The Location Substitution Effect: Does it apply for China?[1]

Nilanjan Banik[2]

Khanindra Chandra Das[3]

Abstract

The notion about China being factory of the world is changing recently. 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 and intermediate inputs meant for producing final output elsewhere. Results suggest Chinese firms are increasingly shifting (that is, substituting) their production base outside China.

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

JEL Classification: F14, F15, F21

[1] First Draft. Not to be quoted without authors' permission.

[2] Associate Professor, Institute for Financial Management and Research (IFMR), Chennai. All comments to nilbanik@gmail.com.

[3] Research Scholar, Institute for Financial Management and Research (IFMR), Chennai.

1. INTRODUCTION

China is the second largest economy in the world after the US. Trade account for around seventy percent of gross domestic product (GDP) making it an important component in China's income accounting process. The reason for China's success, especially in trade, has to do with the fact that it imports primary and intermediate goods from neighboring Asia, assembles them in the factories of coastal provinces, like, Guangdong, and transports these assembled products through its port at Hong Kong and Shenzen, to destinations, like, the EU 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 the "factory of the world". In fact, studies have shown that there is increase in the foreign content in China's exports (Koopman et al., 2008; Hummels et al., 2001). Higher foreign content of its exports is due to vertical intra-industry trade[4] which has grown manifold in China (Fukao et al., 2003; Ando, 2006; Gaulier et al., 2007).

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, better known as 'location substitution effect', is possible for firms in China because their method of production – particularly the low-and

[4] Vertical intra-industry trade, as opposed to horizontal intra-industry trade, refers to the intra-industry trade where goods are differentiated by quality. It occurs when countries with differences in income distribution have different factor endowments or different technologies in the homogeneous product sector. 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, rather than trade of quality differentiated commodities.

medium technology products – can easily be replicated in other developing countries. If China were to shift its factories outside China, we would expect that China exporting intermediate and primary products 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).[5] 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. Data indicate 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 growth in the volume and direction of intra-GMS trade, and China's trade with GMS highlighted elsewhere (Banik, 2011), in this paper we focus on examining the 'location substitution effect' for Chinese firms. This study could 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 talks about the data source and the methodology used for this study. The results are discussed in section 4. 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

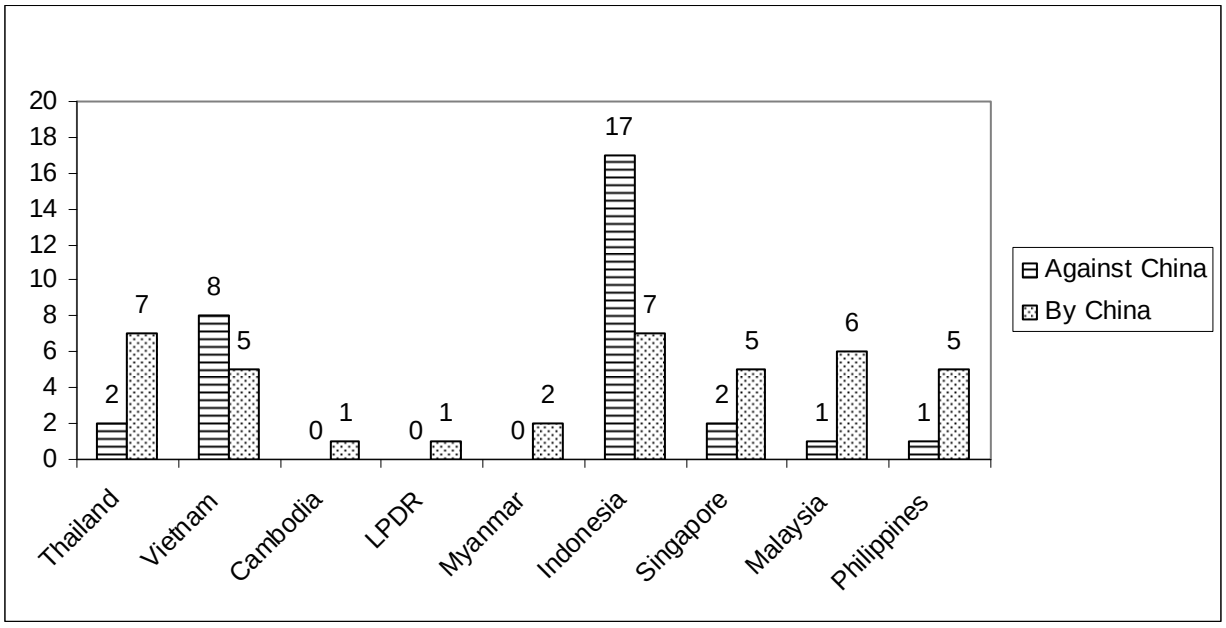
[5] GMS comprises of Yunnan and Guangxi province of Peoples Republic of China (PRC), Thailand, and CLMV (Cambodia, Lao People's Democratic Republic, Myanmar, and Vietnam) countries. These are countries that share the Mekong River.

