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Looking Inward for Transformative Growth in China

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Looking Inward for Transformative Growth in China

Abstract

Export led growth has been very effective in modernising China's economy and establishing a large high-saving middle class. Notwithstanding political opposition from trading partners, this growth strategy has also offered the rest of the world an improved terms of trade and cheaper finance. Yet slowing demand in export destinations has forced a transition to inward-sourced growth. This paper uses a numerical model of the Chinese economy with oligopoly behaviour to examine the available "inward" sources of transformative growth along with the policies needed to exploit them. Continued transformative growth is shown to be feasible though it will require accelerated skilled labour supply growth and the extension of industry policy reform to heavy manufacturing and services. These gains nonetheless require further openness and, even though the share of Chinese light manufactured exports would decline, global acceptance would be required of exported Chinese heavy manufactures. Failure to accommodate these would greatly limit China's growth and force a return to a more primitive trading pattern that would also hurt the global economy more generally.

1 Introduction

There is wide agreement outside China, and more recent concurrence inside, that China's growth will, and should, be increasingly underpinned by rising home consumption rather than exports.¹ The foreign viewpoint is notwithstanding the considerable contributions of China's export-led growth to improvements in the foreign terms of trade and to cheaper financing of investment and government spending. In China's large trading partners the dominant political force behind this view seems to be concern over declining overall economic performance, at least compared with China, comparatively high unemployment and the very visible nature of "offshoring".²

Yet the global gains conferred by China's growth are fragile and the Chinese regime that has produced them faces potentially destabilising threats from within and without. For this reason there looms the "middle income trap" widely ascribed to other developing regions (World Bank 2010). The poor performance of trading partner economies clearly weighs on China's government, as does foreign political hostility to continued export led growth. Internally, there

¹ For the foreign, and particularly the American, perspective see Bergsten et al. (2008) and Lardy (2006, 2012). For the Chinese official line on the "rebalancing" of its economy, including its external accounts, see Wen (2007, 2011) and Yi (2011).

² Foreign animus toward China's economic policy regime has been further inflamed by the large current account surpluses of the last decade and the perspective of some in the West that China's political system denies basic human rights or of others that its large government and defence forces represent a strategic threat. See Tyers (2012).

has been a tightening of labour markets, foreshadowing a Lewis “turning point” that would mark a natural end to export led growth.³ In addition, there are reasons why increased public investment and the fostering of increased private consumption are of considerable political value at present. The high environmental costs of China’s manufacturing expansion have yet to be fully covered and there is increased income inequality, associated with rents in the state-owned sector that will be politically difficult to unwind.⁴ This inequality coincides with socioeconomic stratification in China’s periphery, which has precipitated increased class, ethnic and regional conflicts.

Middle income “slowdowns” in developing countries that have heretofore grown strongly out of poverty are the subject of expanding interest (Easterly 2001; Eichengreen et al. 2011). The focus is the distinction between “natural” slowdown in the convergence process as poorer countries approach full industrialisation, which is due to diminishing returns to physical and human capital and diminished “catch-up” investment incentives (Lucas 2009), and premature stagnation due to powerful vested interests that oppose economic policy reforms needed for the final catch-up phase (Haber et al. 2008; Riedel 2011).⁵ The sense in which the slowdown is considered a “trap” derives from a divergence of collective interests from those of the leadership group, with the latter associated with rent extraction (corruption) that peaks at middle levels of real per capita income.

So where are the rents and the vested interests that could retard China’s future growth and does “turning inward” exacerbate the risk of an associated slowdown? The financial sector is one location. Very high saving challenges this sector to allocate efficiently across investment opportunities. The many weaknesses in this process, stemming in part from the protection of state owned financial institutions, have already received considerable attention (Riedel 2007; Walter and Howie 2011). Yet the potential gains from further industrial reform that reduces rents in protected corners of the economy extend well beyond the financial sector to include comparatively protected and state-owned heavy manufacturing and services. Industrial reforms have penetrated these sectors less because of their political sensitivity. If such reforms

³ The timing of China’s Lewis turning point is a subject of controversy, as suggested by the contrasts between the views expressed by: Cai (2010), Garnaut (2010) and Golley and Meng (2011), which offer just a sampling of a substantial literature. There is, however, little doubt that the turning point is on its way, even if there is little agreement as to whether recent real wage rises suggest its presence.

⁴ For a discussion of the institutional and industrial reform agenda and its difficulty, see for example Tyers and Lu 2008, Riedel 2011 and Deer and Song 2012

⁵ These issues parallel an established literature in political economy that originated with Mancur Olson (1965) and Gordon Tullock (1967) and from which emerged the term “eurosclerosis” to describe stagnation due to interest group conflict and rent seeking in Europe.

are required for inward focussed growth then there will be political difficulty achieving it. Yet, potentially at least, such reforms offer an effective replacement of export led growth that is also transformative of China's economic structure and its labour force.

Alternative approaches to inward-focused growth are numerous and they include, importantly, policies and institutional development to support domestic innovation and productivity growth. These are the engines of steady state growth, whereas in this paper the focus is on alternatives that follow on from the export led era in that they could further transform the structure of China's economy. They include expanded government, accelerated human capital growth and further industrial reforms, amongst which are pure privatisation, the fragmentation of state-owned enterprises, price cap regulation and foreign direct investment in heavy manufacturing and services. In this paper the economic implications of changes of these types are assessed using a mathematical model of the Chinese economy that captures the behaviour of state-owned oligopolies and the impacts of further industrial reform.

The greatest potential for inwardly-generated growth is shown to rest, as expected, with further industrial reform in heavy manufacturing and services. The simulation results suggest the best prospects for further growth are to attack oligopoly rents with tighter surveillance and price cap regulation and to advance heavy manufacturing and services output through human capital accumulation and FDI. The first of these will be resisted by those currently enjoying the rents and the second presses against the desire on the part of China's government to protect services from foreign ownership. Moreover, the "inward" focus notwithstanding, the positive outcomes continue to depend on the acceptance in the rest of the world of Chinese exports, though the pattern of these would shift to better resemble that of typical industrialised countries.

The next section reviews the relative merits of export led growth, develops the reasoning behind the choice to turn inward in China's case and discusses the sources of internally generated transformative growth. In Section 3, the particular structure of China's economy is reviewed along with the associated sensitivity of its overall performance to its real exchange rate. Section 4 offers a description of the model used and the construction of its database. Section 5 compares inward-sourced growth scenarios and Section 6 concludes.

2. The Turn Away from Export Led Growth

Economic development is primarily about shifting the population from low labour productivity rural activities to urban employment where the availability of physical capital ensures higher

income and more efficient access to essential services. This requires rural-urban migration and, at least initially, basic (mainly primary) education and training. These conditions supply a workforce suitable for light manufacturing. If the protection of property rights and the export infrastructure facilities are sufficient, the availability of adequately trained workers then attracts capital that is supplied from both domestic saving and foreign direct investment (FDI). In the “East Asian model”, much of the migration from rural areas goes into manufacturing, though some goes to construction and other services, which also expand.⁶ In a final phase, the transition from middle level to very high real per capita income requires further education and training suited to the growth of sophisticated heavy manufacturing and services.

The merits of export led growth

The growth in the local supply of light manufactures that occurs in the early stage in the East Asian model is more than can meet local demand. Comparative advantage in light manufacturing is realised via openness to trade and so the home labour force is transformed by exporting. As it turns out, this transformation is also beneficial to already-industrialised trading partners. This is because the resulting change in the international terms of trade is positive for them – light manufactured imports are cheaper and skill-intensive durable (consumer and capital) goods, which they export, are in higher demand. Moreover, since the opening of such developing economies in this way supplies additional low-skill labour to the integrated global economy, FDI opportunities are abundant and savers in industrialised countries earn higher returns. Idiosyncratically, the East Asian model has also offered high saving households and firms which have supplied excess saving to the global economy (Horioka and Terada-Hagiwara 2011). This has financed investment and government expenditures in the industrialised economies in ways that have enhanced their growth.⁷

The choice to look inward

Variations on the East Asian model have been the dominant basis for catch-up by poorer countries and regions for more than a century (Dooley et al. 2004). Then why should the Chinese choose to “look inward” now? The reasons are manyfold. First, it is inevitable that China will cease to depend on labour intensive exports and move its production up the chain of sophistication in the manner of Japan, the Republic of Korea and its regions in Taiwan and Hong Kong before it. This generally coincides with a slowdown in the rate of rural to urban

⁶ The Indian model differs from this in that the rural to urban migration goes primarily to services with manufacturing by regulatory and infrastructural constraints. See Bardhan (2010).

⁷ While it is true that cheaper credit has not always led to growth enhancing expenditures in these countries, their errors in public and private expenditure patterns have not been the fault of the Asian high savers.

migration and some acceleration in the rate of rise in real wages – the “turning point” of Lewis (1955). The ardent debate over the proximity of this turning point notwithstanding, the most carefully considered evidence suggests it may still be some way off (Cai 2010; Golley and Meng 2011). It is nonetheless true that demographic changes associated with China’s one child policy have accelerated it, and labour costs have indeed grown more sharply in recent years. Even though this pattern of labour force tightening is smooth, the associated transition to slower growth can be abrupt and destructive, as in the case of Japan in the late 1980s,⁸ and so it is possible the Chinese government seeks to ensure a smooth transition.

It is likely that the most important reason for China’s turn inward is that growth has slowed in the regions to which China’s exports are directed. This raises the prospect that the terms of trade might shift more rapidly against it if exports continue to be pushed out at the current rate and so a smaller proportion of the benefits from export led growth would accrue at home in China.⁹ Third is political pressure from destination regions against China’s current account surpluses of the past decade, the perceived unfairness of Chinese macroeconomic policy and the loss of trading partner employment in manufacturing. Political attacks on Chinese exports, and anti-Chinese xenophobia in general, are more likely when the movement of vast numbers of Chinese workers into the modern sector is perceived as being associated with the unemployment of a tenth of those seeking work in Western Europe and the US. This association has high level backing in policy debates, particularly in the US (Bernanke 2006; Krugman 2010).

