

# THE RECENT RISE IN COMMODITY PRICES: A LONG-RUN PERSPECTIVE<sup>1</sup>

## Introduction

Commodity prices have increased sharply during the past five years, which has provided a significant boost to Australia's terms of trade. This article places the recent commodity price boom in an historical context, drawing on an analysis of very long-run price series, and documents some unique features of the current price cycle. The article shows that over an extended period, at least until recently, overall commodity prices have tended to decline relative to the price of other outputs, although with considerable volatility. Much of this volatility has been due to large cycles in the real prices of food and non-food agricultural commodities; for much of the last century, metals prices moved within a fairly narrow range. In contrast, real metals prices have recently increased at a rapid pace, although this was preceded by a period of price weakness. The article also discusses the prices of other important resource exports of Australia, which have recently shown a broadly similar trend to base metals prices.

## Long-run Developments in Commodity Prices

The long-run trend in the price of commodities has attracted considerable attention for well over 50 years. Several commentators – notably Prebisch and Singer in 1950 – have argued that the price of commodities relative to that of manufactured goods will tend to decline over time. Several theories have been proposed to account for this trend: that commodities have a relatively low income elasticity of demand compared with the output of other sectors, and hence that the relative price of commodities declines as world income increases; that technical progress in manufacturing has tended to be raw-material saving, lowering the demand for commodities over time; and that the pace of productivity growth in the agricultural and mining sectors has been higher than in other sectors.<sup>2</sup>

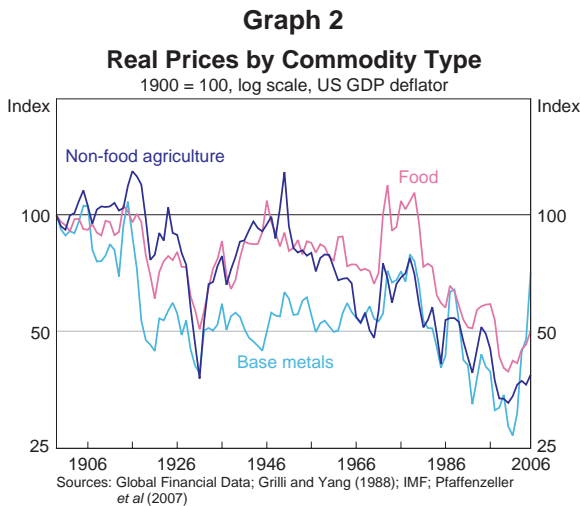
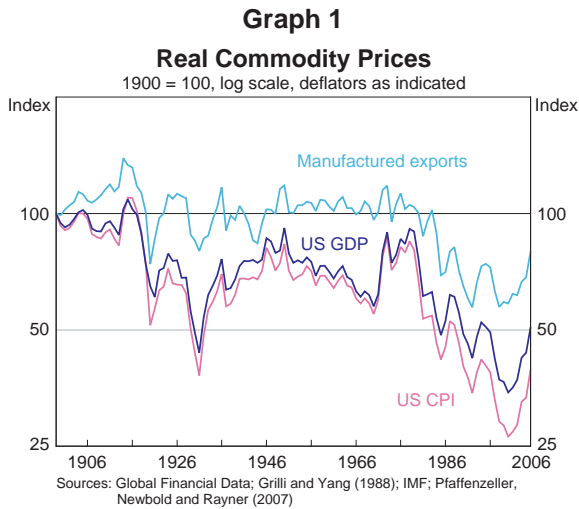
Empirical analyses of long-run commodity price trends are often based on the indices first prepared by Grilli and Yang (1988), which aggregate the prices of 24 primary commodities that are important exports of developing countries (see the Appendix for details). Updating these indices to 2006, real commodity prices overall appear to have declined over the past century, with the largest decline recorded when the commodity price index is deflated by a broad measure of goods and services prices – such as consumer prices or the GDP deflator in the US – rather than by just manufactured goods prices (Graph 1). Specifically, commodity prices have

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1 *This article was prepared by John O'Connor and David Orsmond of Economic Analysis Department, with substantial input from Max Layton.*