their domestic industries. It is no surprising to see that such protectionist measures is hurting China the most, especially when for the year 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.

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 (See also, Figure 1). 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). China's trade surplus fell from US$ 298.12 billion in 2008 to US$ 195.84 billion in 2009.

Chinese firms are looking for an alternate production base to evade such protectionist measures. Given its geographical proximity to mainland China, the GMS member countries becomes a natural choice.

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 the favorable destination among the foreign fund managers. Last year, China has received more foreign fund - much higher than any of the BRIC economies. The expectation about future appreciation of Chinese Renminbi has also been an influential factor in 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. However, such active intervention in the foreign exchange market, and increase in income in China, have resulted the economy to heat-up. Wages of migrant workers, land, property rents, and power prices, have all registered an increase. Measured as year on 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). Property prices are also on the rise. 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 as shifting production base to the neighboring south-east Asian region means goods can be produced at a cheaper cost. Also, as Chinese currency has been appreciating since 2005, and with an expectation about future appreciation there is a feeling that price of Chinese exports will become 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 in the form of tariff barriers 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 fruit 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 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).[6] Accumulation of such a huge 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, value of which is now falling. Federal Reserve is printing too much money making the US dollar lose value further. In fact, USA is investing in assets in China, and other emerging economies in Asia through FDI route, thereby exporting inflation (Banik, 2011). The EU and the US still remains some of the largest investors in China. China has actively intervened in its foreign exchange market and accumulating foreign exchange reserves. Such accumulation continues to increase, making it difficult for the monetary authority to prevent growth of 'excess liquidity' for the domestic market leading to resurgence of inflation that results in rise in commodity, and factor prices affecting competitiveness of firms. A part of this excess liquidity found its way into the Chinese stock market further contributing to the inflationary trend (Li and He, 2007).

The People Bank's of China (PBC) wanted 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 accentuates the inflow of capital further. The appreciation of Chinese Renminbi coupled with increase in inflation has hurt Chinese external competitiveness. Following goods market approach of determining the value of exchange rate, we define external competitiveness

[6] China's entry into WTO in 2001 led many MNCs to view China as an attractive place for their foreign subsidiaries (He and Lyles, 2008). As a result there has been outpouring of research on FDI flows to China. Nevertheless, there is less effort aimed at investigating the China's outward investment including in the GMS in South-East Asia.

of any country, as the difference between domestic inflation and movement in exchange rates. As is evident from Table 1, China's external competitiveness fared reasonably well against many of the GMS countries until 2006 but 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, Myanmar, and Cambodia, did well relative to China in terms of price competitiveness. The fall in price competitiveness also motivated Chinese to relocate their production base outside China.

