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## Abstract

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## Keywords

Impact, Economic, Policy, Reform, Regional, Global, Shocks, Trade, Growth, East, Asia, Econometric, Evidence, for, China

## Disciplines

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## **Impact of Economic Policy Reform and Regional and Global Shocks on Trade and Growth in East Asia: Econometric Evidence for China\***

Tran Van Hoa\*\*

The paper introduces the generalised gravity theory (Tran Van Hoa, 2004) to construct a simple flexible simultaneous-equation econometric model of growth and trade of China and its five major trading countries or blocs (Japan, ASEAN-6, the European Union, the US, and Australia). The model incorporates explicitly major temporary and persistent structural change. Using latest ICSEAD, OECD and WBWT data, the paper reports efficient empirical results on trade-growth causality, trade determination and effects of shocks and policy reform on trade and growth between these economies and China over the past two decades. Based on these findings and current trade policy and economic relations negotiations, economic policy challenges are then targeted for discussion and for resolution development.

JEL Classification: C30, F15, O11, O47

Keywords: regional free trade agreement, trade and growth causality, structural change, generalised gravity theory, modelling economic and trade policy

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## 1. INTRODUCTION

In pursuing policies of trade liberalisation and growth promotion within the framework of regional economic integration, WTO membership and globalisation, major Asian developing economies in Asia in general and China in particular had achieved economic 'miracles' in the past decades. Recently however, they face many challenges, economically and politically (Tran Van Hoa, 2000 and 2002a), compounded by a global (especially the US) economic slowdown (IMF, 2005), terrorist attacks, the SARS and avian flu outbreaks, the unprecedented Indian Ocean tsunami devastation affecting millions in Asia, and other domestic or international (e.g., the 2005 China-Korea-Japan tension) uncertainty ahead. In response to and as a result of these internal and external shocks or structural and major policy change, what are the development and growth prospects then for these economies or especially China and their trade and economic relations or cooperation in the medium and long term?

The paper is an empirical study and based on (i) time-tested economic and trade-growth postulates, (ii) recent advances in econometric modelling, and (iii) improved efficient estimation and forecasting methodologies to provide credible answers to these questions for informed academic debates and practical policy analysis. It has a number of novel features. First, it briefly surveys recent free trade agreements (FTAs) developments and its current negotiations within the context of the WTO, regional economic integration (REI), closer economic relations and bilateral and plurilateral trade in the Asian region. Second, it formalises the essential of these conceptual economic-political developments and, introducing the generalised gravity theory or GGT (Tran Van Hoa, 2004), constructs a simple flexible simultaneous-equation econometric model of growth and trade of China and its five major trading countries or blocs (Japan, ASEAN-6, the EU, the US, and Australia). Third, the model contains novel features in incorporating explicitly not only chief ingredients of the mercantilist trade and modern growth theory but, significantly, also major temporary and persistent

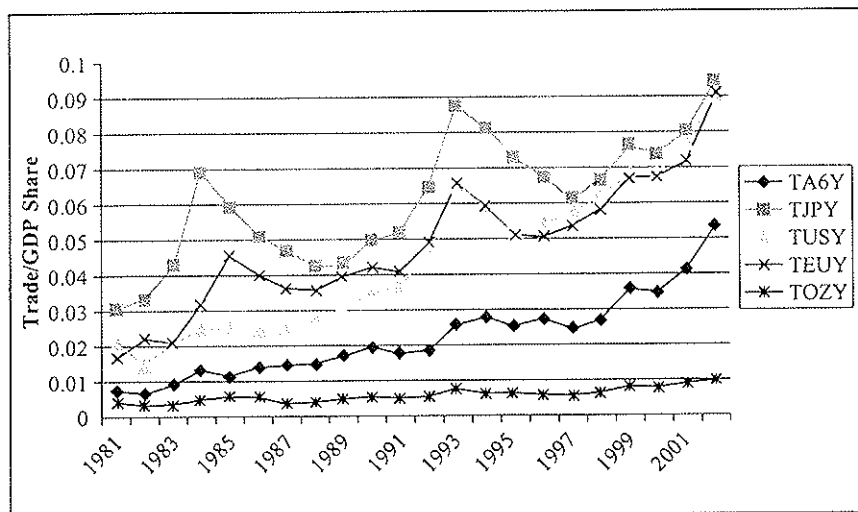
structural change as conceptualised and used in the contemporary literature on unit-root and cointegration analysis. Fourth, using latest ICSEAD, OECD and WBWT data, the paper obtains and reports efficient empirical results on trade-growth causality, trade determination and effects of structural change and shocks on these economies on China over the past two decades. Finally, based on these findings and current trade policy and economic relations negotiations, economic policy challenges are then targeted for discussion for resolution development.

The structure of the paper is as follows. Section 2 surveys and briefly analyses China's major trade and economic trends in recent years. Section 3 discusses a classification of crises and shocks that the Asian economies have experienced or the economic policy change they have embarked on in the past two decades. The possible impact of these crises, shocks and policy change on China's trade, development and growth then formalised in an empirical study. In section 4, the possible nexus between bilateral and plurilateral FTAs and growth and the gravity theory is analysed. In section 5, the GGT is used to construct a trade-growth model to study the impact of trade, crises, shocks and policy change on China's economic performance. Section 6 briefly discusses the data, the estimated models and empirical findings. A discussion of major implications from the econometric findings for practical policy analysis is given in section 7. General conclusions and suggestions for further study are given in section 8.

