



Rebalancing China's Economy: Domestic and International Implications

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Abstract

This paper considers interactions between China's domestic and external imbalances and their global implications. We present scenarios detailing how a rebalancing of China's growth pattern from investment-driven growth towards more consumption-driven growth may occur in practice. Using input–output tables for 2012, we illustrate the knife-edged nature of Chinese rebalancing, the linkages between expenditure-side and production-side rebalancing, and how an internal rebalancing could exacerbate external imbalances. A policy implication for China is that for rebalancing to be fast, consumption must be exceptionally resilient and the efficiency of investment must increase sharply. If rebalancing is too slow, the capital-to-output ratio will rise to potentially unsustainable levels and consumption will fail to attain levels of contemporary upper middle-income economies by 2030. Global input–output tables (1995–2011) suggest that the patterns of Chinese rebalancing considered in our scenarios may generate substantial headwinds for exports to China by its trading partners.

Key words: China, external rebalancing, internal rebalancing

JEL codes: E21, E22, O11, O53

I. Introduction

China's twin imbalances (the high investment-to-GDP/low consumption-to-GDP ratio and large current account surplus) have been a focal point for international policy debate

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over much of the past decade and a half.¹ Between 2000 and 2007, China's current account surplus surged from less than 2 percent of GDP to 10 percent of GDP. The rise in the current account surplus was accompanied by a sharp increase in the household saving rate (31 to 39 percent of household disposable income) and in the investment share of GDP (33 to 40 percent) (CEIC Data). In the wake of China's policy response to the global financial crisis, the investment share of GDP expanded even further, reaching 44 percent in 2014, although the current account surplus has receded to around 2 percent (CEIC Data).

Multiple explanations have been put forward for China's imbalances, ranging from the managed exchange rate regime (Lardy and Goldstein, 2008), financial repression (Lardy, 2008) and broader factor cost distortions (Huang and Tao, 2011) to rapid wealth accumulation (Ma et al., 2013), demographic transition (Cai, 2011) and even population control policies (Wei and Zhang, 2011). The twin imbalances have, in turn, been held responsible for the "global savings glut," excessively low global interest rates in the 2000s (Bernanke, 2007) and the global financial crisis (Obstfeld and Rogoff, 2009). The rise in debt accompanied by the domestic investment imbalance has also raised concern that a sudden deleveraging could trigger a financial crisis within China itself (Pettis, 2013). Perceived negative implications of these imbalances have led to repeated calls for China to rebalance both its domestic demand structure and its pattern of trade (see IMF, 2010, 2015).

The implications of Chinese domestic "rebalancing" from an investment-led economy to a more consumption-based one are, *ex ante*, ambiguous for external rebalancing and for the global economy. This can be illustrated by the following identity relationship between saving, investment and the trade balance:

$$Y - C - I = X - M, \quad (1)$$

where Y refers to GDP, C to consumption, I to investment, X to exports and M to imports. Of course, this accounting identity reveals nothing about the causality between the savings gap ($Y - C - I$) and China's external surplus ($X - M$).² The rise in China's external surplus in the 2000s coincided with an increase in investment relative to output and an even stronger rise in savings. In an accounting sense, a more balanced domestic demand structure may occur alongside either a rise or a fall in the external balance,

¹In this paper, "China" mainly refers to the Chinese mainland, and does not include Taiwan Province and the Special Administrative Regions of Hong Kong and Macao, unless specified.

² C refers to both household and government consumption. The difference between savings and investment is equivalent to the current account balance, which in addition to the trade balance (net exports) includes the balance on primary income and the balance on secondary income. The current account balance has closely approximated its trade balance as a share of GDP in recent decades.

depending on the relative speed with which investment and saving ratios adjust.

Ma et al. (2013) argue that China's twin imbalances can be understood as the product of large income windfalls that arose from multiple positive productivity and demand shocks, giving rise to large external surpluses. An advantage of this explanation is that it reconciles rapid growth in both investment and consumption with the rise of the external surplus over the 2000s. Ma et al. (2013) also predict that as these windfalls fade, and the real effective exchange rate appreciates alongside rising unit labor costs, the current account surplus will shrink and savings will fall.

However, Huang and Tao (2011) and Pettis (2013) suggest that both internal and external imbalances in China have had a different root cause: labor and capital market distortions that have lowered the cost of labor and capital, repressed consumption and suppressed the value of the RMB. They argue that both imbalances may be tackled simultaneously by reducing these distortions. Similarly, Obstfeld and Rogoff (2009, p. 39) contend that:

if typical Chinese savers had access to relatively safe instruments offering higher rates of return, huge positive income effects would in all likelihood swamp substitution effects, resulting in lower, not higher, household saving. The result would be higher household welfare in China, as well as a reduction in China's foreign surplus.

However, Fukumoto and Muto (2011) provide a historical counterexample to this claim. They observe that, in practice, a relaxation of factor cost distortions in Japan in the 1970s led to a more rapid fall in the investment rate than in the savings rate, which, in turn, fueled a widening of the current account surplus.

To date, domestic rebalancing (defined as a fall in the investment-to-GDP ratio and a rise in the consumption-to-GDP ratio) has lagged behind the reduction of the external imbalance. Therefore, a central question is whether, over the next decade or so, China can achieve a meaningful domestic rebalancing while maintaining slower but more sustainable growth, without a much wider external imbalance. In the present paper, we put forward several points about the likelihood of a “double rebalancing.”

First, we briefly summarize evidence from Ma et al. (2016) that suggests that China's consumption growth is anything but weak, and that any meaningful rebalancing is likely to flow from a sharp deceleration of investment rather than an acceleration of consumption.

Second, we consider quantitative scenarios of domestic rebalancing for the period of 2015–2030, to illustrate that a simultaneous resolution of domestic and external rebalances while maintaining reasonable growth is possible but quite challenging. Our scenarios underscore the “knife-edged” nature of domestic rebalancing. Even a baseline “moderate” combination of rebalancing and growth scenarios involves a considerable

growth slowdown, a rising capital/output ratio and a further decline in the return to capital. If the domestic rebalancing is rapid, the implied disparity between the growth of consumption and investment requires both exceptional resilience of consumer spending on the demand side and a swift increase in the efficiency of investment on the supply side. If it is slow, the capital-to-output ratio rises to potentially unsustainable levels, and real household consumption per capita falls short of the levels of a contemporary upper middle-income economy even by 2030.

Finally, the wider effects of domestic rebalancing in China on its trading partners depend on the composition of bilateral trade flows and the extent to which that composition and relevant prices adjust in response to the changing structure of China's economy. China's domestic rebalancing is more likely than not to worsen its external imbalance, given the different import intensities of consumption and investment. Ahuja and Nabar (2013) use a dynamic panel model to assess the spillover effects of an investment slowdown in China and conclude that there could be sizeable negative effects for capital goods exporters, such as Germany and Japan, and commodity producers, such as Australia, Brazil and Canada. Mohommad et al. (2012) reach similar conclusions using Asian input–output tables, which allow them to account for regional supply-chain linkages.

We confirm and update these findings using broader global input–output tables published by the OECD, building on previous work by Kelly (2014) and Kelly and La Cava (2014). Assuming that the structure of global trade with China remains broadly stable and that relative price adjustments are of second-order importance, our calculations suggest that domestic rebalancing in China will be negative for countries that export resource commodities. Regional producers of manufacturing inputs that have been used intensively in Chinese capital formation, including Korea and Japan, may experience similar effects. Our assumptions can be questioned, but a robust implication is that a large-scale reorientation of production and trade would need to occur to mitigate the negative impact of Chinese rebalancing on these economies.

The present paper proceeds as follows. Section II places China's twin imbalances in perspective and considers mechanisms for rebalancing. Section III constructs scenario projections for output, consumption, savings, investment and return to capital, assuming that the domestic economy rebalances but that the current account surplus is unchanged. Section IV uses Chinese input–output tables to illustrate the linkages between rebalancing on the expenditure and production sides of the economy. Section V relaxes the assumption of an unchanged current account surplus, and Section VI explores how different rebalancing scenarios could affect China's trading partners, using data from OECD input–output tables. Section VII concludes.

II. China's Expenditure Imbalance

Compared with other economies, China has an extremely atypical domestic expenditure composition, featuring one of the highest investment rates and lowest household consumption rates globally. The sustained gap between investment and consumption rates has had few parallels outside major oil-exporting countries. Nonetheless, China's external balance seems quite moderate when compared to major advanced and emerging market economies, at least when averaged over the past 10 years. Therefore, the domestic imbalances have taken center stage in policy discussions.

Despite the low consumption share of GDP and its reduction over the past few decades, China's consumption growth has been far from weak. On average, household consumption growth was the lowest among all the major domestic expenditure components during 1978–2014 (see Table 1). However, growth has averaged 9 percent for more than three decades. The unbalanced nature of China's expenditure pattern stems from the fact that investment had been expanding at an even faster, double-digit, pace until 2010.

