

China meets the middle-income trap: the large potholes in the road to catching-up

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We follow Woo (2011) in using the Catch-Up Index (CUI) to define the middle-income trap and identify the countries caught in it. The CUI shows that China became a middle-income country in 2007–2008. We see five major types of middle-income trap to which China is vulnerable: (a) fiscal stress from the nonperforming loans generated by the interaction between the lending practices of the state banks and the innate desire by state enterprise managers to over-invest and embezzle; (b) the frequent use of macro-stabilization tools that hurt long-term productivity growth; (c) flaws in socio-political governance that exacerbate social tensions; (d) ineffective management of environmental challenges that threaten sustainable development; and (e) inept handling of international economic tensions that could unleash trade conflict. We recommend new governance principles and management methods to prevent China from falling into these five types of middle-income trap.

Keywords: middle-income trap; overly-large state sector; urbanization under principle of future home ownership; environmental stress; trade war

JEL Classifications: D31; E21; E26; E44; E51; E65; F41; G21; O53; P24; P31; P36; Q50

1. A new stage in China's economic development but will this be the permanent stage?

China will stand in 2013 where Argentina had stood in 1913 – the launch pad for high income-hood. China in 2013 will have been the fastest growing country for the past 33 years just as Argentina in 1913 was the fastest growing country for the past 43 years (of the 65 countries for which data were available in 1913).¹ In 1913, the two richest countries in the world were USA and Australia, and Argentina was ranked the 10th richest country. As USA and Australia were lands of recent settlement, like Argentina, the dominant expectation then was that Argentina would soon catch up with them and be in the front rank of the rich countries. This was,

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however, not to be. The Argentina–USA income gap has now widened from 72% of US income in 1913 to 35% in 2008; and its income rank in the original group of 65 countries had fallen to 28.

Argentina's failure to catch up is not unique.² Four of the top 10 countries in 1913 are not in the top 10 group in 2008 – New Zealand, UK, Belgium and Argentina were replaced by Ireland, Norway, Hong Kong and Singapore. The obvious lesson is the well-known observation that the past is not a reliable predictor of the future. The interesting question for China is that, while it is clear that Argentina has failed to catch up with the richest countries, in what sense could we say that Argentina (the star growth performer in the 43 years before 1913) spent the twentieth century inside the middle-income trap? And how could China (the star growth performer in the 33 years before 2013) escape this same fate?

2. Defining the middle-income trap

Possibly the most important consideration in defining the analytical metric to classify a country as high-income, or middle-income, or low-income³ is that the definition of income categories must have a built-in dynamic element to take into account that the income of the world's richest countries has been rising steadily over the last 200 years. In the context where the highest potential level of income (output per person) internationally is increasing, due to factors such as technological progress and institutional innovation, the boundaries of the income categories should not be drawn on the basis of absolute levels of income. This is because we believe that most countries that are not severely geographically-disadvantaged (e.g. a landlocked desert with no mineral resources) could come to attain an income level that is close to the highest international level of potential income after they have adopted and adapted the appropriate policy regimes in the various socio-economic-political spheres. For example, a country that denies education to its women is unlikely to ever achieve the income level of the rich countries because this country is running on one leg – actually, hopping on one leg – to catch up with the moving finishing line.

So to assess whether a country has been making substantial progress in catching-up during the 1960–2008 period, we follow Woo (2011) in defining high-income, middle-income and low-income by the ratio (expressed in percent) of the income level of the country to the income level of the United States, which is commonly accepted to have been the economic leader of the world at least since 1920. We call the ratio of a country's income level to the US income level the country's score on the Catch-Up Index (CUI).⁴

For the task of benchmarking income levels, we use the GDP (measured in 1990 international Geary-Khamis dollars) and population data from the Maddison (2010) dataset that covers the AD 1 to AD 2008 period. After matching the CUI with the common notions that most Western European countries are high-income countries and that most sub-Saharan countries are low-income countries, Woo (2011) defined:

- high-income countries as countries with $CUI > 55\%$;
- middle-income countries as countries with $55\% > CUI > 20\%$; and
- low-income countries as countries with $CUI < 20\%$.⁵

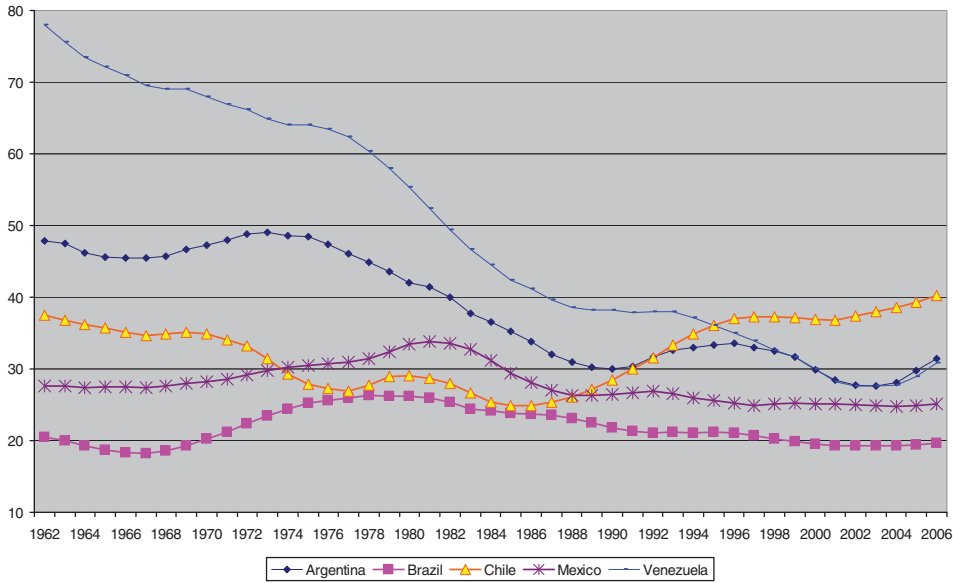


Figure 1. GDP per capita (PPP) of Latin America as a percentage of US level.

In thinking about the probability of China stumbling into the middle-income trap, we keep in mind that because China is a continent-sized country with a large proportion of its territory without easy access to cheap water-based transportation unlike the Netherlands, Ireland and Denmark, we should look more at the growth experiences of the largest regional economies, and less at small economies that have caught up.

Figure 1 captures the essence of Latin America being in the middle-income trap by graphing the five-period moving average (centred on the year indicated) of CUIs for 1962–2006 for the five large Latin American countries: Argentina, Brazil, Chile, Mexico and Venezuela. There is convergence within the group as shown by the narrowing of the spread of CUIs from about 60 percentage points in 1960 to about 20 percentage points in 2006, but the mean value of the group in 2006 is about the same as the mean value in 1960, i.e. the group is stuck at CUI equal to 30%. It is in the sense that these five Latin American countries are showing no signs of catching up with the living standard of the United States after 50 years that we say they are caught in the middle-income trap.

Figure 2 graphs the CUIs of the *developing* members of the Asian group: China, India, Indonesia, Philippines, Thailand and Malaysia. Other than for the Philippines, every developing Asian member has a higher CUI in 2006 than in 1962, moving the average CUI of the group from 7% to 16%. Unlike in the earlier Figure 1, the end result is a widening in the spread of CUIs rather than a convergence because there were three countries that had very high growth: Malaysia, Thailand and China. By growing at more than 4% annually, Malaysia and Thailand are the star performers in this group, joining the richer half of the Latin American countries by 2008.

