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# China's Trade in Asia and the World: Long run Relation with Short run Dynamics

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## Abstract

This paper attempts to find the long run relation with short run dynamics of China's trade in Asia and the world. Co-integration technique provides the economic integration of China's export to the US and its import from Asian nations. This study observed that China is economically integrated with Asia and the world. China has double role in international trade – (i) China acts as an attractor of all inputs from Asia and (ii) China pushes the products in international market with a comparative advantage in price competition. This study also reveals that the speed of China's import from Asia is faster than that of China's export to the US.

**Key Words:** Economic Integration, production network, Co-integration, Asia, China, the US, Error correction, Double Engine of Growth, Export, Import, Long run, short run dynamics.

**JEL Classification:** C1, F1, R3

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## 1. Introduction

Recently most of the Asian economies recover quickly from the global economic crisis which started in 2008. China plays a crucial role in the post crisis era in the international and at the regional level. With huge trade surplus, China is already ‘making a room’ in the world economy (Rodrik 2010) and ready to rescue the world economy and dominate the world business. Now, none can deny China in the global arena and especially in the East and South East Asia region. China acts as a global player in the supply driven economy which is based on the strong production network in Asia region. This is popularly known as ‘factory Asia’. China is the most important strategic and decisive player in this ‘factory Asia’.

The changes in the industrialization strategies of developing Asian countries and their subsequent adoption of deeper liberalisation of FDI and trade policies<sup>1</sup> have initiated and developed production networks within East Asian region. China becomes the central attractor in the region and pulls up the Asian nations. Asia exports to China to fulfil its input demand. With low production cost (the cheap inputs: labour and raw materials) China pushes the comparatively low price products in the international market. China plays a double role –(a) it acts as a attractor for Asian inputs and (b) it supplies all the products in the international market. Thus, China is integrated in the world market. The US represents the international market in this study.

China is highly integrated in economic activity within the East and South East Asia region and rest of the World. Truly, China is the regional engine of economic development, which is observed its deep involvements in the international production networks (IPN), especially for automotive industry. This supply is possible with huge input demand which China imports from the region i.e., the East and South East Asia.

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<sup>1</sup> Incentives in the form of liberalization policies ensure that costs of relocation for MNC are less than the benefits. Therefore these countries have relied on incentives to attract foreign MNCs to establish production locally and gradually integrated with the regional production network.

China pushes the products into the world market at relatively cheaper prices pulling poor Asian economies. China is the main engine of driving growth in the South East Asia. This Chinese growth engine pulls the demand for produced goods from South East Asia while it pushes these products competitive way to the rest of the world especially to the most developed countries like the US and EU. During the crisis, China adopted some stimulus package to boost up its internal domestic demand which helped to raise the regional trade sharply. China acts as double engine<sup>2</sup> of growth.

The global economic crisis<sup>3</sup> 2008 originated in the most developed economies and automatically they have traded the crisis with the rest of the world. The economic crisis spread and widely affects the world causing significant decline in trade, employment and production. Obviously export markets disintegrate quickly and export –led growth economies search alternative way out of it. One of their efforts was to generate internal demand and took several stimulus packages to boost up their economies. Within short period (around middle of 2010) most of Asian economies return to their pre-crisis level of trade (monthly data) and financial flows look more stable than in the months before the crisis. From the Asia’s perspective, it looks as exports were again used as an engine to pull their economies out of crisis. In this context, China plays a vital role in creation of internal demand and increase import from Asian countries. China maintains its high growth rate in 2010.

There are several trade performance indicators to assess the relative position of China and sub regions in global economy with an objective of offering some ideas on the role of trade in Asia’s recovery from the crisis. All these trade performance indicators are readily available in several reports, for example APTIR 2010.

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<sup>2</sup> One engine pulls Asian nations and promotes regional growth while other engine pushes the products to the rest of the world.

<sup>3</sup> This is different from the Asia crisis 1997. It originated in Asia and exported it way out of crisis to the developed economies and they absorbed it. So, developed world were part of solution for the Asian crisis 1997.

