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Title: China's Exports Expansion: Determinants and Pattern Shifts During 1985 - 2000

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China's Exports Expansion: Determinants and Pattern Shifts During 1985 - 2000

Abstract: The large nominal devaluation of the official exchange rate of RMB in 1994 has been held responsible by some for China's post-1994 export surge and Asian economy crisis in 1997. However, given the existence of dual exchange rate system before 1994, the economically meaningful nominal exchange rate should be a weighted average of the official rate and the swap market rate. Therefore, the 1994 RMB devaluation was insignificant in real effective terms due to the limited depreciation of the economically meaningful nominal exchange rate and high domestic inflation. With an extended imperfect substitutes model intended to capture the evolving process of China's external sector reforms, this paper attempts to demonstrate that, while the competitive effect of devaluation has diminished after 1993, the post-1994 export performance is largely related to institutional factors and structural changes, which are peculiar to China's transitional economy.

1. Introduction

Since 1986, China's exchange rate regime has been characterized by the co-existence of the official exchange rate and the market-determined swap market rate. While the official exchange rate devaluated gradually under a managed floating system, the more depreciated swap market rate was determined in Foreign Exchange Adjustment Centres (FEACs) to facilitate transactions outside the foreign exchange plan. The dual exchange rates were then unified in January 1, 1994, which led to a 50% nominal devaluation of the official exchange rate. This was followed by a robust growth of export value of 32% in 1994 and 23% in 1995. These sequential developments have evoked intense argument on whether and how the devaluation had contributed to the phenomenal export growth. At the onset of the Asian crisis, press reports and some economists even speculated that competition from China might have contributed to the crisis. They have asserted that the devaluation of China's official exchange rate in 1994, and a consequent surge in China's exports in 1994 and 1995, was the first domino in the Asian crisis[1]. However, in a dual exchange rate system, the effective exchange rate received by domestic exporters is a weighted average of the official and swap market rates, with the weight being determined by the size of the foreign exchange retention ratio. Since 80% of foreign exchange

[1] The Economist Nov 22, 1997, p41; The New York Times Feb 3, 1998, p31.

transactions were already conducted at the market-determined swap rate by 1993, devaluation of the official exchange rate might only affect 20% of China's trade transactions. Thus, evaluation based on nominal devaluation of the official exchange rate might have overstated the impact of the dual rate unification on China's export competitiveness. (see Figure 1) Nonetheless, conclusions about the impact of the dual rate unification are made in most studies through implication rather than empirical measurement. Thus, this paper intends to investigate empirically whether the 1994 official rate devaluation has been effective in promoting exports.

[Insert Figure 1 here]

Figure 1 shows the official exchange rate EOFF, swap exchange rate ESWAP and the nominal exchange rate NER. Three observations can be made: firstly, the official exchange rate has since 1985 been gradually devaluated over until 1994; secondly, the widening gap between the two rates corresponded to an overheated economy; thirdly, the nominal exchange rate since 1994 has been fairly stable.

If the 1994 official devaluation was insignificant, China's strong export performance might have stemmed from other aspects of the external sector reforms. Although some literature dealt with the possible contributions to export performance by factors peculiar to China's economy, such as changes in foreign trade policy and foreign trade pattern (World Bank, 1994), they are mostly descriptive in nature. Therefore, a more important objective of this paper is to employ an extended imperfect substitutes model to capture the evolving process of the external sector reforms and to assess empirically the impacts of institutional factors and structural changes on China's exports. The factors and changes included in our models are mainly revealed comparative advantage (RCA), foreign direct investment (FDI), export tax refund, processed imports.

China's outstanding export performance is characterized by the dramatic change in its export structure. As the reforms progressed, China has upgraded its export structure by shifting natural resource-incentive exports to labor-intensive exports. In 1985, labor-intensive exports began to replace natural resource-intensive exports as the most important sector of China's exports. Between 1984 and 1994, the combined share of agricultural and minerals-intensive products in China's exports declined from 49% to 15%, while the share of labor-intensive products increased from 37% to 54% (Naughton 1996). In 1999, the share of natural resource-intensive exports has further declined to less than 10%, while the

share of labor-intensive products has increased to more than 80%. The decline of the resource intensity of China's exports is the result of less distorted prices, progressive decrease of export subsidies and decline in export planning in general. This suggests that the composition of China's exports has changed to reflect China's comparative advantage in labor endowment. Although China's export commodity composition has changed from being mainly composed of primary products to be mainly composed of industrial manufactured goods, the ratio of commodities that are produced with advanced technology remains low. Furthermore, over 90% of current exports of electricity products are in the form of processed exports, implying a relative low domestic value-added. Therefore, China has been making great efforts in promoting the exports of high-tech products and transforming traditional export industrials by exploiting domestic technological components. Incentive measures such as full refund of export tax, export credit and export credit insurance have been provided to support the expansion of the exports of high-tech products.

An important category of export subsidies in China is export tax refund, which has been put into effect since 1985[1]. Initially, this policy was designed to stimulate exports based on processing or assembly activities. Under the Value-added Tax (VAT) refund policy, imports of raw materials and intermediate input for the production of processed exports are exempted from import duty and taxes or eligible to claim full refund after the finished products are exported. The VAT prevailed were 17%, 14% and 6% for three broadly classified commodities[2]. In January 1994, 'zero rating' scheme was introduced, which allowed exporters to claim full refund of the VAT paid on exports. However, motivated by the lucrative profits from the tax refund, export VAT fraud became very serious. The export refund rates were then cut down sequentially to 14%, 10%, 3% in 1995 and 9%, 6%, 3% in 1996 respectively. Since 1998, the refund rates have been increased successively for three times to encourage exports in the wake of the Asian financial crisis. Until 1999, refund rates have been raised to the full refund level for almost all exports.

[1] Prior to 1994, China imposed four kinds of taxes on exports: product tax, value-added tax (VAT), industrial & commercial unified tax and special GST. From Jan 1994, all these taxes were unified as VAT and GST. GST is negligible (3%) in compared with VAT and is therefore excluded from our discussion.

[2] The VAT rate is 6% for goods purchased from small scale taxpayers, 13% for 1) grain, edible oil; 2) coal, gas, water; 3) fertilizer, forage, agricultural film, agricultural machine, pesticide and 17% for all the rest taxable commodities.

Under the "protected export promotion" trade regime, which is an outward-oriented strategy and based on the "infant exporter" argument, China's objective is to promote import substitution in order to develop new exports (World Bank 1994). The strategy also stimulates imports of raw materials, intermediate inputs and machinery for the production of exports. Since the mid 1980's, China's export has increasingly involved processing and assembly activities, which are highly dependent on imported raw materials and intermediate goods as the inputs for production. The scheme of "processed with supplied/imported materials" designed to facilitate exports based on processed or assembly activities established in 1984 entitles local enterprises to import free of duty on all raw materials that they use to manufacture exports.

