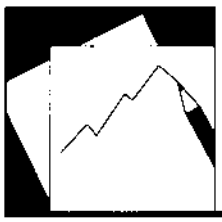
Working Paper

INTERNATIONAL MONETARY FUND

WP/11/86



IMF Working Paper

Identifying the Linkages Between Major Mining Commodity Prices and China's Economic Growth—Implications for Latin America

Yongzhen Yu

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Western Hemisphere Department

Identifying the Linkages between Major Mining Commodity Prices and China's Economic Growth—Implications for Latin America

Prepared by Yongzhen Yu[1]

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April 2011

Abstract

Major mining commodity prices are inherently volatile and cyclical. High levels of investment in China have been a key driver in the strong world demand for minerals and metals over the past decade. The urbanization and industrialization of China has been an important factor behind the increase in domestic demand and high investment growth, while its export sector is also an important source of growth and plays a critical role as a catalyst. Activity in infrastructure, construction, real estate, and automobile manufacturing all contribute to the strong demand for minerals. Over the next five years, the Chinese demand is expected to remain strong, supported by investment and gradually rising consumption rates. However, in the second part of this decade economic growth in China could slow down. For Latin American countries, export receipts should remain strong over the next five years and beyond, given the continued strong demand from China.

JEL Classification Numbers: F43; L72; Q31

Keywords: Major mining commodity; China's demand; economic structure; prospect

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Contents

Supplemental Appendix Tables

I. INTRODUCTION

Latin America's economic performance over the past decade has been good, in part because of strong commodity prices. Commodity prices, which tend to move in cycles, have risen sharply over the past decade. This paper assesses prospects for the current cycle, which started in 2003. Most commodity analysts think that a critical factor behind the rise in commodity prices has been the strength of the Chinese demand for commodities. This strength has been associated, in part, with higher investment levels, reflecting the emphasis given on developing domestic infrastructure and the interior of the country. Therefore, future developments in commodity prices also depend on prospects for the Chinese economy.

Since joining the WTO in 2001, the Chinese economy has undergone a period of strong growth, with a rapid expansion in exports and investment which, in turn, has resulted in a strong demand for metals and mining commodities. China has become the largest consumer and producer of steel in the world, and its share of the world demand for other metals has also grown very rapidly over the past decade. This paper focuses on the main mining commodities, which account for the thrust of world demand. In addition, the data related to these commodities (iron ore, copper ore, alumina, manganese ore, and chrome ore) are more easily accessible than data for less important commodities. As a result, this paper focuses on these few commodities because of their critical importance.

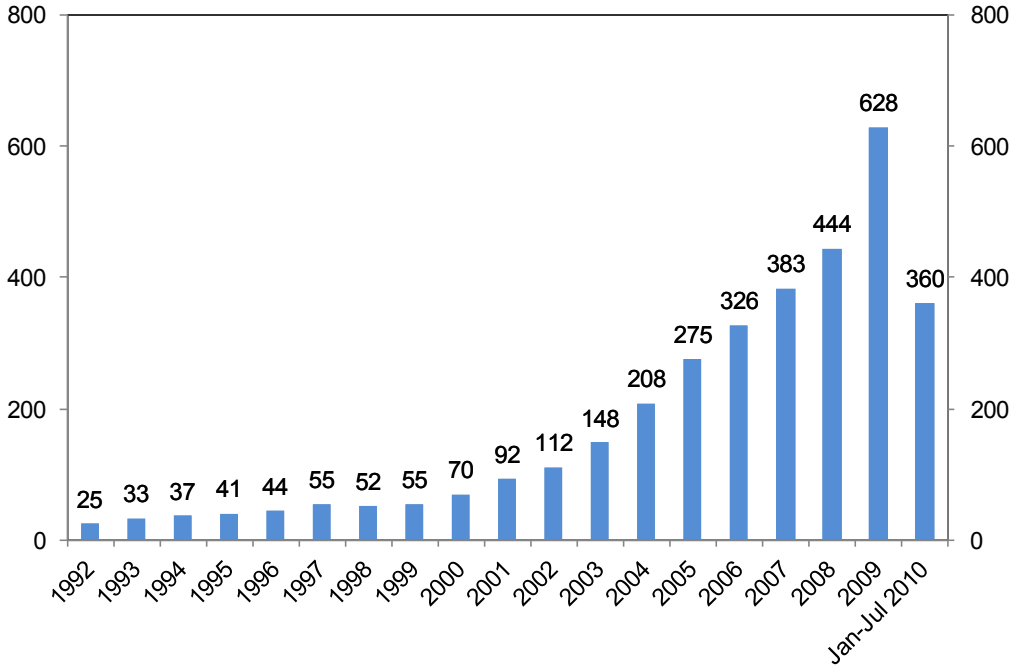
II. BACKGROUND AND RECENT DEVELOPMENTS: BASIC DATA

A. A Picture of Major Mining Commodity Imports to China: Volume and Value

The basic trend of China's imports of the main mining commodities has been upward, even though there are some exceptions for some specific products or some specific periods, such as 1998–99, because of the Asian financial crisis (Figure 1 and Figure 2). For example, the annual import volume of iron ore increased about over 25 times between 1992 and 2009, from 25 million tons (M. tons) to 628 M. tons (Figure 1). As Table 1 shows, the annual import volume of manganese ore increased 5.7 times between 1997 and 2008 (from 1.3 M. tons to 7.6 M. tons); copper ore rose 5.5 times (from 0.9 M. tons to 5.2 M. tons); chrome ore 7.7 times (from 0.9 M. tons to 6.8 M. tons); and alumina 3.8 times (from 1.1 M. tons to 4.1 M. tons).

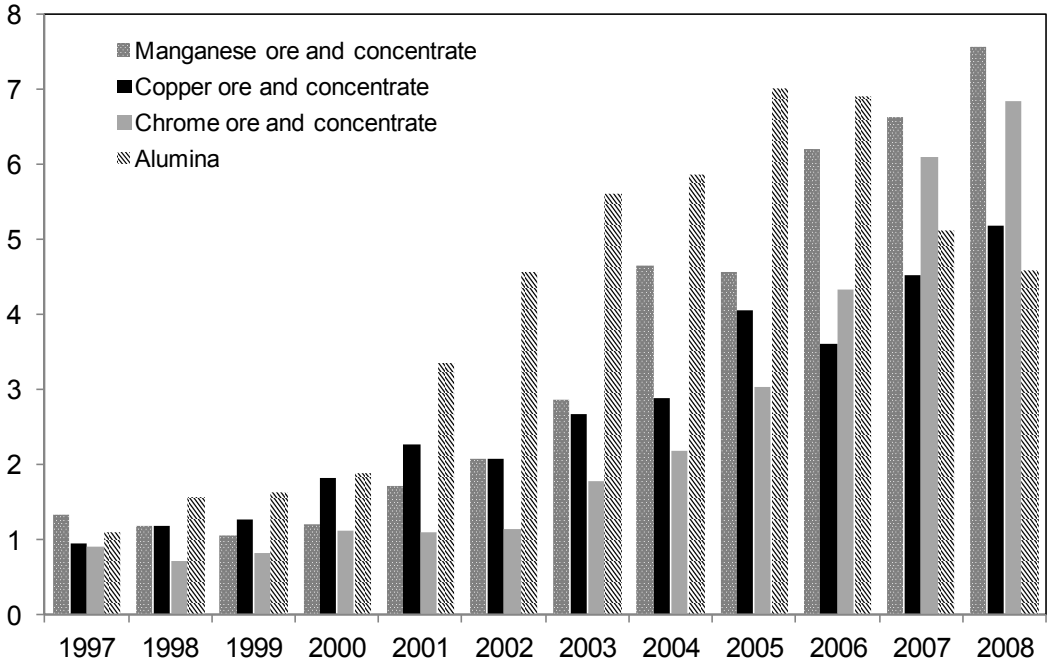
Undoubtedly, the rise in Chinese imports of those products is very large. At the same time, how did the domestic Chinese production of these products evolve over the same period? How about large are imports in proportion of domestic consumption, and how is China's dependence on foreign supply? Also, from a different prospective, what is the share of China in the world demand for these commodities? What is the relationship between China's rising imports of these products and their price? In order to answer these questions, we will assess specific mining products one by one. To that effect, we selected the three most important commodities (iron ore, copper ore, and alumina), and assessed the evolution of world output and demand over the past two decades, and their dependence on China.

Figure 1. Iron Ore and Concentrates Import Volume of China
(In Millions of Tons)



Source:China Statistic Yearbook 2009. Available at http://www.stats.gov.cn/tjsj/ndsj/.

Figure 2. China's Major Mining Commodities Imports: Volumes
(In million of tons)



Source:China Statistic Yearbook 2009. Available at http://www.stats.gov.cn/tjsj/ndsj/.

Table 1. China's Major Mining Commodities Imports (1997–2008): Volume (In millions of tons) and Value (In US$ millions).

	Iron ore and concentrates		Manganese ore and concentrate		Copper ore and concentrate		Chrome ore and concentrate		Alumina	
	Volume Mton	Value M$	Volume Mton	Value M$	Volume Mton	Value M$	Volume Mton	Value M$	Volume Mton	Value M$
1997	55.1	1,614.8	1.3	123.8	0.9	421.2	0.9	110.8	1.1	238.7
1998	51.8	1,467.8	1.2	90.3	1.2	458.3	0.7	80.9	1.6	354.2
1999	55.3	1,379.0	1.1	87.8	1.3	474.4	0.8	74.3	1.6	337.9
2000	70.0	1,857.7	1.2	95.4	1.8	805.8	1.1	9i6.83	1.9	638.5
2001	92.3	2,502.8	1.7	131.1	2.3	898.0	1.1	81.0	3.4	624.9
2002	111.5	2,769.1	2.1	151.4	2.1	809.5	1.1	78.9	4.6	753.0
2003	148.1	4,856.5	2.9	205.0	2.7	1,288.2	1.8	150.8	5.6	1,375.8
2004	208.1	12,712.0	4.7	585.7	2.9	2,238.4	2.2	381.3	5.9	2,043.6
2005	275.3	18,372.8	4.6	683.5	4.1	3,706.7	3.0	595.6	7.0	2,597.2
2006	326.3	20,923.8	6.2	645.8	3.6	6,117.3	4.3	739.2	6.9	3,023.5
2007	383.1	33,795.6	6.6	1,302.4	4.5	8,816.4	6.1	1,549.7	5.1	1,974.0
2008	443.6	60,531.6	7.6	3,469.8	5.2	10,440.2	6.8	2,714.4	4.6	1,775.7
2009	627.8	50,140.4								
2010 Jan-Jul	360.4	41,803.8							2.6	906.7

Source: China Statistic Yearbook 2009. Available at < http://www.stats.gov.cn/tjsj/ndsj/>.

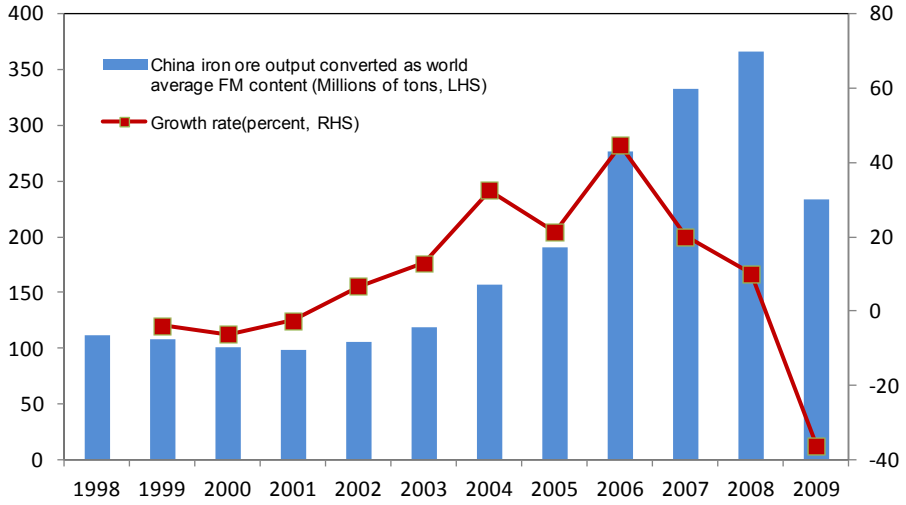
B. Iron Ore

From 1998 through 2008, China's total demand for iron ore rose 5.3 times, from 164 M. tons to 861 M. tons (Figure 3 and Table 1). Over that period, Chinese domestic output increased 3.3 times (from 112 M. tons to 366 M. tons) while imports of iron ore rose 8.5 times, from 52 M. tons to 444 M. tons. As a result, China's iron ore dependence on imports gradually rose from 31.6 percent in 1998 to 54.8 percent in 2008, and 72.9 percent in 2009 (Figure 4). The exceptionally high level registered in 2009 is due to several factors: (a) China's fiscal stimulus package, with heavy investments in real estate and infrastructure, in the aftermath of the crisis; (b) a compression in demand in 2008 resulting from high ore prices and a subsequent sharp increase in 2009, following a drop in prices; and (c) cuts in domestic iron ore production, given that profits had been adversely affected by the 2008 price decline.