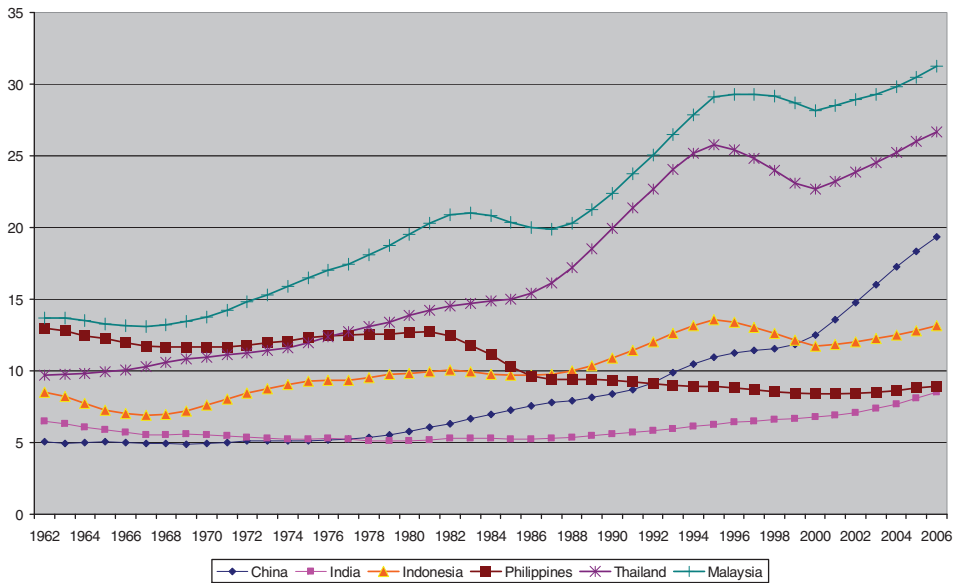


Figure 2. GDP per capita (PPP) of developing Asia as a percentage of US level.

China had the lowest CUI score (5%) in the group in the 1960–1975 period for very understandable reasons: the Great Leap Forward economic strategy created a famine in 1960–1962 that killed 25 million people, and the Great Proletarian Cultural Revolution in 1966–1976 closed virtually all high schools and universities, and disrupted production and normal government functions off and on. China started its catch-up process in 1978, and accelerated its catch-up speed twice (1992 and 2000) to reach middle-income status in 2007–2008. China's living standard overtook India's in 1978, the Philippines' in 1993, and Indonesia's in 2000. China's income pipped Colombia's in 2008 and joined the middle-income club.

The growth record of the above developing Asian economies depicted in Figure 2 might have overstated the impressiveness of the catch-up growth in Malaysian and Thailand, however. To be reminded of what is truly impressive economic catch-up, Figure 3 graphs the CUI of Malaysia with the CUIs of Japan, South Korea and Taiwan. Malaysia was actually richer than Taiwan until 1965 and richer than South Korea until 1970. And when Malaysian growth accelerated in 1971, its new growth rate was still considerably lower than those of Korea and Taiwan. Furthermore, Malaysian CUI stagnated from 1981 to 1988, and stagnated again from 1997 until the present. Korea and Taiwan experienced only a slowdown, not stagnation, in the rise of their CUIs upon the onset of the Asian Financial Crisis; and this slowdown was short-lived.⁶

With the perspective of the broader canvass in Figure 3, we can recognize that Malaysia has had respectable, but not outstanding, economic growth, and that Malaysia is now muddling in the middle-income trap. Which set of its neighbours is China likely to resemble when its CUI score reaches the 35 mark: Malaysia-Thailand or South Korea-Taiwan?

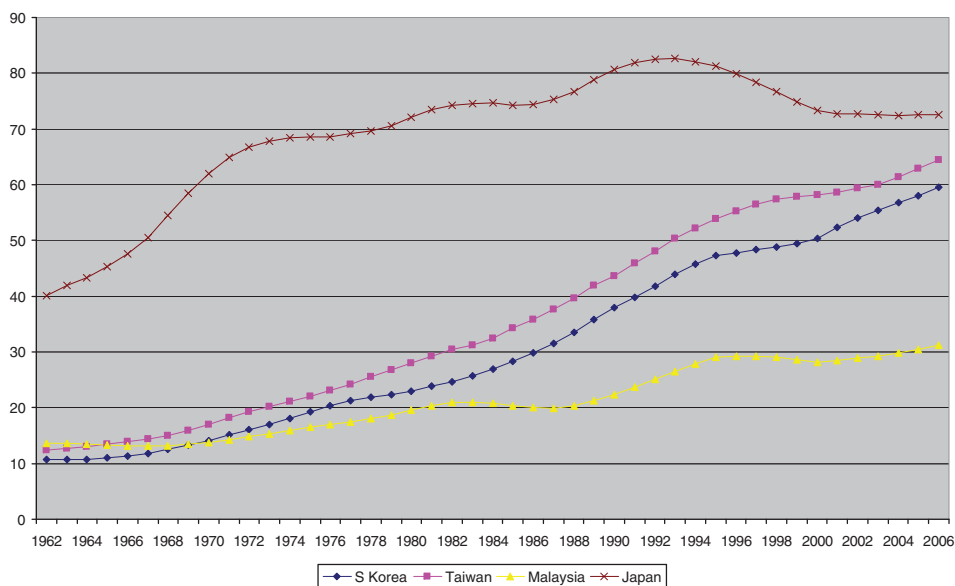


Figure 3. Japan, South Korea, Taiwan and Malaysia: living standard as a percentage of USA living standard.

3. What could cause China to fall into the middle-income trap?

A good guide on how one should assess the probability of continued high growth in China is found in the discussions of the annual Plenum of the Communist Party of China (CPC) that concluded on October 11, 2006. From 1978 through 2005, every Plenum had ended with the resolution that the primary task of CPC in the following year was ‘economic construction’, i.e. increase GDP. The 2006 Plenum broke with tradition and, instead, passed a resolution to commit the CPC to establish a harmonious society by 2020. The obvious implication from this new resolution is that the present major social, economic and political trends within China might not lead to a harmonious society or, at least, not lead to a harmonious society fast enough.⁷

What is the origin of the CPC’s decision to change its primary focus from ‘economic construction’ to ‘social harmony’? To use the analogy of China’s economy being like a speeding car, the CPC saw that the car could crash in the near future because there were several high-probability failures that might occur and trap China in middle-income status. To be specific, there are three classes of failures that could occur: hardware failure; software failure; and power supply failure.

A *hardware failure* refers to the breakdown of an economic mechanism, a development that is analogous to the collapse of the chassis of the car. Probable hardware failures include a banking crisis that causes a credit crunch that, in turn, dislocates production economy-wide, or a budget crisis that necessitates reductions in important infrastructure and social expenditure (and also possibly generates high inflation, and balance of payments difficulties as well).

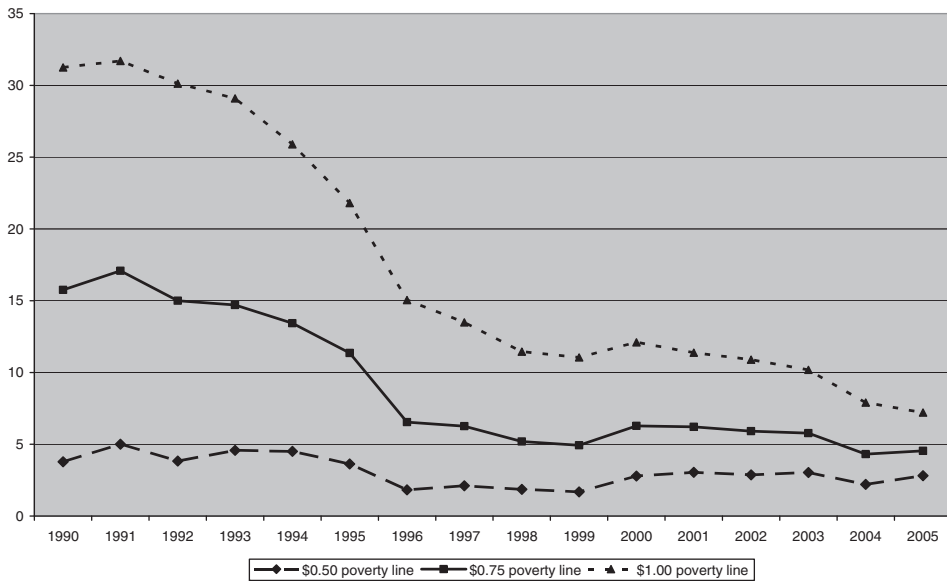


Figure 4. Proportion of rural population below poverty line (%). The poverty line is measured in 1985 PPP US\$.

