant, and account for demographic change and changes in the composition of age groups to derive the overall long-term savings rate. We assume domestic investment will be primarily financed by domestic savings. We thus map the change in savings to the change in investment and use the perpetual inventory rate with a constant depreciation rate to derive the capital stock.

[8] Abstracting from capital in the primary sector, the capital allocation in China is about one-third to two-thirds in the secondary and tertiary sector, respectively. On average across the G7 economies, the allocation is about one-quarter to three-quarters.

We do not consider a scenario of higher investment growth despite a current policy focus on green innovation and technology. First, without a strong increase in domestic demand, continued high investment growth would expand external surpluses—yet relying on global demand could become more difficult amid protectionist policies around the world and concerns around intensifying trade conflicts. Second, investment in new sectors makes up a considerably smaller share than the outsized investment in infrastructure and real estate observed in the past decade, thus unlikely to substitute for a deleveraging in these areas, both amid illiquid real estate developers and highly indebted local governments. On the other hand, more investment in R&D could push up TFP growth, and amid stronger productivity growth, investment growth could be higher even with a constant investment-to-GDP ratio. Yet, amid a large SOE presence we neither expect investment efficiency to increase nor to considerably boost productivity. As observed in the last few years, some green sectors, such as new-energy vehicles, already experienced rapid growth which coincided with a period of falling overall TFP growth, thus not providing a strong case for a sudden change.

Figure 17: Potential Growth Projections, Baseline

(In percent)



Sources: Authors' projections.

Our baseline scenario suggests that potential growth is going to slow considerably over the medium to long term. We find that potential GDP growth rates could drop to about 3.8 percent on average between 2025-30 and to around 2.8 percent on average over 2031-40, implying per capita growth rates of similar magnitude over the same horizon (Figure 17). This compares to averages of almost 8 percent actual real GDP growth in the decade before the pandemic, and 7 percent real per capita GDP growth over the same period.

Table 1: Scenario Assumptions in the Production Function

	Baseline	Reform
K	Investment-to-GDP ratio falls in line with savings rate by about 1 percent until 2050 (based on demographics & income).	Investment-to-GDP ratio falls to advanced economy (AE) average of 22 percent over 15 years.
K_i	Convergence to shares in AEs by 2050.	Convergence to AE shares within 15 years.
L	Total workforce in line with UN population projections, medium fertility scenario.	Retirement age gradually moves by 10 years (from 55 to 65) for females and by 5 years (from 60 to 65) for males over long term, increasing by 1 year every 5 years.
L_i	Return to pre-pandemic trends; by 2050 convergence towards AE sectoral employment shares.	Reallocation towards services and AE shares over reform horizon of 15 years.
h	Continues to grow at current rate.	Human capital converges to current AE level within 15 years.
A_i	Grows in line with growth rate in past decade.	No change for primary sector; secondary sector TFP lifted by 6 percent over 15 years on top of baseline to close SOE productivity gap plus 1ppt higher growth over 15 years from higher market dynamism; tertiary sector TFP growth improves with labor reallocation by 0.05ppt per 1ppt higher labor share.

5. Reforming China's Economy

a. A Reform Scenario in the Production Function

We rely on the production function to derive a medium- to long-term projection under a reform scenario. Analogous to the baseline assumptions, the approach is based on projections of the input factors to the production function. With our reform scenario, we aim to illustrate one possible path of China's potential growth under a set of simultaneous reforms—a best-case scenario.

To illustrate the scope for reform, this scenario assumes several growth-enhancing reforms compared to the baseline of no reforms. Reforms are phased in linearly over 15 years starting in 2024. The main assumptions are the following (see Table 1 for the specific production function assumptions):

- *State-owned enterprise (SOE) reforms:* Implementation of SOE reforms help close the productivity gap between SOEs and privately-owned enterprises (POEs) in the manufacturing sector by improving resource allocation and deleveraging among SOEs. Jurzyk and Ruane (2021) estimate the counterfactual productivity gap to be around 6 percent. We assume this gap to extend to the entire secondary sector and to be closed by year 2039. We make the simplifying assumption that productivity reform alone will not have

an impact on rebalancing. We also do not consider benefits of SOE reform in the tertiary sector where SOE presence is also pronounced.

