

## The Global Financial Crisis, Economic Integration and China's Exports: A Causal and Predictive Analysis

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### Abstract

Recent strong growth of China's exports has elevated the country to a rising global economic power and caused geo-political concern to policy-makers in the country and its trading partners world-wide. What are the determinants of this growth, how has it affected major economies in ASEAN (World Bank, 2009) in particular, and what kind of evidence-based responses are required and appropriate? The paper focuses on the first issue and introduces an endogenous trade model (ETM) and, using historical data, empirically investigates the causes of China's exports in recent years for regional trade policy analysis. The ETM (see Tran Van Hoa, 2004, 2008a for earlier applications) is a system approach and contains improved structural and modelling features, in comparison to conventional gravity theory, panel regression and CGE/GTAP, to provide more credible outcomes and policy options in the sense of Friedman (1953) and Kydland (2006). Significantly, the ETM also incorporates multiple structural changes in the form of crises and policy reforms to accommodate and manage recent economic and financial developments in regional and global economies. Policy options and choice recommendations are, finally, suggested for debate and analysis.

**Keywords:** China's exports and their drivers, exchange rates and volatility, world demand, global financial crises and policy reform, econometric modelling and forecasts, economic and trade policy.

**JEL Classification:** F14, F17, F31

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## 1. Introduction

The strong growth of China's exports in recent years has elevated the country to a rising global economic power and caused geo-political concern to policy-makers in the country and its trading partners worldwide. What are the determinants of these exports, how have they affected major economies in the ASEAN (ASEAN, 2009, and World Bank, 2009) in particular, and what kind of evidence-based responses are appropriate and effective? The paper focuses on the first issue. In the context of classical consumer demand theory, exports are a derived demand and have, as their fundamental postulates, conventional determinants such as domestic and world demand, terms of trade or relative prices, trading substitution and complementarity effects, and real exchange rates (XR) and their volatility (XRV). In the special case of XR, this factor of international trade has played an important part in the monetary system of many countries such as the European Monetary System and the European Monetary Union earlier and China's XR regime since 2005 when it moved away from the dollar peg. It has been argued, for example, that in a flexible or managed exchange regime, XR and XRV (or risk) could have a negative impact on the trade and investment of a country. An early study of this argument by Dell'Ariccia (1999), using a gravity model and panel data from the European Union (EU), confirms this effect. This finding, if found for China, would have deep implications on its trade, global commodity prices (Chen, Rogoff and Rossi, 2009) and subsequently its economic performance (Levy-Yeyati and Sturzenegger, 2003; Sokolov, Lee and Mark, 2009). The paper is an integrated empirical study using a new system modelling approach (Tran Van Hoa, 2004, 2008a) of this XR-trade or, more specifically, export-growth nexus hypothesis, with a special focus on China for predictive policy analysis by China and major countries in the East Asia Summit (EAS) region such as Australia, Thailand and Vietnam (ATV). Why China? China is an economy which has had an export-led (as well as FDI-led) growth policy for the past three decades or so, and has also achieved high growth and growing global economic and geo-political status as a result. As its flexible XR policy is fairly recent, substantive evidence on the possible effects of this on China's exports and growth is at present lacking and acutely

desirable. Evidence-based recommendations for credible options and choices, in the context of domestic reform and global economic crises, are suggested for informed debate and predictive policy analysis for ATV countries.

The plan of the paper is as follows. Section 2 briefly reviews previous studies on XR and trade and its major component, exports. Section 3 briefly surveys the recent trend and patterns of China's trade, growth, exports and export destination. Section 4 introduces a new endogenous trade (or exports) model (ETM) for China based on a simultaneous-equation system modelling approach (Tran Van Hoa, 2004, 2008a) and with a focus on the effects of conventional determinants of exports including XR and XRV as well as other contributing factors as stipulated by emerging thinking on growth causality in developing economies (Kong, 2007; Krueger, 2007). Using available historical economic and trade data and suitable econometric system estimation methods, it empirically investigates China's exports and their link to the country's growth on China's exports in recent years. Section 5 evaluates the estimated models and their predictive power. Section 6 discusses the export policy implications of the findings and suggests options for trade policy analysis for use by researchers, analysts and policy-makers in China and the ATV countries (see also issues raised by Eichengreen et al. 2007; IMF and WB, 2009). Summary and conclusion are briefly described in Section 7.

## **2. Previous Studies on causes of Exports: Real Exchange Rates and Trade**

Since the introduction of floating XRs in 1973 in the world economy, study of the relationship between XR, XRV and changes in the trade volume has become an important topic and generated a large body of research. To support their work many scholars have used a variety of methodological approaches to investigate bilateral trading between different countries and regions in order to formulate empirical or evidence-based regulations. In terms of outcomes their final conclusions can be divided into two diametrically opposed categories.

First, some researches show that XR volatility possesses a negative effect on bilateral trade. Coes (1981) examines Brazilian exports from 1965 to 1974. By using a log-level functional specification he reaches the conclusion that a significant reduction in XR uncertainty in the country's economy during the crawling-peg era stimulated the country's exports after the crawling peg was adopted in 1968. Brada and Mendez's (1988) study covers 15 Latin American countries, with data from 1973 to 1977. They apply a series of dummy variables to account for the different effects under the fixed and floating XR regimes. Also, they find that XR uncertainty inhibits bilateral exports. Caballero and Corbo (1989) adopt a Koyck-type model and real bilateral XR volatility measure to estimate an export demand equation for six countries, including Chile, Colombia, and Peru. They conclude that there is a strong negative effect of XR uncertainty on the exports of all these countries. Arize, Osang, and Slottje (2008) find that similar conditions hold for all Latin American countries, both in the short and the long run. According to Arize et al. (cit. op.), although some developed countries have mature currencies, forward markets and futures markets which can be used to hedge against XR risks, it has been proved that forward markets have failed to have the desired effect. Also, forward hedging will somehow incur costs for both importers and exporters, so the bilateral trade quantity decreases.

