University of Oxford

Department of International Development

SLPTMD Working Paper Series

No. 032

The Impact of China's Exports on Global Manufactures Prices

Xiaolan Fu, Raphael Kaplinsky, Jing Zhang

The Impact of China's Exports on Global Manufactures Prices

Xiaolan Fu[a]*, Raphael Kaplinsky[b], Jing Zhang[c]

[a] *Department of International Development, University of Oxford, Oxford, OX1 3TB,UK*
[b] *Development Policy and Practice, The Open University, UK*
[c] *School of Contemporary Chinese Studies, The University of Nottingham, UK*

Abstract

This paper analyses the impact of China's exports on the prices of exports from other countries using disaggregated import data in the US, EU and Japan over the 1989-2006 period. Findings from this study suggest that China's exports have affected not just those countries whose competitiveness is largely based on low wages but all country groups in certain products sectors, destination markets and during different time periods. The middle income countries are the most affected by China's export expansion through price competition particularly after the late 1990s as a consequence of China's market expansion, its WTO entry and exchange rate variation. The influence on high-income countries is only in low-technology product sectors and appears to lose its significance in the post-1997 period. The impact on low-income countries is only significant in the medium- and high-tech sectors mostly in the pre-1997 period and this effect weakened over time.

Keywords: Unit prices, exports, competition, China
JEL code: F10, F14, E30

Acknowledgement: This research was funded by the Economic and Social Science Research Council of the UK, Grant number RES-000-22-2791. The authors are grateful to Dina Kale for excellent assistance in data collection, and to Adrian Wood, Joerg Mayer and participants at the Oxford Forum on China and the World Economy for helpful comments on an earlier draft.

*Corresponding author. Tel: +44 1865 281832; Fax: +44 1863 281801.
Email: xiaolan.fu@qeh.ox.ac.uk (X Fu); R.Kaplinsky@open.ac.uk (R. Kaplinsky); J.Zhang@nottingham.ac.uk (J. Zhang)

The Impact of China’s Exports on Global Manufactures Prices

Abstract

This paper analyses the impact of China’s exports on the prices of exports from other countries using disaggregated import data in the US, EU and Japan over the 1989-2006 period. Findings from this study suggest that China’s exports have affected not just those countries whose competitiveness is largely based on low wages but all country groups in certain products sectors, destination markets and during different time periods. The middle income countries are the most affected by China’s export expansion through price competition particularly after the late 1990s as a consequence of China’s market expansion, its WTO entry and exchange rate variation. The influence on high-income countries is only in low-technology product sectors and appears to lose its significance in the post-1997 period. The impact on low-income countries is only significant in the medium- and high-tech sectors mostly in the pre-1997 period and this effect weakened over time.

Keywords: Unit prices, exports, competition, China
JEL code: F10, F14, E30

I. Introduction

China's rapid growth since the opening up of the economy in 1978 has been associated with its growing participation in global manufacturing trade. Neither this rapid economic nor export growth is unprecedented. Both Korea and Japan had a similar experience during the three decades after 1960 (Kaplinsky, 2006). But what is significant is the coupling of this expansion in activity with China's large size. China's share of global manufacturing value added grew from 1.4 percent in 1995 to 11.2 percent in 2007[1]; her share of global exports increased from 2 percent in 1990 to 9 percent in 2007[2]. One of the potential consequences of China's export performance is the impact this might have had on global prices. Export growth from a country with reservoirs of surplus unskilled- (and increasingly also semi-skilled and skilled) labour (Kaplinsky, 2005), coupled with sustained productivity growth (Lai, 2004; Fu and Gong, 2008), have provided the world with low-cost products. It is not surprising therefore, that it is widely claimed that China's rapid expansion of manufactured exports has been a primary factor explaining the fall in the aggregate price of trade manufactures recorded by the IMF after the mid 1990s.

China's exports span a widening spectrum of sectors. In 1995, of a total 4,143 HS 6 digit product lines exported by the US, Japan and the EU, China failed to participate in only 101 lines; this number fell to 83 out of 4,212 product lines in 2005 (Wang and Wei, 2008). This suggests that, in respect to the impact of China's rapidly-growing manufactured exports, the affected firms and countries are not just those whose competitiveness is largely based on low wages. Its exports in technology-intensive sectors have increased rapidly based on semi-skilled labour intensive processing trade (Fu, 2003) and improvements in human capital

[1] Data source: UNIDO available at www.unido.org.
[2] Data source: International Financial Statistics, IMF.

and government policy (Wang and Wei, 2008). Anticipating this structural change, Lall and Abaladejo (2004) suggested some years ago that China would increasingly also pose a competitive threat to middle-income countries.

Nevertheless, despite the widely-held belief that China's growing exports have *caused* a fall in the global prices of many manufactures, there is little empirical evidence which allows a testing of this claim. In this paper we focus on the unit prices of manufactures across a range of sectors in three major importing markets – the EU, Japan and the US. We hypothesise that as a consequence of China's export growth, there will be a differentiated impact on the prices of traded manufactures in sectors of differential technological intensity. This will have varying impacts on different groups of exporting countries, with falling prices of low-technology products affecting low-income countries, and falling prices of more technology-intensive sectors affecting the exports of middle- and high-income economies. High-income countries, which predominantly export high-tech products, are least likely to be affected by these pricing pressures. There will also be varying impacts over time as China's relative wages and its technological capabilities have grown. Moreover, China's accession to the WTO in 2001, as an important contextual factor on the evolution of relative prices, raises the possibility that a combination of greater competition in its domestic market and the reduction in non-tariff barriers in export markets will have affected the price of its manufactured exports, and hence global product markets in these sectors. We use the most disaggregated trade data feasible – 8 digits for the EU and the US, and 6 digits for Japan, all for the 1989-2006 period. While most of the existing literature uses the unit prices in one major export market, for example, the EU or the US, this study takes into account the unit prices in three major importing markets – the EU, Japan and the US.

The paper is organised as follows. Section II briefly reviews the recent literature. Section III discusses the model, methodology and data. Section IV reports the results. Section V concludes.

II. The recent literature

There is a developing literature using the unit prices of exports to investigate changing comparative advantage and the evolution of export sophistication. For example, the changing patterns of global trade specialisation (Schott, 2002), the evolution of the export sophistication of China's exports (Rodrik, 2006; Hausmann *et al*., 2007), and most recently in the analysis of China's export structure (Feenstra and Wei, 2009). The literature examining the impact of China on the rest of the world mostly focuses on its impact on the export share/volume of other countries. Eichengreen *et al*. (2004) show that Chinese exports crowd out the exports of other Asian countries mainly in markets for consumer goods. Lall and Albaladejo (2004) and Roland-Holst and Weiss (2005) find that China's exports are eroding the market share of its regional neighbours in the US and Japan. Phelps (2004) argues that China's exports growth is detrimental for less advanced economies, especially Latin America, since Chinese competition has drastically worsened terms of trade, decreasing Latin America's comparative advantage. Recent literature has begun to examine the impact of China on world prices. Most of this focuses on the impact of the fast economic growth, especially the increasing demand for commodities and energy, on global prices of primary commodities, for example metals and oil (e.g., Roeger, 2005; Cheung and Morin, 2007; Pain *et al*., 2006).

Three sets of empirical studies have explicitly concentrated on the association between traded prices in general and China's participation in these traded markets. Kaplinsky and Santos-Paulino (2006) examine the price performance of 150 products imported into the EU between 1989 and 2001. The products chosen for analysis were those in which low-income countries specialise. It concluded that in four sets of product groupings, the prices of Chinese and low-income country exports to Europe were more likely to fall than those exported by middle-income and high-income economies. Amiti and Freund (2008) report that between 1997 and 2005, average prices of goods exported from China to the US fell while those of the same products from the rest of the world to the US increased on average by 0.4 percent per year. Finally, and in contrast to these two sets of studies, Broda and Weinstein (2009) challenge the argument that China's exports forced down the prices of competitors exports to Japan. They find that "[i]n those categories where China already had a presence in 1992, we do not find that Chinese prices fell more rapidly than those of other exporters to Japan". However, their result falls away if Hong Kong exports are excluded, with Chinese prices falling significantly, but prices from Hong Kong rising significantly. None of these three sets of studies attempt to model the impact of China's exports on the prices of other countries. Instead they draw causal conclusions on the basis of correlates in price performance. Moreover, neither Amiti and Freund (2008) nor Broda and Weinstein (2008) make any attempt to distinguish differential impact on different groupings of exporting countries, on different technology-intensities of exports, or on the interaction between technological intensity and country-type. In this paper we seek to fill these gaps.