- *Market dynamism:* Pro-market reforms improve business dynamism, with higher firm entry and exit boosting productivity. In line with findings in Brandt and others (2020), we assume these reforms would boost productivity in the secondary sector by 1 percentage point over the reform horizon.

- *Demand-side rebalancing:* A budget-neutral re-composition of fiscal expenditures toward households, including strengthening the social protection system (IMF, 2022), supports a reduction of the excessively high household savings rate and rebalancing toward consumption, triggering an expansion of services and consumer industries on the supply side due to the higher income elasticities in these sectors. This would also imply a faster reallocation of factors to these sectors. Consequently, the investment-to-GDP share is assumed to fall by around 10 percentage points over the reform horizon as it converges to current advanced economy ratios, implying an improvement in the ratio of private consumption of a similar magnitude. Sectoral reallocation of labor and capital will occur faster than under the baseline scenario as higher consumption implies more demand for services, increasing factor demand in the sector relative to the other sectors.[9] Reallocation of resources from less productive to more productive sectors is assumed to boost tertiary sector TFP growth by 0.05 percentage points per additional percentage point of higher labor share (see Nabar and N'Diaye, 2013) on the back of higher investments and within-sector reallocation over the reform horizon.

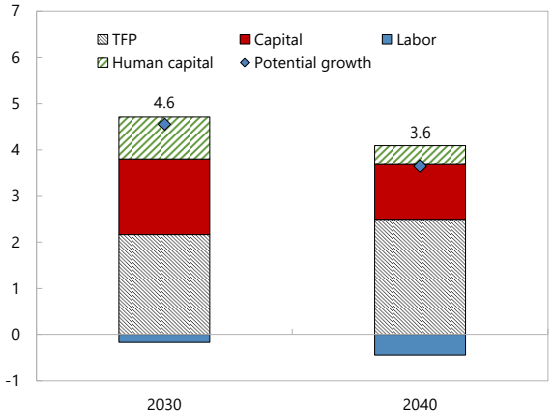
- *Retirement age reform*: To address changing demographics, labor market reforms gradually lift the retirement age from 60 (male) and 55 (female) to 65 over the long term, thus enlarging the potential workforce. This is in line with IMF recommendations (2022). This reform has a longer reform horizon, as we assume the retirement age is lifted by 1 year every 5 years.

- *Education reform*: Reforms that further improve access to and enhance the quality of education boost human capital, with human capital converging to current advanced economy levels over the reform horizon, around 10 years earlier compared to the no-reform baseline.

[9] The rise of the tertiary sector and the decline or leveling-off of the secondary sector need not hinder economy-wide productivity growth even as aggregate productivity in the secondary sector is higher. Market-based service subsectors, such as finance and telecommunications, have labor productivity growth as high or higher than the manufacturing sector in a cross section of countries (IMF, 2018). In China's case, Zhu and others (2019) show how sectoral transitions within the manufacturing and services sector based on significant variation in productivity within those sectors could be an important buffer to moderate a productivity slowdown. In addition, resolving resource misallocation would help outweigh downward pressures.

Figure 18: Potential Growth Projections, Reform Scenario

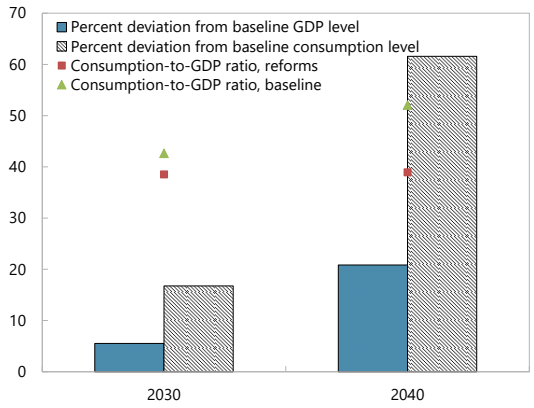
(In percent)



Sources: Authors' projections.

