COMMODITY PRICES

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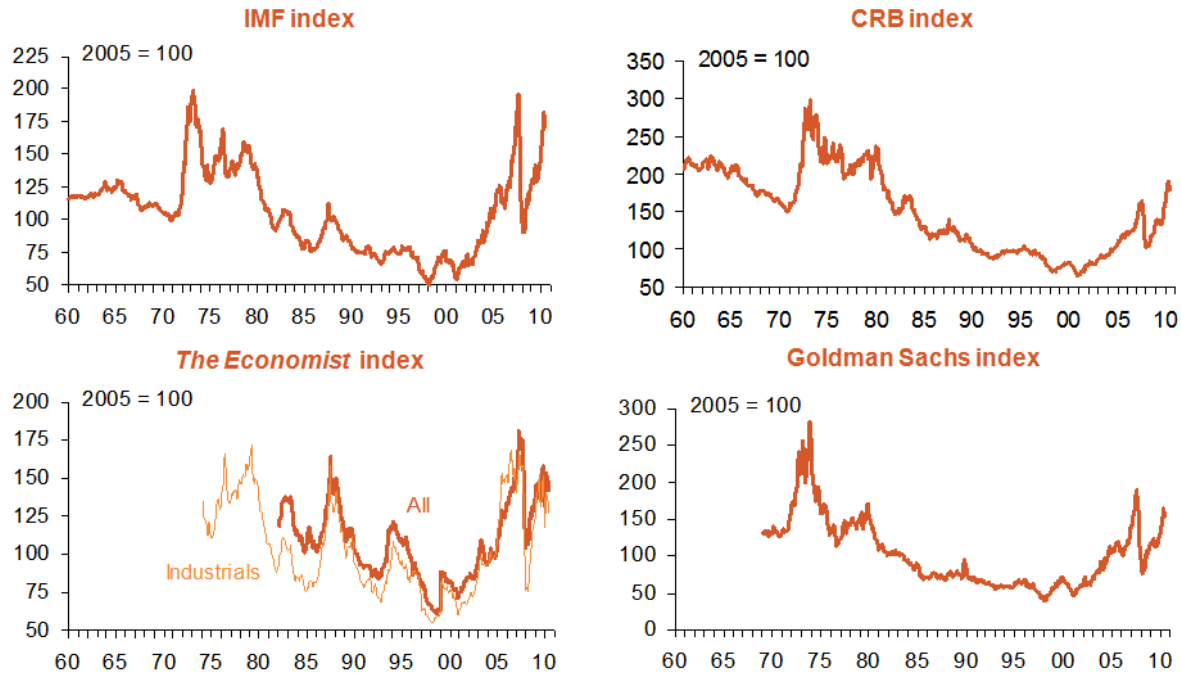
Introduction

The outlook for commodity prices is one of the principal 'known unknowns' in any assessment of the prospects for the world economy as of mid-2011. Although broad indexes of commodity prices are, as of mid-June, some 5-20% off the peaks reached in March or April this year, the reversal (since the early 2000s) of the long-term downward trend in commodity prices in real terms which prevailed throughout most of the 20th century (and in particular over the last quarter of the 20th century) remains very much intact (see Chart 1). Moreover, most broad commodity indexes are, in real terms, still below the peaks attained in the early 1970s.

Chart 1: Commodity price indices in real terms



Note: all indexes expressed in US$ and deflated by US consumer price index, rebased to 2005 = 100.
Sources: International Monetary Fund, *The Economist*, Thomson Reuters, author's calculations.

High and rising commodity prices represent a potential source of inflationary pressures, both in advanced economies, where they pose something of a dilemma for central banks which are also faced by wide margins of excess capacity and still-fragile financial systems, and in emerging and developing commodities, where the effects of rising commodity prices are in many cases more likely to 'spill over' into higher on-going inflation.

Rising food prices also give rise to risks of social unrest in some emerging and developing countries, where food represents a relatively large proportion of household expenditures and where other opportunities for expressing concern about the effects of rising food prices are limited.

There is also a risk that anxieties prompted by persistently high commodity prices will prompt governments to embark upon unwise or dangerous policy courses under the guise of promoting 'security' of access to supplies of food, energy or other resources – including restrictions on international trade, wasteful and distorting subsidies, and (in extreme cases) military adventurism. Indeed, examples of the first two of these are already plentiful.

On the other hand, to the extent that high commodity prices are the result of a 'fundamental' excess of demand over supply, misguided attempts to push prices down, or to blame them on 'speculators', will serve only to obscure or nullify the price signals required to induce the investment required to bring forth increased commodity production, or to shift demand to alternative technologies.

The primary theme of this paper is that the present elevated level of commodity prices is largely the result of mismatches between demand, which has been and will be for some years yet to come boosted by (in particular) the ongoing industrialization and urbanization of China and India, the two most populous nations on the planet, and supply, which for many commodities has been constrained by years of under-investment, changes in market structure, declining productivity or adverse weather-related developments. Persistently high prices for many commodities will, in many cases, result in increased supply, which will in turn ultimately force prices down, although in some instances (oil being the most prominent example) there may be geological or other insurmountable barriers to increasing supplies.

This paper does not seek to deny that the stance of monetary policy in the major advanced economies (in particular the United States), or other financial variables (in particular the value in terms of other currencies of the US dollar, in which most commodities are prices) have had an important influence on the behaviour of commodity prices; or that the activities of investors (or 'speculators') have played some (and probably an increasing) role in commodity price movements over the past five years.

However the argument of this paper is that macro-economic policy settings, linkages to financial markets, and the activities of investors have for the most part served to exaggerate trends and fluctuations that result from more 'fundamental' factors, rather than over-riding those factors or causing commodity prices to move in a different direction from that in which they would have moved otherwise.

Note that this paper does *not* consider oil market conditions, which are the subject of a separate paper being presented at this conference.

Commodity demand

History suggests that nations typically pass through three distinct stages of development, in so far as the commodity-intensity of economic activity is concerned:

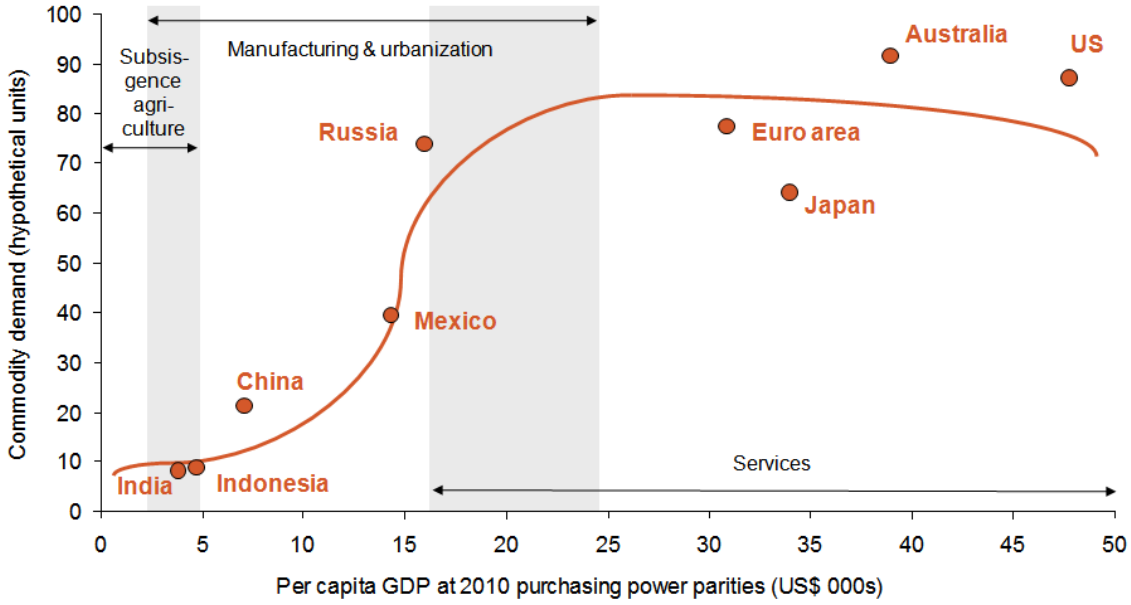
- for as long as per capita income is below about US$3-4,000 per head (in 2011 dollars), most of the nation's population is engaged in subsistence agriculture, and nearly all household income is typically spent on food, clothing and rudimentary housing – the [traded] commodity content of which is practically zero; during this stage there is almost no relationship between changes in per capita income (which may well be zero over a very long period of time) and commodity demand.

- once a nation begins to develop an industrial base, and a significant proportion of the population moves out of subsistence agriculture into urban occupations, typically as per capita income moves past about US$3-4,000 per head, and until it reaches somewhere between about $18,000 and $25,000 per head (with the precise figure depending on, among other things, the distribution of income as well as its mean), a large proportion of the income growth which occurs is devoted to more durable forms of housing, to the purchase and operation of consumer durables (including household appliances and motor vehicles) and to the provision (usually by governments) of various forms of urban infrastructure (including roads, railways, urban water and sewerage, and electricity generation and distribution). All of these activities are typically highly intensive in their use of commodities: so that during this stage of economic development there is a strong, and sometimes disproportionate, relationship between changes in per capita income and commodity demand.

- once a nation's per capita income moves out of the range of about $18-25,000 (again noting that the precise figure will also depend on the distribution of income), households devote an increasing proportion of further income gains to services such as education, health, recreation and entertainment, and financial services, the commodity content of which is typically very small (in comparison with that of consumer durables), while governments typically devote more of their budgets to the provision of personal services and less to capital expenditures. Thus, in this stage of economic development, there is once again very little relationship between per capita income growth and commodity demand.

These stages are depicted stylistically in Chart 2, where the 'transition zones' between an economy dominated by subsistence agriculture to an industrializing and urban one, and from an industrializing and urban economy to one increasingly dominated by the production and consumption of services, are shown in grey.

