



## China: Credit, Collateral, and Commodity Prices

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*“We review how China has become a dominant influence in global commodity markets due to the economy’s size and commodity intensity. We then focus on the emergence of China’s credit market as a new influence on commodity prices ... We find that a 1 percentage point (ppt) surprise increase in China’s bank lending results in statistically significant price increases of 10-12 percent for some base metals, including copper. This contrasts with a 1 ppt shock to China’s industrial production which leads to a statistically significant change of 7-9 percent of aluminum, copper, and crude oil. We suggest that one reason for the large influence of China’s credit aggregates may be the important role that some commodities play as collateral for lending in a financial system still bedeviled by information asymmetries, particularly for private sector borrowers.”*

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### Introduction

China has long had a large demand for commodities, serving as the world’s largest consumer in a long list of commodities, now consuming 22% of the world’s energy in addition to 26% of crops and 47% of base metals. It was long thought that increases in consumption and industrial production were the key drivers of commodity demand. This paper explores an alternate explanation, one in which apparent commodity demand, and therefore price increases, can be traced to increases in credit availability in the Chinese market, some of which is related to financial market investments rather than investments in the real economy.

### Why the Paper’s Research Question is Important

The global commodity market has historically based supply and pricing decisions on the interaction of supply and demand. The large demand coming from the Chinese market has led to a substantial increase in commodity supply, much of which was financed through increasing debt loads. The new level of supply, especially in base metals, makes an assumption that Chinese demand will continue to grow. However, these demand numbers may be difficult to believe, as the demand from copper may not be exclusively related to industrial activity. This is worrisome, as copper that is placed in storage rather than used in the production of industrial and consumer goods, may eventually return to the market as extra supply and pressure copper to trade at lower prices. In the long run, this overestimated

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demand can lead to excess supply, lower prices, and the impairment of debt issued by higher cost copper producers.

### **Background: Commodities as Collateral**

The use of commodity inventories as collateral for financial borrowings and investment, especially in copper, may have an even larger price impact than demand for industrial uses. Given the information asymmetries between borrowers and lenders in China, a large portion of bank loans require collateral pledges, often with a required collateral value twice the amount of the loan. This makes inventory levels, which can be opaque in China, especially important in understanding the full supply and demand picture and the likely long-run impact on commodity prices. Banks had previously preferred property assets as collateral, but the 2007 Property Rights Law expanded other types of collateral, including more categories of “movable assets,” amongst which is copper held in certified warehouses. October 2007 serves as a break point, as inventory-use ratios rise after this date when commodities are imported but not consumed.

Copper held in bonded warehouses can be used as collateral for a carry trade. The firm finances imports using a US dollar denominated letter of credit at a low interest rate. Borrowing costs in a foreign letter of credit may be lower than the domestic borrowing cost due to a perceived increase in security of letters of credit relative to domestic bank loans. The proceeds from the borrowings are deposited into a Chinese bank at a higher interest rate. As long as the Chinese interest rate stays higher than the US dollar denominated interest rate and the Chinese currency does not depreciate faster than the carry earned on the borrowing and investment, the carry trade will be profitable. These commodity financing deals (CFDs) may account for over 30% of China’s short-term foreign currency borrowings and hold over 5% of the world’s annual copper production as collateral. Prior research shows that over 12% of the price increase in base metals from 2007 to 2014 may be attributed to CFDs.

### **Data Description**

The study seeks to correlate commodity prices to measures of industrial production as well as increases in credit availability, and to differentiate between the two influences on commodity demand. Variables include monthly observations on world commodity supply, global industrial production outside of China, China’s aggregate credit, China’s industrial production, US dollar short-term interest rates, the US dollar real exchange rate, and real commodity prices. Data were collected from January 2002 through May 2015. An important breakpoint was noted at October 2007, the date of the Chinese Property Law that allowed movable assets such as copper to be used as security for loans.

### **Description of Investigation**

The paper uses sophisticated statistical techniques to estimate the impact of change in aggregate credit and economic activity on commodity prices. Two studies are completed, one on the full sample from 2002 to 2015 and the second starting after the introduction of the Chinese Property Law in October 2007. Results linking commodity prices to credit growth appear to be stronger in the latter period, while industrial production seems to have a stronger impact over the full sample period.



A one percentage point surprise increase in Chinese bank lending leads to a price increase of over 10% over four quarters in some base metals, including copper. A similar surprise in industrial production leads to a four-quarter price change of over 6% in the price of aluminum, copper, and crude oil. Base metals have a stronger response to credit growth than is found in crude oil, as base metals are easier to store in warehouses.