Second, other research has reported opposite conclusions. De Grauwe (1988) contends that the degree of risk-averseness decides the response of the producer to an increase in XRV. When producers are extremely risk-averse, an increase in XRV will induce producers to export more to avoid a drastic decline in their revenue stream. The opposite case exists when producers are less risk-averse. Doyle (2001) gives another possible reason for the positive effect of the XRV - relatively high multinational ownership. Doyle believes that such volatility enables multinationals to diversify XR risk through international intra-subsidary changes in trade. A positive effect of the XRV on trade is also shown by Choudhry (2005), who verifies that

XR<sub>V</sub> has enhanced international trade flows from Canada, Japan and New Zealand to the United Kingdom.

In the 1980s China changed from a fixed XR system to a floating one (NBS, 2009). Since reform and opening up the RMB exchange rate has been overvalued for many years, making exports unprofitable. Therefore, the Chinese government allowed a national currency devaluation to 2.8 RMB/USD in 1981 and to 8.3 RMB/USD in 1985 and to 6.8 RMB/USD in 2009, in order to stimulate the exporting wishes of domestic producers. Such substantial XR fluctuations also bring some unknown impact on China's bilateral trade. Nevertheless, related study results are still conflicting at the disaggregated or commodity level. Chou (2000) investigates the impact of XR fluctuations on both China's total exports and its exports by SITC category. After tests for stationarity and multiple structural breaks, he uses the error-correction and ARDL (auto-regressive distributed lag) models, respectively, to show that XR variability has a significant negative long-run effect on total exports, exports of manufactured goods, mineral fuels, foodstuffs, and so forth, and a positive impact on exports of industrial materials. Thus the conclusion basically supports the hypothesis that XR uncertainty impedes trade. Additionally, Chou (op. cit.) indicates that China's lack of a developed forward market for RMB is the main reason for the negative response of exports. Because exporters cannot obtain complete protection against XR risks they are more inclined to reduce international trade. Thus Chou suggests the establishment of an exchange market for the RMB, although this would take some time to realise.

Zhou and Li (2007) argue that XR<sub>V</sub> has no effect on China's exports, either for the long run nor the short run. Instead, they suggest that Chinese people's income level (domestic demand) and prices (inflation) are the key reasons for export movements. In their study, Zhou and Li use quarterly data for the period after China's XR reform in 1994. XR volatility is represented by an ARCH (autoregressive conditional heteroskedasticity) model and the relationship between trade and XR is shown by bound testing based on ARDL.

Other research is not so clear-cut when XR effects on exports and imports are decomposed. Cao and Li (2006) and Jiang (2006) find that China's exports have a positive response to XRV and imports have a negative response. Further, Cao and Li estimate XR fluctuations (data from 1980 to 2004) by an AR-GARCH (autoregressive-generalised ARCH) model, and achieve their results by using the Engle-Granger long-run causality method. They conclude that China's export volume decreases with XRV but increases in the long run, though the short-run effect is hard to detect. Dell' Ariccia (1999) applies the classical gravity model in an empirical study using European Union trade flows, with both trade and financial panel data. A negative effect of XRV on trade was obtained.

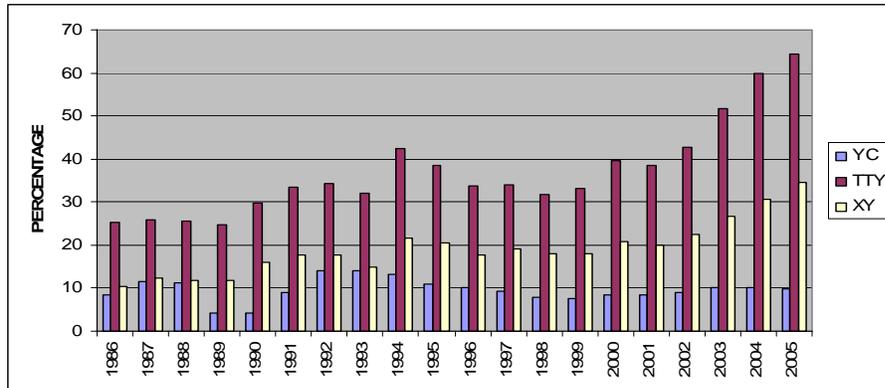
### 3. Recent Trend in China's Exports, Growth and Export Destinations

The recent pattern of China's growth, total trade/GDP, exports/GDP is described in Chart 1, its export shares to major trade partners in Chart 2, and their 1986-2005 averages in Chart 3. The data in Chart 1 shows China as an important open economy with strong trade (25.16 per cent of GDP in 1986 and 64.26 per cent in 2005) and its robust increases even during its domestic turmoil in the late 1980s and especially during its early 1990s reform and after its WTO membership in 2001. Exports/GDP follows closely this trend. The data also shows China's strong real output growth during the period 1986-2005 even though some slight decline is noticeable for the late 1980s period. China's average annual GDP growth was 9.57 per cent for 1986-2005. Interestingly, in spite of its fast growth in trade and exports in recent years, China's real output growth has been more stable since the country's WTO membership in 2001. One immediate question from these stylized facts is whether there is a causal relationship between China's exports, trade and growth.

The major destinations of China's exports and their shares (importance) are given in Charts 2 and 3. Data in Chart 2 indicate the importance of Hong Kong as China's main re-exporting port before the territories were returned to China in 1997. They also show the decline in the export share of Japan since 1997. In 2005, the US was China's biggest export destination (21.51 per cent), followed by the EU (18.23

per cent), Hong Kong (15.92 per cent) and Japan (11.12 per cent). Vietnam was China's smallest export destination (0.74 per cent). Over the period 1986-2005, Hong Kong was China's most important export destination (27.14 per cent), followed almost equally by Japan and the US (15.85 per cent and 15.79 per cent respectively).

