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## RMB Exchange Rate and Local Currency Stability

### - a Case of China and ASEAN+2

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#### Abstract

In the paper the degree of price discrimination across destinations has been measured that is associated with the RMB exchange rate changes using China and ASEAN+2 industry data. Local currency stability has been observed both in ASEAN+2 and China. As a result of different initial endowments as well as a government effects, import price over-adjustment has also been observed. Finally, Local currency stability has shown certain asymmetry even though there is not a usual pattern as has been discovered in the US industry data.

**Keyword:** Local Currency Stability    ASEAN+3    RMB Exchange Rate

#### Introduction

RMB appreciation has been the focus of international economics since 2001. There are different views on whether RMB should appreciate or not from the perspectives of economic growth, employment, wages, foreign reserve, trade relationship with USA, Japan and political economics. This paper examines the issue from a different angle: the regional economic cooperation and integration, particularly, to investigate the impacts of change RMB exchange rate on the pricing behaviour of exporters within ASEAN+2 nations and the interactions in the region.

ASEAN+2 has been China's major trade partners since 1990. The trade relationship within ASEAN+3 is a crucial factor that China can hardly ignore. Whether and how manufactures in the region respond to the RMB exchange rate changes becomes interesting question. In late 2004 Eichengreen et al have analyzed the impacts of China's exports on the trade of other Asian countries without considering currency rates. This paper is the first to link the currency rate to the trade directly. The answer to this question is relevant to both the policy makers and practitioners.

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## 1. Analytic Framework

The optimal response of a firm's export price to changes in currency values depends on a variety of factors. These factors operate through two channels: through the impact exchange rates have on marginal cost and through the impact exchange rates have on markups of price over marginal cost. Destination specific adjustment of mark-ups in response to exchange-rate changes have been referred to in the literature as "pricing to market" when the marginal cost adjustment is relatively small comparing to the mark-up response (henceforth PTM) (Krugman 1987). Local currency price stability (LCPS) is defined by Knetter (1993) as the following process: sellers reduce mark-ups to buyers whose currencies have depreciated against the seller, thereby stabilizing prices in the buyer's currency relative to a constant markup policy. The nature of PTM is: while Marshall-Lerner condition is the criteria to examine the sensitivity of demand to exchange rate changes, PTM addresses the sensitivity issue of supply sides to exchange rate changes.

Using panel data, this paper examines the firms' pricing behavior with the variation of the currency. Both China's imports from and exports to ASEAN+2 have been investigated, the industry and country effects have been identified as the major source of LCPS. The government's intervention is also found as a cause. Additionally the firms' pricing behavior has revealed asymmetry with respect to RMB devaluation and appreciation. The rest of the paper has been arranged as the following: first, the model specification, data description and analysis are examined; second, model estimation and analysis are presented in; finally, conclusion and future research suggestion.

## 2. Model Specification and Data Description

### 2.1 Model Specification

The prototype model in this paper follows mainly that introduced in greater details by M.Knetter (1989,1991 and 1993 ), the difference is the estimation approach used in this paper, which will be discussed in the next section.

$$\Delta P_{it} = \alpha_i + \Delta E_{it} + \epsilon_{it} \quad (1)$$

where  $i=1, \dots, N$  and  $t, \dots, T$  index the destination of exports and time respectively, and  $p$  is the log of export price,  $E$  is the log of the destination specific exchange rate expressed as units of the buyer's currency per unit of the seller's currency, divided by the destination market price level, the error term  $\epsilon_{it}$  is assumed to be independently and identically distributed with mean zero and variance  $\sigma^2$ .

$$\Delta X_{it} = \alpha + \beta \Delta E_{it} + \delta_i + v_t + \epsilon_{it} \quad (2)$$

$$\Delta M_{it} = \alpha + \beta \Delta E_{it} + \delta_i + v_t + \epsilon_{it} \quad (3)$$

The adjusted model is specified in equation (2) and (3) where  $\Delta X_{it} \cdot \Delta M_{it}$  is the mark-up of export firms in China and ASEAN+2 respectively;  $\Delta E_{it}$  is the real exchange rate,  $\delta_i$  is fixed effects (FE) when country specific effects are considered.  $v_t$  is the random effects ( RE ) when both country and time variations are taken into accounts,  $\epsilon_{it}$  follows the usual statistic regularities.

The statistical interpretation of  $\beta$  is the following: a value of zero or near zero implies the mark-up to a particular destination is unresponsive to fluctuations in the value of the exporter's currency against the buyer's. Thus the cost as a result of exchange rate changes will be undertaken fully by the buyers in the destination countries, in other word a full pass through effect. Negative  $\beta$  value implies that the mark-up adjustment is related to the sticky local pricing, or LCPS, positive  $\beta$  value implies that the amplification of the effect of destination specific exchange rate changes on local pricing in units of the buyer's currency.