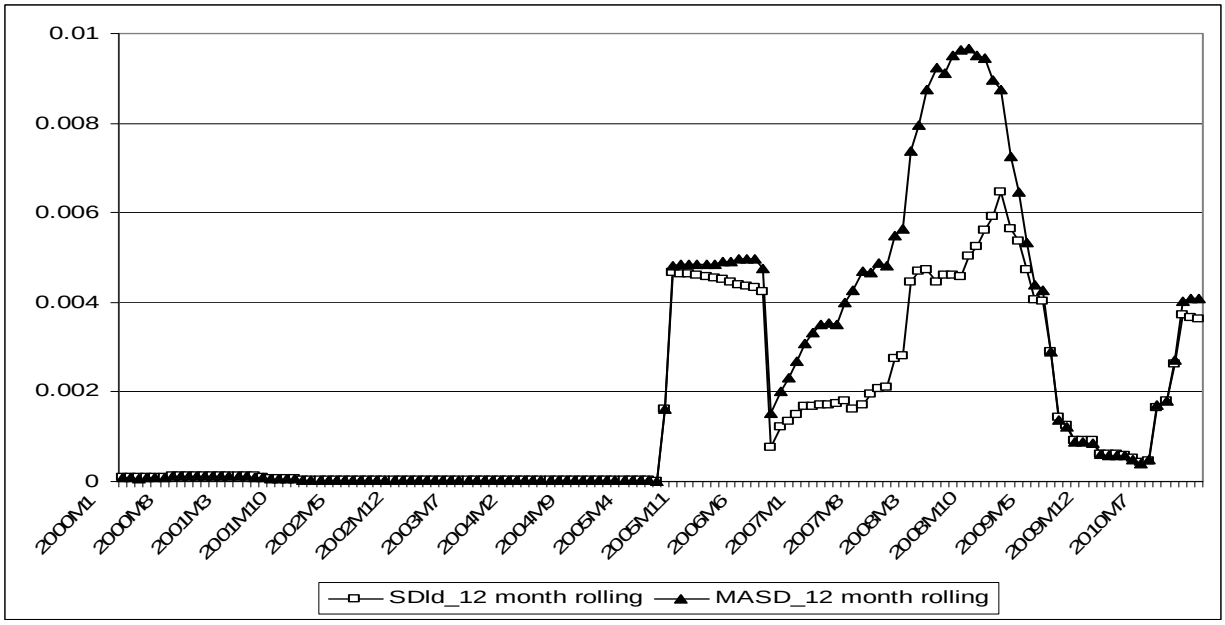
Table 1: External Competitiveness (change in price – change in nominal exchange rate)

Year	China	Thailand	Vietnam	Cambodia	LPDR	Myanmar
2000	0.25	-4.49	-3.32	-1.66	14.02	-3.36
2001	0.74	-9.14	-4.37	-2.57	-5.71	17.08
2002	-0.76	4.01	0.07	3.33	-1.67	58.73
2003	1.15	5.24	1.71	-0.36	10.39	44.15
2004	3.89	5.80	6.23	2.84	10.31	9.97
2005	2.82	4.55	7.56	4.45	6.51	9.11
2006	4.16	10.45	6.53	5.88	11.45	19.60
2007	9.34	11.16	7.61	8.82	10.00	38.90
2008	14.53	8.89	21.89	25.05	16.57	29.90
2009	0.98	-3.77	2.38	-2.76	2.64	-0.98

Note: higher values indicate fall in competitiveness. LPDR refers to Lao People's Democratic Republic
Source: Calculated from International Financial Statistics, IMF.

Also, in addition to higher inflation rates and interest rates, the Chinese Renminbi has also become more volatile. In case of China too the volatility of Renminibi-dollar exchange rate shot-up once the longstanding peg to the US dollar was abandoned in July 2005 (Figure 2).