There are numerous academic and policy papers, seminar and conference materials, dedicated to find the linkage of country's trade performance with the global or regional level. There is only few studies address China's economic integration with the world economy. Countries become economically integrated in this globalization era. Here integration means togetherness or closeness among nations. Integration is measured as the close relationship or association between two or more defined variables. This paper measures the economic integration using the degree of association among economic variables under certain conditions. Finally statistical co-integration test measures the co-movement or move together jointly on the time path.

This study mainly focuses on China's economic association with other countries especially East and South East Asia and the world as a whole. In the post economic crisis China came at the focus point in the world economy. Gradually the developed world is losing the economic power and China is gaining power. It is clear that world economic command and control has shifted from the developed nations to emerging economies and China is in the forefront and plays a pivotal role in the world economy with a strong economic integration with other nations. In this context this paper mainly investigates how China is economically integrated in the East and South East Asia region and rest of the world.

From *literature* it is clear that Asian economies are mainly integrated in the production network. The production network is successful possibly because of the trade liberalization policies and several regional trade agreements. Trade liberalization facilitates smooth movement of goods, and services and resources among these countries. China import inputs for their productions and exports the world market. Truly, China acts as a pivotal role in the East and South East Asia in the formation of production network. Few literatures

focused on the role of trade policy or liberalization in creating the international production network<sup>4</sup>.

The integration of China into the global economy in general and East Asia in particular has further deepened international production fragmentation to unprecedented levels (Haddad, 2007; Athukorala, 2007). At the turn of the decade, China's processing exports (exports that are produced from processing and/or assembly of imported inputs) accounted for nearly half of its total exports. In 2006, 51.5% of China's intra East Asian trade was in machinery products, of which more than half was trade in parts and components. The rate of annual growth in parts and components with its East Asian partners between 1993 and 2006 was a staggering 22.7% (Kimura and Obashi, 2008).

Given the extent to which the East Asian countries have managed to liberalize their capital account transactions in recent years, one might expect that financial markets of these economies may have become more closely linked with one another than in the past. The investment policy response was essentially many policy packages with an objective to attract foreign direct investment (FDI). It is worth mentioning that the 'targeted' countries' FDI policy was so aggressive, reflecting the rather tight competition among the countries for the alternative manufacturing relocations and other countries' businesses. Kimura (2006) noted

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<sup>4</sup> The concept of production network is based on the global value chain system. It underlines the notion of sequential and interconnected structure of economic activities, with each link in a value chain and adding value in the process (Henderson et al. 2002). Value chain may include a wide-range of related and dependent activities within or between chains. More specifically, Porter divides all of the activities in a value chain into two big groups: primary and support. Primary activities include research-and-development, manufacturing, marketing, and logistics services; while support activities include finance, human resource management, and technology development and procurement.

It is common for a producer of an intermediary input to be involved in several value chains, which can span within- and across- geographic boundaries. This implies that the activities are not only done within the boundary of a single firm – as in the traditional Porter's conception of value chain – but also are done by more than one firms located in more than one countries or region. This large interconnected system of value chain has become known as Global Value Chain (GVC) (Kuroiwa and Toh 2008). Kuroiwa and Toh (2008) viewed IPN as a complement to GVC. It reflects the accelerated fragmentation in knowledge-intensive activities of some value chains, which had become the modularisation, allows the activities to be separated from the value chains and to be performed at different location (Ernst and Luthje 2003). Production network is not only integrating firms and parts of the firms but also national economies. Kimura and Ando (2005), define IPN to consist of vertical production chains that are extended across countries within a region as well as distribution network across the world.

that in response to the fear of losing FDI, ASEAN countries even took a radical approach of ‘accepting everybody’, instead of making selection, for their FDI policy approach. As for trade policy, many Asian countries, and these are East and South East Asian countries in particular, cut unilaterally their tariffs rate, which is often viewed as ‘*race to the bottom*’ (Baldwin 2006).<sup>5</sup> Moreover, according to Baldwin, some of this tariff cut came in the form of duty-drawback and duty-free treatment for the establishments in economic processing zone; but, not only that, over the time countries realised the large benefit of giving lower trade cost by switching from special treatments to lowering applied MFN tariff rates, and as the result, many of these countries continuously cut their tariff, unilaterally, in the past two decades.