## **2. RECENT TRADE AND ECONOMIC DEVELOPMENTS IN ASIA**

Recent trends in China's trade (as a proportion of its GDP) with its major trading partners in the world, namely, the ASEAN, Japan, the US, the EU and Australia, are given in figure 1.

We note from the data reported in the chart that the trends in China's trade with these 5 partners had been growing over the years, and China's large

**Figure 1 China's Trade with the World**

Source: Raw data from 2004 ICSEAD databases and author's calculations.

trade is with Japan, followed by the EU, the US, and the ASEAN in that descending order. Australia's trade with China is small in comparison, and it seems to be rising only very slowly over the sample period. In terms of its volatility or dynamics, China's trade with Japan and the EU peaked around 1986, 1995 and 2001, and that with the US scored a big surge only in around 1995. In terms of growing importance, trade of the US and the EU with China had been trailing that of Japan in the early years, but there appears to be an almost complete convergence in trade value of these three trading partners of China in the early 2000s. While the ASEAN is ranked fourth in trading importance with China in this chart, its trade had been growing steadily especially after the Asia crisis of 1997. When we take into account this picture of China's historical trade trends with its trading partners and incorporate it with recent developments in Asia, there are issues and aspects that could be considered and rigorously investigated empirically to improve informed debates on trade, economic and political relations between China and the world.

### 3. CRISES, SHOCKS AND POLICY REFORM IN ASIA

As discussed in our previous studies (e.g., Tran Van Hoa, 2004), while the focus of new Asian regionalisms (NARs) and FTAs is important and the objective is plausible in an economic-theoretic sense, there have been numerous recent developments in the region that could have impeded or sometimes even enhanced the attainment of this objective. These developments include (i) national and international resistance to reform to maintain the status quo, (ii) unexpected shocks and crises, and major structural change and 'good-in-a-market-economy-sense' policy reform. The first category encompasses for example the Seattle and Singapore issues, globalisation and agricultural subsidies by the US, the EU, and Japan in the current WTO debates. The second category covers the stock market crash of 1987, the Tiananmen Square uprising in 1989, the Gulf War in 1991, the Asia economic and financial crisis of 1997, the SARS and avian flu of 2003, and the devastating tsunami shock of 26 December 2004 in the Indian Ocean, and from the other spectrum of change, China's major SOE reform of the early 1980s and its pro-FDI reform in the early 1990s.

It should be noted that while the terms shocks, crises, and structural change used above are generic, the content in each case may have completely different characteristics and implications. For example, shocks usually refer to a sudden event that can have damaging effects, and structural change and policy reform are often used to indicate a sudden major change in government management or governance that has been gradually developed and constructed to generate beneficial outcomes. In addition, as is well known from the current literature on unit roots and cointegration studies, shocks and structural change or policy reform can again have short term impact or they can have a lingering, non-decaying, volatile and permanent consequences (Perron, 1989 and 1997; Tran Van Hoa, 2004). Shocks and structural change may also have selectively national, regional and global implications and contagion. The Black Friday stock market crash of October 1987 for example was considered significant chiefly only for developed countries the

have a well-developed financial system and linkage, but it may be regarded as a minor event by the LDCs in which a strong financial system is yet to be developed and operated. The Tiananmen Square incident in 1989 may be considered a watershed point in China's reform processes, but it is only of minimal consequences to other economies in the Asian region and beyond. On the other hand, due to its status as an LDC but with a large population and economy, China's WTO membership has been regarded as having a global effect especially on the countries having trade with China or having trade with the markets China is likely to have a competitive edge in trade with. One of the countries in this latter category is India.

Above, we stipulated that shocks, crises, structural change and policy reform can have significant impact on trade, development, growth (and even welfare and poverty reduction) for a country, a region or globally. This impact may outweigh or boost the gain from liberalised trade and investment and improved cooperation and economic relations as expected from the NARs and FTAs for the member countries. Unfortunately, existing methodologies or approaches that have been used almost routinely in this kind of study are either unable or inappropriate to accommodate this kind of impact in a realistic or historical data-consistent sense. Among these methodologies are the applied or computable general equilibrium (CGE) and its variations (e.g., GTAP), the standard gravity theory (GT) (see Frankel and Romer, 1999), and the panel regression (PR) (see Dollar and Kraay, 2004). These methods are however severely restricted either by scope and coverage, temporal historical features, and a lack of circular causality. For example, the CGE deals only with trade in goods and is structurally heavily calibrated and essentially static (unable to accommodate crises) modelling (see Productivity Commission Report (2003) for other issues); the GT deals chiefly with cross-section data and is also unable to accommodate crises or other recent shocks or economic developments in Asia (and other regions); and the PR excludes completely interdependence or circular causality between trade and growth (Tran Van Hoa, 2004).