Figure 19: Gains Over the Reform Period

(In percent)



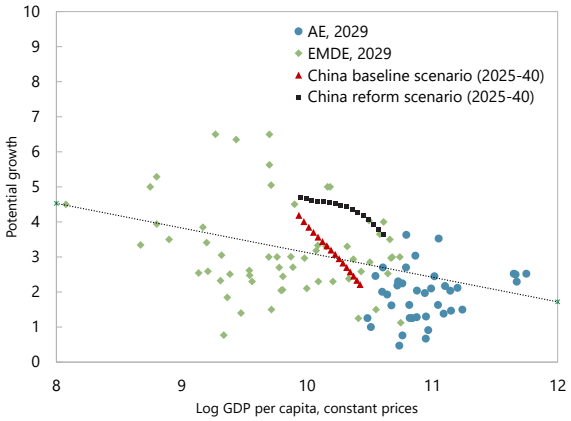
Sources: Authors' projections.

We find that potential growth would be significantly higher under our reform scenario than the baseline over the reform period. The scenario implies average GDP growth rates of about 4.3 percent between 2025-40 (Figure 18) and a per capita growth rate of around 4.5 percent. The reforms are projected to lift the level of real GDP by around 5½ percent by 2030 compared to the baseline scenario, and by around 21 percent by 2040, with the bulk of the benefits stemming from productivity-enhancing reforms (Figure 19). Combined with a re-orientation of fiscal resources toward household support, domestic consumption would increase significantly, with the higher consumption share of GDP by around 13 percentage points in 2040 translating to an improvement in consumption of more than 60 percent over the same period.

These reform policies would also ensure growth benefits are shared more broadly and offer faster progress towards China's climate goals. In particular, China would not only narrow the gap to advanced economies in terms of per capita GDP (Figure 20) but—thanks to the lower energy intensity of a more balanced GDP growth—make faster progress towards its climate goals, with the direct effect on carbon dioxide emissions a reduction of about 12 percent by 2040 (Chateau and others, 2022). Productivity enhancing SOE reforms could also support decarbonization goals, especially since estimates suggest that SOEs generate about half of the country's total greenhouse gas emissions (Clark and Benoit, 2022), while typically having easier access to credit.

Figure 20: Potential Growth in the Cross-Section

(In percent)



Sources: IMF World Economic Outlook; and authors' calculations.

Finally, growth would also be less risky and more sustainable. Under the same path for fiscal policy, higher growth would reduce public debt. This would create additional fiscal space the authorities could build as a buffer. The corporate debt burden would also fall, mainly because of higher growth. Finally, the reduction in saving rates would make the economy less prone to asset bubbles and provide a sustainable driver for non-real estate investment.

b. The General Equilibrium Modeling Approach

To further support our analysis, we complement the production function approach by general equilibrium modeling. We use a version of the IMF's multi-region dynamic stochastic general equilibrium model, GIMF (Global Integrated Monetary and Fiscal model), complemented by a global value chain (GVC) sector. Using a global DSGE model allows us to consistently model both the demand and supply sides of the economy, while taking into account trade flows with other countries, an important feature of China's economy.

The Structure and Calibration of GIMF

GIMF is an annual, multi-region, micro-founded dynamic stochastic general equilibrium model (DSGE) of the global economy. For our analysis, GIMF comprises 10 regions: the United States, the European Union plus (EU+), other advanced economies, China, India, Indonesia, Japan, Korea, other Southeast Asia, and the rest of the world.[10]

We extend the standard elements of the GIMF model by introducing a tradable sector related to global value chains (GVCs). This allows us to capture the key role that GVCs have played in China's integration to the world

[10] "EU+" comprises the European Union and Switzerland; "other advanced economies" comprise Australia, Canada, Iceland, Israel, New Zealand, Norway, and the United Kingdom); China includes both mainland China and Hong Kong SAR; other Southeast Asia comprises Brunei, Cambodia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam; the rest of the world includes emerging markets Russia, South Africa, and Türkiye plus the regions of Africa, the Caribbean, Central Asia, Latin America, the Middle East, Oceania, and any other economy not accounted for elsewhere.

economy and allows us to model global interdependencies more precisely. While more detailed expositions of the model can be found in Kumhof et al. (2010), Anderson et al. (2013), and Carton and Muir (2024), the main features of the model are the following:

- *Households:* Some households are modeled as non-Ricardian, finitely lived, overlapping generations, as found, for example, in Blanchard (1985). These saving households choose consumption, savings, and labor supply. The remaining households are liquidity constrained, consume all their income every period and set their labor supply in proportion to that of the saving households and reinforce the short-term non-Ricardian properties of the model.