**Chart 1: China's Trade, Exports and Growth**



**Chart 2: China's Major Export Destinations**

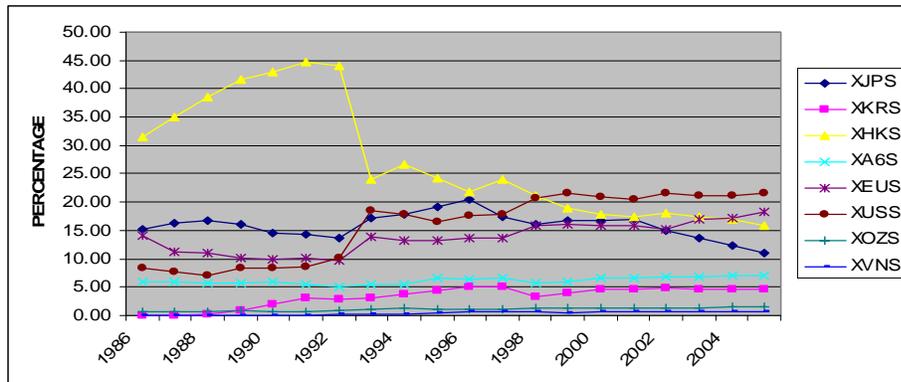
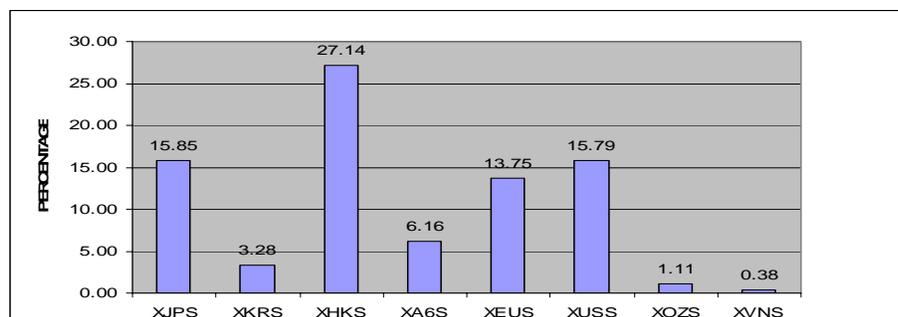


Chart 3: Importance of China's Export Destinations



Note: Data for Charts 1-3 are from ICSEAD (2007).

As mentioned previously, in this paper we develop a new and integrated model to study the major causal drivers of China's exports for predictive policy analysis. The model is integrated in the sense that not only XR and XRV but other conventional and emerging-thinking (Johansen, 1982; Tran Van Hoa, 1992; Frankel and Romer, 1999; Kong, 2007; Krueger, 2007) determinants (denoted together by XRS below for convenience) are likely to causally affect China's exports in an economy-wide and global framework. Methodologically, we depart significantly from the existing modelling methods of panel regression, CGE/GTAP (computable general equilibrium/global trade analysis project), VAR (vector autoregression), ARDL, ARCH and AR-GARCH, and develop a new endogenous trade-growth model using a system (or simultaneous-equation) approach to study the integrated XRS-exports nexus for China. The model has improved structural (e.g. endogenous exports and fully incorporating the economy's structure and policy) and modelling (e.g. nonlinearity) features in comparison to the existing popular models (see above). The model's variations have been successfully adapted and used in numerous previous studies on trade and growth in major Asian economies (see for example Tran Van Hoa, 2004, 2005, 2007a, 2007b, 2008a, 2008b).

#### 4. An Integrated Model of China's Endogenous Exports

##### New Advances in Economic Modelling

In a number of recent papers, Tran Van Hoa (e.g., 2002a) uses a simple, new and general modelling approach, namely the endogenous gravity theory, to empirically study trade and its testable causal link to growth in major developing countries in Asia. A new endogenous growth-trade or export model (ETM) for China with significant improved features is adapted for the present paper. The major and novel structural and modelling features of an ETM over existing approaches can be briefly described further as follows. First, unlike other modelling studies in this genre (e.g., CGE/GTAP and growth or panel regression), it assumes no *a priori* (e.g., linear or log-linear) functional form (Tran Van Hoa, 1992). Second, unlike growth and panel regression, it recognises country-specific or heterogeneity characteristics and impacts on trade and growth in each economy. Third, unlike other WTO-oriented trade-in-goods studies and more appropriately for regional trade agreement (RTA) scope studies, it covers comprehensive trade in goods and other factors of production (i.e., FDI and services). Fourth, it incorporates reform, crises and non-economic events (Johansen, 1982; Tran Van Hoa, 2004; Edwards, 2007) that have affected trade and growth globally or in the region in recent years. Fifth, and most importantly, it incorporates explicitly the interdependence (endogeneity) between trade or exports, growth and major macroeconomic conditions or activities in the trading economies (Krueger, 2007).