A *software failure* refers to a flaw in governance that creates frequent widespread social disorders that disrupt production economy-wide and discourage private investment. This situation is similar to a car crash that resulted from a fight among the people inside the speeding car. Software failures could come from the present high-growth strategy creating so much inequality, and corruption that, in turn generate severe social unrest, which dislocates economic activities; or from the state not being responsive enough to rising social expectations, hence causing social disorder.

A *power supply failure* refers to the economy being unable to move forward because it hits either a natural limit or an externally-imposed limit, a situation that is akin, respectively, to the car running out of gas or to the car smashing into a barrier erected by an outsider. Examples of power supply failures are an environmental collapse, e.g. climate change, or a collapse in China's exports because of a trade war.

The fact that the CPC chose to emphasise the danger of social disharmony suggests that it regards software failure as having the highest probability of happening. The post-2006 emphasis of the government on generating inclusive growth (*bao rong xing zeng zhang*) supports this interpretation. However, the occurrence of the Global Financial Crisis in 2008 and the prolonged economic stagnation of the G7 economies that followed have (1) made macroeconomic management in China much more challenging, and (2) strengthened greatly the protectionist sentiments within G7. These two recent developments have, in short, raised the both the probability of hardware failure and the probability of power supply failure in China today.⁸ In the next few sections, I discuss one or two of the most likely precipitating events in each class of failures.

4. The likely hardware failures: fiscal stress from state banks and low productivity growth from state enterprises

China began the recapitalization of the state-controlled banks (SCBs) in 2003 and brought the capital adequacy ratio (CAR) of the four largest SCBs to about 8% at the end of 2004. The important question is how many more rounds of bank recapitalization can China afford without generating a fiscal crisis? The simple fact is that fiscal sustainability lies at the heart of whether a banking crisis would actually occur. As long as the state is perceived to be able and willing to bail out the SCBs, depositors would probably retain their confidence in the SCBs regardless of the actual state of their balance sheets. Since the stock of publicly acknowledged government debt in 2011 is only about 20% of GDP, it is usual to hear official assurances that the current fiscal deficits of less than 4% of GDP do not pose a problem for debt servicing by the state.⁹ However, the current value of the debt–GDP ratio is not a good indicator of the sustainability of the existing fiscal policy regime; a better indicator would involve working out the evolution of the debt–GDP ratio over time.

To put the issue formally, the evolution of the debt–GDP ratio is given by:

$$d(\ln[Debt/GDP])/dt = r + [GDP/Debt] \cdot [f + b] - y$$

where

- r real interest rate on government debt,
- f primary fiscal deficit rate,
[state expenditure excluding debt service – state revenue]/GDP,
- b non-performing loans (NPL) creation rate,
[change in NPL in SCBs]/GDP,
- y trend growth rate of real GDP.

As long as $y > r$, then the $Debt/GDP$ ratio will have a steady-state value that is non-zero when the sum of $(f + b) > 0$. Specifically,

$$(Debt/GDP)_{\text{steady-state}} = (f + b)/(y - r) \text{ when } y > r$$

China appears to belong to this case because its post-1978 annual growth rate has averaged 9.8%, its growth rate in the next ten years is likely to be above 8%; and the real interest rate has been about 4%. For the generation of likely future scenarios, I will make the conservative assumptions that y is 8%, f is 1%, and r is 6%.¹⁰ It is difficult to predict b , the rate that banks would generate NPLs, because it depends on the type of banking reform undertaken. If no meaningful reforms are undertaken, then b is likely to remain at the historic value of 6%.

So, conditional on the effectiveness of reforming the SCBs, the steady-state ratio is:

$$(Debt/GDP)_{\text{steady-state}} = 350\% \text{ when } b = 6\%$$

$$(Debt/GDP)_{\text{steady-state}} = 200\% \text{ when } b = 3\%$$

$$(Debt/GDP)_{\text{steady-state}} = 100\% \text{ when } b = 1\%$$

The noteworthy finding from the above scenarios is that China will produce a level of $(Debt/GDP)_{steady-state}$ that is high by international experience despite the optimistic assumptions that the long-run growth rate is 8%, and that b will be lowered from 6% of GDP to 1%. The most optimistic outcome is still two-thirds larger than what the European Union has set to be the 'safe' debt–GDP target (60%) for its members. The banking system has made China vulnerable to a fiscal crisis even though there is a theoretical steady-state level for the debt–GDP ratio. Of course, the creation of NPLs cannot be attributed entirely to the SCBs, their chief customers, the embezzlement-ridden and inefficiency-ridden state-controlled enterprises (SCEs),¹¹ deserve an equal share of the blame.

The important point from this second fiscal feature is that the 2004 recapitalization of the SCBs was the last time that the government could afford to recapitalize the SOBs, and possibly the last time that the government can do so without upsetting confidence in the financial markets about the soundness of China's fiscal regime.

When the Global Financial Crisis (GFC) erupted in full force in September 2008, the central government fought the fast slowdown of the national economy in November 2008 by introducing a two-year four trillion RMB stimulus package, which is equivalent to about 14% of China's GDP. The central government would fund only 1.18 trillion yuan (29.5%) of the total stimulus spending, and the local governments would finance the rest of the cost of the stimulus programme by raising funds from wherever. The fact that the central government would fund only one-third of the proposed expenditure might prompt one to think of the stimulus programme as a work agenda for the government to create the incentives to induce investment to reach the stated level, but such an interpretation would be wrong. The stimulus should be properly understood as permission by the central government to allow additional investments up to the stated level.

This different understanding is based on the reality that a large part of China's economy is still state-controlled,¹² and that this segment pursues other objectives besides the ideal of profit-maximization. Because state-controlled enterprises (SCEs) are usually bailed out when investment decisions turned out to be over-optimistic or derailed by bad luck, this soft-budget practice has created the well-know interest-inelastic phenomenon of 'thirst for investment' which makes the economy inflation-prone; see Woo (2006). An expanded SCE yields its state-appointed manager three major benefits: higher likelihood of promotion based on the proven ability to handle bigger things, greater patronage power to build a political base; and more resources that could potentially be diverted for personal gains.¹³ Equally important is that the leaders of the local governments share the enthusiasm of SCE managers for growth for the same three reasons.

The central government has two lines of defence to maintain macro-stability in China's partially-reformed economy. The first line is that all large projects need the approval of the National Development and Reform Commission (formerly, the State Planning Commission). The second line of defence is that all banks are assigned credit quotas.

So when Premier Wen Jiabao approved the stimulus programme and covered only a third of its cost, he was giving permission (1) to the SCEs to invest more in order to offset the spending slump in the private sector; and (2) to the state-controlled banks (SCBs) to extend the necessary loans to fund the approved projects.

Herein lies the mechanism for the success of the stimulus programme: the use of non-profit-maximizing state-controlled production and financial units to boost aggregate demand. Because the SCEs and the SCBs are implementing a state-assigned mission, their managers cannot rightly be held responsible should the assigned projects turn out to be financial busts in the future.