2 *See Prebisch (1950) and Singer (1950) for details. The Prebisch-Singer hypothesis remains a source of controversy, with some studies refuting whether there is a trend decline in commodity prices and others the reasons for it. For example, Lipsey (1994) suggests that the relative price decline reflects quality improvements in manufactured goods that are not well reflected in the manufactured goods price index.*

fallen by roughly one-half relative to consumer or GDP prices over the past century, compared with a decline of about one-quarter relative to manufactured goods prices.<sup>3</sup>



Looking over the past century, food, non-food agricultural and base metals prices have all contributed to the decline in the relative price of commodities (Graph 2). Food and non-food agricultural price movements have been quite volatile around their trend.<sup>4</sup> After rising for several decades following the Great Depression, the decline in the price of these commodities since the 1950s has been steep, reflecting in part technological innovations that boosted crop yields and the development of synthetics that reduced the demand for natural fibres. In contrast, after falling sharply in the first two decades of the century, metals prices fluctuated within a fairly tight range between 1920 and 1980, although these prices declined for two decades thereafter, broadly in line with food and non-food agricultural prices.

### Recent Stylised Facts

In contrast to this long-run trend decline, the overall real commodity price index has risen sharply since 2001, although its current level is still far below that of a century ago.<sup>5</sup>

The recent commodity price boom is unusual in several ways. The current upturn has been large and rapid, and in this respect is rivalled by only two other periods during the last century. One was the price boom in the

3 The smaller decline when the commodity index is deflated by manufactured goods prices reflects the faster pace of productivity in the manufactures sector compared with the services sector. As a consequence, inflation is lower in price indices that have a high share of manufactured goods in their construction (Peach, Rich and Antoniadis 2004).

4 The Grilli and Yang indices include wheat and wool, which are important commodity exports for Australia. The prices of these commodities have broadly followed the long-run price trends in the overall food and non-food indices shown in Graph 2.

5 To establish a common numeraire, nominal commodity prices are expressed in US dollar terms and deflated by the US GDP deflator in the rest of this article. The trends discussed would likely be broadly similar had the various indices been expressed in other major currencies.

mid 1930s – which largely reflected the recovery from the sharp declines during the Great Depression – and the other the commodity price rise in the 1970s that was driven by strong world demand and temporary supply shortages of certain food and non-food items at that time (Cooper and Lawrence 1975).

The role played by the industrialisation of China in the most recent price spike is also unusual. During earlier periods of country-specific industrialisation, such as the strong economic growth in the US and Germany in the early 20<sup>th</sup> century,<sup>6</sup> and the industrialisation of Japan in the 1950s and 1960s, real commodity prices remained either flat or fell gradually. The recent large commodity price increases may reflect the uniqueness of China's economy and population. In particular, China's population is proportionately much larger than the countries that industrialised in earlier periods – and is almost double that of the current G7 nations combined – and China has a low per capita endowment of natural resources relative to other economies (Garnaut 2006). Hence, its rapid pace of development has led to a sharp increase in world commodity demand. At the same time, the ready availability of unskilled labour, high productivity growth in China's manufactured production sector, and the competitive globalised environment have helped to contain the price of manufactured goods in recent years.

## Base Metals Prices

Another unique feature of the current price boom is its composition, and particularly the exceptional growth in metals prices compared with other commodity prices. At roughly 150 per cent over the past five years, the recent increase in real metals prices is by far the largest of the last century for these commodities, and the level of real metals prices is now above its century average. In contrast, the recent upturns in food and non-food agricultural prices have been comparatively small, and these prices are still well below their century average levels.

As during previous metals price cycles, the recent increase in prices has been correlated with a pick-up in world industrial production and metals consumption growth. During the metals price cycles in the 1960s, 1970s and 1980s, within several years the growth in metals supply outstripped consumption and metals prices fell back (Graph 3). Through the 1960s, growth in industrial production on a three-year rolling average basis remained roughly constant, with the price decline driven largely by an increase in metals production. The price reversals in the 1970s and late 1980s reflected declines in the growth of metals demand while at the same time supply was boosted by the investment in base metals production that had been started in earlier periods; the price declines in the early 1990s were also accelerated by the effects on the base metals market from the collapse of the former Soviet Union (IMF 1994).