Other existing modelling approaches for this kind of trade-growth impact study are inappropriate or not credible (or realistic) for policy uses because of their structural and econometric limitations and subsequently less acceptable outcomes. For example, the VAR, ARDL and AR-GARCH rely heavily on autoregressiveness and moving averages as the data-generating process, lacking therefore economic-theoretic fundamentals. The CGE/GTAP is essentially confirmatory in nature with its *assumed* causal functional relationships and *given* impact parameters. The gravity theory (Frankel and Romer, 1999) lacks endogeneity or circular causality between trade and growth and is, in

terms of modelling specification, beset with serious cross-country heterogeneity bias when fixed-effect panel regression (the most successful method in the literature so far, see Eichengreen et al. 2007) is used for all diverse countries. Growth regression is in addition econometrically fragile (Levine and Renelt, 1992) which can be attributed to a lack of the well-known circular causality (endogeneity or interdependence) in the sense of Marshall or Haavelmo among economic activities (e.g., trade, growth, monetary, fiscal and industry policies) (see also Krueger, 2007 for the need for this feature in developing economics analysis and modelling). The specification of a linear or log-linear function for empirical trade-growth studies has been increasingly regarded as unsuitable (Minier, 2007). In terms of policy outcomes realism, previous ETM studies have also demonstrated the excellent modelling performance of the ETM models when this performance is assessed by the Friedman ‘fruitfulness’ (1953) or Kydland data-model consistency (2006) criteria. Finally, as the economic variables in the ETM model (being planar approximations to any functional form) are expressed as their rates of change (or equivalently log differences when appropriate), the model’s findings can be regarded as long-run outcomes in the sense of Engle and Granger causality if all of these variables are integrated of degree one  $I(1)$  or as short-term Granger causality if they are  $I(0)$ .

### The Model

The ETM for China to explore the testable causality of exports (T), XR, crisis or reform (CR) and growth (GDP) relationships, and with features relevant to its development in the past 15 years (where data are available) can be written arbitrarily (or in function-free form without *a priori* assumptions about the exact functional forms) as two implicit and dependent functions [for T and GDP] as in Equations (1) and (2). The model is built on previous work in gravity theory (Frankel and Romer, 1999) and endogenous growth and institutions theories (see Kong, 2007 for a description). It can be regarded as an integrated model of aggregate growth and derived commodity demand with conventional price, income and the influence of advanced or new ‘conditionality’ contributing factors. The model’s testable economic and trade

determinants include FDI, services (SV), trade partners GDP (YT), terms of trade (TT), XR, and policy and structural change variable CR. Thus

$$(1) \quad T = T(\text{GDP}, \text{YT}, \text{TT}, \text{XR}, \text{CR})$$

$$(2) \quad \text{GDP} = \text{GDP}(T, \text{FDI}, \text{SV}, \text{CR})$$

Using Taylor's series expansions for the functions and neglecting second and higher-order differentials (see Tran Van Hoa, 2004; See also Baier and Berstrand, 2008, for a recent use of this approach to deal with nonlinearity), the two equation model for T and GDP above can be written equivalently and including comprehensive trade (see below) and crises or reforms for empirical implementation as

$$(3) \quad T\% = a_1 + a_2Y\% + a_3YT\% + a_4TT\% + a_5XR\% + a_6CR + u_1$$

$$(4) \quad Y\% = b_1 + b_2T\% + b_3FDI\% + b_4SV\% + b_5CR + u_2$$

Where % denotes the rate of change and the u's represent error terms or omitted determinants (Frankel and Romer, 1999). The model's economic-theoretic rationale which is based on the current literature's postulates (Frankel and Romer, 1999, and Kong, 2007) and recent extensions (Tran Van Hoa, 2008a, 2008b) can be briefly described as follows. In Equation (3), China's exports of goods (and other factors of production) are assumed endogenous and affected by the country's economic activities (see below), trade-related policies (TT, XR) – see Coe and Helpman, 1993, and structural change (CR) – see Johansen, 1982, Tran Van Hoa, 2002a, Edwards, 2007, Cerra and Saxena, 2008 - in China and its trading partners. Assuming for convenience and for lack of sufficient sampling sizes for the necessary data, that the GDP of China's major trade partners (e.g. the OECD) is a proxy for all variables reflecting their own economic activities in addition to policy reforms and shocks, then Equation (3) for T, in its structural form of our two-simultaneous equation model, simply assumes that China's exports to the world are affected by the exogenous factors such as the world's GDP

(named YT), fiscal policy, monetary policy, inflation pressure – see Romer (1993), XR – see Rose (2000), industry policy – see Otto et. al. (2002), population (POP) – a gravity proxy in time series, see Frankel and Romer (1999), and CR – see Johansen (1982) and Tran Van Hoa (2004). In a system or economy-wide modelling framework, China's GDP growth (Y%) in Equation (4) is also assumed to be (or to be tested) as being dependent on its merchandise exports (T) given in Equation (3), FDI and financial services (SV), crises, shocks or policy reforms (CR).

Equation (3) is in fact a derived utility-based demand equation in a system or simultaneous-equation framework for China's tradable or exportable commodity reflecting essentially the world's demand for China's products and China's domestic supply conditions, as postulated in standard microeconomic and international trade theory and its recent specification extensions. The model's exogenous factors (instrumental variables or equivalently all non-endogenous variables in the model) explicitly constitute China's domestic and international micro and macroeconomic conditioning environment. These factors have not been explicitly incorporated in previous econometric modelling studies in this genre (see however Frankel et al., 1996, for the use of gravity factors as proxies for this environment). The tests for significant causality between China's exports to the world and their impact on China's growth in the ETM framework are then based on the testing of the structural equations (3)-(4) above by appropriate statistical estimation and testing procedures.

### The Data

Data for the models' estimation were obtained from China-NBS, France-CHELEM and Japan-ICSEAD databases. For consistency with previous studies, all economic data (except real GDP) are in current value. In our study, all original data are obtained as annual and then transformed to their ratios (when appropriate). The ratio variables include exports (T), FDI, financial services (SV), money supply, and government budget, all divided by China's GDP. Other non-ratio variables include population (a gravity factor proxy, see Frankel and Romer, 1999), terms of trade, XR, inflation, and binary variables representing the occurrence of the economic, financial and other major

crises, policy shifts or reforms in China over the period 1991 to 2006. All non-binary variables are then converted to their percentage rates of change. The use of this percentage measurement is a main feature of our ETM approach, and it avoids the problem of *a priori* known functional forms (see above) and also of logarithmic transformations for negative data [such as budget (fiscal) or current account deficits]. In this paper, we focus on a unidirectional direction of trade and growth, that is, the determination of China's exports and their possible causal impact on China's growth and within the prevailing international economic and trade environment. This conditional causality transmission mechanism is the fundamental foundation of our testing hypothesis.

