Chapter 2

The Asian Giants and their Macroeconomic Impact

China and India's sustained growth and large populations are reshaping the world economy. Their newly felt scale is affecting global markets for labour and commodities. New demand has raised the price of both oil and industrial metals. The labour shock of China's entry into global markets has depressed low-skill wages globally, though the continuing shift of its export mix to higher-technology goods increasingly impacts middle-income countries.

Asset accumulation by the Chinese public sector has raised the country's global cyclical, financial and macroeconomic importance. Variations in China's output gap have growing repercussions on global interest and exchange rates. Reserve building there and elsewhere contributed to macroeconomic imbalances and the mispricing of financial risk on a global level. Socio-structural explanations for China's saving surplus mean monetary and exchange rate tools will not be enough for rebalancing. There is also a need for an increase in China's consumption rate, perhaps through reforms in its social, pension and family policies.

Introduction

The past two decades have seen an accelerating realignment of the global economy. The crisis has reinforced this rather than interrupting it, given the relatively early emergence of the large converging middle-income countries from recession. Three developments over this 20-year period in particular stand out. First, the initial wage shock resulting from the arrival of huge numbers of workers in the global labour force of large converging economies; second, the rising price of fossil energy and industrial metals – prompted by the vast appetite of these economies for raw materials, in turn, transferring wealth to their exporters; and third, the move of many emerging countries from being a net debtor to a net creditor, together with the downward pressure this has had on US and global interest rates.

Harnessing the headwinds and tailwinds of the global economy to contribute to poverty reduction strategies now means looking at more than just trade, foreign direct investment (FDI) and aid – the direct channels of interaction between large converging countries and the poor countries. It is necessary to look at the present and future potential of the drivers that support or even lead global growth. This also means analysing the pricing power of the large converging countries on the key macro variables that impact poor countries: raw material prices, low-skill wages and interest rates. A solid understanding of the global drivers of these macroeconomic trends will allow poor countries to formulate the appropriate national strategies and practices to respond to the rise of their converging partners. This chapter therefore looks first at the Asian giants' macroeconomic impact on each of these variables, and then examines what macroeconomic drivers underlie the imbalances that have dominated the global economy over the last decade.

A new engine of growth

As shown in Chapter 1, emerging and developing countries contribute to an increasingly large share of global growth. However, simply adding together the shares of emerging and developing countries can be deceptive. The influence of China and, increasingly, India is disproportionate and overwhelming, a reflection of both their scale and dynamism. Excluding China, the contribution of developing economies to PPP-adjusted global GDP growth was around 40% when the crisis broke in 2008. Including China raises the contribution of the emerging and developing group to almost 70%. As the crisis has unfolded, global growth has relied primarily on the emerging and developing economies, with nearly half coming from China alone (Figure 2.1).

Understanding the China's role – the leading member of the group of converging countries identified in Chapter 1 – is the key to understanding the macroeconomic implications of shifting wealth for poor countries. Indeed, China has become a global growth engine that should be treated as an additional driving force behind the recent growth performance in converging countries. China also has more power to influence

Figure 2.1. **Contribution to world GDP, PPP growth**

% Contribution to world GDP, PPP growth (based on 3-year moving average)
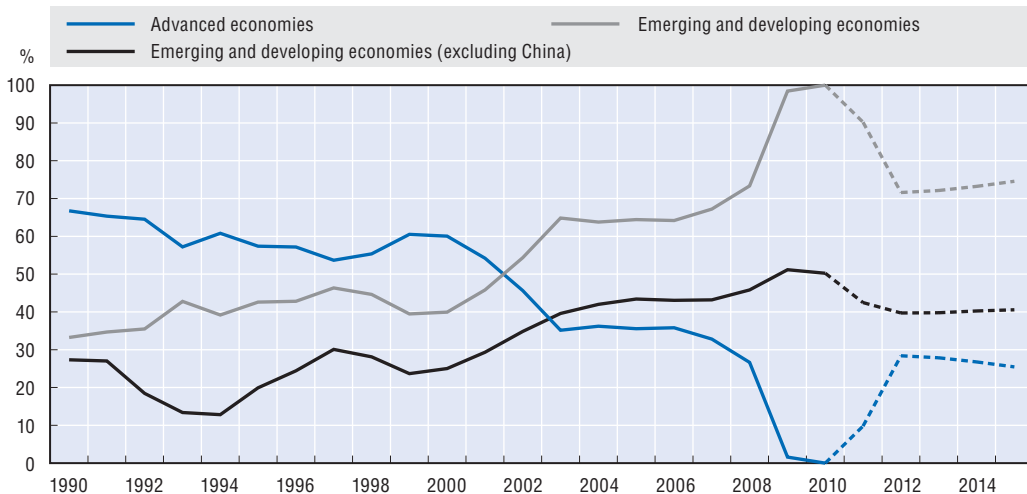
Note: Projections are shown with a dotted line.

Source: IMF (2010).

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global factor and goods prices than any other converging country (noting sector-specific exceptions for Brazil in agriculture and Saudi Arabia in fossil fuel energy).

Recent research by Levy Yeyati (2009) supports this contention. He shows that growth for a sample of emerging economies[1] from 2000 onwards was more dependent on growth in China than in the G7, a reversal of their dependence in the 1990s. Splitting the data between earlier (1993-99) and later (2000-09) periods, Levy Yeyati finds that the explanatory power of G7 growth virtually disappears in the later period as a result of increasing Chinese influence. The elasticity of growth in the sample to G7 growth in the later period was just 0.267, while the corresponding elasticity to China's growth had grown to 1.115. That is, 1 percentage point of GDP growth in China during this period was associated with growth in the sampled emerging economies of more than 1 percentage point.[2]

In a similar exercise, Garroway *et al.* (2010) extend the analysis beyond emerging economies and focus on changes in the sensitivity of all low-and middle-income country growth rates to Chinese growth. By comparing the 1990s to the 2000s, they document that the latter period witnessed strengthening of the link between China and the developing world. As was the case with the emerging markets in Levy-Yeyati's work, the sensitivity to advanced economies also significantly decreased for both the low and middle-income economies. They find that any change in the growth rates of the Chinese economy has implications for the emerging and developing world. A 1 percentage point increase in China's growth rates results in an 0.2 percentage point increase in the growth rates of low-income countries. As for the middle-income countries, this growth sensitivity with China is stronger, with a 1 percentage point increase in China implying a 0.37 percentage point increase in middle-income countries'growth rates.

These findings have important implications for low- and middle- income countries that are increasingly benefitting from China's growth. The results show that both the low and the middle-income economies have established a positive link with China. While this was the case for middle-income countries in both the 1990s and 2000s, the impact of China only became significant for the low-income economies in the 2000s. This evidence supports China's rising

profile as the new global driver of growth. However, it also highlights the amplified vulnerability of the developing economies to any shock to China's GDP. It is widely accepted that on average, across countries, economic growth is associated with reductions in income poverty (see Chapter 4). The research by Garroway *et al*. (2010) thus suggests that China's growth may have translated into poverty reduction in poor countries. China may have been the most potent global poverty-reduction engine during the first decade of the 21st century. Given disappointing growth in the G7 but a dynamic Chinese economy, a critical implication is that converging-country growth is linked to the global engine "that works".

What does this mean for poor countries? Their lack of social safety nets, lack of capacity to adopt counter-cyclical policies and a high degree of dependence on foreign flows (mostly in the form of remittances, FDI and aid) mean that macroeconomic linkages matter more for them than for other countries. The nature of economic interactions between the North and the South has evolved from dependence to inter-dependence along many axes.[3] Decoupling converging- and advanced-country growth should therefore be good news for poor countries. It should foster a more stable global growth constellation and increase opportunities for risk-sharing across countries. The emergence of new poles of global growth will mean higher output stability if diversified and independent output fluctuations between rich and converging countries tend to cancel each other out. Less welcome may be a conclusion that poor countries will "catch a cold when China sneezes" if China simply replaces the advanced economies as the source of potential contagion.

The shifting of the economic centre of gravity towards new growth engines has implications for asset values and the prices of raw materials. For decades, investors have looked to the United States to pull the world out of recession. Today, the impetus is coming from China, which has come through the financial crisis in much better shape than many observers initially expected. Poor countries, but also the western financial world will need to change their approaches accordingly. For example, when China acted to avoid domestic over-heating by imposing lending curbs on its banks in early 2010, the negative effects on raw material prices and Asian stock markets were virtually immediate.