III. Model, methodology and data

Demand and supply are the two main factors that shape the prices of internationally traded goods. On the demand side, evidence suggests that price movements tend to be driven by world industrial activity and the US exchange rate (Hua, 1998; Lalonde, *et al.*, 2003). On the other hand, it has also been shown that supply factors are also an important factor affecting unit-prices. Using time series analysis based on quarterly data, Cheung and Morin (2007) find strong evidence suggesting that industrial activity in emerging Asia have become a more important driver of oil prices, and argue that supply side factors have been a more significant determinant of the rise in metal prices. “Demand-driven” structural models which ignore supply are found to persistently over-predict real commodity prices by wide margins from the second half of the 1980s into the early 1990s (Borensztein and Reinhart, 1994). Our analysis in this paper draws on these supply-side factors, while controlling for some key demand factors in an integrated approach. The impact of China’s rapidly growing exports on global prices can arise from a combination of both aggregate volumes of trade and changes in the quality of these traded items (Broda and Weinstein, 2008) as well as from a reduction in production costs due to technical change and efficiency improvement (Fu and Gong, 2008).

Model

We start with a simple version of the demand and supply models and then state a more formal version that will be used as the basis for the empirical analysis in the subsequent sections. Following Deaton and Laroque (2003) we consider a partial equilibrium model for a typical good that is tradable internationally. The final demand of this product is a log-linear function of price, income and other exogenous variables influencing the level of demand:

$$d_t = m + Ay_t - Bp_t + EX_t + \xi_t^d \tag{1}$$

where lower case d_t, y_t, and p_t are demand, income and price of the product; X_t is a vector of other exogenous variables influencing the level of demand; *m, A, B* and *E* are parameters and ξ_t^d is a stationary and unobservable random variable.

For the supply side, we define:

$$s_t = n + Fp_t + Gp_t^e + KZ_t + \xi_t^s \tag{2}$$

where s_t, p_t and p_t^e are supply, price and the expected future price of the product; Z_t is a vector of other exogenous variables influencing the level of supply; *n, F, G,* and *K* are parameters and ξ_t^s is a stationary random variable.

We seek to analyse the prices of products exported by different categories of countries, namely low-income countries, middle-income countries, high-income countries and China. We refer to the product of one industry produced in different types of countries as variety. Following Armington (1969), these varieties of product are interdependent, i.e. are close substitutes. We assume the elasticity of substitution varies, depending on which two of these varieties are considered, e.g. the variety of the middle-income countries is a close substitute for the exports from China, but probably a less close substitute for the exports from high-income countries and/or low-income countries. We also assume all these elasticities of substitutions are greater than unity. However, the price of each variety of each product is potentially affected not just by the demand for and supply of all varieties of that product, but also of other related products. For simplicity, we assume that cross-elasticities of demand among goods are small enough to be neglected. Similar assumption is also applied to the supply side. Therefore, equation (1) can be rewritten as

$$d_t = m + Ay_t - Bp_t^H - Cp_t^C - Dp_t^O + EX_t + \xi_t^d \tag{3}$$

where lower case p_t^H, p_t^C, and p_t^O are prices of the varieties from home country, China and other types of countries; *B, C* and *D* are parameters.

The expected future price (P_t^e) is affected by the lagged price of the variety and also the variety of prices from China and other countries due to the competition effect in which a firm responds to the current price of its rivals so maintain its market share. Moreover, the price level of its main rivals and market leaders will affect a firm’s expectation of future price. The expected future price is hence defined as:

$$p_t^e = H\sum_j p_{t-j} + Ip_t^C + Jp_t^O + \varepsilon_t \tag{4}$$

where p_{t-j} is the lagged variety price; H, I, and J are parameters (H is a vector) and ε_t is stationary and random. The signs of H, I, and J are ambiguous.

Substituting Equation (4) into Equation (2), the supply function becomes

$$s_t = n + Fp_t + H\sum_j p_{t-j} + Ip_t^C + Jp_t^O + KZ_t + \varepsilon_t + \xi_t^s \tag{5}$$

The total supply of the product on the left hand side of the equation includes the supply from China (S_t^C) and that from the rest of the World. The increase of China's export will drive up the supply curve rightward and hence impose a downward pressure on the market price. In the absence of inventories and taking into account the increase of supply as a result of opening up of China to the world, the final market clearing price is determined by equalising supply and demand functions, so that

$$p_t = (B+F)^{-1}\left[(m-n) + Ay_t - H\sum_j p_{t-j} - (C+I)p_t^C - (D+J)p_t^O - MS_t^C + EX_t - KZ_t + \xi_t^d - \xi_t^s - \varepsilon_t\right] \tag{6}$$

For simplicity, the equation is written as:

$$p_t = \alpha + \sum_j \beta_{j,t} p_{t-j} + \delta y_t + \gamma p_t^C + \phi p_t^O + \eta S_t^C + \lambda X_t + \sigma Z_t + \xi_t \tag{7}$$

For the exogenous variables that may affect the demand and supply of the product, we consider the exchange rate, technology intensity of the product and external shocks. Changes in exchange rate will affect the level of exports and imports, i.e. on both supply and demand sides. Cashin *et al*. (2004) find a long run relationship between real exchange rates and real commodity prices for about one third of the commodity-exporting countries. Technology intensity may affect the level of unit price because of differing income elasticities of demand for the products and due to innovation rents. External shocks are likely to generate significant impact on the evolution of relative prices. Therefore, the empirical model of price determination for a panel data is set out in the following form[3]:

$$p_{it} = \alpha + \sum_{j} \beta_{ij,t} p_{t-j} + \delta y_{it} + \gamma p_{it}^{C} + \phi p_{it}^{O} + \eta S_{it}^{C} + \lambda E_{t}^{C} + \sigma TE_{t} + \varsigma D + \xi_{it} \tag{8}$$

where y_{it} is income measured by the logarithm of real GDP of the destination market calculated as GDP deflated by consumer price index (CPI) of corresponding destination market. S_t^C is exports from China measured as the share of exports of product *i* from China in total exports of that product. E_t^C is real effective exchange rates (REER) of Chinese yuan[4]. The REER is not only an indicator of the exchange rate, but is also widely regarded as an overall measure of a country's external competitiveness, with an increasing REER reflecting growing competitiveness. *TE* is technology intensity of the product proxied by a categorical variable indicating the degrees of the technology intensity of the product. The 300 products in each market are grouped into four categories[5]: resource based manufactures, low technology manufactures, medium technology manufactures and high technology manufactures. *TE* is defined to equal 1 to 4 for the above four groups correspondingly. We also estimate the model for each sub-sample of different technology categories in order to examine the different effects of China's exports on the prices in different technology groups.

D is a set of dummy variables equal to 1 for the years after the shocks. The first external

[3] We have also applied an Autoregressive Distributed Lags structure to these price variables. Since the data we use is yearly prices rather than monthly prices, and because firms now have better information about market price and therefore can make quick response to price competition, the specification with current prices appear to be more appropriate than that with distributed lags. The estimated results of the two specifications are also broadly consistent with each other.

[4] Following the IMF's definition, a nominal effective exchange rate index represents the ratio (expressed on the base 2005=100) of an index of a currency's period- average exchange rate to a weighted geometric average of exchange rates for the currencies of selected countries and the euro area. A real effective exchange rate index represents a nominal effective exchange rate index adjusted for relative movements in national price or cost indicators of the home country, selected countries, and the euro area. The nominal exchange rate is the exchange rate of currency i in dollars.