### 5. Evidence-Based Findings and Their Realism Properties

The empirical findings for the structural ETM Equations (3) and (4) in the two-simultaneous equation model of China's exports and their impact on growth are given in the table below. Conceptually interpreted, Equations (3) and (4) can be implicitly regarded as a trade and growth regression respectively when they are estimated by the OLS or maximum-likelihood method that will produce, as is well-known, biased impact or elasticity parameters. Or they can be regarded as structural equations in a system model with circular causality or endogeneity incorporated. As a result, and for consistency in efficient impact studies, an instrumental-variables estimator such as the 2SLS, 3SLS or Generalised Method of Moments (GMM) has to be used when appropriate for this estimation. As mentioned above, the instrumental variables in this case are all the exogenous or non-endogenous variables explicitly incorporated or assumed for the model. They reflect the micro and macroeconomic conditioning environment of China and its major trading economies (when data are available) and indirectly influence their trade, economic, WTO/RTA and external relations. The XR-exports-growth causality issues are similar when directionally reversed and viewed from the world's perspective.

Judged from the table and standard statistical diagnostic tests, the performance of the estimated ETM models for China's exports and its link to growth above are acceptable in terms of the  $R^2$  and DW values.

The performance of the models can also be evaluated by the Friedman (1953)-Kydland (2006) data-model realism or consistency criterion where the trend gap (or discrepancy) between historical data and model predictions have to be tight and small. The criterion was advocated earlier by Milton Friedman (1953) in the sense of model (theory) and reality consistency, but it seems to have been overlooked by econometric modellers and policy-makers alike in recent years. This performance is given in Charts 4 and 5 for China's observed and predicted growth and exports to the world. A visual indicates that the models emulate well the troughs, peaks and turning points of China's exports and growth even during the highly volatile period of the late 1990s (the Asia crisis) to early-2000s (terrorist attacks and China's WTO membership) and mid-2005 in the global economy and China. *Ex ante* simulation or extrapolation of the estimated models for predictive policy analysis and their implementation credibility are based on these findings.

**Table 1. Causes and their Impact on China's Exports and Growth ETM Modelling in Flexible Structural Form: GMM Estimates, 1991-2006**

	EXPORTS/GDP	GROWTH
Const	-10.008	7.646**
China's World Exports/GDP		0.058**
FDI/GDP		0.012**
Services/GDP		0.000**
China's Growth	0.297	
OECD Growth	2.902*	
Terms of Trade	0.605**	
Real Exchange Rates	1.334**	
China's Reforms 1992	14.946**	3.010**
Asia Crisis 1997		-2.725**
China's WTO Membership 2001		0.666**
China's XR Float 2005	-5.866	1.724**
R-squared	0.811	0.927
DW	2.947	2.722

Note: \*\*=Significant at 5%, \*=Significant at 10%. The p-value for the overidentifying restriction test = 0.097.

Chart 4: ETM Modelling Performance of China's Exports/GDP – Friedman-Kydland Criterion, 1991-2006

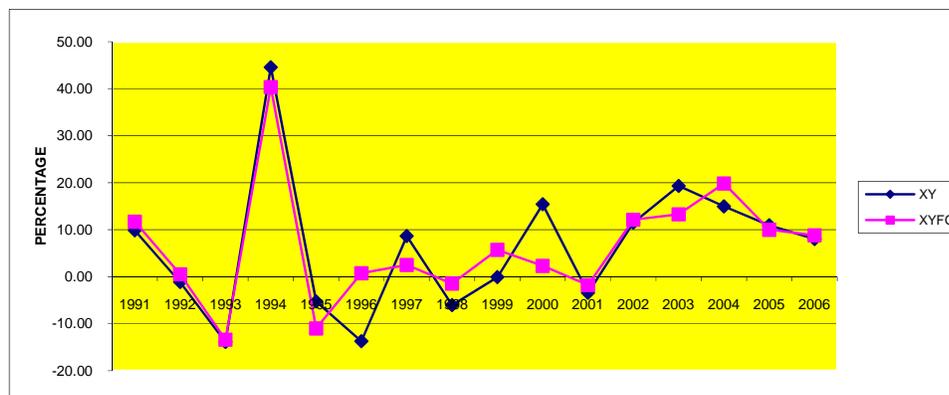
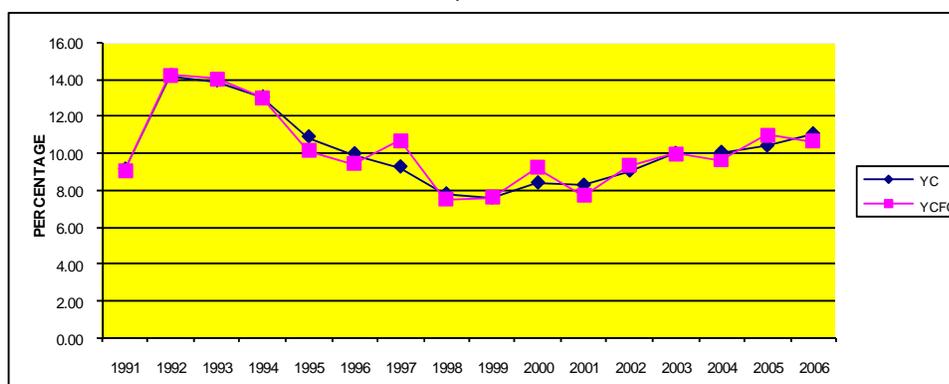


Chart 5: ETM Modelling Performance of China's Growth – Friedman-Kydland Criterion, 1991-2006



Note to Charts 1-2: XY, XYFG, YC, YCFG denote respectively China's actual exports/GDP, its ETM GMM predicted value, China's actual growth and its ETM GMM predicted value.