The broader group of large converging countries matter increasingly for key prices that are important to poor countries, because they can bring massive shifts in relative wealth and purchasing power. This is discussed in the following sections.

Box 2.1. **China's place in the world – Shifting wealth, shifting health, shifting tastes…**

China's re-emergence as a world power is the most visible and recognisable manifestation of shifting wealth. The table below captures some dimensions of China's meteoric rise. The indicators include both traditional economic ones, as well as some alternative measures that offer a more eclectic view of shifting wealth in action. While China remains home to nearly one-fifth of the world's population, its share of the world's rural inhabitants and arable land has declined as the country transitions from a predominantly agricultural society to a modern industrialised one. The last 20 years have seen China double its share of the world's manufacturing value-added, triple its share of steel production, and almost quadruple its share of gross domestic product. China now holds more than one-tenth of the world's currency reserves and receives nearly one-tenth of the remittances sent home from migrants working abroad. Chinese residents today hold nearly one in three of the world's trademarks and account for one in six of its patent applications.

Box 2.1. **China's place in the world
– Shifting wealth, shifting health, shifting tastes...** *(cont.)*

China once accounted for more than one-third of global absolute poverty, now it is less than one-sixth. While holding a negligible part of the world's telecommunications infrastructure 20 years ago, China now accounts for one-fifth of the world's telephone subscribers, more than a quarter of the world's phone lines, and nearly one-sixth of the world's internet users.

The country has also dramatically increased its consumption of the world's luxury products. Chinese imports of French champagne have increased fifty-fold since the 1990s. Even with this growth China still represents less than 1% of global consumption of the beverage, so clearly there is still much more room for Chinese tastes to shift!

Not all the news is reason to celebrate, however. China has more than its "fair" share of the world's smokers, and despite remaining relatively poor, its share of global carbon emissions has been rising extremely rapidly.

Table 2.1. **China's share of the world's...**
Percentage

	Early 1990s	Late 2000s
Total population	21.6	19.8
Rural population	27.5	22.6
Arable land	9.2	8.6
Poor (living on < USD 1.25 PPP/day)	37.6	15.1
Manufacturing value-added	5.1	10.6
Steel production	12.4	38.8
GDP (PPP rates)	3.5	11.4
GDP (market rates)	1.7	7.1
Foreign exchange and gold reserves	2.7	21.9
Workers' remittances (received)	0.3	9.4
Trademarks (held by residents)	5.9	31.7
Patent applications (filed by residents)	0.9	15.1
Telephone subscribers	1.3	19.7
Telephone lines	1.3	28.9
Internet users	0.0	15.2
Champagne (imports by volume)	< 0.1	0.3
Tobacco smokers	–	26.8
Carbon emissions	11.3	20.1
Armed forces personnel	14.6	10.6
Arms exports	5.4	2.2
Arms imports	0.7	5.5

Source: IMF (2009a), World Bank (2009), UNIDO (2009), Central Intelligence Agency (2009), Guindon and Boisclair (2003), Comité Interprofessionnel des Vins de Champagne (2009).

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A labour supply shock – with an effect on global wages

The opening of formerly closed large economies brought a supply shock to the global labour market, the scale of which can be compared to the increase in the western world's access to land and natural resources following the opening of routes to the Americas five centuries ago. In the first years of the 1990s, the integration of China, India and the former Soviet Union brought the world economy new labour forces of 750 million, 450 million and 300 million respectively. The arrival of these 1.5 billion workers doubled the number of people working in open, market-oriented economies and so halved the capital/labour ratio.

Applying a very simple Cobb-Douglas production function (with typical factor shares of one-third for human capital, one-third for capital and one-third for labour), this shock labour integration may have depressed world real equilibrium low-skill wages by 15%.[4]

A core model of economic development, the Lewis-Ranis-Fei or "surplus labour model" (Fields, 2004), helps explain one crucial feature of this period. The modern sectors of the Asian giants – and by extension the world economy – have until recently had an effectively unlimited supply of labour at wages close to subsistence levels. The labour market was Ricardian, not neoclassical, in the sense that wages did not reflect marginal productivity but were able to stay at subsistence levels as long as surplus labour persisted. As the value of the marginal product of this labour far exceeded its cost, profits were high and these profits were saved and reinvested. China's extremely high corporate savings and investment rates therefore have a link to this labour-market phenomenon.

At first, rapid growth of exports of low-skill and labour-intensive manufactures, particularly by China, increased the available supply of these goods and hence exerted a downward pressure on their prices. Kaplinsky (2006) examined data on the major product-groupings (at the SITC eight-digit level) imported into the EU between 1988 and 2001 in which developing-country exporters were prominent. Reporting the proportion of the sectors for which the unit-price of imports from different income groups fell, he found that in almost one-third of these sectors the price of Chinese-origin products dropped. His later study (Fu *et al.*, 2010) suggests that China's exports have recently had less effect on those economies where competitiveness is largely based on low wages. Whereas prior to the late 1990s Chinese exports put greatest pressure on the prices of low-income countries, thereafter it was middle-income countries that were most affected. The study also points to a depressive effect for high-income countries in low-tech product markets.[5]

China's export success was first underpinned by cost-competitiveness in traditional light manufactures and final assembly as a result of its abundance of labour. This was accompanied by policy reforms which facilitated the linking of the local economy into global production chains. Many observers now also believe that China's competitiveness has benefited from an artificially low exchange rate, though this remains the subject of considerable debate.

This integration into the global economy certainly created competition, notably against labour in countries that have traditionally been outsourcing destinations. On the other hand, it has also created openings. China has become a sizeable importer within global production networks. In fact China's role as an importer of components from other East Asian countries for processing and re-export to western markets has grown so deep that China cyclically leads its Asian neighbours (Tanaka, 2010). This national and regional integration into global production is reflected in the dual nature of China's bilateral trade balances: in surplus with most developed economies – particularly European countries and the United States – and in deficit with nearly all Asian countries. The complementarities of Chinese and Asian exports are therefore such that a real effective appreciation of the renminbi would lead to a decline in total exports from many East Asian economies (Garcia-Herrero and Koivu, 2008).

The *OECD's 2010 Economic Survey on China* (OECD, 2010) sets out how China's labour market is in transition. Over the past decade the share of jobs not controlled by the state has increased considerably, whilst employment in agriculture has declined against a backdrop of ongoing urbanisation. More than 200 million people have been drawn to urban areas through official or unofficial migration, despite obstacles to labour mobility such as the registration system and its associated restrictions on access to social services. The urban labour market

grew at an annual rate of 3.5% compound during 2000-07 (Cai *et al.*, 2009), implying an annual absorption requirement of 12-15 million people. Behind this movement is the rural-urban income gap – the ratio stood at 1:3 in 2007 – combined with some relaxation of internal restrictions. According to nationally representative Chinese census data from 2005, migrant workers accounted for more than 20% of the labour force in the urban labour market. Yet despite this massive migration, and allowing for rural-urban skill differences (Gagnon *et al.*, 2009), urban per capita income has continued to rise much faster than rural per capita income.

However, recent estimates using provincial-level data show that the marginal product of labour has been increasing at a faster pace than wages. This suggests that China is steadily moving toward the "Lewis Turning Point" (Islam and Yokota, 2008), where wages start to reflect marginal labour productivity. For its trading partners this shift has two effects: it will reduce pressure on global wages, but may also reduce the real purchasing power of wages as the price of low-tech goods rises in response to higher Chinese unit labour costs.

New and growing demand – reflected in commodity prices

Until about 2000, continuing technological advances had prompted the widely held belief that global GDP was becoming "lighter", that is each unit of output required fewer units of raw-material input to produce. The perception was that demand for commodities would remain subdued even in the face of robust economic growth. In fact, since 2000 the demand for commodities has been strong. By the onset of the crisis, oil prices had quadrupled and metals prices almost doubled from their 1995 levels (Figure 2.2). Food prices, by contrast, saw only a relatively moderate rise over the decade (including a short-term spike in 2007-08), reflecting the prevalence of supply-side determinants which have driven price decreases over longer periods (OECD-FAO, 2008).

