The location substitution effect: does it apply for China?

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Abstract

The notion about China being factory of the world is changing. Factories in China are shifting their production base to neighboring Asia, primarily because of higher input costs in China, a volatile Chinese exchange rate, Chinese exports being increasingly targeted by its major trading partners, and a fall in price-competitiveness in producing in mainland China. We examine the location substitution effect for China: Chinese firms are exporting primary, intermediate and machinery items, meant for producing final output elsewhere. Results suggest Chinese firms are increasingly substituting their production base outside China.

Key Words: Trade, Foreign Direct Investment, China, GMS

JEL Classification: F14, F15, F21

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1. INTRODUCTION

China is the second largest economy in the world after the US. Trade account for around seventy percent of China's gross domestic product (GDP), making it an important component of national income. The reason for success, especially in trade, has to do with the fact that China imports primary and intermediate goods from neighboring Asia, assembles them in the factories of coastal provinces, such as Guangdong, and transport these assembled products through its port at Hong Kong and Shenzen, to destinations such as in Europe, and the USA. Most of these intermediate inputs are manufactured in Thailand, Myanmar, and Viet Nam, which are finally used for producing Chinese made electronic items. China's trade pattern, which is, maintaining trade surplus with the EU and the US, whereas, maintaining trade deficits with Japan, Taiwan, South Korea, and the ASEAN – supports the proposition that China is "factory of the world." In fact, studies have shown there is an increase in foreign content for Chinese exports. Assembling, and processing of imported inputs meant for re-exports account for about half of China's foreign trade (Hummels et al., 2001; Koopman et al., 2008). Higher foreign content of its exports is due to vertical intra-industry trade[3] which has grown manifold in China, and possibly may have been responsible for its diverse exports base, from electronics and machinery to textile and apparel (Fukao et al., 2003; Ando, 2006; Gaulier et al., 2007).

Table 1: China's Merchandize Trade (in 100 million US $)

Country or Region	2008			2009		
	Export Value	Import Value	Trade Surplus	Export Value	Import Value	Trade Surplus
EU	2929	1327	1602	2363	1278	1085
USA	2523	814	1709	2208	774	1434
ASEAN	1141	1170	-29	1063	1067	-4
Japan	1161	1507	-346	979	1309	-330
South Korea	740	1122	-382	537	1026	-489

Sources: Statistical Communiqué of the PRC on 2008 and 2009

[3] Vertical integration happens when a firm controls several steps in the production and distribution process, such as a firm having its own supply and distribution facilities. According to Ando (2006) the explosive increase in vertical intra-industry trade in East Asia is largely due to the expansion of back-and-forth transaction in vertically fragmented cross-border production process.

However, recently this notion about China being factory of the world is changing. Factories in China are shifting their production base to neighboring Asia, primarily because of higher input costs in China, a volatile Chinese exchange rate, Chinese exports being increasingly targeted by its major trading partners, and a fall in price-competitiveness in producing goods in mainland China. Pushed by these domestic disadvantages and external restrictions, and helped by change in government policy to circumvent such problems, there has been industrial restructuring in the form of diversification of production base of some of the products to cheaper overseas destinations. This has been part of 'going global' strategy that has lead to offshore equity investments and acquisitions. Such an effect relating to the shift in production location from home country to cheaper overseas locations (also known as 'location substitution effect'), is possible for firms in China because their method of production – particularly the low-and-medium technology products that can be easily replicated in other developing countries. If China were to shift its factories outside China, we would expect that China is exporting primary, intermediate and machinery items, to neighboring Asia, and importing finished manufactured items from them. In this paper, we examine this hypothesis, that is, 'location substitution effect' with respect to Chinese investment in the Greater Mekong Sub-region (GMS).[4] Although Chinese companies are investing in countries around the globe, GMS is a natural choice given their geographical proximity to China, and free trade agreements that prevail between countries in the GMS and China. Result suggests China is exporting intermediate inputs and machinery, and in turn expanding manufacturing base in the GMS to produce final manufactured goods there. Similarly, if the 'location substitution effect' is at play, then China's imports from the GMS should ideally comprise of final manufactured items. Our result also supports this.