[5] The Lall taxonomy was constructed at the 4 digit level. We extended it to the 6 and 8 digit levels.

shock for consideration is China's accession to the WTO in 2001, which has led to greater competition in its domestic market and the reduction in non-tariff barriers in export markets affecting the price and volume of its manufactured exports. The second is the Asian Financial Crisis of 1997, which led to excess capacity in the region and hence in enhanced price competition in global markets price, particularly from middle-income Asian economies in medium-technology sectors. The third is the commodity boom that started from 2000. Cycles are a dominant feature of commodity prices with significant economic consequences (Cashin *et al*., 2002). Commodity booms will inevitably affect manufactures prices, especially the prices of resource based and low technology products.

Methodology

Several methodological issues are raised. First, although the model provides a method for examining dynamic effects, it raises the problem of convergence of the estimators because the lagged dependent variable is correlated with the disturbance term (Greene, 1997). In order to overcome this problem, an instrumental-variable (IV) approach has been proposed for estimation. For instance: the instrumental variables estimator proposed by Anderson and Hsiao (1981), the General Methods of Moments (GMM) estimator proposed by Arellano and Bond (1991), and Corrected LSDV approach discussed by Kiviet (1995). In this paper we use the "system GMM" approach developed by Arellano and Bond (1991) and Blundell and Bond (1998). System GMM is designed for panel data that may contain fixed effects and idiosyncratic errors that are heteroskedastic and correlated with individuals. In order to purge the unobserved and perfectly autocorrelated product specific fixed effects, we look for AR(2) to check whether the second order serial correlation exist. The existence of autocorrelation indicates that the lags of the variables are endogenous and thus are not proper instruments.

Second, in the international markets firms set prices in response to those of the competitors. Thus the relationship between prices from different countries is bi-directional. Consequently, all the price variables on the right hand side of Equation (8) are treated as endogenous and their lags dated t-2 and earlier are used as the instruments. Other regressors are all assumed to be strictly exogenous and used as standard instruments. The validity of the instrument set is examined using the Hansen J test. We also check the difference-in-Hansen statistics for the validity of the subsets of instruments. However, a consequence of using all the available lags date t-2 and earlier as instruments is that the number of instruments is large relative to the number of observations. Such proliferations of instruments may overfit endogenous variables and fail to expunge their endogenous components. It weakens the power of the Hansen test. Therefore, we test for the robustness of the results by severely reducing the number of instruments, i.e. using limited lags as GMM instruments (Holtz-Eakin, Newey and Rosen, 1988; and Arellano and Bond, 1991).

Finally, before proceeding to the GMM estimation, we carry out unit root tests because the estimated coefficients can be spurious if the variables are non-stationary. Given the nature of the data, i.e. N>T, we employ LLC (Levin, Lin and Chu, 2002) and IPS (Im, Pesaran and Shin, 2003) methods, with the null hypothesis that the variable contains a unit root and the alternative that the variable was generated by a stationary process.

Data

Although the measurement of the unit prices of traded goods is relatively simple in principle, in practice, the calculation of these price indices is more complicated. For one thing, most countries calculate imports on a Cost, Insurance and Freight (CIF) basis, and exports on an Free on Board (FOB) basis. This immediately raises complications in the alignment of data on bilateral trade. More problematically, there are varying degrees of efficiency in the recording of trade data. In general, low-income countries have relatively weak custom's authorities, and either do not systematically report up-to-date trade data, or do so with significant errors. Moreover, not all countries have similar tariff structures and/or have proceeded with tariff reduction at the same pace. In the face of these difficulties, we have chosen to use three sets of data in the analysis of unit prices data. Based on the widespread acceptance that the least-weak forms of trade-data are those collected by high-income economies, we have used import data into the three Triad economies – the EU, Japan and the US. However, because the US import data is collected on a FOB basis, and that in Japan and the EU data is at CIF prices, and because of other differences in the Triad's measurement of import values, we make no attempt to compare absolute unit prices across the Triad regions, and confine ourselves only to the differences and changes in unit prices between different exporters within the same market

The biggest problem which arises in the measurement of unit prices is the problem of product heterogeneity. The greater the degree of aggregation the less likely that trade data will capture product-specific movements in prices. This problem is so substantial that it has led some observers to jettison the use of unit prices since "unit value indices suffer mainly from not comparing prices of like with like" (Silver, 2007). Silver bases his criticism in large part on trade data collected at the 3-digit level of aggregation. Kaplinsky and Santos-Paulino (2006) have shown that the higher the degree of disaggregation the more price trends are visible. We have therefore used the most disaggregated trade data feasible - 8 digits for the EU and the US, and 6 digits for Japan, all for the 1989-2006 period. The EU data is sourced from the COMEXT EUROSTAT database; the US data from US International Trade Commission database; and the Japanese data from the Japanese customs official website[6]. Examples of

[6] The US data is collected from http://dataweb.usitc.gov/; and the Japanese data from http://www.customs.go.jp/toukei/info/index_e.htm.

products at the 8-digit level include 61046200 for Women's or girls' trousers, bib and brace overalls, breeches and shorts of cotton, knitted or crocheted (excl. panties and swimwear); 61046300 for Women's or girls' trousers, bib and brace overalls, breeches and shorts of synthetic fibres, knitted or crocheted (excl. panties and swimwear).

The time-period we have chosen for this analysis begins in 1989 with the introduction of the Harmonised System in trade data. The HS taxonomy is available at a more detailed level than the SITC dataset utilised in the COMTRADE database, and although this has the disadvantage of reducing the time period available for the analysis of changes in trend, it provides a finer degree of disaggregation which we believe to be essential in the analysis of unit prices. Moreover, insofar as we are concerned with the "China effect", this only began to surface in global trade from the late 1980s.

The product categories we have employed in the unit price analysis are defined by China's trading role, since this is the primary lens of the research endeavour.[7] For each of the Triad regions we have examined the price performance of imports from China and three comparator groups of countries for the 300 major products imported from China. We have used 2006 trade data to identify this sample of products for each triad market separately. The comparator countries are the major income groups defined by the World Bank, namely low-income (excluding China), middle-income and high-income[8]. Total sum of export value and quantity are calculated for each country group and the average price for each product in each country group is estimated by dividing the sum of value by sum of export quantity.

One final methodological point concerns the number of sectors for which data were available.

[7] By contrast, the earlier work of one of the authors on the evolution of unit prices constructed its sample of traded products by focusing on the major exports of low-income countries (Kaplinsky and Santos-Paulino, 2006).

[8] We assume that the membership of the income country groups were stable over the sample period.

Trade structures have altered over the 18 year time-period of data analysis, and some sectors represented in China's trade with Triad economies in 2006 were not represented in 1989. These dynamics in trade composition are particularly evident in the US data. In addition, and this is no surprise, data sets are not complete, so there are some years with missing values (for either value or volume). Where there is a gap, we have interpolated trends. We have also dropped products with only three or less observations over the years and outliers which report an unreasonable unit price. Finally, some country groups, especially the low-income countries, do not export some of the top 300 products exported by China in some years or in all sample years. We have kept only the products that all the country groups have export value for a given year. Thus the final sample of sectors utilised in the analysis was 214 sectors for Japan, 184 for the US, and 240 for the EU over the 1989-2006 period. This result in a total of 15,444 observations[9], accounting for 65.7 percent, 74.9 percent and 71.4 percent of China's exports to the EU, Japan and the US respectively. All the prices are deflated using the GDP deflator in the relevant markets. The EU GDP deflator is calculated using the average GDP deflator of the 5 major economies in the EU (UK, France, Germany, Italy and Spain).