The imbalanced nature of China's growth pattern raises the question of when and how these imbalances will be resolved. As discussed in the next section, a range of indicators suggest that “rebalancing” may already have started from 2010. Notwithstanding the popular hypothesis that financial repression has contributed to the imbalances by suppressing consumption growth (Lardy, 2008; Nabar, 2011; Pettis, 2013), the speed with which consumption has grown to date suggests that it may be optimistic to hope that even stronger consumption growth in coming years will resolve the imbalances.

Indeed, historical experience suggests that such an outcome would be exceedingly unlikely. To consider this, define “rebalancing” as a shift from a very “unbalanced” situation in which the investment share of GDP has on average exceeded the household consumption share of GDP for at least 5 years, to a situation in which the household consumption share exceeds the investment share of GDP for a subsequent 5 years.

Table 1. China's Growth of GDP Expenditure Components, 1978–2014
(in 1978 Constant Prices, Compound Annual Growth Rate, %)

	GDP	Consumption			Gross capital formation	
		Total	Private	Government	Total	Fixed
1978–2014	9.7	9.2	9.0	10.0	10.4	11.1
1978–2007	9.9	9.4	8.9	10.8	10.2	11.1
2000–2007	10.8	8.8	9.0	8.4	14.0	14.4
2007–2014	8.8	8.7	9.5	6.7	11.2	11.3
2007–2010	9.8	9.1	9.8	7.7	15.6	15.7
2010–2014	8.1	8.3	9.3	5.9	8.1	8.1

Sources: CEIC Data, NBS (2015a) and authors' calculations.

Table 2. Rebalancing: Selected Historical Episodes (%)

	Gross capital formation				Household consumption			
	Share of GDP ^c		Growth ^d		Share of GDP ^c		Growth ^d	
	Before	After	Before	After	Before	After	Before	After
Angola (1995–2004) ^a	33.2	12.2	10.9	–14.5	31.5	42.4	5.1	19.5
Brunei (1979–1988) ^a	7.0	11.7	16.7	–0.5	6.3	20.6	16.2	11.7
Congo (1981–1990) ^a	40.6	19.8	8.5	–16.1	40.2	56.3	12.7	–2.3
Gabon (1984–1993) ^a	35.4	21.2	–3.6	–7.8	33.2	38.3	–2.4	3.1
Japan (1970–1979) ^b	37.0	31.6	6.9	2.7	49.8	53.7	4.9	5.0
Philippines (1979–1987) ^b	33.8	19.9	5.4	–10.4	62.1	69.4	3.5	2.3
Qatar (1979–1988) ^a	20.6	16.7	–7.6	–2.4	19.6	28.0	–5.8	–1.5
Saudi Arabia (1976–1985) ^a	29.1	26.9	12.8	–2.4	26.4	40.9	16.1	10.9
South Korea (1993–2002) ^b	36.6	28.7	6.8	1.7	52.6	54.3	7.2	3.9
Thailand (1993–2002) ^b	40.1	21.8	2.2	–9.1	51.9	54.1	5.5	2.4
Uruguay (1966–1975) ^a	48.6	19.7	19.0	2.2	46.4	71.5	3.6	1.3
Venezuela (1978–1986) ^a	46.1	25.3	–9.1	–4.9	40.1	46.6	4.3	2.6

Sources: Penn World Table Version 8.1 and authors' calculations.

Notes: ^aPeriod refers to 5 years on either side of a year (before and after rebalancing) in which the 5-year cumulative investment share of GDP fell below the 5-year cumulative consumption share. ^bPeriod refers to 5 years on either side of a year (before and after rebalancing) that saw a substantial reduction in the investment share. ^c5-year cumulative share. ^d5-year real annualized average.

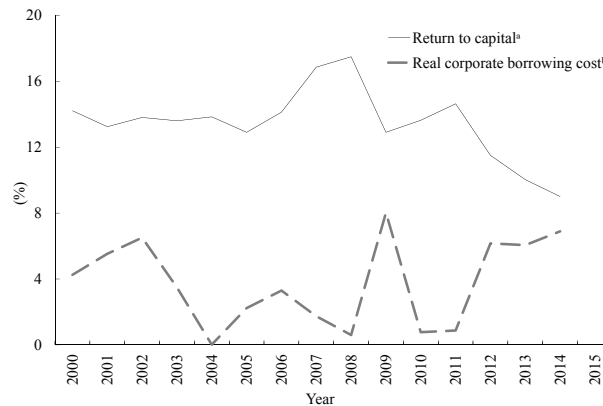
There are relatively few historical examples of such a rebalancing, and it is rarer still for them to be accompanied by an increase in the consumption growth rate. In a sample of 167 economies between 1950 and 2011, there are 10 cases of rebalancing that satisfy this definition. In most cases, household consumption growth in the 5 years after such a “rebalancing” was lower than in the 5 years before (see Table 2).³ Even using less restrictive definitions of rebalancing delivers similar findings.⁴ The lessons of history for China appear to be that a fall in investment growth is a far more likely driver of rebalancing than an acceleration of consumption.

One reason why we might expect rebalancing to be associated with slowing investment is the narrowing gap between the return to capital and the cost of funding facing China's corporate sector. Ma et al. (2016) estimate the return to capital in China using a Jorgenson-style investment model as in Bai et al. (2006) and compare it to a rough average of the real corporate financing cost. The real corporate financing cost is estimated as a weighted average of the interest rate on general loans published by the People's Bank of China (PBC), the average collective trust product advertised yield (as reported by Wind Information, available from: www.wind.com.cn), and the 5-year AA corporate note yield to maturity (sourced from Bloomberg), deflated by a geometric

³The 10 economies experiencing rebalancing episodes according to this criterion are Angola, Brunei Darussalam, Congo, Gabon, Iraq (which experienced two episodes), Oman, Qatar, Saudi Arabia, Uruguay and Venezuela. We exclude microstates (e.g. Saint Kitts and Nevis).

⁴For a more detailed discussion, see Ma et al. (2016).

Figure 1. China's Return to Capital and Corporate Financing Cost, 2000–2014



Sources: CEIC Data, NBS (2007) and authors' calculations.

Notes: ^aBased on gross fixed capital formation data. ^bWeighted average medium-to-long-term debt yield, deflated using geometric mean of the producer price index, consumer price index and GDP deflator.

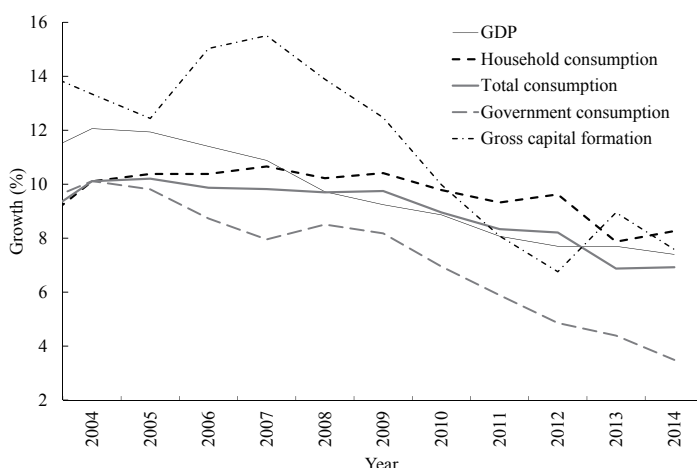
average of inflation in the consumer price index, the producer price index and the GDP deflator.

The trends in both series suggest that the gap is likely to have narrowed considerably since 2011 (see Figure 1). This narrowing gap may have contributed to the halving of the average pace of China's gross capital formation from 15 percent in the 2000s to 8 percent in the 2010s. If it persists, the shrinking gap between the cost of funding and returns to investment will continue to exert downward pressure on investment growth. While the behavior of the real interest rate is hard to predict, our analysis of rebalancing and growth scenarios in Section III will suggest little upside for the return to capital in the near future, which, all else equal, should contribute to an ongoing process of internal rebalancing.

Between 2010 and 2014, the nation's aggregate saving and investment rates both declined from their peaks (in 2008 for savings and in 2011 for investment), while the household consumption share of GDP increased from its 2010 trough. Real growth of household consumption outpaced the growth of both investment and government consumption since 2010 (see Figure 2). A similar picture can be gleaned from higher-frequency official indicators (CEIC Data). Although the growth rates of both retail sales and fixed asset investment have moderated since 2010, retail sales growth has been resilient while investment growth has declined, particularly in 2014 and 2015.