#### 4. FTAS, ASEAN+3 AND GRAVITY THEORY

Since the primary objectives of FTAs are trade liberalisation and welfare improvement, as well as economic partnerships generally, for member countries, the FTA premises that, directly, trade (international and domestic) and, indirectly, other determinants of trade significantly and causally affect (i) economic welfare (see Raimondos-Moller and Woodland, 2002); (ii) wages (see Ruffin and Jones, 2003), (iii) growth (for developed countries see Frankel and Rose, 1998; Frankel and Romer, 1999) and (iv) development (for developing countries, see Harrison (for all countries), 1996; Frankel *et al.* (for 10 East and South East Asian countries), 1996; Tran Van Hoa (for ASEAN, China, Korea and Japan), 2002a). The outcomes also are mutually beneficial in many other non-economic aspects (e.g., closer regional and international cooperation and collaboration, social harmony, political stability and prosperity), and, in the context of globalisation and enhanced international competitiveness, conducive to regional or international economic integration (ASEAN, 1999).

In view of the expectation that FTAs will enhance trade and produce favourable outcomes of higher growth and higher real wages or better economic development improvement for trading partners or FTA member countries, a useful causality concept in the form of a GT using geographic, demographic and other common or concurrent attributes (see for example Linneman, 1966 and the specification in table 3 in Frankel *et al.*, 1996) to explain trade flows (liberalisation) between countries may be appropriate. Empirical studies of this trade-growth nexus (for another more restricted justification, see Rose, 2000). Some extensions to this theory's determination using OECD country data have also been attempted to deal with trade correlations and output fluctuations (see for example, Otto *et al.*, 2002). The data used in these important studies of the GT have been singularly cross-sectional and therefore unable to deal with recent temporal developments in the Asian or other non-Asian regions.

In the case of China vis-à-vis Asian economies and its other major trading countries or blocs in our focus (that is, Japan, ASEAN, the US, the EU, and Australia), the trade-growth impact in a bilateral (China-Japan, China-US, China-Australia) and plurilateral (China-ASEAN and China-EU) context, both of a qualitative or quantitative kind, has not been done or reported. This lack of evidence on the validity of the required premises underlying the foundation of NARs or FTAs leaves much to be desired. In addition, the role played by shocks, structural change and policy reform on this trade-growth causality for these countries and trading blocs has not been addressed or adequately dealt with in the current literature.

## 5. A TRADE-GROWTH MODEL TO STUDY THE IMPACT OF SHOCKS AND POLICY REFORM ON CHINA'S TRADE AND GROWTH

Based on our previous modelling and impact studies (e.g., see Tran Van Hoa, 2002a, 2003, 2004, 2005) using the GGT in flexible functional form (Tran Van Hoa, 1992) and allowing for circular causality, we can write our 2-simultaneous-equation model of trade and growth as

$$Y\% = \alpha_1 + \alpha_2 T\% + u_1, \quad (1)$$

$$T\% = \beta_1 + \beta_2 Y\% + \beta_3 X\% + \beta_4 W\% + u_2, \quad (2)$$

where  $Y$  = growth,  $T$  = trade,  $X$  = economic factors, and  $W$  = non-economic factors, and the  $u$ 's = error terms. To implement the model (equations (1)-(2)) above with available data to empirically investigate the causal relationship between, for example, comprehensive trade (that is, goods, services and investment) and growth for China-ASEAN, we can use, given fixed geographical components (distance and area) as discussed, and, for time-series data, population (a proxy for size), conventional economic

determinants of trade (e.g., see Frankel and Rose, 1998; Frankel and Romer, 1999; Rose, 2000; Otto *et al.*, 2002) and/or other relevant factors (e.g., external or internal shocks or policy reform – Johansen, 1982) when sufficient data are available. One such extended model relevant to our focus of study is on the possible causality (impact) between say China-ASEAN trade and China's growth may be written in either the structural equation (3), and (4), supplemented by the full reduced-form equation for  $T$  (4) (and similarly for growth  $Y$ ) as

$$Y\% = a_1 + a_2 T\% + a_3 ST + a_4 SV\% + a_5 FDI\% + v_1, \quad (3)$$

$$T\% = p_1 + p_2 YT\% + p_3 FT\% + p_4 MT\% + p_5 PT\% + p_6 ERT\% + p_7 IT\% + p_8 POT\% + p_9 ST + v_2.$$

The model's features are as follows. In equations (3)-(4), China's trade ( $T\%$ ) with its ASEAN trading partner for example is assumed to be caused together with crises or shocks or policy reform ( $ST$ ) and services ( $SV$ ) and foreign direct investment ( $FDI$ ), China's growth ( $Y\%$ ), but this trade  $T$  (and its endogenous  $SV$  and  $FDI$ ) is also affected by economic activities, trade-related policies and external or internal shocks in China and its trading partner, ASEAN. Assuming for convenience that China's trade (traditionally defined as its exports (or imports, see Barro and Helpman, 1991) with its trading partner is affected by this partner's GDP (supply) and other major economic activities, trade-related policies (see Coe and Helpman, 1993 – see this approach) or external or internal shocks or policy reform in China (and in its trading partner), then equation (4) in its reduced form simply assumes that China's partner trade is simply affected by the exogenous factors such as GDP (named  $YT$ ), inflation ( $PT$ ) – see Romer (1993), fiscal policy ( $FT$ ), monetary policy ( $MT$ ), trade policy and exchange rates ( $ERT$ ) – see Rose (2000), industry structure ( $IT$ ) – see Otto *et al.* (2002), population ( $POT$ ) – see Frankel and Romer (1999), and internal or external shocks or policy reform ( $ST$ ) – see Johansen (1982) – of China and its trading partner.