## 6. Policy Implications For China

What then are the policy implications of our substantive empirical findings for discussions and possible policy uses in the context of China's exports and their link to the post-2005 XR regime, terms of trade, growth prospects, and crisis management in the face of present and future regional or global economic and financial crises? How can

these implications be fruitfully used in RTA negotiations (e.g., the Australia-China FTA or ASEAN+3 FTA) or trade policy formulations relevant to growing economic and trade relations between China and other WTO members or some of its major trade partners or blocs in the East Asia Summit region in the future?

### **Domestic and World Demand as Drivers of China's Exports**

During the 2008-09 global financial crisis (GFC) with credit deficits and its subsequent low world demand, the exports of China (and other export-dependent countries in the world) suffered severe declines resulting in the country's low growth (IMF, 2009). Increased domestic demand or consumption via fiscal stimulus packages have been used as a chief government policy in China (and all other countries, developed and developing alike) to boost its growth and reduce unemployment. The relevance of our findings here (while statistically fairly weak) is interesting in two aspects. First, our findings (see Table 1) lend empirical support for appropriate stimulus packages on the part of China's government to counter declining world demand for its exports and to promote growth. Second, the findings show, however, the far more important role of the growth of China's major trade partners (i.e. the OECD) than its own growth attainment (with an elasticity of 0.297 against 2.902) in effectively affecting the demand for China's exports. To mitigate the effects of the GFC and to exit the GFC required an international co-operative effort which was advocated by world's leaders (IMF, 2009).

### **Real Exchange Rates and Terms of Trade as Major Determinants of China's Exports**

Our findings also show the particular importance of appropriate monetary and trade policy via the terms-of-trade and, more significantly quantitatively, real exchange rate adjustments in order to significantly enhance China's exports. It should be noted that, in our ETM models, XR are measured as their rates of change over time and these are also known as XR volatility (see Dell'Araccia, 1999). One interpretation of our findings is that they provide evidence to support the hypothesis that this volatility assists in promoting China's export growth (see related

results in De Grauwe, 1988; Doyle, 2001; and Choudhry, 2005). However, the announcement of a flexible exchange rate regime in 2005, which implies XR variability or uncertainty over time, appears to have affected negatively the prospects of China's increasing export performance (see also the findings by Dell' Ariccia, 1999; Levy-Yeyati and Sturzenegger, 2003; Arize, Osang, and Slottje 2008; Sokolov, Lee and Mark, 2009; and others cited above). This damaging policy can, however, be mitigated to some significant extent by the fact that its impact, while being large in magnitude, is hardly significant. In addition, this effect can be mitigated further by China's other appropriate policy reforms, such as those adopted by China in the early 1990s, the impact of which far outweighs that of a flexible XR regime. When these reforms are coupled with China's continuously enhanced high-ranking international competitiveness in trade, our substantive findings indicate that, even with the RMB's gradual appreciation (due either to domestic policy or external international trade pressure), China's exports and generally its export sector can be improved in the post-2005 period. This is the scenario even in the face of GFC effects that have caused concern on China's exports as expressed by the leadership in China.

### **The Role of Exports, FDI, Financial Services in China's Growth**

Over the past decades, China has been characterised by its leadership and the international community as a successful export-led and FDI-led economy, due largely to the high international competitiveness in its exportable products and favourable FDI-attracting environment. Our empirical findings in Table 1 confirm these policy observations. In fact, they do more than that. They also show the statistically significant and dominant role played by exports over capital (FDI) and financial services in promoting China's growth during the period 1991-2006. The obtained ranking for exports, FDI and services in that descending order is interesting, in that it can be used as important input to policy-makers to develop national priorities for development and growth or remedial policy to support important but only emerging pro-growth sectors in the economy. One example of these priorities is to promote and strengthen the financial sector which is currently under-developed and weak in China (and in other countries in developing Asia).

### China's Exports, Growth, Policy Reform and Global Financial Crises

While sudden crises, shocks and major gradual policy reforms have been acknowledged by a large number of economists as important sources of fluctuations in economic performance worldwide (see Johansen, 1982; Tran Van Hoa, 2002a; Edwards, 2007; OECD, 2009; Stiglitz, 2009), they have rarely been incorporated in well-known economic policy modelling studies such as the CGE/GTAP, gravity theory, growth or panel regression, or in a more realistic (that is, multiple structural breaks and with temporary or non-decaying effects) manner in the often-used cointegration or unit root analysis of economic activities. An important feature of the endogenous growth-trade approach and its derived ETM models above is in its flexibility in accommodating these events.

The findings from the table above also indicate that all four major crises or shocks and policy reforms over nearly two decades in our study (i.e. China's early 1990s reform, the 1997-98 Asia crisis, China's WTO membership in 2001, and 2005 XR regime change) do have a significant impact on China's economic growth. The findings of a severe adverse and significant impact of the 2 July 1997 Asia crisis and the benefits of China's globalisation policy through its WTO long-awaited membership since 2001 provide evidence to confirm the well-supported views and facts on these regional and global crises' serious contagion and opening effects on the Asian economies (Tran Van Hoa, 2001, 2002c).

The particularly beneficial effects of good economic governance or constructive and opening-up policy reforms on China's growth in the early 1990s are also observed. An interesting finding in Table 1 is that, while the 2005 XR regime change has dampened China's exports, it nevertheless has contributed significantly to the country's growth performance. As exports are only one component of the SNA93 national income accounting identity, research on the other components' contribution to growth would be useful future research. From a quantitative perspective of the impact, our findings show that 'good' policy reforms produce far larger gains in national economic performance than trade liberalisation or RTA or multilateral trade agreement (e.g. WTO membership) policy. On the contrary, our findings show that major crises could wipe out economic gains achieved

over many years. These outcomes were observed with the GFC and the crisis economies in both developed and developing countries (OECD, 2009). Our study strongly indicates the importance of crisis management and prevention and of the exploration of the causes of crises for effective remedial policy measures. Another implication of the findings is that, due to the far-reaching effects of crises, shocks and policy change on a large number of sectors in an economy, the need to specify these aspects of structural change in a multi-equation or even single-equation policy model is clearly desirable and appropriate. Our findings thus cast doubt on quantitative or descriptive studies of trade and growth that ignore these sub- and add-factors especially in their multiple structural breaks in the sense of Johansen (1982) or in the unit-root analysis literature and their policy modelling specification.