China integrates most of the nations in the East and South East Asia in this production network. Intuitively everybody accept this production integration especially in automotive industry in this region. This production integration is possible because of regional free trade agreement and trade liberalisation policies. These policies help to integrate the production system and strengthen market integration in the region as well as the world. This production network system integrates the national capital markets with the world capital market. The result is the huge flow of foreign direct investment (FDI) towards these nations. This FDI flow over time gradually brings all nations closer in the production front removing national boundary. The characteristic of this region is that the market is integrated through production network. So, FDI flow is very important factor that promotes economic integration in the region<sup>6</sup>. For a measure of regional integration in East Asia, one would need information on

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<sup>5</sup> Kuchiki (2005) mentioned some anecdotal evidence on the ‘race-to-the-bottom’ unilateral tariff cuts.

<sup>6</sup> This balance of payment characteristic together with underdevelopment of financial markets suggests that the level of financial transactions including bank lending and trade in regional securities between different countries in East Asia is likely to have been relatively small, in particular when a large Japanese bank lending to direct investment in other East Asian countries are excluded. Furthermore, since the outbreak of the 1997-98 crisis, Japanese banks lending and FDI to other East Asian countries have fallen dramatically. So Korea’s and Taiwan’s FDI’s moved to other East Asian countries. Singapore’s FDI data are rather sketchy, but its FDI to Malaysia and Indonesia declined during the post crisis period from 1997 to 1999. As a result, it would be reasonable to assume that intra-regional financial flows in East Asia have been smaller than inter-regional flows between East Asia on the one hand and North America and Europe on the other. This feature of inter regional capital movements have become more visible with the increase in current account surpluses of Indonesia,

intra-regional capital flows in East Asia relative to inter-regional flows between East Asia<sup>7</sup> and the rest of the world. Reliable data on intra-or inter-regional capital flows are not available. Alternatively trade flow might be a good indicator of close association among nations. Hence, this study concentrates only on available China's trade flow data, i.e., export and import.

## **2. Data and Methodology**

In this study the economic integration is measured in terms of trade flows using monthly data on export and import of China during December 2005 to July 2010. For this study data source is the CEIC. Monthly Data on China's export to the US and Asia8's export to China are taken from CEIC. Here, China's import from Asia8 nations is equivalent to Asia8's export to China. Time period is December 2005 to July 2010. Using the monthly trade data (from CEIC) on export and import this paper examines the co- integration relationship between China's export to the US and its import from major eight Asian economies (hereby, Asia8). Asia8 is consisting with South Korea, Hong Kong, Singapore, Malaysia, Thailand, Indonesia, Philippines and Taiwan.

The paper examines the characteristics of data by unit root test and co integration test. The unit root tests are used to judge the nature of variables whether they are stationary or non-stationary. Following unit root tests the co integration test is necessary for the variables having integration of order one, i.e., I(1).

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Malaysia, Republic of Korea, and Thailand and provides a piece of indirect evidence that East Asian countries have forged tighter financial links with North America and Europe than with their neighbouring economies in the process of financial liberalization. The economic integration can be measured as the degree of association among nations. So, the basic criteria are the correlation coefficient bilaterally and multilaterally under certain conditions. Alternatively the level of integration can be measured in terms of conditional correlation and finally co- integration among nation in trade and FDI flows.

<sup>7</sup> East Asia as it is defined to include the ASEAN members, Taiwan, Hong Kong, China, Korea, and Japan has always been a net saver to the rest of the world.



Now the long run equilibrium relationship between China's export to the US ( $ChnXUS$ ) and Asia8's export to China ( $Asia8XChn$ ) is

$$ChnXUS_t = \alpha + \beta Asia8XChn_t + e_t \quad (1)$$

where  $e$  is the disturbance term. The short run dynamics is observed in the error correction model (ECM), it is derived from eq(1)

$$\Delta ChnXUS_t = \beta \Delta Asia8XChn_t + \eta e_{t-1} + \varepsilon_t \quad (2)$$