In addition to the reform of exchange rate regime and foreign trade, the policy to attract FDI is also an important component of China's outward-oriented economic reform. The first wave of FDI inflow occurred in the second half of 1980s, due to the strategy of developing an export-oriented economy in the coastal region by concentrating FDI in the manufacturing sectors. In response to Deng Xiaoping's Southern China Tour, China's inward FDI increased tremendously and the amount of FDI utilized in 1992 reached $11 billion. With the further liberalization and rapid proliferation of open economic zones, China has become the largest recipient of FDI among the developing world and globally the second only to the U.S. since 1993.

Over the last two decades, China's external sector reforms in the foreign exchange regime reform and foreign trade regime have resulted in a progressive transformation of China's foreign trade structure to become one whose basic operation is more comparable to the foreign trade systems of developing market economies (World Bank 1994). The structural transformation includes 1) the increasing processing and assembly activities involved in exports; 2) the dominance of labor-intensive products in China's export pattern; and 3) the substantial increase in the FDI inflow, which is basically used in outward-oriented foreign trade activities. These institutional changes and the induced structural transformation are both expected to have some influences on the export behavior.

2. Literature Review

Different from the fundamental foreign trade theory - Marshllian demand theory, the imperfect substitutes model estimates the demand and supply side in a system context. It has become the standard approach to specifying and estimating trade equations, and also

the most commonly used model in the empirical trade literature. The key underlying assumption for the imperfect substitutes model is that neither imports nor exports are perfect substitutes for domestic goods, i.e., there are price differences for the "same" product in different countries (Goldstein et. al, 1985; Rose, 1991). However, estimating the demand and supply function alone will lead to the simultaneous equation bias given the simultaneous relationship between quantities and prices in such a model. It is therefore a common practice to solve for and estimate the reduced-form equation in empirical research. An example of the reduced-form export and import equations in the imperfect substitutes model can be found in Cerra et. al (1999).

A devaluation can only accomplish the task of promoting export growth if, in the first place, it translates into a real devaluation and, secondly, if trade flows respond to relative prices in a significant and predictable manner. In the case of China, contrary conclusions were found among the empirical works. Cerra et. al (1999) finds that, depreciation of the real effective rate serves to improve China's export volume and decrease import volume in the long run. In contrast, empirical works by Radelet et. al (1998) and Fernald et. al (1999) find no evidence that the 1994 devaluation led to the strong export performance of China in 1994 and 1995, and neither did it exert significant impacts on the export performance of other Asian economies. These seemingly contrary results may invite amendments to the general imperfect substitutes model to adapt to the peculiar foreign trade behavior of China.

The theory of comparative advantages is used to predict the pattern of trade between countries. Specifically, it states that the country will export goods which use intensively its relatively abundant factors, and import goods that use factors with which it is relatively poor endowed. Alternatively, a country will export those goods for which it has a comparative advantage and import those for which it has a comparative disadvantage. In a survey of trade theories by Deardorff (1984), he finds that most models agree that comparative advantage, or the structure of relative autarky prices[1], is the proximate determinant of the pattern of commodity trade. Whatever may be the relationship between trade and relative autarky prices of certain goods implied by the law of comparative advantage, a similar or at least easily derivable relationship should exist between trade and the characteristics of the goods. However, the theory of comparative advantage does not imply any deterministic relationship between trade volume and its determinants of

[1] Autarky price is the price of export which has the lowest relative cost.

comparative advantage. Nonetheless many find such a relationship to be so plausible that they assume it anyway as the basis for empirical work. Balassa (1965), for example, uses indices of export performance as a way of "revealing" comparative advantage. Many investigations that have run regressions of trade on the proposed determinants of comparative advantages have been relatively successful. In fact, the results of the large body of literature are too strong and consistent to be dismissed (MacDougall 1951, Baldwin 1971).

From a micro perspective, Rauch (1991) builds a functional relationship between the comparative advantage and the volume of trade. Adopting the continuum-of-goods Ricardian model (Dornbusch et al. 1977), Rauch (1991) indexes goods to get the degree of comparative advantage and uses this index as regressors. The model generates a positive relationship between home country comparative advantage and the volume of its net exports.

One aspect of foreign direct investment that has been studied intensively is the linkage between the FDI inflow and the host country's trade flows. Exploring the effects of FDI on trade flows between Latin American countries and Southeast Asian countries with the United States and Japan, Goldberg et. al (1997) finds that FDI into developing countries have significant effects on their trade flows with industrialized countries. Thus, this paper shows that FDI may set the stage for export promotion, import substitution, or greater trade in intermediate inputs, especially between parent and affiliate producers. However, different views are held on the FDI-foreign trade relationship with respect to China. Zhang et. al (1995) claims that FDI inflows not only have significant impact on China's exports, but also result in the shift of China's exports from primary products to labor-intensive manufactured products. In spite of the concentration of FDI in export processing operations, Cerra et. al (1999) finds that FDI into China is positively related to imports, while it has no significant effects on export. This may suggest that FDI inflow primarily finance imports of capital and intermediate goods used in the production of processed exports, and may thereby only have indirect effects on export. In addition, the causality between FDI and export of a host country has also been long recognized in literature. Investigating the causal link between FDI inflow and China's exports, Zhang et. al (2001) suggests that potential exports or exports attracts FDI at an early stage of development, but the direction is reversed at a later stage when the FDI has turned potential into real export growth. The role of FDI in promoting China's provincial exports is also confirmed in Zhang et. al (2000).

If export VAT is subject to full refund, the imposition of VAT would have no effect on prices of exports. Yet in reality full refund is rarely achieved, and refund rates are adjusted from time to time. An increase in the refund rates not matched by an equal increase in the VAT rates amounts to providing export subsidy to exporters. In this sense, refund of VAT is regarded as an export incentive. Equalizing the nominal rate of protection of exports to the rate of export subsidy or tax, Balassa et. al (1982) uses the concept of the nominal rate of subsidy to gauge the incidence of protective measures on export product quantity in a range of incentives. The practice of using export subsidies such as tax incentives to encourage exports relies on the premise that such policies are likely to be effective at stimulating exports. To date, this premise has had limited empirical foundation. Based on a non-quantitative discussion, Salant (1964) suggests a negative relationship between the value added tax and the US exports as well as net balance of payments. Among studies investigating the relationship between export subsidies and export expansion, only a few have justified that export subsidies could achieve a certain level of export expansion. Balassa et. al (1982) compares eleven semi-industrial economies for the effects of the system of incentives on the growth of exports, and confirms the existence of positive relationship between export incentives and export growth for several countries. Conversely, Nogues (1989) evaluates the case of Latin America based on a review of a large body of evidence and argues that, in the absence of policy supports including a liberal trade regime and stable real exchange rate, export subsidization will not lead to higher export growth.

3. Theoretical Framework and Methodology

With the imperfect substitute model as the underlying theoretical framework, two models respectively for total exports, manufactured exports are extended to capture the evolving process of the external sector reforms in terms of institutional factors and structural changes. These factors have been, more or less, related to China's foreign trade performance descriptively in existing literature. However, our study would be the first to investigate empirically their effects on China's export behavior. The model for manufactured exports is developed to shed some light on these fastest growing subsets of trading activities.

Following Cerra et. al (1999), the demand and supply side will be integrated to produce a reduced-form equation, so as to avoid the simultaneous bias induced by estimating the supply function and demand function separately.