Table 2 shows the total demand for iron in China and its share of total world demand during 2006–09. During this period, the growth rate of iron ore demand in China was twice as fast as that of the world demand. As a result, China's share in world demand rose from 40.2 percent in 2006 to 54.3 percent in 2009. As noted, the exceptionally high share registered in 2009 reflected in part the impact of China's large domestic stimulus package.

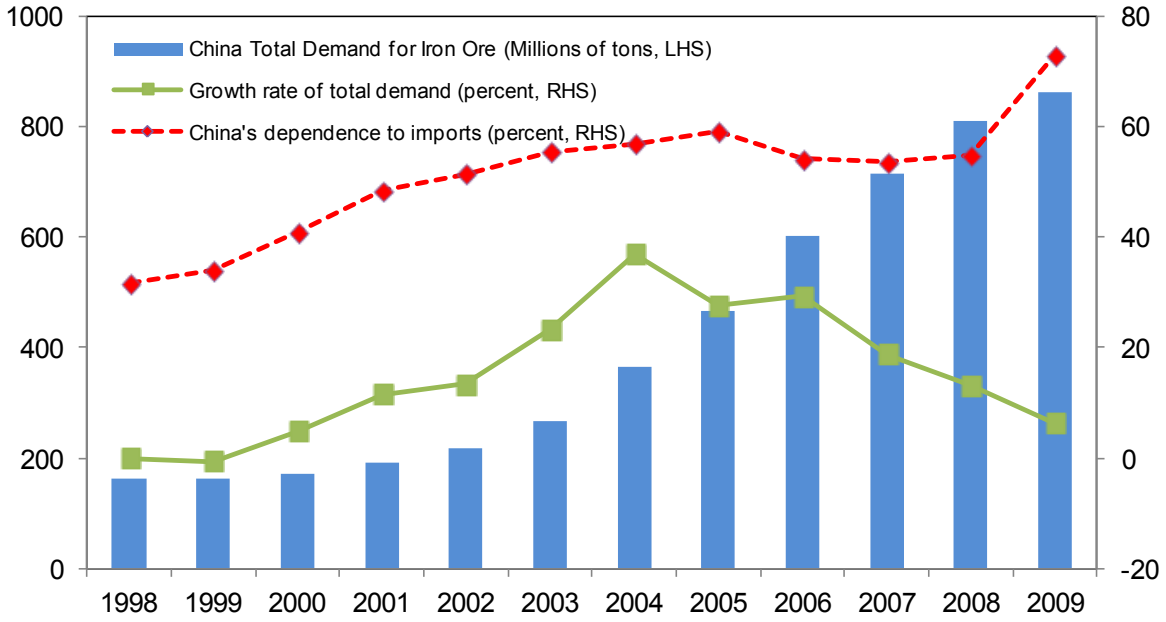
China has been the largest steel producer for over a decade. In 2005, it produced nearly one-third of the world's steel, or more than three times the output of Japan and the United States—the second and third largest producers, respectively. By 2008, China's share of total world steel production had risen to 47.4 percent (Jianmin MA, 2010). Steel production in China nearly doubled during the 1990s and it tripled during the 2000s, rising at an average annual rate of over 22 percent.

Figure 3. China's Domestic Iron Ore Output Converted as World Average Ferric Content, and Growth Rate



Source: China Statistical Yearbooks; World total production volume data from Ma, Jianming (2010); Author's estimates.

Figure 4. Iron Ore Total Demand in China, Dependence to Imports[1/]



Source:China Statistical Yearbooks; World total production volume data from Ma, Jianming (2010); some data from table 2; Author's estimates.

1/ China domestic iron ore output has been converted as world iron ore average ferric content. Here, China's total demand for iron ore is roughly calculated as the total of China's domestic iron ore output and China's iron ore import

Table 2. Iron Ore Total Demand in China and as a Share of World Supply[1/]

	China's Total Demand for Iron Ore		China's Demand Share of world total (In percent)	World Total production	
	Volume (1) Millions of tons	Growth rate percent	(1)/(2)*100	Volume (2) Millions of tons	Growth rate percent
2006	602.7	n/a	40.2	1497.7	n/a
2007	715.4	18.7	43.9	1630.8	8.9
2008	809.6	13.2	47.0	1722.5	5.6
2009	861.5	6.4	54.3	1587.7	-7.8

Sources: China Statistical Yearbooks; World total production volume data from Ma, Jianming (2010); Author's estimates.
1/ China domestic iron ore output has been converted as world iron ore average ferric content. Here China's total demand for iron ore is roughly calculated as the total of China's domestic iron ore output and China's iron ore import. World total production can be roughly looked as world total demand when calculating the China's demand share of world total

C. Copper Ore

China's copper output started from a small base, requiring sustained reliance on imports to meet the increase in domestic demand (Figure 5 and Table 3). However, since 1990, China's copper smelting industry has grown fast, and even faster since 2000, when its annual growth rate has been kept above 10 percent. The average growth rate of smelting (14.3 percent) has been more than twice as high as that of mining output (6.6 percent), reflecting increased reliance on copper ore imports, processed domestically. China's total copper demand rose from 0.7 M. tons in 1990 to 6.6 M. tons in 2007 (Table 4). Since1990, its annual average growth rate has averaged close to 14 percent a year, well above the growth rate of domestic copper output.

Table 3. China's Copper Output and Growth Rate

	1950	1960	1970	1980	1990	2000	2007
Copper mining output (ktons)	2.9	87.4	145.8	221.3	295.9	593.0	928.0
Annual growth rate (percent)	n/a	40.6	5.3	4.3	2.9	7.2	6.6
Refined copper output(ktons)	10.5	100.3	165.3	383.6	558.7	1371.0	3499.4
Annual growth rate (percent)	n/a	25.3	5.1	8.8	3.8	9.4	14.3

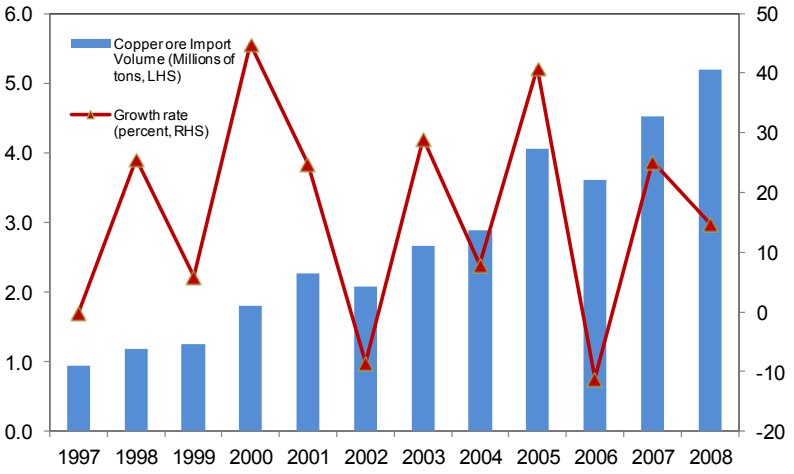
Source: Mei Zhang (2008).

Table 4.China's Copper Consumption

	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007
Refined Copper Consumption (Ktons)	729	1190	1942	2307	2737	3123	3875	3682	3587	4926
Total copper consumption (Ktons)	729	1190	2650	3620	4140	4663	5536	5301	5108	6596

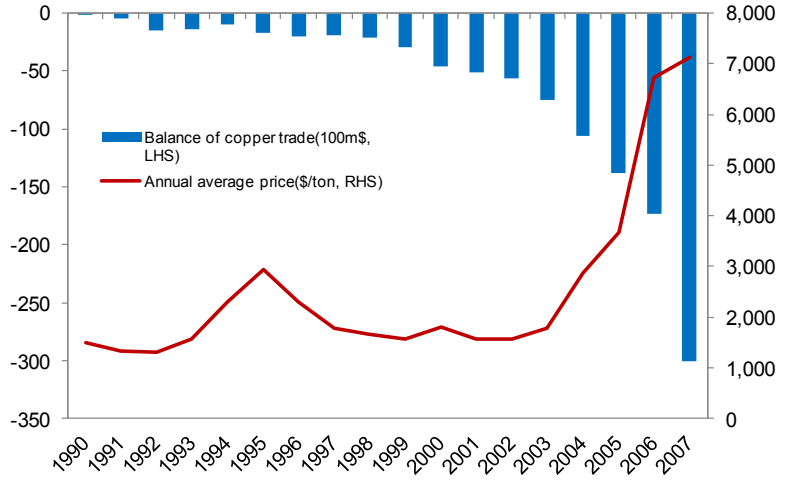
Source: Mei Zhang (2008).

Figure 5.China's Copper Ore Import Volume and Its Growth Rate



Source: China Statistic Yearbook 2009, available at <http://www.stats.gov.cn/tjsj/ndsj/>; author's estimates.

Figure 6.China's Copper Mining Products Trade Balance and International Copper Price



Source: Mei Zhang (2008).

In 2007, China net import volumes of copper-related products included 4.5 M. tons of copper ore; 0.2 M. tons of crude copper; 1.4 M. tons of refined copper; 0.6 M. tons of copper products; and 5.6 M. tons of scrap copper. The deficit of copper trade was equivalent to US$30.1 billion. Over the long run, domestic copper output was insufficient to meet the rising domestic demand, and China had to rely on large scale imports. Since 1990, net import volumes have increased steadily, as a result of high economic growth, particularly since the beginning of the 2000s (Figure 6). As a result, China's degree of self sufficiency in copper decreased gradually from 40.6 percent in 1990 to 14 percent in 2007 (Table 5). In other words, China's dependency on copper imports is very high now, as around two thirds of copper ore used in China are imported.

Table 5.China's Copper Mining Output's Degree of Self-Sufficiency

	Copper mining output (ktons)	Refined copper output (ktons)	Degree of self sufficiency (%)
1990	296	729	40.6
1991	304	787	38.6
1992	334	990	33.6
1993	346	990	34.9
1994	396	910	43.5
1995	445	1190	37.4
1996	439	1204	36.5
1997	496	1591	31.2
1998	487	1750	27.8
1999	500	2029	25.6
2000	593	2650	22.4
2001	587	3620	16
2002	568	4140	14
2003	604	4663	13.0
2004	742	5536	13.4
2005	762	5301	14
2006	873	5108	17.1
2007	928	6596	14.0

Source: Mei Zhang (2008).

D. Alumina and Aluminum Ore

Over the past decade, China's alumina and aluminum product consumption rose very fast. In 2008, China's consumption of refined aluminum was close to 14 M. tons, equivalent to over one third of world consumption (38 M. Tons). The annual growth rate of China's consumption averaged close to 17 percent over past decade, and it is now larger than that of the United States. In order to meet this strong growth, China's refined aluminum output doubled from 6 M. tons in 2003 to 13.2 M. tons in 2008 (Table 6). China has large reserves of bauxite, but they are mixed with silicon and iron. They require a complex process of extraction at high temperature and dense soda in a Bayer process. As a result, domestic production costs are significantly higher than the prices of imported high quality bauxite or alumina. China's imports of alumina grew very fast prior to 2005, as Table 9 shows, but since then, they have declined. Conversely, domestic alumina output grew very rapidly from 2005 to 2008 (Table 6).

In order to meet its rapidly growing domestic demand for aluminum ore, China increased its production of bauxite and imported more aluminum ore. In 2008, China's bauxite output reached 25.2 M. tons, corresponding to an annual average growth rate of 20 percent over the past decade (Mei Zhang, 2010). By 2008, bauxite production was almost identical to aluminum ore import, which reached 25.7 M. tons (Table 10). Imports of aluminum ore grew

at particularly high rates from 2005 to 2007 (Table 7), thus contributing importantly to the high rate of growth of domestic alumina output during that period.

China's alumina dependency on imports, which rose from 32 percent in 1998 to 48 percent in 2003, subsequently dropped down to 17 percent in 2008 (Table 6). In practice, around 40 percent of Chinese aluminum output gets its raw materials from outside China (Jianming Ma, 2009). In addition, China's total demand for alumina share of world total rose to around 28 percent in 2005, according to available data (Table 7). Figure 7 shows the linkage between changes in alumina and aluminum ore prices and import volumes. The prices peaked at the year of their largest import volumes in 2006 and 2008, respectively.