Where error in last period is

$e_{t-1} = ChnXUS_{t-1} - \alpha - \beta Asia8XChn_{t-1}$ ,  $\eta$  is the error adjustment coefficient or speed of error correction, and  $\varepsilon_t$  is the white noise. Granger causality is applicable for short run, while long run equilibrium is captured in the error correction term. Optimum lags are required to attain  $\varepsilon_t$  which follows zero mean and constant variance, i.e.,  $\varepsilon_t \sim (0, \sigma^2)$ . For Granger causality in the ECM equ. (2) can be rewritten as

$$\Delta ChnXUS_t = \sum_{i=1}^p \beta_{1i} \Delta Asia8XChn_{t-i} + \sum_{j=1}^q \beta_{2j} \Delta ChnXUS_{t-j} + \eta_1 e_{t-1} + \varepsilon_{1t} \quad (2a)$$

$$\Delta Asia8XChn_t = \sum_{i=1}^r \beta_{3i} \Delta Asia8XChn_{t-i} + \sum_{j=1}^s \beta_{4j} \Delta ChnXUS_{t-j} + \eta_2 e_{t-1} + \varepsilon_{2t} \quad (2b)$$

The unidirectional Granger causality is running from Asia8's export to China to the direction of China's export to the US provided at least one  $\beta_{1i} \neq 0$ , while the unidirectional Granger causality is running from China's export to the US to the direction of Asia8's export to China if at least one  $\beta_{4j} \neq 0$ . There is a bidirectional causality provided both have at least one non-zero coefficients in both the equations.

### 3. Results and discussion

Basic statistical measure of integration or association is correlation among the variables. In this context this study measures the correlation coefficients for China and Asia8 countries. The economic integration should be measured as the degree of association among the same variable within the region for the defined period.

### 3.1 Primary Observations

Let examine the China's regional and global integration. Here the basic assumption is that the US represents the rest of the world. Now the paper examines China's export to the US and China's import from Asian8 countries. Fig 1 depicts the China's export to the US and Asia8 export to China during December 2005 – July 2010. It is clear from fig 1 that China's export and import occur simultaneously. There is strong association between China's export to the US and import from Asia8 nations.

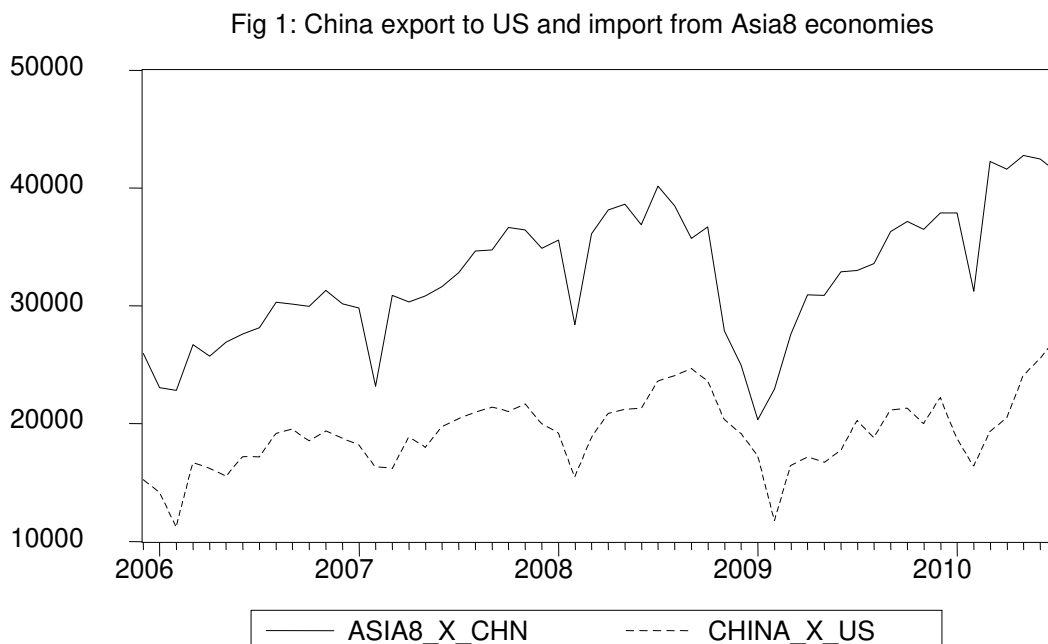


Fig 1 suggests that there is a close coordinated co movement between China's export to the US and China's import from Asia8 nations. So, China's export to the US is closely associated with its import from Asian countries and both China's export and import jointly move over time. The degree of association or correlation between China's export and import