The world demand for China's exports is specified as a function of world income and the export relative price defined as the ratio of China's export price to the world price level. Expressing in logarithm term, the export demand equation is specified as

$$\ln EXPORT^d = a_1 \ln\left[\frac{P_{xw}(\$)}{P_x(Y)} \times NER\right] + c_1 \ln DF \qquad (1)$$

where $a_1 > 0,\ c_1 > 0$

EXPORT: Export volume, with super-scripts "d", and "s" (used in supply equation) denoting demand and supply respectively.

NER : The nominal exchange rate as a weighted average of the official and swap rates.

$P_x(Y)$: Yuan-based price index for China's exports

$P_{xw}(\$)$: U.S. dollar-based price index for products competing with Chinese exports in the world market

DF : Real world income approximated by of trade partners' total imports.

The supply of exports is specified as a function of the ratio of export prices to domestic prices for alternative goods, and a variable that gauge the capacity of the economy to produce for the export market.

$$\ln EXPORT^s = b_1 \ln\left[\frac{P_x(Y)}{RPI}\right] + d_1 \ln OUTPUT \qquad (2)$$

where $b_1 > 0,\ d_1 > 0$

RPI : China's price index, approximated by Yuan-based retail price index

OUTPUT: Domestic production capacity index, approximated by real industrial production.

Using the fact that $P_x(\$) = P_x(Y) / NER$, equation (1) and (2) can be rewritten as (3) and (4), respectively.

$$\ln EXPORT^d = a_1 \ln P_{xw}(\$) - a_1 \ln P_x(\$) + c_1 \ln DF \qquad (3)$$

$$\ln EXPORT^s = b_1 \ln P_x(\$) + b_1 \ln\left[\frac{NER}{RPI}\right] + d_1 \ln OUTPUT \qquad (4)$$

By assuming an equilibrium condition for $EXPORT^d$ and $EXPORT^s$, i.e., $EXPORT^d = EXPORT^s = EXPORT$, solve (5) and (6) simultaneously for $\ln P_x(\$)$.

$$(a_1 + b_1)\ln P_x(\$) = a_1 \ln P_{xw}(\$) - b_1 \ln\left[\frac{NER}{RPI}\right] + c_1 \ln DF - d_1 \ln OUTPUT \quad (5)$$

$$\ln P_x(\$) = \frac{a_1}{a_1 + b_1}\ln P_{xw}(\$) - \frac{b_1}{a_1 + b_1}\ln\left[\frac{NER}{RPI}\right] + \frac{c_1}{a_1 + b_1}\ln DF - \frac{d_1}{a_1 + b_1}\ln OUTPUT \quad (6)$$

Substitute equation (6) into equation (3) and solve for $\ln EXPORT$, we have

$$\begin{aligned}\ln EXPORT &= -\frac{a_1^{\,2}}{a_1 + b_1}\ln P_{xw}(\$) + \frac{a_1 b_1}{a_1 + b_1}\ln\left[\frac{NER}{RPI}\right] + \frac{a_1 c_1}{a_1 + b_1}\ln DF + \frac{a_1 d_1}{a_1 + b_1}\ln OUTPUT \\ &\quad + a_1 \ln P_{xw}(\$) + c_1 \ln DF \\ &= \frac{a_1 b_1}{a_1 + b_1}\ln P_{xw}(\$) + \frac{a_1 b_1}{a_1 + b_1}\ln\left[\frac{NER}{RPI}\right] + \frac{b_1 c_1}{a_1 + b_1}\ln DF + \frac{a_1 d_1}{a_1 + b_1}\ln OUTPUT \\ &= \frac{a_1 b_1}{a_1 + b_1}\ln\left[\frac{P_{xw}(\$)}{RPI} \times NER\right] + \frac{b_1 c_1}{a_1 + b_1}\ln DF + \frac{a_1 d_1}{a_1 + b_1}\ln OUTPUT \end{aligned} \quad (7)$$

Equation (7) is the reduced form export equation. It contains a relative price term $P_{xw}(\$) \times NER / RPI$, where prices of products competing with China's exports $P_{xw}(\$)$ can be approximated by consumer prices index expressed in U.S. dollars, say $CPI(\$)$. The relative prices term in equation (7) can then be expressed as $(CPI(\$) \times NER / RPI)$, which in turn can be approximated by an index of real exchange rate (*RER*). Hence, the reduced export equation becomes

$$\ln EXPORT = \frac{a_1 b_1}{a_1 + b_1}\ln RER + \frac{b_1 c_1}{a_1 + b_1}\ln DF + \frac{a_1 d_1}{a_1 + b_1}\ln OUTPUT \quad (8)$$

Replacing *RER* by the export-weighted real effective exchange rate *EREER*, "ln" by "*L*", and adding a constant, the export equation can be expressed as

$$LEXPORT = \alpha_0 + \alpha_1 LEREER + \alpha_2 LDF + \alpha_3 LOUTPUT \quad (9)$$

where $\alpha_1 > 0$, $\alpha_2 > 0$, $\alpha_3 > 0$.

Since the coefficient α_1 is positive, an increase in *LEREER* that indicates a depreciation of the real effective exchange rate will increase export volume.

To obtain an extended model to capture institutional factors and structural changes in China's export sector, several variables are added. Firstly, FDI is included because of the vast empirical evidence on the relationship between FDI and host country's export volume.

Secondly, though export structural transformation has been widely referred to as an important source for China's export growth, its association with export performance has not been quantitatively studied so far. Thus, revealed comparative advantage at labor-intensive exports will be incorporated into the export model to feature the export structural changes. Labor-intensive exports will be further divided into two subsets, namely, skilled labor-intensive exports and unskilled labor-intensive exports in the manufactured export equation. Thirdly, another variable that characterizes China's export structure is processed imports, which is constituted of raw materials and intermediate inputs used in the production of processed exports. Lastly, the institutional factor stemmed from the export fiscal subsidization is identified as net export VAT rate. The extended equation for exports is therefore given as

$$LEXPORT = \lambda_0 + \lambda_1 LEREER + \lambda_2 LDF + \lambda_3 LOUTPUT + \lambda_4 LRCA + \lambda_5 LNVAT + \lambda_6 LPROCIMPORT + \lambda_7 LFDI + \varepsilon_1 \quad (10)$$

where LRCA, LNVAT, LPROCIMPORT and LFDI denote the logarithm of reveal comparative advantages, net VAT rate, processed imports and FDI inflow respectively.

The specification of manufactured export is

$$LMEXPORT = \lambda_0 + \lambda_1 LEREER + \lambda_2 LDF + \lambda_3 LOUTPUT + \lambda_4 LRCASKILLED + LRCAUNSKILLED + \lambda_5 LNVATM + \lambda_6 LPROCIMPORT + \lambda_7 LFDI + \varepsilon_1 \quad (11)$$

The labor-intensive export is broken down into the skilled and unskilled labor-intensive exports, with their RCA in the manufactured exports represented by RCASKILLED and RCAUNSKILLED respectively. And the NVAT is replaced by NVATM that covers exports under manufacturing only.