This aspect about examining 'location substitution effect' has not been considered before, and this study fills this gap. In the light of growing literature commenting about volume, and direction of intra-GMS trade, and GMS trade with China (Banik, 2011) in this paper we focus on the 'location substitution effect' for Chinese firms. Through this study we expect to complement an important aspect of new trade theory, which suggests, a way to explain vertical intra-industry trade is to look at the extent of firm-level heterogeneity. Extent of heterogeneity within any given industry affects outsourcing decision – with high productivity firms sourcing intermediate inputs

[4] GMS comprises of Yunnan and Guangxi province of Peoples Republic of China (PRC), Thailand, and CLMV (Cambodia, Lao People's Democratic Republic, Myanmar, and Vietnam) countries. The GMS is a natural economic area bound together by the Mekong River.

in international markets, and multinational firms with heterogeneous productivity self-select into different host countries (Helpman, 2006; Castellani et al., 2010; Chen and Moore, 2010). Therefore, this study will also help to understand changing nature of international trade and investment linkages. The rest of the paper is organized as follows. Section 2 documents reasons for China to relocate its production base. Section 3 deals with methodology, and data used for this study. Section 4 contains results. And, we conclude in section 5.

2. CHINA'S COMPETITIVE DYNAMICS

Before empirically examining the applicability of 'location substitution effect' for the Chinese firms we discuss what are the factors that are motivating the Chinese firms to relocate their production base outside mainland China.

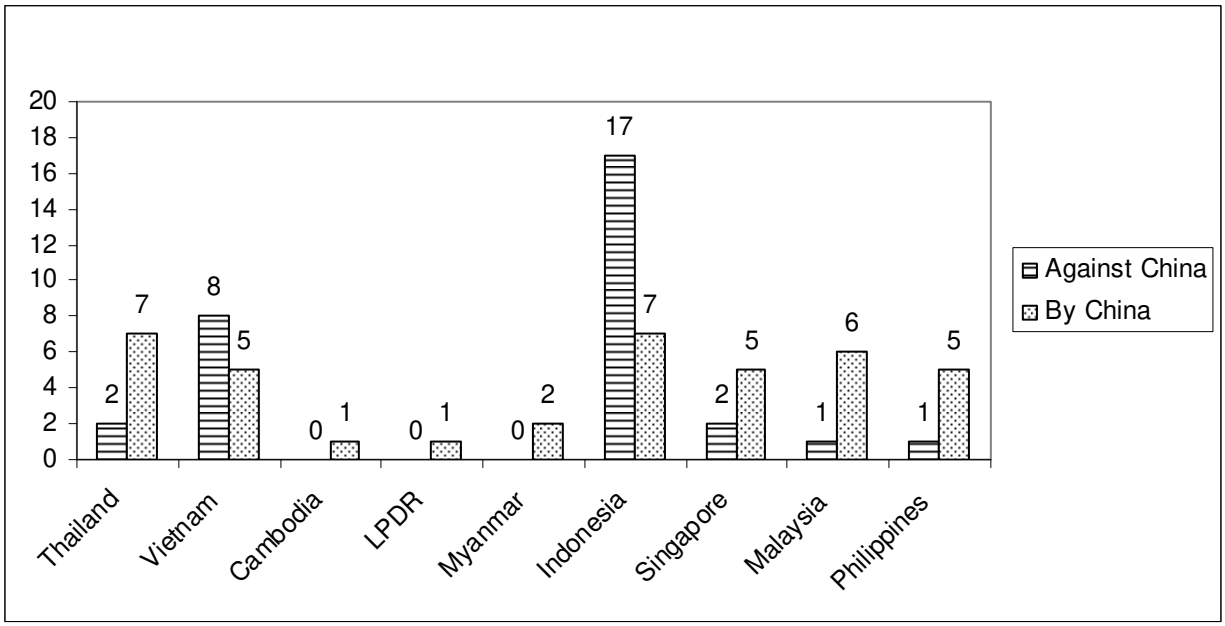
Economic Crisis and the Chinese Exports

The financial crisis since 2007 has seriously affected world trade, with some governments resorting to protectionist measures, such as antidumping and countervailing measures to protect their domestic industries. It is no surprising to see that such protectionist measures is hurting China the most, especially because during 2008 and 2009, Chinese exports value ranked highest in the world. During 2008, Chinese exports to the EU, and the US fell by 19.4 per cent, and 12.5 per cent, respectively. China's trade surplus fell from US$ 298.1 billion in 2008 to US$ 195.8 billion in 2009.

Global Trade Alert database (a database tracking number of protectionist measures imposed around the world) has indicated that as many as 659 measures have been initiated against the Chinese exports in 2009. Most of these measures (numbers of measures initiated are indicated in parenthesis) have originated from – Russia (31), Germany (18), France (16), United Kingdom (17), Spain (16), Italy (15), Netherlands (15), Sweden (13), Austria (13), Belgium (13), Finland (13), in Europe, and USA (9).