Not surprisingly, the public media carried occasional anecdotes about new investments in industries plagued by overcapacity (e.g. steel, cement, and aluminium); trophy investments – e.g. grand town centres, high-speed rail and stately administrative buildings – and spontaneous privatization of project funds (e.g. massive purchase of cars by state bodies).¹⁴ Many of these industrial and infrastructure investments were undertaken by the 8000 local investment companies established by the local governments. It has been estimated that at the end of 2009, the loans of these investment vehicles amounted to 51% of GDP in 2009 and the debt of the central government amounted to 20% of GDP.¹⁵ There is thus concern in some quarters that much of the bank loans to the stimulus programme would end up as nonperforming loans (NPLs), and that the resulting financial crisis would cause China to crash as the US and the UK did in 2009.¹⁶ Or alternatively, the bailout of the SCBs by the government would cause a fiscal crisis that would require large cutbacks on important infrastructure and social programmes.

A second common concern about China's stimulus programme is that the SCBs were channelling the flood of liquidity to the SCEs and further¹⁷ neglecting the increased financing needs of the private sector brought on by the GFC. Pressed for working capital, two well-known large private companies, Rizhao (a steel firm) and Mengniu (a dairy), agreed to be acquired by their state-owned counterparts. As SCEs are generally less efficient and innovative than private firms, the expansion of the role of the state firms has rightly raised the issue of whether Premier Wen's way of imparting the needed boost to capacity utilization during the GFC would become a drag on future productivity growth.¹⁸

While CPI inflation in 2009 was reassuringly low at -0.7% , 'land prices ... doubled in 2009 on a nationwide basis'.¹⁹ The first quarter of 2010 saw even more rapid increases in land prices, especially in the major coastal cities.²⁰ As a real estate bubble is inevitably socially-alienating (by disappointing new home buyers on the way up and dismaying existing home owners on the way down), the government sought to stabilize property prices in mid-April 2010 by making it harder to buy houses, e.g. requiring first-time home buyers to put a minimum of 30% down payment for houses larger than 90 square metres; and increasing the mortgage rate on second homes. The roaring real estate market and the use of non-market means (e.g. ban on purchases) to tame it are symptoms of some deep economic problems that China will have to address in order to sustain growth over the long-run.

The real estate boom was, of course, only part of a generalized investment boom unleashed by the 400 trillion RMB stimulus programme. The November 2008 stimulus programme ultimately resulted in strong inflationary pressures appearing in 2010. China applied its monetary brake sharply in 2011, accentuating the financing difficulties that the private sector had faced since 2004. The result, it appears, could be a sharp slowdown in GDP growth on the eve of the CPC Congress at the end of 2012, which will see a large-scale change in the top political leadership.²¹

To summarize, there are two hardware failures that are likely at the present time. The large dose of SCE-cum-SCB-based macro-stimulus in 2009–2010 has (a) created future NPLs that could cause either the SCBs to collapse or a fiscal crisis from the bailout of the SCBs, and (b) lowered productivity growth in the future by enabling the state sector to crowd out the private sector. China's current instruments of macro-stimulus have thus created a potential trade-off between maintenance of full capacity utilization in the short-run and sustenance of a high rate of capacity expansion in the long-run. The important task for Chinese policymakers now is to eliminate this trade-off. This task will require the state to replace the usual macro-stimulus with new market-friendly instruments to maintain an adequate level of aggregate demand; a topic that we will take up later in the paper.

5. The likely software failures are from flaws in governance

The satisfactory functioning of a market economy requires a wide array of regulatory institutions that range from straightforward law-and-order administration to complicated legal adjudication. China's strategy of incremental reform combined with the fact that institution building is a time-consuming process meant that many of its regulatory institutions are either absent or ineffective. The results have been governance failures on many fronts, of which the most well-known are the violations against the welfare of consumers, e.g. the addition of poisonous substitutes into toothpaste, cough medicine, and animal feed; the application of lead paint to children's toys; and the over-employment of antifungals and antibacterials in fish farming. Most of these abuses had received enormous attention only because these items were exported to other countries and their harmful effects were reported widely in the international press.

However, besides inadequate institutions of governance, the present economic development strategy, despite its ability to generate high growth rates, is now also generating high social tensions. This is because the trickling-down mechanism in income diffusion seems to have slowed down significantly, and is hence unable to reduce extreme poverty further and improve significantly the rural–urban income distribution and the regional income distribution.²² In the 1990s, the \$1-poverty-rate²³ (i.e. the proportion of rural population receiving a daily income of \$1 or less), dropped rapidly from 29.1% in 1993 to 11.1% in 1999. But in the following six years, 1999–2005, the decline was only 3.9 percentage points, see Figure 3. In fact, the \$1-poverty-rate had dropped to only 10.2% in 2003 (a 0.9 percentage point decline from 1999) even though the annual GDP growth rate averaged over 8.5 percent in the 1999–2003 period. It was only after the accumulated effects of the sustained large-scale effort to develop western China began in 2001 and the post-2002 rise in the GDP growth rate to above 10% had kicked in, that the \$1 poverty rate dropped to 7.9% in 2004 and then to 7.2% in 2005.

More troubling is that Figure 3, in fact, shows that the decline in the \$1-poverty-rate in the 1999–2005 period overstates the progress in reducing extreme poverty. In the 1999–2005 period, there was practically no improvement in the \$0.75-poverty rate (4.9% in 1999 and 4.5% in 2005), and an increase (!) in the \$0.50-poverty-rate (1.7% in 1999 to 2.8% in 2005). In short, the trickling-down mechanism of

Table 1. Disposal income per capita in each income category in 2008.

Category	% of urban residents	Official income (RMB)	“True” income (RMB)	Distribution of hidden income (%)
Lowest income	10	4754	5350	0.4
Low income	10	7363	7430	0.0
Lower middle income	20	10,196	11,970	2.3
Middle income	20	13,984	17,900	5.1
Upper middle income	20	19,254	27,560	10.9
High income	10	26,250	54,900	18.8
Highest income	10	43,614	139,000	62.5
<i>All urban dwellers</i>	<i>100</i>	<i>16,885</i>	<i>32,154</i>	<i>100.0</i>

Hidden Income = Total True Income – Total Official Income.

Source: Tables 5 and 6 in Wang and Woo (2010).

income-diffusion in China has slowed down for the poorest 5% of the rural population, and, hence, worsened income inequality.²⁴

Furthermore, the present mode of economic development also generates immense opportunities for embezzlement of state assets, seizure of farmlands for industrial development, and corruption because of the absence of effective mechanisms to supervise government employees. These features certainly make social harmony hard to sustain. Wang and Woo (2011) have found that urban residents have substantial unreported (hidden) income. Table 1 reports their estimates of official income and true income in each income group. The official income per capita and true income per capita in the richest 10% of households in 2008 was 43,614 RMB and 139,000 RMB respectively; official income being one-third of true income. Total household disposable income in 2008 was RMB 14.0 trillion according to the official data but RMB 23.2 trillion according to the Wang and Woo estimate. And as 63% of the total unreported income went to the richest 10% of urban households, the income of the richest 10% of Chinese households is really 65 times that of the poorest 10% instead of the 23 times reported in the official data. In short, the Gini coefficient is clearly much higher than the Asian Development Bank’s (2007) figure of 0.47 for 2004.

The data on social unrest are consistent with the hypothesis of rising social disharmony. The incidence of public disorder, labelled ‘social incidents’, rose steadily from 8700 in 1993 to 32,500 in 1999 and then to 74,000 in 2004; and the average number of persons in a mass incident has also risen greatly, from 8 in 1993 to 50 in 2004. Clearly, the number of mass incidents would have been lower and governance would have been better if the government’s actions had been monitored closely by an independent mechanism and the government had also been held more accountable for its performance. The embrace of the Harmonious Society programme by CPC is acknowledgement that democracy, the rule of law, and a stable income distribution comprise an indivisible combination that is necessary to ensure the social stability that will keep the economy on the high growth path to catch up with the United States.