### Findings from Other Research

#### Hoffman and Gilmartin (2016): “Quantifying ‘Real’ Chinese Copper Demand,” a *Bloomberg Intelligence* Report

“China’s carry trade – which uses metals as collateral to finance deals – inflated demand, kept prices higher, and led miners to raise output.” The authors note an inconsistency between the demand growth for copper of 117% since 2006 and the increase in cement of 11% and the 5.7% growth in the electrical grid over the same time period. Separating the demand for copper that is actually used in construction, home appliances, and demand for growing the electrical grid from that stored in warehouses for financial uses substantially changes China’s demand picture, which may show “real” copper demand as growing at just 5.8% per year. Hoffman and Gilmartin (2016) estimate that China’s (industrial) copper demand may be just 8.13 million metric tons a year, 29% below popular estimates, which would have led to China’s share of global copper demand at 36% of world use, far below the widely quoted 50% share.

Over 15 million tons of copper may sit in Chinese warehouses as collateral for carry trades that arbitrage the difference between Chinese and foreign interest rates. There is a concern that the apparent demand for copper could decline and warehouse stocks could be liquidated if and when the carry trade unwinds, which is likely with a weakening of the Chinese yuan or a decline in Chinese interest rates relative to borrowing rates in the foreign/funding currency.

#### Bi et al. (2015): “Copper in China: A Bottom-Up Approach to Long-Term Demand,” a *Macquarie Research* Report

China’s growth in copper demand has risen from 1.8 million tons in 2000 to 9.9 million tons in 2014, reaching 45% of global consumption after compounding growth at 13% per year. This rate of growth is likely to slow substantially, but may not contract as feared by some investors. The Macquarie researchers estimate annual growth of Chinese copper demand to be just 3.4% per year through 2020, reaching 13.5 million tons.

This article provides a bottom-up analysis of copper demand through an examination of five key sectors: infrastructure, construction, transportation, industrial goods, and consumer appliances. The report is data driven, including 72 figures describing in detail the drivers of copper demand in China. As the urban population stabilizes, the prior demand growth in infrastructure and construction will move toward growth in consumption sectors including automobiles and white goods, such as refrigerators, air conditioners, and laundry appliances.



Approximately 70% of copper demand in infrastructure is from the electrical grid, which will continue to grow from both primary and replacement demand as the urban share of the Chinese population grows from 54% to over 62% by 2020. The use in construction is likely to slow, especially with a slowing in new building construction, but could grow from the rehab demand for existing buildings. The use of copper in transportation has nearly doubled as a share of Chinese demand, from 4% to 7% since 2000, due to the growth in automobiles and motorcycles as well as trains and subway cars.

## Conclusion

To fully understand commodity prices, investors need to analyze both the commodity intensity and the credit intensity of the Chinese economy. While industrial production continues to have a large influence on commodity prices, credit growth and the use of commodities as collateral may have had an even larger influence on base metals prices over the last decade. Both suppliers and investors in base metals need to proceed with caution, as the large warehouse stocks of base metals in China may have to be quickly sold if financial markets deteriorate, either (a) by a contraction of credit in China, or (b) by a rise in US interest rates, or (c) if the value of the US dollar relative to the Chinese yuan causes losses to those who have borrowed in US dollars and invested in the proceeds in China. A maturation of the Chinese credit market or enhanced ability of Chinese to borrow overseas may make base metal collateral less necessary to justify loans, which could again weaken copper prices by bringing warehouse inventory back into world supplies.

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## Endnotes

The original article was also included in the February 2016 issue of the eJournal, *Global Commodity Issues [Editor's Choice]*, a publication of the J.P. Morgan Center for Commodities at the University of Colorado Denver Business School. The eJournal is available here:

<http://www.ucdenver.edu/academics/colleges/business/industry-programs/commodities/Pages/Global-Commodity-Issues.aspx>.

The author of this digest article is also a member of the Editorial Advisory Board (EAB) of the *Global Commodities Applied Research Digest (GCARD)*. The GCARD's EAB membership is listed here:

<http://jpmcc-gcard.org/editorial-advisory-board/>.

## References

Bi, A., Train, G. and C. Hamilton, 2015, "Copper in China: A Bottom-Up Approach to Long-Term Demand," *Macquarie Research*, June 23.

Hoffman, K. and S. Gilmartin, 2016, "Quantifying 'Real' Chinese Copper Demand," *Bloomberg Intelligence*, March. This analysis is summarized here:

<http://www.bloomberg.com/news/articles/2016-03-29/china-s-true-demand-for-copper-is-only-half-as-much-as-you-think>

## Keywords

Commodity markets, commodity prices, China, collateral, credit