Chinese firms are looking for an alternate production base to evade such protectionist measures. Given their geographical proximity, the GMS member countries become a natural choice. Figure 1 shows when it comes to imposition of protectionist measures, the ASEAN member countries are much less hostile towards Chinese exports in comparison to the EU, and the US.

Figure 1: Number of Measures against (and by) China



Source: Global Trade Alert, November 2010.

Higher Input Cost

The China growth story is still intact making it a favorable destination among the foreign fund managers. Last year, China has received more foreign fund - much higher than any of other four emerging economies in the BRICS group, comprising of Brazil, Russia, India, and South Africa. The expectation about future appreciation of Chinese renminbi also has been responsible for enhancing inflow of foreign funds. Chinese central bank has been frantically trying to keep renminbi from appreciating further by actively intervening in the foreign exchange market. Active intervention in the foreign exchange market has resulted in inflation (Zhang, 2009). In addition, wages of migrant workers, land, property rents, and power prices, have all registered an increase. Measured on a year-over-year basis, as of November 2010, labor costs have gone up by 21 per cent, and the home prices across 70 cities in China have gone up by 7.7 per cent. 2010 estimates suggest minimum annual wage rates for Cambodia, Laos, and Viet Nam are US$ 600, US$ 434, and between US$ 1200-1500, respectively. If one were to add the mandatory welfare allowances to the minimum annual wage rates, then the Chinese labor costs are at least double compared to laborers in other regions in south-east Asia (Devonshire-Ellis, 2011).

Li and He (2007) provide evidence about foreign fund entering into the real estate sector. What is worrisome is that property prices are rising despite the government having ownership right for land – indicating possible real estate bubble. China has also imposed stricter pollution control norms on its industries, raising the marginal cost of producing goods in China, further.

Hence, Chinese firms stand to gain by shifting production base to the neighboring south-east Asian, with a lower production cost. Also, as Chinese currency has been appreciating since 2005, and with an expectation that it will appreciate further, there is a likelihood of Chinese exports becoming costlier. Chinese firms can gain by importing raw material (as imports become cheaper when currency appreciate), and use this imported raw material to produce finished goods outside China.

Access to a bigger market

Trade and investment measures undertaken in the south-east Asian region are non-discriminatory and complementary in nature. These nations are increasingly driving down differences among each other by reducing tariffs, and other border costs. Most of the items are traded at zero tariffs among the member countries. Thailand, Laos, Cambodia, Viet Nam, and Myanmar are all part of ASEAN. As on 1 January 2010 duties on 99.65 per cent of all tariff lines under the Common Effective Preferential Tariff Scheme for the ASEAN Free Trade Area have been eliminated. For the newer ASEAN Member States – Cambodia, Laos, Myanmar, and Viet Nam – 98.96 per cent of total tariff lines are within the tariff of 0 to 5 per cent range. Since October 2003, China and Thailand have taken lead in implementing zero tariffs on agricultural products, covering 200 types of fruits and vegetables. China has also granted zero tariffs treatment to Cambodia (83 products), Laos (91 products), and Myanmar (87 products). Free market access for Chinese exports into this region means a larger market share for their manufacturers.

Inflation, Exchange Rate Appreciation and External Price Competitiveness

Rapid economic growth in China over the last two decades has been accompanied by a surge in foreign capital inflows both in current and capital accounts (the 'twin surpluses'), causing a massive accumulation of foreign exchange reserve (US$ 2.65 trillion by September 2010).[5]

[5] China's entry into WTO in 2001 has made it easy for many multinational firms to invest in China, an attractive investment destination (He and Lyles, 2008).

Accumulation of foreign exchange reserve has its own risks, including the cost of holding in low yielding financial assets of foreign governments. Before the global economic crisis started, China has invested a major portion of their trade surplus in US dollars and Euro-denominated assets. Values of these assets are now falling because of Federal Reserve in the US, and European Central Bank in the EU, are printing too much money. In fact, USA is investing in assets in China, and other emerging economies in Asia through Foreign Direct Investment (FDI) route, thereby exporting inflation (Banik, 2011). The EU, and the US still remain the largest investors in China. Such investment is leading to accumulation of foreign currencies, making it difficult for the Chinese monetary authority to prevent growth of 'excess liquidity'. A part of this excess liquidity is finding its way into the Chinese stock market, further accelerating inflation (Li and He, 2007). In fact, for the period between 1980 and 2002, pass through effect of exchange rate translating into higher domestic price was much less in comparison to the period after 2002 (Yu, 2007).