The Western backlash is essentially mercantilist and much of it is directed at China’s exchange rate. The perception in the US that countries like China use “exchange rate protection”, stems from the role of the US dollar as the reserve currency and the difficulty the US faces when a lack of competitiveness would justify a depreciation against others. In the 1980s, this ire had been directed against Japan, leading to the Plaza Accord, an associated large and destructive appreciation of the Yen (Goval and McKinnon 2003; Hamada and Okada 2009), and ultimately to the US *Exchange Rates and International Economic Policy Coordination Act of 1988*, which formalised the US “defence” against “currency manipulators”. Poverty, and its associated low wages, are seen in US policy debates as an unfair trade advantage rather than a problem that is solved by expanded trade. The fact that the underlying real exchange rate of China against the

⁸ The literature on Japan’s stagnation since the late 1980s is vast. See Hayashi and Prescott (2002) and Tyers (2011).

⁹ This raises the prospect of “immiserizing growth”, which is already hotly debated as a consequence of Chinese export expansion, at least for smaller, poorer exporters that compete with China (Bhagwati 1987).

US has appreciated substantially since 2004 seems to have been missed in much of the American literature (Tyers and Zhang 2011).¹⁰ Yet poverty in China remains a serious problem. The associated inequality is a concern of government and this, also, has motivated the “turn inward”. Expanded public investment has been justified as a means of redirecting the fruits of growth to lagging regions and to the rural sector in general (Wen 2011).

Potential inward sources of growth

Alternative inward growth stimuli are numerous. Most conventionally, they include policy implementation in the areas of innovation, technology acquisition and human capital growth (Robertson 2011). These are at the core of China’s long run steady state growth path. Yet they are not the focus here. Instead, emphasis is given to particular sources of growth that are natural successors to the export-led paradigm in that they could further transform the structure of China’s economy and support, at least temporarily, further very high rates of expansion.

The scale of government:

All the sources to be considered require action from the central government. The first concerns the mere scale of its revenue and expenditure. Given the apparent success of China’s surge in public investment during the global recession in 2008-9 the government is surely tempted to think of expanded government activity as an inward source of future growth. And it is common for governments of developing countries to undersupply public goods that are foundations for growth. In China’s case these include the facilities and regulatory institutions to support basic and higher education, transport and telecommunications infrastructure, retirement insurance, health insurance and environmental protection. Compared with other developing countries, China is in the fortunate situation of having implemented a sensible tax law in 1994 that is accessing an increasing share of all its economic activity. This means that central government tax revenue is rising faster than GDP and it was this that allowed the substantial increase in public investment in 2009 without a large increase in the fiscal deficit (Jia and Liu 2009).¹¹ So, depending on the extent of crowding out and of Ricardian equivalence amongst savers, a rise in government activity could help expand China’s GDP by

¹⁰ While the American literature continues on this refrain, the Geithner-led US Treasury, the guardians of the “currency manipulator” label, have increasingly tried to highlight the real exchange rate adjustment as one of the arguments behind their unwillingness to cite China. Thanks to Huw McKay for this note.

¹¹ A less well publicized reason for the modest expansion in Beijing’s fiscal deficit is that the increased spending on provincial public projects was heavily financed by commercial banks and so associated with similarly rising deposit rates and at least implicit government guarantees. It was therefore “off balance sheet” so far as the federal government was concerned. Thanks also to Huw McKay for this observation. The key implication is that private saving has financed public investment at the provincial level.

reducing the rate at which home income is spent on foreign assets and products and therefore bolsters aggregate demand abroad rather than at home. It is unclear, however, to what extent this expanded government activity can bring about more than a comparatively short term, one-off change in national output.

Industrial reform:

An important and yet only partially tapped source of further growth is in the extension of industrial reforms to heavy manufacturing and services. State owned firms in these sectors have been relatively protected and significant foreign ownership shares have been prevented. One consequence of this is that these firms, supplying as they do essential materials and services to an economy that is expanding rapidly, courtesy of the more competitive light manufacturing export sector, have been extremely profitable (Lu et al. 2008). At the same time they have returned little in the way of dividends to the central government and so their profits have not been distributed to their public owners. Instead, these profits have been reinvested. Consequently, the decision to save or consume from this component of national income has been denied households, contributing to China's saving a sum amounting to about a fifth of GDP.¹²

Substantial potential future growth lies in the redistribution of these rents, which would make Chinese intermediate products cheaper and foster overall output growth while at the same time raise private consumption. A number of approaches are possible, some of which are already being tried.

- 1) Pure privatisation: this would return the profits of SOEs to private households and foster consumption, raising domestic demand for China's goods and services,
- 2) SOE fragmentation: this would force more competition between firms and thus reduce mark-ups, and
- 3) Tighter regulation of SOE pricing: this could, at least in theory, force firms to price nearer their average costs, cutting rents and reducing the price level.

Rural registration and human capital growth:

The rate of human capital accumulation in China is constrained by the *hukou* system, since urban residents with rural registration have comparatively poor quality rural education and

¹² The contribution of corporate saving to China's overall saving rate and to the current account surpluses of the past decade is examined by Kuijs (2006), Kuijs and He (2007) and Tyers and Lu (2008).

must educate their children in comparatively poor quality rural schools.¹³ This forms a poor basis on which to build the more advanced education required to support increased activity in the heavy manufacturing and services sectors (Zhang et al. 2012). A relaxation of the *hukou* system would open the superior urban school system to all urban residents and, at least temporarily, accelerate the rate of acquisition of skill.¹⁴

These alternatives are examined in the analysis to be discussed in subsequent sections.

3. China's Economic Structure, Performance and its Real Exchange Rate

As the analysis to be discussed shows, a turn “inward” does not necessarily imply a less open Chinese economy. Any growth that stems from it will continue to depend on China's global competitiveness and hence on its real exchange rate. This special sensitivity stems from its economic structure, as summarised in Table 1. Four patterns stand out:

- 1) the great majority of non-agricultural employment is in the export-oriented light manufacturing sector – indeed, employment in this sector exceeds that in agriculture,
- 2) the light manufacturing sector dominates China's exports,
- 3) light manufacturing is relatively competitive – price mark-ups are low and so pure or economic profits make up only a small share of total revenue, and
- 4) the SOE-dominated energy, metals and services sectors are less labour-intensive and at the same time they are oligopolistic, generating substantial rents.

Since exporting firms are highly competitive, generate little pure profit and carry most of the new or “modern sector” employment, future employment performance is very sensitive to the relativities between home wages and export prices, and hence to China's real exchange rate.

Yet the inward-looking policy changes that could contribute most to enlarging China's economy all have implications for the real exchange rate. Consider each in turn.

Government expansion

There are several mechanisms by which expanded government expenditure tends to appreciate the real exchange rate. First is the Mundell-Fleming effect (Fleming 1962, Mundell 1963)

¹³ There remain immense disparities between education quality in rural and urban areas (Fang et al. 2012, de Brauw and Rozelle 2013) and, under China's *hukou* system, most urban households with rural registration must seek education in their rural districts of origin (Chen et al. 2007).

¹⁴ The relaxation of the *hukou* system is also touted as a means of raising consumption demand directly. See Song et al. (2010).

whereby increased government borrowing is financed partially from financial inflow, which requires higher bond yields as an inducement. The net effect is to raise demand for home relative to (more elastically supplied) foreign products and services and hence to appreciate the real exchange rate. Second is the Froot-Rogoff effect (Froot and Rogoff 1995) whereby governments concentrate their spending on non-traded services and so their expansion changes the composition of aggregate demand toward more inelastically supplied home products, driving up their relative price and hence the real exchange rate.¹⁵ This effect is illustrated in Figure 1, which is based on the abstraction that goods and services are starkly divided according to their tradability. If the share of government spending in aggregate demand rises, then the pattern of implied preferences shifts favouring non-traded goods, appreciating the real exchange rate.

The third appreciating effect is due to oligopoly rents. Increased government spending raises home demand for home products, reducing the exported share of the average firm's output. Because foreign demand is the most elastic, this reduces the elasticity of demand faced by oligopoly firms, which then raise their mark-ups. And since oligopoly firms reside mainly in the protected heavy manufacturing and largely non-traded services sectors, such price rises appreciate the real exchange rate by raising the relative prices of non-traded services and by increasing costs faced by the competitive export sector (Tyers and Lu 2008). A way of thinking of this is that the excess profits are achieved by supplying less output and so the oligopoly firms reduce productivity in the largely non-traded sectors of the economy. Again employing the abstraction that goods and services are either tradable or not, the effect of this productivity contraction on relative prices is illustrated in Figure 2. It raises the prices of non-traded goods relative to traded goods and hence China's real exchange rate.

In assessing fiscal expansions, the negative effect on the real exchange rate is commonly seen as being more than offset by the resulting expansion in aggregate demand. A key mechanism for this is that the increase in government dissaving reduces the *national* saving rate, at least temporarily, requiring the failure of Ricardian equivalence. Because reduced national saving contracts the leakage of expenditure abroad, which in China takes the form of foreign reserve accumulation, the current account surplus is reduced and more Chinese expenditure falls on the home relative to the foreign economy. This has the effect of either inducing a home inflation or arresting a deflation, thus stabilising the relationship between nominal wages and the price

¹⁵ De Gregorio et al. (1994) and Froot and Rogoff (1995), and more recently Galstyan and Land (2009), recognise that boosting government expenditure appreciates the real exchange rate by this mechanism, even in the case of public investment, at least in the short run.

level and hence maintaining the steady state level of employment. Just such a short run approach to government spending in China is taken by Tyers and Huang (2009). The expansion of government to be considered here is long run in orientation and therefore tax financed. It is therefore not by fiscal expansion and hence it lacks the potential for Keynesian gains.

Further industrial and education reforms

Returning to the oligopoly pricing effect on the real exchange rate, the alternative of further industrial reform is also considered here. To the extent that this reduces oligopoly mark-ups, particularly in the non-traded sector, it will also tend to depreciate the real exchange rate and thereby preserve the competitiveness of China's export manufacturing sector. The further alternative of accelerating the rate at which human capital is accumulated would reduce the growth in China's skilled wage premium and hence reduce costs in those sectors that are intensive in skill, namely heavy manufacturing and services. More access to FDI in Chinese services is a further means by which services costs could be controlled. Both these reforms would depreciate China's real exchange rate by reducing the relative cost of supplying the home product bundle and, particularly, the cost of non-traded services, via the reverse of the Balassa-Samuelson effect. To quantify the effects of these changes on the real exchange rate and on China's overall economic performance, a complete model of the Chinese economy is required.