4. Empirical Results and Discussion

Data for this study comes from multiple sources, with International Financial Statistics (IFS), Datastream and CEIC as the main sources. The sample period ranges from 1985q1 to 2000q4. Quarterly data is used to avoid small sample bias. All volume series are transformed to volume index with 1995 as the base year. In addition, seasonal dummies are added to deseasonalize the export and import volume series.

Constrained by the availability of data,. two kinds of data manipulation (smoothening and interpolation) are also used to construct proxies for several variables. For example, some quarterly series are derived from monthly series by averaging the 3 monthly observations. In addition, quarterly series were constructed for some variables by taking interpolations between annual observations (Gujarati 1995).

To avoid running spurious regression, Engle-Granger procedure is adopted to estimate the cointegrating regression. The estimation began by testing the time-series properties of the series, i.e., using Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests to testify whether the series are integrated of the same order. The unit root tests are conducted with Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) as criteria for the length of lags. Table 1 reports the results of unit roots tests.

[Insert Table 1 here]

The results on two series are inconclusive. The ADF test results suggest the presence of unit root in all series. However, the null of unit root is rejected at 5% significance level in the PP test for series LIREER and LPROCEXPORT, indicating nonstationarity. In this circumstance, we are unable to conclude that all series are stationary in their levels. However the first difference of each variable is clearly stationary, thus it is appropriate to assume that all serials are I(1) and to proceed with cointegrating regression.

After testing the stationarity of all series, we then carry out the cointegrating regression employing the Engle-Granger approach. OLS regressions are carried out on two equations: total exports (EX) and manufactured exports (MEX).

Given the change in China's foreign trade policy in the late 1980s and early 1990s, structural change might occur during the sample period. The existence of structural breaks implies that the constancy of the estimated model and its parameters may only exist within separated sub-sample periods. In this case, simply estimating the model over the entire sample period would lead to unstable results and invalidate the model. To examine whether the reforms undertaken during 1988 to 1993 had changed the relationship between trade volumes and the explanatory variables, tests of the parameter constancy based on recursive estimation is performed. Both Chew test and recursive regression results strongly indicate instability in the parameter of the equation. More specifically, the evidence of Chow's breakpoint test confirms that, a structural break occurred in 1993q1 both in Equation EX

and Equation MEX. This separation point falls in the period from 1992 to 1995, during which period the mandatory export planning was abolished and the scope of export controls was sharply reduced. In addition, further measures of liberalizing the foreign exchange market were employed at the end of 1992. Firstly, the number of authorized local FEACs had been substantially increased by end of 1992, which then increase the mobility of interregional foreign exchange movement. Secondly, all enterprises, not only foreign-invested enterprises but also state-owned and collectively owned enterprises were granted to purchase foreign exchange from FEACs.

Based on the breakpoint identified, both Equation EX and Equation MME are estimated over two sample periods, i.e., EX01 and MEX01 over 1985q1 to1992q4, and EX02 and MEX02 over 1993q1 to 2000q4. The estimation results of the OLS regression for the full sample period and the two sub-sample periods are presented in Table 2. Examination of parameter constancy using recursive method confirms that the vast majority of these residuals lie within their anticipated 95% confidence intervals. The adjusted R^2 for the eight equations are relatively high, indicating very good fit. Moreover, variables of all these equations are of correct sign and significant, though some are significant at 10% to 15% level. The system diagnostics test for serial correlation is carried out using LM test. The null of no serial correlation cannot be rejected except for EX02. Given the high adjusted R^2 of these three equations, the serial correlation detected is essentially a sample phenomenon. Although all series are integrated of the order 1, to avoid estimating spurious regression, we need to go further to check the stationarity of the residuals of these regressions. Since all residual series are stationary as indicated by ADF and PP test, we confirm that there are stable long-run relationships between these variables.

[Insert Table 2 here]

Having obtained the long-term equilibrium relationship, we can derive the Error Correction Model (ECM) to gauge the disequilibrium in long–run cointegrating regression. Following the Henry's general-to-specific modeling approach in the estimation of ECM, we start with the most general models with several regressors, and then sequentially test and whittle them down, which are evaluated against their goodness of fit and diagnostic test results. The estimation results of ECM are presented in Table 3. The results show that all variables are significant. For all the first-difference regression, the adjusted R^2 are quite high. More importantly, all the error correction terms fall within the range (-1, 0), and are

highly significant except for equation MEX01, where the error correction term is at 16% significance level. Nevertheless, the ECM estimation reinforces the belief that cointegration exists.

[Insert Table 3 here]

One of the main objectives of the export equation is to evaluate the effect of the unification of dual exchange rates in 1994 on China's export performance.

[Insert Figure 2 here]

Figure 2 enables a comparison among the RPI, nominal exchange rate NER and real exchange rate RER against US dollar. As can be seen, both the nominal and real exchange rates have accomplished vast depreciation before mid-1993, and reverse themselves to appreciate from then on. The January 1994 devaluation is barely a blip in the upward trend from the third quarter of 1993 to the forth quarter of 1996, and both NER and RER get back to their track immediately after the shock. To explain this phenomenon, we should refer to the RPI curve. The unification of the two rates indeed took place at a time of rapidly increasing inflation in China. During the overheating period from 1993 to 1996, the retail price index has increased by 66.7%. Including the price factor allows us to see that, the extremely rapid depreciation occurred in the first quarter of 1993 rather than the first quarter of 1994, and the historical high of the real exchange rate is reached in the second quarter of 1993. After the 1994 unification, given the stable nominal exchange rate, the substantial inflation then resulted in the continuous appreciation in real exchange rate. From end of 1997, as the inflation has been curtailed and even reversed later on, the trend of real exchange rate has been reversed from appreciation to depreciation.

Having discussed the behavior of real effective exchange rate, we can now explain the role of LEREER in the export equations. Evidently, the separated regressions EX01 and EX02 return much better estimation results than the full sample regression EX does. This verifies the validity to examine China's foreign trade behavior at segmented stages. The result of Equation EX01 suggests that, the effect of real depreciation on exports is positive and significant during first quarter of 1985 to the fourth quarter of 1992. The export elasticity with respect to LEREER is 0.425, suggesting that export is fairly sensitive to changes in the real effective exchange rate. In comparison to the estimation of about 0.3 in

Cerra et. al (1999), the LEREER elasticity for total exports in our studies is somewhat higher. The difference may be due to the different regression period segmentation involved. However, the result is comparable to an estimation of industrial country demand for exports from Asia by Reinhart (1995), where the corresponding elasticity is about 0.4.

Next, for Equation EX02, the coefficient on LEREER is statistically insignificant, indicating a clear shift on this parameter. This could be explained by the peculiar trend of real effective exchange rate after 1993. From mid-1993 to end of 1996, the real effective exchange rate has been gradually appreciated, largely attributed to the prevalence of high domestic inflation. Hence, the real effect of the 1994 RMB devaluation has been eroded by the real appreciation experienced during that period. From 1997 onwards, as foreshadow of the Asia crisis, inflation has been curtailed and gradually reversed, which has led to slight depreciation of the real effective exchange rate. Therefore, the effects, if any, exerted by exchange rate in the appreciation period is likely to be offset by the effects arising from the depreciation period.