A question remains whether this apparent turn is cyclical or structural. While cyclical swings cannot be completely ruled out, there are two reasons why the economic adjustments over 2010–2015 can be viewed as having structural features. First, the tailwinds behind the positive income shocks in the past two decades (gains

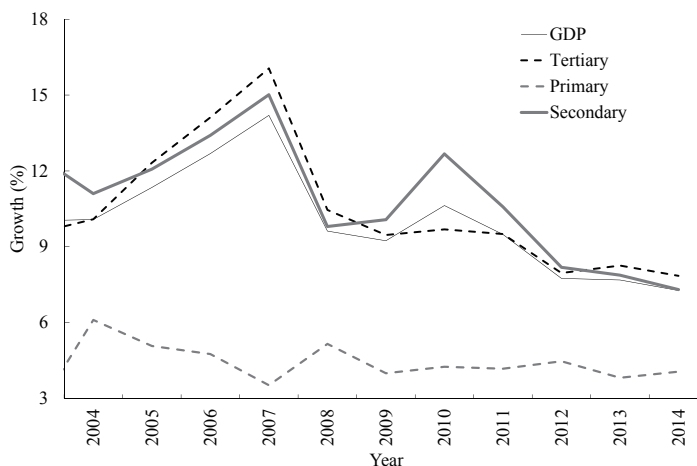
Figure 2. China's Real GDP and Expenditure Component Growth, 2004–2014
(Rolling 4-year Annualized Average)



Sources: CEIC Data and authors' calculations.

from harvesting the low-hanging fruit from economic reform and the “demographic dividend” implied by a rising working-age population) have now started vanishing and may even reverse into headwinds in the decade ahead (Ma et al., 2016). Second, there are signs of a more permanent resource reallocation on the supply side of the Chinese economy. A less capital-intensive service industry finally outgrew the manufacturing and construction sectors in the 2010s (see Figure 3).

Figure 3. China's Real GDP and Production Sector Growth, 2004–2014
(Annual Average)



Sources: CEIC Data and authors' calculations.

During 2013 and 2014, real growth in the less capital-intensive tertiary sector has exceeded that of the rest of the economy. Productivity growth in services is typically found to be lower than in the industrial sector. To the extent that this is true in China, a bigger services sector may weigh on China's potential growth, although there is scope for such a compositional shift to support the labor share of national income and cushion employment and consumption during the slowdown. Furthermore, the production-side and expenditure-side trends should be mutually reinforcing. The expansion of a less capital-intensive services sector is likely to reduce overall investment growth, while the expansion of the consumption share of expenditure is likely to support growth in the service sector (reasons will be discussed in Section IV).

III. Scenarios for Rebalancing in China

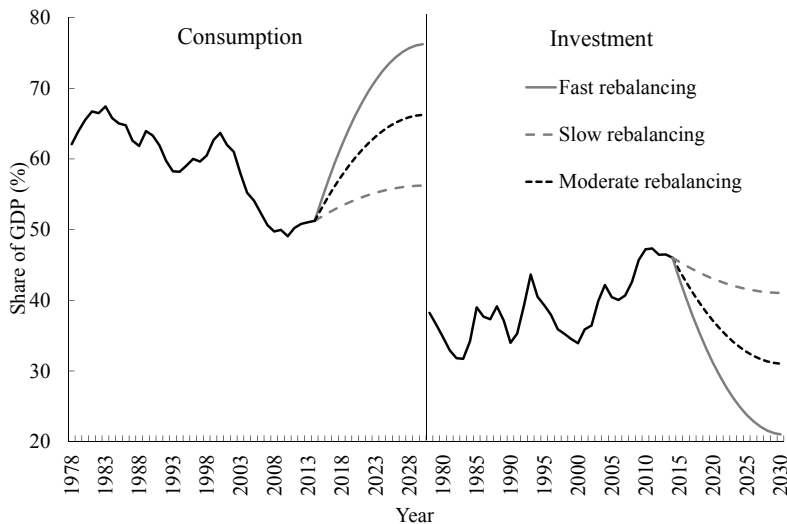
To consider the prospects for China's domestic rebalancing, we adopt a simple framework to assess the implications of various rebalancing scenarios for the period of 2015–2030. In this section, we frame the prospective domestic demand rebalancing as a one-to-one rotation between consumption and gross capital formation.⁵ These rebalancing scenarios are combined with alternative growth scenarios to inform us about the implied growth patterns of key aggregate demand components. We assume that the share of net exports in GDP remains unchanged at its 2014 level; this assumption will be relaxed in Section V.

We consider three different scenarios for China's domestic rebalancing over the period of 2015–2030, taking the observed 2014 shares of total consumption and gross capital formation in GDP as our starting benchmarks. Our scenario for “moderate” domestic rebalancing assumes a rise of 15 percentage points in the nominal consumption share and a corresponding 15 percentage point fall in the nominal investment share by 2030, with the nominal net export share remaining constant at its 2014 level. On average, domestic rebalancing progresses 1 percentage point per annum during 2015–2030, unwinding most of the domestic imbalance accumulated over the past three decades and returning China's domestic expenditure profile to the pattern of the first half of the 1980s.

In addition to this “moderate” rebalancing scenario, we consider an alternative “slow” scenario, involving a 5-percentage point rotation between consumption and investment

⁵We assume that the proportions of household and government consumption in total consumption are kept constant throughout the whole period. Similarly, the share of changes in inventory in gross capital formation remains constant. Relaxing these assumptions does not materially alter our discussion.

Figure 4. China's Domestic Rebalancing Scenarios, 2015–2030



Sources: CEIC Data and Authors' calculations.

shares, and a “fast” scenario, involving a 25-percentage point rotation (see Figure 4). Slow rebalancing only brings China's domestic expenditure composition broadly back to that witnessed around the mid-2000s; a fast rebalancing process would move China to a domestic expenditure pattern that resembles that of an average contemporary OECD economy by 2030. We assume that the rebalancing process is geometric; that is, the component shares converge smoothly to their terminal levels, which are specified in Table 3.

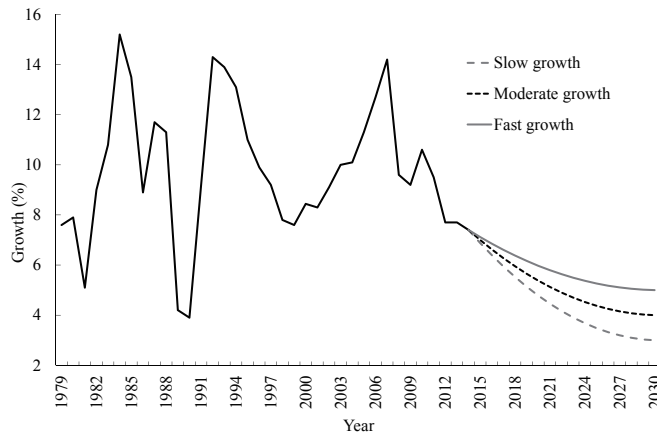
As Chinese living standards rise and the size of its economy expands, the rate of potential growth can be expected to converge gradually towards that of advanced economies. Any domestic rebalancing will likely be intertwined with this expected potential growth slowdown in the years ahead. In our scenarios for the period of 2015–2030, we consider three different cases for the final GDP growth rate in 2030: 4 percent for the “moderate” growth case, 3 percent for the “slow” growth case and 5 percent for the “fast” growth case (see Figure 5). These 2030 GDP growth rates are relatively

Table 3. Domestic Rebalancing Scenarios (Shares of Nominal GDP in 2030, %)

Scenario	Total consumption	Private consumption	Government consumption	Gross capital formation	Net exports
Slow rebalancing	56.2	41.4	14.9	41.0	2.7
Moderate rebalancing	66.2	48.7	17.5	31.0	2.7
Fast rebalancing	76.2	56.1	20.1	21.0	2.7

Sources: Authors' calculations.

Figure 5. China's Real GDP Growth Scenarios, 2015–2030 (Year Average)



Sources: CEIC Data and Authors' calculations.

conservative and within the “ballpark” estimates and projections of the World Bank and DRC (2013), Ma et al. (2013) and Perkins (2015). The GDP growth path is assumed to converge geometrically to the final growth rates.

Each GDP growth scenario, combined with a particular rebalancing scenario, mechanically yields average annualized growth rates for the various GDP components over the scenario period. However, because the scenarios' GDP growth rate is in real terms while the GDP component shares are in nominal terms, the real growth of GDP components implied by such a combination is conditional on an additional assumption regarding changes to relative prices. For simplicity, we assume constant growth in the overall GDP deflator from 2015 to 2030, with equivalent growth in both the consumption and investment deflators, so that relative prices remain unchanged.⁶

Table 4 summarizes the average annualized real growth rates in total consumption and investment (gross capital formation) implied by each combination of growth and rebalancing scenarios for the period 2015–2030.⁷ For example, a “moderate growth and rebalancing” scenario would require annualized growth rates of 5.1, 6.8 and 2.5 percent for GDP, consumption and investment, respectively.