Figure 2.2. **Real commodity prices**

Price indices, 1995 = 100
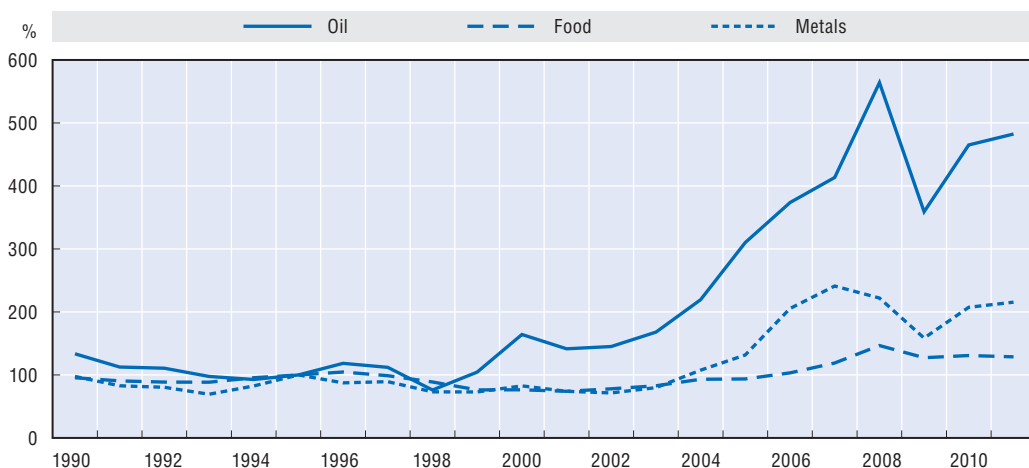
Note: Data for 2010 and 2011 based on IMF staff projections.

Source: IMF (2010).

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Many explanations have been put forward for the surge in the real price of crude oil, including speculation in oil futures and spot markets, adverse oil supply shocks, deliberate restrictions on OPEC production, and shifts in global real economic activity.[6] Recent evidence, however, points to a significant demand effect (which applies also to metal prices)

arising from superior emerging-country growth. Killian and Hicks (2009) utilise a direct measure of global demand shocks, based on revisions to real GDP growth forecasts, to show: that revisions were associated primarily with unexpected growth in emerging economies; that markets were repeatedly surprised by the strength of this growth; that these surprises were associated with a hump-shaped response in the real price of oil that reached its peak after 12 to 16 months; and that news about global growth predicts much of the surge in the real price of oil from mid-2003 until mid-2008 and much of its subsequent decline. The IEA (2007) simulated hypothetical demand on real oil and metal prices by removing the impact of non-OECD growth. According to their simulations, the cumulative impact over 2000-05 of zero growth outside the OECD member economies would have been to leave real oil prices 40% lower than actually observed, and real metal prices 10% lower.

Rising global demand for industrial commodities driven by unexpected economic growth certainly seems to have supported the real price of industrial metals. From 2000 to 2005, China contributed all of the growth in consumption demand in lead, nickel, tin and zinc, and roughly half in aluminium, copper and iron ore (steel). Indian energy and steel use also accelerated in the first decade of the 21st century, although at a more moderate pace. China alone accounted for a third of oil demand growth, and the contribution of the rest of Emerging Asia, Emerging Europe and, especially, the Middle East, was also significant until the global crisis struck. Conversely, the consequent rise in prices actually led to a slowdown in demand growth in mature markets.

Are we in a new super cycle'?

Changes in market demand on this scale, of this pervasiveness and this duration are unusual. In a careful empirical investigation by the IMF of data covering 150 years, Cuddington and Jerrett (2008) looked at the market for copper. They conclude that it was not possible to reject the hypothesis that the high GDP growth rates enjoyed by China and other emerging markets were associated with the emergence post-1999 of a "super cycle" in commodities.

"Super cycles" are phenomena associated with the urbanisation and industrialisation of large populous economies. They are demand driven (which implies that the super cycle components in individual commodity prices should be strongly positively correlated). They are long-period, with upswings of roughly 10 to 35 years. And they are broad-based, affecting a wide range of industrial commodities including metals and other non-renewable resources. The past century and a half brought two earlier super cycle expansions: the first ran from the late 1800s through the early 1900s, driven by economic growth in the United States; the second was from roughly 1945 to 1975, initiated by post-war reconstruction in Europe and fuelled by Japanese economic expansion.

Nevertheless, at current levels of commodity prices it would be reasonable to recognise considerable downside risks. First, China, even though relatively scarce in natural resources, is still a significant producer of some (for example oil and metals) and rising prices can be expected to trigger a domestic supply response. Second, rising prices bring greater scope for the cost-effective implementation of alternative and more efficient technologies – China, for example, is already raising energy efficiency and reducing energy demand per unit of output. Third, the initial rapid take-off phase of energy- and metal-intensive industrialisation is likely to give way to more balanced growth, with emphasis on domestic consumption and rural development. While it is the impact on marginal demand that has driven price determination in oils and metals, future growth may well come more from gains in factor productivity than from capital accumulation.

The exception: food

Agricultural commodities seem to have other drivers. OECD-FAO (2008) do not see demand from China, India or other emerging markets as an over-riding factor in determining price trends in this sector. They believe that growth in the supply of agricultural products (largely as a result of productivity gains) will eventually outweigh demand – whether for human consumption or as a feed-stock for industry, in particular biofuel production. Consequently, they see prices resuming a real decline over the longer term, though possibly not as fast as has previously been the case.[7] Continued population growth, expanding demand as a result of higher incomes, and climate change are the future challenges for agriculture production (von Braun, 2008). What is certain is that the huge populations of Brazil, China and India will mean these countries, even if not price-setters, continue to play a critical role in world food markets as both major producers and consumers.

Big enough to be a new source of volatility?

Rising absolute prices as a result of new demand from the Asian giants have a significant positive impact on the economic performance of the developing world. However, the value of this is tempered by price volatility. Volatility in global markets arises partly from cyclical variations in demand and partly from arbitrage between domestic production and imports. Although it is difficult in practice to separate out these effects, at least some part may stem from the role of large converging countries as swing producers – exporting when prices are high and stockpiling when (for cyclical or other reasons) they are lower. Given the size of their economies, any behavioural change – real or perceived – is quickly reflected in prices and so may feed increased volatility. Variations in China's and India's commodity stockpiles, or infrastructure investments (as in 2009 economic stimuli) are examples of such changes.

But is the world really experiencing higher commodity-price volatility than before? In the left-hand panel of Table 2.2, we calculate a measure of volatility over a number of periods between 1990 and 2009. Clearly there has indeed been an increase in volatility over the last decade, even discounting the very high levels experienced during the crisis. The increase is most marked in the case of fuel commodities.

Table 2.2. **Commodity price volatility**

	Volatility of non-fuel primary commodities	Volatility of fuel and non-fuel commodities		Volatility of all commodities		
				USD	SDR	EUR
1990-1995	0.015	0.019	1990-1994	0.022	0.028	
1995-2000	0.018	0.035	1995-1999	0.019	0.022	
2000-2007	0.021	0.041	2000-2007	0.026	0.025	0.034
2008-2009	0.056	0.096	2008-2009	0.062	0.055	0.056
1990-2007	0.019	0.035	1990-1999	0.021	0.025	
1990-2000	0.017	0.029	2000-2007	0.026	0.025	

Notes: Table entries represent the volatility levels of commodity price indices, calculated as the standard deviation of the per cent change in the monthly price indices over each period. The left-hand table presents the volatility levels of non-fuel and all commodity price indices in USD (2005 = 100). The right-hand table presents the volatility of the all commodity price index reported in USD, special drawing rights (SDR) and EUR (2000 = 100 in each case). This controls for any changes in the volatility of commodity prices induced by exchange rate fluctuations.
Source: (Left-hand) IMF (2009b), (right-hand) UNCTAD (2009b).

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Most commodity price indices are denominated in US dollars, and one component of overall commodity price volatility is therefore volatility in exchange rates. The right-hand panel of the table separates out this component. The figures show that the commodity price volatility calculations are robust to exchange rate fluctuations. Trends in volatility levels cannot be attributed only to the fluctuations in the value of the US dollar. Currency hedging alone will not be enough – the increased underlying volatility of commodity prices will need specific hedging or insurance to mitigate its cost to both importing and exporting countries.