The People Bank's of China want to curb this inflation by formulating contractionary monetary policy, raising the interest rates. The rise in interest rates in China relative to the US in recent years has accentuated the inflow of capital. The appreciation of Chinese renminbi alongside with an increase in inflation has hurt Chinese external competitiveness. Following goods market approach of determining the value of exchange rate, we define external competitiveness of any country, as the difference between domestic inflation and movement in exchange rates. As is evident from Table 2, China's external competitiveness fared reasonably well against many of the GMS countries until 2006 but has started to fall thereafter, especially, since 2007. For example, in 2007, Vietnam and Cambodia, have shown better external price competitiveness. In particular, in 2009, Thailand, and Cambodia, has done better relative to China in terms of price competitiveness. Starting 2000, price competitiveness is declining for China. This is going to hurt price elastic low technology intensive exports, such as leather foot ware, and apparel. In fact, share of these items has fallen in total exports (Amiti, and Freund, 2008). The fall in price competitiveness has also motivated Chinese firms to relocate their production base outside China.

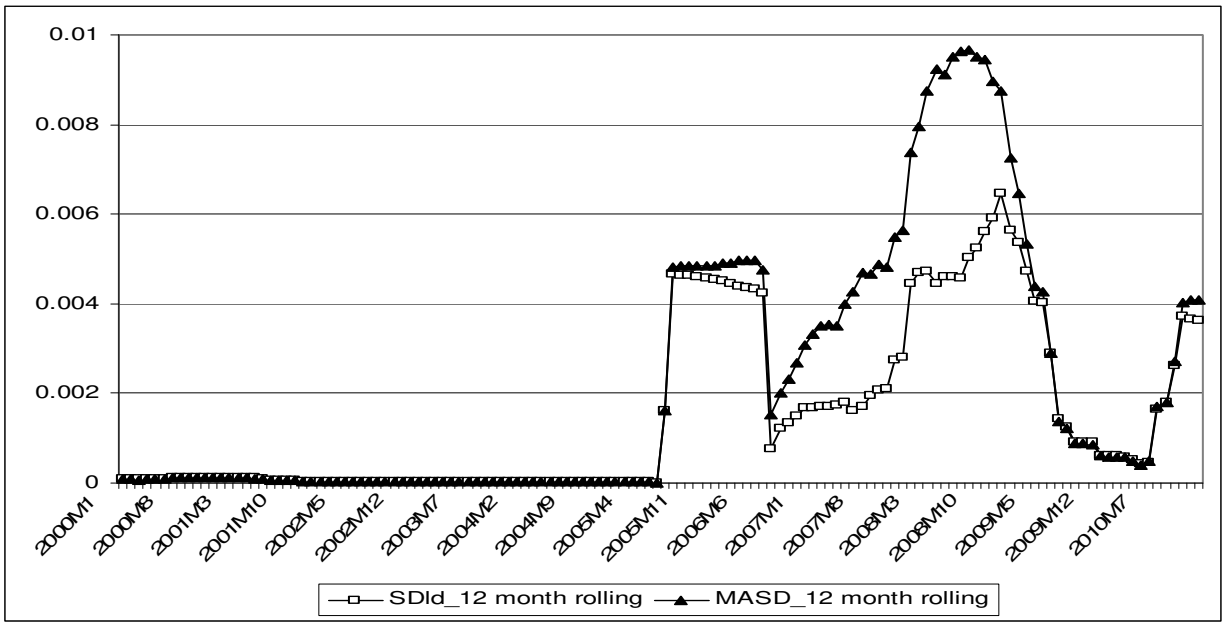
Table 2: External Competitiveness (change in price – change in nominal exchange rate)

Year	China	Thailand	Vietnam	Cambodia	Laos
2000	0.25	-4.49	-3.32	-1.66	14.02
2001	0.74	-9.14	-4.37	-2.57	-5.71
2002	-0.76	4.01	0.07	3.33	-1.67
2003	1.15	5.24	1.71	-0.36	10.39
2004	3.89	5.80	6.23	2.84	10.31
2005	2.82	4.55	7.56	4.45	6.51
2006	4.16	10.45	6.53	5.88	11.45
2007	9.34	11.16	7.61	8.82	10.00
2008	14.53	8.89	21.89	25.05	16.57
2009	0.98	-3.77	2.38	-2.76	2.64

Note: Higher values indicate fall in competitiveness.
Source: Calculated from International Financial Statistics, International Monetary Fund.