The data of GDP and CPI of destination markets over the sample period and the REER of Chinese yuan are collected from International Financial Statistics of IMF. Export value and the share of Chinese exports of each product are collected from COMEXT, the US Trade Commission database and Japan customs official website as the same as those for prices. Table 1 reports the descriptive statistics of all the variables. In China's top export sectors, China actually had dominant market share only in the Japan market. In the US, China and the high-income country group each accounted for around one third of the market share. In the EU market, middle-income countries as a group dominated the market with 45% market

[9] Theoretically there should be 300×4×3=3600 products over 18 years period, resulting in 300×3×18=16,200 observations.

share on average, which is about twice as large as that of China. Overall, low-income countries have a very small market share: around 5 percent in the EU and US markets. Unit root tests using LLC and IPS methods reported in Table 2 suggest that the logged variables are stationary. Therefore, in the following econometric analysis, all price variables are transformed to logarithm.

IV. Results

The average logged price levels and their trends in these three markets are reported in Figure 1. It illustrates that the average unit price of high-income countries were consistently higher than those of other countries in all the triad markets. The average unit prices of middle-income countries were similar to China in Japanese and European markets and slightly higher than those from China in the US market. However, the average price of low-income countries varied across markets. It was higher than middle-income countries and China in Japanese market, at a similar level to China and middle-income countries in the US market, and was the lowest in the European market. With regard to the trends over time, all the prices in Japan increased significantly in the early 1990s, and then remained relatively stable after 1994. Prices in the US were stable over time with small fluctuations. In the EU, prices of China, high- and middle-income countries have been decreasing over time. Prices of low-income countries stayed at a low level prior 1997, grew until 2002 after which they stabilised.

The impact of Chinese exports

Table 3 reports the estimated results for the whole sample using all feasible lags of the endogenous variables as instruments (columns 1-3) and those using limited lags for robustness checks (columns 4-6). Hansen J statistics of over-identifying restrictions for all specifications in all tables do not reject the null hypothesis that the instruments are valid. Similarly the difference-in-Hansen test results (not reported in tables because there are many statistics) confirm the exogeneity of the subsets of instruments. The Arellano-Bond test for the second order serial correlations rejects the existence of second-order autocorrelation at the 5 percent level.

Results in columns 1-3 shows that the price of China's exports has a significant but varying impact on the prices of the same products exported from other country groups. The estimated coefficients in the middle- and high-income country exports regressions bear a positive sign suggesting that the prices of China's exports move together with and in the same direction as those of middle- and high-income countries. The magnitude of the estimated coefficients is about three times larger for the middle-income countries than for the high-income countries, indicating greater impacts of China on middle- rather than high-income countries. The estimated coefficient of the Chinese price variable is 0.144 for the middle-income country price equation, suggesting that everything else being equal, a 10 percent increase (or decrease) in China's unit prices will lead to an increase (or decrease) of prices of middle-income countries by 1.44 percent. The estimated coefficient of the China price variable in the low-income countries price equation is negative and significant at the five percent level.

The share of China's exports has a negative effect on the prices of low- and high-income countries. These results indicate that China's export expansion has had a significant competitive pressure on the prices of exports from low- and high-income countries, pushing down the prices of these products. The estimated coefficients of the real effective exchange rate of Chinese yuan are negative and significant in the middle-income country equation. This suggests that an increase in the competitiveness of Chinese exports will generate a significant negative effect on the prices of exports from middle-income countries. China's WTO entry also has had a significant negative effect on the prices of exports from middle-income countries and from high-income countries. Holding other factors constant, the average unit price of the sampled exports from the middle-income countries during the post China-WTO entry period is about 0.08 units lower that before the event; and that for high-income countries is 0.04 units.

Interestingly, the prices of exports of low-income countries appear to be significantly higher after the Asian financial crisis. However, somewhat surprisingly, the average exports price of the middle- and high-income countries does not show significant change after the Crisis. The commodity boom does not have a significant effect on the price of the sampled products probably due to the fact that these products are major exports from China which are mainly labour intensive. Technology intensity appears to have a mixed effect on the unit prices of export products. With the increase in technology intensity, the unit price for exports from low-income countries decreases; while that for exports from middle-income countries increases. Finally, as expected, market demand has demonstrated a robust and significant positive effect on the unit prices of the imported products.

Lagged dependent variables all have a positive and significant estimated coefficient in the corresponding equations, suggesting the significant role of past price level in current price formation. The results in Table 3 also suggest a pattern of price interaction in international markets. The price of middle-income country exports appear to have a significant influence on the export prices of both high- and low- income countries. However, the price of low-income countries affects only the export prices of middle-income countries but not the high-income countries. Similarly, the price of high-income countries exports also only influence the export price of middle-income countries but not that of low-income countries.

Robustness check

Since the sample spans an 18 year period, using System GMM may raise the problem of overfitting because of the large number of instruments. Therefore, for a robustness check, we estimate the models using limited lags as instruments. The estimated results are reported in Columns 4-6 of Table 3. The general conclusion from the robustness check is that the estimated results are in general highly consistent with those of System GMM, suggesting the robustness of the results. This is in particular the case with regard to the impact of China's exports on the export prices of middle-income countries through various transmission mechanisms. The price competition between China's exports and those of low- and high-income countries loses its statistical significance in the robustness check, suggesting China's exports are only in significant price competition with those of middle-income countries. The effect of China's WTO entry on the export price of high-income countries also marginally loses its statistical significance in the robustness check, although maintaining a similar size level. The most robust effect of China WTO entry is again on the prices of middle-income countries. Finally, the magnitude of the estimated coefficient of the income variable is considerably smaller in the robustness check regressions for low-income countries (0.238 vs 0.447). This suggests that, for the same products, the income elasticity of prices for low-income countries exports are on a par with those of middle- and high-income countries rather than about twice as high as those of high-income countries.

Effects by product technology groups

Due to China's comparative advantage, the effect of China's export expansion may have different price effect in different product groups. Our sample is defined by China's top 300 products in the triad markets. It consists of 15 percent resource-based products, 56 percent low-technology products, 12 percent medium- and 17 percent high-technology products. We therefore split the sample into two groups: the resource-based and low-technology sample and the medium-and high-technology sample. For reasons discussed earlier, estimates using limited lags as instruments are superior to the estimates using all available lags as instruments. We therefore only report the estimated results using limited lags as instruments. Table 4 reports the estimated results using limited lags for two sub-samples broke down by the technology-intensity of the products. Columns 1-3 report the results for the resource-based and low-technology product group. The unit price of China's exports appears to have a significant impact on the unit prices of the exports from middle- and high-income countries. The estimated coefficients are positive suggesting they are moving in the same direction. A decrease in the price of China's exports will lead to a decrease in the prices of the same product exported from the middle- and high-income countries; and vice versa. Again, for the exports from the low-income countries, their price does not appear to be in significant price competition with those from China. China's expansion in export market share in the low-technology sector appears to exert a significant downward price pressure on the exports from high-income countries. China's WTO entry also has a significant negative effect on the unit prices of exports from both the middle- and high-income countries. The REER has a negative impact on the export prices of low-income countries, but the estimated coefficient is only marginally significant at the 10 percent level. In sum, in addition to the middle-income countries that have already received wide attention, in the low-technology sector, the exports from high-income countries also appear to be affected by China's exports.

Columns 4-6 report the results for the medium- and high-technology product group. In this sector, China's exports have a significant effect on the prices of exports of middle-income countries through price competition, China's WTO entry and enhancement of competitiveness. Moreover, China's expansion in market share has exerted a negative effect on the prices of exports from low-income countries although it is only significant at the 10 percent level. China does not appear to have any significant influence on the export prices of high-income countries in this sector.

Effects by destination markets

Table 5 reports the estimated results by destination markets taking into account different market structure and dynamics. In Japan, the closest market to China, China's impact is felt by all country groups through different channels. The middle-income countries are in direct price competition with China; their prices are squeezed by China's increasing competitiveness and WTO membership. However, China's market share in the Japanese market appears to be positively associated with their exports prices. Thus in this market it is possible that both China and the middle-income countries are competing with high-income countries in medium- and high-technology sectors when they move up the technology ladder. The withdrawal of high-income exporters also allows them to move up-market and to position products in more price inelastic markets. The high-income countries, as shown above, are affected by China's market expansion and WTO entry, while the low-income countries also feel the competitive pressure of China's increasing competitiveness and WTO entry.