The effect of the giants on terms of trade

From the perspective of the poor countries, the most important consequence of the Asian giants' entry into the global economy has been their impact on the global terms of trade (Kaplinsky, 2006). As noted above, their arrival lowered the global average resource/labour ratio and increased the share of workers with a basic education in the global labour force. Other countries therefore found their relative position shifted in the opposite direction, tending to move their comparative advantage away from labour-intensive manufacturing. The corresponding increase in comparative advantage was mainly in primary production (Wood and Mayer, 2009). For a particular country, therefore, the net impact depends on the composition of its manufacturing and primary production. That is, how closely its industrial products compete with Asian exports and how much additional demand there is for its primary exports. The changing terms of trade (documented in Figure 2.3) have major strategic implications for poor countries, and frame the development of policies covering, for example, aid, foreign investment and trade negotiations. A long-term reversal in the relationship between the prices of manufactures and commodities would challenge the basic premise of industrialisation which underlies

Figure 2.3. **Net barter terms of trade, 2000-08**

Terms of trade indices, 2000 = 100
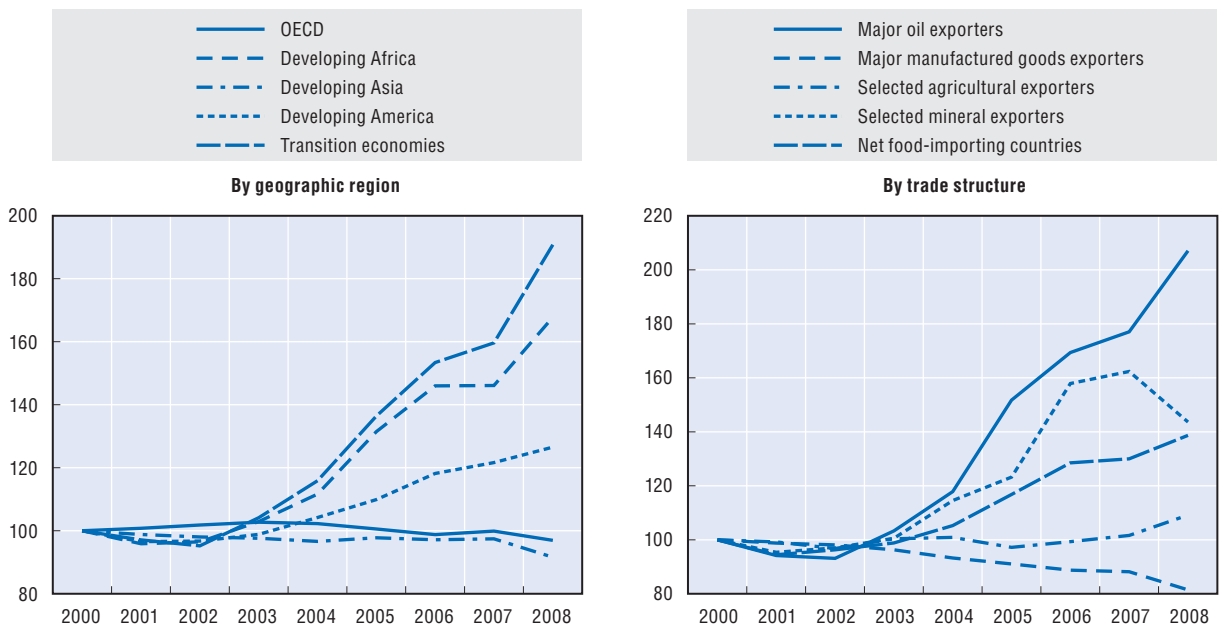
Note: Net food importers are low-income food-deficit countries, excluding exporters of fuel and minerals.

Source: UNCTAD (2009c).

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much of development strategy (Goldstein *et al.*, 2006), This would upset the rationale behind the commitment to industrialise and so reduce the relative importance of the non-food commodity sectors of the economy. The rise of labour-abundant China and India has challenged the logic of this commitment. Their impact is related to the "fallacy of composition" problem in labour-intensive manufactures: if a number of competing economies all try to expand their exports of labour-intensive manufactures, who will do the importing?

There are two reasons why the fallacy of composition might hold. One is that the glut of manufactured goods depresses prices, reducing the private and social returns to manufacturing investment. The second is that a flood of exports might provoke a protectionist response in the importing markets (largely the advanced economies), again reducing the returns to investment in late industrialising countries (Commission on Growth and Development, 2008). For Africa, these arguments might currently seem rather academic – African countries export very few manufactured goods and so the immediate competition they face from China and India is limited, albeit not insignificant (Goldstein *et al.*, 2006). The key issue, though, is not this immediate effect but rather the possible loss of this route to development for the continent. The good news seems to be that the question of the fallacy seems now to be receding in importance thanks to the increasing sophistication of products from China and India (Woo, 2010).

East and South Asia suffer – but many other groups benefit

The countries in each region depicted in the right-hand panel of Figure 2.3 do not form homogenous groups, but they do tend to trade in similar ways and recent regional trends for net barter terms of trade seem to confirm this. Albeit with notable intra-regional differences, the 2000s witnessed a strong rise in the barter terms of trade for the Arab Gulf region, Africa and Latin America. In contrast, East and South Asia have seen their barter terms of trade decline. These countries tend to be resource poor and are more integrated into global production chains of transnational corporations. Because of similarity in endowment and trade patterns, Southeast Asian manufactures have initially been more affected by China's opening, with complementary and competitive forces both at play. While China has been increasing competition in the production of standardised electronic parts, it is complementary to the extent that its neighbours are part of an expanding assembly production network within transnational corporations regional production chains (Yusuf, 2009).

Many countries in Africa and Latin America are rich in natural resources and these often dominate their exports. The standard inter-industry trade model implies that third-market export competition with the Asian giants may be harmful for low-income countries in cases where there are significant similarities between their export structures. Such a similarity has indeed been demonstrated for Mexico and South Africa – though these countries do not belong to the low-income group (see Goldstein *et al.*, 2006; and Avendaño *et al.*, 2008). For most of low-income Africa and Latin America, on the other hand, there is little to support the perception of China and India as threatening competitors, and this position is confirmed by the evolution of terms of trade during the 2000s.

For low-income importers, China's opening has also been welfare-enhancing. In a standard trade theory setting China's opening and increased interaction with Africa could have two consequences: African countries importing new Chinese products (trade creation); or importing from China what they would have bought from other trade partners (trade diversion). Where trade creation dominates, partial trade liberalisation provides

benefits to African importers. However, if both trade creation and trade diversion occur the consequence in terms of net well-being for the African countries is difficult to predict. Testing creation and diversion effects in a standard gravitation model, Berthélemy (2009) suggests there is clear evidence of trade creation between 1996 and 2007, while over the same period he cannot detect trade diversion from Africa's other trade partners sufficient to be welfare-reducing.[8]

A dynamic effect as export composition changes

The future effects on terms of trade of Asian growth may well be different. The trade patterns of growing countries tend to be quite dynamic, and the composition of output can change quite quickly if productive factors are not being accumulated at identical rates. If, say, skills in China advance faster than its other factors, then China's skill-intensive output will rise disproportionately.[9] Moreover, the engine of their growth is also important, with capital-driven growth exerting far greater upward force on agricultural and energy prices than productivity-driven growth (Martin *et al.*, 2008). A shift toward higher value-added and better-quality exports would also change the welfare effects (Hummels and Klenow, 2005), with China benefiting from improved unit prices while poorer countries would see their export scope increase. Higher real domestic wages or a real appreciation of the renminbi would encourage China's structural upgrading. This would in turn reduce price pressures on low-tech goods and on low-income countries. At the same time, technological upgrading in China would move China's price impact from the middle-income to the high-income economies. Any such process would be likely to be protracted however, given the still considerable reserves of unskilled labour in China.