- *Firms:* Profit-maximizing firms (owned by households) operate in monopolistically competitive markets, and produce goods in non-tradable, non-GVC tradable, and the GVC tradable sectors. These three sectors are based on sectors from the OECD Inter-Country Input-Output Database (OECD 2021).

- *Production:* Non-tradable goods and domestically produced non-GVC tradable goods are produced using some combination of labor and capital. The GVC tradable sector is more complex than the other two sectors, as GVC tradable goods are used as inputs to the production of both final goods and other GVC tradable goods - roundabout production (Basu 1995). As an example of a GVC, consider the automobile industry. While automobiles themselves are final consumption goods, along the GVC there are semiconductors, used to produce chips going into the production of various automobile parts. Moreover, GVCs can be sensibly represented in aggregate due the links between GVCs – for example, chips also enter into the production of personal computer parts (another GVC good). Production in the GVC sector combines capital and labor (bundled using a Cobb-Douglas function) with other GVC goods, sourced both domestically and from abroad. Production in the GVC sector is used either as final goods consumption, both exported and sold domestically, or cycled back as intermediate inputs into the production of other GVC goods (roundabout production mentioned above), both domestically and abroad.

- *Trade:* Regions trade final goods and services for consumption and investment and intermediate goods from the non-GVC and GVC tradable sectors. The flows of these goods and services are tracked bilaterally. Trade flows react to demand, supply, and pricing (that is, the terms of trade and bilateral real exchange rates). The model captures barriers to trade using "non-tariff barriers" (NTBs), which increases prices for importers and imposes iceberg costs on exporters. Moreover, they do not generate fiscal revenues.

- *Monetary policy*: Each region's central bank (or monetary authority) uses an interest rate reaction function to maintain an inflation target with the ability to also target secondary objectives such as the output gap or a fixed nominal exchange rate. The default set-up for China is an inflation-forecast-targeting regime.

- *Fiscal policy:* Governments have access to an extensive set of fiscal instruments. They include public consumption, public investment, general lump-sum transfers to households, lump-sum transfers targeted only to saving or liquidity-constrained households, tariffs, and taxes on consumption and labor and corporate income. The fiscal authority targets a deficit-to-GDP ratio (which is consistent with a debt-to-GDP target), which can be achieved by adjusting one or more fiscal policy instruments. The default set-up uses

general lump-sum transfers to maintain the deficit target. Furthermore, in the short term, the government employs an automatic stabilizer, by using a measure of the output gap to countercyclically vary the level of general lump-sum transfers to smooth real GDP fluctuations through household consumption.

The model relies on the following assumptions to calibrate each region's economy:

- Each region's economy is calibrated using the OECD Inter-Country Input-Output Database for 2018 (OECD, 2021), drawing on its national accounts and fiscal ratios. The size of the various sectors is determined jointly with the parameterization of other sectors such as consumption and international trade. Some adjustments are necessary to reconcile the global data with a well-defined steady state. Therefore, countries that are far from a steady state in 2018 may have notably different steady state calibrations. For example, China's investment is much higher than needed to maintain its capital stock in the steady state. Therefore, in the calibration, investment is lower, and consumption is higher as a share of GDP than in the 2018 data. Table 2 presents the calibration for China.

Table 2: China's Steady-State Calibration

(Percent share of nominal GDP, unless otherwise stated)

	China
Share of Global GDP (percent, US$)	16.7
Domestic Demand	
Household Consumption	51.7
Private Investment	18.5
Trade	
Aggregate Exports	17.5
Consumption	*5.1*
Investment	*3.1*
Non-GVC Tradable	*1.8*
GVC Tradable	*7.5*
Aggregate Imports	17.5
Consumption	*4.1*
Investment	*1.6*
Non-GVC Tradable	*2.6*
GVC Tradable	*9.2*

Sources: OECD (2021); and authors' calculations.