6. The first type of likely power supply failure is environmental collapse in China

The present mode of economic development has given China the dirtiest air in the world, is polluting more and more of the water resources, and, is, possibly, changing the climate pattern within China. The unexpurgated version of a 2007 World Bank Report stated that ‘about 750,000 people die prematurely in China each year, mainly from air pollution in large cities’;²⁵ and a 2007 OECD study has estimated that ‘China’s air pollution will cause 20 million people a year to fall ill with respiratory diseases.’²⁶

Water shortage appears to pose the most immediate environmental threat to China’s continued high growth. Presently, China uses 67 to 75% of the 800 to 900 billion cubic metres of water available annually, and present trends in water consumption would project the usage rate in 2030 to be 78 to 100%.²⁷ The extended period of semi-drought in northern China combined with the economic and population growth have caused more and more water to be pumped from the aquifers, leading the water table to drop three to six metres a year.²⁸ And a study using measurements from satellites (the Global Positioning System) has established that the part of China north of the 36th parallel latitude has been ‘sinking at the rate of 2 mm a year.’²⁹

While northern China has been getting drier and experiencing desertification, nature as if in compensation (or in mockery) has been blasting southern China with heavier rains, causing heavy floods that have brought considerable deaths and property damage almost every summer since 1998.³⁰ The sad possibility is that the northern droughts and southern floods may not be independent events but a combination caused by black carbon particulates that originate in China.³¹

Clearly, without water, growth cannot endure. And in response, the government began implementation in 2002 of Mao Zedong’s 1952 proposal that three canals be built to bring water from the south to the north: an eastern coastal canal from Jiangsu to Shandong and Tianjin, a central canal from Hubei to Beijing and Tianjin, and a western route from Tibet to the north-western province. Each canal will stretch over a thousand miles.³² This massive construction project will not only be technically challenging but also extremely sensitive politically and fraught with environmental risks. The central canal will have to tunnel through the foot of the huge dyke that contains the elevated Yellow River, and the western canal will have to transport water through regions susceptible to freezing and earthquake.

The enlargement of the Danjiangkou Dam (in Hubei) to enable it to be the source of the central canal has already displaced 330,000 people; and many more are expected to be displaced.³³ Moving people involuntarily is certainly potentially explosive politically. The project could also be politically explosive on the international front as well. One plan for the western canal calls for ‘damming the Brahmaputra river and diverting 200 billion cubic metres of water annually to feed the ageing Yellow river,’ a scenario that is reportedly ‘giving sleepless nights to the Indian government . . . which is concerned that this “Great Western Water Diversion Project” could have immense impact on lower riparian states like India and Bangladesh.’³⁴

The general point is that effective policy-making on the environmental front is a very difficult task because much of the science about the problem is not known.

The uncomfortable reality for China is that unless ecological balance is restored within the medium-term, environmental limits could choke off further economic growth. And the uncomfortable reality for the rest of the world is that the negative consequences of large-scale environmental damage within a geographically large country are seldom confined within that country's borders. The continued march of China's desertification first brought more frequent sand storms to Beijing and then, beginning in April 2001, sent yellow dust clouds not only across the sea to Japan and Korea but also across the ocean to the United States. China's environmental management is a concern not only for China's welfare but for global welfare as well.

There is no doubt, however, that the Chinese government is trying to improve its performance in sustainable development. The 12th Five-Year Plan for 2011–2015 that was passed by the National People's Congress in March 2011 has identified 'Green China' as one of its core objectives. But it is still hard to call China's green targets ambitious, e.g. energy intensity is to decline by 17% in the forthcoming 5-year period when it fell 20% in the last 5-year period, and non-fossil fuel will account for 11.3% of overall energy use in 2015 up from 8% in 2011.³⁵

7. The second type of likely power supply failure is trade protectionism

It was no April Fool's Day joke when the *Wall Street Journal* of 1 April 2011 carried the headline 'China meeting highlights currency conflict'. The list of US grievances generated by the large US–China bilateral imbalances has now expanded from the loss of US jobs to the meltdown of the US financial market in September 2008.³⁶ The 'bad China' feeling is so strong that even *The New York Times* (17 March 2010) stooped to oxymoronic rhetoric, calling the fixed RMB–Dollar exchange rate 'a textbook example of the beggar-thy-neighbour competitive *devaluation*' (emphasis added). The English language is not the only casualty in the discussion of the US–China economic relationship: history has also been given the wrong twist. According to Lardy (1998):

The United States is the addict. We are addicted to consumption . . . China is the dealer. They're supplying the credit that makes it possible for us to over-consume.³⁷

It is hard not to see in this quote reference to the Opium War of the nineteenth Century, with the identities of the aggressor and the victim reversed as a transmogrification of history that is quite over the top. What should be very clear from the above recent rhetoric is that China–US trade tensions have reached a dangerously high level now that the United States is experiencing intractably high unemployment from the Global Financial Crisis.

There are quite a number of China-centric explanations³⁸ for China's chronic trade surplus, and we will discuss the two that seems the most important (a) the *financial market theory* that attributes the imbalance to the inability of China's largely unreformed financial system to intermediate all savings into investment; and (b) the *industrial policy theory* that attributes the trade imbalance to China's promotion of exports and suppression of imports.

The *financial market theory* focuses on the aggregate-level accounting identity that the overall current account balance is determined by the fiscal position of the

government, and the savings-investment decisions of the SCEs and the private sector. Specifically:

$$CA = (T - G) + (S_{SCE} - I_{SCE}) + (S_{private} - I_{private})$$

where CA = current account in the balance of payments

CA	$(X - M) + R$
X	export of goods and non-factor services
M	import of goods and non-factor services
R	net factor earnings from abroad (i.e. export of factor services)
T	state revenue
G	state expenditure (including state investment)
S_{SCE}	saving of the SCEs
I_{SCE}	investment of the SCEs
$S_{private}$	saving of the private sector
$I_{private}$	investment of the private sector

Because the Chinese fiscal position ($T-G$) has nearly always shown a small deficit, the current account surplus reflects primarily the savings of SCEs, and the private sector is larger than the sum of their investment expenditures. Why has China's financial system failed to translate the savings into investments? Such an outcome was not always the case. Before 1994, the voracious absorption of bank loans by SCEs to invest recklessly kept the current account usually negative and the creation of NPLs high. When the government implemented stricter controls on the SCBs from 1994 onward (e.g. removing top bank officials whenever their bank lent more than its credit quota or allowed the NPL ratio to increase too rapidly), the SCBs slowed down the growth of loans to SCEs. This cutback created an excess of savings because the SCB-dominated financial sector did not re-channel the released savings (which were also increasing) to finance the investment of the private sector.

This failure in financial intermediation by the SCBs is quite understandable. First, the legal status of private enterprises was, until recently, less secure than that of the state enterprises; and, secondly, there was no reliable way to assess the balance sheets of the private enterprises, which were naturally eager to escape taxation. The upshot was that the residual excess savings leaked abroad in the form of the current account surplus. Inadequate financial intermediation has made developing China a capital exporting country and put it in conflict with its trade partners!³⁹

The *industrial policy* explanation for China's chronic trade surplus views this anomalous situation as the unintentional outcome of (1) the overriding economic and political priority in China to create jobs for its underemployed (surplus) labour force; and, two, the widespread belief in the efficacy of infant industry protection – ambiguously labelled as the ‘promotion of indigenous innovation’ – in accelerating China's movement up the value-added ladder. The resulting export subsidies, import barriers, and undervalued exchange rate worked together to accelerate the simultaneous growth of export firms (which increased exports) and import-competing firms (which decreased imports), and hence kept the trade balance in surplus.

The industrial policy theory has been challenged on the grounds that its microeconomic plausibility is at odds with economy-wide constraints. Specifically, in

a two-sector general equilibrium model of exportables and importables, there could not have been simultaneous growth of the exportable sector and the importable sector because labour would flow from one to the other depending on the relative size of the effective export subsidy rate and the effective import tariff rate – and, hence, the trade balance would not be affected by the industrial policy. However, this theoretical reasoning about industrial policy does not hold for China, one, because of the existence of surplus labour in the countryside that could move into both the exportable sector and the importable sector; and, two, because of the existence of a sizeable non-tradable sector (e.g. low value-added service activities, and subsistence agriculture) that would release labour to the ‘policy-favoured’ tradable sector.