Using unit prices of exports to investigate changing comparative advantage and the evolution of export sophistication, Fu *et al.* (2010) find that it is middle-income countries that have faced greatest price competition from China's exports. This is particularly notable from the late 1990s onwards, a consequence of China's market expansion, its WTO entry and movements in the exchange rate. China's exports also appear to have a significant downward impact on the unit prices of exports from high-income countries. For low-income countries, however, the effect is not evident. These findings are confirmed by a variety of studies for ASEAN. Chapponière and Cling (2009), for example, compare the export structures of Viet Nam and China and find them very different. They conclude that China is not "crowding out" Viet Nam in the US markets for textiles and clothing. Petri (2009) finds that China is, in fact, mainly a competitor to middle-income ASEAN countries and that it is India that provides the principal competition for the lower-income countries in the group.

The Asian impact on global interest rates

From the early 2000s, China's influence began to expand beyond goods and commodity markets into world financial markets. Seen first just as a producer of cheap goods, China has increasingly become a source of cheap savings. The accumulation by the Chinese official sector of foreign assets which accompanied this has, in turn, raised the country's global cyclical, financial and macroeconomic importance. Variations in China's output gap now have growing repercussions on key global interest and exchange rates (Reisen *et al.*, 2005).

Over the same period, in a process that might be likened to a supplier making loans to its clients, China has become the world's biggest holder of US government debt. Work by Warnock and Warnock (2009) show how the accumulation of China's foreign exchange

reserves and their investment into US Treasuries has had a dampening effect on US and hence world interest rates. The authors estimate that the effect was to reduce short-term US interest rates by 140 basis points in 2004, and produced some flattering of the US yield curve.[10]

Global imbalances

Underlying these Treasury bond acquisitions are the imbalances that have dominated global trade in recent years. It is natural to ask if these are a problem in themselves – did they contribute to the crisis? – and, if so, to look at what macroeconomic drivers underlie them with a view to examining ways in which they might be mitigated in the future.

Talk of "global imbalances" essentially refers to the current account surpluses of around 100 countries, most of them classified as developing or emerging. These have largely arisen in response to the US current account deficit – the excess of US domestic investment over US national savings. The position is summarised in Figure 2.4.

Figure 2.4. **Global imbalances in the current account**
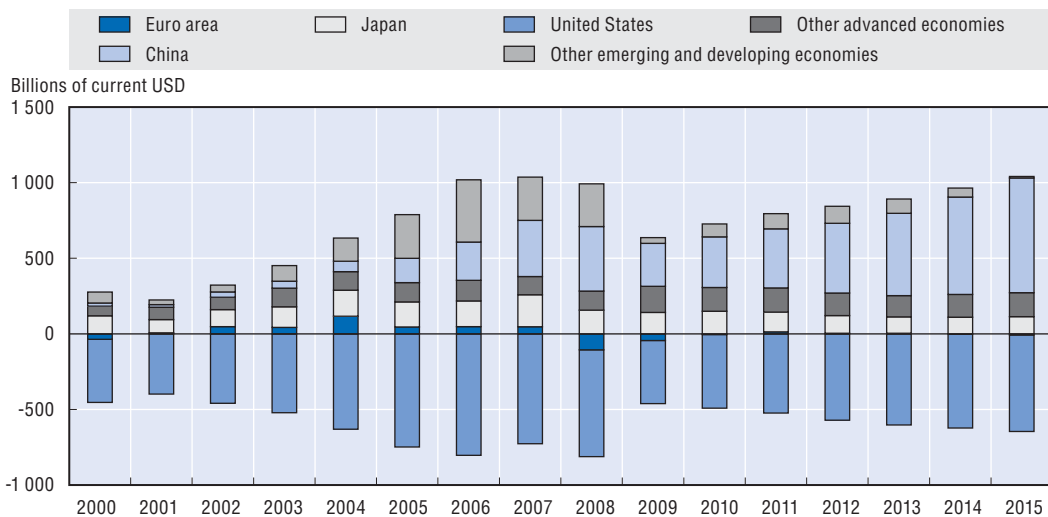
Note: Data for 2009-2015 (Japan and the United States) and 2008-2015 (all others) based on IMF staff estimates.
Source: Authors' calculations based on IMF (2010).

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The annual figures themselves are large, and their accumulation over time has led to the creation of huge net asset positions. The United States, for example, outspent its national income by an accumulated USD 4.7 trillion, equivalent to 47.3% of GDP, from 2000 to 2008. Over the same period, China's accumulated surplus was USD 1.4 trillion – huge by any measure, but by itself only enough to fund some 30% of the US deficit. To fill the gap the United States was absorbing three-quarters of the world's savings until the crisis. Another sizeable imbalance has been the current account surpluses of oil exporters, notably in the Gulf region, where the effect on oil prices of the voracious appetites of the Asian giants has created a second wave of asset build-up. Imbalances on this scale have led to a reshaping of the lender- and investor-bases throughout the world.

Imbalances? Or out of balance?

The perception of these imbalances and their accompanying capital flows at the time was benign: the process was a natural consequence of the rapid economic integration

between China and the United States[11] and of limited financial development in the converging middle-income countries.

China's accumulation of assets denominated in US dollars additionally gives it an apparent direct economic interest in the maintenance of a stable dollar-renminbi exchange rate. To some observers, this symbiotic producer-consumer relationship between China and the United States supports a new system of quasi-fixed exchange rates. In this view, current account imbalances matter less because of the mutual economic dependence of the economies at either end of the flows. This relationship has been nicknamed "Bretton Woods II" – a term coined by Dooley *et al.* (2003) in reference to Germany's and Japan's interaction with the United States in the post-war II period.

However, allowing these imbalances and their accompanying capital flows to accumulate may have contributed to the over-leveraging and under-pricing of risk that triggered the crisis. This was recognised at the Pittsburgh Summit in September 2009 when the G20 leaders announced the creation of a new framework to co-ordinate and monitor national economic policies in order to reduce existing global imbalances and prevent them from building up in the future. In addition, Roubini and Stetser (2005), among many others, argued against the stability of the assumed underlying "Bretton Woods II", pointing out that the renminbi-dollar exchange rate was not a standard and that the financing required to sustain US current-account deficits was increasing faster than the willingness of the world's central banks to build their dollar reserves.

International imbalances, notably the US deficit and the Chinese surplus, have reduced appreciably during the downturn. But it is questionable whether the root causes have yet been addressed. According to recent projections (OECD, 2009a) this crisis-related adjustment had run its course by the end of 2009, and the OECD went on to warn that "with imbalances remaining at levels that would have been unprecedented just a few years ago, the risk of disorderly exchange rate adjustment cannot be excluded. This underlines the importance of international efforts … to ensure a sustainable international growth pattern." While economists may disagree on the role of the global imbalances in the crisis, few dispute that the strength and sustainability of future growth will largely depend on the degree to which a rebalancing of global demand takes place (see, for a recent discussion, Blanchard and Milesi-Ferretti, 2009).

Is a savings glut the problem?

Finding a way to deal with these global imbalances – and defining the appropriate policy responses – will require clarity about their causes. If these are essentially monetary, then monetary policy and exchange rate responses (such as appreciation of the renminbi) will be appropriate. If, on the other hand, they are primarily structural in nature, then structural policy responses, such as obliging state enterprises to pay taxes or dividends, will be needed.

Some observers (for example Wolf, 2008) blame global imbalances on misguided exchange rate policies in Asia. According to this view, these policies fuelled excess savings (the so-called "savings glut"), so facilitating the continuation of loose monetary policy in the United States. This in turn supported high demand and boosted commodity prices, all in a self-reinforcing manner. The governor of the US Federal Reserve Board, Ben Bernanke (2005), famously argued that the US external imbalance was driven by this savings glut, a result of the financial integration of the United States with economies – especially those of

the Asian giants – which found themselves at a much lower level of development and governance of financial markets.

Alternatives to the savings glut view of global imbalances focus on the role of domestic policies in the United States such as lenient monetary, fiscal and financial policies in the face of a housing bubble, and deficiencies in the regulation of financial markets. Another more complementary argument points to the relative scarcity of safe assets and the financial underdevelopment of emerging countries in general, and China in particular.