4. An Oligopoly Model of the Chinese Economy

To capture the behaviour of the oligopolistic SOEs, a comparative static macroeconomic model of the Chinese economy is used that embodies a multi-industry structure in which all industries are treated as oligopolies, with firms in each industry supplying differentiated products and interacting on prices.¹⁶ Government expenditure creates demands for goods and services via nested constant elasticity of substitution (CES) preferences and government revenue stems from a tax system that includes both direct (income) taxes levied separately on labour and capital income and indirect taxes including those on consumption, imports and exports.¹⁷ A capital goods sector is included which translates investment expenditure into product and

¹⁶ It is a distant descendant of that by Harris (1984), Gunasekera and Tyers (1990), though it is considerably generalised to include macroeconomic behaviour following Tyers and Lu (2008).

¹⁷ Income taxes are approximated by flat rates deduced as the quotient of revenue and the tax base in each case. Capital income tax rates vary by industry in which the income is earned.

service demands, again using a nested CES preference structure. The level of total investment expenditure has Q-like behaviour, being influenced positively by home rates of return on installed capital and negatively by a financing rate obtainable from an open “bond market” in which home and foreign bonds are differentiated to represent China’s capital controls. Savings are sourced from the collective household at a constant rate and from corporations at industry-specific rates applying to the magnitudes of pure (economic) profits earned. Foreign direct investment and official foreign reserve accumulation are both represented, to complete China’s external financial accounts.¹⁸

Model structure

The scope of the model is detailed in Table 2. Firms in all industries are oligopolistic in their product pricing behaviour with the degree of price-setting collusion between them is represented by conjectural variations parameters that are set to account for the degree of regulatory surveillance. Each firm bears fixed capital and labour costs, enabling the representation of unrealised economies of scale. Home products in each industry are differentiated by variety via CES nests and output is Cobb-Douglas in variable factors and intermediate inputs. While firms are oligopolists in their product markets they have no oligopsony power as purchasers of primary factors or intermediate inputs.¹⁹ The economy modelled is “almost small”, implying that it has no power to influence border prices of its imports but its exports are differentiated from competing products abroad and hence face finite-elastic demand.²⁰ The consumer price index is constructed as a composite Cobb-Douglas-CES index of post-consumption-tax home product and post-tariff import prices, derived from the aggregate household’s expenditure function. This formulation of the CPI aids in the analysis of welfare impacts. Because collective utility is also defined as a Cobb-Douglas combination of the volumes of consumption by generic product, proportional changes in overall economic welfare correspond with those in real GNP.²¹

¹⁸ Hereafter the capital, financial and official sub-accounts of China’s balance of payments will be referred to as the “capital account”.

¹⁹ Imports in each industrial category are seen as homogeneous, differentiated from home products as a group, so that import varietal diversity never changes. Since all home varieties are exported there is no movement on the “extensive margin” of the type that is evident in the models of non-homogeneous export industries by Melitz(2003) and Balistreri et al. (2007).

²⁰ The effective numeraire is the import product bundle. Consumer and GDP price indices are constructed for real aggregations, following the practice in national modelling since Dixon et al. (1982) and Harris (1984).

²¹ When the utility function is Cobb-Douglas in consumption volumes, the expenditure function is Cobb-Douglas in prices. If the consumer price level, P^C , is defined as a Cobb-Douglas index of prices, the equivalent variation in income can be expressed in terms of the proportional change in this index. Thus, following any shock, the income equivalent of the resulting changes to income and prices is:

The quantity of domestically-owned physical capital is fixed both in the short and long runs, so that changes in the total capital stock affect the foreign ownership share and hence the level of income repatriated abroad. In the experiments to be presented a long run closure is used throughout and so the foreign owned stock of domestic capital can vary in size, retaining a market rate of return equivalent to that demanded abroad.²² In this long run, physical capital is homogeneous and fully mobile between industries, though claims on home and foreign capital are differentiated and so there is a wedge between the home and domestic rates of return that stems from the differentiation of these financial assets (due, say, to the retention of inward and outward capital controls) combined with endogenous reserve management policy. Factor market closures are many but, normally, all real unit factor rewards are flexible while domestic non-capital factor supplies are fixed. A fixed oligopoly structure is retained, assuming SOEs are protected from competitive entry and are prevented from exiting if losses are incurred. Finally, the standard fiscal closure in the long run is consistent with China's heretofore fiscal conservatism, the base fiscal deficit is held constant with expenditure dictated by endogenous revenues at fixed tax rates, or shocks to government spending being financed by changes in tax rates.

Macroeconomic behaviour

The model's macroeconomic behaviour is most important in short run closures not used here. Central to it is the open economy capital market which is built around the market clearing identity:

$$(10) \quad I^{EXP}(r^c, r) = S_D(Y_{DH}, \pi, G) + S_{NF}(r, r^*) - \Delta R(r, r^*) ,$$

where r is the home real financing rate (bond yield), r^* is the real yield on bonds abroad (the two being differentiated and so offering different yields). Total domestic saving is

$S_D = S_H(Y_{DH}) + S_C(\pi) + (T - G)$, where S_H is saving from home household disposable income. The household saving rate is assumed fixed, so that $S_H = s_H Y_{DH}$. Following Tyers and

$$\Delta W = Y_1 - Y_0 + EV(P_0^c, P_1^c, Y_1) = Y_1 - Y_0 - Y_1 \frac{\Delta P^c}{P_1^c} ,$$

which can be expressed in proportional change form as:

$$\frac{\Delta W}{W} = \frac{Y_1 \left(1 - \frac{\Delta P^c}{P_1^c}\right) - Y_0}{Y_0} \cong \frac{\Delta Y}{Y_0} - \frac{\Delta P^c}{P_1^c} .$$

This is, approximately, the proportional change in real GNP.

²² This contrasts with the results presented by Tyers and Huang (2009), which are short run in nature.

Lu (2008), China's extraordinarily high level of corporate saving, S_C , is assumed to stem from pure profits, π , with a distinct but fixed saving rate assumed for each industry:

$$(11) \quad S_C = \sum_i S_{Ci} = \sum_i s_{Ci} \pi_i .$$

The last two terms of (10) represent net private and public flows on the capital account. S_{NF} is the inflow of private foreign saving to finance investment in China net of Chinese private saving going abroad and ΔR is the annual addition to official foreign reserves. r^c is the average net rate of return on installed capital, which takes the following form at the industry level:

$$(12) \quad r_i^c = \frac{P_i^Y MP_i^K}{P^K} - \delta_i ,$$

where P^K is the price of capital goods, P^Y is the product price and δ is the rate of depreciation. An average of these rates is taken that is weighted by value added in each industry to obtain r^c . Investment expenditure then is determined by:

$$(13) \quad I^{EXP} = P^K I_0 \left(\frac{r^c}{r} \right)^{\varepsilon_V} .$$

This Q-like relationship constrains the investment response to a change in either the rate of return or the financing rate, offering a reduced form representation of either gestation costs or expectations over short run consequences of installation for the rate of return.

Because in China's case capital controls have been tight and inflows mainly take the form of state-approved FDI, this comparative static analysis assumes net foreign saving, S_{NF} , is motivated by the difference between the home and foreign bond yield. A linear relationship is used to allow for reversals of the direction of net flow in response to shocks.

$$(14) \quad S_{NF} = a_{SF} + b_{SF} (r - r^*) .$$

The tight capital controls necessitate a low level of responsiveness and so b_{SF} is small (the supply of net foreign private saving is inelastic). Correspondingly, the combination of China's high saving rate with outward capital controls necessitates that the surplus of saving over investment, which has amounted to a tenth of GDP in some years, be directed abroad by the PBC as official foreign reserves. This behaviour depends on a relationship that is linear, for the same reason as in (14):

$$(15) \quad \Delta R = a_{DR} - b_{DR} (r - r^*),$$

where the movement of reserves is much more elastic to the home real interest rate than that of private financial capital, so that $b_{DR} \gg b_{SF}$. The effect of this is to stabilise the home real rate in response to shocks, which cause, instead, elastic movements in the rate of reserve accumulation.²³

The capital market clearing identity (10) then determines the home real interest rate and the magnitude of the capital account deficit ($\Delta R - S_{NF} = S_D - I$). This is then equal in magnitude to the current account surplus [$X - M + N(r, r^*)$, where N is net factor income from abroad²⁴]. Shocks originating in the determinants of domestic saving and investment, and hence in external flows, cause home (relative to foreign) product prices (and hence the *real* exchange rate) to adjust sufficiently to clear home markets and preserve the balance of payments.

Oligopoly in supply

Firms in each industry supply differentiated products. They carry product-variety-specific fixed costs and interact on prices. Cobb-Douglas production drives variable costs so that average variable costs are constant if factor and intermediate product prices do not change but average total cost declines with output. Firms charge a mark-up over average variable cost which they choose strategically. Their capacity to push their price beyond their average variable costs without being undercut by existing competitors then determines the level of any pure profits and, in the long run, the potential for entry by new firms.

Thus, each firm in industry i is regarded as producing a unique variety of its product and it faces a downward-sloping demand curve with elasticity $\varepsilon_i (< 0)$. The optimal mark-up is then:

$$(16) \quad m_i = \frac{p_i}{v_i} = \frac{1}{1 + \frac{1}{\varepsilon_i}} \quad \forall i,$$

²³ It is argued elsewhere (Tyers and Zhang 2011, for example) that, given the commitment to outward capital controls and the high saving rate, the PBC has little residual discretion over annual increments to reserves. This is because the PBC must print home currency to exchange with the commercial banks in return for unwanted foreign currency. Yet, by soaking up domestic saving through the issue of “sterilisation bonds” the PBC’s reserve accumulation has the effect of preventing downward pressure on that rate. Equation (14) is intended merely as a reduced form description of this process.