## 7. Summary and Conclusion

The findings in Table 1 reveal conceptually and, importantly, empirically the causal foundation of export performance and economic successes and slowdowns in one important regional economy in Asia with rising global economic and geo-political influence, namely China. The findings show that increasing growth in China and its major trade partners as well as a rise in real exchange rates (i.e., the RMB/\$US) and terms of trade (export prices/import prices) can benefit China's exports. Conversely, a fall in these indicators due either to the GFC or other reasons will reduce its exports. However, our study does not provide empirical support to the expected benefits of China's WTO membership on its exports or, interestingly, the damaging impact of the 1997 Asia crisis on these exports. On the other hand, the findings show that appropriate policy reform (resulting in, for example, enhanced international trade competitiveness and FDI attraction) can provide a strong impetus to expand exports and assist in reducing the effects of a flexible XR regime which results in China's currency appreciation and reduces the country's export potential. Finally, the findings lend strong statistical support to the severe damages of crises and the need for appropriate crisis management policy to avoid future crises or to mitigate their effects for common prosperity in the country and the region.

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**References**

- 1- Arize, A. C., Osang, T. and Slottje, D. J. (2008), "Exchange-rate Volatility in Latin America and its Impact on Foreign Trade", *International Review of Economics and Finance*, Vol. 17, No. 1, 33-44.
- 2- ASEAN (2009), "RTAs and FTAs", <http://www.aseansec.org/press-8oct08-3.htm>.
- 3- Baier, S L and Bergstrand, J H (2008), "Bonus Vetus OLS: A Simple Method for Approximating International Trade-Cost Effects using the Gravity Equation", *Journal of International Economics*, Vol. 77, No. 1, 77-85
- 4- Brada, J. C. and Mendez, J. A. (1988), "Exchange-rate Risk, Exchange Rate Regime and the Volume of International Trade", *Kyklos*, Vol. 41, Issue 2, 263-280.
- 5- Caballero, R. J. and Corbo, V. (1989), "The Effect of Real Exchange-rate Uncertainty on Exports: Empirical Evidence", *The World Bank Economic Review*, Vol. 3, No. 2, 263-278.
- 6- Cao, Yang and Li, Jianwu (2006), "The Effect of Real RMB Exchange Rate Fluctuations on Exports", *World Economy Study*, No. 8, 56-59 .
- 7- Cerra, V and Saxena, S. C (2008), "Growth Dynamics: The Myth of Economic Recovery", *American Economic Review*, Vol.98, No.1, 439-57.
- 8- Chen, Y-C, Rogoff, K. and Rossi, B. (2009), "Can Exchange Rates Forecast Commodity Prices?", *American Economic Association Meeting*, 3-4 Jan 2009.
- 9- Chou, W. L. (2000), "Exchange Rate Variability and China's Exports", *Journal of Comparative Economics*, Vol. 28, 61-79
- 10- Choudhry, T. (2008), "Exchange rate volatility and United Kingdom trade: Evidence from Canada, Japan and New Zealand", *Empirical Economics*, Vol. 35, No. 3, 607-619.

- 11- Coe, D. and Helpman, E. (1993), "International R&D Spillovers", National Bureau of Economic Research Working paper, Cambridge, MA, No. 4444, August 1993.
- 12- Coes, D. V. (1981), "The Crawling Peg and Exchange-rate Uncertainty". In: J. Williamson (ed), *Exchange Rates Rules*, New York: Macmillan and St. Martins, 113-136.
- 13- De Grauwe, Paul (1987), "Exchange Rate Variability and the Slowdown in Growth of International Trade", International Monetary Fund, Research Department, No. 87/38, May 22, 1987.
- 14- Dell' Ariccia, Giovanni (1999), "Exchange Rate Fluctuations and Trade Flows: Evidence from the European Union", *IMF Staff Papers*, Vol. 46, No. 3, September/December 1999, 315-334.
- 15- Doyle E(2001), "Exchange rate volatility and Irish-UK trade, 1979-1992", *Applied Economics*, Vol. 33, No. 2, 249-265.
- 16- Edwards, S (2007), "Globalization, Crises and Growth", 2007 Max Corden Lecture, 11 October 2007, University of Melbourne, Australia.
- 17- Eichengreen, B., Rhee, Y. and Hui Tong (2007), "China and the Exports of Other Asian Countries", *Review of World Economics*, Vol. 143, 201-226.
- 18- Frankel, J.A., Romer, D. and . Cyrus, T. (1996), "Trade and Growth in East Asian Countries: Cause and Effect ?", NBER Working Paper No. 5732, Cambridge, Mass, August 1996.
- 19- Frankel, J.A. and D. Romer (1999), "Does Trade Cause Growth?", *American Economic Review*, Vol. 89, 379-99.
- 20- Friedman, M.(1953), *Essays in Positive Economics*, Chicago: Chicago University Press.
- 21- ICSEAD (International Center for the Study of East Asian Development) (2006 and 2007), [http:// www.icsead.or.jp/index\\_e.html](http://www.icsead.or.jp/index_e.html)
- 22- -IMF (2009), [http://www.imf.org/external/np/speeches /2009/061909.htm](http://www.imf.org/external/np/speeches/2009/061909.htm)