The results of manufactured export equations (MEX01 and MEX02) reinforce our argument. The LEREER elasticity for manufactured exports is also positive and significant in model MEX01, but negative and insignificant in model MEX02. Compared with model EX01, the coefficient on LEREER of model MEX01 is much lower (0.285) and only significant at 15%.

Next, the results show that the export volume during the overall period is responsive to world real income. In all the specifications of total exports and manufactured exports, the income elasticities are of correct sign and statistically significant. For total exports, the estimated income elasticity is about 0.683 and 0.699 respectively, comparable to the estimate of about unity obtained by Brender (1992), but significantly lower than the estimate of about 2 obtained by Cerra et. al (1999). The discrepancy between our estimate and that of Cerra et. al (1999) could be due to the inclusion of more explanatory variables in our export equations. Both total export equation and manufactured export equation have a higher world demand coefficient in the second sub-sample period. This shift can be attributed to the liberalization of mandatory export planning and export controls taking place during 1992 to 1995, which enabled China's exporters to be more sensitive to variations in external demand. In comparison, the LDF coefficients in MEX02 is higher than that in EX02, indicating that manufactured exports have become more responsive to external demand factor than total exports. This could be due to the fact that non-manufactured exports are largely composed of primary products such as agriculture

products and raw materials, which are relative scarce endowment in China and thus subject to rigid export control.

The coefficient on LRCA in the equation EX01 is 0.520, suggesting that China's comparative advantage in labor-intensive exports is positively correlated to the total export volume. However, the variable becomes insignificant in equation EX02, indicating that the comparative advantage in labor-intensive exports doesn't make obvious contribution to China's total export after 1993. While the result of the first sub-sample period regression meets well with most descriptive analysis, the obvious shift in the coefficient seems to be paradoxical. The picture would be clearer if we refer to the results of manufactured exports. To be more precise, labor-intensive exports is divided into two categories, skilled labor-intensive exports and unskilled labor-intensive exports, according to the skills embodied. The coefficient on LRCAUNSKILLED is 1.67 in equation MEX01 in the second sub-sample period, smaller than that in the first sub-sample period, possibly suggesting the losing effectiveness in comparative advantages in labor. A tentative explanation can be derived by taking a look at the foreign trade trend over the last two decades. The largest component of China's manufactured exports is the unskilled labor-intensive exports, mainly comprised of textiles and clothing. However, despite being tax favored, the importance of textiles and clothing in the manufactured exports has been declined. This is primarily because of relatively low income elasticity and import restrictions in industrial countries. On the other hand, there is a new global glut in labor-intensive manufactured exports, precisely the kind of exports that fueled East Asia's growth in the past generation. Such a glut leads to slower export earnings and declining terms of trade for exports such as apparel, footware and consumer electronics (Radelet et. al 1998). The story of China's evolving export structure is more complex, however, than the above might suggest because of the role of skilled labor-intensive exports. LRCASKILLED has positive though small impacts on manufactured exports during the first sub-sample period, while being insignificant in the period after 1993. Despite of the rapid growth of this export sector, it has relied primarily on the explosion of assembly operations, which accounts for the major export activities in Asia. The rapid growth in electronics production in Asia probably created excess productive capacity and contributed to the decline in prices, which would in turn affect the growth of China's skilled labor-intensive exports. This provides a plausible explanation for the relatively small contribution of LRCASKILLED to manufactured exports prior to 1993, and its ineffectiveness in promoting manufactured exports after 1993.

The second variable that has rarely been quantitatively analyzed otherwise is processed imports. The magnitude of its coefficient is 0.60 for total exports and 0.72 for manufactured exports during the second sub-sample period. The relatively large coefficients indicate that, over the majority of 1990s, growth in processed imports have directly led to export expansion. The coefficient in manufactured export equation is higher, as manufactured exports are mainly constituted of processed trade, under which the imported inputs and components enjoyed enormous duty free and the minimum administrative interference. The positive effects of China's imports on exports are indeed confirmed in Liu et. al (1997). The coefficient is not significant in the first sub-sample period, possibly due to the relative small percentage of processing and assembly activities in the foreign trade sector before 1990s.

The evidence of net export tax variable LNVAT and LNVATM prove that the export tax refund serves as an export incentive. Compared with LNVAT, the coefficient on LNVATM is much lower in magnitude. The result is also expectable because the majority of manufactured exports are processed exports, which are exempted from VAT and thereby not eligible to VAT refund. As can be seen, in both export and manufactured export equation, the coefficients are higher in the first sub-sample period, suggesting that the effectiveness of export tax refund as an export subsidy has been declining. However, interpreting these results may require extra attention because it some form of bias may be introduced in data interpolation for the series LNVAT and LNVATM.

With respect to FDI inflow, it is incorrectly signed in the first sub-sample period, while exerts positive though relatively small effects (0.212) on the export volume in the second sub-sample period. This indicates that FDI has not become a driving force for the export expansion before 1993, due to the relatively small amount of FDI inflow. Starting in 1992, foreign direct investment moved onto a higher plane. These findings prove that, the policy of enhancing export through attracting FDI has been one of the reasons behind China's superior export performance for the last decade. Our results to some extent confirm the widely held belief of the export promotion effects of FDI in recent studies of China, for example Zhang et. al (1995), Zhang et. al (2000) and Zhang et. al (2001). However, the corresponding results for manufactured export regressions show that FDI does not exhibit positive effects over the entire period. Although the effects of LFDI may be overshadowed due to its multicollinearity with LPROCIMPORT, the coefficient on FDI is still insignificant by dropping off LPROCIMPORT from estimation, but the coefficient on

LPROCIMPORT is still stable no matter LFDI is included in the estimation or not. This may suggest that FDI is not so influential in export expansion as is widely believed.

The only variable that deviates absolutely from our hypothesis is LOUTPUT. As has been established in the theoretical framework, the domestic production capacity variable — industrial output would be expected to have a positive relationship with export supply. However, our result seems to contradict this hypothesis, as the coefficient on industrial output is incorrectly signed or insignificant for the overall period. This result is consistent with the estimation of Cerra et. al (1999). Although it suggests that, output gap defined as the difference between actual and potential output may capture the cyclical influence of productive capacity utilization in the short run, the potential output data is not available. Therefore, the variable LOUTPUT is excluded from our estimation.

5. Policy Implication and Conclusion

Since the Chinese economy has experienced drastic changes in institutions and policies during the period under investigation, it is not surprising that structural shifts are detected. The break point is identified as the first quarter of 1993, due to the liberalization of the mandatory export planning scheme, the foreign exchange scheme and the rigid domestic price scheme. Changes in the export behavior in the two sub-sample periods imply changing roles of the foreign trade determinants.