is high and the correlation coefficient is 0.80 (See 2<sup>nd</sup> column last row of Table 1). Table 1 provides the pair wise correlation coefficient matrix. Second column shows the correlation between China's export to the US and China's import from Asian countries. All these nations have strong association with China's export except Philippines. Rest of the columns (3 -10) describe the degree of association or closeness among nations which are exporting to China (i.e., China's import) in the region. Fig 2 also supports these high degrees of association among china's importing countries from the East and South East Asia. These degrees of association measurement are valid for only China's import related economic integration. China is one of the important growing business hubs in this region<sup>8</sup>. Fig 2 shows that the trade pattern from China to the US and that of Asia8 countries in East and South East Asia region to China are very similar. It is clearly visible and noted that there is a co- movement among trade flow from Asia8 to China and that of China to the US.

### 3.2 Basic Results

The paper also examines this co-movement statistically using co-integration techniques. Panel A in Table 2 suggest that China's export to the US and China's import from Asia8 nations is non-stationary. The augmented Dickey Fuller (ADF) and Philips Perron (PP) tests suggest that both the variables follow integration of order one, i.e., I(1).

The LR test indicates two co- integrating equations at 5% significance level. The estimated long run equilibrium relationship between China's export to the US and China's imports from Asia8 countries is

$$ChnXUS_t - 0.3412 * ChnMAsia8_t - 8181.02 = 0.$$

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<sup>8</sup> Other most important business hubs are Hong Kong and Singapore.

This suggests that there is a direct relationship between China's export to the US and China's import from Asia8. It is true that China integrates the East and South East Asia with the rest of the world. China plays a crucial role and connects Asia into the global market. This economic integration was successful only through adaptation of liberalisation policies which actually promoted to develop production network in the region.

### **3.3 Error Correction**

Using vector error correction model (VECM) we observe that all the error correction coefficients are negative and statistically significant. This suggests that if there is any divergence from equilibrium relationship it will come back to the long run equilibrium relation. The error correction coefficient values are the speed of convergence to the co-integrating relation. The speed of error correction in case of China's export to the US is very high (84.8%) while China's import from Asia8 is just in time. So the speed of China's import from Asia8 is faster than that of China's export to the US.

Vector error correction model (VECM) also provides the vector autoregressive (VAR) structure. From this estimated VAR structure the paper observes that China's export to the US follows autoregressive (AR) only, while China's import from Asia8 follows AR (1) and also depends on China's export to the US (Table 3). In terms of Granger causality, China's export to the US is the cause of China's import from Asia region. Here, Granger causality is unidirectional running from supply (export to the US) to demand (import from Asia8). In other words, the world demand stimulates to raise China's supply to the rest of the world. China's supply creates the demand for inputs in Asia region. This induced demand actually integrates the nations within region and involves in production network through trade liberalisation.

### 3.4 Analysis

Let  $r_t$  and  $r_t^*$  denote the change of China's export to the US and change of China's import from Asia8 countries, respectively. From Table 3, on the basis of statistical significance the estimated VAR structured equations are  $r_t = 0.349 r_{t-3} + \varepsilon_{1t}$  and  $r_t^* = 0.929 r_{t-1} - 0.857 r_{t-1}^* + \varepsilon_{2t}$  where  $\varepsilon_{1t}$  and  $\varepsilon_{2t}$  are white noise terms with zero expectations and constant variances. These equations take specific form depending on the statistical significance of individual parameters of VECM. Thus, the change of China's export to the US follows autoregressive form but statistically significant autoregressive lag is three month. The change of China's import from Asia8 countries is also autoregressive form and also depends on the change of China's export to the US. Both statistically significant lags are one month. If there is any disturbance in China's export to the US it affects the export to the US as well as China's import from Asia8. It should be noted that if any shock in China's import from Asia8 it affects import only, not export. So, the direction of causality is running from China's export to the US to China's import from Asia8. In other words, Asia8's export to China will be affected if China's export to the US is disturbed.

