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The effect of a change in pricing regime on iron ore prices ☆

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ABSTRACT

This paper performs a quantitative analysis of iron ore prices. The analysis will focus on two general issues. First, are prices more volatile before or after the introduction of spot market pricing in 2008/2009? Second, has the change in pricing regime had a significant effect on the iron ore price? The quantitative analysis uses monthly data between January 2003 and August 2012. The overall results show that when including transportation costs to the price series we do not find that iron ore prices are more volatile after the introduction of spot market pricing. Furthermore, the change in pricing regime does not have a significant impact on the iron ore price in the econometric model. Iron ore prices, GDP growth in China, and the freight rates are found to be cointegrated (when regressed with a market dummy variable), and the short run results indicates that GDP growth in China has the strongest impact on the iron ore price series for the period tested.

Introduction

For a long period of time the iron ore market has been characterised by the so called producer pricing, i.e., large producers and consumers in the two dominating regional markets have negotiated an annual benchmark price. The main motivation for this pricing regime was because the demand for iron ore is sensitive for changes in GDP growth, and both iron ore and steel producers have favoured a pricing regime that stabilizes the market. However, during last years there has been a change in iron ore pricing. Larger volumes of iron ore (mainly in Asia) have been traded on a so called spot market. In 2010, the system of yearly negotiated prices finally was abolished by the three dominating iron ore producers (Vale, Rio Tinto and BHP Billiton) who introduced a system of quarterly negotiated prices, which are influenced by the spot market prices during the previous quarter. Furthermore, before the benchmark prices were published openly, and therefore many traders perceived the pricing system as relatively transparent. Today the pricing regime is considered as less transparent which thus makes many decisions more difficult both for producers and consumers on the market. The prices on iron ore today are mainly driven by the development in the Asian market, and foremost by the Chinese consumers (see e.g., Hellmer and Ekstrand, 2013; Sukagawa, 2010). The European steel industry, through the organisation Eurofer, have opposed the introduction of a spot market on iron ore with the motivation that this will lead to more volatile steel prices, see Blas (2010).

Many of the commodities traded on the London Metal Exchange (LME) today made the transition from producer pricing to market pricing already in the 1960s and 1970s. Earlier research focusing on the effect on metal prices from a change from a producer pricing regime to a market pricing regime is relatively extensive. For example, Slade (1989 and 1991) analyses change in price volatility between different pricing systems by comparing producer prices and market (LME) prices for the six metals traded on the LME between 1970 and 1986. The overall findings for all metals are that the producer prices are more stable than market prices, but also that price variability increases in the 1980s (even for producer prices). Regarding the price level Slade (1989) finds that price levels are unaffected by which pricing system that is used (producer or market). Moreover, it is often the case that the average producer price is lower than the average market price. However, regarding the price variability it is concluded that this is affected by pricing system, i.e., variability increases when the commodity is traded on LME. Slade (1991) further investigates how market structure (measured by HHI) affects price stability, and the conclusion is that in more concentrated industries prices are more stable.

Figuerola-Ferretti and Gilbert (2001) examines, similar to Slade (1989; 1991), the effect on prices when moving from producer pricing to market (LME) pricing. Figuerola-Ferretti and Gilbert

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(2001) supports Slade's conclusion regarding less variability for producer prices compared to exchange prices (for the period 1970–86), but the price variability did not increase in the 1980s (after the removal of silver from the sample). The authors argue that Slade's conclusion regarding increased price volatility in the 1980s compared to the 1970s is influenced by the inclusion of silver in the analysis. Silver differs from the other metals traded on the LME given that it has no recent history of producer pricing and also since it is precious as well as an industrial metal. Furthermore, there is also evidence that the silver market was manipulated in 1979–1980 (the so called Hunt affair), when prices increased from about $6 per ounce in 1979, to a high of about $48 per ounce in less than a year. The authors argue that the Hunt affair had a significant effect of Slade's conclusion that price volatility increased in the 1980s. When excluding silver from the sample (considering the same time period as Slade) there is no evidence that price volatility increased between the 1970s and early 1980s. Furthermore, if extending the time period from 1970 to 1997 the authors find that there is little difference between the market and producer price variability. Thus, there is no evidence that producer prices are more stable for the extended time period. One explanation of this result can be that from about 1985 it is noted that producer prices started to adjust more rapidly to changes in market prices. Further, in the 1970s it is likely (at least regarding aluminium and nickel) that the trade on LME were relatively illiquid and that the prices on these metals were still quite dependent upon the producer prices.