In the EU market, only the middle- and low-income countries are affected by China's exports. China's exports have not generated any significant impact on high-income country exports through any of the four major mechanisms that we analysed in this paper. China's exports are in direct competition with those of middle-income countries. But export prices of low-income countries are moving in a different direction from those of China, suggesting that holding other things constant, they are experiencing a growth in price, whilst the price of China's exports are decreasing. This could be due to technical progress in China, the uniqueness of low-income country products, and some special price treatment to some low-income countries (Special and Differential Treatment) in the EU market.

In the US market, again the prices of low and middle-income countries were most affected by China's exports. The magnitude of the effects is stronger than those in the EU market for middle-income countries. The estimated coefficient of the Chinese price variable is 0.163 in the US market while that in the EU market is 0.083. The direction of the price competition and market expansion effects on low-income countries is different in the US than in the EU markets. In the US market, low-income countries prices move in the same direction as China's exports. China's export expansion has resulted in a negative price pressure as the low-income country exporters participate in price competition in order to defend their market share. Finally, the high-income countries have begun to experience some of the price pressure of China's competitive advantage although the magnitude is very small.

The evolution of the effects over time

In order to investigate whether the effect of China's exports on the prices of exports from other counties evolved over time, we divide the whole sample into two sub-samples, breaking in the late 1990s when China's comparative advantage moving further up the technology ladder. We chose 1997 as the break point, both because it marked the deepening of intensive innovation-based growth in China (Fu and Gong, 2008) and because of the 1997 Asian Financial Crisis's impact on excess capacity in the region. After 1997, there were considerable changes in the competitive advantage of China and its major competitors in Asia. Table 6 reports the estimated results by time period.

The estimated results reveal the evolution of the impact of China's export expansion on the prices of exports of other countries. In general, the price competition effects of China's exports diminish after the late 1990s. For low-income countries, the significant negative impact of both price competition and market lost its significance in the 1998-2006 period. The magnitude of the estimated coefficients also changes from -0.118 to -0.068 and from

-0.047 to -0.021, respectively. Middle-income countries are in price competition in both periods. However, the size of the effect decreased from 0.263 in the early 1990s to 0.105 in the post-1997 period. On the other hand, the effect of China’s increasing competitiveness became significant in the post-1997 period as the estimated coefficient of REER became significantly negative in the post-1997 panel. They also experienced a significant impact following China’s WTO entry. With regard to high-income countries, their prices seem to be decoupled from those of China’s export prices and competitiveness in the post-1997 period. The estimated coefficients of the price competition, market expansion and competitiveness variables were all insignificant in the second period. However, China’s WTO entry seems to have a once-for-all shock on the export prices of the high-income countries, with their average prices falling most in comparison to those of low- and middle-income countries.

V. Conclusions

This paper attempts to examine the impact of China’s exports on the prices of exports from other countries through price competition, supply expansion, WTO membership and real exchange rate evolution. Findings from this study suggest that China’s exports have affected not just those whose competitiveness is largely based on low wages. In fact, the affected countries cover all country groups with varying significance in different products sectors, destination markets and during different time periods. Whereas prior to the late 1990s the prices of low-income countries were most affected by Chinese exports, after 1997, it was the middle-income countries who were most affected by China’s export expansion. The price pressure on middle-income countries of China’s exports is robust across technology groups and markets, and is reflected in all the channels, notably price competition, market expansion, WTO entry and exchange rate depreciation. Moreover, evidences from this study also indicate a price depression effect of China’s exports on high-income countries in low-technology product markets; while that for low-income countries is mainly in the medium- and high-technology sector and is significant in the pre-1997 period.

However, the price competition effects of China's exports, in general, diminish after the late 1990s, particularly for low- and high-income countries. The direct price competition pressure on middle-income countries also reduces. All this suggests changes in the type and nature of competition from China exports. China's impact has evolved from low price competition to other areas probably due to product diversification, quality upgrading and the increase of production costs. However, China's WTO entry had a once-for-all shock on the export prices of the high-income countries, with their average prices fell the most in comparison to those of low and middle-income countries in the post-1997 sample. Nevertheless, we need to be cautious about the results with regard to high-technology products given the important role of processing trade in China's external trade, especially in the high-technology sector where exports on account of processing trade accounted for more than 80-90 percent of China's exports of these products in the 1990s (Fu, 2003). The import content of exports in these products may be much higher than the value-added in China. Therefore, changes in their unit values may considerably understate changes in the price of the part of the unit value that is added in China.

The Japanese market felt the widest and strongest price effect of China's exports through price competition, market expansion, increasing competitiveness and WTO entry. In the EU and US market it was mainly the middle- and the low-income countries that felt China influence. The impact of China's export competition on high-income countries in these two markets is negligible. China's export expansion and WTO entry have both exerted significant price pressure on middle-income country products; which most strongly felt in the Japan market.

How might these price effects change in the future? One possibility is that real wages in China grow as the labour surplus is absorbed and that Chinese firms vacate the lower technology labour-intensive sectors. This will diminish the price impact on low-income countries (which as we have seen has already diminished since the late 1990s) as well as the more recent impact on the price of middle-income economies. At the same time, growing technological capabilities in China allow Chinese firms to make the transition into more technology-intensive sectors, moving China's price impact from the middle-income countries to the high-income economies. On the other hand, there may still be a considerable reserve army of unskilled labour in China's vast interior and western regions, which may allow Chinese firms to continue to compete in the lower technology sectors, even whilst they become more competitive in the high-technology sectors. In these circumstances, pricing pressures will remain for the middle-income competitors. A second possible development is one which in the context of China's historic trade surplus, sees a growing appreciation in China's exchange rate. Given that China's large presence in global markets seems to have had a price-determining impact (see our earlier discussion), this may result in an appreciation in the price of products exports by other countries.

References

Amiti, M. and Freund C., 2008. The Anatomy of China's Export Growth, Policy Research Working Paper Series 4628, The World Bank.

Anderson, T. W. and Hsiao C., 1981. Estimation of Dynamic Models with Error Components, *Journal of the American Statistical Association*, 76, 598-606.

Arellano, M. and Bond S., 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, *The Review of Economic Studies*, 58, 277-97.

Arellano, M. and Bover O., 1995. Another Look at the Instrumental Variable Estimation of Error-components Models, *Journal of Econometrics*, 68, 29-51.

Armington, P.S., 1969. A Theory of Demand for Products Distinguished by Place of Production, International Monetary Fund Staff Papers 16 (1996): 159-176.

Blundell, R. and Bond S., 1998. Initial Conditions and Moment Restrictions in Dynamic Panel Data Models, *Journal of Econometrics*, 87, 115-43.

Borensztein, E. and Reinhart C.M., 1994. The Macroeconomic Determinants of Commodity Prices, Working Paper 94/9, IMF.

Broda, C. and Weinstein D., 2008. Exporting Deflation? Chinese Exports and Japanese Prices, Working Paper Series 2008-29, Federal Reserve Bank of San Francisco.

Cashin, P., McDermott, C.J. and Scott, A., 2002. Booms and slumps in world commodity prices, *Journal of Development Economies*, 69, 277-296.

Cashin, P., Cespedes, L. and Sahay, R., 2004. Commodity currencies and the real exchange rate, *Journal of Development Economics*, 75, 239-268.

Cheung, C. and Morin S., 2007. The Impact of Emerging Asia on Commodity Prices, Bank of Canada Working Paper 2007-55.

Deaton A. and Laroque G., 2003. A Model of Commodity Prices After Sir Arthur Lewis, *Journal of Development Economics*, 71, 289-310.

Eichengreen, B. Rhee Y. and Tong H., 2004. The Impact of China on the Exports of Other Asian Countries, Working Papers 10768, NBER.