Chart 2: A stylized depiction of the relationship between per capita GDP and commodity demand

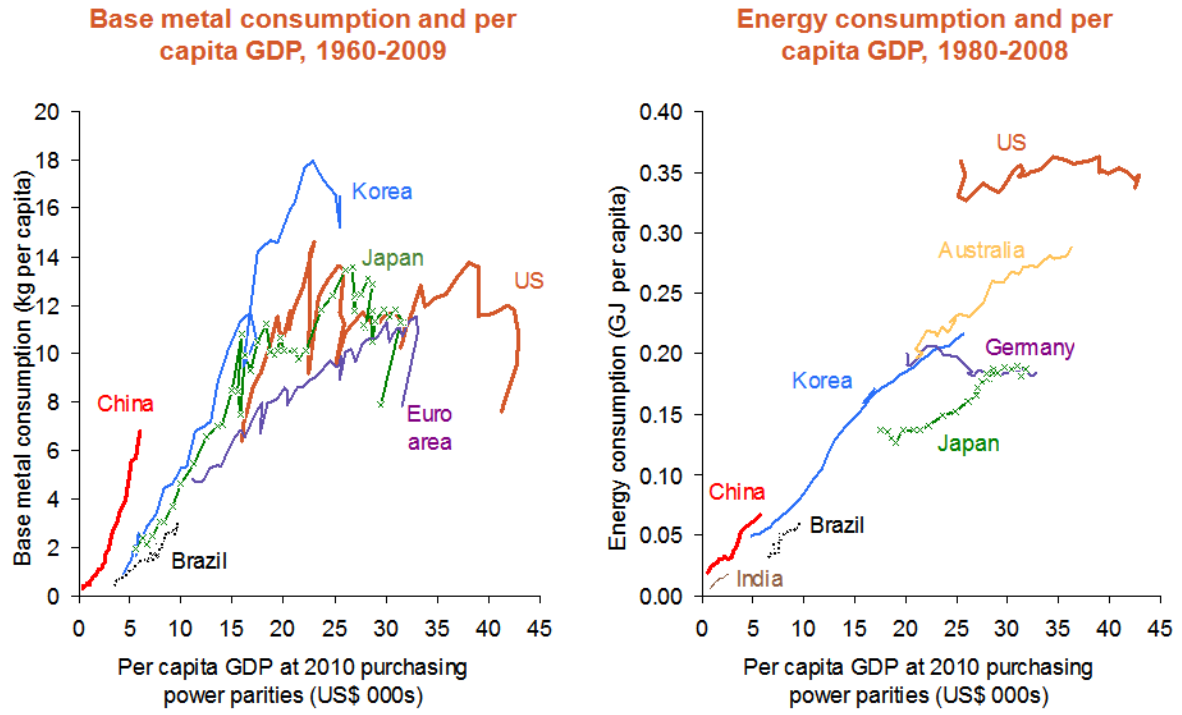


Note: Double-headed arrows denote the primary form of economic activity at different stages of economic development. The location of the countries shown on the vertical scale is intended only as a general illustration of the general level of commodity use and is not based on any specific units of measurement.
Source: International Monetary Fund *World Economic Outlook* database (April 2011); author's estimates.

In practice, the extent to which the relationship between per capita consumption of particular commodities and per capita GDP of particular countries conforms at any particular point in time to the stylized pattern depicted in Chart 2 will be influenced by, among other things, the share of GDP which is accounted for by manufacturing, which is typically the most metal- and energy-intensive form of economic activity. In the case of energy consumption, it will also be influenced by countries' energy pricing and taxation or subsidy policies.

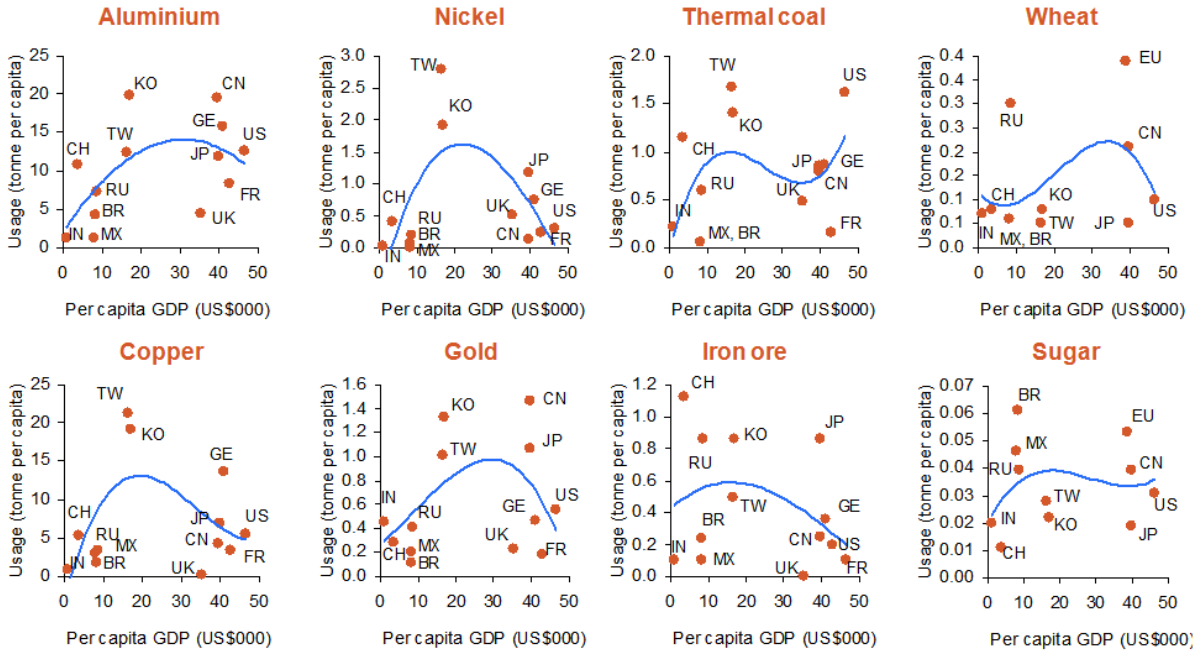
For example, Chart 3 (on page 4), adapted from two charts in the most recent edition of the IMF's *World Economic Outlook*, shows the relationship between per capita GDP and the consumption of base metals and of energy, over the last 40 and 20 years, respectively, while Chart 4 depicts this relationship for selected individual commodities. Korea and (although not shown on these charts) Taiwan have unusually high per capita consumption of metals for medium-income economies, and Germany for a high-income economy, reflecting the relatively greater importance of manufacturing in their GDPs. The United States and, to a lesser extent, Australia, have a relatively high energy intensity of GDP in part because in both cases most forms of energy are relatively cheap, especially by comparison with Europe and Japan.

Chart 3: Per capita GDP and per capita consumption of base metals and energy



Note: Base metal consumption is of aluminium, copper, nickel, lead and zinc. Per capita energy consumption converted from billion BTU to GJ by author.
Source: International Monetary Fund *World Economic Outlook* (April 2011); author's calculations.

Chart 4: Per capita GDP and per capita consumption by selected countries of selected commodities



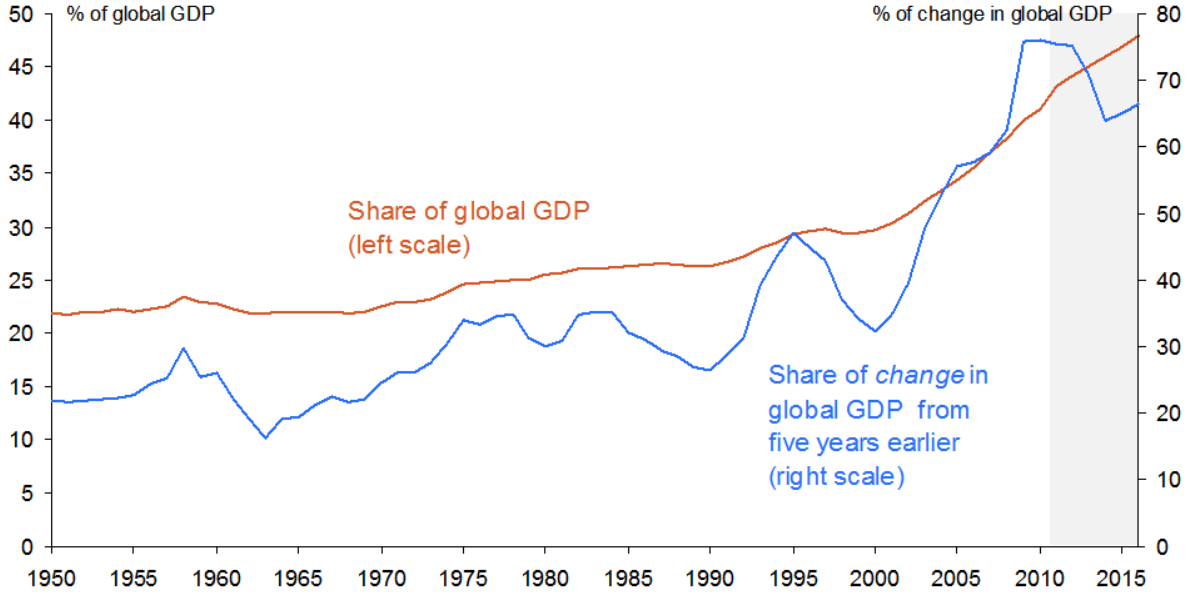
Note: Blue lines are a polynomial trend (n = 3). *Sources:* ANZ Research, *ANZ Commodity Informer* , May 2011, and author's calculations.

Note that the stylized relationship between per capita income and commodity intensity holds to some degree for food commodities as well as for base and precious metals, and for thermal coal and iron ore.

The significance of all this for the medium-term outlook for commodity prices is that economies whose per capita GDP is in the 'zone' where commodity intensity rises more rapidly than incomes (defined for this purpose as between US$3,000-18,000 per head, at 2010 purchasing power parities) now account for 41% of world GDP, compared with 20-30% of GDP during the second half of the 20the century.

More importantly, these countries have over the past five years accounted for fully three-quarters of the *growth* in world GDP (Chart 5). And while their share of global GDP growth during this period was inflated by the global financial crisis (which affected high-income economies much more severely, in general, than low- and middle-income economies), even in the five years to 2007, economies whose per capita GDPs were in the 'range' in which the commodity intensity of economic activity typically rises sharply accounted for 60% of global GDP growth. Moreover, the forecasts in the most recent IMF *World Economic Outlook* (2011) suggest that these economies will account for around two-thirds of global growth over the five years to 2016.

Chart 5: Share of global GDP, and global GDP growth, attributable to economies with per capita GDP of US$3-18,000 in 2010

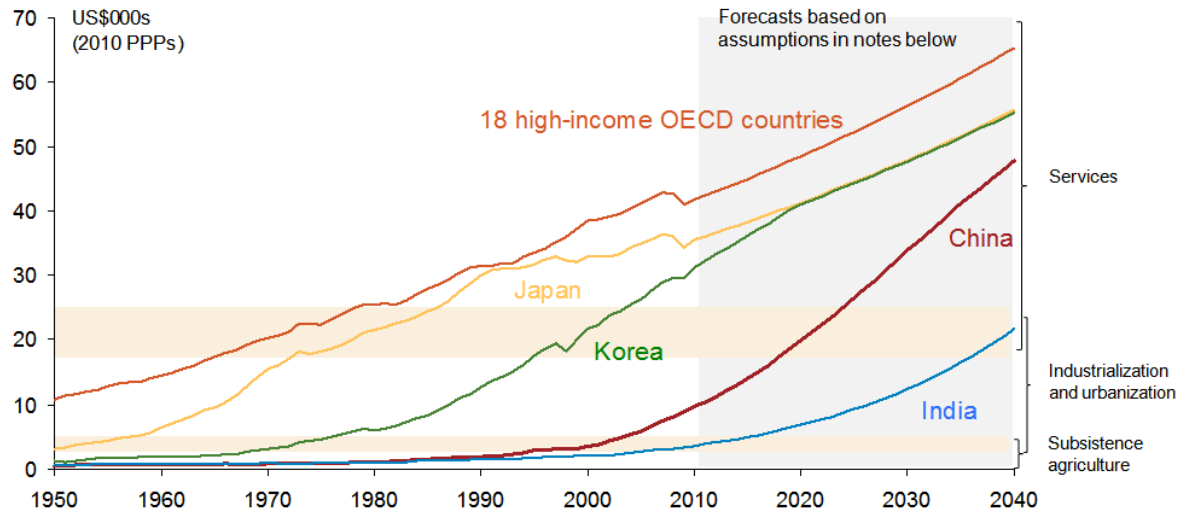


Source: The Conference Board, *Total Economy Database*, January 2011; IMF, *World Economic Outlook* database (April 2011); and author's calculations.