In addition to, higher inflation rates and interest rates, the Chinese renminbi has also become more volatile. Once the longstanding peg to the US dollar was abandoned in July 2005, the renminibi-dollar exchange rate has shot-up, appreciating by about 20 percent, (Figure 2).

Figure 2: Volatility of RMB-dollar Exchange Rate



Source: Calculated from International Financial Statistics, International Monetary Fund.
Note: Volatility is calculated using (a) the standard deviation of the first difference of the log of monthly exchange rate (SDld), and (b) the moving average standard deviation (MASD) of the log of (monthly) exchange rate. Such measures have been used for studying the impact of exchange rate volatility on exports (See Tenreyro, 2007; Chit et al., 2010).

Exchange rate volatility can have negative effect on international trade, directly through uncertainty and adjustment cost, and indirectly through its effect on allocation of resources (Côte, 1994).

3. METHODOLOGY AND DATA

Trade flows are usually explained using the gravity model. The original application of the Newtonian law of gravity in the field of economics goes back to the work of Tinbergen (1962), Poyhonen (1963), and Linnemann (1966) suggesting that bilateral trade between two nations is positively related to their national income and inversely related to the distance between them. Although backed by little economical underpinning, these early models became popular because of their prognostic nature in explaining trade flow. Later, however, economists have worked on building a theoretical (microeconomic) foundation for the gravity model (Anderson 1979; Bergstrand 1985; Deardorff 1998).[6] For this study, to examine the location substitution effect for China, we use a variant of the gravity model. The idea is like this. When it comes to final manufactured exports originating from the GMS, China is likely to gain prominence in comparison to rest of the world (ROW) for final goods. Likewise, for primary resource base exports, and intermediate and machinery exports, entering GMS, China is likely to emerge as major exporter vis-à-vis ROW. For the purpose of our analysis, we categorize the commodities into three groups, namely, primary and resource based, intermediate and machinery, and final manufactured goods (See, Appendix). For this classification, we use SITC Revision 3 at a two-digit level, and examine trade flows between China and the GMS countries in these three respective categories.

Data Source: Data on trade (both exports and imports) between China and individual countries within GMS are obtained from the United Nations COMTRADE database. Trade figures are reported in constant US dollars for each country, and all its trading partners. The data are available annually and involve trade values of five GMS countries, namely, Thailand, Vietnam, Cambodia, Laos, and Myanmar, with China and ROW.[7] For any GMS country, ROW trade figures are derived by deducting China's trade figures from world trade figures. The time period

[6] For more discussion on the theory of the gravity model, see Anderson and van Wincoop (2004).
[7] Imports data for Myanmar are not available. Accordingly, we have to exclude Myanmar from the import equation.

is between 2000 and 2009. We choose this time period because GMS initiative was undertaken only starting early 2000, and there were considerable trade integration happening in this region (through tariffs reduction) during this period.

For commodity classification into primary, intermediate, and final manufactured items, we have followed the classification put forward by Lall (1998, 2000). Our primary and resource based group contains items falling under SITC headings 0 to 4. Intermediate and machinery items fall under SITC headings 5, 6, 7, and 8, whereas, the final manufactured items falls under SITC headings 7, and 8.[8] To arrive at overall primary and resource base, intermediate and machinery, and final manufactured exports, we aggregate trade values for all commodities falling under each one of these three categories.

Estimation: We estimate the following equations:

$$X^{t}_{iROW} = \beta_1 PR^{xt-1}_{ic} + \beta_2 IM^{xt-1}_{ic} + \beta_3 FM^{xt-1}_{ic} + \beta_4 GDP^{t-1}{}_{w} + \beta_5 E_{t-1} + D_i + \varepsilon^{t}_{i} \quad \ldots\ldots (1)$$

$$M^{t}_{iROW} = \gamma_1 PR^{mt-1}_{ic} + \gamma_2 IM^{mt-1}_{ic} + \gamma_3 FM^{mt-1}_{ic} + \gamma_4 GDP^{t-1}{}_{GMSi} + \gamma_5 E_{t-1} + D_i + \varepsilon^{t}_{i} \quad \ldots\ldots (2)$$