- For consumption, the intertemporal elasticity of substitution is common across regions at 0.2. The share of liquidity constrained households varies based on level of financial market development, and is set at 25 percent for the United States, EU+, the other advanced economies, and China, and at 50 percent for the remaining regions. Regions with high shares of liquidity constrained households usually display greater volatility in GDP, as they are less able to smooth their consumption under temporary shocks or implement gradual adjustments under permanent shocks.

- Region size and openness to trade also differentiate the role of regions in the global economy. Regions with smaller shares of global GDP will have less impact on the global neutral interest rate. A region's degree of openness determines how activity in the rest of the world will spill over onto it, and how that region influences the rest of the world.

- Many of the elasticities of substitution in GIMF are calibrated the same across regions, including for trade and the combination of various goods to produce final goods. However, each region has a unique set of related bias parameters, which, given the elasticities, are computed based on the calibration of key steady-state ratios based on OECD (2021).

- For our analysis, the most important elasticities are related to trade and combining imports and domestically produced goods to produce intermediate and final goods (Table 3). Demand for goods in the GVC sector is assumed to be relatively inelastic (about 0.8), compared to demand and trade for consumption, investment, and tradable intermediate goods, which are usually elastic at about 1.5. Domestically produced consumption and investment goods are a combination of non-tradable goods and a tradable goods bundle, with an elasticity of substitution of 0.5. The tradable goods bundle is assembled from tradable intermediate goods and GVC goods with an elasticity of 0.95.

Table 3: Key Elasticities of Substitution in Production and Trade

Elasticity between ➔	Capital-Labor / GVC	Domestic / Imported	Different Regions
Consumption	-	1.5	1.5
Investment	-	1.5	1.5
Non-GVC Tradables[1]	-	1.5	1.5
GVC Tradables[1]	0.5	0.8[2]	0.8

Source: Authors' calculations.

Notes: 1/ There is also an elasticity of substitution to produce an overall tradable goods bundle between Non-GVC and GVC tradables equal to 0.95. 2/ Elasticity between domestic and imported when using GVC goods in the production of final goods or of other GVC goods

A Reform Scenario

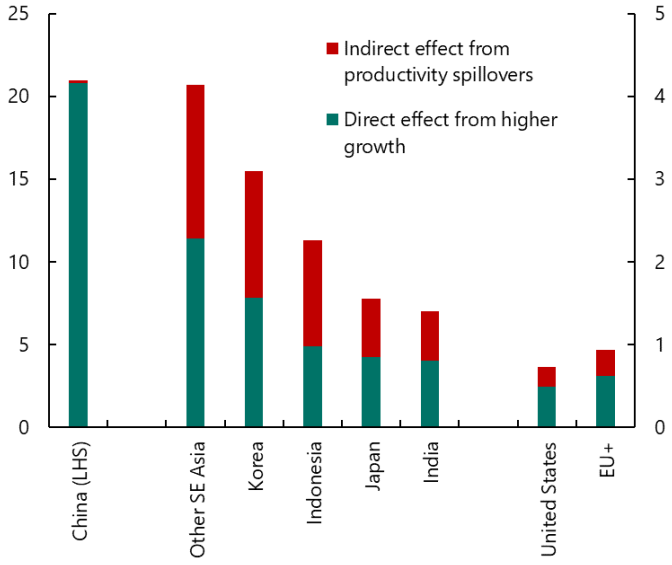
First, we consider the impact of a reform scenario with two layers, one based on productivity improvements, the other on fiscal rebalancing. While these scenarios are not fully identical to the scenarios modeled in the previous section, they provide a more in-depth understanding of the drivers of potential or sustainable output. The productivity scenario also demonstrates benefits for the rest of the world.

We consider the impact of reforms that would ignite further convergence to the productivity frontier, which would increase the long-term level of China's real GDP about 21 percent.[11] This implies annualized GDP growth 1.3 percentage points higher than in the baseline. As IMF (2023) shows, current productivity gaps with the frontier remain large, especially in GVC-intensive sectors. Significant reforms, such as the ones mentioned above, could reignite faster convergence. Consequently, growth is assumed to be about 1 percentage point higher than that of the baseline scenario for 15 years. Given the larger productivity gaps relative to the frontier in China's GVC tradables sector, GVC sector productivity is assumed to grow twice as fast as non-tradables productivity.