Equation (4) is in fact a derived demand equation for tradable goods (or even transacted services and investment) reflecting essentially its supply (its trading partner) and demand components (China) postulated in standard microeconomic and trade theory.

In deriving equations (3) and (4) for 2 trading countries or blocs above, we assume that Country 1's trade affecting its growth is a testable hypothesis and this trade itself is essentially a demand equation for either imports (from Country 2) and exports (to Country 2) or vice versa or both. For the economies of the ASEAN and China, geographic attributes (that is, being in the neighbouring region) are assumed to be the *prime facie* reason for setting up the ASEAN+3 or ASEAN+China, and the distance and area characteristics are omitted and proxied by population size as all of our variables are expressed in terms of time-series (distance and area may also not be appropriate even for cross-section studies with high-trade and small countries like Singapore and Brunei in ASEAN+3). All variables in the model, that is,  $Y$ ,  $T$ ,  $SY$ ,  $FDI$ ,  $YT$ ,  $FT$ ,  $MT$ ,  $PT$ ,  $ERT$ ,  $IT$  and  $POT$  are expressed as their rates of change so the units of measurement (i.e., \$billion or \$million, ratios or index numbers) for the trading countries' variables are irrelevant.  $ST$  is a qualitative time-series variable representing internal or external shocks and policy reform having either one-off effects or temporally permanent effects (autoregressive and non-stationary) on trade and growth with discrete values.

## 6. ECONOMETRIC EVIDENCE ON CHINA'S TRADE WITH ITS MAJOR TRADING PARTNERS AND GROWTH

### 6.1. Estimation Methods

The importance of using a suitable estimation method for our model (or similar models) to get more accurate or unbiased results has been emphasised

in previous trade-growth studies using the standard gravity theory (see for example, Frankel and Romer, 1999). These studies deal mainly with the OLS and 2SLS or IV (instrumental-variables) estimations. A brief survey of the various new and improved (in average MSE or Wald risks) estimation and forecasting methods that are available is given in Tran Van Hoa (2004). These include specially the two-stage hierarchical-information (2SHI) estimators and forecasters that are Stein-like or empirical Bayes. For comparison with the findings of previous studies in standard GT applications, the results below are obtained by the OLS, 2SLS and 2SHI for the structural equation of growth, equation (3).

## 6.2. Data

Due to the limitation of the required data in our studies, especially dealing with developing economies (see also Austrade, 2003), all original data are obtained as annual and then transformed to their ratios (when appropriate). The ratio variables include trade (exports and imports), services, FDI, government budget, and money supply (M2), all divided by GDP, and unemployment rates (open unemployment/labour force). Other non-ratio variables include RMB/US exchange rates, population and binary variables representing the occurrence of the economic, financial and other major crisis or policy shift or reform over the period 1981 to 2002. All non-binary variables are then converted to their percentage rate of changes. The use of this percentage measurement is a main feature of our modelling and impact approach and 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). As the average micro- / macro-economic data for the countries in the ASEAN (and the EU) are difficult (if not impossible) to measure and our sampling size is limited, we have focused on a unidirectional direction of trade below in a 'dual' context: China's trade with Japan, ASEAN, the US, the EU and Australia, and the impact of the trade on China's growth.

The data for regional (e.g., ASEAN and the EU) and national (e.g., China, Australia and the US) trade (exports ( $X$ ) to and imports ( $IM$ ) from, respectively), services ( $SV$ ), foreign direct investment ( $FDI$ ), GDP and estimated mean population (named  $POP$ ) are retrieved from ICSEAD's 2004 regional trade databases. Openness between 2 trading countries is defined as  $T=X+IM$  although the separate effects of either  $X$  or  $IM$  can be experimented with. All trade and economic data are at current prices in US dollars. Fiscal, monetary, trade and industry policy data for the country of focus, China, were also obtained from the 2004 ICSEAD databases and approximated, respectively, by government budget/GDP ( $BY$ ), M2/GDP ( $M2Y$ ), interest rates ( $R$ ), exchange rates per US dollars ( $XR$ ), and unemployment rate ( $UR$ ). In addition to the usual demographic and economic components in our model, we also identified (due to ICSEAD data unavailability before 1980) 5 major crises that had affected China, the ASEAN, the US, the EU, and Australia (and other economies) during our sampling period, and included them as 5 dummy variables with persistent effects after their occurrence (one-off effects were postulated but empirically discarded as implausible in the study). These are the stock market crash of 1987 ( $C87$ ) which was coinciding with China's Broadening Reform period 1984-1988, the China Tiananmen Square turmoil ( $C89$ ), the Gulf War of 1991 ( $C91$ ) which was coinciding with China's Rectifying Program during 1988-1991, China's Deepening Reform since 1992 ( $C93$ ), and the Asia crisis of 1997 ( $C97$ ). The outbreaks of SARS in 2003, avian or bird flu early in 2004, and the December 2004 tsunami devastation have been omitted due to a lack of sufficient data. Various modelling experiments in our study also show that these crises all have an econometrically permanent or non-decayed effect (reflecting autoregressiveness or non-stationarity) on growth in China.