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- 23- Jiang, Jing (2006), "An Empirical Research of the Relationship Between Import & Export Trade and Exchange Rate of the RMB", *Journal of Southwest Agricultural University (Social Science Edition)*, Vol. 4, No. 4, Dec 2006, 22-26.
- 24- Johansen, L. (1982), "Econometric Models and Economic Planning and Policy: Some Trends and Problems," in M. Hazewinkle and A. H. G. Rinnooy Kan (eds.), *Current Developments in the Interface: Economics, Econometrics, Mathematics*, Boston: Reidel, 1982, 91-122.
- 25- Kong, T. (2007), "A Selective Review of Recent Developments in Economic Growth Literature", *Asian-Pacific Econ. Lit.*, Vol. 21(1), 1-33.
- 26- Krueger, A. O. (2007), "Understanding Context and Interlinkages in Development Policy: Policy Formulation and Implementation", *American Economic Association Meeting*, 5-7 January 2007, Chicago.
- 27- Kydland, F. E. (2006), "Quantitative Aggregate Economics", *American Economic Review*, Vol. 96, No. 5, 1373-1383.
- 28- Levine, R. and Renelt, D. (1992), "A Sensitivity Analysis of Cross-Country Growth Regressions", *American Economic Review*, Vol. 82, No. 4, 942-63.
- 29- Levy-Yeyati, E. and Sturzenegger, F. (2003), "To Float or to Trail: Evidence on the Impact of Exchange Rate Regimes on Growth", *American Economic Review*, Vol. 93, No. 4, September 2003, pp. 1173-1193.
- 30- Minier, J. (2007), "Nonlinearities and Robustness in Growth Regressions", *American Economic Association Meeting*, 5-7 January 2007, Chicago.
- 31- National Bureau of Statistics (2009), <http://www.stats.gov.cn/tjsj/ndsj/2008/indexeh.htm>.
- 32- OECD (2009), [http://www.oecd.org/document/9/0,2340,en\\_2649\\_34447\\_1893129\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/9/0,2340,en_2649_34447_1893129_1_1_1_1,00.html).
- 33- Otto, G., G. Voss and L Willard (2002), "Understanding OECD Output Correlation", Seminar paper, Department of Economics, University of Wollongong, Australia. May 2002.

- 34- Romer, D. (1993), "Openness and Inflation: Theory and Evidence", *Quarterly Journal of Economics*, Vol. 108, 869-903.
- 35- Rose, A.K. (2000), "One Money, One Market: The Effects of Common Currencies on Trade", *Economic Policy*, Vol. 30, 9-30.
- 36- Sokolov, V., Lee, B-J and Mark, N.C. (2009), "Linkages between Exchange Rate Policy and Macroeconomic Performance", *American Economic Association Meeting*, 3-4 Jan 2009.
- 37- Stiglitz, J. (2009), "Marketeers Lose their Religion", *The Age*, 6 February 2009, p. 8. Online access: <http://www.theage.com.au/businessday>.
- 38- Tran Van Hoa (1992), "Modelling Output Growth: A New Approach", *Economics Letters*, Vol. 38, 279-284.
- 39- Tran Van Hoa (2001), *The Asia Recovery*, London: Edward Elgar.
- 40- Tran Van Hoa (2002a), "New Asian Regionalism: Evidence on ASEAN+3 Free Trade Agreement from Extended Gravity Theory and New Modelling Approach", Department of Economics, University of Wollongong, Australia, mimeo.
- 41- Tran Van Hoa (2002b), "New Asian Regionalism and ASEAN+3 Free Trade Agreement: Theoretical and Empirical Foundation, Policy Challenges and Growth Prospects", *Chulalongkorn Journal of Economics (Thailand)*, Vol. 14, No. 3, 366-384.
- 42- Tran Van Hoa (2002c) (ed.) *Economic Crisis Management*, Mass: Edward Elgar.
- 43- Tran Van Hoa (2004), "Korea's Trade, Growth of Trade and the World Economy in Post-crisis ASEAN+3 Free Trade Agreement: An econometric and Policy Analysis", *Journal of the Korean Economy*, Vol. 5, No. 2, 73-108.
- 44- Tran Van Hoa (2005), "New Asian Regionalism: Evidence on the Impact of ASEAN+3 Free Trade Agreement on Its Member Countries", *Journal of Quantitative Economics*, Vol. 3, No. 2, July 2005, 98-109.

- 
- 45- Tran Van Hoa (2007a), "Causal Empirics and Political Economy of Official Development Assistance and Development in Asia: The Case of Vietnam", *Journal of the Korean Economy*, Vol. 8, 91-119.
- 46- Tran Van Hoa (2007b), "Foreign Aid and Development in Thailand: Causality and Political Economy", *Thammasat Economic Journal (Thailand)*, Vol. 25, No. 4, 127-54..
- 47- Tran Van Hoa (2008a), "Australia-China Free Trade Agreement: Causal Empirics and Political Economy", *Australian Economic Papers*, Vol. 27, No. 1, 19-29.
- 48- Tran Van Hoa (2008b), "Education and Economic Development in East Asia Summit Economies: A Study in China-India Public Service Efficiency and Competitiveness", *AFBE Journal*, online access: <http://www.afbe.biz.com/>.
- 49- World Bank (2009), <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:22216950~pagePK:64257043~piPK:437376~theSitePK:4607,00.html>
- 50- WTO (2009), [http://www.wto.org/English/res\\_e/statis\\_e/its2006\\_e/its06\\_bysubject\\_e.htm](http://www.wto.org/English/res_e/statis_e/its2006_e/its06_bysubject_e.htm).
- 51- Zhou, Hongshan and Li, Qi (2007), "RMB Exchange Rate and Trade-Exports - Evidence from Bound Testing", *Journal of Northwest A&F University (Social Science Edition)*, Vol.7, No. 4, July 2007, 86-90.