where, X^{t}_{iROW} is total exports from country *i* within GMS to ROW at time period *t*, whereas, PR^{xt-1}_{ic} stands for primary and resource based exports of this *i*th country to China (subscript *c* stand for China), IM^{xt-1}_{ic} stands for intermediate and machinery exports to China at time period *t*, and FM^{xt-1}_{ic} stands for final manufactured goods exports to China at time period *t-1*. These three subcategories (primary, intermediate, and final) will therefore add up to total exports of GMS countries to China. Likewise, for the imports equation we have M^{t-1}_{iROW} as *i*th country's imports from ROW, and PR^{mt-1}_{ic}, IM^{mt-1}_{ic}, FM^{mt-1}_{ic} are *i*th country's imports of primary, intermediate, and final manufactured goods from China at time period *t-1*. GDP_w in the exports equation refer to world GDP, which is a proxy for world demand for GMS exports. Likewise, demand for imports from ROW also depends upon economic condition in the GMS. It is captured through GDP_{GMSi}, referring to GDP of *i*th country within GMS. E stands for nominal exchange rate. To avoid endogeneity, GMS trade with ROW is regressed against lagged value of primary, intermediate, and final items, trade with China. It is to be noted, for exports, or imports, adding GMS trade

[8] For a detail classification, see the Appendix. SITC headings 7 and 8, contains both final manufactured items, and intermediate and machinery items. Machinery items are not classified as final manufactured items.

figures with ROW with GMS trade with China will give total trade figures for the GMS countries. However, since we are regressing against the lagged figure we are saying this years GMS trade with ROW is dependent on last years GMS trade with China. D_i represents country specific dummies, and ε_i^t is the disturbance term. For each one of these variables superscript *t* stands for time. All the variables, except for the dummies, are reported in log.

If the coefficients, $\beta_1,\ldots,\beta_4$, and $\gamma_1,\ldots,\gamma_4$, are positives and less than unity it imply, a rise in GMS trade with ROW of the world will also be reflected through a rise in trade with China. However, for each percentage point increase in trade with China, GMS trade with ROW to increase less than proportionately. In case the coefficients are negatives and less than unity, it imply a rise in trade with China is coming at the expense of a fall in trade in ROW. If location substitution effect is at play, we would expect either of these two things to happen, suggesting the importance of China in the GMS trade.

Coming back to the model, in a panel framework, the term ε_{ij}^t captures both country specific (cross sectional) and temporal effects at time *t*. A general expression for ε_{ij}^t is: $\varepsilon_{ij}^t = \gamma + \alpha_j + \mu_t + \eta_{i,j,t}$, where, $\gamma + \alpha_j$ can be thought of as a country specific intercept; μ_t capture time effect, and $\eta_{i,j,t}$ the overall purely random disturbance term.[9] The combined, time, and country specific fixed effect terms eliminate an omitted variables bias arising both from unobserved variables that are constant over time and from unobserved variables that are constant across countries.

If $\gamma + \alpha_j$ is observed for all countries, then the entire model can be treated as an ordinary linear model and fit by least squares. For the purpose of estimation we consider the least square dummy variable fixed effect model. If $\gamma + \alpha_j$ contains only a constant term, then the ordinary least squares estimation provides consistent and efficient estimates for the common intercept terms, and the slope vectors. However, in presence of other explanatory variables (as in the present case), classic pool, that is, modeling without dummy variables will lead to inefficient estimate. So we use country specific dummies to capture individual country characteristics. As we consider all the countries within GMS there is no necessity to undertake random effect modeling (where it is assumed we are randomly selecting few sample countries from the GMS

[9] We use j-1 dummies to avoid dummy variable trap.

population).[10] As *N* in our case is small (cross sectional elements comprise of five different countries), the dynamic panel approach of generalized method of moments (GMM) estimation techniques, which are expected to yield more consistent estimates in presence of infinite *N*, are also not considered.[11]

4. RESULTS

Table 3: Exports dynamics

Dependent variable: Total Exports value of GMS countries to the rest of the world	
Independent Variables	Coefficients
Constant	-41.1220***
	(5.8809)
GMS Primary and Resource Based Exports to China	-0.1722*
	(0.0864)
GMS Intermediate and Machinery Exports to China	0.0754***
	(0.0176)
GMS Final Manufactured Exports to China	0.1000***
	(0.0184)
GDP rest of the World	1.7383***
	(0.1975)
Exchange Rate	0.8529***
	(0.2444)
Dummy Thailand	9.0195***
	(1.3632)
Dummy Vietnam	3.1438***
	(0.3259)
Dummy Cambodia	1.9559***
	(0.2668)
Dummy Myanmar	8.0154***
	(1.7880)
Diagnostic Statistics	
F Test	1486.37***
Adjusted R^2	0.99

*** significant at 1%, ** significant at 5%, * significant at 10%
Explanatory variables are lagged by one year. All variables except dummies are in log. Figures in the parenthesis are standard errors.