### 6.3. The Estimated Models

The 2-simultaneous equation trade-growth model for China and Australia in our studies, for example, that is based on equations (3) - (4), can be written

fully using mnemonic notation for estimation and impact analysis as

$$YCN\% = \alpha_1 + \alpha_2 TOZ2Y\% + \alpha_3 SY\% + \alpha_4 FDIY\% + \alpha_5 C87 \\ + \alpha_6 C89 + \alpha_7 C91 + \alpha_8 C93 + \alpha_9 C97 + v_1,$$

$$TOZ2Y\% = \beta_1 + \beta_2 YOZ\% + \beta_3 BY\% + \beta_4 M2Y\% + \beta_5 R\% \\ + \beta_6 CPI\% + \beta_7 XR\% + \beta_8 UR\% + \beta_9 POP\% \\ + \beta_{10} C87 + \beta_{11} C89 + \beta_{12} C91 + \beta_{13} C93 + \beta_{14} C97 + v_2,$$

where in percentage change,  $YCN$  = China's  $GDP$ ,  $TOZ2Y$  = Australia's trade (exports + imports or openness) to China divided by China's  $GDP$ ,  $SY$  = total services/ $GDP$ ,  $FDIY$  = total direct investment/ $GDP$ , and  $YOZ$  = Australia's  $GDP$ . The variables  $BY$ ,  $M2Y$ ,  $R$ ,  $CPI$ ,  $XR$ ,  $UR$  and  $POP$  denote respectively, fiscal, monetary, interest rates, inflation, exchange rate, industrial policy and population in Australia. The  $v$ 's are the disturbances representing other unknown factors but with effects on  $YCN$  and  $TOZ2$  (and  $SY$  and  $FDIY$ ) respectively (see Frankel and Romer, 1999 for this rationale). The trade growth models for China-ASEAN, China-US, China-EU, and China-Japan can be similarly constructed.

#### 6.4. Substantive Findings

Five sets of empirical findings for 5 trade-growth models and based on equations (3)-(4) above for China and its 5 trading countries/blocs are given in table 1. These models provide information on the causality direction of trade (goods/services/ $FDI$ )-growth activities. Due to the importance of the estimation methods used that can provide greatly different results and conclusions even for the same model and data (see further detail in Frankel and Romer, 1999) and also for the purpose of statistical efficiency comparison, three types of estimated structural parameters have been

**Table 1 Impact of Trade, Services and FDI on China's Growth  
Generalised Gravity Theory in Flexible Structural Form  
(1981 to 2001)**

Variables	China-ASEAN			China-Japan		
	OLS	2SLS	2SHI	OLS	2SLS	2SHI
Constant	9.30**	9.24**	8.93**	9.74**	9.40**	8.23**
O/GPD	0.03**	0.03**	0.03**	0.02 <sup>a)</sup>	0.02 <sup>a)</sup>	0.02 <sup>a)</sup>
S/GDP	0.01	-0.01	-0.01	0.003	-0.003	-0.003
FDI/GDP	0.04**	0.05**	0.04**	0.04**	0.05**	0.04**
C87	1.12 <sup>a)</sup>	1.18*	1.14*	1.44	1.68*	1.58*
C89	-6.97**	-6.96**	-6.73**	-7.42**	-7.28**	-6.83**
C91	4.90**	4.70**	4.54**	4.45**	3.92**	3.68**
C93	2.15**	2.32**	2.24**	2.33**	2.75**	2.58**
C97	-2.84**	-2.79**	-2.69**	-2.67**	-2.56**	-2.40**
R <sup>2</sup>	0.97	0.73	0.99 <sup>b)</sup>	0.96	0.91	0.98 <sup>b)</sup>
F	43.07**	39.57**	4.80**	25.57**	21.88**	5.49**
DW	1.71	1.77	1.32 <sup>c)</sup>	2.10	2.15	1.36 <sup>c)</sup>

Variables	China-US			China-EU		
	OLS	2SLS	2SHI	OLS	2SLS	2SHI
Constant	9.78**	9.41**	8.80**	10.37**	10.10**	9.35**
O/GPD	0.04 <sup>a)</sup>	0.05 <sup>a)</sup>	0.05 <sup>a)</sup>	-0.009	-0.003	-0.003
S/GDP	-0.004	-0.02	-0.02	0.009	0.009	0.008
FDI/GDP	0.04**	0.05**	0.04**	0.04**	0.05**	0.04**
C87	1.13	1.43 <sup>a)</sup>	1.34 <sup>a)</sup>	0.41	0.72	0.67
C89	-7.46**	-7.29**	-6.82**	-7.17**	-7.25**	-6.72**
C91	4.83**	7.53**	4.17**	4.48**	4.35**	4.04**
C93	2.15**	4.46**	2.21**	2.66**	2.72**	2.55**
C97	-2.75**	2.36**	-2.50**	-2.80**	-2.75**	-2.55**
R <sup>2</sup>	0.96	0.95	0.98	0.95	0.94	0.97 <sup>b)</sup>
F	25.84**	21.06**	5.13**	19.54**	18.64**	3.20**
DW	2.19	2.17	1.32 <sup>c)</sup>	2.44	2.40	1.35 <sup>c)</sup>