²⁴ As modelled, N comprises a fixed net private inflow of income from assets abroad and fixed aid to the government, less endogenous repatriated earnings from foreign-owned physical capital in China.

where p_i is the firm's product price, ν_i is its average variable cost and ε_i is the elasticity of demand it faces. Firms choose their optimal price by taking account of the price-setting behaviour of other firms. A conjectural variations parameter in industry i is then defined as the influence of any individual firm k within that industry, on the price of firm j within the same industry:

$$(17) \quad \mu_i = \frac{\partial p_{ij}}{\partial p_{ik}}, \quad \forall j, k, j \neq k.$$

These parameters are exogenous, reflecting industry-specific collusion and free-rider behaviour along with the power of price surveillance by regulatory agencies. The Nash equilibrium case is a non-collusive differentiated Bertrand oligopoly in which each firm chooses its price, taking the prices of all other firms as given. In this case the conjectural variations parameter (17) is zero. When firms behave as a perfect cartel, it has the value unity. This parameter enters the analysis through the varietal demand elasticity.

Critical to the implications of imperfect competition in the model is that the product of each industry has exposure to five different sources of demand. The elasticity of demand faced by firms in industry i , ε_i , is therefore dependent on the elasticities of demand in these five markets, as well as the shares of the home product in each. They are final demand (F), investment demand (V), intermediate demand (I), export demand (X) and government demand (G). For industry i , the elasticity that applies to (19), above, is a composite of the elasticities of all five sources of demand.²⁵

$$(18) \quad \varepsilon_i = s_i^F \varepsilon_i^F + s_i^V \varepsilon_i^V + s_i^I \varepsilon_i^I + s_i^X \varepsilon_i^X + s_i^G \varepsilon_i^G \quad \forall i$$

where s_i^j denotes the volume share of the home product in market i for each source of demand j . These share parameters are fully endogenous in the model and the elasticities of demand are calculated from CES demand nests and the conjectural variations parameters, as per (Tyers and Lu 2008). Mark-ups then follow from (16).

Thus, the strategic behaviour of firms, and hence the economic cost of oligopolies, is affected by collusive behaviour on the one hand and the composition of the demands faced by firms on the other, both of which act through the average elasticity of varietal demand. The collusive behaviour enters through conjectural variations parameters and composition through the

²⁵ The expressions for these elasticities are messy and voluminous. They are derived in appendices to Tyers and Lu (2008).

demand shares s_i^j . Of course, the capacity firms have to reduce their prices also depends on their productivity performance and on the fixed cost burden carried by each industry (and hence on firm numbers).

To study the effects of price-cap regulation a Ramsey mark-up, m_i^R is formulated as:

$$(19) \quad m_i^R = \frac{afc_i + v_i}{v_i}.$$

Compromise mark-ups can be simulated by altering the parameter φ_i in an equation for the “chosen” mark-up:

$$(20) \quad m_i^C = (\varphi_i - 1)m_i^R + (2 - \varphi_i)m_i \quad \forall i.$$

Thus, when $\varphi_i = 1$, $m_i^C = m_i$, and when $\varphi_i = 2$, $m_i^C = m_i^R$.

The database and its representation of broad economic structure

The flow data for the current model originates from the GTAP Version 6 global database for 2001.²⁶ It combines detailed bilateral trade, transport and protection data characterizing economic linkages among regions, together with individual country national accounts, government accounts, balance of payments data and input-output tables which enable the quantification of inter-sectoral flows within and between regions. Factor shares and input output coefficients from these 2001 data are combined with Chinese national accounts and balance of payments data for 2005, inflating the database to that year and readjusting it for balance. Key structural elements are evident from Table 1, already discussed in the previous section and the scope of the model is clear from Table 2. Factor proportions in each industry are given in Table 3, which confirms that traded industries in general, and the exporting light manufacturing industries in particular, are intensive in production labour. This is most notably true of processed agricultural products and textiles.

Calibration of pure profits and oligopoly parameters

The flows represented in the database do not reveal details of intra-sectoral industrial structure. To represent oligopolistic behaviour, additional information is required on effective firm numbers, pure profits, fixed costs and minimum efficient scale for each industry. With the support of China’s official statistics these variables are calibrated in the following manner.

²⁶ Documentation on the GTAP 6 Data Package may be viewed at:
<<http://www.gtap.agecon.purdue.edu/databases/>>.

First, pure profits are required as a share of total revenue in each industry. This is needed to finalise the flow database by splitting capital payments between market and over-market returns.²⁷ It is also a starting point for calibrating industry competitive structure. Second, rough estimates are required of strategically interacting firm numbers in each industry and their corresponding conjectural variations parameters. Again, official statistics provide firm numbers and sizes and the proportion that are private and state-owned.²⁸

Third, to complete the formulation of industry demand elasticities, values of elasticities of substitution between home product varieties on the one hand, and between generic home and foreign products on the other, are required for each industry. These are initially drawn from the estimation literature.²⁹ Preliminary industry demand elasticities are then calculated for each source of demand (final, intermediate, investment, government and export). Initial shares of the demand facing each industry are then drawn from the database to enable the calculation of weighted average demand elasticities for each industry. Preliminary mark-up ratios are deduced from these, via (16). The base year equilibrium industry shares, elasticities and mark-up ratios for each industry are given in Table 4.³⁰ This completes the initial demand side calibration. Work on the supply side begins with the application of mark-up ratios to deduce the initial level of average variable cost in each industry. Then the proportion of pure profits in total revenue is deducted from the mark-up to arrive at fixed cost revenue shares.³¹ Total recurrent fixed cost in each industry then follows. At this point these results are reviewed and, where conflicting information is available on fixed cost shares of total turnover, the calibration is recommenced with new initial elasticities.³²

Importantly for the interpretation of later results, Table 4 also makes clear that the five sources of demand facing firms in each industry are not equally elastic. Export and final demand are

²⁷ Pure profit shares of total revenue in 2005 were high in “metals and minerals”, “petroleum and energy”, “telecommunications”, “insurance and finance” and “transport”. Data on accounting profits in the latter three sectors is comparatively weak and the estimates are partly judgemental, accounting for such determinants as low borrowing rates for these SOE dominated sectors and hence low capital service costs. See the appendices to Tyers and Lu (2008).

²⁸ *Effective* firm numbers are smaller than totals since pricing is frequently dominated by a few large firms in each sector. For oligopolistic sectors in China, these tend to be state owned enterprises. See Tyers and Lu (2008).

²⁹ Summaries of this literature are offered by Dimaranan and McDougall (2002) and at <http://www.gtap.purdue.edu/databases/>.

³⁰ Note that the reason the elasticities appear large in magnitude at first glance is that they do not represent the slopes of industry demand curves for generic goods. Rather, they are the elasticities faced by suppliers of individual varieties and are made larger by inter-varietal substitution.

³¹ Fixed costs take the form of both physical and human capital costs using the rule of thumb (based on estimates by Harris and Cox, 1983) that physical capital has a fixed cost share of 5/6.

³² The actual calibration process is yet more complex than this because the elasticities of intermediate demand depend on intermediate cost shares, which depend on the variable cost share. It is therefore necessary to calibrate iteratively for consistency of elasticities and shares.

the most elastic and intermediate demand the least.³³ Also from Table 4 it is evident that, where exports dominate demand firms face larger elasticities and charge smaller mark-ups. Consistent with these observations, pure profit shares of total revenue tend to be small or even negative for export-oriented industries and very large for the SOE dominated industries: petroleum, metals and minerals, telecommunications, finance and transport.

5. Comparing Alternative Regimes

This section offers results from several applications of the model. Even though the model is structured to be consistent with detailed data on the Chinese economy the shocks applied to it are stylised with a view to illustrating the general magnitudes of the expansions that could stem from each of the reforms considered in Section 3. In almost all cases long run closures are employed to allow for an endogenous capital stock which is mobile between industries. Labour market closures are case specific, commencing with an exogenous real production wage and endogenous employment and moving to exogenous labour supply and endogenous real wages. Industrial competition closures hold the numbers of firms exogenous and the level of pure profits endogenous throughout. This is to capture changes in competitive behaviour in response to each policy shock and to reflect the continuing importance of state-owned firms in most sectors.³⁴

Simulations commence with shocks representing continued export-led growth. A contraction in foreign demand is then added and then a “base case” is constructed that combines all the export led growth shocks, an external demand contraction and a labour supply contraction of the type expected following “Lewis turning point”. An expanded government is then considered, first financed by a rise in consumption taxation and then additional corporate and labour income taxation, in turn. Next, the effects of a relaxation of the skill demand bottleneck are simulated by “twisting” labour supply away from low skilled production workers to professional workers. Finally, four types of industrial reform are considered. First, a pure privatisation is simulated by allowing most profits of SOEs to accrue as income to the collective private household, causing a substantial cut to corporate saving. Second, a tightening of oligopoly pricing surveillance is represented by reduced collusion (smaller

³³ Export demand is found to be more elastic because of the larger number of substitutable product varieties available abroad while intermediate demand is relatively inelastic because of firms’ reluctance to alter arrangements for intermediate input supply which may depend on location or “just in time” relationships.

³⁴ Corresponding short run results are used to address macroeconomic policy issues in Tyers and Huang (2009) and Tyers and Lu (2008).

conjectural variations parameters). Third, a threefold fragmentation of SOEs is tried in order to elicit more competitive pricing, and fourth, price cap regulation is imposed to force mark-ups a fifth of the way to the level sufficient to barely cover average costs. Finally, the option of opening the services sector to additional FDI is represented via accelerated productivity growth in that sector. It is worth noting that, except for the last, all these scenarios ignore natural innovation and productivity improvements that would continue irrespective of the fiscal or industrial policy regime. As such, these simulations consider policy changes that would be “transformative” in their effects on China’s economic performance.

Further export led growth

Continued export led growth is illustrated in this simulation by some representative shocks to productivity and a closure that allows rising labour supply. There is a rise in labour productivity in agriculture, to represent its capacity to continue shedding workers, and a rise in total factor productivity in manufacturing which is strongest in the light manufacturing (export) sector, to represent the effects of continued FDI into that sector. There is also an arbitrary increase in the real production wage, which is made exogenous for this simulation so that the supply of workers to the modern sector can grow. Workers continue to be released by agriculture, foreign capital flows in, the current account surplus widens and the physical capital stock increases via foreign investment. The net effect of all these shocks on the real exchange rate is to appreciate it.³⁵ The levels of both GDP and GNP continue to expand substantially. These results are shown in the first column of Table 5. The Chinese economy becomes yet more open by virtually all of the criteria indicated in Table 6.