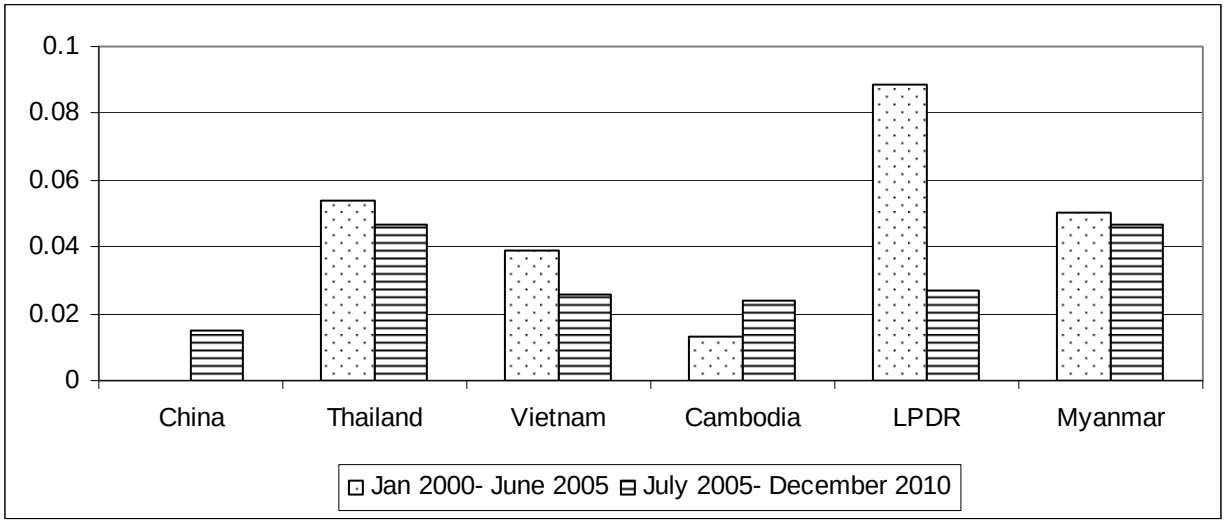
Figure 2: Volatility of RMB-dollar Exchange Rate



Source: Calculated from International Financial Statistics, IMF.
Note: Volatility is calculated using (a) the standard deviation of the first difference of the log of monthly exchange rate (SDld), (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). In particular, SDld = $\sqrt{\sum_{t=1}^{m}(\Delta e_t - \Delta \bar{e}_t)^2/(m-1)}$ where, e is the log of monthly exchange rate and m is the number of months, and MASD = $\sqrt{\sum_{k=1}^{m}(e_{t-k-1} - e_{t-k-2})^2/m}$, where e is the log of monthly exchange rate and m is the order of moving average.

However, the global financial crisis induced the Chinese government to (unofficially) return to the *de facto* US dollar peg. As a result, volatility reduced considerably. China re-abandoned its dollar peg in June 2010 and used a basket of currencies to manage Renminbi exchange rate. Since then the volatility has started rising again. Even though volatility of RMB-dollar exchange rate is not as high as that of the exchange rate of other GMS countries, it is to be noted that has increased significantly since July 2005 (See, figure 3).

Figure 3: Standard Deviation of Change in ln(exchange rate)



Source: Calculated from International Financial Statistics, IMF. Note: Standard Deviation is annualized.

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).[7] For this study we use a variant of the gravity model. Since the objective is to look at composition of trade flows, rather than trade flows *per se*, of China in the context of the GMS region only, thus, we do not use gravity variables in the model. For the purpose we have categorized the commodities into three groups (See, Appendix) and

[7] For more discussion on the theory of the gravity model, see Anderson and van Wincoop (2004).

incorporated the trade flows for different groups of commodities, between China and GMS countries, as the main explanatory variable in our equation. We use recent data and try to explain which commodity groups are driving China's export and import in the context of GMS.