Table 6. China's Alumina Demand and Share of World's Demand[1/]

	China's domestic Alumina output		China's Alumina Import		China's Total Demand for Alumina		China's demand as	China's dependence	World Total production	
	Volume (1)	Growth rate	Volume (2)	Growth rate	Volume (3)	Growth rate	Percent	Percent	Volume (4)	Growth rate
	Millions of tons	percent	Millions of tons	percent	Millions of tons	percent	(3)/(4)*100	(2)/(3)*100	Millions of tons	percent
1997	n/a	n/a	1.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a
1998	3.3	n/a	1.6	44.0	4.9	n/a	n/a	32.0	n/a	n/a
1999	3.8	15.0	1.6	3.2	5.5	11.2	n/a	29.7	n/a	n/a
2000	4.3	12.5	1.9	16.1	6.2	13.6	n/a	30.3	n/a	n/a
2001	4.8	10.0	3.4	78.2	8.1	30.7	n/a	41.4	n/a	n/a
2002	5.5	15.4	4.6	36.4	10.1	24.1	n/a	45.5	n/a	n/a
2003	6.1	11.3	5.6	22.8	11.7	16.5	22.3	47.9	52.6	n/a
2004	7.0	14.4	5.9	4.6	12.9	9.7	23.4	45.7	54.9	4.3
2005	8.6	23.1	7.0	19.6	15.6	21.5	27.8	45.0	56.2	2.4
2006	13.3	54.4	6.9	-1.6	20.2	29.2	n/a	34.3	n/a	n/a
2007	19.5	46.8	5.1	-25.9	24.6	21.9	n/a	20.8	n/a	n/a
2008	22.8	17.0	4.6	-10.4	27.4	11.3	n/a	16.8	n/a	n/a

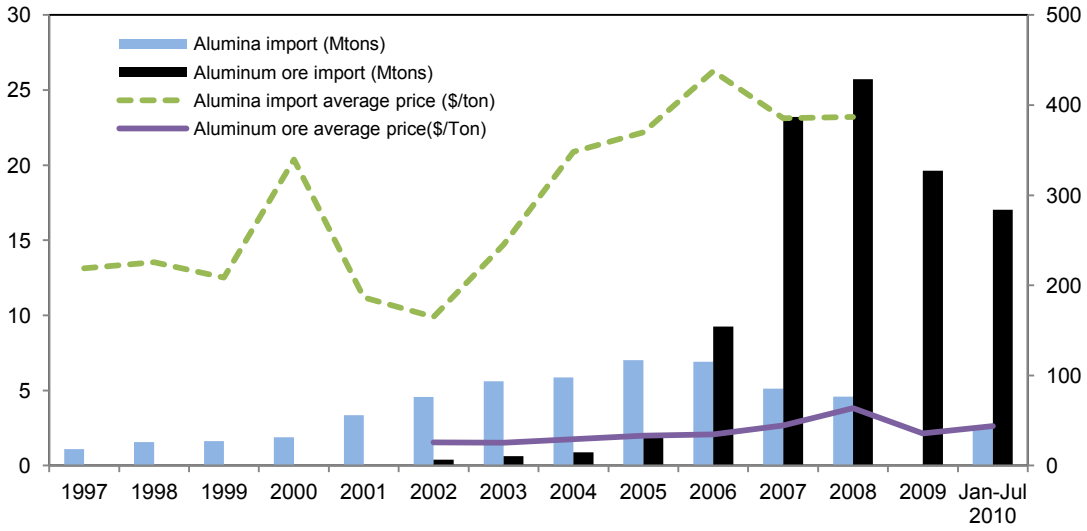
Sources: China Statistical Yearbooks (1998-2009); The Yearbook of Nonferrous Metals Industry of China (2006); Author's estimates.
1/ China' total demand for alumina is computed as the sum of China's domestic alumina output and China's alumina imports. World total production was proxied by world demand when computing China's share of world production.

Table 7. China's Aluminum Ore and Concentrates Import and Average Price

	Volume (1)	Growth rate	Value (2)	Average price (2/1)
	Mtons	percent	M$	$/ton
2002	0.4	n/a	10.4	25.9
2003	0.6	53.2	15.7	25.4
2004	0.9	43.0	25.8	29.2
2005	2.2	145.6	71.7	33.1
2006	9.3	327.2	320.0	34.6
2007	23.2	150.8	1030.6	44.4
2008	25.7	10.9	1638.8	63.7
2009	19.6	-23.7	703.0	35.8
Jan-Jul 2010	17.0	-13.3	743.9	43.7

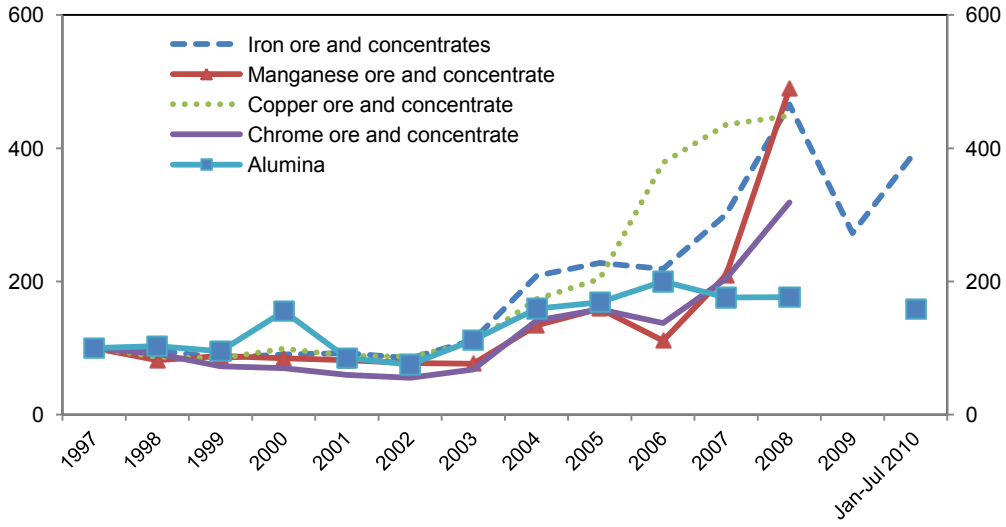
Sources: China Customs Online Database, available at:
< http://www.haiguan.info/OnLineSearch>; author's estimates.

Figure 7. Alumina and Aluminum Ore Imports and Prices



Sources:China Statistical Yearbooks (1998-2009); China Customs Online Database, available at :<

Figure 8. Prices Indexes (1997=100) of China's Main Mining Commodity Imports



Sources:China Statistical Yearbooks (1998-2009); author's estimates.

E. Major Mining Commodities Prices and Linkage with China's Demand

Major mining commodity prices have risen sharply since 2003. Figure 8 shows the annual average prices of five major mining commodities, a picture similar to that presented in the IMF's Economic Data Sharing System (Figure 9). In the late 1990s low commodity prices resulted in relatively low levels of investment in the sector and the closing of some mines. However, the strong global demand of the past decade, including from China, has driven inventories to low levels. With production bumping into capacity constraints, prices have surged. Strong growth in demand combined with a slow pace of capacity expansion has kept markets exceptionally tight. It is noticeable that China is a large net importer of copper ore,

iron ore, and nickel, the prices of which have increased most among commodities. By contrast, China has been a net exporter of aluminum since 2002, which may explain why aluminum prices have increased by only a fraction of most other commodity prices.

China has emerged as one of the largest—often the largest—consumers of most primary commodities. Its demand for metals has picked up since 1999, explaining two-thirds of world demand growth between 1999 and 2005 (during that period, China's demand for major metals grew at an average rate of 14.7 percent a year). China produces and consumes nearly one third of most major metals, except for nickel and copper (Table 8). Chinese demand has been a major driver in the surge of metal prices, together with capacity constraints, low stocks, and the depreciation of the U.S. dollar. For a long time, China has been a net importer of steel, but in 2006 it became a net exporter of steel and ranked first in the world as net exporter in 2008. In 2009, with strong domestic demand and reduced exports after financial crisis, it became a net importer again.

Figure 9. Price Indexes of World Metals and Major Mining Commodities

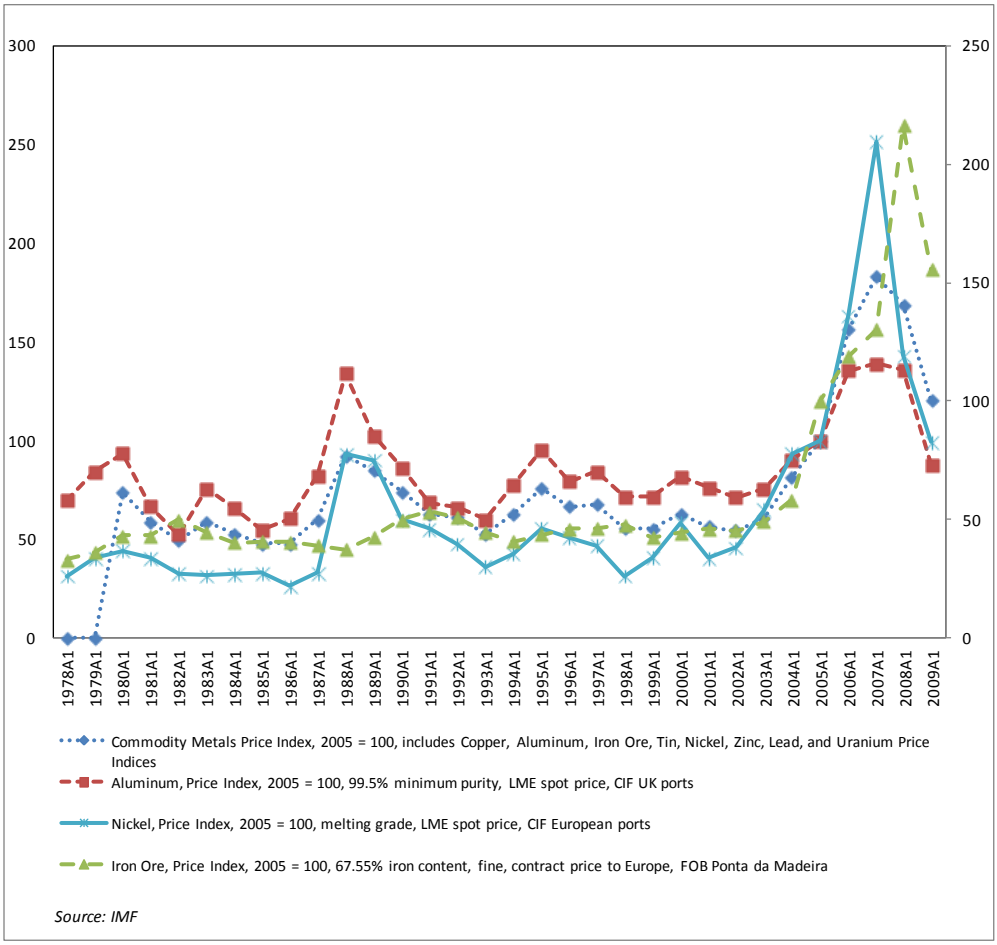


Table 8. China's Main Nonferrous Metal Production (10,000 tons), Consumption (10,000 K tons), and Share of World Total Production/Consumption

Product		2001	2007	2008	2008 China share of world total (percent)	2001 prod /cons ratios	2008 prod /cons ratios
Refined copper	Production	1554.0	1798.0	1846.0	20.5	1.1	1.0
	Consumption	1455.0	1810.0	1808.0	26.6		
Refined aluminum	Production	2452.0	3811.0	3983.0	33.1	1.0	1.1
	Consumption	2352.0	3758.0	3777.0	33.4		
Refined nickel	Production	119.8	145.6	136.5	9.7	1.0	1.1
	Consumption	115.1	135.3	129.4	28.2		
Refined lead	Production	670.3	817.8	867.9	36.9	1.0	1.0
	Consumption	647.1	836.3	870.4	31.6		
Refined zinc	Production	921.3	1136.0	1153.0	33.9	1.1	1.0
	Consumption	867.1	1129.0	1136.0	32.6		
Tungsten	Production	4.5	9.8	10.5	80.0	n/a	n/a
Refined tin	Production	25.7	34.9	33.2	36.6	1.0	1.0
	Consumption	26.7	35.7	33.7	35.0		
Molybdenum	Production	13.1	21.4	22.0	40.1	n/a	n/a
Antimony	Production	12.1	18.6	20.8	66.5	n/a	n/a

Sources: Jianmin MA (2009); author's estimates.