Bernanke's view has been modelled in an influential paper by Caballero *et al.* (2008). They built a comprehensive framework to explain US current-account deficits, low interest rates globally, and the emergence and subsequent bursting of bubbles (including those in the commodities market). At the root of this model is excess demand for assets from residents in converging economies. This excess demand arises because weak financial systems in their countries prevent these agents from fully appropriating the income generated by domestic assets. When capital account liberalisation allows these agents to invest abroad, they look for opportunities in countries with more developed financial systems. In this hypothesis, the United States maintains its ability to incur dollar liabilities by exploiting its comparative advantage in supplying high-quality financial assets to the rest of the world.

Frankel (2009) classifies this saving glut argument as "exotic". Its premise of US comparative advantage in financial matters has been undermined by the crisis: many assets were revealed to be of low quality and its financial institutions suffered a major loss of credibility. A study by the European Central Bank (Bracke and Fidora, 2008) explored to what extent the rising imbalances could be attributed to three structural shocks in different mechanisms of the global economy: monetary shocks (the "excess liquidity" hypothesis); preference shocks ("savings glut"); and investment shocks ("investment drought"). They found that US monetary policy explained the greatest part of the variation in imbalances, but also confirmed the existence of an Asian saving glut.

Figure 2.5. **International reserves**

Index based on a three-month moving average, January 2000 = 100
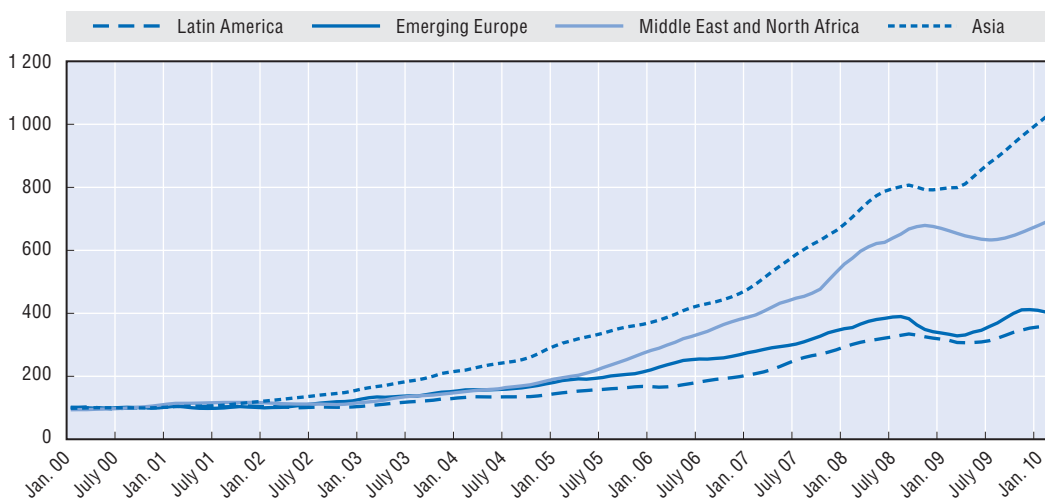
Note: Emerging Europe refers to Bulgaria, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and Turkey. Middle East and North Africa refers to Bahrain, Djibouti, Egypt, Islamic Republic of Iran, Jordan, Kuwait, Lebanon, Libya, Oman, Qatar, Saudi Arabia, Sudan, Syrian Arab Republic, United Arab Emirates, and Republic of Yemen.
Source: IMF (2010).

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The precautionary motive

The immediate cause of reserve accumulation is usually central bank intervention in the foreign exchange market to prevent financial inflows driving up the external value of the currency. However, the Asian and Russian crises of 1997-98 also demonstrated to emerging economies the advantage of holding a large stock of international reserves as a way of enabling them to protect their domestic financial system without recourse to the IMF.

This lesson has certainly been repeated in the current crisis. The crisis, in its post-Lehman phase, has seen capital leaving emerging markets in response to problems in advanced ones. The use of reserves to stabilise net capital outflows has proved to be the most important domestically-controlled circuit breaker for preventing this capital flight translating into local slumps in the countries affected. Countries with reserves have been able to deploy them and still take steps to ease credit in their economy. Countries without reserves could not do this and have largely remained both highly vulnerable and dependent on a recovery of the international system. The influence of differences in holdings of official foreign exchange reserves can be seen in the heterogeneous incidence and severity of the 2008-09 crisis, with Emerging Europe hardest hit and Emerging Asia, Africa and the Middle East least.

The existence of this self-insurance motive for reserve building is supported by recent empirical research (Obstfeld *et al.*, 2008). Other factors have also been important, particularly since 2002: the scale of domestic financial liabilities available to be converted into foreign currency (money supply); financial openness; the ability to access foreign currency through debt markets; and exchange-rate pegs are all significant predictors of reserve stocks. Another precautionary motive will be found where countries have chosen monetary stimulus as a way of responding to the crisis, since the effect of such measures is to increase money supply relative to GDP.

That this accumulation comes with an exposure to asset concentration does not seem to act as a deterrent. As early as 2004, China's monetary authorities were beginning to question the concentration and structure of their foreign exchange reserves. The inherent interest rate and currency risks of their exposure to the US dollar and to the value of US Treasury bonds militated in favour of portfolio diversification. Nevertheless, by early 2010 China's total holdings were nearly USD 3 trillion, of which USD 2.4 trillion was in official reserves and USD 500 billion in sovereign wealth funds. As noted above, China's increase in domestic bank lending in 2009, as a measure to stimulate its economy, might require a further rise in its official reserves for precautionary purposes (Obstfeld *et al.*, 2008).

An alternative view – structural issues in China

Chinese economists and authorities point to structural, rather than monetary, explanations for their country's rising current-account surplus. As a matter of definition, China's current-account surplus is equal to the excess of its national savings over its domestic investment. And China has seen a strong rise in retained corporate and surpluses of government-owned enterprises over recent years (Figure 2.6).

Reforms to the pension, housing and healthcare systems over the course of the 1990s brought an effective end to China's "iron-bowl" system (promising lifetime employment and welfare), and at the same time state-owned enterprises (SOEs) stopped providing free

Figure 2.6. **Sectoral savings balances in China and OECD countries**

% relative to GDP
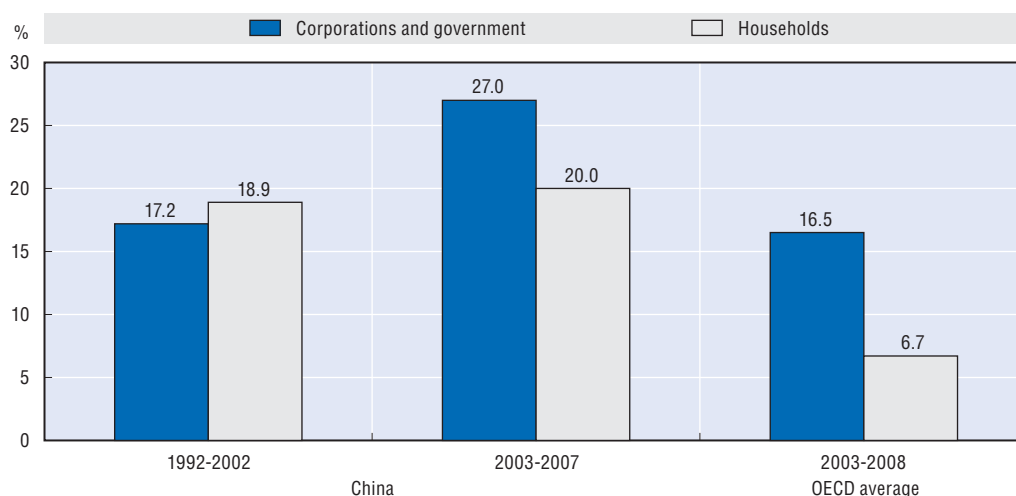
pensions and housing (Zhou, 2009). Since no social-security system took their place, the effect of this was to transfer costs and risk to households.

The first impact of this was on corporate profitability. As in the presence of a large pool of subsistence labour the rise in wages will only be slowly reflected in the cost-base of an enterprise, the SOE sector became highly profitable and increased its savings while decreasing its contribution to social security.[12] Corporate savings were further bolstered by the fact that until recently the SOEs did not have to pay dividends or taxes. This left them with plentiful retained earnings needing to be allocated. Their domestic financial market offered few alternative investment instruments and the capital account was largely closed. The natural home for these savings was therefore to reinvest in additional capacity. Reforms since 2008 have required SOEs to distribute part of their profits as dividends, but the prescribed dividend rates are low by OECD standards and should be increased to improve shareholder value and lower corporate savings.