⁶For our purposes only the relative growth rates of the overall and component deflators in these scenarios is relevant, not their absolute growth rates. The assumption of constant relative prices remains strong, but there does not appear to be any consistent bias in relative price growth; average inflation over 2000–2014 has been similar across components. In any case, relaxing this assumption would not materially change the discussion.

⁷Because the net export share of GDP is assumed to remain unchanged, net export growth at the same rate as overall GDP growth in all scenarios.

Table 4. Real GDP Component Growth Scenarios, 2015–2030
(Average Annual Growth, %)

Scenario	Slow growth	Moderate growth	Fast growth
GDP	4.4	5.1	5.7
Consumption			
Slow rebalancing	5.0	5.7	6.4
Moderate rebalancing	6.1	6.8	7.5
Fast rebalancing	7.0	7.7	8.4
Investment			
Slow rebalancing	3.6	4.3	5.0
Moderate rebalancing	1.8	2.5	3.2
Fast rebalancing	–0.6	0.0	0.7

Source: Authors' calculations.

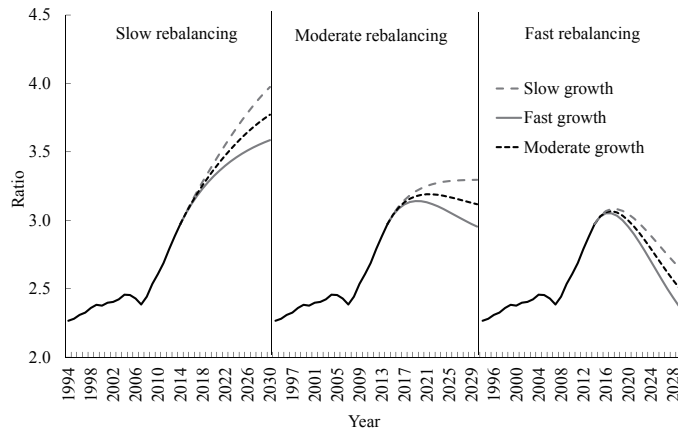
Although these exercises tell us little about how or whether a particular investment growth rate can support a particular consumption growth rate, they highlight a couple of key points. First, a fast rebalancing in coordination with rapid growth requires continued rapid consumption growth (more than 8 percent per annum) and virtually no growth in investment. The discussion of historical rebalancing experiences in Section II suggests that there are few precedents internationally for such an outcome. Second, even in the event of slow or moderate growth in GDP, a fast rebalancing requires prolonged weakness in investment and rapid growth in consumption. If this occurred, the impact of radically lower investment growth on household incomes and consumption would have to be very small. In other words, these experiments raise doubts about the likelihood that China's rebalancing process will be rapid.

Using the perpetual inventory method, we can estimate scenarios for China's capital–output ratio, which has surged since the global financial crisis (see Figure 6).⁸ Under a “moderate” scenario for both growth and rebalancing, the capital–output ratio does not stabilize until around 2020, at a level around 3.2. In contrast, moderate growth combined with slow domestic rebalancing imply that the capital–output ratio would climb to a level of 3.8 by 2030, which is high by international standards (Berleermann and Wesselhoft, 2014), and continue to rise beyond. Such an outcome would weigh heavily on the return to capital and might be unsustainable, increasing the risks of significant financial stress, misallocation of resources and, potentially, an abrupt halt to economic growth.

Such a scenario highlights the urgency of the domestic rebalancing task; it also reveals the extent of the challenge facing policy-makers. In all our scenarios, a meaningful deceleration of real investment from its recent growth rate (around 7 percent in 2014) is required to restrain growth in the capital-to-output ratio (see Figure 7).

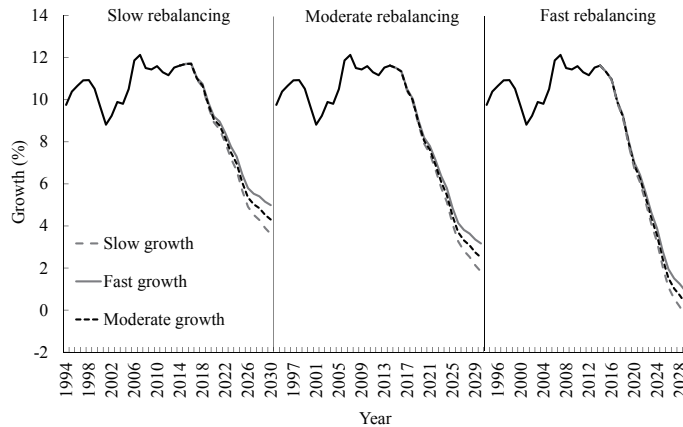
⁸For simplicity we assume a 7-percent depreciation rate throughout.

Figure 6. China's Capital–Output Ratio Scenarios, 2015–2030
(Ratio of Capital Stock to GDP)



Sources: CEIC Data and authors' calculations.

Figure 7. China's Real Investment Growth Scenarios, 2015–2030
(Rolling 16-year Annualized Average)



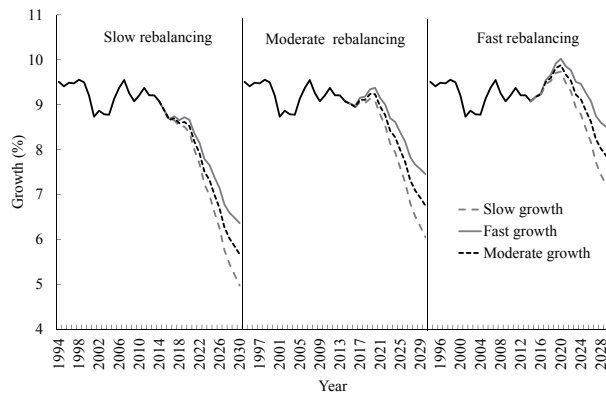
Sources: CEIC Data and authors' calculations.

Similarly, consumption growth significantly below 7 percent per annum is unlikely to be sufficient to allow a peak in the capital-to-output ratio by 2030 (see Figure 8).⁹

Our slow, moderate and fast rebalancing and growth scenarios also have implications for the level of household consumption per capita in China. Certain combinations of rebalancing and growth scenarios could see Chinese real per capita

⁹Given the assumptions regarding the stability of relative prices and the net export share of GDP, a particular combination of a real growth rate and a nominal rebalancing path will be consistent with a particular combination of investment and consumption growth rates and a particular path of the capital–output ratio.

Figure 8. China's Real Consumption Growth Scenarios, 2015–2030
(Rolling 16-year Annualized Average)

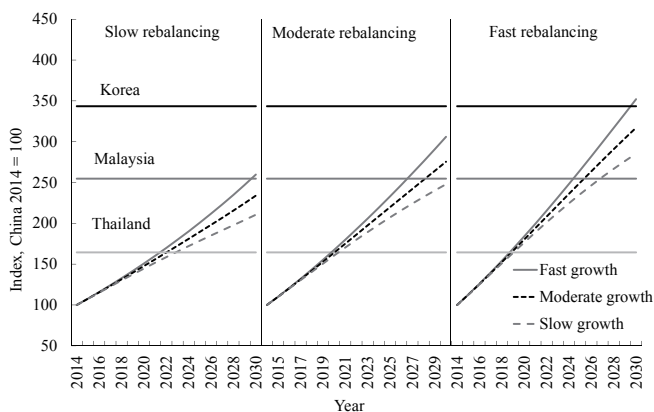


Sources: CEIC Data and Authors' calculations.

household consumption approach or even exceed the current levels of other upper middle-income economies by 2030 (see Figure 9). However, international experiences of consumption growth outstripping investment growth for an extended period are the exception, rather than the rule. In order for real per capita household consumption to rise above the level of contemporary upper middle-income economies, we must assume remarkable resilience in Chinese private consumption despite a sharp moderation in investment growth, for which there is little historical precedent, as discussed in Section II.

The relationship between a given investment share of GDP and the “efficiency”

Figure 9. China's Real Per Capita Household Consumption Level Scenarios, 2015–2030^a (China 2014 = 100)

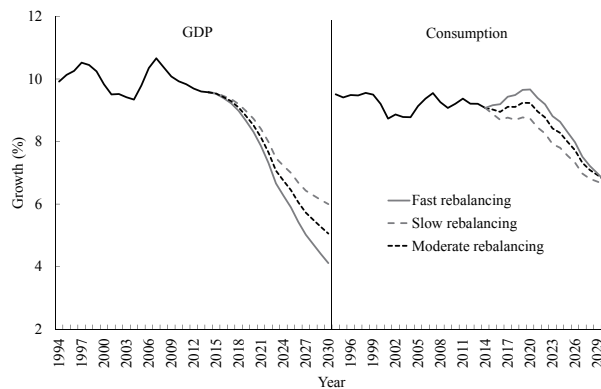


Sources: UN (2015), World Bank (2015) and Authors' calculations.