Clearly, the prevention of a trade war with the US would require that China accelerates the development of its financial sector if the financial market theory is correct; and removes the export incentives and import barriers from rent-seeking industries with low potential to generate dynamic externalities if the industrial policy theory is correct. However, regardless of which theory is right, both actions should be undertaken because they both enhance China’s economic welfare, with one of them also lowering the probability of a trade war with the United States. We will discuss the details of each action in the last section of this chapter.

8. The hardware reform agenda

We had identified earlier the deleterious consequences of the administration of the emergency-room medicine of large-scale SCB-funding of hastily approved SCE projects. We would like to recommend that the present slowdown in June 2012 be dealt with by unleashing two new interrelated growth drivers that would minimize the trade-off between full utilization of existing production capacity and viable long-term growth of production capacity, and they are (1) the creation of more new private entrepreneurs; and (2) urbanization according to the principle of future home ownership.

The state can partly offset the expanded state sector by mobilizing the inland migrant workers (*nongmin gong*) laid-off from the coastal provinces into an entrepreneurial force. Many of the *nongmin gong* have sufficient work experience to start their own factory-workshops to take advantage of the increased cost competitiveness of the inland provinces created by the explosive extension of the national transportation network during the GFC. Because the primary barrier to the emergence of this group of owner-operators is the availability of credit, the government should legalize small and medium private banks as they have comparative advantage over the four large state banks in catering to the needs of these new entrepreneurs.⁴⁰ Farmland should also be privatized so that the new businesses can have the collateral to access credit from the new private banks. The creation of a new large group of private entrepreneurs will bring three major benefits (1) expenditure by this new group will substitute for the present macro-stimulus programme in keeping aggregate demand high; (2) private firms are likely to have higher productivity growth than SCEs; and (3) these small and medium private enterprises will be more labour-intensive than SCEs.

The second new growth driver would be urbanization based on the principle of affordable future home ownership. The fast growth of the real estate sector, not only recently but also over the last decade, reflected not just speculative demand but also genuine pent-up demand for housing and genuine accommodation of the high rate of the joint industrialization-urbanization process.⁴¹ The bulk of the new arrivals from the countryside cannot qualify for bank mortgages, and so many investors have been buying multiple housing units to rent to the new arrivals with the intention of raising the rents over time in line with the income growth of the renters. In this sense, much of the recent housing demand has been speculative.

We propose that China studies the low-cost public housing schemes in Hong Kong and Singapore and establishes a national housing programme where the new arrivals would rent homes for seven years and then have the first right to buy these units at a price based on construction costs. China can afford a massive public housing programme because the expensive part of such programmes in other countries is the cost of land and not the cost of the structures, and land in China is mostly owned by the state.⁴²

Our proposed 'future-ownership' form of urbanization will support China's growth in three ways (a) the maintenance of real estate investment to supply the needed housing and to help maintain existing level of aggregate demand (b) the redirection of bank loans to new rural migrants, with the new housing agency as the intermediary, to prevent the appearance of NPLs; and (c) this housing scheme will redistribute income to the rural migrants (which helps in reducing the threat of software failure), with the positive side-effect that consumption would rise to help offset the elimination of the macro-stimulus programme.

We note that the first new growth driver and second new growth are mutually-reinforcing. The new enterprises of the former rural migrants would inevitably be located in or near towns and cities to take advantage of infrastructure and positive spillovers from agglomeration. We also note that the main institutional adjustments that must be made to enable the working of the second new growth driver are the same that would help the development of the first new growth driver: privatization of farmland, termination of the household registration system, and liberalization of the financial system. In brief, China now needs to move from macro-stabilization to macro-sustainability; the 2009–2010 type of macro-stimulus cannot produce sustainable growth, only economic reforms can do so.

9. The software reform agenda

We agree with the CPC that the probability of a software failure is higher than the probability of a hardware failure. The former is easier to deal with because, for most hardware problems, China can learn from the experiences of the rest of the world, especially those of the richer countries in East Asia, as long as ideological constraints on methods of economic management continue to wither. The 1868 insight of the Meiji reformists that success in economic catch-up largely involves a willingness to adopt and adapt to 'best international practices' will continue to apply to China until its per capita GDP converges with that of Japan and Western Europe.

Dealing with software failure is harder than dealing with hardware failure for two major reasons. The first is that policymaking in China has become more challenging because popular expectations of administrative performance have risen dramatically with income growth and, more importantly, with increasing knowledge of the outside world. In this new situation, the greater use of democratic procedures, the establishment of an independent judiciary, and the restoration of a free press might be inevitable if China is to successfully accommodate the rising social expectations and mediate the emerging differences in social expectations. A Chinese government that consistently fails to deliver progress toward the Harmonious Society vision fast enough to catch up with the rise in social expectations runs an increasing risk of social instability.

The second reason for why fixing software failures is more difficult is that successful reconfiguration of the administrative software requires not just highly developed political skills but favourable circumstances in the domestic political arena and a benign international environment – both of which are normally beyond the reach of most politicians. What happens in the future will depend on whether the CPC is politically skilful enough to lead the transition to the democratic, equitable, and law-based Harmonious Society and emerge afterwards as the most important political force. The practical issue is whether the CPC can do a better job in political transition than the Kuomintang did in Taiwan during 1983–88.

10. Dealing with power supply failure caused by environmental degradation

Effective policy-making on the environmental front is a very difficult task because much of the science about the problem is not known. For example, if the change in China's rainfall pattern is indeed due to China-emitted black carbon pollution, then China must no longer select its water strategy and its energy strategy separately. A systems approach to policymaking is necessary because the interaction among the outcomes from the different sectoral policies can generate serious unintended environmental damage. A sustainable development policy would require a complete rethinking about the location of population centres and the types of enhanced international cooperation on global environmental management.

In discussing the environmental aspects of the water transfer plan, it is important to note that there is now an open controversy in China involving a key government infrastructure project, and that this controversy is not limited to members of the technocracy. The very public nature of the controversy, and the involvement of more than just scientists, engineers and economists in it, reveals how very far social attitudes have progressed. The important point is that this change in social expectations will require any government in China to live in harmony with nature. However, any government will have great difficulties in doing so even if it wants to because a green-growth policy involves a systems approach, and scientific understanding of many ecological sub-systems and the nature of their interactions is still rather incomplete.

The global environment is an important area in which China can help to build a harmonious world system.⁴³ Specifically, China should be mobilizing international consensus to form an international research consortium to develop ways to burn coal cleanly because China is now building a power station a week and is hence able to

facilitate extensive experimentation on prototype plants to burn coal cleanly. Furthermore, given the growing water shortages in China (especially in the north) and in many of its neighbouring countries, China should start a regional forum on the joint use of water from the Tibetan plateau before the situation gets too critical. China should also be mobilizing an international scientific research effort on the desalination of seawater for drinking. If global cooperation on clean energy research and desalination research is successful, it will unleash sustainable development on the whole world.

11. Dealing with power supply failure caused by trade protectionism

Finally, we consider how to reduce the probability of the speeding car (that is China) crashing into a road block that takes the form of foreign trade sanctions. It should be immediately noted that a trade imbalance reflects the economic situation in two countries: China could not have over-saved if the US had not under-saved. US profligacy is just as much to be blamed for the trade tensions as Chinese thriftiness, e.g. even today, the US government does not have a credible plan to reduce its budget deficit upon the recovery of the economy. The straightforward implication is that a fair solution to any desired reduction in the trade imbalance would require corrective measures to be implemented by both China and the US.

Given that the trade imbalances are produced by a host of factors, another straightforward implication is that the efficient solution will employ more than one policy instrument for the task. There would not just be an appreciation of the RMB against the USD but also equally large changes in policy measures such as the lowering of Chinese trade barriers, the adoption of a budget deficit reduction by the US, and expansion of the trade credit facilities of the US ExIm Bank to promote US exports.