Reform in China can also have positive global long-term effects (Figure 21). Assuming spillovers in the model occur only through trade channels (Figure 21, green bars), real GDP in the rest of the world increases by about 1.4 percent or 0.1 percentage point higher annualized growth. Spillovers are largest in the economies of other southeast Asia, where real GDP increases by about 2.3 percent in the long term as they are relatively open economies that trade intensively with China. The spillovers are generally smaller in larger advanced economies (Japan, the United States, EU+), which tend to be more closed and have relatively smaller links to China.

Figure 21: Long-Term Effects of the Reform Scenario Using GIMF on China's Real GDP

(Percent deviation from baseline)



Source: Authors' calculations.

The positive spillovers from reforms in China can be significantly larger if they also result in direct productivity gains in other regions (Figure 21, red bars).[12] The spillover structure captures both the direct effects of technology embodied in imports and the indirect effects of the dissemination of technological advances. All

[11] This scenario has been presented before in IMF (2023). It takes about 10-12 years to reach the long-term equilibrium.

[12] The productivity spillover calculations are based on the methodology found in the IMF model, FSGM (Flexible System of Global Models; Andrle and others 2015), drawing on Franco, Montresor, and Marzetti (2011) and Lumenga-Neso, Olarreaga, and Schiff (2005).

regions see larger spillovers, though the amplification from productivity spillovers is larger for countries that are further from the technological frontier and that have stronger trade links with China, such as the economies in the group other southeast Asia.

In addition to productivity-enhancing reforms, rebalancing toward consumption and away from investment would result in more sustainable, less debt-intensive growth in China. While rebalancing will unambiguously enhance consumption and welfare for China in the short and medium term, the effect on real GDP is uncertain. Real GDP is likely to rise in the short term, especially as the economy is currently operating below its potential; over the medium term, rebalancing could be negative for GDP as capital accumulation slows, though dynamic inefficiencies in China's case suggest potential for a positive GDP impact from rebalancing.

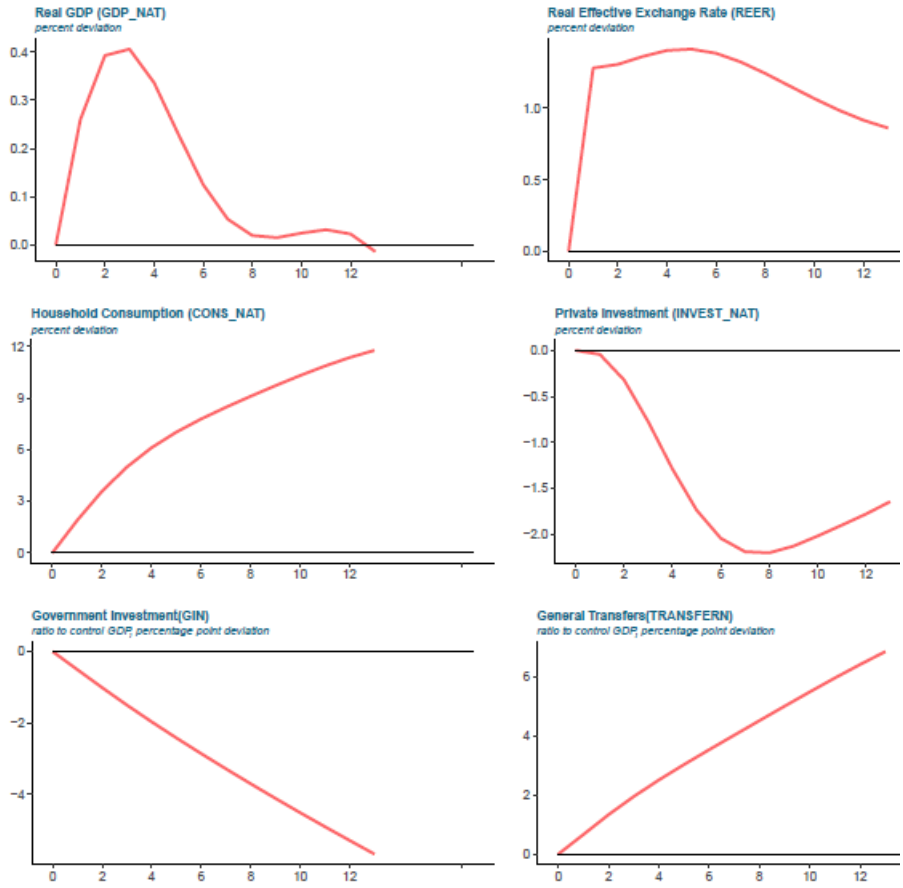
We find that rebalancing in China is GDP neutral over the long term. To model rebalancing, we assume public investment in China is reduced by 0.5 percentage points of nominal GDP per year for 15 years (halving China's public investment), offsetting it by an increase in social protection for households, represented in GIMF by lump-sum transfers to all households. The decline in public investment is assumed to not have an impact on overall productivity on the assumption that the marginal productivity of "lost" public investment would have been close to zero.