Notes: ^aLevels for Korea, Malaysia and Thailand indicate 2014 comparisons with China using purchasing power parity conversion factor for household consumption (2011 international dollars). The population projections are the United Nations' “medium fertility variant” population projections.

with which this investment translates in GDP growth can give a further perspective on the plausibility of the various scenarios. Assuming no change in the net export share of GDP, a combination of sustained rapid (or even increasing) consumption growth together with a meaningful decline in the investment share of GDP could only occur if new investment had a relatively immediate, sizeable positive effect on overall GDP growth, implying constant or increasing returns to China's stock of capital at the margin and continuously improving allocative efficiency. If we instead consider the possibility that the efficiency of new investment is invariant to the degree of rebalancing, it would suggest a relationship between the size of the fall in the investment share and the extent of the slowdown in overall growth. In Figure 10, we take the path of the incremental capital–output ratio implied by the moderate growth and rebalancing scenario as an independent variable and let growth become dependent on the degree of rebalancing.¹⁰ The results in Figure 10 indicate that unless faster rebalancing is matched by more efficient investment, the process of rebalancing may drive a slowdown in overall economic growth that could largely offset the positive effect on consumption caused by the shifting domestic demand profile.

Figure 10. China's Real GDP and Consumption Growth Scenarios
for Fixed Investment Efficiency, 2015–2030
(Rolling 16-year Annualized Average)



Sources: CEIC Data and Authors' calculations.

The findings of the above analysis can be summarized as follows. Our scenarios underscore the challenges involved in reconciling a rebalancing Chinese economy

¹⁰The capital–output ratio K/Y is a measure of the “efficiency” of past and present investment, in that its inverse Y/K represents the speed at which the capital stock produces its own value in output. The incremental capital–output ratio $\Delta K/\Delta Y = I/\Delta Y = (I/Y)/(\Delta Y/Y)$ is a measure of the “efficiency” of additions to the capital stock (i.e. investment) with an inverse equivalent to the ratio of GDP growth to the investment share of GDP.

with slowing potential growth, and the role that measures to enhance the efficiency of investment would need to play in this process. They also highlight the “knife-edged” nature of domestic rebalancing. If rebalancing is too slow, the capital-to-output ratio will rise to a potentially unsustainable level, and real household consumption per capita will struggle to attain that of a contemporary upper middle-income economy even by 2030. If it is too fast, the required disparity between the growth of consumption and investment would imply both exceptional resilience of consumer spending on the demand side and swift increase in the efficiency of investment on the supply side. Finding that delicate balance in practice could prove challenging.

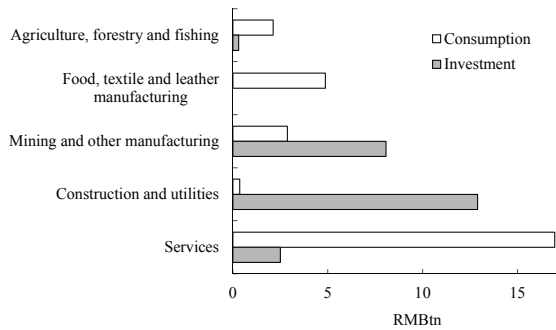
IV. Expenditure Rebalancing and the Production Side

Data on inter-industry linkages suggest that a rotation from investment towards consumption may interact with the production side of the economy. The ongoing shift in the production share towards more labor-intensive service industries and away from manufacturing and construction should mean that less capital expenditure is required to generate a given level of employment and household income growth. At the same time, the rise in the consumption share of domestic expenditure should reinforce the shift from the secondary to the tertiary sector, because of the differing impacts that consumption and investment demand have on different industries.

Investment expenditure is directed largely towards construction and the production of capital goods, while consumption expenditure is directed primarily to service industries and the manufacture of consumer goods, including textile and food products. The implications for upstream sectors depend on the structure of intermediate production, and can only be inferred approximately from China’s official input–output tables. Although not very timely (the latest is for 2012), these data provide a means of exploring interrelationships between the expenditure, production and income sides of the Chinese economy at a relatively aggregated level.

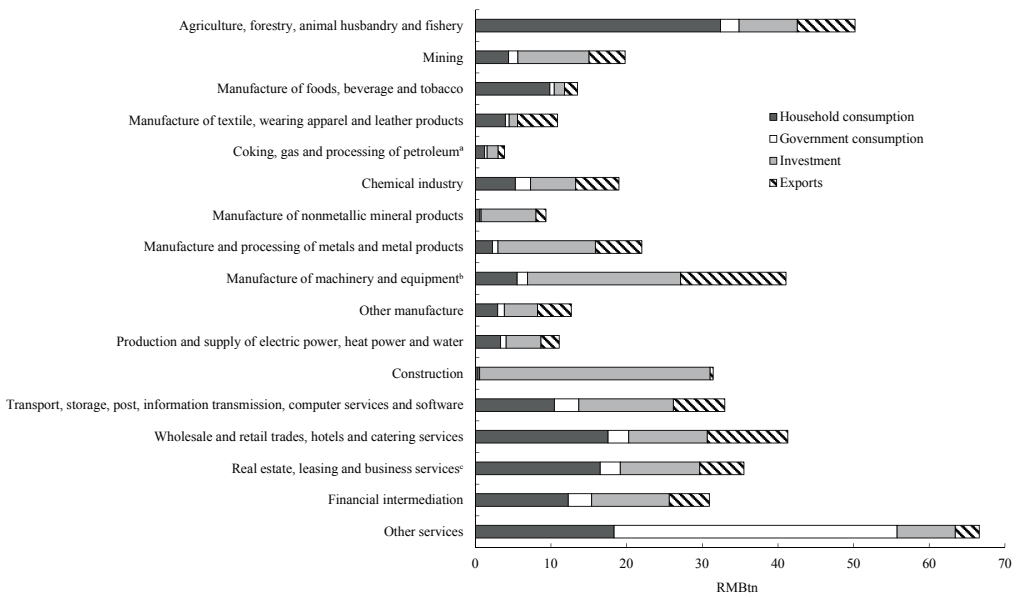
Figure 11 illustrates the differences between consumption (public and private combined) and investment in terms of total expenditure on various final goods and services by industry. Taking these components’ expenditure profiles and that of the export component of total final demand, and accounting for the sequence of intermediate production linking downstream to upstream industries, Figure 12 splits the gross value added (the difference between the value of an industries’ output and the value of its intermediate inputs) for each of the 17 Chinese industries according to the proportions attributable to household consumption, government consumption, investment and export

Figure 11. China's Expenditure on Final Products, 2012



Sources: NBS (2015b), CEIC Data and authors' calculations.

Figure 12. Sources of Final Demand by Industry in China, 2012



Sources: NBS (2015b), CEIC Data and authors' calculations.

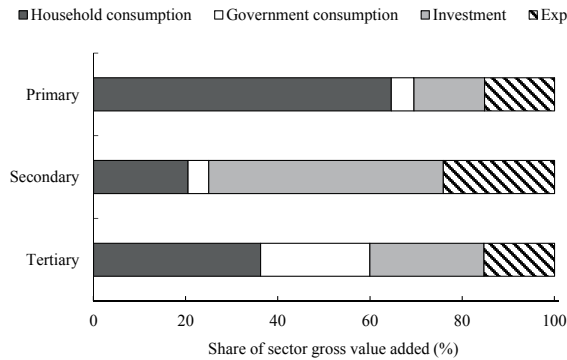
Notes: ^aIncludes coke, refined petroleum and nuclear fuel manufacturing. ^bIncludes electrical, optical and transport equipment, manufacturing not elsewhere classified, and recycling. ^cIncludes renting of machinery and equipment.

demand.¹¹

The drivers of demand vary across China's various industries. For example, investment is the primary source of demand for the construction, machinery and equipment, and metal manufacturing industries, while consumption is, unsurprisingly, a more important driver for agricultural and food production and for the majority of

¹¹The method is explained in Ma et al. (2016).