Feenstra, R. and Wei S., 2009. *China' Growing Role in World Trade*, The University of Chicago Press, forthcoming.

Fu, X., 2003. *Exports, Foreign Direct Investment and Economic Development in China*, Palgrave Macmillan, London and New York.

Fu, X., 2004. Limited Linkages from Growth Engines and Regional Income Inequalities in China, *Journal of Comparative Economics*, 32, 148-64.

Fu, X. and Gong Y., 2008. Indigenous and Foreign Innovation Efforts and Drivers of Technological Upgrading: Evidence from China, SLPTMD Working Paper, University of Oxford.

Fu, X., Kale, D., and Kaplinsky, R., 2009. The Evolution of Global Manufactures Prices 1989-2006, SLPTMD Working Paper, University of Oxford.

Greene, W. H., 2002. *Econometric Analysis*, 5th ed., Prentice-Hall.

Hausmann, R., Hwang J., and Rodrik D., 2007. What You Export Matters, *Journal of Economic Growth*, 12, 1-25.

Holtz-Eakin, D., Newey W., and Rosen H.S., 1988. Estimating Vector Autoregressions with Panel Data, *Econometrica*, 56, 1371-95.

Hua, P., 1998. On Primary Commodity Prices: The Impact of Macroeconomic / Monetary Shocks, *Journal of Policy Modeling*, 20, 767-90.

Im, K. S., Pesaran, M. H., and Shin Y., 2003. Testing for Unit Roots in Heterogeneous Panels, *Journal of Econometrics*, 115, 53–74.

Kaplinsky, R., 2005, G*lobalisation, Poverty and Inequality: Between a Rock and a Hard Place*, London, Polity Press.

Kaplinsky, R., 2006. Revisiting the Terms of Trade Revisited: Will China Make a Difference? *World Development*, 34, 981-95.

Kaplinsky, R. and Santos-Paulino A., 2006. A Disaggregated Analysis of EU Imports: Implications for the Study of Patterns of Trade and Technology, *Cambridge Journal of Economics*, 30, 587-612.

Kiviet, J. F., 1995. On Bias, Inconsistency, and Efficiency of Various Estimators in Dynamic Panel Data Models, *Journal of Econometrics*, 68, 53-78.

Lai, P., 2004. China's Foreign Trade: Achievements, Determinants and Future Policy Challenges, *China and World Economy*, 12, 38-50.

Lall, S. and Albaladejo M., 2004. China's Competitive Performance: A Threat to East Asian Manufactured Exports? *World Development*, 32, 1441-66.

Lalonde, R., Zhu Z., and Demers F., 2003. Forecasting and Analyzing World Commodity Prices, Working Paper 2003-24, Bank of Canada.

Levin, A., Lin, C. F., and Chu C., 2002. Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties, *Journal of Econometrics*, 108, 1–24.

Maddala, G. S. and Wu S., 1999. A Comparative Study of Unit Root Tests with Panel Data and New Simple Test, *Oxford Bulletin of Economics and Statistics*, 61, 631-52.

Pain, N., Koske I., and Sollie M., 2006. Globalisation and Inflation in the OECD Economies, Working Paper 524, Economic Department, OECD.

Phelps, E. S., 2004. Effects of China's Recent Development in the Rest of the World, *Journal of Policy Modeling*, 26, 903-10.

Roeger, W., 2005. International Oil Price Changes: Impact of Oil Prices on Growth and Inflation in the EU/OECD, *International Economics and Economic Policy*, 2, 15-32.

Rodrik, D., 2006. What's So Special about China's Exports? *China and World Economy*, 14, 1-19.

Roland-Holst, D. and Weiss J., 2005. People's Republic of China and its Neighbours: Evidence on Regional Trade and Investment Effects, *Asian-Pacific Economic Literature*, 19, 18-35.

Schott, P. K., 2002. Across-Product versus Within-Product Specialization in International Trade, mimeo, Yale School of Management.

Silver, M., 2007. Do Unit Value Export, Import, and Terms of Trade Indices Represent or Misrepresent Price Indices? Working Paper 07/127, IMF.

Wang Z. and Wei S., 2008. What Accounts for the Rising Sophistication of China's Exports? Working Paper 13771, NBER.

Windmeijer, F., 2005. A Finite Sample Correction for the Variance of Linear Efficient Two-step GMM Estimators, *Journal of Econometrics*, 126, 25-51.