Contracting foreign demand for exports

Here the export-led growth shocks are retained but there is also a uniform leftward shift in the rest of the world’s excess demand functions for all of China’s exports. The effect is to almost eliminate the growth that would otherwise have occurred. Employment contracts slightly as does the physical capital stock, and the greatest losers are the capital owners. Capital income falls and the share repatriated to foreign owners rises little, explaining the smaller shortfall in GNP relative to GDP growth compared with the export-led case. The economy closes relative to the export-led case, as shown in Table 6.

³⁵ High domestic saving and the financial outflow that stems from it is depreciating because it switches home income toward expenditure abroad, but this effect is here more than offset by the exogenous increase in production labour costs and the endogenous rise in the skilled wage

The base case: export led shocks with foreign demand and labour supply contractions

Here the same shocks are applied as previously, except that the passing of the Lewis turning point and China's demographic contraction are represented by a switch in closure that makes labour supply exogenous and real wages endogenous and a cut in the supply of production workers. The effect of this negative shock, combined with the export demand contraction, is to more than kill off the GDP growth that would otherwise have accrued. The capital stock now shrinks by more than before and the economy closes still further by the criteria of Table 6.

It is from this starting point that "inward looking" policy reforms are examined for their potential to restore growth. All the base case shocks are retained and reform shocks are added, individually and collectively, with a view to indicating which might be most growth-enhancing.

Tax financed government expansion

In the long run any expansion in government activity must be tax financed. Here an expansion in government spending is financed, alternately, by taxes on consumption, capital income and labour income. The experiment is an arbitrary increase in government spending by 30 per cent. In all three cases, shown in the final three columns of Table 5, there is no significant overall economic expansion relative to the base case. Raising government activity is, however, a classic turn inward, since government expenditure is intensive in home non-traded services. For the reasons discussed in Section 3, the real exchange rate further appreciates and exports decline. Private saving rates are here assumed to remain constant and so no Ricardian equivalence is present. Consequently, since the government absorbs income that would otherwise be divided between saving and consumption and then commits it to its own consumption, total domestic saving falls. The current account surplus therefore contracts substantially.

In the case of the consumption tax, an increase in revenue is required to the tune of 11 per cent of the tax base. It differs from the other two financing modes in that it creates a wedge between the level of the GDP price index and the CPI. Since GDP is deflated by the former and GNP (and other incomes) by the latter, the pattern of effects on *real* GDP and GNP deviates from the other cases. In the other cases, the tax taken rises by 6.4 per cent of the tax base in the case of the capital income tax and by 11.8 per cent of the base in the case of the labour income tax. All have negative effects on the production wage and capital growth and all close the economy by the measures in Table 6.

Accelerated skilling

The idea here is to consider an acceleration in the rate at which production workers are transformed into professional workers, such as might be achieved if the *hukou* system were relaxed to the extent of allowing urban residents with rural *hukou* the opportunity to seek education and training in cities. Again, a stylised shock is offered, upgrading 3.2 per cent of production workers to achieve a 30 per cent increase in the supply of professional workers. Adding this to the base shocks, the results are detailed in the second column of Table 7. As expected the shock is positive, adding to aggregate output and income. It is inward looking in that, by reducing the skill premium, it reduces costs in industries intensive in skill, namely the more inward looking heavy manufacturing and services industries. Since the latter is largest, the effect is to reduce the cost of non-traded goods and hence reduce the real appreciation associated with the base case while at the same time reducing the proportion of output that is exported. The real wage of production workers is boosted substantially while that of skilled workers falls and there is a reduction of the average skill premium from 72 to 10 per cent. Overall this shock would be a significant contributor to continued growth.

Industrial reforms

The simplest industrial reform to simulate is a pure privatisation of the remaining SOEs. In this model the only direct effect this has is to reduce the volume of corporate saving. In this stylised experiment it is reduced from a fifth to a 20th of GDP by simply shocking the rate.³⁶ The capital income tax rate is unchanged and is the same for households and firms, so the change simply represents a transfer to households who then divide the new income between consumption and saving. The principal effect of this change is to raise private consumption and reduce the overall saving rate, thus reducing exports and virtually eliminating the current account surplus. Relative to the base case, it restores some capital growth and provides substantial additional growth in production real wages. Overall, the reform is growth-enhancing and, from Table 8, it is clear that it also reduces openness relative to the base case. By itself, however, its boosting effect is modest.³⁷

The next reform considered is a tightening of pricing surveillance over oligopoly firms, such as to constrain collusion in pricing. To represent this the conjectural variations parameter (17) is reduced by 20 per cent in all industries. Of course, this has most effect in industries where the

³⁶ This is the scale of corporate saving in Taiwan. See Tyers and Lu (2008).

³⁷ Had it been assumed that privatization might eliminate x-inefficiency and hence raise productivity by making poor performing firms take-over targets, a more substantial one-off growth surge might be expected from this change.

parameter, and the mark-ups it influences, are large. From Table 4 it is clear that these industries include metals, petroleum, chemicals, telecommunications, finance, transport and construction, which are mostly little traded services. At least as of 2005, this reform would have reduced the prices of intermediate inputs substantially, cutting overall costs and depreciating the real exchange rate. The resulting expansion is considerable. As is clear from Table 8, however, the reduced costs and depreciated real exchange rate cause so great an improvement in China's competitiveness that the base contraction in foreign demand curves is overcome by a fall in export prices, and the country becomes more dependent on trade than before.

The third industrial reform considered is the fragmentation of SOEs within sectors with a view to forcing more competition on output prices. Such a change is clearly pro-competitive but the new oligopoly firms must then each carry recurrent fixed costs. As modelled at least, this represents a substantial overall cost increase at the industry level. The results indicate that the cost increasing effect greatly outweighs the price competition effect and that the results are not attractive. Because fixed capital is required, the capital stock increases substantially but capital returns are slashed. While production workers gain due to the labour component of recurrent fixed costs, domestic capital owners lose. So costs rise considerably, the real exchange rate appreciates and the levels of GDP and GNP collapse.

The results from imposing tighter regularly limits on the price to average cost margin (price cap regulation) on oligopolies are more positive. Indeed, they suggest that substantial new growth is available from this policy option. In oligopoly industries with fixed costs, mark-ups over average variable cost are required just to break even. In the simulation, price caps are imposed that would force firms to reduce their mark-ups just 20 per cent of the way toward the level that would cover average costs. Such price cap regulation appears to have been successful in many industrial countries and the simulation suggests that the effect in China would be to reduce costs in industries whose products are used as intermediate inputs throughout the economy and hence economic activity would be expanded substantially. As in the case of tighter surveillance against collusion, the results for price caps, indicated in the sixth column of Table 7, show that the lower costs help depreciate the real exchange rate, aiding the export sector and, aside from the overall expansion it offers, it unwinds much of the income inequality of recent decades by redistributing rents and raising wages. Also as in the case of surveillance, the effects improve China's competitiveness so much that exports, and

general openness rise (Table 8) notwithstanding the 10 per cent leftward shift in foreign excess demand functions carried forward from the base case.

Combined positive reforms

When all the positive reforms are combined a very substantial expansion is achieved, as indicated in the penultimate column of Table 7. Importantly, the gains to labour, both unskilled and skilled, are larger than those to capital-owners and it is production workers who gain most. There is, however, a substantial real depreciation and, thus, an increase in export dependence. Indeed, all the measures of openness increase, as shown in the corresponding column of Table 8.

The final growth policy simulation considers the effect of a productivity improvement in services of the type that could be delivered by additional foreign investment. The results are indicated in the final column of Table 7. The more efficient services sector further depreciates the real exchange rate, boosting rather than impairing exports and fostering overall growth. The real exchange rate effect is just the reverse of the standard Balassa-Samuelson Hypothesis. Though it does not advantage the export sector directly, it reduces indirect costs and makes it more competitive abroad. Importantly, however, the mix of output and exports shifts towards structural convergence of the Chinese economy with the industrialised West. This convergence is a consequence of higher wage costs, which cause a redistribution of industrial output and exports in favour of heavier manufacturing. The Chinese economy continues to open but it is much more reliant than before on intra-industry trade with the West, in the manner of the US and Western Europe. Indeed, as the final column of Table 8 shows, the level of Chinese openness following these combined reforms is greater than for all other options.

Growth reforms with worsening international intolerance of Chinese exports

“Inward-looking” reforms yield substantial increases Chinese dependence on trade and foreign investment, even with a 10 per cent contraction in global excess demand functions for Chinese products. It is therefore of interest to examine the consequences of these reforms under external trade conditions that are even worse than those assumed thus far. For this reason, new simulations are constructed that embody all the growth-enhancing reforms but that include the more serious contractions in foreign excess demand indicated in Table 9. These contractions tend to drive down Chinese export prices and hence further depreciate the real exchange rate. The net effect is to reduce export dependence relative to the full growth base but not to contract it below the initial 2005 level unless the leftward shift exceeds 70 per cent. With contractions

that exceed this exports decline precipitously, as does foreign investment and hence the size of the increment to the total capital stock. Interestingly, even with a 90 per cent contraction in foreign demand, there is still growth relative to initial conditions. Moreover, the collective reforms continue to yield very substantial gains for Chinese production workers and small net improvements over the baseline for capital owners, though skilled workers lose substantially, suggesting important changes in the composition of production and exports. Unsurprisingly, such a large contraction in foreign demand renders the Chinese economy more closed than the baseline by virtually all criteria, as indicated in Table 10.

Effects on the composition of exports

The closure of foreign markets to Chinese exports has the effects on trade composition indicated in Table 11. Relative to the baseline, the combined growth reforms lead to a fully industrialised pattern of exports, with substantial contributions from motor vehicles, electronics and chemicals. Contracting global demand for Chinese products forces this pattern to shift back to that typical of a poor country, reflecting China's comparative advantage relative to the industrialised world. Exports are then dominated by processed agricultural products and textiles.

The difficult politics of internally generated growth

While the results obtained here are dependent on some strong assumptions underlying the modelling,³⁸ they are clear in suggesting that, for substantial further growth to be found from looking inward, China will need to combine other elements of industrial reform with a more ardent regulatory attack on oligopoly rents. This will be difficult politically, as will the other key element of further growth, namely substantial productivity growth in the primarily state-owned services sector. Achieving this will require levels of FDI in services that parallel those in Chinese manufacturing. Heretofore, the government has tended to oppose foreign ownership in key services and heavy manufacturing industries.