Figure 13. Sources of Final Expenditure, 2012 (Share of Sector Gross Value Added)



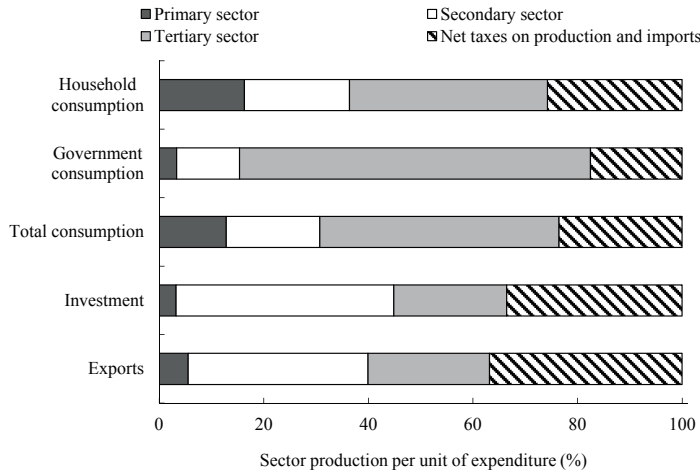
Sources: NBS (2015b), CEIC Data and authors' calculations.

service industries. To simplify the picture, we aggregate the 17 available industries into primary, secondary and tertiary sectors, dividing the gross value added attributable to the different expenditure components by each of these sectors' totals (see Figure 13). The primary sector (agriculture, forestry, animal husbandry and fishery) ultimately derives approximately two-thirds of its demand from household consumption, compared to around one-fifth for the secondary sector and approximately one-third for the tertiary sector. The secondary sector is heavily reliant on investment expenditure (ultimately accounting for approximately half of demand) and exports (accounting for approximately one-quarter of demand). The tertiary sector derives approximately 60 percent of its demand from consumption, nearly half of which comes from government consumption.

Input–output tables also illustrate how much final and intermediate production by each domestic sector is required per unit of expenditure for each final demand component (see Figure 14).¹² Each unit of expenditure on investment equates to more than double the amount of value added for secondary sector industries than does each unit of consumption. Conversely, each unit of expenditure on consumption equates to four times the amount of value added for the primary sector, and more than twice the amount of value added for the tertiary sector, relative to each unit of expenditure on investment. If production and expenditure relationships remain stable, these demand intensities imply that the expenditure-side rebalancing will drive structural change on the production side away from manufacturing and construction towards services.

¹²Here we exclude changes in inventories from the investment component.

Figure 14. Sector Production Per Unit of Expenditure in China, 2012 (Value Added)



Sources: NBS (2015b), CEIC Data and authors' calculations.

China's input–output tables also separate each industry's gross value added into payments to labor (compensation of employees) and payments to capital (gross operating surplus).¹³ Labor compensation accounts for almost all of primary sector value added. Payments to labor and capital vary widely at the industry level. The variation of factor intensity within industries with differing exposures to the various final demand components means that the shares of income accruing to labor and capital vary according to the source of expenditure. Figure 15 shows how each unit of expenditure from the various demand components corresponds to different amounts of income for domestic labor, domestic capital and foreign factors of production.¹⁴

As for the domestic value added required for each unit of expenditure, Table 5 gives the percentages corresponding to the payments to labor and capital according to the source of demand. The comparison explains why investment-driven and export-driven growth should correspond to a lower labor share of income than consumption-driven growth. Other things being equal, rebalancing from investment towards consumption should support a higher rate of employment growth for a given rate of GDP growth, possibly cushioning the effect of the slowing economy on the Chinese labor market and

¹³We discuss returns to capital gross of depreciation, although the NBS tables account for depreciation and operating surplus separately.

¹⁴Foreign factors of production refer to the proportion of the expenditure that ultimately leaves China due both to imports of final goods and services and imports of intermediate inputs used in the domestic production of final goods and services.

Table 5. Factor Shares of Domestic Value Added by Source of Final Demand in China, 2012
(Shares of Domestic Value Added, %)

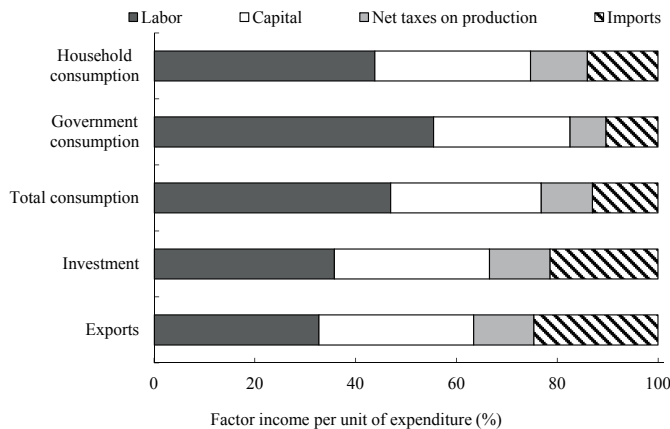
Factor	Total consumption	Private consumption	Government consumption	Gross fixed capital formation	Exports
Labor	61.1	58.6	67.2	53.7	51.6
Capital	38.9	41.4	32.8	46.2	48.4

Sources: NBS (2015b), CEIC Data and authors' calculations.

on household incomes.¹⁵ As a higher share of payments to labor than payments to capital is spent on consumption, this may support faster growth of consumption relative to overall growth, reinforcing the process and possibly contributing to necessary resilience in consumption growth.

Input–output tables also shed light on how demand components differ in their import intensities, or requirements for foreign value added. Investment is more import-intensive than consumption, and household consumption is more import-intensive than government consumption (see Figure 15). This calls into the question the assumption underlying the domestic rebalancing scenarios discussed earlier, in which the net export share of GDP is unchanged while the composition of domestic expenditure changes. The next section will relax that assumption and explores implications of domestic rebalancing for the external balance.

Figure 15. Factor Income Per Unit of Expenditure in China, 2012 (Value Added)



Sources: NBS (2015b), CEIC Data and authors' calculations.

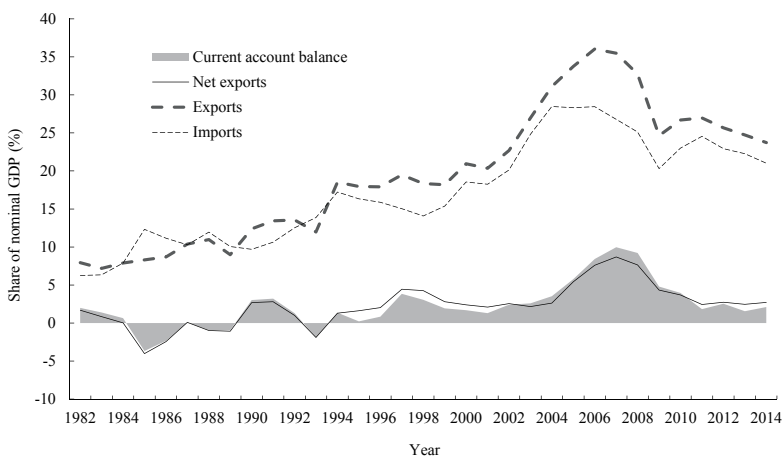
¹⁵A higher labor share of income does not automatically correspond to more demand for labor, but this would be a reasonable inference assuming that average compensation per employee is relatively balanced across sectors.

V. How May the External Balance Respond?

While internal rebalancing appears to be at an early stage, China's external rebalancing has been clearly underway since the global financial crisis (see Section III). Net exports peaked as a share of GDP in 2007 at 8.7 percent and have since declined to below 3 percent, as a sharp fall in the export share was accompanied by a milder reduction in the import share, reflecting a combination of a rise in China's investment rate and a smaller fall in its saving rate (see Figure 16). In the Section IV scenarios, we assumed that the external balance would remain fixed as the internal balance changed, which implicitly constrained the rate of consumption growth that could accompany a given rate of GDP growth (or a given "efficiency" of investment). In this section we relax this constraint to allow the external balance to vary. Different import intensities may alter the external balance for a given rotation between consumption and investment.

The different production-side requirements of industries producing for consumption or investment mean that internal rebalancing may affect the external balance by changing the composition of demand for imports. Changes to the net export share may be driven either by changes in the export share or the import share (which were 23.7 and 21.0 percent in 2014, respectively, according to CEIC Data). For simplicity, we consider only changes to the import share of GDP, leaving the export share fixed (the

Figure 16. China's Exports and Imports, 1982–2014 (Share of Nominal GDP)



Sources: CEIC Data and authors' calculations.

Table 6. China's Import Intensities, 2012 (Ratio of Related Imported Content to Total Expenditure Based on 2012 Input–Output Table)

Component	Total consumption	Private consumption	Government consumption	Gross capital formation	Domestic absorption	Exports	Total final demand
Ratio	0.13	0.14	0.10	0.21	0.17	0.25	0.19

Sources: NBS (2015b), CEIC Data and authors' calculations.

future of external demand for Chinese exports being beyond the scope of this paper).¹⁶ Specifically, we consider what the various internal rebalancing scenarios outlined in Section IV might imply for the external balance if the “import intensities” described in Section IV (see Table 6) remained unchanged over the period to 2030.

Table 7. China's Internal Rebalancing Scenarios and the External Balance

	Shift from investment to consumption (share of domestic absorption)	Change in import share of GDP by 2030 (%)	Net export share of GDP in 2030 (%)	Relative difference in nominal GDP by 2030 (%)
Slow rebalancing	5.14	−0.47	3.10	0.39
Moderate rebalancing	15.42	−1.39	3.85	1.17
Fast rebalancing	25.70	−2.31	4.58	1.94

Source: Authors' calculations based on the scenario analysis in the paper.