What is to be done in China? It is most unfortunate that the trade imbalance issue has focused overwhelmingly on the amount that the Chinese yuan ought to appreciate.⁴⁴ It is now forgotten that the much-praised Plaza Accord of September 1985, which engineered a sharp appreciation of the Japanese Yen, caused so much instability in global financial markets that it became a museum piece after only 17 months(!) with the hurried signing of the Louvre Accord in February 1987. As the world is currently only beginning to get over the trauma of the Global Financial Crisis of 2008–2009, it verges on irresponsibility to now push China to impart a Plaza Accord-type of shock to the financial markets.

More importantly, the effectiveness of a large appreciation of the RMB–USD exchange rate in reducing the US trade deficit is suspect outside of the textbook situation of a two-country world. When the Yen–USD exchange rate went from 238.5 Yen/USD in 1985 to 128.2 Yen/USD in 1988 (an appreciation of 86% by the IMF definition), the overall US and Japanese trade imbalances saw only small improvements. The US trade deficit improved very little when direct Japanese exports became drastically more expensive in the US market after 1985 because (1) US customers reacted by switching their purchases to similar imports from third countries; and (2) Japanese businesses relocated their production to other Asian countries and serviced the US market from there.

Since over 60% of Chinese exports are produced in factories with foreign investment, many of these foreign investors would relocate their operations to other parts of the world if the RMB were to duplicate the dramatic 1985–1988 appreciation of the Yen. Unless accompanied by US actions to raise its low private savings rate and to cut its budget deficit, a second Plaza Accord is unlikely to diminish the US trade deficit adequately and its primary consequences would be a reconfiguration of the sources of US borrowing from abroad, and a new round of global financial market instability.

We had outlined earlier the financial market theory and the industrial policy theory about China's chronic surplus. We are persuaded that, because the development of the financial sector and the elimination of subsidies-tariffs motivated by rent-seeking would increase economic efficiency independently regardless of the impact of each on the trade balance, we should implement both actions. We propose a policy package with three components. First, the steady process of yuan appreciation that begun in July 2005 should be continued, and should also be used more aggressively as an anti-inflation instrument.

Second, import liberalisation should be accelerated and expanded beyond WTO by greatly increasing some new types of imports, e.g. educational services and tourism. With its huge foreign exchange reserves, China should have expanded its scholarship and student loan programmes tremendously to enable the large number of qualified Chinese to go abroad to receive better university-level training. It has been a failure of the imagination that China has not increased this method of importing human capital prodigiously for productive purposes.

Furthermore, China should recognize that its large indigenous innovation programme to incubate high-tech industries has, in fact, been an inequitable mechanism that transfers income from the customers to the makers of the products covered in the programme. The global experience with indigenous innovation programmes has mostly been a negative one. Most of the industries they spawned never became internationally competitive, showing that most indigenous innovation programmes are based either on a misguided sense about the possibilities from 'learning-by-doing' or on rent-seeking motives. Given this global experience, China could drastically reduce the size of its extensive indigenous innovation programme without hurting its capability in technological upgrading.

The third component of China's trade-imbalance-reduction package is to establish an improved mechanism for coordinating private savings and private investments. The establishment of a modern financial system will not only achieve the objective of intermediating all of domestic saving into domestic investment, it will also enhance welfare and lower the savings rate by pooling risks through vehicles such as medical insurance and pension insurance. We note that financial sector development will also help the two new growth drivers of the hardware reform package (new entrepreneurs and urbanization) to work better.

So far, we have stressed that US–China trade tensions would be lowered much more if both countries undertake corrective policies rather than if China acted alone, and that a wider range of policy instruments should be employed (e.g. budget deficit reduction in US, and import deregulation in China) rather than relying just on exchange rate adjustment alone. We now want to stress that the US and China should also work together to prevent the GATT-WTO free-trade regime from

weakening. Specifically, China has benefited immensely from the WTO system, and yet it has, up to this point, played a very passive role in pushing the Doha Round negotiations forward to completion. By default, Brazil and India have assumed the leadership of the developing economies camp in the trade negotiations. According to Susan Schwab, the US Trade Representative, at the G4 (US, EU, Brazil and India) meeting in Potsdam in June 2007, Brazil and India retreated from their earlier offers to reduce their manufacturing tariffs in return for cuts in agricultural subsidies by the developed economies because of 'their fear of growing Chinese imports.'⁴⁵

With the US weakening in its resolve to protect the multilateral free trade system, China should now become more active in the Doha Round negotiations to deregulate world trade further. Such a role will be very much in China's interest because Brazil is now bypassing multilateral trade liberalization by entering into FTA negotiations with the European Union. The fact is that a growing number of nations like Brazil 'are increasingly wary of a multilateral deal because it would mandate tariff cuts, exposing them more deeply to low-cost competition from China. Instead, they are seeking bilateral deals with rich countries that are tailored to the two parties' needs.'⁴⁶ It is the time for China to show that it is a responsible stakeholder by joining in the stewardship of the multilateral free trade system. Such an international stance would also reduce the threat of this type of power supply failure to China's own growth.

12. Final remarks

China has now achieved middle-income status through the marketization and internationalization of its economy. Our assessment is that the continued high growth rates that will enable China to catch up with the rich economies can be generated only if China adopts a new development strategy. This new development strategy is based not only on the recognition that the marketization and internationalization processes have to be deepened and made more comprehensive, but also on the recognition that China has now become an important shaping force of the global economy (e.g. see McKibbin and Woo 2003), and Chinese civil society has come to possess more and more of the middle-class aspirations common in the industrialized world.

China must not only build a stronger economic hardware with measures such as labour market deregulation, land privatization, future-ownership-based urbanization, and financial sector development, China must also create a harmonious society as a primary internal objective and help establish a harmonious world as a primary external objective. The administrative software that will allow the achievement of a harmonious society will require an increasing use of free elections, monitoring by a free press, and adjudication by an independent judiciary. China must start adopting the global perspective that is required of a world leader who will work for the protection of the global environmental commons, the global trading system, and global security, in order to ensure that China's convergence to high income-hood is not foiled by the physical environment or the international political environment.

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Notes

1. The ranking of income level and growth performance in 1870 and 1913 is restricted to the 65 countries in the Maddison (2010) dataset that reported GDP per capita in 1913.
2. Of course, the optimistic expectations about Argentina on the eve of the First World War were typical of the *joie de vivre* of that time. Norman Angell (in *The Great Illusion*, 1913) had famously predicted that deep economic integration had rendered war among the European powers obsolete because of the huge costs that would be incurred by the victors and the losers. Angell was awarded the Nobel Peace Prize in 1933.
3. We will use the three terms 'income', 'GDP per capita', and 'standard of living' interchangeably in this paper.
4. To minimize noise in the ranking, the value of CUI in any year could be replaced by a moving average centred on that year. In the graphs, we will use a five-period moving average centred on the designated year.
5. Woo (2011) finds that the list of countries in each category is almost unchanged when the cut-off scores are set at 60% for high and middle, and 15% for middle and low.
6. The movement of Japan's CUI is very much what we expected based on the behaviour of the CUIs of the large high-income countries. Although Japan's CUI value in 2008 (73.2) was the same as in 1973, it is still higher than the 2008 values of the CUIs of France (71.3), Germany (66.7), and Italy (63.9).
7. The proposed harmonious socialist society would encompass a democratic society under the rule of law; a society based on equality and justice; an honest and caring society; a stable, vigorous and orderly society; and a society in which humans live in harmony with nature.
8. 'Today' refers to August 2012, the time of submission of this article.
9. One should really use the consolidated debt of the state sector because it includes at least some part of the contingent liabilities (e.g. foreign debts of state-controlled enterprises and banks, and unfunded pension schemes in the state sector) that the state might have to assume responsibility for when the state-owned units default on their financial obligations.
10. f has been above 1.5% for the past seven years. r was 4% in the past only because the interest rate was regulated. I think that the implementation of financial deregulation that is necessary for normal healthy development of the financial sector will render r to be at least 6% because (1) according to Solow (1991), the stylized fact for the real interest rate in the United States is that it is 5 to 6%; and (2) both the marginal rate of return to capital and the black market loan rate have been more than 20%.
11. See Notes 13 and 14, and their associated sentences.
12. State-controlled firms include state-owned firms and publicly-listed firms where the state and its intermediaries hold the controlling share.
13. 'China finds huge fraud by officials,' *The New York Times*, 30 December 2009.
14. See, for example, 'Is China's economy speeding off the rails?' *The New York Times*, 23 December 2009; 'China: No one home,' *Financial Times*, 21 February 2010; 'China audit finds misuse of funds tied to stimulus,' *Financial Chronicle*, 29 December 2009, <http://www.mydigitalfc.com/news/china-audit-finds-misuse-funds-tied-stimulus-821>; and 'China boosts auditors' power as stimulus package spending prompts corruption concerns,' *People's Daily*, 21 February 2010, <http://english.peopledaily.com.cn/90001/90776/90785/6898354.html>
15. The 51% figure is from combining information in Shih (2010), who reported the debt of the central government to be 20% of GDP, with the information in the *Financial Times*