Total exports and manufactured exports are found to be responsive to changes in the real effective exchange rate before 1993. However, such a competitive effect has diminished in the second period. The reason is twofold: First, the real effective rate has been maintained relatively stable after the 1994 unification. In particular, the high inflation from 1993 through 1996 has eroded real effect of the devaluation. Our results confirm that the 1994 dual rate unification is neither the cause of China's post-1994 export surge, nor the first domino in the Asian economy crisis. Second, given the high import content of China's export during this period, most competitive effects of depreciation will be neutralized by the indirect effects on exports through increases in the import cost. Similarly, the results seem to be consistent with the observation that China's policy towards a stable RMB during Asian economy crisis has not significantly deteriorated China's export competitiveness as was speculated. In comparison, external demand has been very important in determining the export performance over the full sample period.

Another important finding is the important role played by processed trade and comparative advantage. The scheme of processing with imported/supplied materials has been enormously successful in encouraging processed exports, which has become the main driving force of China's export growth, especially during the second sub-sample period. Over-expansion of the processing activities in exports will however deteriorate the effectiveness of utilizing comparative advantage to promote exports. The various indexes of revealed comparative advantage (RCA) that reflect China's comparative advantage in labor-intensive exports are found to be able to explain for a considerable part of the export growth before 1993. The results from the two sub-sample periods seem to suggest that although China's comparative advantage in labor-intensive exports has been increasing over time, its export promotion effect has been decreasing, and become much less impressive in the second period. China should increase the domestic value-added of its manufactured exports by increasing the input of technology into the production of manufactured exports rather than purely depending on labor as the major domestic component of export products. In this sense, changing the trade policy from focusing on export volume into developing the export competitive ability will definitely benefit the export growth in the long run.

Our results also indicate that FDI inflow has some direct contribution to China's export expansion after 1993. In the earlier period, FDI has been mainly used to import equipment and intermediate goods for the production of processed exports. The FDI-induced imports help China upgrade the export structure from low value-added natural resource-intensive products to more technologically sophisticated labor-intensive products. The export structure upgrade in turn has positive effects on China's export growth. In addition, the increased FDI inflow in 1990s began to exert direct effects on export expansion. The relationship between FDI inflow and foreign trade suggests that the government should encourage FDI inflow because potential exports or exports will attract FDI at an early stage of development, which will increase import volume and upgrade export structure. Gradually, FDI inflow will be used to support or create a domestic industry that produces substitutes goods for those imported machinery and equipment. At a later stage, the FDI will turn potential into real export growth.

Lastly, the policy of export tax refund is widely believed as an export stimulus. However, our regression results show that this policy has increasingly become less effective with further liberalization of foreign trade regime. Therefore the government should be careful when applying export subsidies such as tax refund to encourage exports.

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Appendix Construction of Proxies and Definitions of Variables

Details of proxies and manipulation of variables are given as below:

Nominal Exchange Rate

Under the dual exchange rate system, the economically meaningful nominal exchange rate received by exporters and importers is a weighted average of the official and swap market exchange rate, with the weight being determined by the size of the foreign exchange retention ratio.

$$NER = r \times ESWAP + (1 - r) \times EOFF$$

where

NER : Nominal exchange rate, weighted average of the official and the swap market exchange rate

r : Foreign Exchange retention ratio

ESWAP: Swap center exchange rate

EOFF : Official exchange rate

Real Exchange Rate

$$RER = NER \times \frac{CPI}{RPI}$$

where

RER: Real exchange rate

CPI: The measure of price of the foreign country, approximated by the consumer price index.

RPI: The measure of China's price, approximated by the retail price index

Real Effective Exchange Rate

$$EREER = \sum_{i=1}^{10} k_i \times RER_i$$

$$= \sum_{i=1}^{10} k_i \times \frac{NER_i \times CPI_i}{RPI} \qquad \text{with } \sum_{i=1}^{10} k_i = 1$$

where

EREER: The export-weighted real effective exchange rate

RER_i : The real exchange rate between RMB and country *i*'s currency

NER_i : The nominal exchange rate between RMB and country *i*'s currency

CPI_i : The measure of country *i*'s price

k_i : The share of China's exports to country i of its total exports

Comparative Advantage

The revealed comparative advantage (RCA) index for labor-intensive exports is defined by Balassa (1965) to identify products in which a country does or does not have a comparative advantage. RCA index relates the share of a particular product in the country's total exports to the share of the product in the world exports. The higher the index, the greater is the country's comparative advantage in that particular product. An RCA index less than unity suggests that the country has no comparative advantage in that particular product. Specifically, the Balassa's RCA index for product j is formulated as [1]

$$RCA_j = (X_j / X_m)/(W_j / W_m)$$

where

RCA_j : RCA index of China's labor-intensive exports

X_j : China's exports of labor-intensive products

X_m : China's total exports

W_j : World's total exports of labor-intensive products

W_m : World's total exports

Since labor-intensive exports constitute the majority of China's manufactured exports, it would be more useful to further break down labor-intensive exports into skilled labor-intensive exports and unskilled labor-intensive exports in the manufactured exports.

Net Export Tax

[1]. In Balassa (1965), the index of RCA is defined as $BAL_{ik} = X_{ik} / E(X_{ik})$, and $E(X_{ik})$ is defined as $E(X_{ik}) = X_{wk} * (X_{im} / X_{wm})$, indicating the expected level of trade, where X is export, i is the country, k is the commodity, m indicates the summation across all merchandize products of the country, and w the summation across all countries. Rearranging this equation will then give us the equation as above.

Both export VAT rates and refund rates are subjected to frequent amendments, and the amendments are usually not conformable. Therefore, VAT refund rates are subtracted from the corresponding VAT rates to produce the net VAT rates. The net VAT rates gauge the negative of the effects of export subsidies in this case. The expression of average net VAT rate is as follows,

$$NVAT = \sum R_i \times (VAT_i - REF_i)$$

where

i : The group of exports classified by VAT rates and refund rates.

R_i : The share of each export group in total exports.

VAT_i : Export VAT rate levied on each group.

REF_i : Export VAT refund rate for each group.

Here we should note that, export associated with concessional import arrangements should be excluded from total exports, because they are exempted from export VAT and thereby not eligible to VAT refund. Therefore, R_i is adjusted to take into account of only non-processed exports.

Trade Partners:

China's top ten trade partners in descending sequences are Hong Kong, Japan, US, South Korea, Taiwan, Germany, Singapore, UK, Italy and France.

LEREER:

Export-weighted real effective exchange rate.

Official and swap exchange rate - IFS

Retention rate is 0 for 1985q1to1986q4, 44% for 1987q1 through 1990q4, and 80% for 1991q1 through 1993q4 - World Bank (1994).

RPI - China Monthly Statistics

Trade partners' CPI - Datastream: IFS

EXPORT:

Export volume is obtained by deflating export value by the export-weighted average of trade partners' import price index, with all prices denoted by the US dollar.