Table 7 compares the implications for the Chinese import share of the slow, moderate and fast rebalancing scenarios from Section IV, here recast as shifts from investment to consumption in the respective shares of domestic expenditure, rather than as shares of GDP.¹⁷ Because of the higher import intensity of investment relative to consumption, an internal rebalancing towards consumption leads to a modest decline in the import share (and a corresponding increase in the net export share), with overall GDP left slightly larger than if the import share had remained unchanged. This suggests that internal rebalancing could increase, rather than reduce, external imbalances (and vice versa). Although the scale of this external effect would be small relative to the internal change, it could still be significant enough in absolute terms to have a material impact on China's

¹⁶It is worth acknowledging that the assumption of a fixed export share of Chinese GDP implies that the nominal value of Chinese exports will increase at the same rate as China's nominal GDP and that, with China's GDP growth in coming years likely to outpace that of the rest of the world, this would involve Chinese exports rising as a share of world GDP.

¹⁷The rebalancing scenarios in Section IV involve rotating fixed percentage points of nominal GDP from the investment share to the consumption share. If we allow shifts from investment to consumption to affect demand for imports, we affect the denominator in the GDP component shares, but not in the domestic expenditure shares.

trading partners, given the large and increasing size of the Chinese economy.

A caveat is that the import intensities of the various final demand components (household consumption, government consumption and investment) may not remain constant. Changes to the import intensities of these final demand components could offset the effects of shifts in expenditure shares among components. Such changes would have implications for the rate of Chinese consumption growth that could feasibly coincide with a given degree of internal rebalancing. If the fall in China's investment rate is exceeded by the fall in its saving rate, the external surplus would have to decline further (possibly into deficit). In particular, a falling investment share may be compatible with significantly higher rates of consumption growth than suggested in Section IV if China were to shift from trade surpluses to deficits, allowing the country to import a larger share of consumption goods and services than currently. This effectively implies a jump in the import intensity of consumption. For example, under the scenario of "moderate growth" and "moderate internal rebalancing," a gradual increase of 5 percentage points in the import share of GDP by 2030 would, if entirely allocated to consumption, raise average annualized consumption growth from 6.8 to 7.2 percent over the period. Under a scenario of medium growth and fast internal rebalancing, a similar 5-percentage point reduction in the external balance could lift per capita household consumption levels up to those of contemporary Korea by 2030 (see Figure 9).¹⁸

It is also worth noting that, if the decline in overall growth is positively related to the fall in the investment share, a trade deficit may present one way of "cushioning" the internal rebalancing process. A deficit could allow consumption to rise faster than could be supported by the more gradual growth in the domestic capital stock (although any such benefit would need to be balanced against the implications of a persistent trade deficit for the capital account and the exchange rate). However, considering the higher import intensity of investment and the fact that investment typically adjusts faster than consumption, it is also likely that the current account surplus could widen (as occurred in Japan in the 1980s and in China in 2015). In other words, the investment share of GDP would decline, but the consumption share will not necessarily rise by the corresponding amount.

VI. Implications for China's Trading Partners

In the same way that data on inter-industry linkages can be used to analyze the effects

¹⁸We continue to assume a fixed export share of GDP. We assume that the change in the import share follows a geometric path from its 2014 level as with the other components. Under such a scenario, in 2030 China would be running a trade deficit of 2.3 percent of GDP.

of expenditure-side rebalancing on China's domestic industrial sectors, we can also consider how China's various trading partners would be affected.¹⁹ To do so, we use the same approach as in Section IV, but rely on multi-regional input–output tables that delineate trade and production relationships across industrial sectors in different countries. Specifically, we use the June 2015 version of the *OECD Inter-country Input–Output (ICIO) Tables*, which cover 34 industries and 62 regions for the years 1995, 2000 and 2005, and annually from 2008 to 2011.²⁰ These data allow the components of Chinese expenditure on final goods and services to be connected to the corresponding incomes (i.e. value added) earned in the industries of countries that contribute to their production, directly or indirectly. An advantage of the current OECD ICIO tables compared with previously published multi-regional input–output tables is the distinction made between the different input requirements of equivalent Chinese industries producing for domestic use, non-processing exports or processing exports.²¹

Using these data, the value-added exports to China of its trading partners can be distinguished from their gross exports. Value-added exports measure trade in a manner consistent with GDP, which avoids double-counting by including only expenditure on final goods and not intermediate goods. Value-added exports to China: (i) exclude the value of exports to China that are used as inputs into the production of Chinese goods and services that are then exported from China to other countries; (ii) exclude the value of intermediate inputs imported from third countries used in the production of China's imports; and (iii) include the value of intermediate inputs used in the production of exports by third countries to China.²²

The data in Figure 17 indicate that in 2011 gross exports exceeded value-added exports for all trading partners except Saudi Arabia.²³ Economies strongly economically integrated with Chinese mainland through East Asian manufacturing supply chains, in particular Korea, Chinese Taiwan, Malaysia and Thailand, have a high ratio of

¹⁹Here we are considering the effects of rebalancing on the countries that export goods and services to China. As in the previous section we do not consider changes in Chinese exports to other countries, which we assume to be unaffected by the internal rebalancing process.

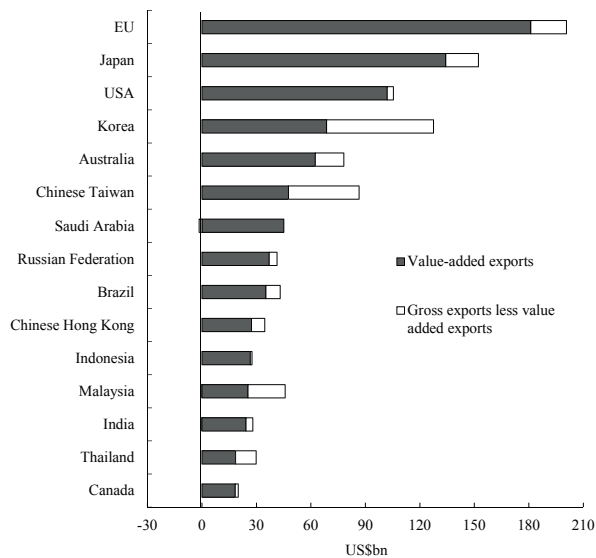
²⁰Kelly (2014) undertakes a similar analysis using the World Input–Output Database (WIOD). The two data sources yield results that are broadly similar but differ in some details.

²¹Processing trade is likely to use more imported content than non-processing trade because of tariff exemptions. More imported content is used in Chinese production for exports than in Chinese production for domestic use so the ratio of value-added exports to gross exports is likely to be lower using the OECD ICIO than the WIOD.

²²For more details see Kelly and La Cava (2014).

²³This reflects the unusually large share of Chinese demand that reaches Saudi Arabia indirectly, because of the importance of Saudi Arabian oil as an input in the production of other countries' exports to China.

Figure 17. Exports to the Chinese Mainland, 2011



Sources: OECD (2015) and authors' calculations.

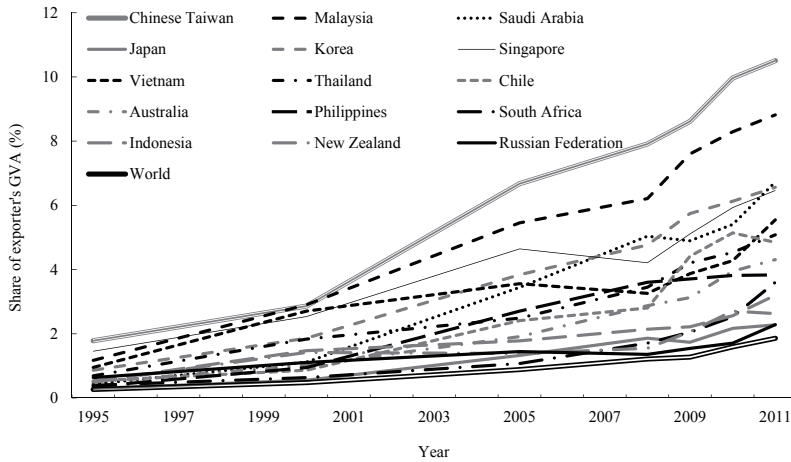
gross exports to value-added exports, reflecting the fact that a large share of these economies' exports to the Chinese mainland are intermediate inputs used in its export manufacturing. In contrast, for exporters of resource commodities, such as Australia, Russia and Canada, value-added exports to China typically account for the bulk of the value of gross exports, implying that most of the value added in these exports is attributable to Chinese final demand. The difference between gross exports and value-added exports is attributable to demand for Chinese exports (using non-Chinese inputs) from other economies.