Simulations suggest that fiscal rebalancing will have a small impact on real GDP but is much more significant for household consumption in the short- and medium-term (Figure 22) The boost in consumption in the long term is over 12 percent. This is larger than the decline in public investment. Real GDP will peak temporarily at 0.4 percent higher relative to baseline 3 years after the start of rebalancing. The larger effective multiplier on transfers relative to public investment reflects the lower import intensity of consumption and, in the short-term, the presence of forward-looking households who increase their consumption to reflect the higher level of wealth from the increasing stream of fiscal transfers to households over the next 15 years. The decline in investment import demand leads to exchange rate appreciation pressures, with the trade balance declining by 0.4 percent of GDP after 3 years. In the long term, rebalancing is GDP neutral, but with a strong shift to household consumption.[13]

[13] If lower public investment were to reduce overall productivity, rebalancing would reduce GDP in the long term.

Figure 22: Fiscal Rebalancing in GIMF

(Percent deviation from baseline)



Sources: Authors' calculations.

6. Conclusion

China's potential growth has started falling and several headwinds suggest it will continue to slow, showing the need for comprehensive reforms of China's growth model. With an ageing population, slowing aggregate productivity, as well as record-high investment rates that have pushed investment into less productive sectors, potential growth under a medium- to long-term baseline scenario is expected to fall. Without reform efforts, aging and declining productivity would likely continue to suppress growth over the long term, beyond our projection horizon. Additional downside risks, such as geoeconomic fragmentation and reduced technology knowledge exchange amid technological decoupling, could further dampen medium- to long-term prospects. These pressing factors suggest the need to rebalance away from the investment-led, carbon-intensive, growth model towards more sustainable growth drivers, in particular consumption. Such a demand-side transformation could be an important step on China's path to an advanced economy.

Under a comprehensive reform scenario, steps to lift productivity growth and foster rebalancing towards sustainable, less investment-driven growth can significantly raise China's growth potential and overall welfare. A return to market-based structural reforms addressing productivity issues could lift aggregate TFP. In addition, reallocating capital between SOEs and POEs and from infrastructure and real estate into more productive manufacturing or services sectors would help lift overall productivity. SOE reforms to enhance productivity in the use of carbon-intensive inputs, while stimulating innovation in renewables, could also support growth. Furthermore, to shift reliance towards more sustainable demand drivers, fiscal rebalancing towards more social protection would rebalance away from excessive, low-productivity investment, moving to more consumption-based growth while being GDP neutral. These policies would not only raise growth and output levels, but reduce risks, raise welfare, and make growth more sustainable, balanced, and green.

It is important to note the limitations of our approaches projecting potential growth. First, these projections are conditional on specific modelling assumptions. It is reassuring, however, that we have broadly consistent findings using two very different approaches. Second, our projections are subject to potential under- or overestimation of potential output due to overly pessimistic or optimistic assumptions. For example, since 2020 China has persistently experienced low inflation, low nominal growth and weak consumer confidence even though growth rates were still relatively high by upper-middle income country standards. This could be consistent with a scenario in which potential growth was higher than our estimates in the recent past, and actual negative output gaps were larger than estimated. Continued refining of China's potential growth projections, including with alternative analytical approaches, could help address some of these concerns. This will be particularly important during a period of relatively fast structural transformation in China.

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