Export value - IFS

Trade partners' import price indices - Datastream: IFS

MEXPORT:

Manufactured export volume is obtained using the same method as that is used to obtain export volume.
Manufactured export value - Datastream (IFS)

DF:

Real world income is approximated by the export-weighted average of the import volumes of China's trade partners.
Trade partners import volume - IFS, Bloomberg[1]

OUTPUT:

Domestic production capacity is approximated by real industrial output volume, which is obtained from the quarterly industrial output value deflated by RPI. Real industrial output value: 1985q1-1990q4 - Khor (1991); 1991q1-q4 - State Statistical Bureau of China; 1992q1-2000q4 - China Monthly Statistics

RCA:

Unskilled labor-intensive export is approximated by the sum of exports under Standard International Trade Classification (SITC 2-digit) category 6 and 8, skilled labor-intensive export is approximated by SITC category 7, and labor-intensive exports is approximated by exports under SITC category 6 through 8. SITC category 6 contains manufactured goods chiefly by materials, SITC category 8 contains miscellaneous manufactured articles, and SITC category 7 is machinery and transport equipment.
SITC 6,7,8 exports from China and from the world - World Trade Analyzer, World Trade Organization: International Trade Statistics 2000/2001 (world export for 1999/2000). The yearly RCA indices thus obtained are used to derive quarterly series by assuming constancy within a year.

PROCIMPORT:

Processed import value: 1993q1-2000q4 - CEIC; 1985-1992 - CEIC. Quarterly data before 1993 are derived from data of the same quarter in the subsequent year by assuming that quarterly growth rate equals to yearly growth rate. The value series are deflated by the US CPI index to obtain the volume series.

NVAT/NVATM:

Net export tax/net export tax for manufactured exports. The two series are derived using data classification and aggregation. In the calculation of VAT and VAT refund, exports classified based on SITC and HS codes are aggregated to obtain non-processed exports and processed exports.

[1] Taiwan import volume is computed as import value (Bloomberg) divided by import price (IFS).

Category 1 includes ten groups of non-processed exports: crude oil; sugar; coal; petroleum; grain; agriculture products; manufactures made with agriculture products; mineral; iron & steel; cement. Category 2 includes twelve groups of processed exports: mechanical & electrical products; textile machine; textile materials & products; garment; clocks & watches; footwear, ceramics; chemical materials; toys; plastic & rubber articles; travel articles & handbags; exports not classified. Since processed exports are exempted from export VAT and thereby not eligible to VAT refund, exports under Category 2 are adjusted to reflect only non-processed exports. To simplify the calculation, annual average non-processed percentage of total exports are used to adjust for groups under Category 2. For manufactured exports, the net export tax NVATM has been calculated to cover export groups under manufactured exports only. Summary of export VAT rates and refund rates for various commodity groups is presented in Appendix 2.

Export VAT rate and refund rate - Export Tax Refund Policy Manual, *Shanghai State Bureau of Taxation, Internal Material*

Each group's export value - China Statistics Yearbook. The yearly series of each group's share of total exports are used to derive quarterly series by assuming constancy within a year.

FDI:

FDI actually utilized: 1995q1-1999q4 - China Monthly Statistics; 2000q1-q4 - Bloomberg; 1985-1995 - China Statistical Yearbook. Quarterly data before 1995 are derived from data of the same quarter in the subsequent year by assuming that quarterly growth rate equals to yearly growth rate. The FDI value is then deflated by the US CPI index to obtain the FDI volume.

Table 1: Testing for Unit Roots of Regressing Variables

Variable	Unit Root Test	Level		First Difference	
		Test Statistics	Specification	Test Statistics	Specification
LEXPORT	ADF	-1.931186	c, 7 lags	-2.706391*	5 lags
	PP	-1.852934		-14.15205*	
LMEXPORT	ADF	-2.240803	c, 4 lags	-3.247356*	4 lags
	PP	-2.311696		-13.21694*	
LDF	ADF	-2.193908	c, 8 lags	-4.131167*	2 lags
	PP	-0.505267		-11.18000*	
LEREER	ADF	-2.316752	c, 4 lags	-3.901208*	2 lags
	PP	-2.736207		-8.160550*	
LFDI	ADF	-1.429298	c, 4 lags	-5.915521*	2 lags
	PP	-1.266984		-17.65380*	
LPROCIMPORT	ADF	-0.309268	c, 4 lags	-3.208274*	4 lags
	PP	-1.631295		-15.04167*	
LRCA	ADF	-2.691277	c, 0 lag	-8.626427*	c, 0 lag
	PP	-2.691277		-8.626427*	
LRCASKILLED	ADF	-1.897708	c, 0 lag	-8.138089*	c, 0 lag
	PP	-1.897708		-8.138089*	
LRCAUNSKILLED	ADF	-2.760809	c, 0 lag	-8.096586*	c, 0 lag
	PP	-2.760809		-8.096586*	
LNVAT	ADF	-2.020809	c, 4 lags	-3.188853*	c, 2 lags
	PP	-1.950073		-7.849786*	
LOUTPUT1	ADF	-0.027615	c, 4 lags	-2.897915*	3 lags
	PP	-0.743065		-22.00924*	
LIMPORT	ADF	-0.551924	c, 4 lags	-12.06100*	2 lags
	PP	-1.875343		-18.24620*	
LMIMPORT	ADF	0.195243	c, 4 lags	-11.68710*	2 lags
	PP	-1.390938		-18.76131*	
LIREER	ADF	-2.585641	c, 4 lags	-3.612053*	2 lags
	PP	-3.226679**		-7.723496*	
LGDP	ADF	-0.035604	c, 4 lags	-2.930284*	3 lags
	PP	-1.459951		-22.54761*	
LPROCEXPORT	ADF	-2.589016	c, 4 lags	-2.671377*	4 lags
	PP	-3.437481**		-10.12202*	
LRESERVE	ADF	-1.213027	c, 8 lags	-3.632503*	c, 7 lags
	PP	-0.154539		-6.732256*	
LNVATM	ADF	-1.971900	c, 4 lags	-4.181109*	c, 2 lags
	PP	-1.777039		-7.780221*	
LRTARIFF	ADF	-2.321853	c, 0 lag	-7.811485*	c, 0 lag
	PP	-2.321853		-7.811485*	

Note: ADF and PP test stand respectively for Augmented Dickey Fuller and Phillips Perron tests. Specifications mention the best specification possible based on the model selection criteria AIC and SBC. *, and ** indicate that the unit root test is rejected at 1% and 5% critical level respectively.

Table 2: OLS estimate of Exports

Variable	Total Export Models			1.1 Manufactured Export Models		
	EX	EX01	EX02	MEX	MEX01	1.2 MEX02
	85q1~00q4	85q1~92q4	93q1~00q4	85q1~00q4	85q1~92q4	1.3 93q1~00q4
2 Constant	-4.643	-4.339	-3.224	-11.929	-11.471	-10.186
LEREER	0.259 (1.528)	0.425 (4.876)		0.041 (0.241)	0.285* (1.459)	
LDF	1.283 (6.582)	0.683 (5.861)	0.699 (2.401)	1.674 (7.340)	0.562 (2.219)	0.804 (3.032)
LRCA	0.333 (1.153)	0.520 (2.307)				
LRCAUNSKILLED				1.727 (4.523)	2.124 (4.699)	1.669 (1.798)
LRCASKILLED				0.105 (1.751)	0.346 (5.364)	
LNVAT	0.015 (0.806)	-0.182 (-3.920)	-0.030 (-1.859)			
LNVATM				-0.009 (-1.730)	-0.028 (-1.827)	-0.007 (-2.320)
LPROCIMPORT	0.195 (2.272)		0.599 (3. 837)	0.174 (1.822)		0.715 (5.125)
LFDI	-0.088 (-2.088)		0.221 (1.715)	-0.202 (-4.602)		
Adjusted R^2	0.9881	0.9924	0.9750	0.9900	0.9853	0.9819
3 Durbin-Watson Stat	0.7530	1.9627	0.8708	0.9343	1.5596	1.4135
S.E. of regression	0.0790	0.0402	0.0536	0.0871	0.0739	0.0491
Unit Root Test of Residuals **3.1 AD F**		-5.380 (0 lag)	-2.378 (0 lag)		-4.364 (0 lag)	-3.969 (0 lag)
3.2 PP		-5.380 (0 lag)	-2.378 (0 lag)		-4.364 (0 lag)	-3.969 (0 lag)