III. Key Drivers of Strong Demand for Minerals and Metals in China

Compared with other countries, China GDP's composition has a prominent feature, which is that consumption has accounted for less than 50 percent of GDP in recent years, compared with a world average of close to 80 percent. According to World Bank data, world consumption has stabilized at around 77–78 percent of GDP since 1990s. Private household consumption in China is only 34 percent of GDP, well below the averages for the groups of middle-income countries (60 percent) and low- and middle-income countries (41 percent).

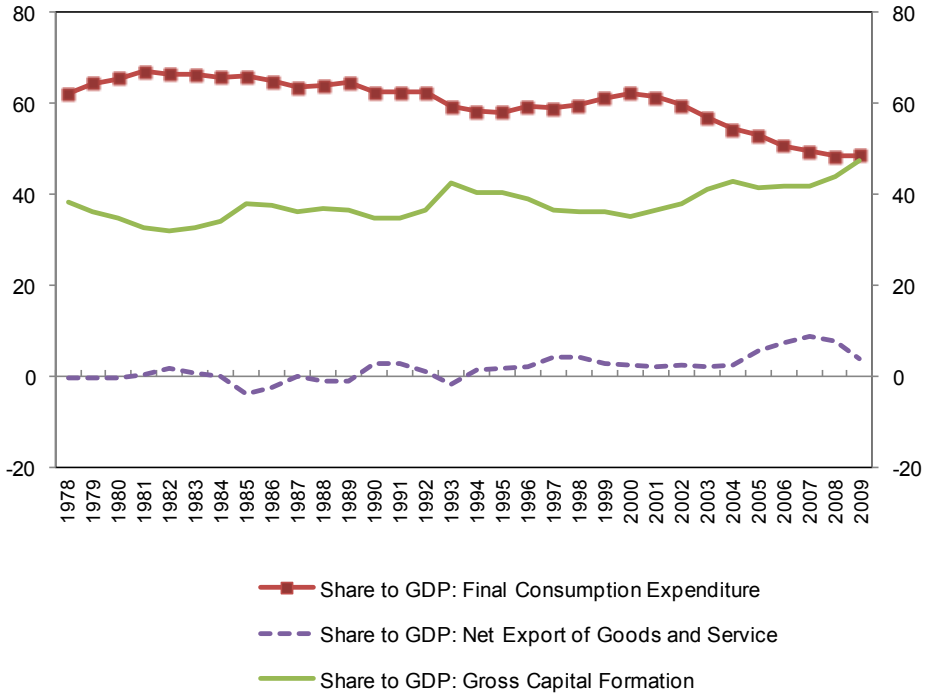
A. The Structural Evolution of China's GDP's Composition and its Implication for Major Mining Commodity Prices

Over the past decade, China's share of consumption in GDP has declined steadily, from 62.3 percent in 2000 to 48.6 percent in 2009. Over the same period, the share of investment in GDP (capital formation rate) rose from 35.3 percent to 47.5 percent and the share of net exports increased from 2.4 percent to 3.3 percent (after having peaked at 8.8 percent in 2007). A sharp increase was registered in investment in 2009, following the large stimulus package that China implemented packaging the wake of the global crisis (Table 13 and Figure 10).

In 2009, the share of consumption in China was only slightly higher than that of gross capital formation, with both of them close to 48 percent of GDP. If we look at changes in GDP composition from 2000 to 2007, we find that final consumption increased 1.1 times, while capital formation rose 2.2 times and net exports 8.8 times. The growth rate of final consumption is far lower than that of capital formation and net exports, which explains the decline in the share of consumption in GDP. The share of consumption in GDP has declined

significantly since 2000 (by 13½ percentage points of GDP), while the share of investment has risen sharply (by over 12 percentage points of GDP), particularly since 2004. Net export have also increased significantly since 2004.

Figure 10. Share to GDP: Consumption, Investment, and Net Exports

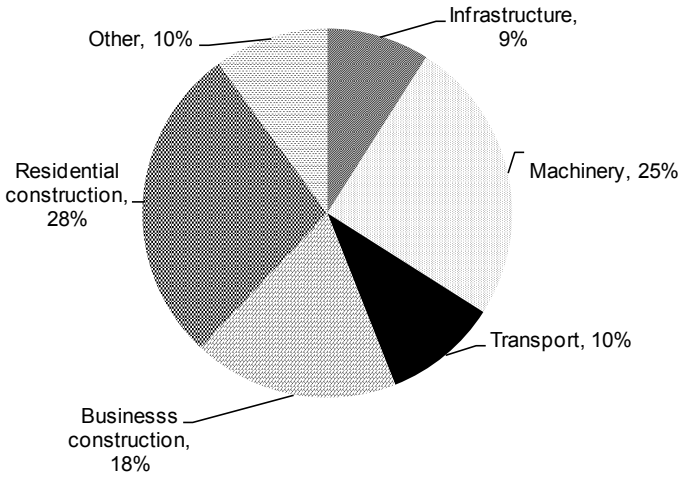


Source: CEIC, author's estimates

With the sharp rise in the shares of investment and net exports to GDP, the total demand and imports of major mining commodities also rose dramatically. The question thus arises of the extent to which the changes in the composition of growth in China have directly affected world commodity prices. A related question is whether the emphasis on the economic development of the interior of China and the need to develop infrastructure have further boosted the demand for commodities.

To answer these questions, we first need to know which sectors of the Chinese economy are the main users of metals. We were not able to find recent data on China's steel consumption by sectors. However, the 2003 data may still present a relatively good picture of the present situation. As shown in Figure 11 below, infrastructure and construction (both residential and business) accounted for over half (55 percent) of Chinese steel consumption in 2003 (ODUSD—IP, 2005). Another noteworthy factor affecting steel demand is the production of machinery, the second largest consumer of steel in China (about one fourth of total consumption). Steel required for the production of machines has grown steadily in recent years, fueled both by the rising internal demand for machines and by China's emergence as a major exporter of machine tools.

Figure 11: China's steel consumption by end use, 2003



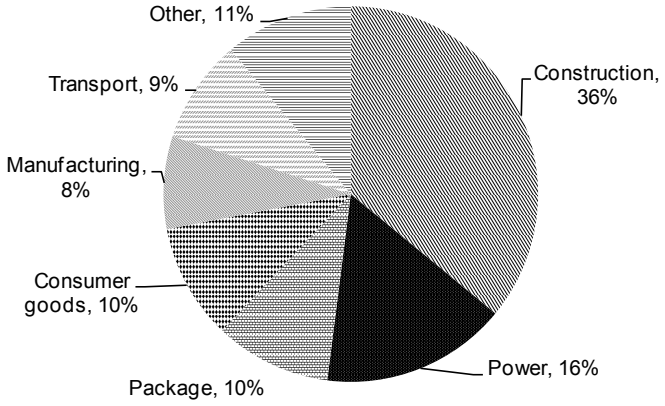
Sources: Rio Tinto and Morgan Stanley Equity Research (ODUSD (IP), 2005)

The third largest sector in the use of steel in China is the automobile industry. Car owners in China are still relatively few compared to developed countries, but the Chinese are buying cars in increasingly large numbers. Additionally, China is beginning to develop an automobile export market. Automobile production increased ten times between 1998 and 2008, from 0.5 million cars to 5 million cars.[2] Rising production has led the Chinese steelmakers to begin producing high quality steel sheets for use in the auto industry.

With respect to aluminum, Figure 12 shows that the construction sector accounts for about one third of total Chinese demand. This compares with 20-25 percent in the developed economies of Europe, Japan, and the United States. In these countries, transportation (primarily automobiles) and packaging (primarily aluminum cans) represent the bulk of aluminum demand (approximately 30-40 percent and 15-30 percent, respectively). The energy sector is the second most important sector in the demand for aluminum in China, accounting for 16 percent of total consumption. Aluminum consumption in this sector rose by 70 percent from 1999–2003 (ODUSD—IP, 2005). Other important sectors include appliance production (especially air conditioners), packaging, and transportation (automobiles and other).

[2] China Statistical Yearbook (2009).

Figure 12: China's aluminum consumption by end use, 2003



Sources: Morgan Stanley Equity Research (ODUSD (IP), 2005)

China is in the midst of a major historical shift, from a largely agrarian to an increasingly urban society. It has been experiencing rising average incomes, rapid urbanization and industrialization, growing entrepreneurship, and a rapid development of exports. Rapid urbanization and industrialization are the two main factors behind China's rapid economic growth and development over the past 30 years.

- While China's *urbanization rate* was less than 18 percent in 1978, it rose to close to 47 percent in 2009, consistent with an average increase of 1 percent a year over the past three decades. This means that, every year, about 14 million people move from rural areas to urban areas.

- From 1978 to 2008, China's GDP increased 17 times. Over that period, *industrial production* increased 25 times in volume and 27 times in value.[3] The development of this sector has required large amounts of mineral products.

These factors have dramatically increased China's demand for buildings, cars, appliances, consumer goods, and improvements to transport and communication systems, all of which are dependent on metals. In turn, this induces a large demand for mining commodities, from both domestic production and imports. Additionally, since the creation of a commercial housing market and the tapering off of the supply of government-supplied residences since the late 1990s, Chinese citizens are increasingly buying their own homes.

Both urbanization and housing privatization have encouraged widespread construction of new apartment buildings. Rising consumer spending and growing entrepreneurship have led to increased construction of new shopping centers, stores, and office buildings. China's construction boom translates into increasing demand for steel, aluminum, copper, and other metals, resulting in a huge demand for major mining commodities. Steel is used extensively

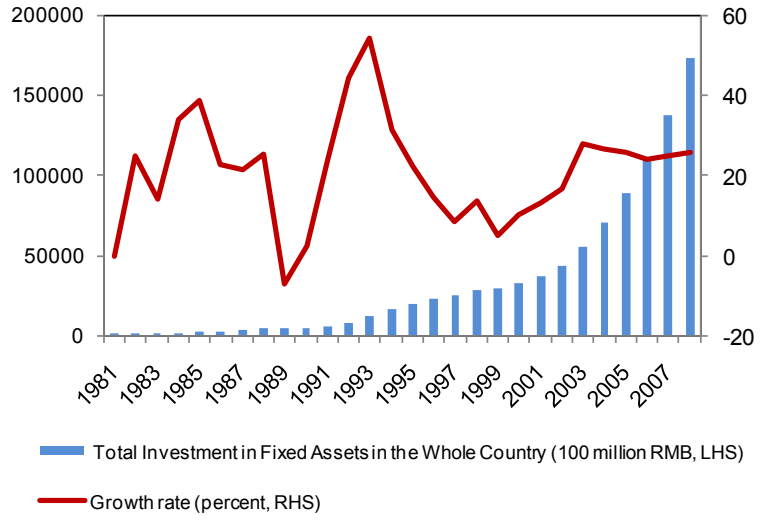
[3] Source: China Statistical Yearbook 2009.

in building, machinery manufacturing and automobiles; aluminum is used to make windows and doors; and copper is extensively used in electricity generation and transmission system.

With the huge rise in investment and net exports over the past decade, total investment in fixed assets in China has increased 180 times in nominal terms from 1981 to 2008, while GDP increased 61 times over the same period.[4] Figure 14 shows the structure of fixed asset investment in several sectors: manufacturing accounts for 33 percent of total; real estate for 23 percent; and transportation and storage for 10 percent. It is remarkable that investment in residential buildings has experienced a long term accelerating growth, especially since 2003 (Figure 15). From 2000 to 2008, the length of highways rose 2.7 times, expressways 3.7 times, civil aviation routes 1.6 times, and petroleum and gas pipelines 2.4 times.[5]

In sum, the changes in the composition of growth in China have led to a sharp increase in the demand for major minerals and metals, which is an important factor affecting their prices. Also, the economic pick up in the interior of China and emphasis on infrastructure development have also boosted the demand for major mining commodities. Finally, within the economy, critical sectors as highly intensive users of metals (including construction, real estate, and automobile) have experienced high rates of growth, further increasing the demand for metals and related minerals.

Figure 13. Total Investments in Fixed Assets in the Whole China and Its Growth Rate



Source: China Statistical Yearbook (1982-2009); author's estimates.

[4] Investment rose from RMB 96.1 billion in 1981 to RMB 17,282.8 billion in 2008, while GDP rose from RMB 489.2 billion to RMB 30,067 billion over the same period. Source: China Statistical Yearbook 2009.

[5] Source: China Statistical Yearbook 2009.