This suggests that, absent another shock to the global economy similar to that imparted by the global financial crisis of 2008-09, the 'fundamental' *demand* for a wide range of energy, industrial and food commodities is likely to continue to grow strongly over at least the next five years.

Demand from China, in particular, for a wide range of commodities is likely to remain buoyant for many years to come, even if slowing labour force growth and the need to contain inflationary pressures results in China's overall growth rate slowing from an average of 10.8% pa over the past eight years to somewhere around 7-8% pa over the next five-ten years (cf. the IMF's most recent forecast that China's growth rate will average 9½% per annum over the next five years). China's per capita GDP in 2010 was just over US$7,500 (at PPPs, or just under $4,400 at current exchange rates which in China's case are widely perceived to be 'undervalued'): assuming (for the sake of illustration) that China's per capita GDP growth rate slows gradually from an average of 8% per annum during 2011-2015 to 6% per annum during 2021-25, it will not exit the 'zone' of high commodity intensity until sometime between 2019 and 2024 (see Chart 6, on the following page).

Chart 6: Per capita GDP – high income Western countries, Japan, Korea, China and India 1950-2040



Note: GDP is in 2010 US dollars, at 'EKS' purchasing power parities. The 18 high-income OECD countries are Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Iceland, Italy, Luxembourg, Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom and the United States. Per capita income in these countries and Japan *assumed* to increase at 1½% pa from 2010 onwards. Per capita income in Korea assumed to rise at 3% pa 2011-2015, 2½% pa 2016-20, and 1½% pa thereafter. Per capita income in China assumed to rise at 8% pa 2011-2015, 7% pa 2016-2020, 6% pa 2021-2025, 5% pa 2026-2030, 4%pa 2031-35, and 3% pa 2036-40. Per capita income in India assumed to rise at 6½% pa 2011-2025, 6% pa 2026-2035, and 5½% pa 2036-2040. *Source:* The Conference Board, *Total Economy Database*, January 2011 and author's calculations.

India has arguably only just entered the 'zone' in which the commodity intensity of economic activity rises sharply, with a per capita GDP in 2010 of just under US$3,350 (at PPPs; measured at current exchange rates, India's per capita GDP of just over $1,250 is still well below this threshold). Even if India's per capita GDP continues to grow at around 6½% per annum (as it has done over the past decade) for another fifteen years, before slowing gradually in line with the assumptions stated in the footnote to Chart 6 above, it will not exit the 'zone' of high commodity intensity until at least 2037.

China's steel consumption has risen at an average annual rate of 15% over the past decade, and now accounts for 45% of the world total. Per head of population, China is now the fourth most steel-intensive economy in the world (after Korea, Taiwan and Japan). Yet China's steel consumption is still expected to grow by an average of 8% per annum over the next five years, by which time it will account for 52% of the world total (ABARES 2011a: 170), driven largely by government investment in steel intensive transport infrastructure, especially in China's western provinces, and continued growth in housing and other urban infrastructure, as the proportion of China's population living in urban areas increases from 47% in 2009 to 51% by 2015. India's per capita steel consumption is just 12% of China's, and accounted for less than 5% of the world total in 2010: but it is expected to grow by over 10% per annum over the next five years, underpinned (as for a much longer period in China) by rising government infrastructure investment and by increased spending on consumer durables. Strong demand for steel from China and India will in turn underpin continued growth in demand for iron ore and coking coal, of at least 5% per annum over the next five years.

China's primary energy consumption has risen at an average annual rate of 9% since 2000, and now accounts for 20% of the world's total energy consumption. Over 70% of China's energy consumption is fuelled by coal, and China has switched from being a net exporter of coal to a net importer, because of the declining quality of its own coal supplies, the rising cost of transporting it, and increasing concern over the number of deaths and injuries incurred in extracting it. Although China is actively seeking to close down some of its most CO_2-intensive power stations, its thermal coal imports are expected to increase by some 13%, while its exports will continue to decline (ABARES 2011a: 155).

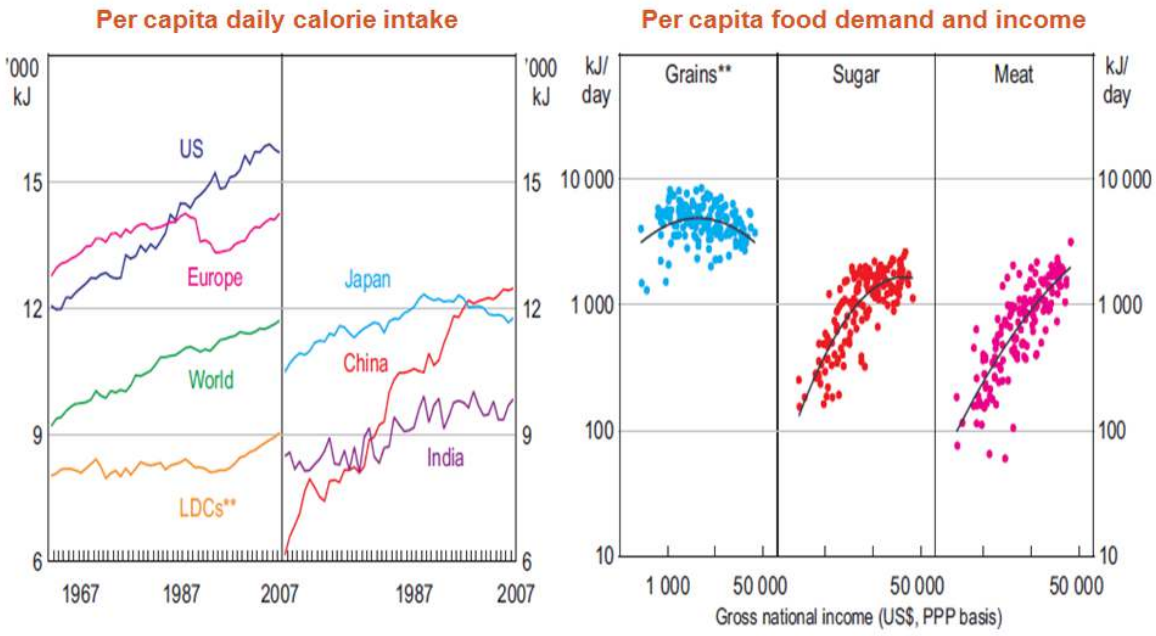
Coal also accounts for 52% of India's primary energy consumption, which has grown at 5.3% average annual rate since 2000. India is undertaking a major expansion in its electricity generating capacity, with four major projects, each consuming 15mn tonnes of coal a year, expected to produce an additional 16,000MW by 2016. India's thermal coal imports are expected to rise by almost two-thirds over the next five years, so that by 2016 India will be importing almost as much coal as China.

Natural gas accounts for around 11% of total primary energy consumption in Asia, a much smaller proportion than it does in the US (28%) or Europe (24%). However, this proportion is likely to increase significantly over the next decade as China, in particular, seeks to reduce its dependence on imported oil and its overall CO_2 emissions. China only began importing LNG in 2006, but now has six LNG import terminals under construction in addition to the three now in operation, as well as constructing natural gas pipelines into Turkmenistan and Burma. Chinese LNG imports are expected to rise by an average of 17% per annum over the next five years (ABARES 2011a: 148). India has more domestic natural gas supplies than China, but its LNG imports are also expected to increase at a 6% annual rate over the next five years.

Although energy demand is rising much more slowly in advanced economies than in China or India, government policies seeking to lower CO_2 emissions are likely to result in continued growth in demand for natural gas in various forms, displacing other forms of energy generation.

Global demand for food commodities has also been growing more rapidly, and changing in its composition, particularly (again) as a result of rapid income growth in China and India. The growing ability of an increasing number of people to afford higher-protein diets has significantly boosted demand for livestock products (meat and dairy), and also for sugar (see Chart 7), while having much less impact on demand for grains, except to the extent that rising demand for meat creates an increased intermediate demand for grains as livestock feed. Daily food intake (measured as kcal per person) is expected to rise by 0.35% per annum in non-Japan East Asia and 0.51% per annum in South Asia over the period 2000-2030, compared with just 0.07% per annum in industrialized economies (FAO 2006: 8).

Chart 6: Per capita food intake and income



Note: data for the right hand chart are for 158 countries in 2007, sourced from FAO and World Bank.
Source: Vanessa Rayner, Emily Laing and Jamie Hall, 'Developments in Global Food Prices', Reserve Bank of Australia *Bulletin*, March quarter 2011, pp. 15-21.

Demand for coarse grains (in particular corn), oilseeds and sugar has also been driven by government policies favouring or mandating increased use of ethanol and biodiesel. Almost 40% of US corn production now goes into ethanol production. This is a terribly inefficient use of resources: corn-based ethanol requires almost as much energy to produce it as it generates, compared with sugar-based ethanol which generates almost eight times the energy absorbed in its production. However subsidizing or mandating the production of corn-based energy wins vital votes in Iowa and other mid-western States, while permitting the import of sugar-based ethanol (most likely from Brazil) would lose vital votes in Florida.

This is just another example of the way in which global agricultural markets are corrupted, invariably to the detriment of people in developing countries (in this case by magnifying the upward pressure on the prices of commodities which form a large part of their diet), by the policies of governments in advanced economies (see, eg, Steenblik 2007, and FAO 2008).

Commodity supply

The trajectory of commodity prices of course depends not only on what happens to demand for commodities, but also on the behaviour of commodity supply. One of the more striking aspects of the commodity cycle of the past five years is just how restrained has been the supply-side response to the persistently strong growth in demand, in contrast to previous episodes of large increases in commodity prices.

There are three factors behind the apparently sluggish response of commodity supply to the sustained increase in commodity demand over the past decade.

