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The impact of monetary liquidity on Chinese aluminum prices

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ABSTRACT

By expanding Frankel and Rose's (2009) theoretical model to consider the interaction of commodity prices with both money liquidity and expectation formation, this paper empirically studies the long-run relationship and short-term dynamics between aluminum prices and money liquidity via Vector autoregressive (VAR) and Impulse Response Function methodologies. Our results show that: (1) a cointegration relationship between money liquidity and Chinese aluminum prices exists, and monetary liquidity positively significantly influences the price over long periods; (2) a structural change has been found during the 2008 Financial Crisis and the change of Chinese monetary policies; and (3) the negative impact of production capacity mechanism on aluminum prices coexists with the positive impact of financial asset returns mechanism, to allow for varied market expectations on aluminum prices within and outside China.

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Introduction

Aluminum is the second largest base metal in the world by production. It is widely used in transport, electricity and construction sectors. Like steel, it is an indispensable raw material for economic development and demand for aluminum goes hand in hand with the speed of economic growth. Following its decades of rapid economic growth, China has emerged as a dominant player in the global aluminum market during the past 10 years. The ratio of Chinese aluminum output to global output has expanded from 12.12% in 2000 to 40% in 2010 (Fig. 1). This significant change in the marketplace suggests that China element which had been confined to its internal borders not long ago needs to be factored in within the international market carefully. It may imply that the impact and the potential impact from China on aluminum market become important issues for policy makers, and market participants. What follows is that fiscal and monetary policies intended for internal use in China may find their way to influence international market through channels such as trades and exchange rate

movements. This is an emerging issue and under-researched area. In this paper, we concentrate on how the loosened monetary policy implemented in China during the 2008 financial crisis to shield China from wide spread international economic crisis may have supported strong domestic demand, but at the same time, have further fueled international prices (Fig. 2).

In aluminum market, Liu (2008, 2009) shows that prices escalated despite higher aluminum production and investment suggesting there are other forces working in the market place. There is a consensus among policy researchers that the loose monetary expansion policy (Four Trillion Policy) in 2008 has rapidly stimulated demand for aluminum from high aluminum usage sectors such as transport, electricity and construction. In particular, investment and consumption on car industry experienced explosive growth, which facilitates the influx of money into aluminum market. The stimulated demand for aluminum in term puts pressure on international aluminum prices and reverses the downward trend due to the crisis. This phenomenon raises the question as whether the money liquidity may have acted as a main force driving aluminum prices after the 2008 financial crisis (Yao, 2010; Tong, 2010a, 2010b). The work so far has been mainly theoretical. This paper aims to provide empirical evidence in this issue. Our results would have significant implications for policy makers and market percipients around the world. Our research on aluminum prices is important because aluminum is one of the most important base metals, after steel. The results would have implications to other commodities.

There are generally two mechanisms through which money liquidity may influence aluminum prices. First one is the capacity

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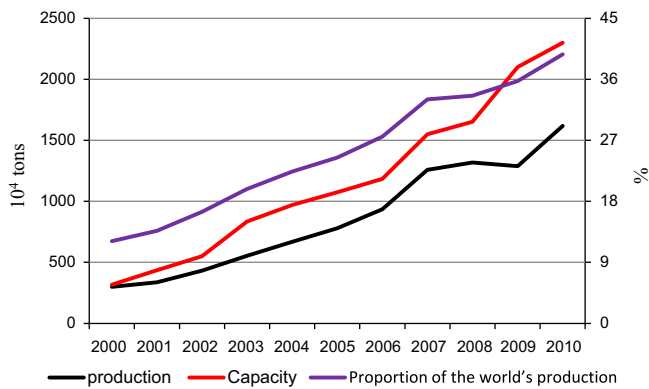


Fig. 1. China's aluminum market development, 2000–2010

Sources: China Nonferrous Metals Industry Yearbook, China Nonferrous Metals Statistics and the collection of public information by the authors.

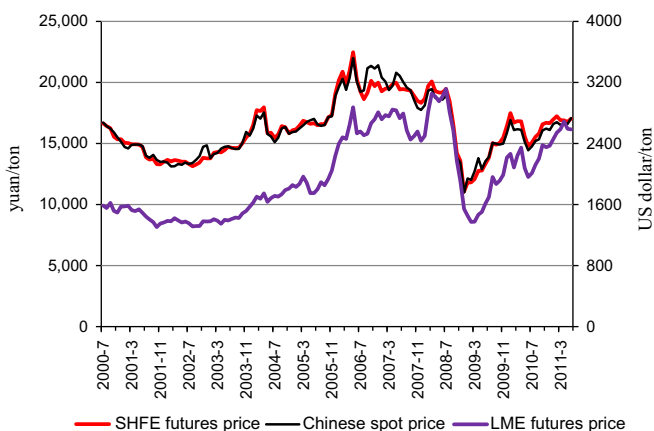


Fig. 2. Aluminum price movement, 2000–2011.