Figure 14. China Fixed Asset Investment in Different sectors, 2008

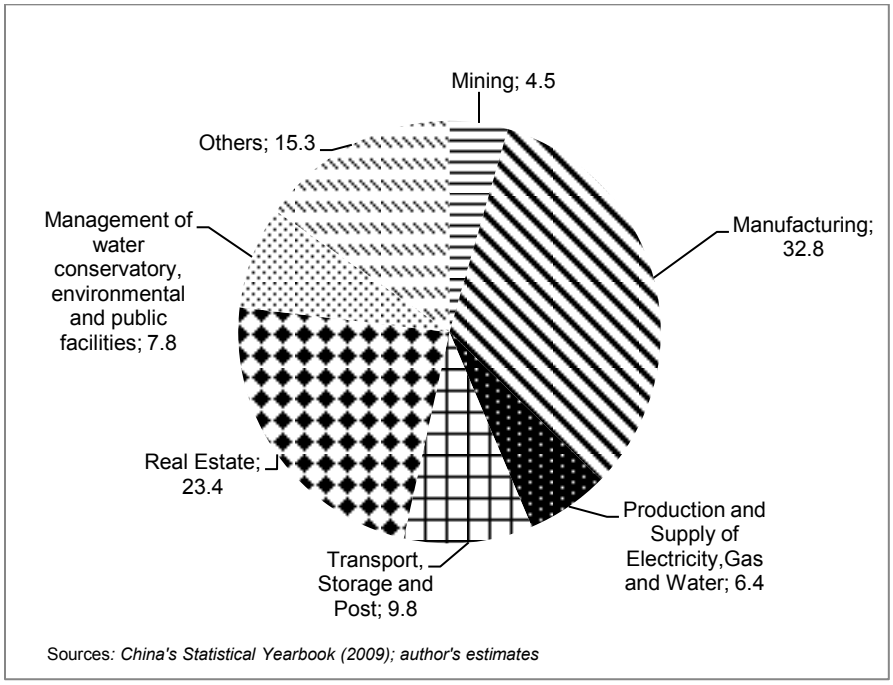
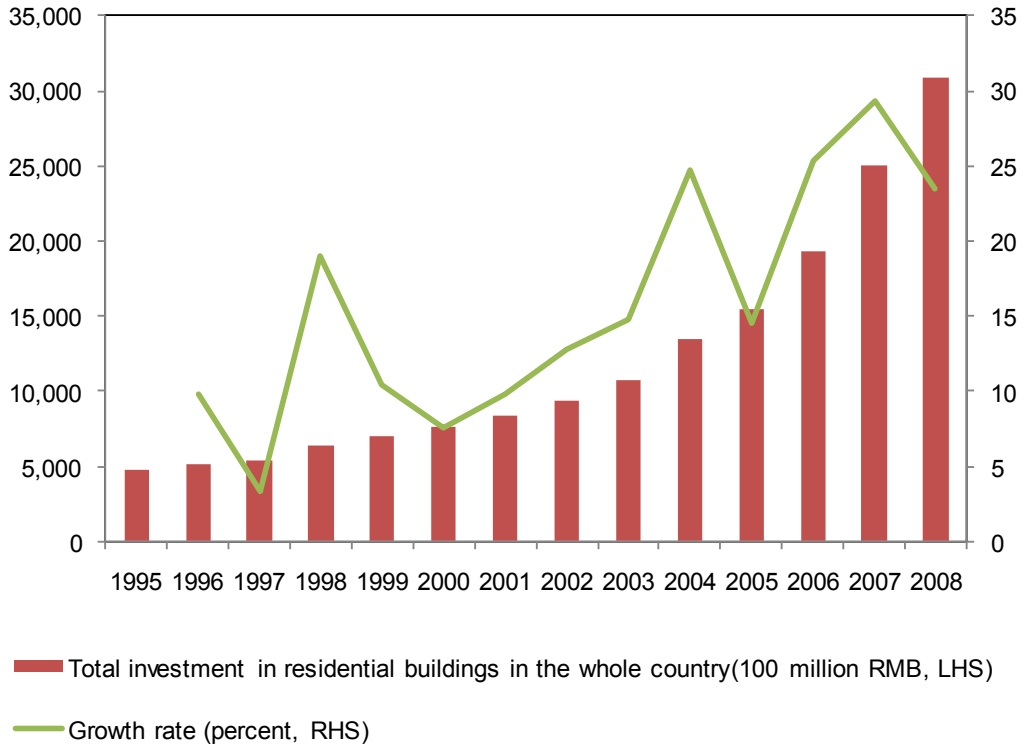


Figure 15. Total Investments in Residential Buildings in the Whole Country



Source: China Statistical Yearbook (1996-2009); Author's estimates.

B. Investment and Net Exports: Which Contributes More?

Although the export sector contributes significantly to the demand for major mining commodities and metals, investment plays the most important part in China's demand. Although it is difficult to separate their contributions precisely, they can be roughly assessed through they contribution to GDP. In 2008, the relative share of net exports in the total demand for major commodities can be estimated at 7.7 percent and the share of investment and comsumption at 92.3 percent.

The export sector is an important source of demand but, more importantly, it plays a key role as a catalyst. It has also brought technology and management knowledge to China, enhancing industrial efficiency and intensifying domestic competition. Furthermore, over the past decade, the growth of the export sector has helped China promote industrialization by the development of huge markets abroad and through technology transfers.

Without the high rate of growth of exports, China would not have been able to create all the jobs needed for ―farm laborers", who work in the export-orientated factories of the East Coast and provide an important source of income for many people, both in cities and in the countryside. This has accelerated the urbanization process in China which, in turn, has boosted the rapid development of the services sector. Some have argued that China's huge investment in infrastructure was necessary because of the need to build infrastructure in order to support the growth of the export sector. However, the main reason for this investment has been the need to address the needs of this huge domestic market and increasingly large urban population. In the long run, urbanization would play more important role to drive economic growth, consumption, and investment of China, as the just published Proposal for the 12th Five Year Plan indicated. As a result, it will make domestic demand contribute more to growth than net exports in the future.

China's domestic infrastructure and housing development needs are enormous, given the still-rising urban population and the need to improve the living conditions in rural areas, where a large part of the population lives. Over the past five years, the central government advanced the concept of ―building up new socialist rural areas", which meant more investment in the countryside. In cities, there is a huge demand for housing, providing long term support to property prices. In specific regions, such as Beijing, Shanghai, and the Guangdong province, there has been ample evidence that real estate prices were increasing well above inflation levels.

IV. Prospects for the Future

China is at a new turning point of its economic structural adjustment and growth model. For over one decade, since the Asian crisis, it has put forward ―expanded domestic demand" as a key component of its economic policies. In the initial stages of the Asian crisis, its export sector suffered, but it subsequently recovered strongly after it joined the WTO. Over the past decade, China's export-orientated economic structure has been strengthened, for a number of

reasons. First, the Asian crisis weakened the export sector of several East Asian countries, leaving more space for China's export sector. Of course, after that hard time, the exports of most of those Asian countries recovered and further improved because of the spillover effect of strong economic and export growth from China after 2001. Some of them even kept relatively large trade surplus to China for a long period, including during the current financial crisis. Second, China's comparative advantages with respect to low labor costs, preferential policies for foreign companies, and relaxed environmental regulations have made export-orientated industries very profitable. Third, China has benefitted from a technological boost by encouraging FDI and technology diffusion; imitation remains the cheapest way to innovate, especially when compared with the high cost and high risks associated with technological innovation and R&D investment.

A. China Economic Structure Adjustment, Growth and its Long-Run Affect for Major Mining Commodity Import

China's investment-led and export-orientated development model has been sustainable for a long time and will continue to benefit from relatively good infrastructure, a well-educated labor force, and a stable policy environment. However, some changes are also underway. Labor costs are rising and environmental protection requirements will become stricter in the future. Over the next decade, China will have to expand domestic demand, especially the share of domestic consumption and imports in GDP. A rapid increase in imports has been registered since 2008, which is significantly higher than that of exports. While its comparative advantage in goods exports will be maintained over the medium term, China is now making new inroads in new, technology-intensive sectors. For example, Chinese companies have begun to participate in biddings for high-speed railway equipments and construction projects abroad, competing with well-established European and North American companies.

Over the next five years, investment can be expected to remain high in China, for a variety of factors. First, China has ambitious public investment plans, which it can implement given the fairly good fiscal position of the central government. In the coming five years, the growth rate of railways construction (including high speed railways) may slow down, but investment will remain high. There are indications that during 2010-14, basic construction investment in the railways sector could average RMB 700 billion a year, a historically high level (Guohai Security Company, 2010). In 2009, the biggest grid company, State Grid Corporation, has announced a plan to invest around RMB 4 trillion in "smart grid" technology upgrade between 2011 and 2020, under the "Strengthened Smart Grid" Plan.[6] In 2010, total

[6] The "Strengthened Smart Grid" Plan includes and an aggressive implementation schedule: (a) construction and development over 2011–15 (including ultra high voltage lines, smart grid operation control, and interaction deployment); (b) possibly high voltage lines connecting Liaoning, Inner Mongolia, Gansu, Xinjiang, and Jiangsu (wind), the Northwestern areas (solar), and large hydropower facilities in the West to consumers in the East; and (c) investments of US$44 billion by 2012 and US$87 billion by 2020 on UHV power lines,

(continued)

investment in the grid is estimated at about RMB 220 billion. This plan is expected to create huge business opportunities for the companies involved. In January 2011, the Chinese government announced that China will invest around RMB 4 trillion in water conservancy in the coming ten years. In 2010, the total investment in water conservancy was estimated at about RMB 200 billion.

Second, China's development remains enormously differentiated across regions. Dissimilarities in natural endowments, historical circumstances, and the economic context explain these differences. While the East coast region has a higher degree of economic development and generally good infrastructure, inland areas are still at a lower level of development, and their infrastructure is still underdeveloped. Investment needs in China thus remain very large.

Third, China's urbanization rate is still, at around 50 percent, significantly lower than the average level in developed countries. According to a study by the Chinese Academy of Social Science (CASS), urbanization will start slowing down after 2013. It is projected to reach 52.4 percent in 2015, 57.7 percent in 2020, and 67.8 percent in 2030. These projections mean that, over the next twenty years, fourteen million people will join the urban population each year, attracted by the job markets in cities (CASS, 2010). Thus, urbanization will remain one of the engines of China's economic growth. As China develops, consumption patterns are expected to shift gradually, to more closely resemble those of developed countries. In that context, the demand for new, more spacious housing will be strong, particularly as incomes rise. Some also argue that apartments built before 1990 may need to be rebuilt over the next ten years because of their low quality, short life duration, and limited space.

Fourth, the policy environment will also support a high level of investment. Given that the economy has been highly dependent on investment, any large scale reduction would mean a rapid slowdown in economic growth. However, this would be potentially problematic, given that a reliable social security system is not yet in place. Even though significant progress has been made in the development of the social security system over the past three decades, it still needs to be significantly enhanced to provide comprehensive protection to a broad share of the population. Strong economic growth will remain critical while social reforms are gradually implemented. The general wisdom in this area is that China needs a rate of growth of at least 8 percent a year in the years ahead.

Some have argued that China can preserve a relatively high rate of economic growth by expanding domestic consumption. However, it is not easy to boost consumption in the short

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US$6 billion to upgrade the grids in the Gansu province for wind farms and in Inner Mongolia, and the planned upgrade to high voltage (750 kW) of a transmission line from Xinjiang to Eastern cities. There are still many challenges to this plan, such as the lack of technical standards and data on demand and end-user equipment in the impoverished parts of Western China (Eisen, 2009).

run, particularly as, in the context of the global recession, fiscal resources are being used in priority to develop infrastructure. In addition, per capita income is still relatively low and income inequality hinders consumption. Poor people have a higher propensity to consume than the rich, but they have no commensurate income. According to a research by CASS, at the end of 2015 the consumption rate could be raised to 50 percent from around 48 percent at present, reflecting a very slow increase over the next five years. Over the long run, as average salaries rise, the share of consumption in GDP will gradually increase. The development of a comprehensive social security system, with sufficient funding, will also help increase consumption, but it is a process that will take time.

On the basis of these elements, keeping a high level of growth will remain a very important target for the Chinese government in the foreseeable future. Over the next five years, investment is bound to remain high and economic growth will likely be above 8 percent. However, in the second part of this decade, the investment rate will likely begin to decline or, at least, its rate of growth will slow down, especially with respect to infrastructure and housing. If we assume that the share of net exports to GDP will also shrink in future, this could potentially affect economic growth negatively. However, domestic consumption should start picking up faster after 2015, with the improvements in the social security system and the increase in incomes. Furthermore, the world economy should have recovered from the global crisis by that time, which will support a more balanced development than during 2010–15.