- (‘China warned of growing “land loan” threat,’ 28 March 2010) that the national total figure was 71%.
16. For example, ‘China is heading for a Japan-style bubble,’ *Financial Times*, 2 November, 2009; and ‘Contrarian investor sees economic crash in China,’ *The New York Times*, 8 January 2010.
 17. Herrala and Jia (2012) found that bank loans to non-state firms were drastically curtailed from 2004 onward.
 18. ‘Communist party needs to loosen its grip on China,’ *The New York Times*, 2 March 2010. This debate over the growth of the state firms at the expense of private ones is conducted over the heading of *guojin mintui* (the state sector advances, and the private sector withdraws).
 19. ‘China tells banks to restrict loans to local governments,’ *The New York Times*, 25 February 2010.
 20. In 2009, land prices had gone up 200% in Shanghai, 400% in Guangzhou, and 876% in Wenzhou; ‘China: No one home,’ *Financial Times*, 21 February 2010.
 21. William Kazer, ‘China PMI falls, points to need for stimulus,’ *Wall Street Journal*, 21 June 2012; Reusters, ‘China data show drops in exports and prices,’ *International Herald Tribune*, 22 June 2012; and Keith Bradsher, ‘Chinese data mask depth of slowdown, executives say,’ *New York Times*, 22 June 2012.
 22. See, for example, Woo et al. (2004), and Démurger et al. (2002).
 23. The poverty rates reported in this section are based on 1985 PPP US\$. The poverty rates reported here are from a private communication from Ximing Yue of Renmin University.
 24. In the 1985–1987 period, China’s Gini coefficient was below 0.3. An Asian Development Bank (2007) study on income inequality in 22 Asian countries over the 1992–2004 period found that for 2004, only Nepal had a Gini coefficient (47.30%) that was higher than China’s (47.25). However, in 2004, China’s income ratio of the richest 20% to the poorest 20% (11.37) was the highest in Asia; significantly higher than the next highest income ratio (9.47 for Nepal). China is probably the most unequal country in Asia today.
 25. ‘750,000 a year killed by Chinese pollution,’ *Financial Times*, 2 July 2007. 350,000 to 400,000 died prematurely from air pollution in Chinese cities, 300,000 from poor air indoors, and 60,000 (mostly in countryside) from poor-quality water.
 26. ‘OECD highlights Chinese pollution,’ *Financial Times*, 17 July 2007.
 27. ‘Top official warns of looming water crisis,’ *South China Morning Post*, 7 November 2006.
 28. ‘Northern cities sinking as water table falls,’ *South China Morning Post*, 11 August 2001.
 29. ‘Northern China sinking... as the south rises,’ *The Straits Times*, 18 March 2002.
 30. The National Development and Reform Commission (2007) reported: ‘The regional distribution of precipitation shows that the decrease in annual precipitation was significant in most of northern China, eastern part of the northwest, and north-eastern China, averaging 20~40 mm/10a, with decrease in northern China being most severe; while precipitation significantly increased in southern China and south-western China, averaging 20~60 mm/10a.’
 31. There is now persuasive evidence that China’s voluminous emission of black carbon (particles of incompletely combusted carbon) has contributed significantly to the shift to a climate pattern that produces northern droughts and southern floods of increasing intensity; Streets (2005).
 32. ‘Ambitious canal network aims to meet growing needs,’ *South China Morning Post*, 27 November 2002.
 33. ‘Massive scheme aims to quench China’s thirst,’ *Financial Times*, 26 July 2004; a lower estimate of 300,000 is given in ‘China will move waters to quench thirst of cities,’ *New York Times*, 27 August 2002.
 34. ‘China’s river plan worries India,’ *Times Of India*, 23 October 2006.
 35. ‘12th Five Year Plan hailed as “Greenest FYP in China’s history”’ (Posted Tuesday, 2011-04-12 14:54 by China Briefing); <http://deltabridges.com/news/prd-news/12th-five-year-plan-hailed-%E2%80%98greenest-fyp-china%E2%80%99s-history%E2%80%99>
 36. Krishna Guha, ‘Paulson says crisis sown by imbalance.’ *Financial Times*, 1 January 2009; <http://www.ft.com/cms/s/0/ff671f66-d838-11dd-bcc0-000077b07658.html>

37. 'Winter Institute: China and U.S. joined at the hip,' St. Cloud State University news release, Monday, 2 March 2009, <http://www.stcloudstate.edu/news/newsrelease/default.asp?storyID=28126>
38. 'China-centric' because they ignore the obvious fact that the current account balance is also determined by US conditions.
39. See Woo (2008). Savings behaviour is not independent of the sophistication of the financial system. An advanced financial system will have a variety of financial institutions that would enable pooling of risks by providing medical insurance, pension insurance, and unemployment insurance; and transform savings into education loans, housing loans, and other types of investment loans to the private sector. *Ceteris paribus*, the more sophisticated a financial system, the lower the savings rate.
40. The system of prudential supervision must also be strengthened, and the interest rate be deregulated.
41. If speculative demand had been the overwhelmingly dominant cause for the property boom, then house rents would not have risen substantially (because the speculative investors would tend to rent out their extra units). Instead, rent in Beijing in March 2010 was 19.6% above March 2009; see 'Survey shows house prices still too high,' *China Daily*, 12 May 2010: http://www.chinadaily.com.cn/metro/2010-05/12/content_9839054.htm
42. It should be noted that (a) housing construction is relatively labour-intensive, and that home decoration is highly labour-intensive; and (b) that the local governments must hence replace land sales with property taxes as an important source of revenue.
43. See McKibbin, Wilcoxon, and Woo (2008) for an example of an efficient global CO₂ emission compact that China and the rest of the world could adopt.
44. The only economically meaningful definition of the equilibrium exchange rate is the market-clearing exchange rate produced in the absence of intervention by any central bank. This market-clearing exchange rate is characterized by the balance of payments position being zero and not by the trade account balance (or the current account balance) being zero or being at some *a priori* value. This means that the notion of exchange rate misalignment that is based on the proposed concept of the Fundamental Equilibrium Exchange Rate (FEER) is analytically vacuous because the FEER is not identical to the market-clearing exchange rate.
45. 'Schwab surprised by stance of India and Brazil,' *Financial Times*, 22 June 2007; and 'China's shadow looms over Doha failure,' *Financial Times*, 22 June 2007.
46. 'Brazil, others push outside Doha for trade pacts,' *The Wall Street Journal*, 5 July 2007.

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