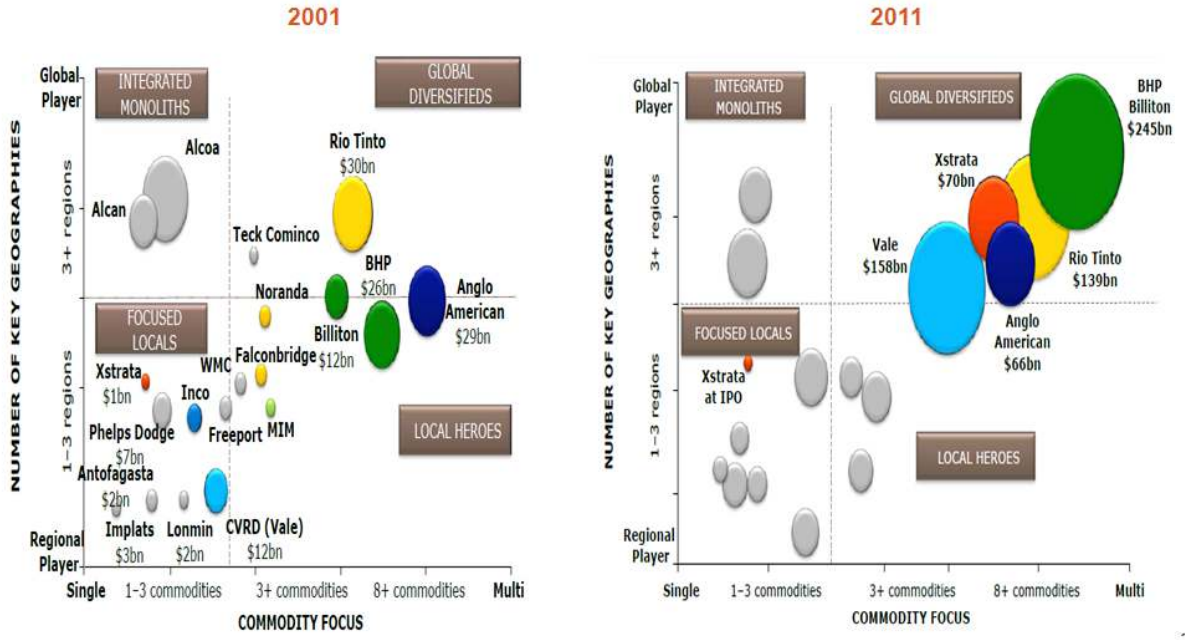
First, the mining industry has become increasingly concentrated over the past two decades. 20 years ago, and even as recently as ten, the global mining industry was highly fragmented: individual mining companies, typically producing only one metal or mineral, usually only in one country, and generally unconcerned about the impact of their investment and production decisions on the overall supply, and hence the price, of the commodity in which they were involved.

As a result, in previous commodity cycles, supply typically responded quickly to any large increase in prices, with the result that the increase in prices was fairly quickly reversed.

The long period of declining mineral commodity prices (by late 2001, metal prices had fallen by 75% in real terms since 1957) and falling mining company profitability prompted a wave of consolidation (shut-downs and take-overs) during the 1990s and early 2000s. Over the past decade, the global mining industry has become increasingly dominated by a handful of diversified mining companies (see Chart 8 on page 9), operating in multiple locations around the world, who evidently do take account of the global demand for and supply of commodities when evaluating major investment and production decisions. The six largest copper mining companies now account for 44% of global copper production; the five largest coal mining companies for 27% of total thermal coal production; and the four largest iron ore mining companies for 52% of global iron ore production (Davis 2011).

Moreover, large mining companies are no longer typically run by people with engineering or geology backgrounds, whose first instinct when confronted with a sizeable increase in cash flows was commonly to plough them back into increased exploration or production, but instead typically by people with finance or accounting backgrounds, whose first instinct in similar circumstances is commonly to seek to take over other mining companies, to lift dividends or undertake share buy-backs. In 2010, only 18% of the revenues earned by the 40 largest global mining companies were invested, compared with an average of 26% from 2003 through 2009 (PricewaterhouseCoopers 2011: 17).

Chart 8: The changing structure of the global mining and metals industry



Note: bubble sizes represent market capitalization on 1 January 2011 and 6 May 2011 respectively.
Source: Mick Davis (CEO Xstrata Ltd), 'Mining: Opportunities and Challenges', Presentation to Minerals Council of Australia 'Minerals Week', June 2011.

Second, the quality of most mineral ores has been declining over the past two decades. For example, average copper grades (copper metal recovered per tonne of ore extracted) have fallen by around 50% since the mid-1990s – implying that mining companies have typically had to dig up half as much ore again the same amount of metal as they did fifteen years ago, while average gold ore grades have fallen by around 30%. More recently, lead and zinc ores appear to have entered a similar decline. The corollary of declining ore grades is increasing costs: according to PricewaterhouseCoopers, 'there has been a fundamental shift in the cost base of the industry' (2011: 16).

For example the average cost of extracting an ounce of gold has risen from around US$200 per oz a decade ago to over US$850 per oz in 2010. This increase in costs in turn raises the level of prices at which production becomes uneconomic, and thus the floor below which prices cannot sustainably fall.

Third, it takes much longer to bring new mining projects into production than in previous decades. This partly reflects the increasing impact of public policy interventions (such as environmental and other regulation) and NGO activity on the time taken to complete the various stages of mine development, and the fact that new mining projects are increasingly located in remote and/or 'difficult' geographies, such as Africa, South America and Central Asia.

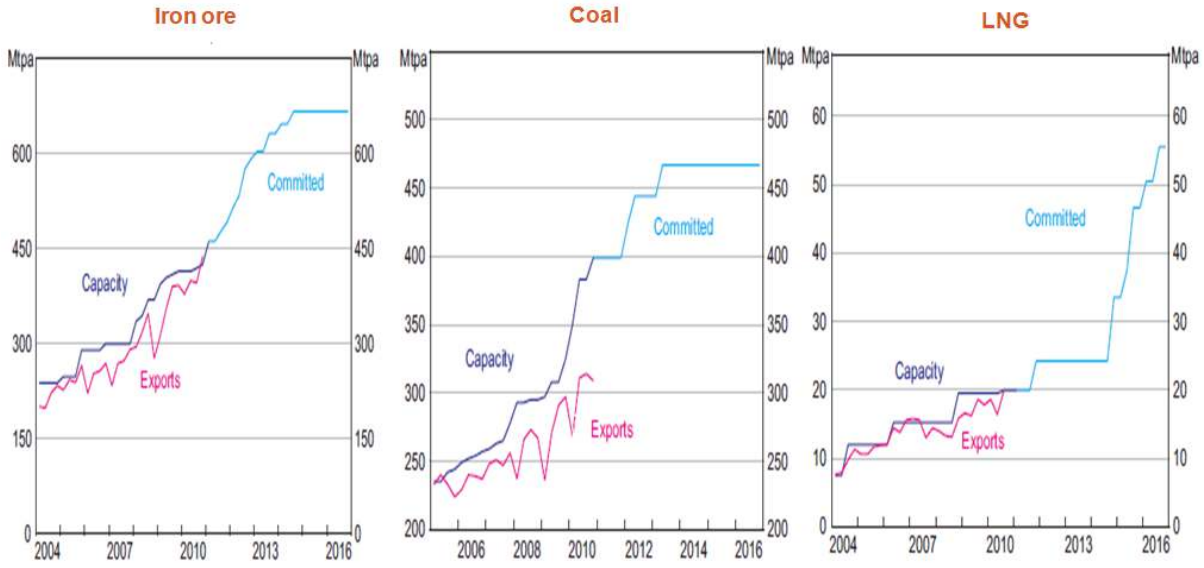
As a result of these three factors, the cycle from increased demand to higher prices to increased production to lower prices takes much longer to play out than it once did. Additionally, the global mining industry was generally surprised by the suddenness of the upturn in commodity demand, largely emanating from China, after 2002, and coming after such a prolonged period of declining demand and prices, has required some convincing that the increase in demand would be sustained before committing to investments that will ultimately result in increased commodity supplies. The global financial crisis, and the impact which it had on mining companies' access to debt finance, also delayed the completion of a number of major projects.

That said, the supply of most (non-oil) commodities *will* increase over the medium term, as mining companies' confidence in the durability of the upturn in demand strengthens, and as investments (with much longer gestation periods than those of previous eras) come on stream.

To a large extent, the 'commodity story' associated with the industrialization and urbanization of China and India is about energy and steel – the most important commodity ingredients of which are oil, thermal or 'steaming' coal and natural gas, and metallurgical or 'coking' coal and iron ore, respectively. Leaving aside oil (which as noted earlier is the subject of another paper being presented to this conference), Australia is the largest exporter of iron ore and metallurgical coal, the second largest exporter of thermal coal, and the fourth largest exporter of liquefied natural gas (LNG). Australia is currently experiencing the largest 'mining boom' in its history: capital expenditure by the mining (including oil and gas) sector has risen from less than 1% of Australia's GDP a decade ago to an estimated 3.6% of GDP in the 2010-11 Australian financial year (which ends on 30 June), and is expected to increase further to around 7% of GDP in the 2011-12 financial year. The Australian Bureau of Agricultural and Resource Economics and Sciences latest (incomplete) tally of mining (including oil and gas), minerals processing and related infrastructure projects under construction, committed or under consideration runs to US$412bn, of which US$76bn are in coal, $83bn in iron ore and $202bn in LNG or coal seam gas, and associated infrastructure (ABARES 2011a).