6. Conclusion

³⁸ One such assumption is that the private household saving rate from disposable income remains constant. Those policy changes that substantially increase household disposable income, such as privatisation, could see a change in this rate, though it is not clear in which direction. A permanent income story might suggest a rise but the focus here is on the long run steady state and in that case it is possible that households expecting a continuation of higher incomes might choose a lower rate. A fully dynamic approach, along the lines of McKibbin and Woo (2004), would help address this, though even then, the results would rely on much debated assumptions about the formation of household expectations and it is unlikely that the direction or the relative scale of the projected changes in overall performance would be altered.

With the impending end to export led growth and conflicts due on the one hand to rising domestic inequality and, on the other, to global imbalances and poor economic performance abroad, China is in need of a further stage of transformative growth that will address these conflicts and thereby maintain the pace of its catch-up. As economic performance abroad continues to deteriorate and the inevitable demographic contraction arrives, China's growth must slow. While this will reduce domestic saving and hence help to address the global imbalance issue, it will bring forth the need for costly adjustments if growth is not to decelerate so much as to risk stagnation. Moreover, the net benefits from China's growth that accrue to the global economy would also be lost. So much depends on the pathway to an orderly transition along the lines previously achieved by the Republic of Korea and the province of Taiwan. Of course, both Korea and Taiwan were helped in this by the stimulus associated with mainland China's own growth surge. Japan's initial transition was orderly, surviving the oil and commodity crises of the 1970s, but it was subsequently disrupted by policy errors during the 1980s and early 1990s. Japan's comparatively liberal democracy could not chart those waters effectively even with the growth of China on its doorstep. Now China must do so, but without the external stimulus associated with a growth surge in a large near neighbour.

The search for alternative strategies to sustain transformative growth in China is here addressed via simulations of a 17 sector model of the Chinese economy that takes explicit account of oligopoly behaviour of SOEs and a database that captures essential economic structure, namely a largely competitive light manufacturing export sector combined with oligopolistic heavy manufacturing and services sectors dominated by SOEs. The results suggest that further transformative sources of growth do exist but, to exploit them, China's government must dig deep and produce industrial reforms that reduce the rents that currently concentrate economic gains while at the same time welcoming FDI into its hitherto protected service industries. The benefits available are considerable, not only including final steps toward real per capita income convergence with the West but also reduced inequality and stronger more externally engaged heavy industry and services.

One irony that emerges is that superficially "inward-looking" reform strategies derive their growth gains from continued, and even expanded, Chinese openness. Even though the industrial composition of China's economy is "modernised" by the reforms, as is the composition of its exports, all measures of openness are raised by them, including the exported share of GDP. This is because the keys to these gains are real cost reductions in heavy manufacturing and services, which cause substantial real depreciations and hence increased

international competitiveness outside the traditionally exported product range. Indeed, China's export mix would shift to be similar to those of the regions to which its exports are destined. It is shown that, without acceptance by the industrialised West of increased heavy manufacturing exports, the gains from the further reforms would be small. Moreover, failure to accommodate Chinese exports would force the structure of its exports to return to developing country mode, thereby delaying the growth of competing but less advanced developing countries.

While delivering the needed reforms is a tall order politically, China's governments since the early 1980s have faced constant political and economic challenges and they have thus far been effective in surmounting them. The continuing external clamour for greater Chinese consumption is essentially xenophobic - tantamount to demands that the Chinese should invest less and have their economy perform more poorly. A strong Chinese economy and a smooth economic transition is in the global collective interest and it will require that Western political pressure is restrained. At the same time, the Chinese are in a better position to learn from the Japanese experience and resist external pressure for economic policy changes that are not beneficial domestically.

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Figure 1: Expenditure Composition and the Real Exchange Rate

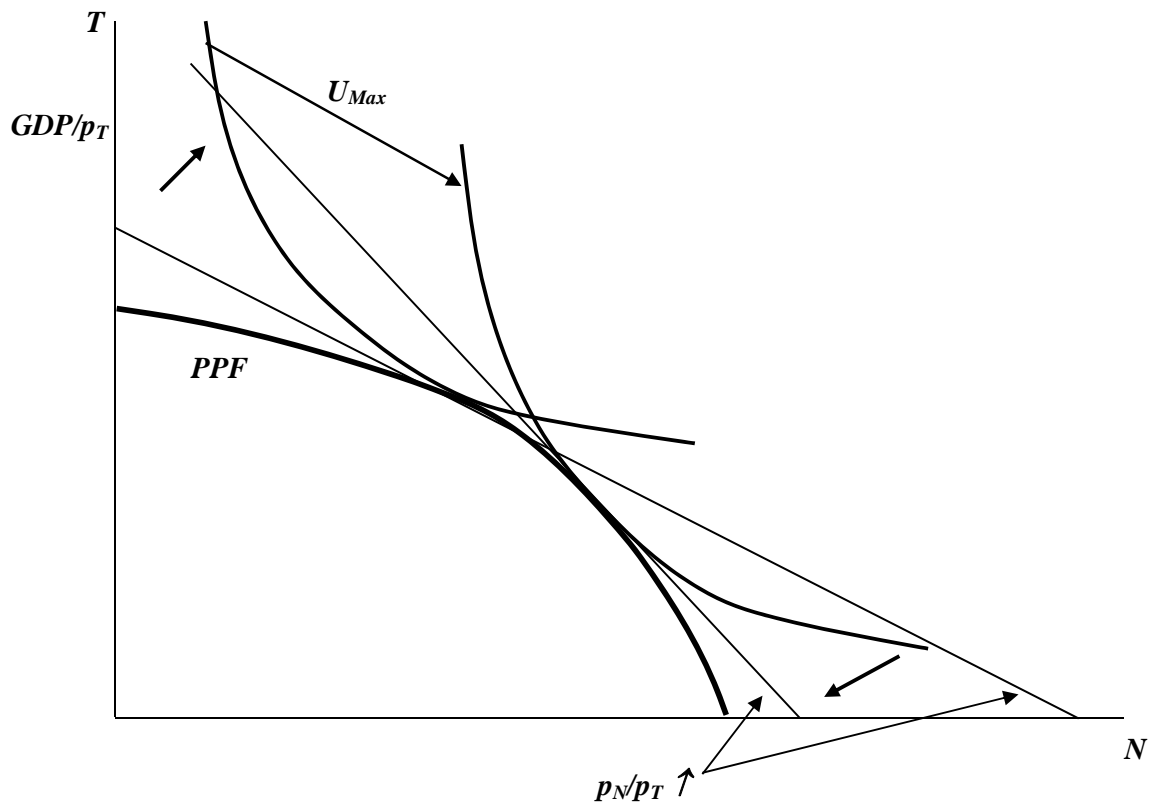


Figure 2: Service Oligopoly Rents and the Real Exchange Rate

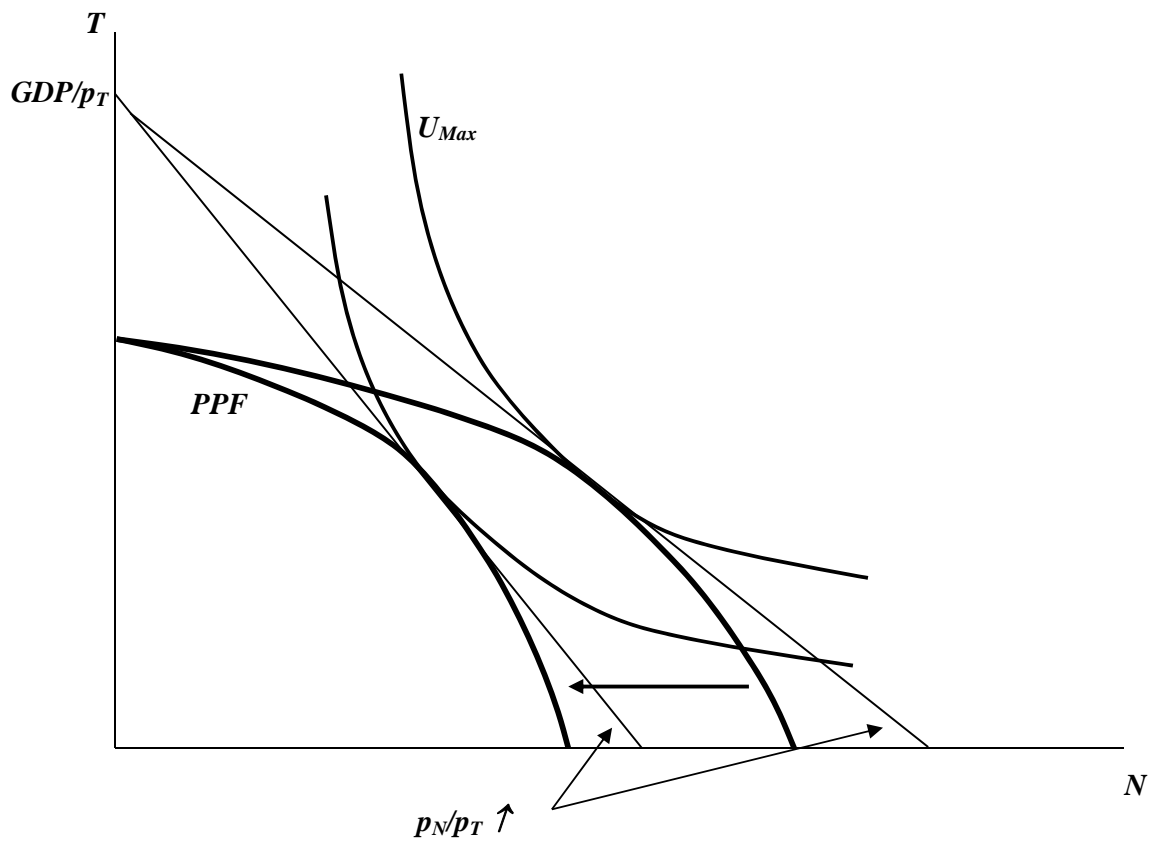


Table 1: Structure of the Chinese Economy, ca 2005^a

	Value added share of GDP	Share of total production employment	Share of total exports	Pure profit share of gross revenue
Per cent				
Agriculture	13	24	2	0
Petroleum, coal, metals	16	11	10	20
Light manufacturing	29	33	82	5
Services	42	32	6	20
Total	100	100	100	12

^a Pure profits are calculated from national statistics estimates of accounting profits, deducting required returns to service industry specific prime rates. Here they are presented gross of tax and corporate saving and as shares of total revenue.