Considering the gradual ageing of the society, the government will need to gradually spend more on social security outlays, with a reduced space for investment expenditure. In addition, energy conservation, environmental protection, and climate change issues will become more pressing. Over time, the target of ~~–e~~conomic structural adjustment" will become more important than that of maintaining a rate of growth. Under that target, the focus will be on increasing consumption, upgrading industries, and reducing the use of natural resources. As a result, China's annual growth rate could settle down to 6–8 percent in the second part of this decade, still higher than in many countries. This might actually be a positive development for China, because its economic growth will be more balanced and sustainable.

During 2010–15, China's demand for mining commodities will therefore continue to be very strong, as China's economic growth model remains dependent on investment. In addition, the Chinese government has just proposed a natural resource tax reform, which is expected to increase the cost of domestic mining activities, thus favoring higher imports. After 2015, China's demand for major mining commodities will begin to fall gradually with the expected slowdown in investment and infrastructure activities. However, it does not mean that the world demand for minerals will fall, as other factors may support their demand. One of these factors is the recovery in the global economy. Another one is the fact that other emerging economies, especially India and Brazil may increase their investments in infrastructure. In addition, some metals are widely used in consumer products, such as aluminum, and the rising demand from consumption in China may offset the reduction in demand from the

expected decrease in the share of investment. As a result, the demand for major mining commodities should remain strong during this entire decade, accordingly sustaining relatively high prices.

B. Exchange Rate and Trade Policy: Their Possible Impact on Demand

In the coming years, the Renminbi has some space to appreciate. However, appreciation pressure will abate with the expected reduction in the trade balance surplus, associated with the rapid growth in imports. The appreciation of the Renminbi will benefit imports, including imports of major mining commodities but, for some products for which China has become a net exporter, such as aluminum, the net benefit might be very limited. Another important policy change might be the gradual reduction of export rebates, which was implemented prior to the global crisis, but has since been abandoned, to spur exports. Over the long run, this policy could be reintroduced, with a view to reducing the trade surplus and easing the accumulation of foreign reserves. Also, the growth of capacity production in the steel and aluminum sectors is expected to be constrained, given excessive capacities in these sectors and their high resource consumption, with adverse impact on the environment.

C. Supply Side Impact

On the supply side, there is significant potential for world copper and aluminum production to expand. While Canada, Chile, and Peru have the largest potential, other countries in Latin America, such as Brazil and Mexico, also have good prospects. Australia has large potential, and Mongolia and the African copper belt (particularly the D.R. Congo and Zambia) offer the largest potential for growth. For aluminum production, roughly one-third of the operating cost is power. Therefore, future capacity additions will likely be in regions with low opportunity cost for power, including hydropower, natural gas, low grade coal, and oil (Streifel, 2006). Two regions in which capacity is not expected to expand are North America and Europe, because of stagnant demand, higher power costs, environmental regulations, and high labor costs.

The mining industry has continued to make strides in reducing the costs of mining and smelting operations through technological developments and better management of projects. There have been dramatic expansions in mine production capacity, notably in iron ore in Western Australia and Brazil, and copper in Chile. Improved equipment and larger machinery have helped boost economies of scale. Occasionally, major breakthroughs occur, and it is expected that the industry will continue to strive to develop new technologies to reduce costs (Streifel, 2006). However, ores are likely to be of lower grade, and new projects will likely be in more difficult locations, thereby raising exploration and development costs. However, the global recession and its prolonged effect will likely dampen world demand, which will help limit the upward shift in long-run marginal prices. In recent years, high prices and profits have enticed workers to seek higher wages, while host governments and communities have sought more favorable mineral taxation and profit-sharing arrangements.

This could adversely affect the development of new projects, particularly if commodity prices were to soften.

V. Conclusion and Policy Implication for Latin America

Major mining commodity prices are inherently volatile and cyclical. The surge in demand in China caught the industry by surprise, contributing to the large increase in commodity prices observed since the early 2000s. Obviously, the rapid increase in Chinese demand is not the only cause for the surge in commodity prices. Other factors, including strong world economic growth, low inventories, abundant global liquidity, new and complex financial instruments, and individual geopolitical situations have been additional contributing factors. All of these factors would need to be taken into account for a comprehensive analysis of commodity price developments. However, this would require further research which is far beyond the objective of this paper, which focuses mainly on the impact of the Chinese demand for commodities.

The current price cycle for metals and minerals is expected to be more prolonged than previous ones. China's especially high investment levels, reflecting its urbanization and industrialization, have been a key driving force in this development, together with activity in the export sector, which acts as a catalyst. Among the critical sectors that have boosted the Chinese demand for metals are the infrastructure, construction, real estate, and automobile sectors.

Over the next five years, the Chinese demand for major mining commodities will remain strong, supported by high investment levels, good economic growth potential, and gradually rising consumption rates. In the second half of this decade, however, the rate of growth of investment should gradually slow down, with the completion of major infrastructure and housing projects. As investment slows down and the share of net exports to GDP shrinks, GDP growth will increasingly rely on the growth of domestic consumption. Consumption growth is expected to pick up after 2015, with the rise in incomes and improvements in the social security system. With the coming of a gradually older society, the government will need to spend more on social security, with reduced space for investment expenditure. In addition, energy conservation and environmental protection issues will become more urgent, forcing China to adjust its economy. Overall, China's growth will slow down to a more balanced and sustainable rate of 6–8 percent in the second half of this decade.

Although the Chinese demand for minerals is expected to abate over time, world demand is likely to remain strong, reflecting the recovery of the global economy and stepped up investment in infrastructure in other large emerging markets. On that basis, the demand for major mining commodities should be relatively stable this decade, and prices should remain close to their current levels. For Latin American countries, export receipts should therefore remain strong in the coming years.

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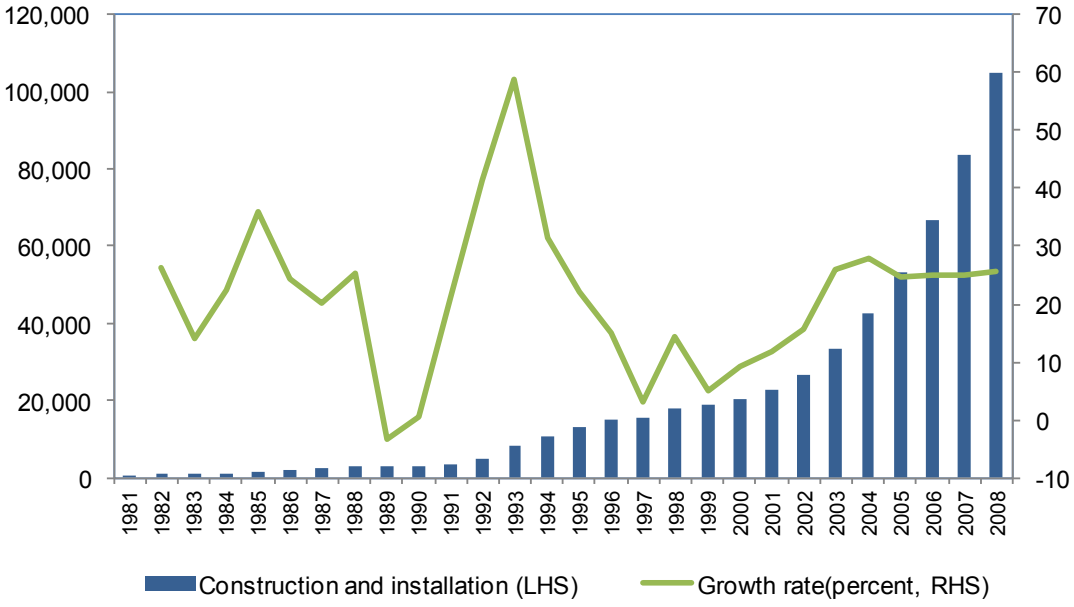
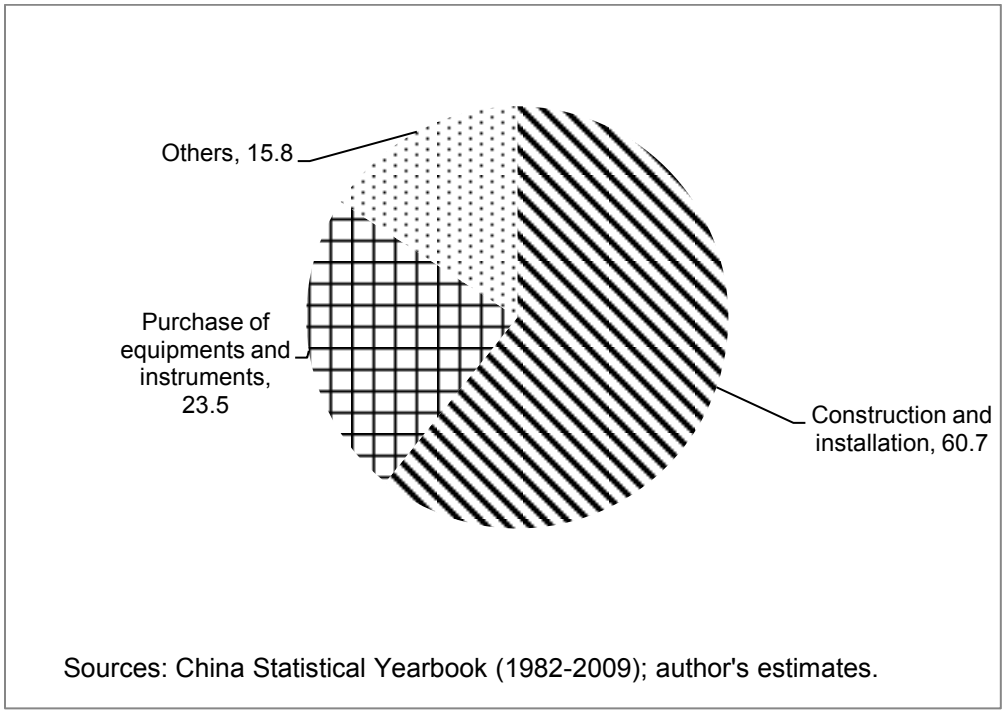
SUPPLEMENTAL APPENDIX

Figure A.1. Construction and Installation and Its Growth Rate



Source: China Statisitical Yearbook (1982-2009); author's estimates.

Figure A.2. Structure of Investment in Fixed Assets in the Whole China (2008)



Sources: China Statistical Yearbook (1982-2009); author's estimates.