As a result, Australia's coal export capacity will rise by about one-fifth over the next three years; iron ore export capacity by around one-half over the next four years; and Australia's LNG/CSG export capacity will increase by around 150% – so that Australia will overtake Qatar as the world's largest LNG exporter before the end of the present decade (Christie et al, 2006; Baker and Bare 2011)

Chart 9: Projected increases in Australian iron ore, coal and LNG production and export capacity



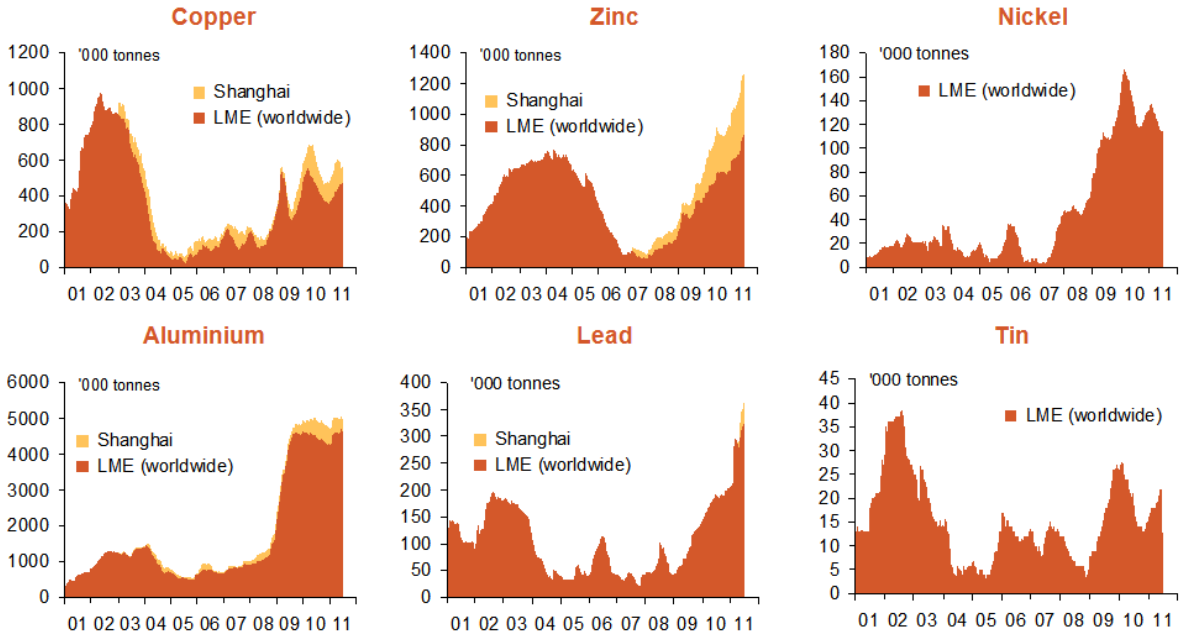
Source: Virginia Christie, Brad Mitchell, David Osmond and Marileze van Zyl, 'The Iron Ore, Coal and Gas Sectors', Reserve Bank of Australia *Bulletin*, March quarter 2011, pp. 1-7.

Production of these and other commodities is also expected to increase significantly from other countries as well, including Canada, Brazil, Peru, Chile, Colombia, Mongolia, Kazakhstan, Indonesia, Papua-New Guinea, New Caledonia, and a number of West and Southern African countries.

For 'bulk commodities' like coal, iron ore and natural gas, where investments in increased supply are often linked to increases in demand through 'take or pay' contracts, increases in supply are unlikely to outrun increases in demand, implying that prices should remain at elevated levels by historical standards for some years yet to come.

Exchange inventories of base metals, other than copper, have risen to decade or more highs since the global financial crisis, suggesting that growth in the supply of these metals has generally outstripped the growth in demand (see Chart 10 below). This is particularly the case with nickel, where strikes at major producers in Canada in 2007 caused acute shortages (and price hikes), and aluminium, where China's supply capacity has grown particularly rapidly (China already accounts for 40% of global aluminium production and has a wide margin of spare capacity), although a significant proportion of the LME aluminium inventories are believed to be locked away in financing deals rather than representing surplus production.

Chart 10: Base metal inventories



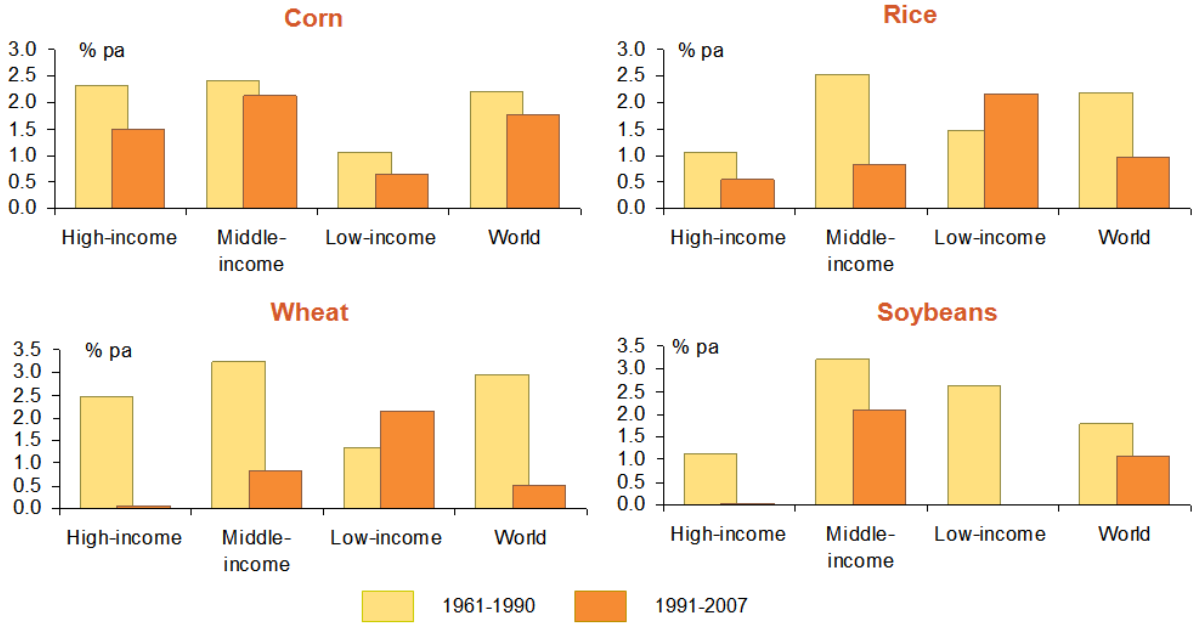
Source: Thomson Reuters Datastream.

Global supply of a wide range of agricultural commodities – particularly wheat, corn, soybeans and sugar – has been adversely affected by a series of weather-related developments in key food-producing countries, including Canada (heavy rains and frosts), Ukraine and other Black Sea countries (drought), Australia (drought in the west and flooding in the eastern states) China (very dry winter), and Brazil and India (poor sugar harvests). It is possible that climate change may be contributing to the increasing frequency of such developments (Ecofys BV 2006; Gunsekera et al 2007). Climate change may also affect the availability of water for irrigation.

Far less contentious is evidence pointing to a significant and pervasive slowdown in agricultural productivity growth over the past two decades. The rate of improvement in crop yields has slowed dramatically, for example in the case of wheat from an average of 3.0% per annum over the thirty years to 1990 to 0.5% per annum between 1991 and 2007; for rice from 2.1% pa to 1.0% pa over the same interval; and for soybeans from 1.8%pa to 1.1%pa (see Chart 10 below) (Alston et al 2010) (see Chart 11 on page 12).

Agricultural productivity has improved in Brazil and especially in China (as a result of the significant movement away from subsistence agriculture since the late 1970s), but this has been more than offset by a dramatic decline in productivity in high-income countries – despite (or perhaps because of) the continued provision of massive subsidies by taxpayers (and indirectly by consumers in the form of higher prices) to agricultural producers in most of these countries.

Chart 11: Global agricultural productivity growth, 1960-2007



Source: Julian Alston, 'Public R&D and Productivity: International Comparisons', Presentation to ABARES Outlook Conference, Canberra, March 2011.

Alston et al (2010) attribute the decline in agricultural productivity growth to declining agricultural research and development spending, especially by public sector agencies; there is some evidence of this in Australia also (Moir and Morris, 2011: 11). Resistance to the adoption of genetically modified organisms (GMOs) in agriculture, especially in Europe (where it in many cases also serves traditional protectionist opposition to imports of agricultural products) has probably contributed to the decline in agricultural productivity growth.

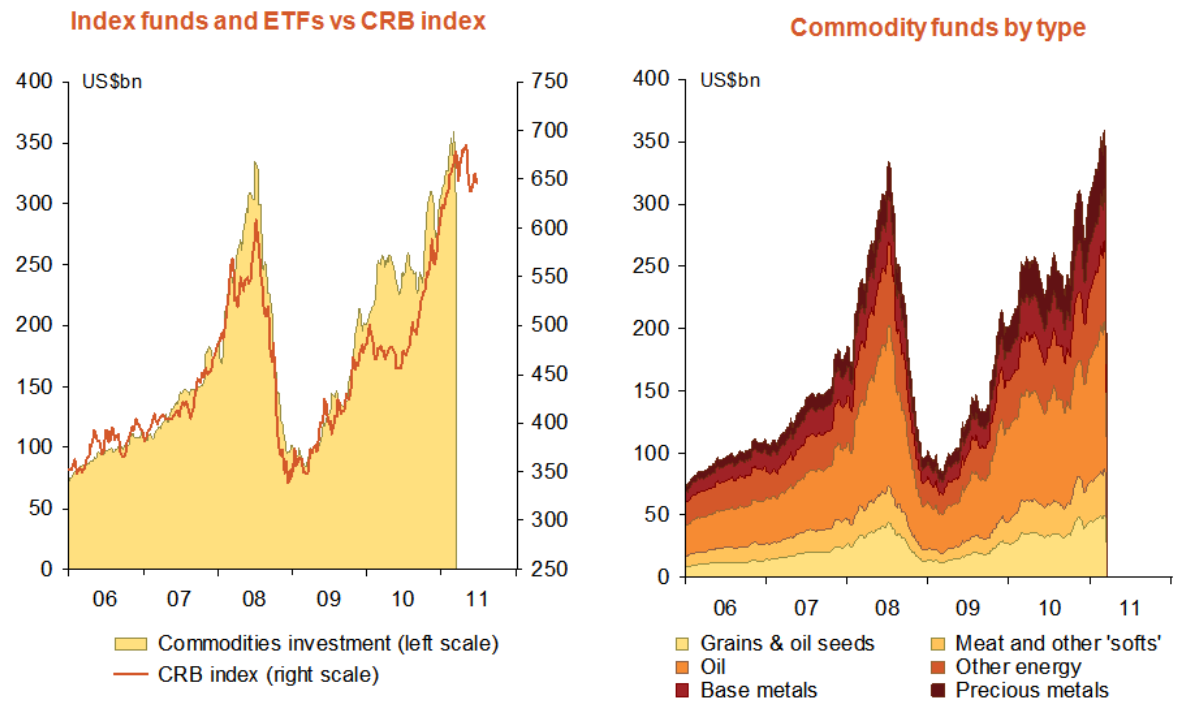
Other factors constraining growth in the supply of agricultural commodities include the diversion of farming land to other uses, in particular the growth of urban areas, and the impact of rising energy costs (for example, on the cost of fertilizers). On some recent occasions, food supplies have also been adversely affected by government restrictions on exports, for example by Egypt and Vietnam on rice in 2008, and more recently by Russia and Ukraine on grain.

The 'financialization' of commodities markets

While commodities markets have often attracted the attention of 'speculators' in the past (going back at least to the Dutch 'tulip bubble' of 1610-1637, through to the Hunt brothers' attempt to corner the silver market in 1979-80), it has only been in the last five or so years that they have become a significant alternative asset class for institutional investors.