The second impact was on the domestic sector and in particular on precautionary savings. No other major country has a household savings rate as high as China's. Since the reforms of the 1990s, the Chinese have worried about costs of healthcare, education, and provision in old age.[13] As they bear not just the costs, but also the risk of how these costs change over time, households are prompted to save more.

The relative importance of these drivers for savings has recently been tested empirically. Econometric analysis published by the Bank for International Settlements (Ma and Haiwen, 2009) measured the relative importance of a range of variables on the evolution of China's net foreign asset position – a result of its accumulated net saving surplus – over the period 1985-2007. The estimated coefficients for the real effective exchange rate of the renminbi emphasised by Wolf (2008) and for financial development (see Caballero *et al.*, 2008) are both insignificant. By contrast, the ratio of domestic and external government debt to GDP and the youth-dependency ratio (the proportion of the population under 15) are both highly significant.

This array of socio-structural explanations for China's saving surplus suggests that monetary tools alone will be insufficient to redress global imbalances. A structural rebalancing of the world economy will need reforms in China's social, pension and family policies with the goal of raising China's consumption rate. These might include the restoration of basic social services, such as in health and education. The investment required by the Chinese government to build an all-round social-welfare system would be CNY 5.74 trillion (some USD 850 billion) by 2020, according to estimates by the China Development Research Foundation (*China Daily*, 26 February 2009). The potentially fundamental nature of some of these changes is illustrated by Box 2.2.

Box 2.2. **"Son preference" and savings rates**

New research suggests that gender discrimination in the form of "son preference" may drive up household saving rates. High household savings can be found primarily in a few large Asian countries and in oil exporting countries – including many countries affected by what Nobel laureate Amaryta Sen calls "missing women". "Missing women" refers to baby girls who are never born or who never make it to maturity because of ingrained social preference for a male child. In many of these societies daughters are considered a liability – the view is they provide little productive value to their families and that investing in them is a waste as they will eventually leave the family when they marry. Female infant and child mortality figures in these countries are high, often due to insufficient health care and neglect of girls. In some instances, sex-selective abortions are used to ensure that many girls are never even born.

Wei and Zhang (2009) highlight the increasing imbalance between the numbers of male and female children born in China. For every 100 girls born today there are 122 boys, presumably as a result of the "one-child policy", pre-natal ultrasound screening possibilities and the reduction in fertility. Wei and Zhang found that not only did households with sons on average save more than households with daughters, but also that households with sons tend to raise their savings rate if they live in a region with a more skewed ratio of males to females. The authors show a close correlation between the sex ratio at birth lagged by 20 years and the rise in China's private saving rate. A skewed sex ratio is, it seems, fuelling a highly competitive "marriage market", pushing up the savings rate for all households, since even those not competing in the marriage market must compete to buy housing and make other significant purchases. This driver up China's savings rate and with it global imbalances.

While there are certainly many reasons for high household savings, this research by Wei and Zhang suggests that discrimination against women plays an important role as well. Their findings are further supported by data collected for SIGI, the Social Institutions and Gender Index (*www.genderindex.org*), compiled by the OECD Development Centre. Figure 2.7 suggests that the link between son preference and a country's gross savings rate also seems to hold in a cross-country setting.* In countries which have a strong preference for boys the household savings are higher than in countries with normal sex ratios.

* Within SIGI "son preference" is an index value describing the difference between the number of women that would be expected in a population (assuming no son preference) and the actual number of women observed. Countries are assigned corresponding values in five categories between 0 (no women are missing) and 1 ("severe incidence").

Box 2.2. **"Son preference" and savings rates** *(cont.)*

Figure 2.7. **Son preference and savings rates**

Average gross savings as a share of gross national income
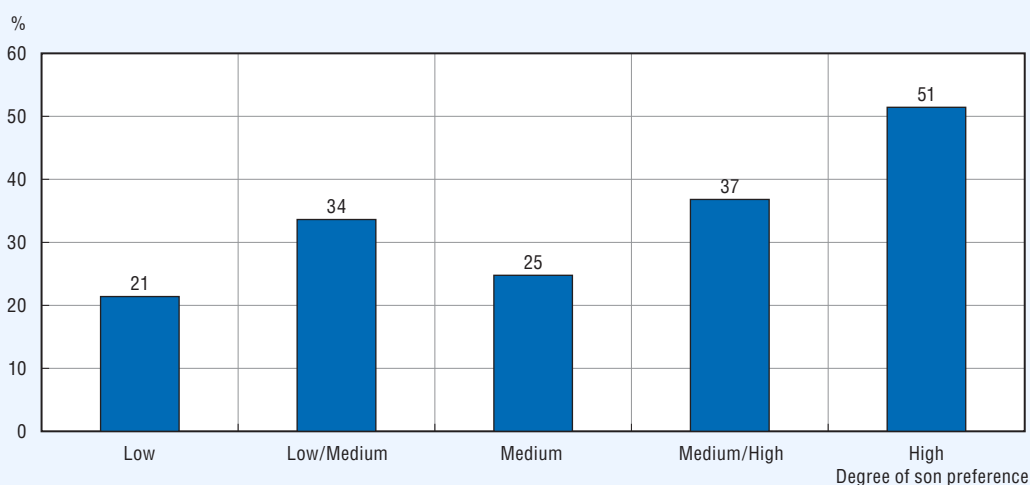
Note: Sample is the 22 countries which present data for both average gross savings and degree of son preference.

Source: Authors' calculations based on OECD (2009b) and World Bank (2009).

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"Money talks" – the world has new financiers

The fast accumulation of global economic imbalances over the past decade has brought about a significant shift in the world's wealth in favour of those countries running surpluses. The United States finds itself, in common with some of its OECD peers, being financed by countries such as China, the Gulf states, Brazil and Russia – countries which until recently played no substantial role as international investors.

The United States is now the world's biggest debtor: its net international investment position (the difference between the financial claims of its residents on the rest of the world and their equivalent liabilities) had sunk to minus USD 3.5 trillion by 2008, equivalent to 24% of GDP. More than half of all US Treasury securities by the end of 2009 were held outside OECD member countries, with China (including Hong Kong, China) accounting for more than a quarter (Table 2.3). The title of Cohen and DeLong's book (2010) points to the potential implications: *The End of Influence: What Happens When Other Countries Have the Money*.

A corollary to the differing saving rates is the impact on public indebtedness. Progress in tax collection and management of public debt, combined with GDP growth rates higher than interest rates, have brought about a remarkable change in the trend of public debt ratios in poor countries. At the same time, ratios have been deteriorating in advanced countries, particularly since the crisis (Figure 2.8). While in the 1980s and 1990s fiscal weakness was seen as a trait of emerging markets, lack of fiscal discipline increasingly appears to be an attribute of certain advanced countries.

However, emerging-countries are as yet "immature" creditors for which there is not yet any material demand for financial instruments denominated in their own currencies. They must therefore manage their net external financial assets in foreign currencies

Table 2.3. **Major non-OECD holders of US treasury securities**

Holder	Holding[1] USD billions	Proportion of total %
China	895	24.3
Oil exporters[2]	207	5.6
Caribbean banking centres[3]	128	3.5
Brazil	169	4.6
Hong Kong, China	149	4.0
Russian Federation	142	3.8
Non-OECD total	**2 143**	**57.8**

1. Estimated foreign holdings of US Treasury marketable and non-marketable bills, bonds and notes reported under the Treasury International Capital reporting system.
2. Ecuador, Venezuela, Indonesia, Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, the United Arab Emirates, Algeria, Gabon, Libya and Nigeria.
3. Bahamas, Bermuda, British Virgin Islands, Cayman Islands, Netherlands Antilles and Panama.
Source: US Treasury (2009).

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against the inherent currency mismatch. As the crises of the 1990s amply demonstrate, such mismatches can be time bombs that can suddenly wreck balance sheets, cause disruptive change to markets and trigger deep slumps. Eliminating (or at least reducing) this contingent currency risk provides a strong incentive to switch from buying foreign financial assets to foreign real assets. Such purchases will have greatest effect on poorer countries, where real assets dominate financial assets.