Source: Model database, derived from Dimaranan and McDougall (2002), and an updating of the national data to 2005.

Table 2: Model Scope

Regions	China Rest of world
Primary factors	Land Natural resources (mineral, energy deposits) Skilled (professional) labour Unskilled (production) labour Physical capital
Industries	Agriculture Metals, including steel, minerals and (non-coal) mining Coal mining and production Petroleum production and refining Processed agricultural products Electronic equipment Motor vehicles Chemical, rubber, plastic products Textiles Other manufactures Electricity supply and distribution Gas supply and distribution Telecommunications Insurance and finance Transport Construction Other Services

Source: Aggregates of the 57 industry GTAP Version 6 database from Dimaranan and McDougall (2002).

Table 3: Factor Intensities by Industry^a

	Capital	Production labour	Skilled labour	Land and nat resources
Agriculture	11	59	0	30
Metals & minerals	66	27	5	2
Coal	28	30	3	39
Petroleum	86	5	1	7
Processed agriculture	38	54	7	0
Electronic equipment	66	26	8	0
Motor vehicles	59	35	6	0
Chemical products	62	32	6	0
Textiles	40	52	7	0
Other manufactures	68	27	5	0
Electricity	69	21	11	0
Gas mfg & distribution	49	37	14	0
Communications	92	5	3	0
Insurance and finance	80	12	8	0
Transport	78	18	4	0
Construction	56	37	7	0
Other Services	54	27	19	0

a These are factor shares of total value added in each industry, calculated from the database. Capital shares include pure profits. Shares sum to 100 per cent horizontally.

Source: Model database (social accounting matrix), derived from Dimaranan and McDougall (2002).

Table 4: Initial Demand Shares, Elasticities and Mark-ups^a

	Demand shares, %					Demand elasticities					Average demand elasticity	Industry mark-up ^b
	Inter mediate	Final	Export	Invest ment	Govt	Inter mediate	Final	Export	Invest ment	Govt		
Agriculture	53	40	4	3	0	-10.2	-28.6	-40.1	-15.6	-16.0	-18.8	1.06
Metals, Minerals	84	3	10	2	1	-2.9	-4.4	-8.9	-2.8	-2.8	-3.5	1.39
Coal	61	4	33	0	2	-3.6	-6.1	-11.2	-2.4	-2.5	-6.2	1.19
Petroleum	58	12	5	14	12	-2.1	-2.8	-6.2	-2.3	-2.1	-2.4	1.69
Proc agriculture	50	34	15	0	1	-12.0	-30.8	-26.8	-16.4	-17.0	-20.7	1.05
Electronics	24	4	65	6	0	-2.7	-6.4	-9.8	-2.9	-2.9	-7.5	1.15
Motor vehicles	46	8	15	29	1	-4.8	-10.0	-16.9	-3.4	-3.7	-6.6	1.18
Chemicals	77	6	17	0	0	-3.6	-6.3	-10.4	-2.5	-2.5	-4.9	1.26
Textiles	45	11	44	0	0	-6.5	-16.9	-25.7	-10.4	-10.2	-16.1	1.07
Other mfg	43	5	35	16	0	-2.6	-7.1	-9.5	-4.0	-4.0	-5.5	1.22
Electricity	84	13	1	1	1	-6.4	-12.3	-21.0	-7.5	-7.7	-7.3	1.16
Gas mfg & distn	50	10	0	8	32	-4.9	-7.7	-13.4	-4.8	-4.9	-5.2	1.24
Telecommunications	42	24	1	5	27	-1.7	-1.4	-5.1	-1.5	-1.7	-1.7	2.45
Finance	57	29	2	3	8	-1.8	-2.6	-6.6	-2.2	-2.2	-2.2	1.86
Transport	53	18	8	7	14	-1.3	-1.6	-5.9	-1.6	-1.5	-1.8	2.26
Construction	4	2	0	86	8	-2.5	-5.1	-12.3	-4.4	-4.0	-4.3	1.30
Other Services	46	21	4	4	25	-3.4	-8.6	-11.7	-3.1	-2.8	-4.7	1.27

a All these variables are endogenous in the model. Initial (base) values are provided here.

b Industry mark-ups are the ratio of producer prices and average variable costs.

Source: Model database, derived from Dimaranan and McDougall (2002) and 2005 national statistics.

Table 5: Simulated Export Led Growth, Growth Contractions and Government Enlargement^a

	Export (X) led growth: 5% manufacturing productivity, 5% real production wage gain ^b	X-led growth + 10% X demand cut ^c	Base: X-led growth + 5% labour supply cut + 10% X demand cut ^d	Base + Government expansion by 30%, consumption tax financed ^e	Base + Government expansion 30%, capital income tax financed ^e	Base + Government expansion 30% labour income tax financed ^e
Per cent changes						
Real GDP ^f	9.8	2.1	-1.3	1.9	-0.9	-1.4
Real GNP ^g	9.5	5.3	3.1	-3.6	4.5	3.0
Real exchange rate ^h	4.7	5.8	6.5	7.3	7.3	7.2
Exports / GDP	7.1	-4.2	-8.4	-12.8	-13.5	-11.0
Consumption / GDP	-4.5	-0.1	1.9	-2.2	-1.0	-4.5
Current account surplus / GDP	8.1	-16.7	-28.2	-30.8	-43.6	-41.1
Government spending / GDP	-3.3	-2.2	-1.5	19.0	22.5	23.0
Tax revenue / GDP	-2.5	-1.8	-1.2	21.3	25.0	25.5
Production employment	5.9	-0.3	-5.0	-5.0	-5.0	-5.0
Real production wage	5.0	5.0	7.3	-2.6	-3.5	-3.3
Real skilled wage	6.4	-1.7	-5.1	0.2	-1.5	-0.7
Physical capital stock	5.3	-0.5	-2.9	-3.5	-2.9	-3.1
Real gross home capital income ⁱ	1.9	-1.7	-4.0	-13.8	-2.8	-2.7
Real repatriated capital income	27.3	3.8	-6.5	-18.4	-12.7	-5.8

a These simulations are all made in long run mode – endogenous capital stock with exogenous external rate of return and perfect mobility of physical capital internationally and of workers between agriculture and the other sectors. The number of oligopoly firms is fixed in each sector, so that pure profits are endogenous.

b This simulation retains the existing policy regime and applies 10% labour productivity in agriculture, to continue to release workers, 5% productivity in light and 4% productivity in heavy manufacturing due to continued FDI, combined with an exogenous rise in the real production wage of 5% with endogenous employment.

c Here the export demand curves faced by China are shifted with exports remaining endogenous. Labour supply remains endogenous.

d The labour market closure is changed in this simulation so that employment is exogenous and cut, to represent the impending demographic contraction..

e The long run fiscal closure used ensures that the government deficit remains constant, so that government spending is linked to tax revenue.

f As modelled, GDP is measured against (fixed price) imports. Its value is here deflated by a GDP price index.

g GNP is here deflated by a consumer price index, which rises substantially relative to the GDP price with the introduction of a consumption tax rise.

h The real exchange rate is here defined as the ratio of the cost of the home relative to the foreign production bundle. With foreign prices fixed it changes with the home GDP price.

i This is capital income gross of pure profits, taxes and depreciation.

Source: Simulations of the model described in the text.

Table 6: Simulated Export Led Growth, Contractions and Government Enlargement: Measures of Openness^a

	Initial (2005)	Export (X) led growth: 5% manufacturing productivity, 5% real production wage gain ^b	X-led growth + 10% X demand cut ^c	<u>Base:</u> X-led growth + 5% labour supply cut + 10% X demand cut ^d	Base + Government expansion by 30%, consumption tax financed ^e	Base + Government expansion 30%, capital income tax financed ^e	Base + Government expansion 30% labour income tax financed ^e
Per cent shares							
Exports/GDP	39	42	37	36	34	34	35
Imports/Consumption	74	74	71	71	70	72	75
Imports/GNE (domestic absorption)	33	34	32	32	30	31	31
Repatriated profits/Gross capital income	26	31	27	27	25	24	26
Foreign owned capital share	29	33	29	27	27	27	27

a These simulations are all made in long run mode – endogenous capital stock with exogenous external rate of return and perfect mobility of physical capital internationally and of workers between agriculture and the other sectors. The number of oligopoly firms is fixed in each sector, so that pure profits are endogenous.

b This simulation retains the existing policy regime and applies 10% labour productivity in agriculture, to continue to release workers, 5% productivity in light and 4% productivity in heavy manufacturing due to continued FDI, combined with an exogenous rise in the real production wage of 5% with endogenous employment.

c Here the export demand curves faced by China are shifted with exports remaining endogenous. Labour supply remains endogenous.

d The labour market closure is changed in this simulation so that employment is exogenous and cut, to represent the impending demographic contraction..

e The long run fiscal closure used ensures that the government deficit remains constant, so that government spending is linked to tax revenue.

Source: Simulations of the model described in the text.