Commodity-backed exchange traded funds (ETFs), allowing investors to gain exposure to movements in commodity prices without holding commodities directly or trading in futures, were first introduced in the early 2000s. Total investment into exchange traded commodity funds and index swaps has more than quadrupled over the past five years, and flows into and out of these instruments appear to have been closely aligned with movements in the commodity price indices which they are intended to track (chiefly, the Goldman Sachs Commodity Index and the Dow Jones-UBS index) (see Chart 12 on page 13).

Chart 12: Total investment in commodity exchange traded funds and index swaps



Note: data are weekly. *Sources:* Bloomberg; Thomson Reuters Datastream.

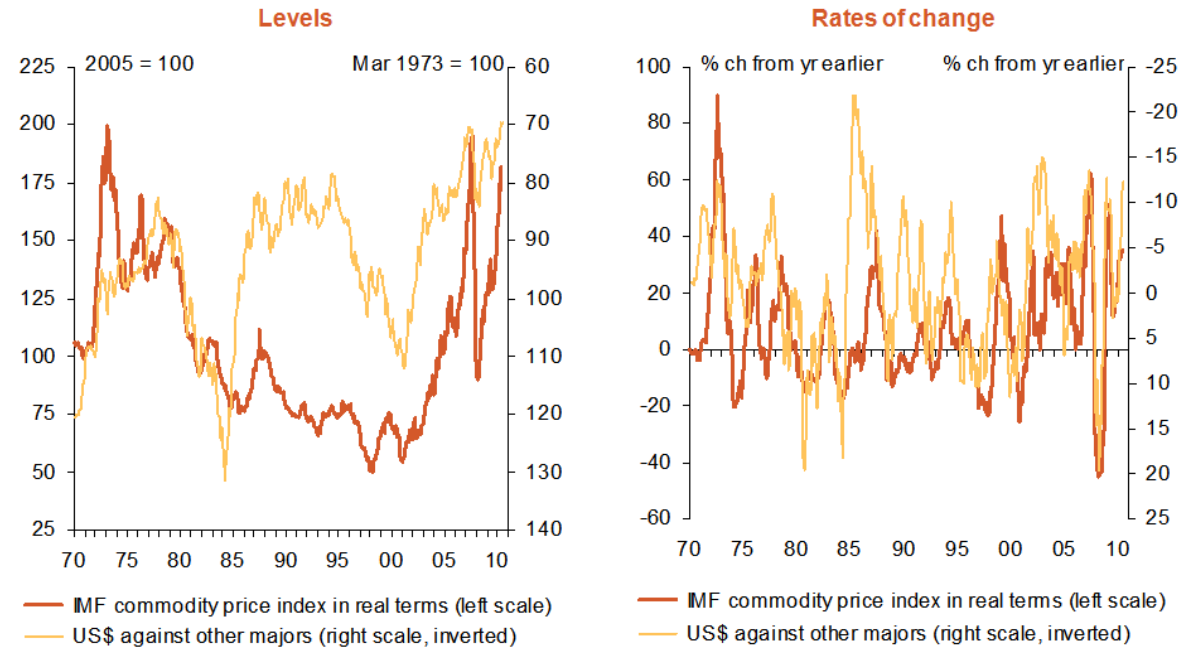
In this area, as in others, correlation does not imply causation. The IMF notes that 'in theory, the price impact of commodity financial investment is ambiguous … Mirroring the ambiguities on the theoretical side, there is no evidence to support the claim that commodity financial investment has been a major factor in recent price cycles or in commodity price formation more generally' (IMF 2011: 32). The UN Food and Agriculture Organization, reviewing the spike in global food prices in 2007-08, while accepting that 'speculation can lead to sudden or unreasonable fluctuations or unwarranted changes in commodity prices', also acknowledged that 'it is not clear whether speculation on agricultural commodities was driving prices higher or was attracted by prices that were increasing anyway' (FAO 2009: 21-22).

Even if the impact of purely speculative transactions in, or holdings of, commodities is small relative to underlying commercial supply and demand (the reverse of the position in foreign exchange markets, where capital account transactions outweigh current account ones by a factor of more than 20 to one), that doesn't mean that financial variables, such as interest rates and exchange rates, don't have any influence on the behaviour of commodity prices. Clearly they do.

Most commodity prices are quoted in US dollars, so it is logical to expect some kind of inverse correlation between the value of the US dollar in terms of other currencies, and US$-denominated commodity prices. As shown in Chart 13 (on page 14), there is not an especially strong correlation between commodity prices and the trade-weighted value of the US dollar when both are expressed in levels, though the relationship is much stronger when both are expressed in terms of annual rates of change.

The weakness in the US dollar over the past decade thus appears to have contributed to the upward pressure on commodity prices (which makes it all the more surprising that governments of some countries who have complained about the contribution made by the decline in the US dollar to food and energy price inflation in their countries haven't sought to diminish that source of inflationary pressure by allowing their currencies to appreciate against the US dollar).

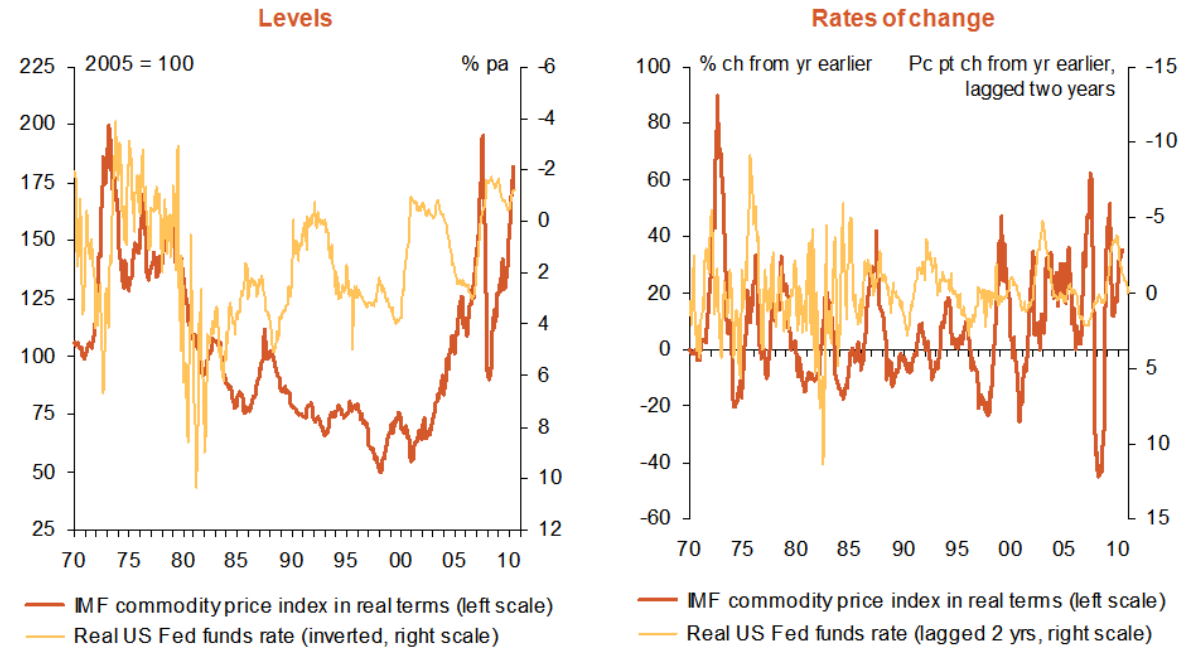
Chart 14: Real commodity prices and the value of the US dollar



Sources: International Monetary Fund; US Federal Reserve Board; Thomson Reuters Datastream.

Similarly, one would logically expect to find some relationship between interest rates and commodity prices, partly because of the relationship between interest rates and economic activity (which is in turn a 'fundamental' driver of demand for industrial commodities), and partly because interest rates are a major determinant of the cost of holding stocks of commodities. Chart 15 suggests that there is a relationship between *changes* in US interest rates and commodity prices, although with quite a long lag (of around two years).

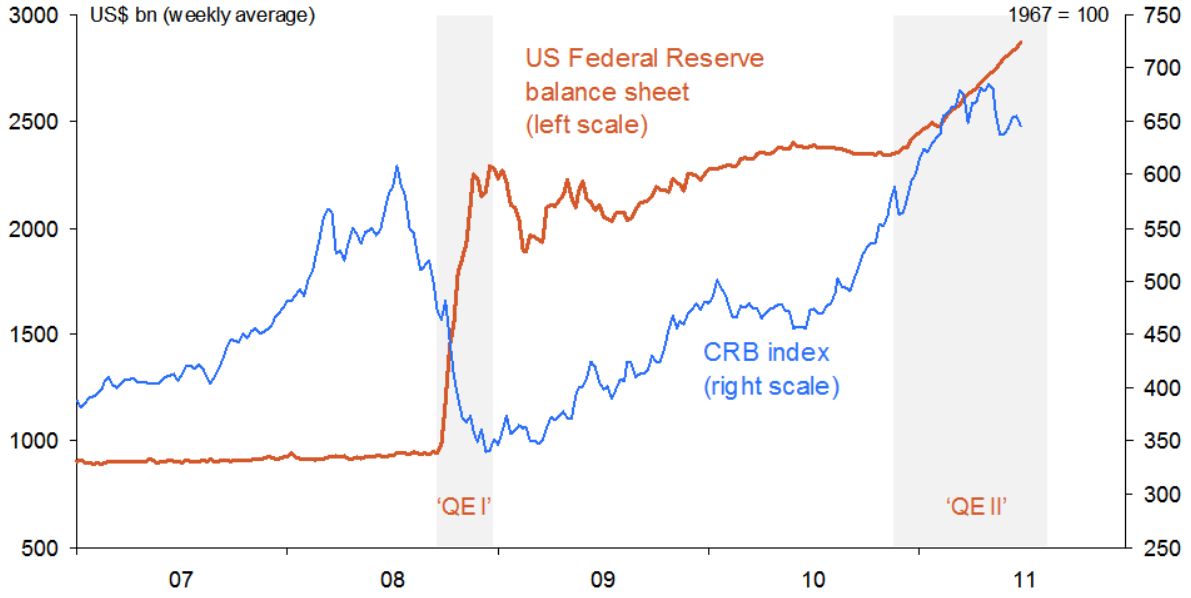
Chart 15: Real commodity prices and US interest rates



Sources: International Monetary Fund; US Federal Reserve Board; Thomson Reuters Datastream.

Indeed it is widely asserted (especially by those purporting to be adherents of the 'Austrian' school of economics, of whom there appear to be a very large number in the 'blogosphere') that the 'quantitative easing' strategy pursued by the US Federal Reserve in two stages (after the collapse of Lehman Brothers in September 2008, and since August last year) has played a significant and direct role in pushing up commodity prices (that is, independently of any belief that by reviving economic activity, 'quantitative easing' would contribute to stronger 'fundamental' demand for commodities). A firm empirical foundation for these assertions is by no means obvious (see Chart 16), particularly once it is appreciated that the vast bulk of the liquidity created by the Fed's purchases of mortgage-backed and subsequently US Treasury securities has simply ended up back on the other side of the Fed's balance sheet in the form of excess reserves held by banks.