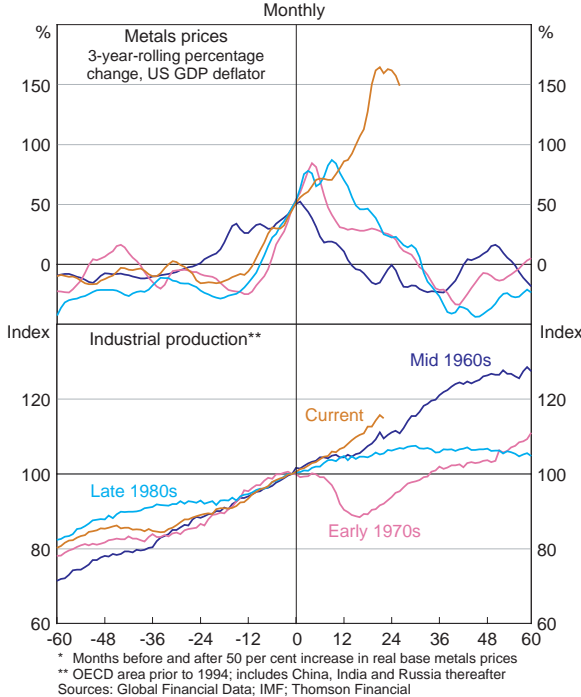
In contrast, the rapid and prolonged nature of the recent growth in base metals prices has been met by only a relatively modest supply response to date. Following the large price declines during the late 1980s and 1990s, global investment in base metals production remained low, and the rate of significant discoveries of new resources slowed. The consequent lack of new supply capacity and long gestation period for new investment to come on line have contributed to the exceptional magnitude of the current price boom, which has now reversed much of the

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<sup>6</sup> While commodity prices rose relative to manufactured goods prices in this period, they were broadly flat relative to consumer and GDP prices.

**Graph 3**

**Metals Price Booms and Industrial Production\***



price weakness seen since the 1980s. During this period, the growing share of global base metals demand by China in order to meet their rapidly growing resource-intensive infrastructure and industrial-based output has been especially noticeable (Table 1).<sup>7</sup>

**Other Resource Prices**

Several important resource commodities exported by Australia, such as coal and iron ore, are not typically included in major long-run commodity price indices, such as those developed by Grilli and Yang. Australia accounts for around one-half of world coking coal production and one-fifth of steaming coal and iron ore, and hence the price developments of these commodities can have a significant impact on the Australian economy.

Real coal prices have not tended to decline over the past century, although they have shown significant volatility (Graph 4). Booms in real coal prices occurred during the ‘roaring twenties’, the immediate post-World War II period, and especially the energy crisis of the 1970s when coal prices trebled. Coal prices subsequently fell back during the 1980s as investments made during the 1970s boosted global supply, in

particular from China, the United States and Australia, and as energy use efficiency increased. Real coal prices have subsequently picked up sharply, partly related to the large increases in electricity demand and steel production in China and other countries, but nonetheless are still below the peaks recorded in the late 1970s and early 1980s.

**Table 1: Chinese Consumption of Base Metals**

Per cent of global consumption

	1995	2005
Aluminium	9.4	22.5
Copper	9.4	21.8
Lead	7.6	25.3
Nickel	4.1	15.2
Zinc	10.0	28.6

Source: ABARE

<sup>7</sup> See Grant, Hawkins and Shaw (2005), Gillitzer and Kearns (2005) and IMF (2006) for further discussion. The presence of financial investors in metals and other commodity markets has also increased, although it is not clear this has played a substantial role in recent price movements; see Domanski and Heath (2007).

After rising in the 1950s in the context of strong world demand for steel – for which iron ore is primarily used – real iron ore prices declined for the next five decades. These price declines reflected in part large iron ore discoveries in Western Australia and Brazil in the 1960s and 1970s, and technological advances in the steel industry (Graph 5). In contrast, strong demand for steel in recent years has seen prices increase sharply, with Chinese consumption of iron ore alone roughly tripling in the past six years, although current real iron ore prices are still below those seen in the 1950s and 1960s.