This paper will perform a quantitative analysis of iron ore prices. The analysis will focus on two general issues. First, are prices more volatile before or after the introduction of spot market pricing? Second, has the change in pricing regime had a significant effect on the price? The first issue is similar to the analyses performed by Slade (1989; 1991) and Figuerola-Ferretti and Gilbert (2001). Their analyses focused on comparing prices determined under the two pricing systems in order to assess the consequences of price volatility. However, given that long term contracts and spot market prices for iron ore co-existed for only a short period, comparing both producer and market prices simultaneously cannot be performed. Volatility will rather be analysed for the separate pricing regimes. The second issue is related to economic theory, and we will econometrically estimate iron ore prices in order to analyse the effect on iron ore prices from the change in pricing regime.

The paper proceeds as follows, the next section will investigate if volatility has increased after the change in pricing regime on the iron ore market. The following section will focus on answering the question regarding if the change in pricing regime has had a significant effect on the iron ore price, both using structural breaks and a reduced regression model. Thereafter a section of the paper questions the previously used prices, and repeats the previously performed results with a new calculated price series. In the last section some concluding remarks are done.

Volatility and pricing regime

The quantitative analysis of iron ore prices is performed between January 2003 and August 2012. The reason for the chosen time period is that this period includes both pricing regimes, i.e., both a dominating use of long term contracts and a dominating use of spot market pricing. The price series can thus be divided in two subsections: before and after the introduction of spot prices. The price data are monthly prices of Chinese imported iron ore fines (62% FE spot CFR Tianjin port) presented in US$ per metric ton (retrieved from International Monetary Fund (2012)(IMF), 2012-09-12). The price series thus represents import prices where the cost of transportation is included (CFR=Cost and Freight, where the seller must pay the costs and freight to the named port of destination).[1] Fig. 1 presents the nominal and real iron ore prices. The real iron ore price series is constructed by using the IMF commodity price index (including both fuel and non-fuel price indices) using 2005=100 (retrieved from IMF, 2012-09-12). The motivation for using a commodity price index (rather than a consumer price index) when deflating the nominal iron ore price series is to analyse iron ore prices after subtracting the general price rise that has occurred on commodity markets during this time period. An inspection of Fig. 1 leads to two prior conclusions. First, producer prices are more stable than spot prices. Second, the price level has increased after the introduction of spot market prices; however not as much for the real price series.

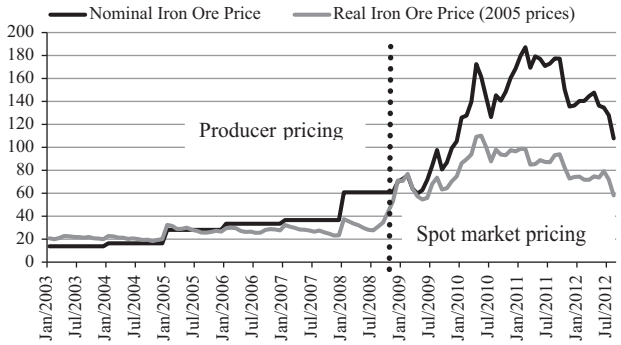

Fig. 1. Iron ore prices in US$ per metric one 2003–2012.
Source: International Monetary Fund (IMF). Retrieved: 2012-09-12.

Table 1 shows the test statistics for the price series that are studied, both for nominal and real prices. The first part of the table presents the descriptive statistics of the nominal price series, and the second part presents the equivalent for the real price series which represents iron ore prices after removing the general price rise that has occurred on commodity markets. It is obvious that the variance, i.e., a measure for how far a set of numbers is spread from the calculated mean, for the nominal price series is very high.[2] When dividing the price series in two sub-periods, the first between January 2003 and November 2008, and the second between December 2008 and August 2012,[3] the variance for the nominal price series is reduced markedly. It is noted that the variance is significantly lower for the time period when producer pricing was dominant. When examining the real price series, i.e., when using constant 2005 prices, it is obvious that the variance in the price series is reduced remarkably compared to the nominal prices. When dividing the price series in two subsamples the same conclusion as above holds, i.e., the variance for the time period representing producer pricing is significantly lower.

A Chow test is performed with the purpose to verify that there is an improvement in the fit from dividing the price series in two subsamples (producer and market prices). The calculated *F*-statistic for the nominal price series is 36.9 and the equivalent for the real price series is 82.6. Both of these are well above the critical value of *F* which is 4.79 at 1% significance level. This verifies that there is a break in the price series about the time when spot prices

[1] An option is to use FOB prices, i.e., Free-On-Board prices where the buyer pays for the transportation of the goods. This can thus be seen as the price that the producer receives. As we are more interested in the consumer price, we have chosen to use CFR prices where the freight is included.

[2] The variance is often used as a measure of how stable a time series is, as it explains the variation of the series to the calculated mean.

[3] The motivation for the chosen break date (December 2008) is that this is about the time when the long term contract pricing was abolished in favour of spot market pricing. This is further, when the price series under inspection, started to report the spot market prices instead of the contract prices. The separate time periods are thus named after the dominating pricing mechanism, i.e., producer and market pricing.