Variables	China-Australia		
	OLS	2SLS	2SHI
Constant	9.72**	9.61**	8.75**
O/GDP	0.01	-0.004	-0.004
S/GDP	0.002	0.003	0.003
FDI/GDP	0.05**	0.06**	0.05**
C87	1.36	1.02	0.93
C89	-7.59**	-7.02**	-6.40**
C91	4.56**	3.58**	3.26**
C93	2.56**	3.35**	3.05**
C97	-2.76	-2.59**	-2.36**
$R^2$	0.95	0.93	0.97 <sup>b)</sup>
F	19.88**	14.74**	5.49**
DW	2.24	2.42	1.21 <sup>c)</sup>

Notes: O/GDP=Openness/GDP, S/GDP=Services/GDP.

\*\* : significant at the 5% level, \* : significant at the 10% level,

a) significant at the 15% level,

b) correlation coefficient between actual China growth and its 2SHI estimate,

c) DW calculated using the formula  $DW=2(1-\rho)$ . Tests on 2SHI estimates are based on their asymptotic properties as  $T \rightarrow \infty$ .

Sources: World Bank (2004) as compiled by Australia's 2004 DX database. ICSEAD Trade Data (2004).

calculated for each model. These are the OLS, the 2SLS (an IV) and the 2SHI (applied to the 2SLS). The finite-sample dominance of the 2SHI over the 2SLS has also been demonstrated (Tran Van Hoa, 1986c, 2004). For hypothesis testing, the 2SHI has approximately the same asymptotic properties as OLS and 2SLS.

From the results given in table 1, we note 5 important findings. First, while having high success in modelling output growth (change in GDP) has been internationally accepted as difficult, all 5 estimated models of growth vis-à-vis trade in goods, services, and investment between China and its trading partners have statistically significant (using the  $F$ -test) and mu

### **7.1. Does China's Trade with Its Major Trading Partners Cause China's Growth?**

Trade-to-growth is an important causality topic in economics that has attracted some of the best minds in the field over the last 15 years or so (see e.g., Frankel and Romer, 1999, for a survey), and the conclusions have not been finalised or robust for all cases, especially in the short run for even comparative static strictly calibrated neo-classical models (see e.g., Rees and Tyers, 2004). Our empirical results above show that, in the specific case of China vis-à-vis its major global trading partners, its trade (when defined as the relative size of openness to its GDP) with the ASEAN, Japan and the US, has only a weak empirical support as a statistically significant and beneficial determinant (except the ASEAN) of China's growth. The impact of China's trade with the EU and Australia on China's growth is negative but this impact is statistically insignificant. A partial explanation for this weak evidence could be in the relative size of trade of the EU and Australia with China during the period under study (see Guttman and Richards, 2004, for similar evidence on the significance of Australia's trade on its GDP).

### **7.2. Does China's Trade with its Major Trading Partners Impact China's Growth Differently and Where the Most Gains Come from?**

It should be noted that, based on the findings given in table 1 above, China appears to have gained most from its trade with the US, the ASEAN, and Japan in that descending order. This is despite that fact that China-Japan's trade is the largest of China's 5 trading partners. This would have important implications in trade and economic relation priority setting for government and corporate trade policy makers in China, the US, Japan, and the ASEAN. The evidence also appears not to support empirically the current proposal by the Australian government to develop further the country's trade and economic cooperation with China via a formal FTA framework. We can

infer that the motives for this proposal may have been more on the volume and growth of China-Australia trade, political or based on other non-economic aspects.

### **7.3. Impact of Financial Services and Investment on China's Growth and Trade Policy**

As mentioned earlier, one of the innovative and novel features of our paper is the introduction of comprehensive trade in goods, services and investment into the GGT models. At this stage, the measurement of services and investment follows the concept of openness in trade in which both inflows and outflows have unweighted impact. Given this definition, it appears that from the results reported in table 1, the effects of services from and to China's 5 major trading partners are barely significant. This can be attributed to some extent to the volatility of service flows during the sample period. In contrast, the important role of FDI on China's growth can be more robustly ascertained from table 1 where FDI is seen to be uniformly statistically, significantly and positively impacting China's growth in all trade-growth models for the 5 trading partners. The impact as estimated by the 2SLS (or IV) appears to be largest (6%) for the China-Australia model and slightly less (5%) for all other 4 models. This evidence would support the objectives of FTAs where not only trade in goods is traditionally important but also, and especially, trade in investment (a major issue of scope and coverage in FTA negotiations) would have a more critical role in the economic performance of not only China but other member countries of the FTAs. One implication is that negotiations on investment liberalisation and promotion under an FTA or economic relation framework can now assume empirically a more prominent part in the feasibility and scoping agenda. This evidence also supports an effective introduction or promulgation of competition law and policy among the trading partners within this framework to promote trade and investment.