### Gold and Oil Prices

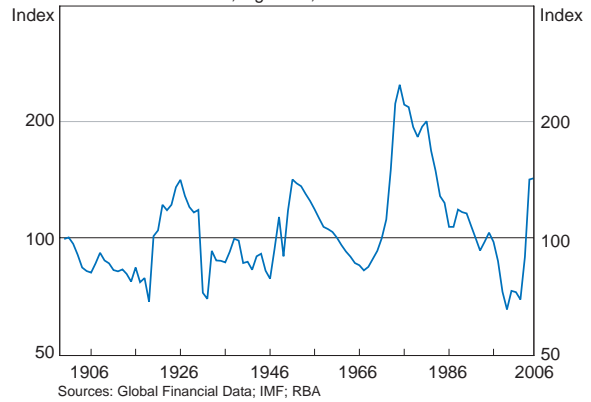
Gold and oil are also not typically included in long-run commodity price indices, perhaps since their price movements have often reflected characteristics unique to these commodities. Nonetheless, like coal and iron ore, gold and in recent decades oil are important exports of Australia, together accounting for around 6 per cent of total export earnings.

Over the past two centuries gold has been both a commodity as well as a *numeraire* for monetary transactions. During this period, major movements in the gold price have been associated with several recurring themes – inflation, changes in the exchange rate of the US dollar, and heightened political and economic uncertainty – often reflecting the impact of wars or changes in the international monetary regime. The nominal price of gold was fixed at US\$20.67 per ounce until 1934 and at US\$35 per ounce until the early 1970s. The movements in the real gold price during that time therefore largely reflected trends in US economy-wide prices (Graph 6). Following the collapse of the Bretton Woods system, the real gold price rose sharply, increasing significantly beyond the level that would have been needed to restore its real value following the fixed gold price period. Much of the spike in the gold price was linked to the energy crises of the 1970s and associated global instability and high inflation, when gold was sought as a store of value, and the gold price fell back as these factors eased during the 1980s and 1990s. The recent rally in the gold price has been driven by a number of factors, including the depreciation of the US dollar, concerns over the inflationary impacts of higher oil prices,

**Graph 4**

**Real Coal Price**

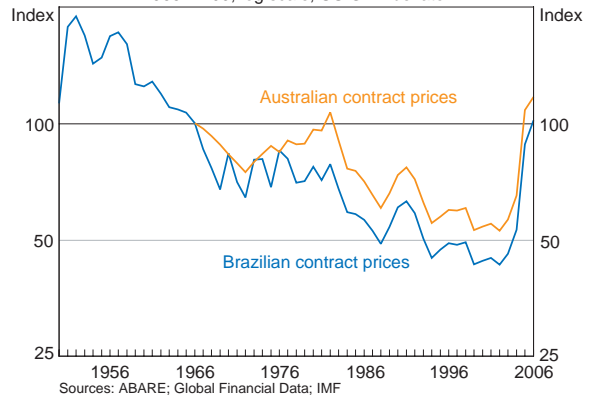
1901 = 100, log scale, US GDP deflator



**Graph 5**

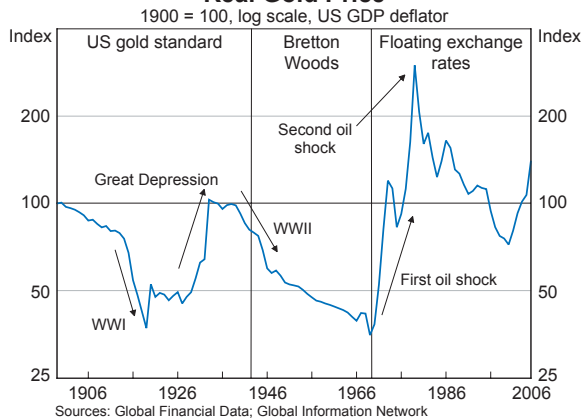
**Real Iron Ore Contract Prices**

1966 = 100, log scale, US GDP deflator



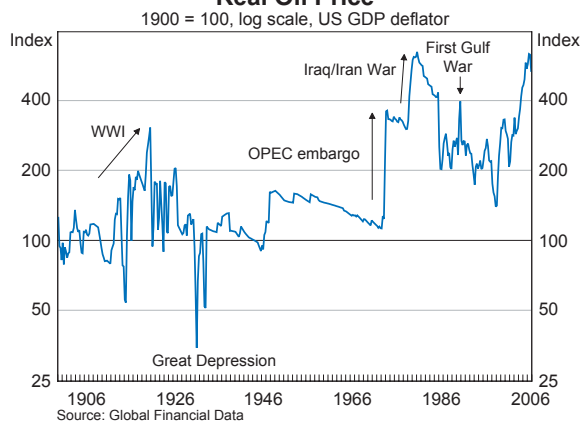
## Graph 6

### Real Gold Price



## Graph 7

### Real Oil Price



investor demand and possibly a high level of speculative activity.