Fig. 1. Trends of Prices by Market

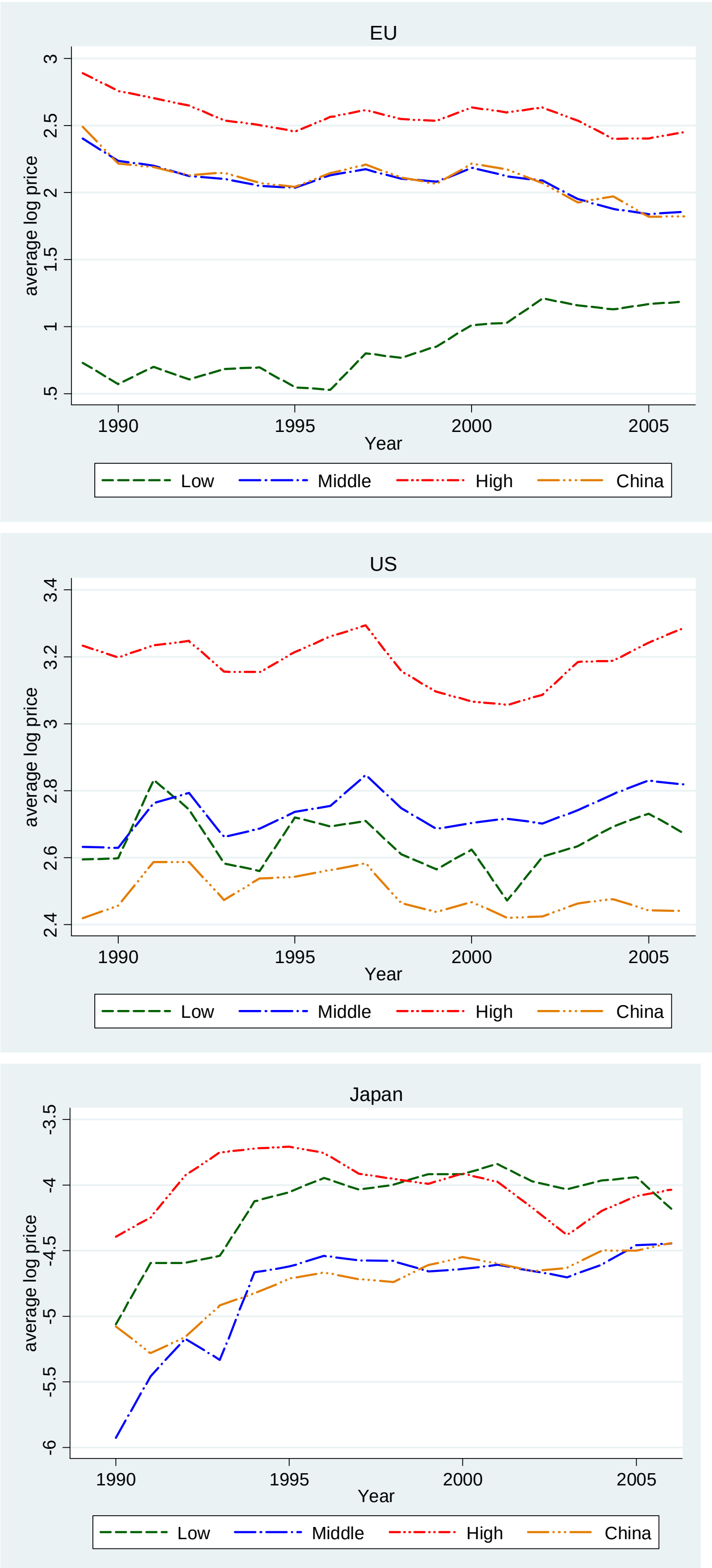

Table 1 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
			Whole Sample		
ln_P_{Low}	8625	-0.038	3.486	-13.841	8.195
ln_P_{Middle}	8625	0.309	3.534	-10.140	8.029
ln_P_{High}	8625	0.843	3.480	-10.837	8.176
ln_P_{China}	8625	0.240	3.547	-11.541	8.485
S_{low}	8625	0.082	0.148	0.000	0.661
S_{Middle}	8625	0.283	0.227	0.000	0.996
S_{High}	8625	0.273	0.269	0.000	0.999
S_{China}	8625	0.362	0.286	0.000	1.000
GDP_{market}	8625	7073.410	2114.569	3082.324	11294.920
E_{China}	8625	97.121	10.074	76.039	145.823
E_{US}	8625	94.031	6.313	85.240	105.648
			EU		
ln_P_{Low}	3570	0.866	2.733	-13.841	8.195
ln_P_{Middle}	3570	2.074	1.236	-2.657	8.029
ln_P_{High}	3570	2.566	1.274	-2.909	7.594
ln_P_{China}	3570	2.087	1.327	-3.711	8.485
S_{low}	3570	0.046	0.080	0.000	0.661
S_{Middle}	3570	0.450	0.170	0.005	0.996
S_{High}	3570	0.237	0.240	0.000	0.987
S_{China}	3570	0.267	0.184	0.000	0.962
GDP_{EU}	3570	7380.200	909.805	5961.384	9208.845
			US		
ln_P_{Low}	2548	2.645	1.882	-3.476	7.060
ln_P_{Middle}	2548	2.744	1.747	-2.864	7.449
ln_P_{High}	2548	3.180	1.806	-1.509	8.176
ln_P_{China}	2548	2.483	1.826	-3.939	7.112
S_{low}	2548	0.044	0.083	1.140E-06	0.491
S_{Middle}	2548	0.244	0.197	2.410E-05	0.920
S_{High}	2548	0.350	0.259	0.001	0.999
S_{China}	2548	0.362	0.287	3.200E-05	0.993
GDP_{US}	2548	9277.977	1325.089	6981.364	11294.920
			Japan		
ln_P_{Low}	2507	-4.050	1.731	-10.759	1.810
ln_P_{Middle}	2507	-4.678	1.536	-10.140	0.671
ln_P_{High}	2507	-3.986	1.711	-10.837	1.955
ln_P_{China}	2507	-4.672	1.814	-11.541	2.151
S_{low}	2507	0.170	0.219	1.280E-08	0.500
S_{Middle}	2507	0.086	0.129	4.670E-07	0.635
S_{High}	2507	0.248	0.300	1.100E-05	0.993
S_{China}	2507	0.496	0.344	4.320E-06	1.000
GDP_{Japan}	2507	4395.914	420.331	3082.324	5123.794

Table 2 Unit Root Test Results (p values)

	Japan		US		EU	
	LLC	IPS	LLC	IPS	LLC	IPS
$\ln Price_{China}$	0.000	0.000	0.000	0.020	0.000	0.033
$\ln Price_{Low}$	0.000	0.000	0.000	0.000	0.000	0.000
$\ln Price_{Middle}$	0.000	0.000	0.000	0.065	0.000	0.087
$\ln Price_{High}$	0.000	0.000	0.000	0.476	0.000	0.000

Note: First order serial correlation is allowed in the errors.

Table 3 GMM Regression Results for the Whole Sample

	GMM			Robustness Check		
	1	2	3	4	5	6
	P_{Low}	P_{Middle}	P_{High}	P_{Low}	P_{Middle}	P_{High}
P_{China}	-0.086	0.144	0.040	-0.052	0.155	0.027
	(0.037)**	(0.000)***	(0.035)**	(0.120)	(0.000)***	(0.162)
S_{China}	-0.037	0.005	-0.022	-0.033	-0.0001	-0.013
	(0.040)**	(0.549)	(0.000)***	(0.028)**	(0.992)	(0.017)**
GDP_{market}	0.447	0.308	0.249	0.238	0.295	0.209
	(0.005)***	(0.000)***	(0.001)***	(0.072)*	(0.001)***	(0.006)***
E_{China}	0.001	-0.003	-0.001	0.000	-0.002	-0.0003
	(0.638)	(0.010)**	(0.421)	(0.746)	(0.014)**	(0.687)
asficrisis	0.055	-0.009	-0.007	0.052	-0.010	-0.012
	(0.063)*	(0.525)	(0.629)	(0.046)**	(0.463)	(0.303)
wto	-0.021	-0.079	-0.047	0.010	-0.070	-0.032
	(0.594)	(0.000)***	(0.040)**	(0.765)	(0.000)***	(0.104)
boom	0.010	0.003	-0.005	-0.004	-0.003	-0.008
	(0.789)	(0.801)	(0.812)	(0.905)	(0.802)	(0.644)
tech	-0.085	0.067	0.014	-0.075	0.068	0.017
	(0.043)**	(0.000)***	(0.200)	(0.056)*	(0.000)***	(0.120)
P_{Low}		0.135	-0.005		0.138	-0.008
		(0.000)***	(0.724)		(0.000)***	(0.576)
L. P_{Low}	0.613			0.611		
	(0.000)***			(0.000)***		
P_{Middle}	0.350		0.122	0.282		0.140
	(0.000)***		(0.000)***	(0.000)***		(0.000)***
L. P_{Middle}		0.615			0.625	
		(0.000)***			(0.000)***	
P_{High}	0.019	0.098		0.083	0.072	
	(0.584)	(0.000)***		(0.015)**	(0.000)***	
L. P_{High}			0.812			0.813
			(0.000)***			(0.000)***
Constant	-4.009	-2.589	-2.061	-2.079	-2.505	-1.755
	(0.007)***	(0.001)***	(0.003)***	(0.093)*	(0.002)***	(0.012)**
Observations	8126	8314	8316	8126	8314	8316
Hansen	616.816	624.807	620.041	434.425	520.626	409.889
	0.350	0.271	0.317	0.128	0.077	0.174
Difference-In-Hansen	Pass	Pass	Pass	Pass	Pass	Pass
AR(2)	1.209	1.804	1.151	1.221	1.788	1.146
	0.227	0.071	0.250	0.222	0.074	0.252

Notes: Robust p values in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%; GMM results are estimated using all available lags of independent price variables as instruments for the first difference equation; Robustness checks use limited lags of independent price variables as instruments for the first difference equation.

Table 4 GMM Regression Results by Technology

	Resource based + Low technology			Medium technology + High technology		
	1	2	3	4	5	6
	P_{Low}	P_{Middle}	P_{High}	P_{Low}	P_{Middle}	P_{High}
P_{China}	-0.055	0.076	0.098	-0.102	0.216	-0.026
	(0.207)	(0.000)***	(0.001)***	(0.151)	(0.002)***	(0.416)
S_{China}	-0.011	0.0005	-0.027	-0.061	-0.004	0.005
	(0.561)	(0.957)	(0.011)**	(0.094)*	(0.832)	(0.647)
GDP_{market}	0.098	0.299	0.269	0.231	0.320	-0.005
	(0.559)	(0.000)***	(0.013)**	(0.499)	(0.107)	(0.977)
E_{China}	-0.002	-0.001	0.0001	0.001	-0.009	-0.003
	(0.094)*	(0.238)	(0.904)	(0.822)	(0.003)***	(0.182)
asficrisis	0.061	-0.017	-0.030	0.133	0.032	0.014
	(0.035)**	(0.243)	(0.066)*	(0.050)**	(0.294)	(0.650)
wto	0.034	-0.065	-0.045	-0.069	-0.097	-0.026
	(0.344)	(0.000)***	(0.081)*	(0.505)	(0.006)***	(0.609)
boom	-0.025	-0.001	0.008	0.142	0.006	-0.056
	(0.449)	(0.943)	(0.674)	(0.090)*	(0.815)	(0.394)
P_{Low}		0.144	0.015		0.084	0.033
		(0.000)***	(0.485)		(0.000)***	(0.040)**
L. P_{Low}	0.620			0.636		
	(0.000)***			(0.000)***		
P_{Middle}	0.362		0.169	0.341		0.078
	(0.000)***		(0.000)***	(0.000)***		(0.026)**
L. P_{Middle}		0.615			0.608	
		(0.000)***			(0.000)***	
P_{High}	0.019	0.157		0.033	0.070	
	(0.670)	(0.000)***		(0.491)	(0.049)**	
L. P_{High}			0.682			0.931
			(0.000)***			(0.000)***
Constant	-0.747	-2.562	-2.238	-2.577	-1.890	0.365
	(0.630)	(0.001)***	(0.024)**	(0.415)	(0.269)	(0.806)
Observations	5960	6061	6063	2166	2253	2253
Hansen	368.767	370.342	363.167	125.607	136.073	131.483
	0.136	0.124	0.186	0.443	0.216	0.306
Difference-In-Hansen	Pass	Pass	Pass	Pass	Pass	Pass
AR(2)	0.744	0.703	0.842	0.989	1.709	0.753
	0.457	0.482	0.400	0.322	0.087	0.452