Figure 2.8. **Public debt as a share of GDP**
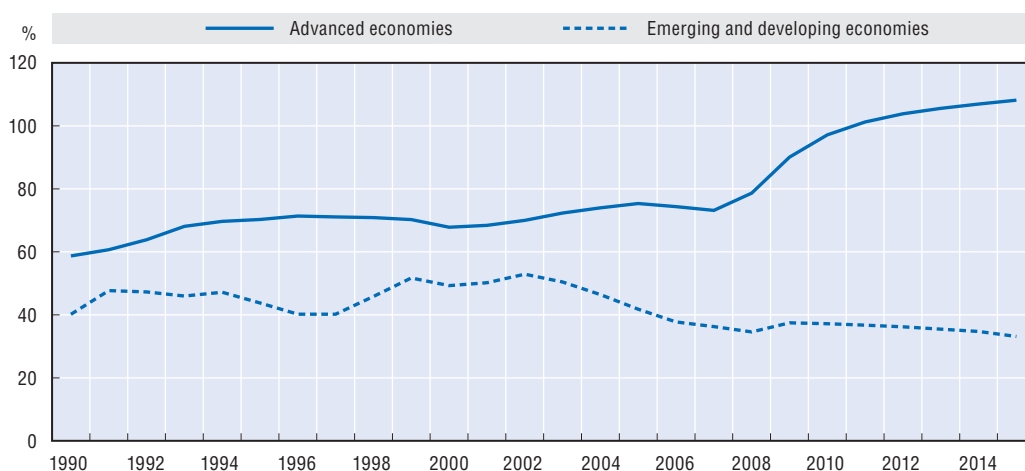
Source: IMF (2009a) and IMF (2010).

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For the reasons just outlined, poor countries should expect to source capital flows increasingly from cash-rich converging countries with large surpluses in their current accounts. This switch from advanced country to converging country sources of finance will bring with it a higher share of state-sponsored capital as opposed to purely private sector sources. Converging economies are explicitly co-ordinating their actions across investment, aid and trade, in contrast to OECD actors who tend operate in an unbundled way. While this description may most closely fit China's partnerships with low-income

countries, it is also evident in India's approach following a sharp change in the direction of economic co-operation with poor countries in recent years.

Conclusion

A proper understanding of the present and future currents in the formulation of growth, industry and poverty-reduction strategies will mean more than looking at the direct channels of interaction between the emerging giants and the poor countries – such as trade, FDI and aid. As a result of their sheer size as well as their growth performance, China, and increasingly other large converging countries, matter in particular for global income and price trends. They shape the global macroeconomic background and thereby set the stage for development. This chapter has demonstrated how macroeconomic output linkages, the shape of relative prices for goods and services, wages and terms of trade, and new sources of development finance all provide a new strategic setting for development partners and policy.

These macroeconomic links have been shown to morph, at times quite rapidly. The initial effects of the Asian giants' opening to the world economy that started in the 1980s will fade in importance. Already these powers compete increasingly with advanced countries in global trade and on extraction rights for natural resources; their growth, in turn, has increasingly become complementary to poor country growth, well beyond the resource demand link.

These changes will continue both as a result of the continuing maturing of the giants' own economies, and also as the world seeks either to address the continuing imbalances in the global economy or to find ways to live with them. Understanding this means understanding the economies and policies of the giants themselves. In assessing the growth, liquidity and price trends that form the macroeconomic background for policy decisions in poor countries, the development policy maker will in future need to examine:

- the cyclical situation of the Asian giants, as a leading indicator for poor country growth;
- their upgrading of skills, technology and exports, and its effect on their competitive impact;
- their industrial outsourcing needs and strategies;
- the changing structure of their final demand patterns;
- exchange rate and (unit) wage developments;
- the evolution of their net asset position, as an indicator of sources of capital exports;
- their preferred forms for foreign capital deployment and the policies behind them.

This will not take place in a vacuum of course, and increasingly the shape of the world will reflect the changing, increasing, role of the Asian giants in global governance and the G20, the IFIs and the WTO in particular. Chapter 7 discusses this important angle further.

Only when equipped with a solid understanding of these global macroeconomic trends can poor and struggling countries formulate national strategies that will best embrace their converging partners.

Notes

1. Argentina; Brazil; Chile; Colombia; Mexico; Peru; Hong Kong, China; India; Indonesia; Malaysia; Philippines; Singapore; Chinese Taipei; Thailand; Czech Republic; Hungary; Poland; Turkey; and South Africa.

2. Levy Yeyati tests whether emerging-market sensitivity to global growth has declined over the years by regressing emerging market growth on G7 growth and evaluating how the coefficients have evolved since the inception of emerging markets as an asset class in 1993. Splitting the data between early (1993-99) and late (2000-09) periods, and assuming for simplicity that trend growth remained stable within each, the specification is a regression of the growth rate of economy i's cyclical output (relative to a log linear GDP trend) on the G7 and Chinese cycles, based on quarterly, seasonally adjusted GDP data, identifying the late period (2001-09) with an interacting dummy.

3. Older models of linkages between the North and South have viewed them as "unidirectional dependence" with growth and cyclical fluctuations in the South being determined primarily by developments in the North. In this framework, growth in the South is driven by northern demand for southern exports to be used as inputs in the northern manufacturing sector (Akin and Kose, 2008).

4. Mankiw *et al*. (1992) have shown that an augmented Solow growth model provides an excellent description of cross-country data in the variation of standards of living, with human capital, physical capital and labour providing each a third to PPP-adjusted per capita income. Using their findings to calibrate a simple Cobb-Douglas production function produces a drop in equilibrium wages of 15% when labour input is doubled.

5. How does China's wage pressure spill abroad in theory? Krugman (1994) has offered a useful extension of the Lewis model in a three-goods (low-tech, intermediate, high-tech) one-factor (labour) perspective. It is assumed that, say, OECD labour is more productive than Chinese labour in all three types of goods, but that productivity advantage is greatest in high-tech, moderate in medium-tech, and least in low-tech**.** Competition will ensure that the ratio of the wage rate in the OECD area to that in China will equal the ratio of labour productivity in those sectors in which workers in the two regions compete head-to-head. If China's productivity increase occurs in low-tech output, there is no reason to expect the ratio of OECD to China's wages to change. China will produce low-tech goods more cheaply, and the fall in the price of those goods will raise real wages in the OECD (and the developing world likewise). Falling (relative) prices raise the purchasing power of importers and consumers; in other words increase their real wages. Surplus labour in China, therefore, may particularly benefit low-income segments in importing countries since low-tech products weigh relatively heavily in their consumption.

6. For UNCTAD (2009a, p. 67), the close correlation between commodities and other asset prices during the second half of 2008 suggests that financial investors "may have had a strong influence on commodity prices". Conceiçao and Marone (2008) provide an overview of the pros and cons of the proposition that commodity prices have increasingly reflected "financialisation". A careful investigation would need to disentangle the excess of liquidity generated by loose monetary policies in several emerging and advanced countries and the growth in sovereign wealth funds; these factors fuelled the demand for liquid assets and are likely to have contributed to the rise in prices.

7. Underlying this analysis is the belief that agricultural production will be increasingly conditioned by water availability, which leads them to project a substantial slowdown in the rate of expansion in agricultural area under irrigation.

8. Berthélemy corrected for geographical and historical variables such as distance, common borders, common languages, and former colonial ties.

9. This is called the Rybczynski effect.

10. As recently observed by Obstfeld and Rogoff (2009), the partial-equilibrium estimates by Warnock and Warnock (2009) tend to overstate the general-equilibrium yield effects of investment or divestment into or out of dollars by official reserve holders. While reserve accumulation contributed something to the compression of yields in US financial markets, the true magnitude has probably been secondary to the effects of global saving flows and monetary policy.

11. Ferguson and Schularick (2007), who coined the term "Chimerica", argue that China's current account surplus and corporate savings are linked with the undervaluation of the renminbi.

12. The same pattern of GDP growth exceeding household income growth could be observed for India.

13. Fully-funded pensions have been shown to raise the national savings rate in countries that have domestic credit constraints which effectively prevent contributors mortgaging their pension savings (Baillu and Reisen, 1998).

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