[10] In fact, fixed effect and random effect are going to yield similar results when all samples in the population are used for regression.
[11] For more on the application of GMM techniques in the context of gravity equation see Arellano and Bond (1991) and Blundell and Bond (1998). This is a widely acknowledged use of GMM techniques in the presence of a lower number of N which may increase the finite sample bias.

Table 4: Imports dynamics

Dependent variable: Total Imports value of GMS countries from rest of the world	
Independent Variables	Coefficients
Constant	-2.9732
	(16.2149)
GMS Primary and Resource Based Imports from China	-0.5007*
	(0.2417)
GMS Intermediate and Machinery Imports from China	0.7217*
	(0.3570)
GMS Final Manufactured Imports from China	-0.7735***
	(0.2086)
GDP of the GMS country	1.4173**
	(0.5964)
Exchange Rate	-0.3497
	(1.1443)
Dummy Thailand	1.5502
	(5.3682)
Dummy Vietnam	4.6933**
	(1.7932)
Dummy Cambodia	1.9533**
	(0.8396)
Diagnostic Statistics	
F Test	633.89***
Adjusted R^2	0.99

*** significant at 1%, ** significant at 5%, * significant at 10%
Explanatory variables are lagged by one year. All variables except dummies are in log. Figures in the parenthesis are standard errors.

The above two tables provide evidence about growing intra-industry trade with respect to primary resource base items, intermediate and machinery items, and final manufactured items. Most of the trade happening between China-Thailand and China-Viet Nam relates to intermediate and machinery items in the capital goods sector, such as office machines, electric machines, and machinery equipments for white goods (essentially consumer durables like mobile phones, air conditioners, computers, and so on). It also involves trade in final manufactured items such as road vehicles, air conditioners, apparels, etc. For the intermediate and machinery items, in both the exports, and the imports equation, the coefficients are positive and less than one. It implies for this category, for each percentage point increase in trade with China, GMS trade with ROW increases less than proportionately. For the final manufactured imports from China, the coefficient is negative, and less than unity, suggesting that for each percentage increase in trade with China, there will be a fall in trade with ROW. For the final manufactured

exports to China the coefficient is positive but is less than unity. Most of the office machines and electrical machineries that Thailand exports, and most of the motorcycles that Viet Nam sells are made with Chinese machinery inputs. Similarly, we find evidence in favor of trade happening in primary and resource base items. China is a major buyer of energy and food items from the GMS region. Laos has been supplying hydroelectric power to China, Viet Nam has been supplying petroleum and petrol products to China, and Cambodia and Myanmar supplying agricultural and meat items to China. Similarly, China is exporting primary items like textile yarn – an input for manufacturing garments in Cambodia and Myanmar (Banik, 2011). In fact, with respect to primary and resource base trade, the coefficients in both the equations are negative: suggesting that for each percentage increase in GMS trade with China, there will be a fall in trade with ROW. The growth in intra-industry trade in all three categories, sometime at the expense of GMS trade with ROW, reveals the importance of China in GMS trade.

Coefficients related to the world GDP, and GDP of the GMS countries, are statistically significant, and greater than unity. It suggests that the tradables in these regions are income elastics, something that is true for the white capital good items. We do not find evidence about exchange rate to be a significant factor driving GMS imports although it is significant in the case of exports. The insignificant coefficient in the imports function may be because of the fact that most of the trade between China and some of the GMS countries such as Viet Nam and Laos, takes place in Chinese currencies, and not in US dollars (Banik, 2011). In general, the country dummies are statistically significant, again suggesting the importance of China in GMS trade.