Figure A.3. World Demand-Steel, 2000–04

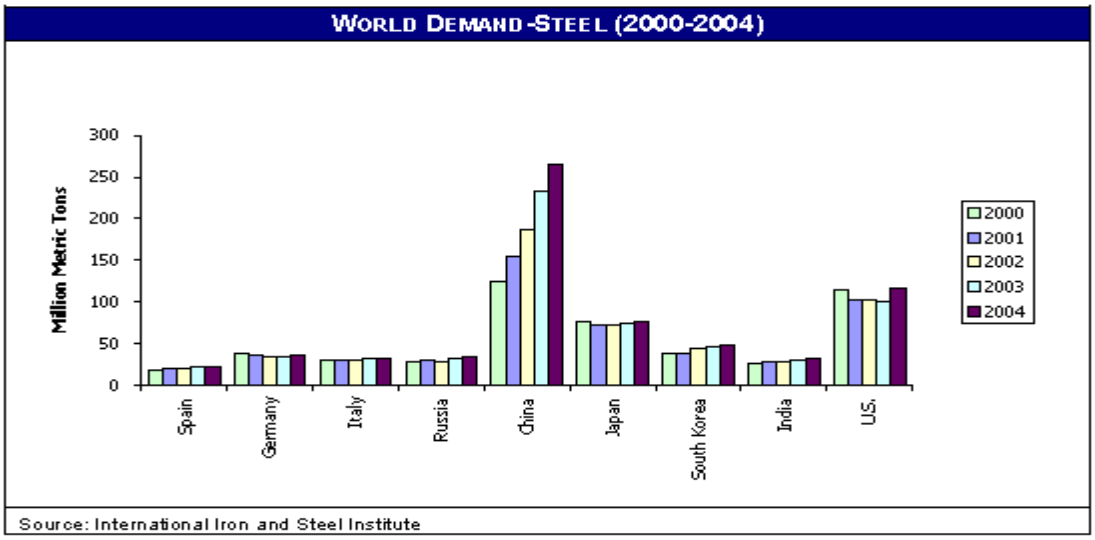
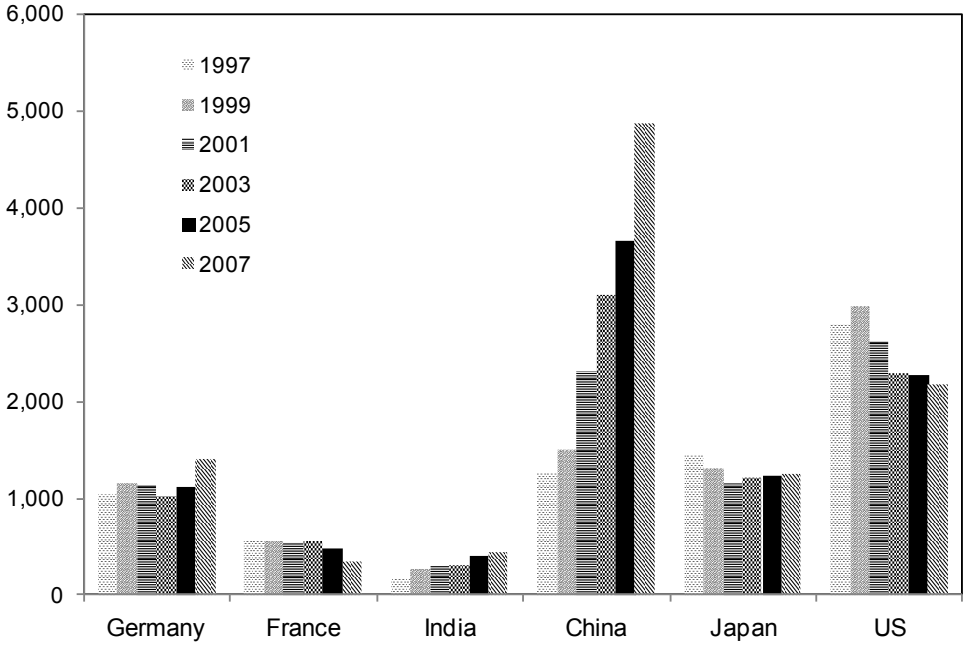
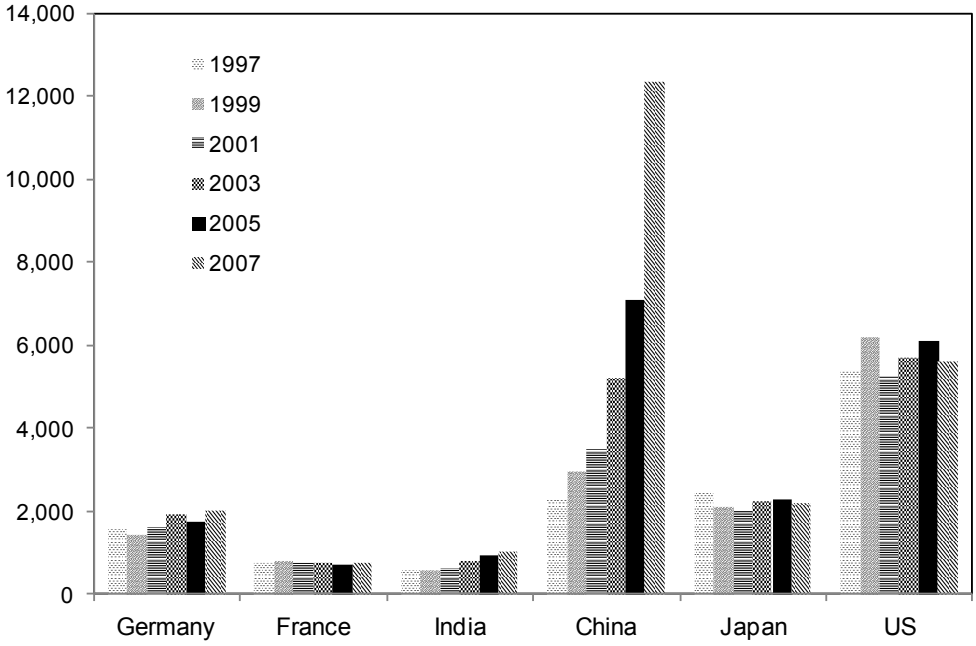


Figure A.4. World Demand-Copper, 1997–2007



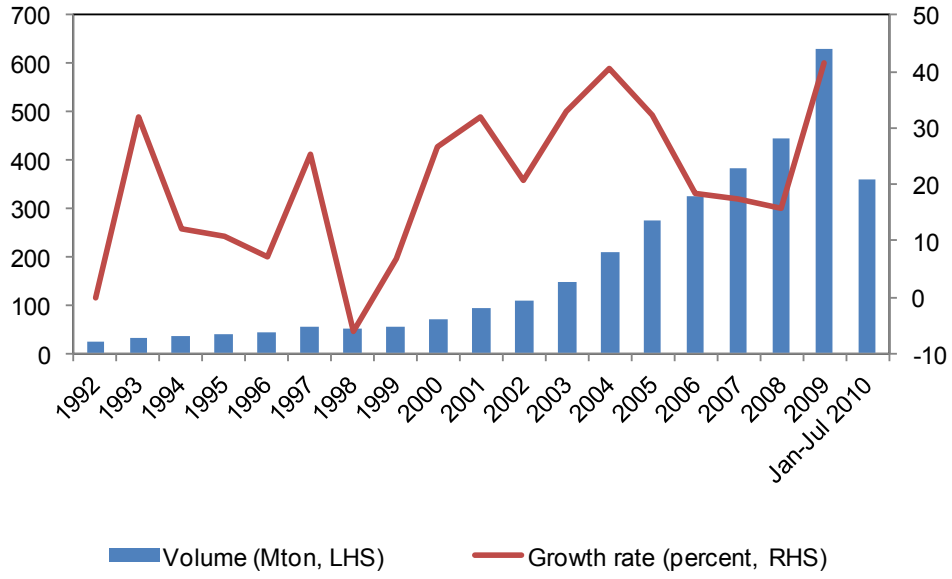
Source: World Metal Statistics Yearbook (2007-2008). Here, world refined copper consumption is calculated as world demand.

Figure A.5. World Demand-Aluminum (1997–2007)



Source: World Metal Statistics Yearbook (2007-2008).

Figure A.6. Iron Ore and Concentrates Import of China, 1997–2010: Volume and Its Growth Rate



Source: China Statistical Yearbook (1982-2009): author's estimates.

Figure A.7. 2008 Main Iron Ore Importers' Shares in the World
(In millions of tons)

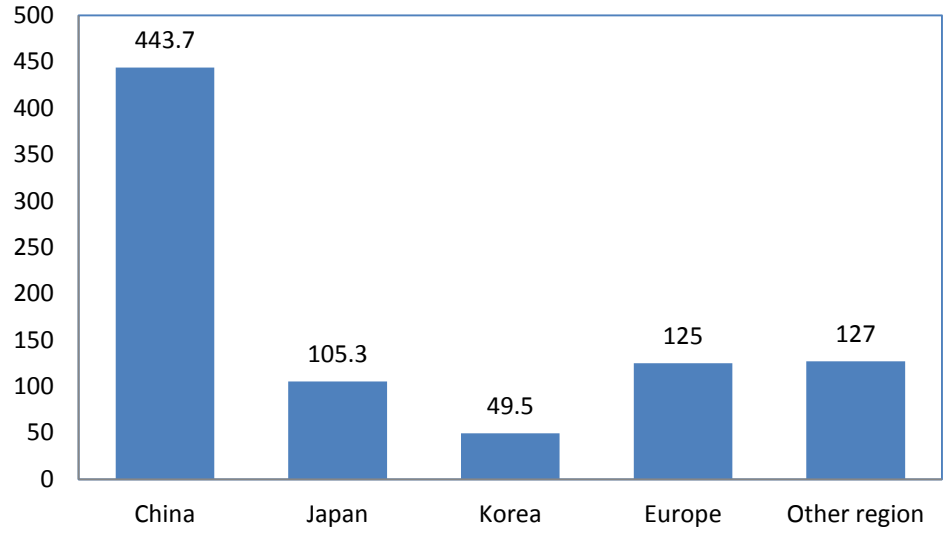
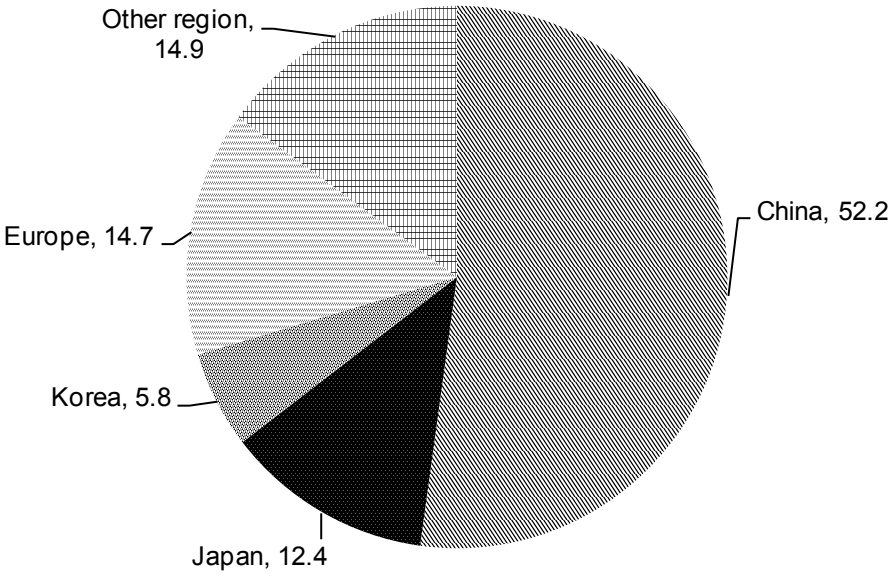
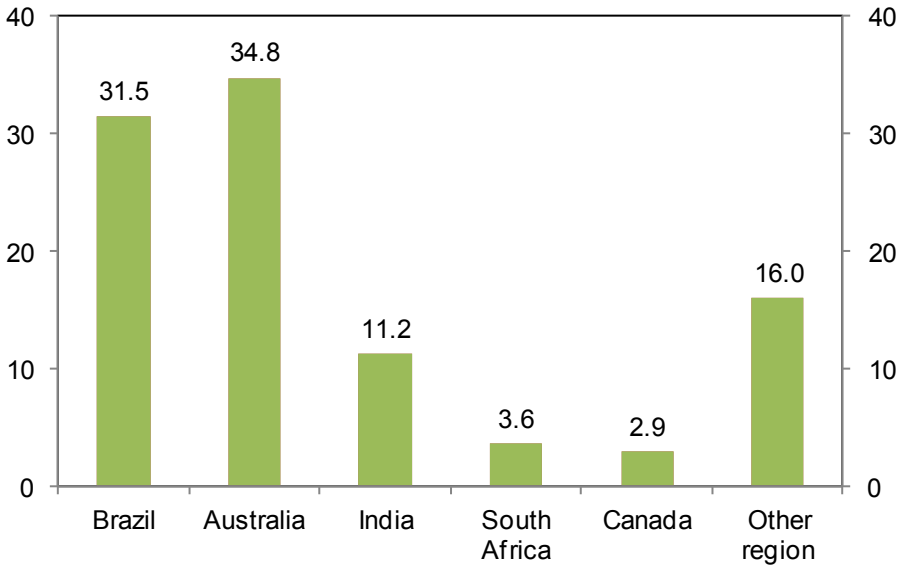


Figure A.8. 2008 Main Iron Ore Importers' Shares in the World



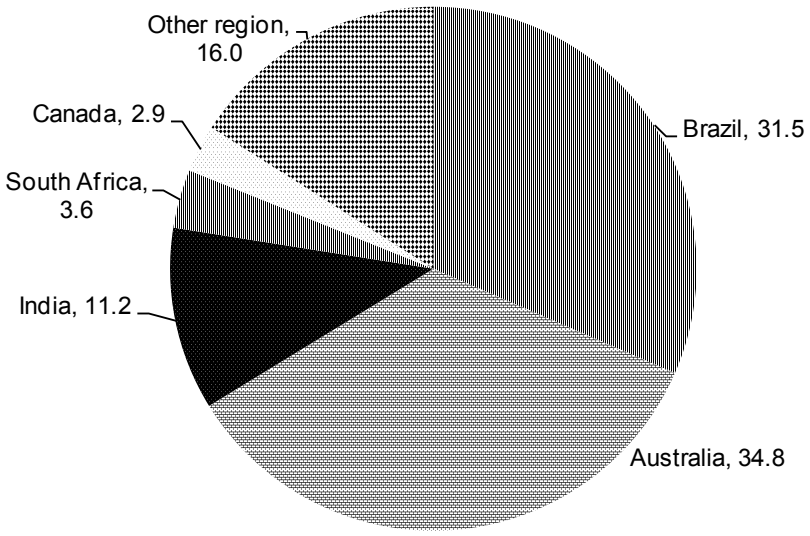
Sources: China Statistical Yearbook (1982-2009); author's estimates.