Chart 16: Commodity prices and the US Federal Reserve's 'quantitative easing'



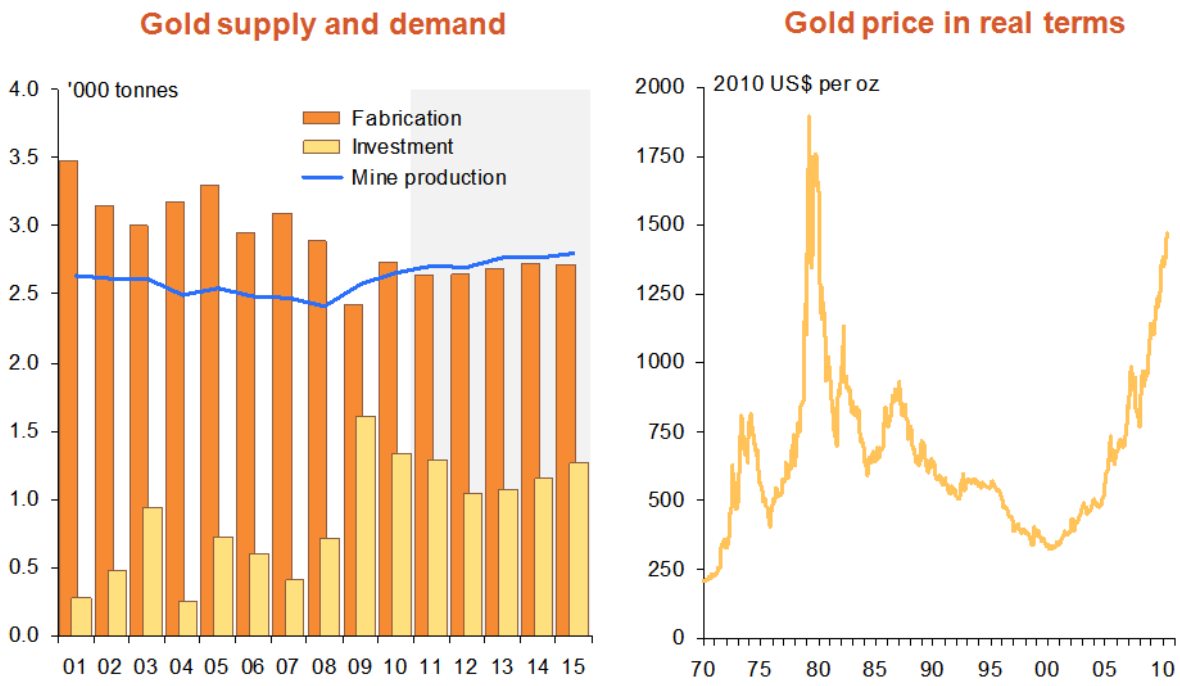
Sources: US Federal Reserve Board; Thomson Reuters Datastream.

Gold and silver are more likely to be influenced by investor behaviour and expectations than other commodities, since investment demand accounts for a much larger proportion of transactions in these two metals than of other commodities. Indeed demand for gold for fabrication (jewellery, electronics, dentistry, coinage and other industrial applications) has fallen by more than 20% over he past decade (to around 2,750 tonnes in 2010), while investor demand has risen more than five-fold (to over 1,300 tonnes)(see Chart 17 on page 16).

Although gold is widely viewed as a 'hedge' against inflation, it has in practice been a very poor one. Gold prices fell substantially through the 1980s, when 'G7' inflation averaged 5.1% per annum, and during the 1990s, when it averaged 2.5% per annum; it has since trebled in price in real terms, during a period in which 'G7' inflation has averaged 1.9% per annum. Historically, gold has been more effective as a hedge against currency depreciation, especially (in the post-war era) in emerging economies that have been prone to periodic currency collapses, or against political instability (of the sort that could entail the destruction or confiscation of other stores of wealth).

However, as this author argued at ICCBE two years ago (Eslake 2009: 7-11), a dramatic acceleration in US inflation of the magnitude that would warrant gold prices of close to US$1,500 per ounce seems improbable in circumstances where the US economy has so much excess capacity (only 58.4% of the working-age population in employment, down more than 6.3 percentage points from the peak in April 2000, and an 'output gap' this year of 3.7% of potential GDP according to the IMF).

Chart 17: Gold market 'fundamentals' and price in real terms



Note: left hand chart does not show scrap sales, producer hedging or central bank transactions.
Sources: Australian Bureau of Agricultural and Resources Economics; Thomson Reuters Datastream.

Nor does it seem plausible that there will be a collapse in the US dollar – at least, not against the currencies of other major advanced economies, whose 'fundamentals' (in terms of economic growth prospects, fiscal position or interest rate outlook) are hardly less worse than those of the United States. The only passably credible rationale for buying gold at current prices would seem to be central banks (such as China's) seeking to diversify their reserve holdings away from their historical concentration in US dollars. Hence gold would appear to exhibit more bubble-like characteristics than any other commodities. The 27% decline in the silver price since its peak in early May is perhaps an illustration of the potential for a large downward correction in the gold price at some point, although this author makes no prediction as to the timing or order of magnitude of any such movement.

The outlook for commodity prices

The principal arguments of this paper have been:

- first, that the steady rise in commodity prices since the early 2000s is largely the result of strongly rising commodity demand, especially from the world's two most populous nations, which are now passing through a stage of economic development in which, if history is any guide, the 'commodity intensity' of economic growth increases significantly;
- second, that this stage of development probably has at least another decade to run in China and at least another two decades in India;
- third, that a range of constraints on commodity supply, including changes in the cost structure and composition of the mining industry, the depletion of the more easily obtainable supplies of minerals and energy, declining productivity in agriculture, and (possibly) the impact of climate change, have meant that supply has been much slower to respond to this increase in demand than in previous cycles; and

- fourth, that while the increasing 'financialization' of commodities markets over the past decade has almost certainly had the effect of amplifying the impact of these developments on prices, it has not caused them to run in a different direction than they would likely have done otherwise.

To the extent that ecological factors may at some point inhibit the capacity of the Earth's resources to support the convergence of living standards and consumption patterns in China and India to those of more advanced economies (something which this paper has not considered), commodity prices are likely to be higher, rather than lower.

Chart 18 (on the next page) depicts the most recent medium-term commodity price forecasts of the Australian Bureau of Agricultural and Resources Economics and Sciences (ABARES).

These forecasts reflect the view that, for many mineral commodities, and for some (but not all) energy commodities, supply will eventually respond to the sustained increase in demand driven by the urbanization and industrialization of China, India and other 'emerging and developing' economies, thereby capping the rise in commodity prices over the past eight years or so and in some cases resulting in a decline from current levels, but to levels which in most cases remain high by historical standards.

For some agricultural commodities, in the absence of further adverse weather-related events the upward trend in prices over recent years is likely to be substantially reversed, but in other cases more lasting supply constraints will likely keep prices at elevated levels by historical standards.

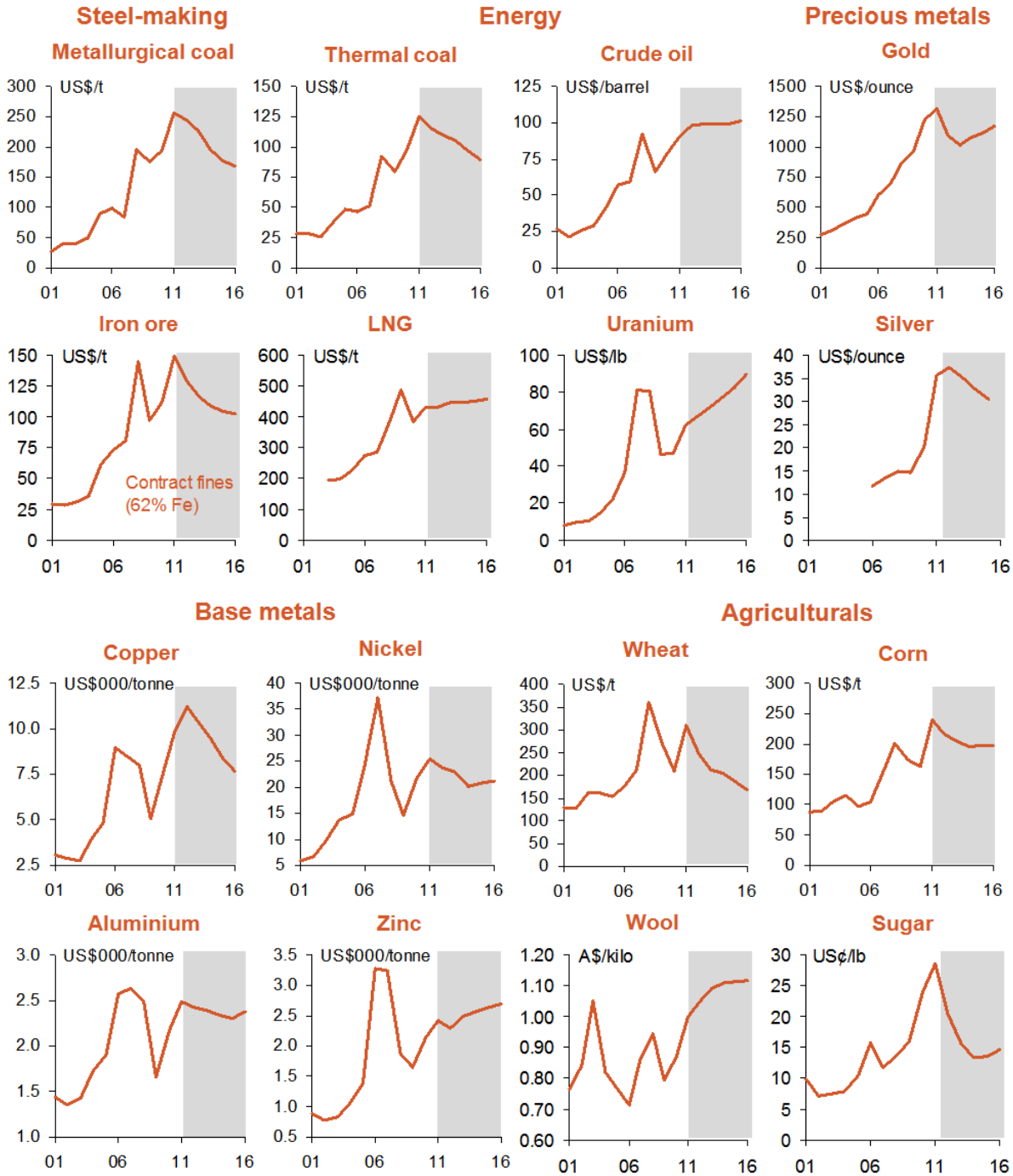
From a global macro-economic perspective, the upward trend in commodity prices over the past decade, and the elevated level (by historical standards) at which many commodity prices seem likely to remain for some years to come, is perhaps most usefully seen as a major shift in *relative prices* – that is, of commodities relative to those of manufactured goods and commercial services (the prices of which have, and will continue to, come under sustained downward pressure as a result of the increasing and expanding production capabilities in these areas of the same economies who are putting upward pressure on commodity prices).