In the time dimension, the data in Figure 18 indicate that in all cases trading partner exposure to the Chinese economy has risen markedly since 1995. The most highly exposed economies are China's East Asian neighbors, along with resource exporters, such as Saudi Arabia, Chile, Australia and South Africa (see Table 8).²⁴

Just as China's internal rebalancing is likely to affect its own domestic industries to different extents on the production side, it may also have differential effects on China's trading partners depending on how exposed they are to Chinese consumption and investment demand. To illustrate this, Figure 19 compares how an overnight rotation of

²⁴We exclude Hong Kong SAR, which derived 11.2 percent of gross value added from the Chinese mainland in 2011, and the small resource exporter Brunei Darussalam, which derived 6.2 percent of gross value added from the Chinese mainland in 2011 according to the *Inter-Country Input-Output Tables* (OECD, 2015),

Figure 18. Value-added Exports to the Chinese Mainland (Share of Exporter's Gross Value Added)



Sources: OECD (2015) and authors' calculations.

Note: GVA, gross value added.

Table 8. Exposure to China (Gross and Value-added Exports to China as Share of Domestic Value Added, 2011)

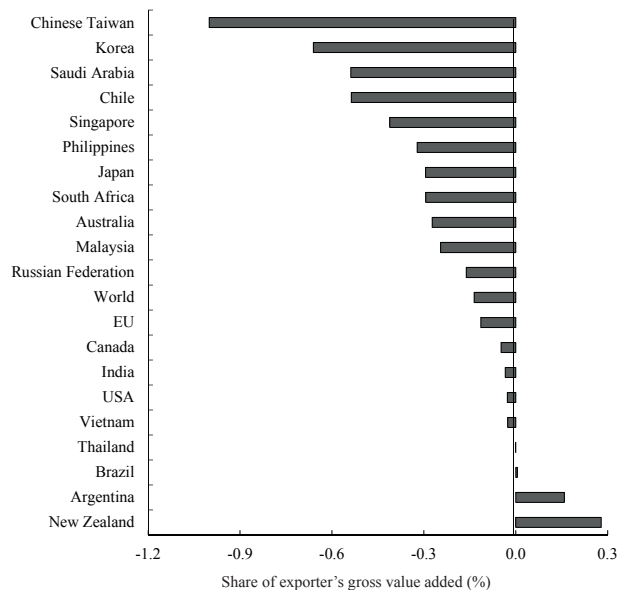
Exporter	Australia	Japan	Brazil	EU	Canada	USA	World
Gross export share (%)	5.4	2.6	2.0	1.2	1.2	0.8	2.3
Value-added export share (%)	4.3	2.3	1.7	1.1	1.1	0.7	1.9

Sources: OECD (2015) and authors' calculations.

15 percentage points in Chinese domestic expenditure from gross fixed capital formation to total consumption (without changing the relative shares of household and public consumption) would have affected the value-added exports of China's trading partners in 2011. As Chinese investment is generally more import-intensive than consumption, the impact on most trading partners is negative, although there are a few exceptions (notably New Zealand). Resource exporters such as Saudi Arabia, Chile, South Africa and Australia are more negatively affected than the world on average, and some (such as Australia and South Africa) are less negatively affected than several exporters of manufactured capital goods (Japan, Korea and Germany).

For resource exporters, the negative effects of Chinese rebalancing are principally because of the role of Chinese investment in driving demand for mining exports. These exports provide key inputs for the Chinese metal manufacturing industry, which, in turn, derives much of its demand from the strongly investment-driven construction and machinery and equipment manufacturing industries. For example, the negative impact of Chinese domestic rebalancing on Australia would largely be borne by the country's mining sector. While agriculture, forestry and fishing, food and beverage manufacturing,

Figure 19. Relative Impact of Chinese Rebalancing on Trading Partners, 2011
(Share of Exporter's Gross Value Added)



Sources: OECD (2015) and authors' calculations.

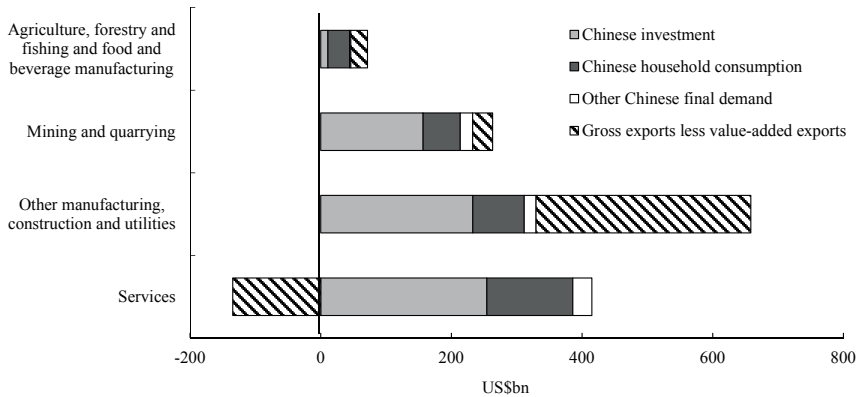
Note: Estimated for a 15-percentage point shift in Chinese domestic absorption from investment to consumption in 2011.

and education and tourism service industries would benefit from rebalancing, the size of the offset would be relatively small.

The differences between patterns of trade exhibited by economies more and less likely to benefit from Chinese rebalancing are pronounced. For instance, New Zealand's exports to China are dominated by agricultural products, food items, such as dairy products, and services, while a relatively small share are inputs to Chinese investment. However, such a pattern of trade with China is atypical. For most economies, the bulk of value-added exports to China meet investment rather than consumption demand (see Figure 20).

The difference between the relative demand intensities of Chinese consumption and investment for imports will no doubt continue to evolve in the future. In general, for resource exporters and also many manufacturing exporters, the demand for value added per unit of Chinese consumption would need to rise sharply to offset the effect of a diminishing investment share. Moreover, as Chinese rebalancing is more likely to be driven by decelerating investment than accelerating consumption, for most economies there would be a substantial reorientation of trade with China in order to benefit from

Figure 20. Sources of Chinese Demand by Global (non-Chinese) Industry, 2011



Sources: NBS (2015b) and authors' calculations.

the rebalancing process.

VII. Conclusions

China's consumption growth over the past 30 years has been extraordinary, both in comparison to growth rates recorded prior to the beginning of the era of reform and opening in 1978, and in comparison to other economies. Any meaningful domestic rebalancing would require continued rapid consumption growth (more than 8 percent per year) and prolonged weakness in investment. To achieve such an outcome, the effect of much lower investment growth on household incomes and consumption would have to be very small. However, historical and international comparisons suggest that it has been rare for economies experiencing rapid consumption growth prior to a rebalancing episode to sustain or to increase consumption growth in subsequent years.

Our scenarios underscore and highlight the “knife-edged” nature of rebalancing and the considerable stakes involved. If rebalancing is too slow, the capital-to-output ratio will rise to potentially unsustainable levels, and real household consumption per capita will struggle to reach that of a contemporary upper middle-income economy even by 2030. If it is too fast, the implied disparity between the growth of consumption and investment, and the required increase in the efficiency of investment, suggest a pattern of growth that may be implausible in practice.

Input-output analysis further demonstrates that for China there is a close relationship between rebalancing on the expenditure side from investment towards consumption and a parallel rebalancing on the production side from manufacturing industry towards services. As services are more intensive in labor input than manufacturing, rebalancing

from investment towards consumption could support a higher rate of employment growth for a given rate of GDP growth, possibly cushioning the effect of the slowing economy on the Chinese labor market and on household incomes. This, in turn, may lend some support to a rotation from investment to consumption.

However, the relationship between the structure of Chinese expenditure and production also has some important global implications. The higher import intensity of Chinese investment relative to consumption means that internal rebalancing would be expected to place downward pressure on the import share of GDP. Accordingly, while a simultaneous resolution of domestic and external imbalances is possible, our investigation of global input–output tables from 2011 shows that the more likely outcome is that internal rebalancing entails a modest worsening of external imbalances.

It is commonly assumed that commodity exporters will be disadvantaged more than other economies by rebalancing in China, but our analysis suggests that most economies “lose” from rebalancing. With few exceptions (such as New Zealand), China’s trading partners generally export manufactured goods that are used more intensively in investment than in consumption. Naturally, there is scope for domestic industries in economies whose exports are heavily exposed to Chinese investment to adapt themselves to the changing composition of Chinese import demand, which could create new opportunities to compete with China’s existing suppliers of consumption goods and services. However, if the current pattern of trade persists, few of China’s trading partners will benefit in net terms from Chinese rebalancing, and many will experience a slowing in exports to China in coming years. By the same token, insofar as rebalancing is needed to correct an otherwise unsustainable pattern of growth, in the long run the consequences of a failure to rebalance the Chinese economy could also be negative for China and its trading partners.

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