#### 7.4. Do Crises and Economic Policy Reform Affect China's Growth?

The specification of shocks, crises and policy reform, either of the sudden or gradual kind and with temporary or long-lasting effects, in our GGT models is one of their significant modelling features. This feature has not been captured adequately or at all by well-known existing methodologies such as the *CGE/GTAP*, the *GT* and the *PR*. The types of shocks and policy reform we introduced into our models, as discussed earlier, include major recent developments in the Asian region and elsewhere. These cover the Black Friday stock market crash of 1987 (*C87*, a major event in developed countries with a strong financial market), the Tiananmen Square incident in China in 1989 (*C89*, a distinct local event with presumably wide repercussions), China's Rectification Program reform adopted in 1991 (*C91*), China's Deepening reform since 1993 to the present (*C93*; see Harvie, 1999), and the Asia crisis with damaging contagion regionally and, to a lesser extent, globally, that started in Thailand on 2 July 1997 (*C97*). In the terminology of Box-Jenkins time-series analysis or the literature on unit roots and cointegration (see for example, Perron, 1989, 1997), the shocks (i.e., *C87*, *C89* and *C97*) have the characteristics of a sudden change, and China's economic policy reforms (*C91* and *C93*) are assumed to have the feature of a gradual change. From our modelling experiments, all shocks and policy reforms have been found to have a non-decaying permanent effects of the non-stationary kind on China's trade and growth for the sampling period under study.

From table 1, it appears that *C87*, which was regarded as crucial, significant and damaging event for developed countries' financial markets and economic performance in 1987, is found to have a statistically weak but beneficial effect on China's growth in all 5 bilateral and plurilateral GGT models. A partial explanation may be that this stock market crash period was, while significant for free-market economies, relatively irrelevant to China which was then a socialist-oriented economy with a weak or non-existing financial system. Another explanation may be China's Broadening reform

period (1984-1988) during which reforms in China's urban-industrial sector and the gradual dismantling of the central planning system were carried out with positive outcomes (see Harvie, 1999). In contrast, the Tiananmen Square turmoil in 1989 (*C89*) which was considered a minor event by most as far as its impact on world economies is concerned is a statistically significant impediment to China's growth in all 5 *GGT* models. In fact, its impact is the largest (or the most serious) among the other economic and non-economic determinants of China's growth incorporated into the models and the results are found for all models vis-a-vis China's trading partners.

For China's policy reforms which are regarded as gradual change introduced or effected over a number of years, the findings of their outcomes on China's growth as obtained from table 1 are remarkable. First, the Gulf War in 1991 (*C91*), as we are aware, coincided with China's Rectification program of 1988-1991 in which fixed investment and production were increased albeit these were associated with a sharp rise in inflation and retrenchment measures especially in the *SOE* and *TVE* sectors. From the perspective of the developed countries involved in the Gulf War, the subsequent consequence of *C91* would be expected to be negative through the crowding-out effect of available resources. But from China's perspective the total benefits of *C91* which are interpreted as policy reform in the above context on China's growth are significantly captured by our *GGT* models. Second, from the findings on *C93* (reflecting the outcomes of the Deepening period (1992-2002 — our data, or 1992-present in an economic management context of reform in China), all our *GGT* models provide statistically significant results to lend support to the claim that the outcomes uniformly and statistically reflect the expected benefits of China's Deepening reform policy during this period. The benefits are, in addition, found through the trade-growth transmission mechanism between China and all its 5 trading partners.

Finally, while many economists and policy makers have, for various reasons, claimed that the Asia crisis of 1997 which has had devastating and lingering impact and contagion on many countries in the Asian region, and

a lesser extent, in the USSR, Africa and the EU, should be considered as negligible or irrelevant to China's development and growth. Our empirical findings here reject this claim, and show that the Asia crisis (C97), when used to approximate a long-lasting effect of this unfortunate economic and financial meltdown in Asia, has had a strong and damaging impact on China's growth as measured through the trade-growth nexus relating causally China's trade to its major trading partners, namely, the US, Japan, ASEAN, the EU, and Australia.

The first derivative conclusion from our findings here is that a contemporary trade-growth model for China (or any other country) vis-à-vis its 5 (or any other) trading partners without (i) the inclusion of these recent shock (sudden change) factors (as implied by Frankel and Romer, 1999, but not dealt with in standard *GT* or *CGE/GTAP* impact evaluation studies), economic policy reform (gradual change), or (ii) as rightly stipulated by Johansen (1982) for policy analysis even in neo-classical models, may have serious and biased results on the causation and subsequent policies being explored and formulated for governments, national and international trade agencies.

The second derivative conclusion is that shocks (and major policy reform), when appropriately modelled and measured with historical trade-growth data, do seriously affect a country's development and growth and, from a policy's perspective, severely damage its ability to carry out economic and social reforms, regional and global economic relations activities. In this context, the tsunami devastation in the Indian Ocean on the Boxing Day 26 December 2004 would be a major issue for governments and policy-makers in the affected countries and regions as far as development and growth prospects in the future are concerned.