For the purpose of our study, that is to capture the composition of trade flow between China and rest of GMS countries, we estimate the equations which take the following forms:

$$X_{ij}^{t} = \beta_1 PR_{ij}^{t} + \beta_2 IM_{ij}^{t} + \beta_3 FM_{ij}^{t} + D_{ij} + \varepsilon_{ij}^{t} \quad \ldots\ldots (1)$$

$$I_{ij}^{t} = \beta_1 PR_{ij}^{t} + \beta_2 IM_{ij}^{t} + \beta_3 FM_{ij}^{t} + D_{ij} + \varepsilon_{ij}^{t} \quad \ldots\ldots (2)$$

where, X_{ij} is the export from country i to country j, I_{ij} is the import of country i from country j, PR is the primary and resource based commodities, IM is the (industrial) intermediate and machinery, and FM is the (industrial) final manufactured goods, D stands for country specific dummy variables and ε_{ij} is the disturbance term. For each one of these variables superscript t stands for the time period 2000–2009. This is the period when a considerable amount of integration has happened in the GMS region. Country i is China (the base country) and country j stands for China's trading partners in GMS namely Thailand, Vietnam, Cambodia, LPDR and Myanmar. China is the largest economy in the region, representing approximately 90 percent of the total GDP in GMS (including entire China's GDP in total GDP of GMS) in 2009.

The expected sign of β_1, β_2 and β_3 are assumed to have positive sign in the export and import equation with higher coefficient representing greater contribution to total (export or import). Since China has been shifting some of the manufacturing activities to the GMS countries; due to location substitution effect i.e. due to increase in input cost, domestic macroeconomic developments and trade barriers; we expect the coefficient of (industrial) intermediate and machinery export to be higher compared to other two categories in the export model. China is expected to import primary and resource based commodities or the final manufactured products which are intensive in resources available in the GMS countries. Therefore, we expect the coefficient of primary and resource based, and final manufactured import to be higher than industrial intermediate and machinery. However, as the manufacturing activities in GMS help process primary inputs to final output, we expect the coefficient of final manufactured imports to be on a higher side in comparison to the other two categories. The dummy variable is expected to capture China's trade relation with the partner countries in the GMS.

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.[8] 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 classic pool, least square dummy variable model (LSDV), and the within transformation model. If $\gamma + \alpha_j$ contains only a constant term, then the ordinary least squares estimation provides consistent and efficient estimates of the common intercept terms and the slope vectors. This is a classic pool model where modeling is done without dummy variables. However, not considering country specific time invariant characteristics seems unscientific and hence country specific dummies to capture such effect are used. This is the LSDV model. However, the problem with modeling in this fashion is a loss in degrees of freedom arising from estimating dummy coefficients. A more efficient way is to use the within transformation model. Here the pooled regression is re-formulated in terms of deviation from the series means leading to disappearance of the intercept terms and the dummies. This model is more efficient than models with dummy variables as it gives *j* degrees of freedom (corresponding to relevant dummies and the intercept term) back with the same parameter estimates. Finally, we consider the random effect model. Unlike in the fixed effect, where the country specific intercept $\gamma + \alpha_j$ is assumed to be fixed, in the random effect model, we assume that it is a random variable with a mean value $\gamma + \alpha = \lambda$ (say), which does not vary across cross section. The intercept value for each cross section can be expressed as $\lambda_{1j} = \lambda_1 + \varepsilon_i$, where ε_i, is a white noise process.

For deriving the independent variables we have aggregated the trade values of traded commodities under three categories (See tables in the Appendix) of goods – primary and resource based, (industrial) intermediate and machinery, and final manufactured goods—at each

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

point in time for export and import separately.[9] While applying regression, dependent and independent variables (trade values of commodities) are standardized by subtracting the mean and dividing by standard deviation for each of the trading partner of China in the GMS. Standardization also helps us to compare the coefficients associated with different group of commodities. The total under the three categories of goods is obtained by aggregating the value of basket of goods in each of the three categories as given in Table 7 & Table 8 in appendix.