This shift in commodity prices relative to prices of manufactured goods and services amounts to a substantial improvement in the terms of trade of major commodity exporting nations such as Australia, Brazil, Chile, Peru, South Africa, and Indonesia, and hence potentially represents a substantial positive income shock. In Australia's case, at least, this is the largest sustained improvement in its terms of trade in at least 140 years (see Chart 19 on page 19). Australia's terms of trade gains look like being larger than those of other large commodity exporting nations, because of its unique endowment of three of the commodities that are integral to the industrialization and urbanization of China and India (ie, iron ore, coal and LNG) (Chart 20).

For these countries, Australia more than most, a key challenge for economic policy makers lies in how to 'manage' the consequences of what amounts to a substantial positive economic shock, and to ensure that the benefits of what for these countries is a 'once-in-human-history opportunity' are not squandered (as they have been in previous commodities booms).

Establishing some kind of sovereign wealth fund, as many other commodity-exporting nations have done, and has been advocated by, among others, the Governor of the Reserve Bank of Australia (Stevens 2010) and the OECD (2010: 78), would be a useful step in that regard.

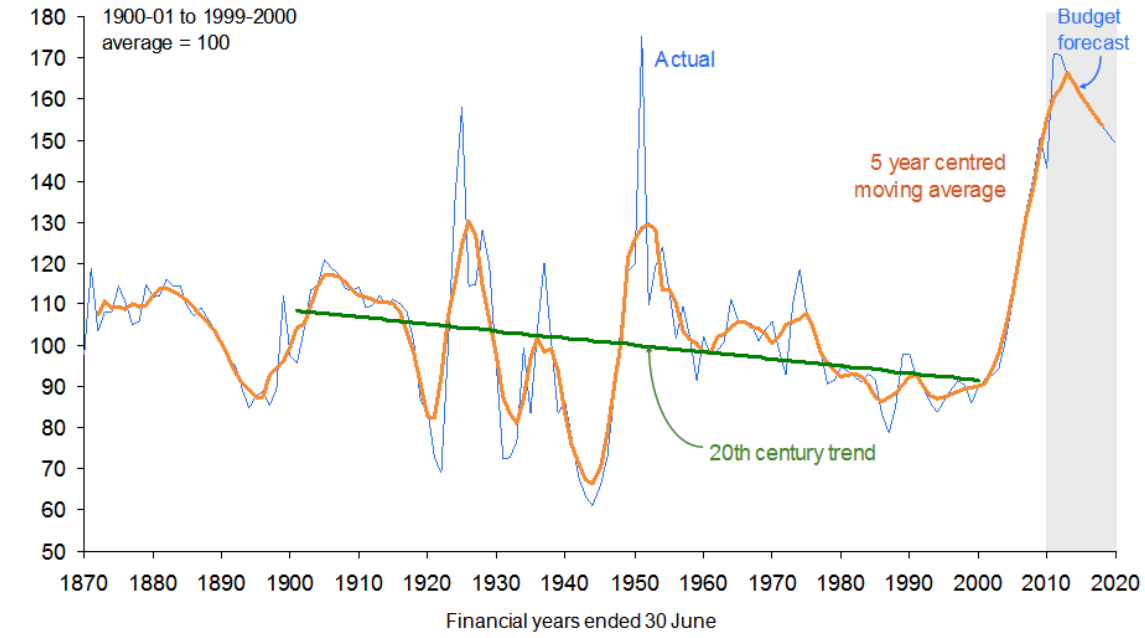
Chart 18: Commodity price forecasts



Source: Australian Bureau of Agricultural and Resources Economics & Sciences, *Australian Commodity Statistics* (2010) and *Australian Commodities* (March Quarter 2011);. LNG prices obtained as value of exports in A$ divided by volume and converted to US$ at average annual exchange rate. Silver is from ANZ *Commodity Informer* (May 2011).

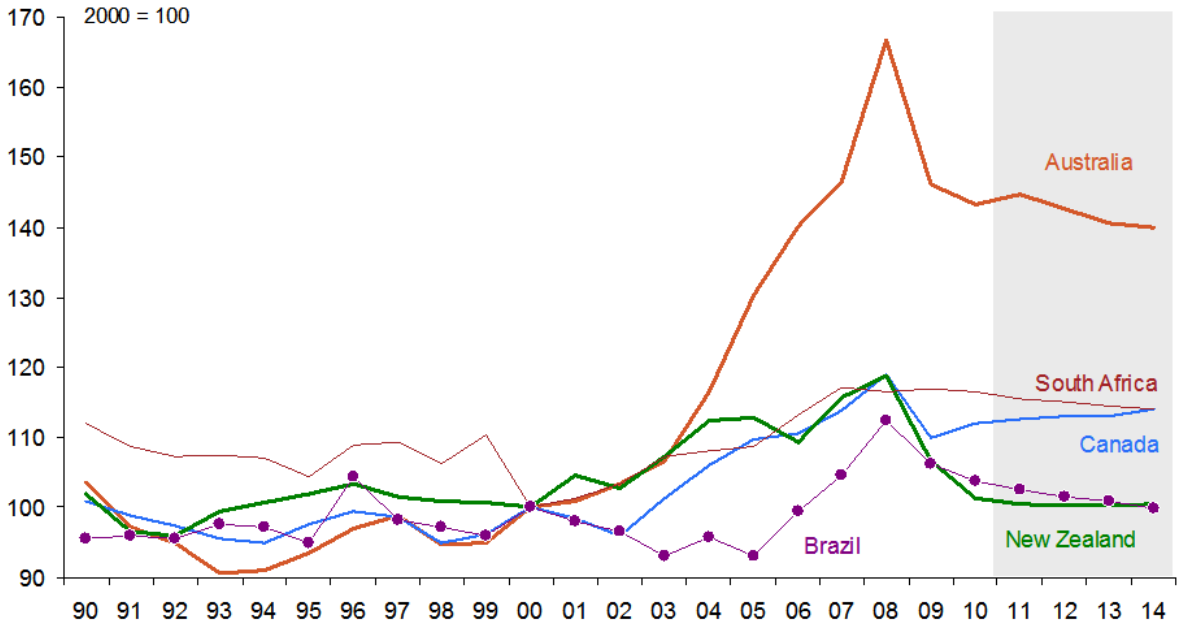
For most advanced economies, however, this shift in relative prices (commodity prices up, prices of manufactured goods and services down) represents an adverse movement in the terms of trade and hence, all else being equal, a detraction from national income, at a time when economic growth prospects are likely to be dampened by the need for sustained fiscal consolidation and by the losses sustained by households and financial institutions during and after the global financial crisis. The adverse terms of trade movement has been particularly acute for Japan (see Chart 21).

Chart 19: Australia's terms of trade, 1870-2020



Sources: Glenn Stevens (Governor, Reserve Bank of Australia), 'The Challenge of Prosperity', Address to CEDA Annual Dinner, 29th November 2010; Martin Parkinson (Secretary, Australian Treasury) , 'Opportunities, Challenges and Implications for Policy', Address to Australian Business Economists, 17th May 2011.

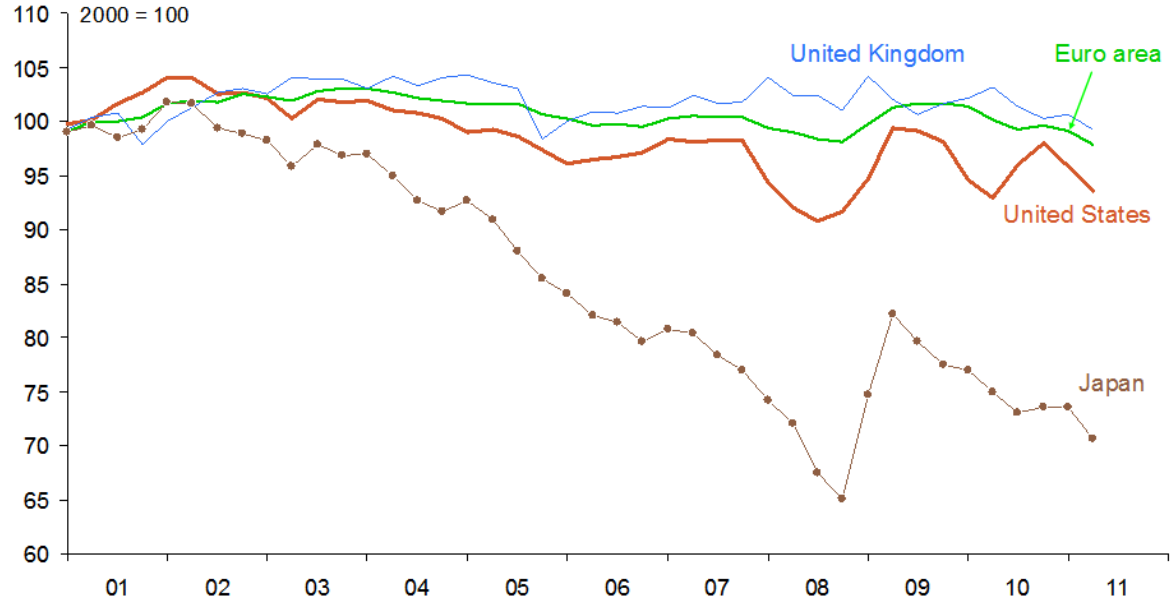
Chart 20: Major commodity exporters' terms of trade



Note: 'terms of trade' is the ratio of average export to average import prices, for goods and services.
Source: IMF, *Australia: 2010 Article IV Consultation – Staff Report* (Country Report No. 10/331), October 2010, p. 11.

China, India and other 'emerging and developing economy' commodity importers are also experiencing adverse terms of trade movements, although for them these are more than offset by ongoing rapid growth in real GDP. Nonetheless, their concerns over resource, energy and food 'security' could nonetheless lead them into policy choices which have adverse effects on their own consumers, as well as on commodity exporters, and potentially – if nations are unable to learn the lessons of history – into situations that could escalate into military conflicts.

Chart 21: Major advanced economies' terms of trade



Note: 'terms of trade' is the ratio of average export to average import prices, for goods and services.
Sources: US Bureau of Economic Analysis; Eurostat; UK Office of National Statistics; Japan Economic & Social Research Institute.

We must all hope that political leaders show sufficient wisdom and restraint to avoid repeating those historical experiences.

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