Notes: Robust p values in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%; Results use limited lags of independent price variables as instruments for the first difference equation.

Table 5 GMM Regression Results by Market

	Japan			EU			US		
	1	2	3	4	5	6	7	8	9
	P_{Low}	P_{Middle}	P_{High}	P_{Low}	P_{Middle}	P_{High}	P_{Low}	P_{Middle}	P_{High}
P_{China}	-0.037	0.077	-0.027	-0.189	0.083	0.007	0.221	0.163	0.024
	(0.252)	(0.012)**	(0.320)	(0.044)**	(0.004)***	(0.804)	(0.025)**	(0.000)***	(0.551)
S_{China}	-0.012	0.054	-0.056	0.031	-0.008	0.015	-0.033	-0.001	0.006
	(0.646)	(0.013)**	(0.003)***	(0.091)*	(0.485)	(0.121)	(0.055)*	(0.903)	(0.388)
GDP_{market}	-0.144	-0.393	0.221	-0.141	-0.033	-0.069	-0.113	0.131	-0.040
	(0.534)	(0.008)***	(0.271)	(0.410)	(0.485)	(0.204)	(0.620)	(0.207)	(0.748)
E_{China}	-0.009	-0.019	-0.003	0.003	-0.0004	0.001	0.001	-0.0003	-0.002
	(0.017)**	(0.000)***	(0.389)	(0.148)	(0.373)	(0.141)	(0.642)	(0.721)	(0.034)**
asficrisis	0.150	0.136	0.007	-0.064	0.016	-0.012	0.036	-0.029	-0.032
	(0.006)***	(0.001)***	(0.881)	(0.105)	(0.120)	(0.385)	(0.449)	(0.183)	(0.268)
wto	-0.210	-0.090	-0.101	0.052	-0.017	0.047	0.122	-0.021	0.0004
	(0.001)***	(0.002)***	(0.045)**	(0.518)	(0.321)	(0.108)	(0.024)**	(0.348)	(0.984)
boom	0.105	0.045	0.003	-0.024	-0.061	-0.033	-0.081	0.032	0.047
	(0.093)*	(0.036)**	(0.950)	(0.700)	(0.000)***	(0.176)	(0.027)**	(0.144)	(0.056)*
tech	0.089	0.101	-0.022	-0.075	0.016	0.096	0.094	0.044	0.003
	(0.095)*	(0.026)**	(0.592)	(0.167)	(0.360)	(0.018)**	(0.061)*	(0.016)**	(0.836)
P_{Low}		0.254	0.001		0.027	0.037		0.033	0.050
		(0.000)***	(0.982)		(0.054)*	(0.001)***		(0.173)	(0.049)**
L. P_{Low}	0.546			0.898			0.348		
	(0.000)***			(0.000)***			(0.000)***		
P_{Middle}	0.342		0.123	0.350		0.398	0.245		0.114
	(0.000)***		(0.001)***	(0.015)**		(0.000)***	(0.068)*		(0.005)***
L. P_{Middle}		0.544			0.590			0.635	
		(0.000)***			(0.000)***			(0.000)***	
P_{High}	0.045	0.058		-0.065	0.253		0.110	0.134	
	(0.154)	(0.022)**		(0.546)	(0.007)***		(0.289)	(0.001)***	
L. P_{High}			0.784			0.504			0.845
			(0.000)***			(0.000)***			(0.000)***
Constant	1.511	4.376	-1.953	1.191	0.276	0.716	0.805	-1.179	0.540
	(0.495)	(0.008)***	(0.329)	(0.456)	(0.519)	(0.170)	(0.684)	(0.202)	(0.641)
Observations	2358	2484	2485	3352	3375	3376	2416	2455	2455
Hansen	181.122	190.563	184.267	195.134	201.816	205.748	139.679	131.185	141.685
	0.421	0.246	0.358	0.224	0.081	0.178	0.159	0.382	0.176
Difference-In-Hansen	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
AR(2)	-1.158	1.525	0.730	1.785	-0.965	1.197	1.565	-0.004	0.195
	0.247	0.127	0.465	0.074	0.334	0.231	0.118	0.997	0.846

Notes: Robust p values in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%; Results use limited lags of independent price variables as instruments for the first difference equation.

Table 6 GMM Regression Results by Time Period

	<=1997			>1997		
	1	2	3	4	5	6
	P_{Low}	P_{Middle}	P_{High}	P_{Low}	P_{Middle}	P_{High}
P_{China}	-0.118 (0.057)*	0.263 (0.000)***	0.068 (0.087)*	-0.068 (0.136)	0.105 (0.000)***	-0.014 (0.564)
S_{China}	-0.047 (0.011)**	0.023 (0.260)	-0.006 (0.517)	-0.021 (0.246)	-0.005 (0.409)	-0.007 (0.323)
GDP_{market}	0.354 (0.088)*	0.359 (0.014)**	0.169 (0.085)*	0.362 (0.090)*	-0.067 (0.423)	0.334 (0.001)***
E_{China}	-0.0003 (0.777)	0.0002 (0.740)	0.001 (0.015)**	0.001 (0.870)	-0.005 (0.013)**	-0.001 (0.647)
tech	-0.103 (0.096)*	0.186 (0.012)**	0.030 (0.073)*	-0.053 (0.094)*	0.033 (0.003)***	0.013 (0.332)
wto				-0.016 (0.697)	-0.032 (0.035)**	-0.064 (0.008)***
boom				-0.024 (0.486)	0.000 (0.966)	-0.004 (0.849)
P_{Low}		0.312 (0.000)***	0.048 (0.006)***		0.055 (0.001)***	-0.006 (0.725)
L. P_{Low}	0.532 (0.000)***			0.708 (0.000)***		
P_{Middle}	0.337 (0.000)***		-0.010 (0.821)	0.291 (0.000)***		0.247 (0.000)***
L. P_{Middle}		0.425 (0.000)***			0.753 (0.000)***	
P_{High}	0.152 (0.035)**	0.017 (0.728)		-0.006 (0.890)	0.106 (0.000)***	
L. P_{High}			0.878 (0.000)***			0.733 (0.000)***
Constant	-3.122 (0.094)*	-3.454 (0.009)***	-1.581 (0.073)*	-3.196 (0.160)	0.944 (0.292)	-2.741 (0.010)**
Observations	3098	3248	3249	5028	5066	5067
Hansen	124.151 0.110	133.702 0.221	107.364 0.222	463.635 0.380	523.194 0.055	502.576 0.105
Difference-In-Hansen	Pass	Pass	Pass	Pass	Pass	Pass
AR(2)	0.794 0.427	1.832 0.067	1.806 0.071	1.043 0.297	-0.504 0.614	-0.188 0.851

Notes: Robust p values in brackets; * significant at 10%; ** significant at 5%; *** significant at 1%; Results use limited lags of independent price variables as instruments for the first difference equation.