5. CONCLUSION

Our results provide evidence about growing intra-industry trade in intermediate machinery items, and final manufactured goods between China and the GMS countries. This may be because of an increase in vertical intra-industry trade between China and GMS countries, involving back-and-forth transaction in vertically fragmented cross-border production process. We also find evidence which support complementarities in primary and resource based trade. Complementarities exist in terms of trade in energy, and food items. Increase income in China has resulted in increase demand for food, meat, and clothing – things that are supplied particularly by Myanmar, Laos, and Cambodia. For instance, Chinese firms are investing in garment manufacturing units in Cambodia and Myanmar. Instances such as in case of garments, and a growing intra-industry

trade in intermediate and final manufactured items, suggest that China is shifting their production base outside mainland China. This is mainly because of higher cost of producing in mainland China (resulting from higher labor, land, and energy prices); and Chinese exports being increasingly targeted by its major trading partners. Chinese firms are circumventing these constraints by shifting their production base to cheaper overseas destination such as in GMS countries. From the policy perspective, Chinese government also stands to gain from such cross border trade and investment decision. Such an investment will not only guarantee access to a more wider market in the ASEAN region, and to rest of the world, but will also imply a more balanced regional growth for China. It is to be noted, that the two provinces, Guangxi and Yunnan of China, which are part of GMS are relatively less developed in comparison to coastal China. A deeper integration with GMS will mean a balance regional growth for China. The integration with GMS comes out natural because of closer proximity to mainland China, better policy coordination among the governments of the GMS countries, and availability of similar technology to replicate medium technology products outside mainland China.

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APPENDIX

Commodity Classification

A.	**Primary and Resource Based**
00	Live animals other than animals of division 03
01	Meat and meat preparations
02	Dairy products and birds' eggs
03	Fish (not marine mammals), crustaceans, molluscs and aquatic invertebrates, and preparations thereof
04	Cereals and cereal preparations
05	Vegetables and fruit
06	Sugars, sugar preparations and honey
07	Coffee, tea, cocoa, spices, and manufactures thereof
08	Feeding stuff for animals (not including milled cereals)
09	Miscellaneous edible products and preparations
11	Beverages
12	Tobacco and tobacco manufactures
21	Hides, skins and fur skins, raw
22	Oil-seeds and oleaginous fruits
23	Crude rubber (including synthetic and reclaimed)
24	Cork and wood
25	Pulp and waste paper
26	Textile fibres (other than wool tops and other combed wool) and their wastes (not manufactured into yarn or fabric)
27	Crude fertilizers, other than those of division 56, and crude minerals (excluding coal, petroleum and precious stones)
28	Metalliferous ores and metal scrap
29	Crude animal and vegetable materials, n.e.s.
32	Coal, coke and briquettes
33	Petroleum, petroleum products and related materials
34	Gas, natural and manufactured
35	Electric current
41	Animal oils and fats
42	Fixed vegetable fats and oils, crude, refined or fractionated
43	Animal or vegetable fats and oils, processed; waxes of animal or vegetable origin; inedible mixtures or preparations of animal or vegetable fats or oils, n.e.s.
B.	**(Industrial) Intermediate and Machinery**
51	Organic chemicals
52	Inorganic chemicals
53	Dyeing, tanning and colouring materials
54	Medicinal and pharmaceutical products
55	Essential oils and resinoids and perfume materials; toilet, polishing and cleansing preparations
56	Fertilizers (other than those of group 272)
57	Plastics in primary forms
58	Plastics in non-primary forms
59	Chemical materials and products, n.e.s.
64	Paper, paperboard and articles of paper pulp, of paper or of paperboard

65	Textile yarn, fabrics, made-up articles, n.e.s., and related products
67	Iron and steel
69	Manufactures of metals, n.e.s.
71	Power-generating machinery and equipment
72	Machinery specialized for particular industries
73	Metalworking machinery
74	General industrial machinery and equipment, n.e.s., and machine parts, n.e.s.
75	Office machines and automatic data-processing machines
76	Telecommunications and sound-recording and reproducing apparatus and equipment
77	Electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof (including non-electrical counterparts, n.e.s., of electrical household-type equipment)
78	Road vehicles (including air-cushion vehicles)
79	Other transport equipment
81	Prefabricated buildings; sanitary, plumbing, heating and lighting fixtures and fittings, n.e.s.
87	Professional, scientific and controlling instruments and apparatus, n.e.s.
89	Miscellaneous manufactured articles, n.e.s.
C.	**Final Manufactured Goods**
61	Leather, leather manufactures, n.e.s., and dressed furskins
62	Rubber manufactures, n.e.s.
63	Cork and wood manufactures (excluding furniture)
66	Non-metallic mineral manufactures, n.e.s.
68	Non-ferrous metals
82	Furniture, and parts thereof; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings
83	Travel goods, handbags and similar containers
84	Articles of apparel and clothing accessories
85	Footwear
88	Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks

All SITC codes except 91, 93, 96 and 97 are included in the analysis.
Source: SITC is provided by United Nations Statistics Division, and is available at:
http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=14