Figure A.9. Main Iron Ore Exporters' Shares in the World, 2008



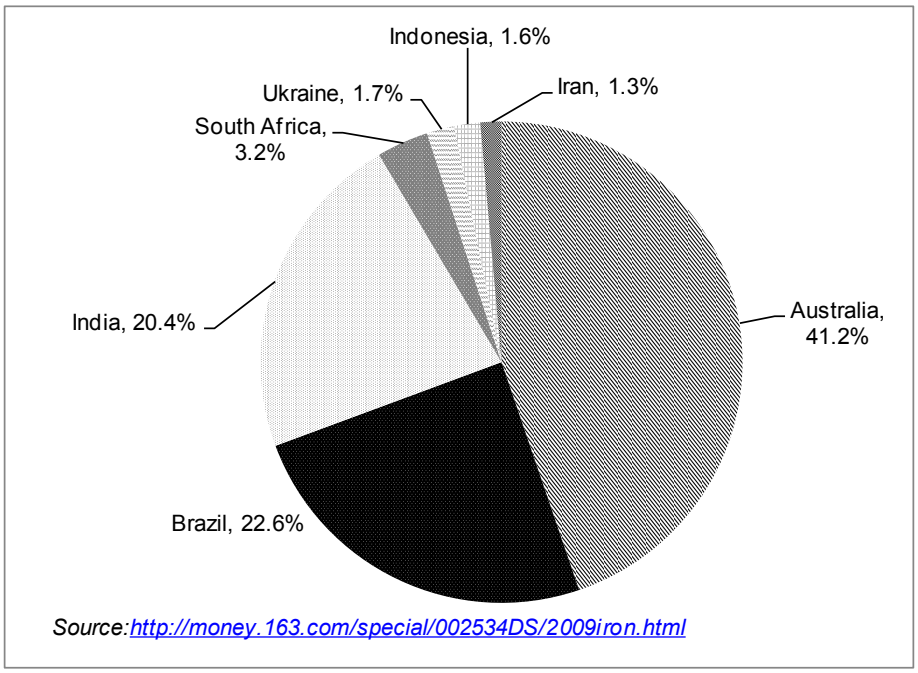
Source: http://news.sohu.com/s2009/tiekuangshi2010/

Figure A.10. Main Iron Ore Exporters' Shares in the World, 2008



Source: http://news.sohu.com/s2009/tiekuangshi2010/

Figure A.11. China Iron Ore Import Sources, Jan.–Oct. 2008



Source:http://money.163.com/special/002534DS/2009iron.html

Table A.1. Comparison on Original Iron Ore Output in China and Output Converted as World Average Ferric Content

		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Original iron ore output	Millions of tons	247	237	223	217	231	261	346	420	589	707	824	
Conversion as world average FM content	Millions of tons	112	108	101	99	105	119	157	191	276	332	366	234
Conversion Growth rate	percent	n/a	-4	-6	-2	7	13	32	21	45	20	10	-36

Sources: China Statistical Yearbooks; World total production volume data from Ma, Jianming (2010); Author's calculation.

Note: China original domestic iron ore output data is from China Statistical Yearbook (various issues); The conversion data from 2006 through 2009 is from Jianming Ma(2010), other data is roughly converted by 1:2.2 (1 ton conversion equals to 2.2 tons original iron ore output, and 2.2 is a roughly average of data from 2006 through 2009 by Jianming Ma).

Table A.2. Iron Ore total demand in China and Its Dependence to Import[1/]

Year	China's domestic Iron Ore output		China's Iron Ore Import		China's Total Demand for Iron Ore		China's dependence to import
	Volume Millions of tons	Growth rate percent	Volume Millions of tons	Growth rate percent	Volume Millions of tons	Growth rate percent	percent
1998	112.2	n/a	51.8	n/a	164.0	n/a	31.6
1999	107.8	-3.9	55.3	6.8	163.1	-0.5	33.9
2000	101.2	-6.2	70.0	26.6	171.1	4.9	40.9
2001	98.6	-2.5	92.3	31.9	191.0	11.6	48.3
2002	105.2	6.6	111.5	20.8	216.7	13.5	51.5
2003	118.8	13.0	148.1	32.9	266.9	23.2	55.5
2004	157.4	32.5	208.1	40.5	365.5	36.9	56.9
2005	191.1	21.4	275.3	32.3	466.4	27.6	59.0
2006	276.4	44.6	326.3	18.5	602.7	29.2	54.1
2007	332.3	20.2	383.1	17.4	715.4	18.7	53.6
2008	366.0	10.1	443.6	15.8	809.6	13.2	54.8
2009	233.7	-36.2	627.8	41.5	861.5	6.4	72.9

Sources: China Statistical Yearbooks; World total production volume data from Ma, Jianming (2010); some data from table 2; Author's calculation.

1/ China domestic iron ore output has been converted as world iron ore average ferric content. Here China total demand for iron ore are roughly calculated as the total of China domestic iron ore output and China iron ore import

Table A.3. China's Copper Mining Products, Trade Balance and International Copper Price

Year	Balance of copper trade(100m$)	Annual average price($/ton)	Year	Balance of copper trade(100m$)	Annual average price($/ton)
1990	-1.9	1496.7	1999	-29.3	1573.7
1991	-4.6	1325.1	2000	-45.8	1814.3
1992	-15.0	1297.1	2001	-51.6	1577.8
1993	-14.1	1573.9	2002	-56.8	1557.5
1994	-10.1	2312.7	2003	-74.9	1779.9
1995	-17.3	2936.5	2004	-105.7	2868.3
1996	-20.0	2290.5	2005	-138.6	3683.6
1997	-19.6	1775.7	2006	-173.2	6730.6
1998	-20.8	1652.9	2007	-301.0	7118.5

Source: Mei ZHANG(2008).

Table A.4. China's Major Mining Commodities Import Average Prices and Their Indexes

Year	Iron ore and concentrates		Manganese ore and concentrate		Copper ore and concentrate		Chrome ore and concentrate		Alumina	
	Average Price		Average Price		Average Price		Average Price		Average Price	
	$/ton	Index(1997=100)	$/ton	Index(1997=100)	$/ton	Index(1997=100)	$/ton	Index(1997=100)	$/ton	Index(1997=100)
1997	29.3	100.0	93.8	100.0	448.0	100.0	124.5	100.0	219.0	100.0
1998	28.4	96.8	76.6	81.7	388.4	86.7	113.9	91.5	225.6	103.1
1999	25.0	85.2	82.8	88.3	379.5	84.7	90.6	72.8	208.6	95.3
2000	26.6	90.6	79.5	84.8	445.2	99.4	87.2	70.1	339.6	155.1
2001	27.1	92.5	76.7	81.8	397.4	88.7	74.3	59.7	186.5	85.2
2002	24.8	84.8	72.8	77.7	391.0	87.3	69.2	55.6	164.8	75.3
2003	32.8	111.9	71.7	76.5	482.5	107.7	84.7	68.1	245.2	112.0
2004	61.1	208.5	126.0	134.3	777.2	173.5	175.7	141.2	348.1	159.0
2005	66.8	227.8	149.2	159.2	913.0	203.8	197.2	158.4	370.0	169.0
2006	64.1	218.9	104.0	110.9	1694.5	378.2	171.1	137.5	437.6	199.8
2007	88.2	301.1	196.4	209.5	1950.5	435.4	254.5	204.4	385.5	176.1
2008	136.5	465.8	458.4	488.9	2011.6	449.0	396.8	318.8	386.9	176.7
2009	79.9	272.6								0.0
Jan-Jul 2010	116.0	395.9							346.1	158.1

Sources: China Statistical Yearbooks (1998-2009); author's estimates.

Table A.5. China GDP Composition: Consumption, Capital Formation and Net Export in Share to GDP (percent)

Year	Final consumption expenditure	Gross Capital Formation	Net Export of Goods and Service
1978	62,1	38,2	-0,3
1979	64,4	36,1	-0,5
1980	65,5	34,8	-0,3
1981	67,1	32,5	0,3
1982	66,5	31,9	1,6
1983	66,4	32,8	0,8
1984	65,8	34,2	0,0
1985	66,0	38,1	-4,0
1986	64,9	37,5	-2,4
1987	63,6	36,3	0,1
1988	63,9	37,0	-1,0
1989	64,5	36,6	-1,1
1990	62,5	34,9	2,6
1991	62,4	34,8	2,7
1992	62,4	36,6	1,0
1993	59,3	42,6	-1,8
1994	58,2	40,5	1,3
1995	58,1	40,3	1,6
1996	59,2	38,8	2,0
1997	59,0	36,7	4,3
1998	59,6	36,2	4,2
1999	61,2	36,2	2,6
2000	62,3	35,3	2,4
2001	61,4	36,5	2,1
2002	59,6	37,8	2,6
2003	56,9	41,0	2,2
2004	54,4	43,0	2,5
2005	52,9	41,6	5,5
2006	50,7	41,8	7,5
2007	49,5	41,7	8,8
2008	48,4	43,9	7,7
2009	48,6	47,5	3,8

Source: China Statistical Yearbook (1978-2009); author's estimates.

Table A.6. 2008 Main Iron Ore Importers' Shares in the World

Countries or regions	Mton	Share of total (percent)
China	443.7	52.2
Japan	105.3	12.4
Korea	49.5	5.8
Europe	125.0	14.7
Other region	127.0	14.9
Total	850.5	100.0

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Table A.7. 2008 Main Iron Ore Exporters' Shares in the World

Countries and regions	100 million ton	Share of total (%)
Brazil	2.8	31.5
Australia	3.1	34.8
India	1.0	11.3
South Africa	0.3	3.6
Canada	0.3	2.9
Other regions	1.4	16.0
Total	9	100

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Table A.8. China Iron Ore Import Source

	Jan-Oct 2008		2007	
Iron Ore Import Source	Value (Mton)	Share of total (percent)	Value (Mton)	Share of total (percent)
Australia	155.4	0.4	145.6	0.4
Brazil	85.3	0.2	97.6	0.3
India	76.8	0.2	79.4	0.2
South Africa	12.2	0.0	12.2	0.0
Ukraine	6	0	2	0
Indonesia	6	0	4	0
Iran	4.9	0.0	5.0	0.0
China total import	376.7	1.0	383.1	1.0

Source: http://money.163com/special/002534DS/2009iron.html

Table A.9. Output of Industrial Products Related to Iron Ore in China

Year	Pig Iron		Crude Steel		Rolled Steel	
	(10 000 tons)	growth rate (percent)	(10 000 tons)	growth rate (percent)	(10 000 tons)	growth rate (percent)
1978	3,479	n/a	3,178	n/a	2,208	n/a
1979	3,802	9.3	3,712	16.8	2,716	23.0
1985	4,384	15.3	4,679	26.1	3,693	36.0
1990	6,238	42.3	6,635	41.8	5,153	39.5
1991	6,765	8.5	7,100	7.0	5,638	9.4
1992	7,589	12.2	8,094	14.0	6,697	18.8
1993	8,739	15.2	8,956	10.6	7,716	15.2
1994	9,741	11.5	9,261	3.4	8,428	9.2
1995	10,529	8.1	9,536	3.0	8,980	6.6
1996	10,723	1.8	10,124	6.2	9,338	4.0
1997	11,511	7.4	10,894	7.6	9,979	6.9
1998	11,864	3.1	11,559	6.1	10,738	7.6
1999	12,539	5.7	12,426	7.5	12,110	12.8
2000	13,101	4.5	12,850	3.4	13,146	8.6
2001	15,554	18.7	15,163	18.0	16,068	22.2
2002	17,085	9.8	18,237	20.3	19,252	19.8
2003	21,367	25.1	22,234	21.9	24,108	25.2
2004	26,831	25.6	28,291	27.2	31,976	32.6
2005	34,375	28.1	35,324	24.9	37,771	18.1
2006	41,245	20.0	41,915	18.7	46,893	24.2
2007	47,652	15.5	48,929	16.7	56,561	20.6
2008	47,067	-1.2	50,092	2.4	58,488	3.4

Source: China Statistic Yearbook 2009. Available at < http://www.stats.gov.cn/tjsj/ndsj/>.