Note:
1. In the separated regressions over two sub-sample periods, variables that are found to be insignificant or of the wrong sign are released.
2. In the preliminary regressions (EX and MEX), all variables are presented except LOUTPUT, which is found of wrong sign in all the three regressions.
3. * Statistically significant at 10%~15% level.

Figure 1: Trends of the Official Exchange Rate, Swap Exchange Rate and Nominal Exchange Rate

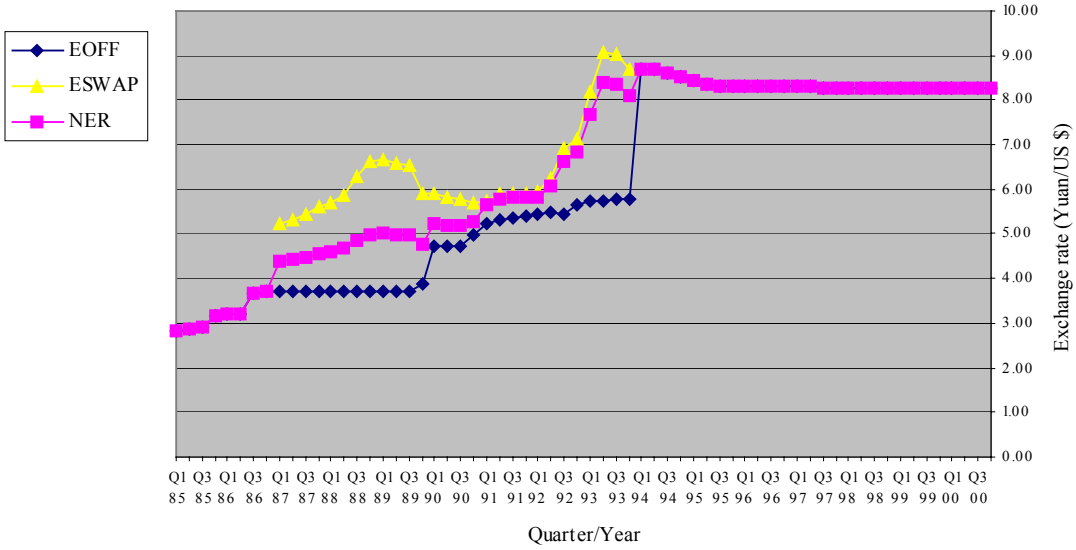

Figure 2: Trends of RPI, Nominal Exchange Rate and Real Exchange Rate

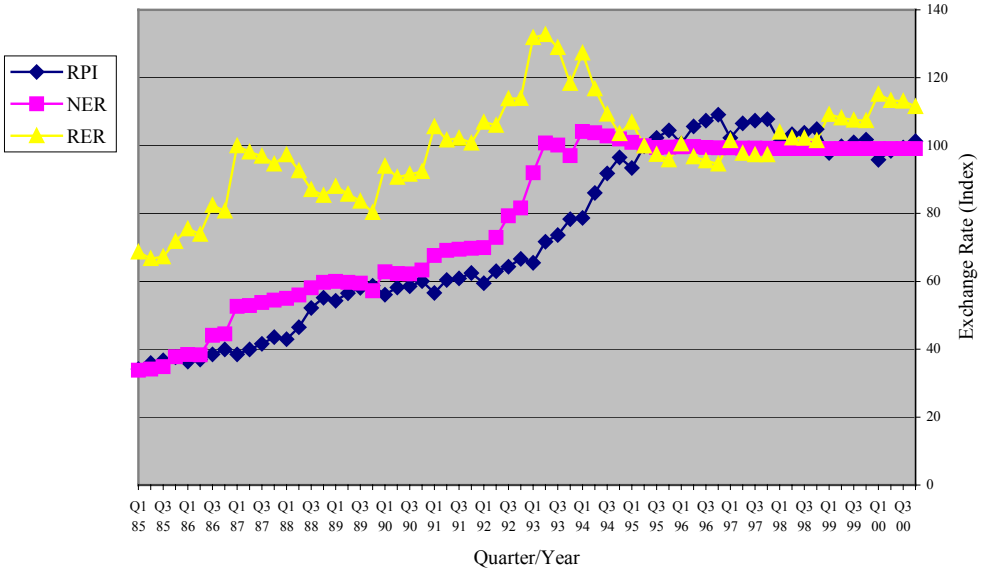

Table 3: Error Correction Model Results for Exports

Total Export Models				**Manufactured Export Models**			
DEX01		**DEX02**		**DMEX01**		**DMEX02**	
Regressor	Estimation Result	Regressor	Estimation Result	Regressor	Estimation Result	Regressor	Estimation Result
Constant	-0.604 (-10.249)	Constant	-0.088 (-2.749)	Constant	-0.542 (-9.657)	Constant	-0.135 (-4.141)
DLEXPORT(-4)	-0.303 (-2.798)	DLDF(-4)	-0.558* (-1.463)	DLMEXPORT(-4)	-0.220 (-1.864)	DLMEXPORT(-4)	-0.390 (-3.840)
DLEREER	0.391 (2.808)	DLNVAT(-2)	**-0.051** (-3.028)	DLEREER	0.523 (2.944)	DLRCAUNSKILLED(-2)	1.767 (2.276)
DLNVAT	-0.216 (-2.386)	DLPROCIMPORT	**0.653** (8.131)	DLRCAUNSKILLED(-1)	0.777 (2.136)	DLPROCIMPORT	0.925 (10.087)
DLNVAT(-4)	-0.094 (-1.772)	DLPROCIMPORT(-3)	-0.174 (-2.462)	DLRCASKILLED(-1)	0.101 (1.884)	DLPROCIMPORT(-3)	-0.259 (-3.693)
DLRCA	0.652 (2.246)	—	—	—	—	DLNVATM(-4)	-0.010 (-2.797)
Error Correction Term	-0.780 (-3.868)	Error Correction Term	-0.524 (-3.232)	Error Correction Term	-0.242* (-1.440)	Error Correction Term	-0.399 (-2.309)
Adjusted R^2	0.9859	Adjusted R^2	0.9740	Adjusted R^2	0.9782	Adjusted R^2	0.9784
S.E. of regression	0.0296	S.E. of regression	0.0356	S.E. of regression	0.0423	S.E. of regression	0.0334

Note: * the coefficient is significant at 16% level.