### 2.2 The Data

The data used in this study are based on the annual average exchange rates and prices of exports and imports between China and ASEAN +2 destination countries including Indonesia, Malaysia, Myanmar, Philippine, Singapore, Thailand, Vietnam, Japan and South Korea. <sup>2</sup>

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<sup>2</sup> The other three ASEAN member countries have been excluded from the sample because they do not meet the four criteria discussed in details later. Also all the data are collected primarily from Almanac of China Foreign Economic and Trade currently available from

Four criteria are established when selecting the relevant sample products: the significance in terms of the trade value<sup>3</sup>, the continuity in terms of time horizon and statistics<sup>4</sup>, the comparability<sup>5</sup>, asymmetry in export and import products<sup>6</sup>. Among the four, the comparability criteria reduces the sample size dramatically. A word of caution however is necessary: in order to avoid the sampling biases, the final conclusions need to be checked so that they are not drawn due to this non-random sampling approach.

Finally, the nominal exchange rate is adjusted by dividing by the wholesale price index in the destination markets. The consumer index has been instead used in this study because half of the sampling countries don't have wholesaler index according to *International Financial Statistics*. To maintain the consistency the consumer price index is selected.

### **3. Analysis of the Estimation Results**

The industry effect and country effect are examined first. For each export and import product, FE and RE approaches have been applied to estimate equation (2) and (3). HAUSMAN test is used to evaluate whether RE is preferable to FE. The results are presented in table 1 to table 4<sup>7</sup>. HAUSMAN test statistic in the table 1 is only significant for clothing. Considering the loss of degree of freedom, FE will be used from then on.

Examining the estimated value of  $\beta$ , the evidence is suggestive of important difference in the pricing behavior that are related to different industry and different source country. As for the exports, the coefficients for clothing and soybean are negative, statistically significant at conventional 5%, which implies the LCPS. The coefficients for the other three products are either insignificant or positive. As for imports, the coefficient for copper is statistically significant at 5% level implying the LCPS.

It is hence evident that LCPS is highly related to products' substitute and complementary features. For exports, clothing, soybean are primary goods which are substitutes to the local goods in ASEAN destination countries, while electronic fan, metal grinding machine, refined oil are complementary. The result is consistent with what have been discovered by You, Ouyan and Feng 2004.<sup>8</sup> It is also safe to conclude that China has been upgrading its export level and is now more competitive in manufacture products.

In terms of imports<sup>9</sup>, LCPS is evident for copper but not for paper, eaten vegetable oil or natural rubber. The coefficient for rubber is significant and positive, which indicates when exchanges rate changes, the price will not only adjust accordingly but will over-adjust, we call it import pricing over-adjustment.

Considering the pricing procedure, Chinese government sets different policy for copper and nature rubber with

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1990 to 2003.

<sup>3</sup> We first select top 30 trade products in the region ranked according to the trade value. For the purpose of comparison we then find out how many of them are shared by all the ASEAN +2 countries. Some products may be shared by all the countries, but for certain country the trade values are too insignificant to be considered. Finally we end up with 5 exports and 4 imports which meet the four criteria for all the sample countries.

<sup>4</sup> Although some products are significant in trade values some of the data are missing in a number of years; the continuity of statistics implies the fact that the connotation of certain products are transformed from year to year. For instance, we identify 1995 as a cutting point because over 10 products have been transformed to a different but partially substitutive items. Soybeans is one example: before 1995 there is such an item but after 1995 it is included into a much broader item called beans. The data is used only with proper adjustment.

<sup>5</sup> We try to select products that all the 9 countries have and significant in terms of trade value so that we can compare the LCPS among the countries.

<sup>6</sup> The variation between imports and exports are large we fail to select the same export goods as import goods. Eventually 4 products are selected for China imports from ASEAN+2 and 6 are available for China exports to ASEAN +2.

<sup>7</sup> Results for country effects are available upon request.

<sup>8</sup> In the study all goods traded within ASEAN+3 are classified into two categories: substitute and complementary.

<sup>9</sup> There are only 8 countries in the sample for imports due to the availability of the information.

restriction on copper pricing but not for nature rubber. Consequently copper producers are now very active in hedging at Shanghai Futures Exchange while nature rubber are much silent. What has been discovered may be related to the competitiveness and initial endowments of the two products in the world market. China is not abundant in nature rubber and less competitive in production, the government imposes control through subsidy to prevent import price from unacceptable variation. Subsequently when ASEAN+2 exports to China, there is pricing over-adjustment in nature rubber. We define this phenomenon as “government effect”, which we have not found in other products in the sample.