### 4. Conclusion

China is emerging as a giant in Asia as well as in the world economy. China is a major economic hub in the world and plays important role in the international economy. From the findings it is clear that China has double role in international trade – first it attracts inputs from the East and South East Asia region and secondly pushes the products in international market with a comparative advantage in price competition. This is possible because China is economically integrated with region and the world as a whole. Co-integration technique provides the economic integration of China's export to the US and its import from East and

South East Asia. The error adjustments suggest that the speed of China's import from Asia is faster than that of China's export to the US.

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Table 1: Pair wise Correlation Coefficients

	CHINA_X_US	HONGKONG_X_CHN	INDONESIA_X_CHN	KOREA_X_CHN	MALAYSIA_X_CHN	PHILIPPINES_X_CH	SINGAPORE_X_CHN	THAILAND_X_CHN
	1	2	3	4	5	6	7	8
CHINA_X_US	1							
HONGKONG_X_CHN	0.85	1						
INDONESIA_X_CHN	0.57	0.63	1					
KOREA_X_CHN	0.70	0.80	0.86	1				
MALAYSIA_X_CHN	0.67	0.75	0.83	0.93	1			
PHILIPPINES_X_CH	0.31	0.29	0.06	0.21	0.05	1		
SINGAPORE_X_CHN	0.70	0.73	0.67	0.84	0.75	0.49	1	
THAILAND_X_CHN	0.66	0.77	0.88	0.92	0.90	0.14	0.74	1
Asia8	0.80							

Table 2: Unit root test and Co-integration

A: Unit Root Test				
Variables	ADF		PP	
	Level	1 <sup>st</sup> Difference	Level	1 <sup>st</sup> Difference
Chnxus	-3.05	-3.514**	-3.03	-10.8***
ChnmAsia8	-2.71	-3.904**	-2.945	-9.15***
B: Co-integration Test				
Null Hypothesis	Eigen value	LR	Critical Value at 5% level	Critical Value at 1% level
Ho: r = 0, Vs H1: r ≤ 1	0.329107	26.86775***	15.41	20.04
Ho: r = 1, Vs H1: r ≤ 2	0.119858	6.511291**	3.76	6.65

Note: ‘\*\*\*’ and ‘\*\*’ indicate the level of significance at 1% and 5%, respectively.

Table 3: Estimated Results of Vector Error Correction Model

Cointegrating Eq:	CointEq1	
CHINA_X_US(-1)	1	
ASIA8_X_CHN(-1)	-0.3412*** (-6.33)	
C	-8181.018	
Error Correction:		
	D(CHINA_X_US)	D(ASIA8_X_CHN)
CointEq1	<b>-0.848***</b> (-3.61)	<b>-1.478***</b> (-3.58)
D(CHINA_X_US(-1))	0.249 (1.02)	<b>0.929**</b> (2.17)
D(CHINA_X_US(-2))	0.275 (1.2)	0.153 (0.38)
D(CHINA_X_US(-3))	<b>0.349**</b> (2.02)	0.1049 (0.35)
D(ASIA8_X_CHN(-1))	-0.1045 (-0.73)	<b>-0.857***</b> (-3.39)
D(ASIA8_X_CHN(-2))	-0.096 (-0.63)	-0.24 (-0.88)
D(ASIA8_X_CHN(-3))	-0.0487 (-0.41)	-0.071 (-0.34)
C	139.756 (0.59)	421.36 (1.007)
R-squared	0.382601	0.357382
Adj. R-squared	0.284378	0.255147
Sum sq. resids	1.23E+08	3.82E+08
S.E. equation	1673.660	2946.900
Log likelihood	-455.4253	-484.8439
Akaike AIC	-455.1176	-484.5362
Schwarz SC	-454.8174	-484.2360
Mean dependent	205.2308	281.7115
S.D. dependent	1978.451	3414.524
Determinant Residual Covariance		1.19E+13
Log Likelihood		-930.4586
Akaike Information Criteria		-929.7663
Schwarz Criteria		-929.0909

Note: (i) Figures in parenthesis are t- values. (ii) '\*\*\*' and '\*\*' indicate the level of significance at 1% and 5%, respectively.

Fig 2: China exports to US & imports from Asia8 region