Table 7: Simulated Skilling and Industrial Policy Reforms^a

Per cent changes	Base: X-led growth + 5% labour supply cut + 10% X demand cut ^b	Base + 1. skilling of 3.2% of production workers ^c	Base + 2. privatisation – corporate saving down to 5.5% of GDP	Base + 3. pricing surveillance so conj variations reduced 20%	Base + 4. fractionation (three-fold increase in firms in heavy mfg and services)	Base + 5. partial price cap regulation (20% reduction in margin over AC)	Base + combined positive reforms (1+2+3+5)	Base + combined positive reforms + 5% services productivity
Real GDP ^d	-1.3	3.2	1.4	20.0	-17.5	30.6	51.0	67.4
Real GNP ^e	3.1	5.2	4.7	10.8	-13.7	16.5	26.5	34.5
Real exchange rate ^f	6.5	4.0	6.6	-3.8	10.3	-6.3	-9.6	-12.7
Exports / GDP	-8.4	-2.5	-17.0	23.6	-36.8	36.9	43.8	53.8
Consumption / GDP	1.9	0.0	16.2	-5.2	33.2	-10.3	-0.7	-4.7
Current account surplus / GDP	-28.2	-12.6	-89.1	36.7	-230.5	75.6	38.0	56.8
Government spending / GDP	-1.5	-1.9	1.6	-3.3	1.7	-3.6	-0.7	-1.4
Tax revenue / GDP	-1.2	-1.5	2.4	-2.4	1.0	-2.4	1.6	1.2
Production employment	-5.0	-8.6	-5.0	-5.0	-5.0	-5.0	-8.6	-8.6
Skilled employment	0.0	30.0	0.0	0.0	0.0	0.0	30.0	30.0
Real production wage	7.3	18.0	9.7	39.0	38.3	45.9	76.8	95.6
Real skilled wage	-5.1	-24.9	-1.3	26.1	-5.9	39.8	27.3	43.9
Physical capital stock	-2.9	0.4	-1.3	21.7	33.0	26.1	44.2	59.3
Real gross home capital income ^g	-4.0	-1.7	-4.3	-5.8	-70.7	4.5	6.2	11.2
Real repatriated capital income	-6.5	5.4	-1.1	57.2	-19.0	80.2	128.9	169.4

a These simulations are all made in long run mode – endogenous capital stock with exogenous external rate of return and perfect mobility of physical capital internationally and of workers between agriculture and the other sectors. The number of oligopoly firms is fixed in each sector, so that pure profits are endogenous. The labour market closure fixes employment and allows wages to vary throughout.

b This simulation retains the existing policy regime and applies 10% labour productivity in agriculture, to continue to release workers, 5% productivity in light and 4% productivity in heavy manufacturing due to continued FDI. The export demand curves faced by China are shifted with exports remaining endogenous. Labour supply is exogenous and cut to represent the impending demographic contraction.

c The starting point is an aggregate labour force that is 12% skilled. Training 3.2% of production workers therefore yields a 30% increase in professional workers.

d As modelled, GDP is measured against (fixed price) imports. Its value is here deflated by a GDP price index.

e GNP is here deflated by a consumer price index, which rises substantially relative to the GDP price with the introduction of a consumption tax rise.

f The real exchange rate is here defined as the ratio of the cost of the home relative to the foreign production bundle. With foreign prices fixed it changes with the home GDP price.

g This is capital income gross of pure profits, taxes and depreciation.

Source: Simulations of the model described in the text.

Table 8: Simulated Skilling and Industrial Policy Reforms: Measures of Openness^a

	Initial (2005)	Base: X-led growth + 5% labour supply cut + 10% X demand cut ^b	Base + 1. skilling of 3.2% of production workers ^c	Base + 2. privatisation – corporate saving down to 5.5% of GDP	Base + 3. pricing surveillance so conj variations reduced 20%	Base + 4. fractionation (three-fold increase in firms in heavy mfg and services)	Base + 5. partial price cap regulation (20% reduction in margin over AC)	Base + combined positive reforms (1+2+3+5)	Base + combined positive reforms + 5% services productivity
Per cent shares									
Exports/GDP	39	36	38	32	48	25	53	56	60
Imports/Consumption	74	71	72	63	78	62	84	80	83
Imports/GNE (domestic absorption)	33	32	32	31	37	31	40	43	45
Repatriated profits/Capital income	26	27	29	28	36	47	36	40	41
Foreign owned capital share	29	27	30	28	42	47	44	51	56

a These simulations are all made in long run mode – endogenous capital stock with exogenous external rate of return and perfect mobility of physical capital internationally and of workers between agriculture and the other sectors. The number of oligopoly firms is fixed in each sector, so that pure profits are endogenous. The labour market closure fixes employment and allows wages to vary throughout.

b This simulation retains the existing policy regime and applies 10% labour productivity in agriculture, to continue to release workers, 5% productivity in light and 4% productivity in heavy manufacturing due to continued FDI. The export demand curves faced by China are shifted with exports remaining endogenous. Labour supply is exogenous and cut to represent the impending demographic contraction.

c The starting point is an aggregate labour force that is 12% skilled. Training 3.2% of production workers therefore yields a 30% increase in professional workers. Source: Simulations of the model described in the text.

Table 9: Simulated Effects of Inward Growth Reforms with Foreign Demand Contractions^a

Per cent changes	<u>Base:</u> X-led growth + 5% labour supply cut + 10% X demand cut ^b	<u>Growth Base:</u> base + combined positive reforms + 5% services productivity ^c	Growth base + total of 40% cut in export demand ^d	Growth base + total of 70% cut in export demand ^d	Growth base + total of 90% cut in export demand ^d
Real GDP ^e	-1.3	67.4	51.1	26.3	2.6
Real GNP ^f	3.1	34.5	27.3	16.0	5.3
Real exchange rate ^g	6.5	-12.7	-14.6	-15.5	-14.9
Exports / GDP	-8.4	53.8	33.7	0.2	-39.3
Consumption / GDP	1.9	-4.7	1.3	11.3	22.6
Current account surplus / GDP	-28.2	56.8	40.5	0.0	-66.3
Real production wage	7.3	95.6	82.4	58.4	29.7
Real skilled wage	-5.1	43.9	27.6	2.7	-20.9
Physical capital stock	-2.9	59.3	44.9	23.2	2.3
Real gross home capital income ^h	-4.0	11.2	9.1	5.2	2.6
Real repatriated capital income	-6.5	169.4	117.6	51.0	-4.0

a These simulations are all made in long run mode – endogenous capital stock with exogenous external rate of return and perfect mobility of physical capital internationally and of workers between agriculture and the other sectors. The number of oligopoly firms is fixed in each sector, so that pure profits are endogenous. The labour market closure fixes employment and allows wages to vary throughout.

b This simulation retains the existing policy regime and applies 10% labour productivity in agriculture, to continue to release workers, 5% productivity in light and 4% productivity in heavy manufacturing due to continued FDI. The export demand curves faced by China are shifted with exports remaining endogenous. Labour supply is exogenous and cut to represent the impending demographic contraction.

c The combined positive reforms are (1+2+3+5) from Table 7.

d Again, the excess demand curves for China's exports are shifted here, keeping actual exports endogenous.

e As modelled, GDP is measured against (fixed price) imports. Its value is here deflated by a GDP price index.

f GNP is here deflated by a consumer price index, which rises substantially relative to the GDP price with the introduction of a consumption tax rise.

g The real exchange rate is here defined as the ratio of the cost of the home relative to the foreign production bundle. With foreign prices fixed it changes with the home GDP price.

h This is capital income gross of pure profits, taxes and depreciation.

Source: Simulations of the model described in the text.

Table 10: Simulated Inward Growth Reforms with Foreign Demand Contractions: Measures of Openness^a

	Initial (2005)	Base: X-led growth + 5% labour supply cut + 10% X demand cut ^b	Growth Base: base + combined positive reforms + 5% services productivity ^c	Growth base + total of 40% cut in export demand ^d	Growth base + total of 70% cut in export demand ^d	Growth base + total of 90% cut in export demand ^d
Per cent shares						
Exports/GDP	39	36	60	52	39	24
Imports/Consumption	74	71	83	71	56	45
Imports/GNE (domestic absorption)	33	28	26	24	23	22
Repatriated profits/Total capital income	26	27	41	38	32	24
Share of physical capital foreign owned	29	27	56	51	43	31

a These simulations are all made in long run mode – endogenous capital stock with exogenous external rate of return and perfect mobility of physical capital internationally and of workers between agriculture and the other sectors. The number of oligopoly firms is fixed in each sector, so that pure profits are endogenous. The labour market closure fixes employment and allows wages to vary throughout.

b This simulation retains the existing policy regime and applies 10% labour productivity in agriculture, to continue to release workers, 5% productivity in light and 4% productivity in heavy manufacturing due to continued FDI. The export demand curves faced by China are shifted with exports remaining endogenous. Labour supply is exogenous and cut to represent the impending demographic contraction.

c The combined positive reforms are (1+2+3+5) from Table 7.

d Again, the excess demand curves for China's exports are shifted here, keeping actual exports endogenous.

Source: Simulations of the model described in the text.

Table 11: Simulated Industrial Shares of Total Exports^a

	Initial (2005)	Export (X) led growth: 5% manufacturing productivity, 5% real production wage gain ^b	<u>Base:</u> X-led growth + 5% labour supply cut + 10% X demand cut ^c	<u>Growth Base:</u> base + combined positive reforms + 5% services productivity ^d	Growth base + 70% export demand contraction ^e	Growth base + 90% export demand contraction ^e
Agriculture	2	3	4	0	1	5
Metals, Minerals	8	4	4	9	5	3
Coal	1	0	0	0	0	0
Petroleum	1	1	1	1	1	0
Processed agriculture	7	12	11	5	21	43
Electronics	18	18	20	14	10	5
Motor vehicles	2	3	1	21	13	3
Chemicals	7	6	7	11	7	3
Textiles	24	30	28	11	24	28
Other manufacturing	25	21	22	20	13	6
Electricity	0	0	0	0	0	0
Gas manufacturing & distn	0	0	0	0	0	0
Telecommunications	0	0	0	0	0	0
Finance	0	0	0	0	0	0
Transport	2	1	0	4	1	0
Construction	0	0	0	0	0	0
Other Services	4	2	2	2	3	3

a These simulations are all made in long run mode – endogenous capital stock with exogenous external rate of return and perfect mobility of physical capital internationally and of workers between agriculture and the other sectors. The number of oligopoly firms is fixed in each sector, so that pure profits are endogenous. The labour market closure fixes employment and allows wages to vary in all but the export-led growth case.

b This simulation retains the existing policy regime and applies 10% labour productivity in agriculture, to continue to release workers, 5% productivity in light and 4% productivity in heavy manufacturing due to continued FDI, combined with an exogenous rise in the real production wage of 5% with endogenous employment.

c This simulation retains the existing policy regime and applies 10% labour productivity in agriculture, to continue to release workers, 5% productivity in light and 4% productivity in heavy manufacturing due to continued FDI. The export demand curves faced by China are shifted with exports remaining endogenous. Labour supply is exogenous and cut to represent the impending demographic contraction.

d The combined positive reforms are (1+2+3+5) from Table 7.

e Again, the excess demand curves for China's exports are shifted here, keeping actual exports endogenous.

Source: Simulations of the model described in the text.