Finally, whether the LCPS is of any asymmetry between appreciation and depreciation is examined. Year 1997 is selected as a cutting point, before which is a period of RMB devaluation, and after, is a period of real appreciation<sup>10</sup>. The results in table 3 and 4 show there is no symmetry in the pricing behavior. However the fact that the LCPS effect is larger when currency depreciates compared with when it appreciates does not appear, which have been disclosed in other countries such as US.

### Conclusion and Future Research

The method and newly collected data used in this paper allows for the comparison of LCPS according to different dimensions including source countries, destination countries, industries, government effects and direction of exchange rate changes. At a minimum, this paper has shown that foreign producers within ASEAN+2 respond differently in pricing to the change of RMB exchange rate, the different behavior has be quantified by the coefficients  $\beta$ . More importantly, this paper has established several interesting new evidence in the pattern of pricing behavior, which can be used as reference for further research.

Generally speaking when exporting to ASEAN+2, China’s primary goods producers do not vary export prices when the currency rate changes; but the manufacturing producers do. When imports are considered, as for goods that are less competitive, producers in ASEAN+2 will adjust their mark-ups with variation of exchange rates so that the export prices in destination countries will maintain unchanged. Furthermore, the government subsidies on pricing, a sign of less competitiveness in the world market will lead to more flexible for exporters of ASEAN+2 countries in their pricing behavior.

While the fact of asymmetric pricing behavior is evident when RMB exchange rates vary to two opposite directions, there is no convincing evidence to show they, like their American or European counterparties, will adjust their price more when the currency is devalued compared with when the currency is appreciated.

The current research can be improved in the future with both better availability of data and methodology. The trade data released by UN may lead to more products satisfying the requirements. As for the model, more factors may be taken into accounts when the data are available. For example the local substitutive prices and the market concentration may be candidates.

**Table 1 China’s Exports to ASEAN+2(Industry Effects) Estimation of  $\beta$  from Equation (2) with FE&RE**

Industry	$\beta$ (FE)	Standard Error	T statistics
Clothing	-0.3096*	(0.0062)	-4.68
Electronic fan	0.2314	(0.1771)	1.31
Metal Grinding Machine	0.6520*	(0.2672)	2.44
Refined Oil	0.0845	(0.2037)	0.99
Soy Bean	-0.7182	(0.4472)	-1.61

<sup>10</sup> The nominal rates remain unchanged•

Industry	$\beta$ (RE)	Standard Error	Z Statistics	Hausman Test
Clothing	-0.0168	(0.0272)	-0.62	23.5*
Electronic fan	0.0773	(0.0958)	0.81	1.07
Metal Grinding Machine	-0.0224	(0.0833)	-0.27	7.06
Refined Oil	-0.0044	0.02995	-0.15	1.24
Soy Bean	-0.0135	0.1010	-1.34	1.79

Note: \* denotes significant at 5%•

**Table 2 China's Import from ASEAN+2( Industry Effects) Estimation of  $\beta$  from Equation (3) with FE& RE**

Industry	$\beta$	Standard Error	T Statistics	
Eaten vegetable oil	0.0343	0.1286	0.270	
Copper	-0.4147*	0.1448	-2.86	
Paper	0.0568	0.0876	0.65	
Natural Rubber	0.2365*	0.0688	3.44	
Industry	$\beta$	Standard Error	Z Statistics	Hausman Test
Eaten vegetable oil	0.0029	0.0384	0.08	0.07
Copper	-0.0336	0.0445	-0.76	7.65
Paper	0.0279	0.0219	1.27	0.12
Natural Rubber	0.0202	0.01558	1.30	10.42

Note: \*denotes significant at 5%•

**Table 3 The Asymmetry Response to The Change of RMB —Exports**

Industry	$\beta$ (Standard Error) (1990-1996)	$\beta$ (Standard Error) (1997-2002)
Clothing	-0.2884(0.1150)*	0.1348(0.1126)
Electronic fan	0.5620(0.2141)*	-1.017(0.5791)
Metal Grinding Machine	0.7735(0.3168)*	1.1977(0.8589)
Refined Oil	0.1626(0.0752)*	0.1306(0.4406)
Soy Bean	-0.3534(0.1454)*	-1.4412(2.4637)

Note: \*denotes significant at 5%•

**Table 4 The Asymmetry Response to The Change of RMB —Imports**

Industry	$\beta$ (Standard Error) (1990-1996)	$\beta$ (Standard Error) (1997-2002)
Eaten vegetable oil	-0.5852(0.4670)	0.7115(0.4087)
Copper	-1.4533(0.5747)*	-0.3181(0.3696)
Paper	0.1374(0.4340)	-0.0403(0.1963)
Natural Rubber	-0.4839(0.3295)	0.7197•0.1361•*

Note: \*denotes significant at 5%•

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