Finally, the nominal oil price was relatively stable for most of the 20<sup>th</sup> century, when oil was primarily sold through multi-year fixed contracts rather than on spot markets, with high prices through World War I and a sharp correction during the Great Depression the only major real price movements prior to the 1970s (Graph 7). Thereafter oil price determination was initially dominated by supply-side factors, and the real oil price quadrupled through the 1970s in response to OPEC's export embargo and the war between Iraq and Iran, which limited global supply. The high price spurred the development of non-OPEC production sources and encouraged greater energy efficiency, and the oil price declined in the 1980s and 1990s. In contrast to its history over much of the last century, the recent rise in the real oil price has been driven by a sustained pick-up in world demand, especially from emerging-market economies.

## Price Outlook

The historical tendency for commodity prices to fall back after a period of rapid increases – and the trend decline in most of these prices over the past century – raises a question over the sustainability of the current high prices for metals and other resources. In response to the high prices, mining and energy sector investment has increased sharply in recent years, and it is reasonable to expect that there will be a significant increase in the production of base metals and other resources in the next few years.

However, the effect of this investment on future real prices is difficult to predict. While increased supply will exert some dampening influence on prices, the rapid growth in world demand for metals and other resources appears to be showing little sign of abating. There are good reasons to believe that strong demand from emerging economies in particular may continue for several decades, although the adoption of new technologies could see a lower

degree of resource-intensive output in these countries over time.<sup>8</sup> Furthermore, productivity advances are still helping to contain the world price of manufactured goods, and a reduction in the price of some services is also probable as the tradability of services in an increasingly globalised economy becomes more widespread. While these various trends continue, they could support the continuation of relatively high real prices for metals and other resources for some time yet.

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<sup>8</sup> For an expanded discussion of the outlook for commodity prices and the role of China, see Edey (2007), ABARE (2007) and Garnaut (2006).

## APPENDIX: DATA, INDEX CONSTRUCTION & SOURCES

### Aggregate Commodity Price Index

Sourced from the commodity price index published by Grilli and Yang (1988), updated to 2003 by Pfaffenzeller *et al* (2007), and thereafter by the authors. The index used is an equal weighted commodity price index of 24 traded non-fuel commodities, including eleven food commodities (bananas, beef, cocoa, coffee, lamb, maize, palm oil, rice, sugar, tea, wheat), seven non-food agricultural commodities (cotton, hides, jute, rubber, timber, tobacco, wool), and six metals commodities (aluminium, copper, lead, nickel, tin, zinc). Data for 2004–2006 obtained from the IMF's *International Financial Statistics*. While the original Grilli-Yang index is based on 1977–1979 export weights, the index published by Pfaffenzeller *et al* (2007) and used here is calculated using equal weights (geometric mean) so that no single year or commodity has undue impact on the index. Further, unlike the Grilli-Yang index, nickel prices are used here instead of silver since precious metals prices are influenced by factors unrelated to the global economic cycle. The nickel price series was sourced from the U.S. Geological Survey for the period 1900–1947, and from the IMF's *International Financial Statistics* thereafter.

### Commodity Price Sub-indices

The three commodity sub-indices – food, non-food agriculture, and base metals – use data sourced as above. Each commodity is equal weighted in their respective sub-indices (geometric mean).

### Other Individual Price Indices

The US dollar coal export price index was constructed using data from *Official Year Book of New South Wales* for the period 1901–1967, the IMF's *International Financial Statistics* from 1967–2004, and thereafter updated by the authors using data from the Australian Bureau of Statistics. Iron ore benchmark contract US dollar prices for Australia were sourced from the Australian Bureau of Agricultural and Resource Economics, while prices for Brazil were from the IMF's *International Financial Statistics*. The oil price data were sourced from Global Financial Data, and gold price data from the Gold Information Network.

### Price Deflators

The US CPI and GDP deflator are sourced from Global Financial Data. The manufactured export unit value index for 1900–2003 is from Pfaffenzeller *et al* (2007); data for the most recent period are estimates.



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