Sources: Shanghai Futures Exchange (SHFE), London Metal Exchange (LME) and Shanghai Metal Market (SMM).

channel. The amount of monetary liquidity, especially via loan entering aluminum marketplace may influence the capacity and the ultimate supply and demand in the market place. During the past decade, the Chinese government often declares that there are too much capacity building and blind investments in China, which may eventually lead to high level of spare capacities and in the same time depress aluminum prices. The second channel lies in the financial asset returns. Increased money inflow into the market place increases the returns of aluminum assets, which would further induce money into the markets, stimulating the holding of commodity inventory and commodity investment, which put aluminum prices higher. Frankel (1986) pointed out that the market disequilibrium caused by changes of money supply would be realized by the overshooting of commodity prices in the financial market. The overall influence of money liquidity on Chinese aluminum price depends on the relative strength of the above two influential channels over time.

Empirical studies have shown that money supply plays a significant role in the formation of commodity prices and commodity prices change following monetary policy changes (Bessler, 1984; Hua, 1998; Pindyck and Rotemberg, 1990). These findings take into account the fact that price adjustments of general consumer products are slow and that commodities rely on centralized trading where prices are elastic. Based on the vector autoregressive (VAR) framework, Anzuini et al. (2010), with Choi et al., (2010), provided ground for argument to prove that the monetary policies (of the United States) as well as the U.S. dollar

exchange rate has a significant and long-lasting impact on commodity prices. However, it has become rather difficult to study the relationship between money supply and commodity prices in a single country owing to the influence of globalization. Using aggregated quarterly data of major OECD countries, Belke et al. (2010) attempted the study of multiple countries. Their study indicates that the amount of global money supply is a key factor in determining commodity prices. Research on China, on this issue, however, is rare. One research by Li and Fan (2005) highlights the mechanism that is different from the research carried out in developed countries, that is, expectations on interest rate and inflation seem to influence effective interest rate first, then cause a change in manufacturing and inventory behavior, and finally drive up commodity prices. However, few empirical studies have examined the relationship between China's monetary policies and commodity prices. This paper tries to fill this gap in the existing literature. It is one of the first papers that attempts to provide empirical evidence on how Chinese monetary factors influence aluminum price formation. So far, most of the work in the area has focused on the U.S. market. With China's increasingly dominant role in production and consumption, this study would shed some light on the empirical relationship between monetary policy and basic commodity prices outside U.S. (cf. Belke et al., 2010).

The money demand function is introduced in this paper. It considers the interest rate regulation in China through an extrapolative expectation formation of futures market prices. Based on Frankel (1986) and Frankel and Rose (2009), monetary variables enter a commodity price model. The VAR model, which includes cointegration analysis, is used to study the long-run equilibrium and short-term dynamics among different variables and commodities prices. This paper focuses on the Chinese aluminum market because aluminum is not only a representative commodity but also a well-developed item in Chinese futures markets. Data availability and time-series-length of aluminum, jointly, can satisfactorily meet the needs of empirical analysis.

The remainder of this paper is structured as follows: the rest of the section gives the background of Chinese market and its government policies. Empirical model and data are provided in section Empirical model and data, while section Empirical results illustrates empirical results developed with the VAR model and Impulse Response Function (IRF), section Discussions discusses empirical findings of this paper and section Conclusions concludes.

Chinese aluminum production capacity and government policies

China has experienced tremendous growth in aluminum production and consumption during the past decade. Its aluminum production increased from 2.98 million tons in 2000 to 16.19 million tons in 2010. Production capacity reaches 24.6 million tons in the first half of 2011. The rapid expansion of aluminum production and capacity has been catalyzed by a large number of fixed-asset investments. In 2001, China surpassed the United States and became the world's largest aluminum producer and, since 2002, has become a net exporter, despite the fact that most of China's aluminum production has been absorbed by its domestic market. China, since 2004, has also become the world's largest aluminum consumer. In general, the proportion of net exports to China's aluminum production is less than 10%, and from January to June 2011, on a declining trend, veering toward 2.13%. For spare capacity, we can see a clear evidence of enhanced productivity in the short term within the Chinese aluminum market (Fig. 1). This indicates that there is a strong production capacity mechanism in the Chinese aluminum market that can respond to exogenous shocks.

In terms of regulation, a large number of aluminum metal industrial policies have been introduced by the Chinese government

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