### **7.5. Are China's Trade-Growth Causation Results Affected by Estimation Methodologies?**

In previous studies of trade-growth, OLS results of trade-growth models

based on the gravity theory or similar theory seem to indicate underestimation of the trade effect. In other words, IV (e.g., 2SLS) estimates of the trade effect are usually found to be at least larger than OLS estimates. In our present studies, this is also supported for trade (openness/GDP) on the China-ASEAN, China-Japan and China-US models. In terms of growth, however, the underestimation of the OLS is uniformly true for all 5 trade-growth models. Four reasons have been put forward to explain the underestimation of the OLS and two explanations for the overestimation of the 2SLS (see Frankel and Romer, 1999, for a brief survey; Anderson, 1999, discusses the bias due to specification).

## 7.6. Do Our Trade Forecasts Model Observed Trade Well?

This is a question on the accuracy and reliability of the trade-growth models and the instruments – in a simultaneous-equation context- used (a point often raised in the literature, see Frankel and Romer, 1999). The answer in this case has to be relative, as different models will have different instruments and therefore different accuracy or reliability outcomes. To answer this question for our simultaneous-equation models of trade-growth above, we have calculated the proxy for  $T$ , namely  $\tilde{T}$ , from its reduced form for each of the estimations requiring a knowledge of  $\tilde{T}$ . Standard evaluation criteria such as the correlation coefficient, the RMSE, and the Theil-MSE-decomposition (bias),  $U_b$  (variation), and  $U_c$  (covariance) where, by definition,  $U_b + U_c + U_v = 1$  (see Pindyck and Rubinfeld, 1998), are then used to evaluate the proxy performance of  $\tilde{T}$  as compared to its actual  $T$  in each of the 5 models reported in table 1. The results of this evaluation are given in table 2. Time-series graphs of the actual trade flows between China and its 5 major trade partners and their estimates from our 5 trade-growth models have also been plotted (but not reported here). From these graphs, we first note that, as in the earlier studies using our new modelling flexible (that is, simultaneous-equation and function-free *GGT*) approach, the  $\tilde{T}$  very accurately emulates the troughs, peaks and turning points of the actual  $T$  in all 5 models. Second,

**Table 2 Reliability of Merchandise Trade Proxy in Models on China's Trade with its Five Major Trading Partners Openness (Exports+Imports) / GDP (1981 to 2002)**

Model	China-A6	China-Japan	China-US	China-EU	China-Australia
CC	0.98	0.98	0.96	0.97	0.94
RMSE	3.83	3.67	3.23	4.15	6.42
ME	0.00	0.00	0.00	0.00	0.00
Um	0.00	0.00	0.00	0.00	0.00
Us	0.01	0.01	0.02	0.01	0.03
Uc	0.99	0.99	0.98	0.99	0.97

Note: CC = Correlation coefficient, ME = Mean error.  $U_b + U_s + U_c = 1$ . See Pindyck and Rubinfeld (1998) for further detail on these evaluation criteria. The estimates are based on TSP calculation.

excellent modelling success here should also be assessed in the context of modelling the rates of changes of major economic variables or activities, a notoriously difficult task according to researchers in this field. Third, as the  $\tilde{T}$  seems to be a very good estimated proxy to  $T$  in all models, our findings would enhance the robustness and reliability of our estimation (by the OLS, 2SLS or 2SHI) of the impact of China's trade with its major 5 trading partners on its growth, and provide more credible empirical support to related recommendations on trade policy or economic relations.

### 7.7. Implications for China's Trade and Investment Policy

Our findings as given in table 1 appear to support the view that China's merchandise trade (i.e., exports and imports of goods), while being considered widely as the most important element of all FTAs or closer economic relations by the media and in political debates and dialogues even at the highest level of government or corporation, constitutes empirically



only a small contribution to China's growth, based on historical data over past 2 decades or so. In addition, China's trade with the ASEAN, while small in comparison with Japan, the US and the EU, is the only significant contribution to China's growth. In contrast, FDI is seen as the most important driver of China's economic performance over this period. The implication is that an overemphasis on trade and trade liberalisation policies and less focus on FDI and FDI promotion policy, while being fashionable in many quarters of governance, is inappropriate and misguided in this case.

### **7.8. Implications for China's Regional FTA Strategy**

The findings above lead us *a fortiori* to the conclusion that the ASEAN, in spite of its smaller trade share in world trade, has been playing an increasingly important and significant part in China's economic 'miracle' performance in recent years. In this context, an ASEAN+China FTA is not only logically appropriate from a 'regional', 'gravity' or Asian perspective, but also is empirically supportable from a research-based policy perspective.

### **7.9. Implications for China-Trade and Regional and Global Cooperation**

In our earlier study (Tran Van Hoa, 2002a) it was pointed out that while trade between the East Asia 3 or ASEAN members and other trading blocs (e.g., NAFTA and EU) reflects an important historical trend in the past 20 years or so, the composition of trade by tradable commodities is also important in promoting growth and development. Since the majority of trade between the East Asia 3 or ASEAN and other advanced economies in North America and the EU involve groups of tradable commodities of a high-technology nature, it was claimed that this technology transfer is essential to growth and development in the East Asia 3 or ASEAN in general and in China in particular. FDI is another important component for technology transfer.

The implications of this for our present study are fourfold. First, while showing an interest in improving trade with China, the proposed Austral-

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