Some comments about the methodology issue follow. The coefficients of the explanatory variables across different models in a panel data framework can vary depending on the variance of the individual effects. However, if the variance approaches zero the results of the panel regressions would converge to the ordinary least square estimators. This is because the transformation parameter $\theta = 1 - \sqrt{\sigma_\eta^2 / \sigma_\eta^2 + \sigma_\alpha^2}$ approaches zero. Accordingly, we have used and report results from the classic pool, LSDV, within transformed fixed effect, and random effect model. Furthermore, as our objective is to explain the composition of trade flows hence our model does not include other explanatory variables such as GDP. We worked with finite *N* in the present case and stick to the static panel framework. As *N* in our case is small, 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.[10]

Data Source: Data on trade between China and individual countries in the GMS, both export and import, are obtained from the United Nations COMTRADE database. Trade figures are reported in current US dollars for each country and all its trading partners. However, we standardize the data for our purpose. We have used SITC Revision 3 at two-digit level. The data are available annually. In total we have 50 observations for the regression where we considered China's exports to (or imports from) Thailand, Vietnam, Cambodia, LPDR and Myanmar for the period 2000 through 2009.

[9] A brief note on commodity classification is given in the appendix.
[10] 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.

4. EMPIRICAL RESULTS

The results have come out with the expected sign (See, table 2 and table 3). In the equation explaining Chinese exports to the GMS countries, for all the four models (classic pool, LSDV, within transformed, and random), the (industrial) intermediate and machinery variable, has statistically significant and higher value coefficients, than the other two categories of exports, which are primary and finished manufactured items. This supports our 'location substitution effect' hypothesis. When it come to Chinese exports to the GMS, the primary and resource based exports and final manufactured exports, have positive sign but a much smaller coefficient than that of (industrial) intermediate and machinery exports – indicating lesser importance of such goods, at least in terms of explaining variation in China's export to the GMS. This suggests that China is exporting intermediate and machinery items meant to produce finished manufactured goods in the GMS.

In case of China's imports from the GMS, the primary resource based and final manufactured imports have positive and significant contribution, whereas, the intermediate and machinery items have statistically insignificant coefficients (See, table 3). Thus there is some evidence to support our proposition that apart from importing primary and resource based commodities China is importing final manufactured products from the GMS. Result suggests that the Chinese activities in the GMS have taken the form of exporting intermediate inputs and machinery to help expand its manufacturing base there (i.e. the location substitution effect). The dummy variables capturing country specific trading relations with China have turned out to be insignificant in both export and import regression, which in some way reflects China's non-differentiating trading relations with all the GMS countries. This supports the trade and investment complementary in the GMS highlighted in Banik (2011).

Table 2: Regression Results for Chinese Exports to the GMS countries, 2000-2009
Dependent Variable: China's Export to GMS Countries

Variables	Classic Pool	LSDV	Within Transformed	Random Effect
PRX	0.059*** (0.010)	0.054*** (0.010)	0.058*** (0.010)	0.055*** (0.010)
IMX	0.843*** (0.013)	0.853*** (0.028)	0.873*** (0.028)	0.831*** (0.027)
FMX	0.111*** (0.025)	0.135*** (0.017)	0.138*** (0.017)	0.141** (0.016)
D1	-	-1.54e-09 (0.012)	-	-
D2	-	-3.42e-09 (0.012)	-	-
D3	-	4.19e-09 (0..012)	-	-
D4	-	6.94e-09 (0.012)	-	-
Constant	-5.84e-09 (0.004)	-0.183*** (0.028)	-0.196*** (0.027)	-0.116*** (0.026)
Time Dummy	No	Yes	Yes	Yes
Obs.	50	50	50	50
R^2	0.99	0.99	0.99	0.99
F Test /Wald Test	16345.68***	3648.31***	4864.42***	65448.50***

*** Significant at 1 %, ** Significant at 5 %
Figures in the parenthesis are standard errors.
All variables except dummies are standardized by subtracting mean and dividing by standard deviation.
PRX –total of primary and resource based export at SITC 2 digit (listed in Table 8)
IMX –total of intermediate and machinery export at SITC 2 digit (listed in Table 8)
FMX –total of final manufactured goods export at SITC 2 digit (listed in Table 8)

The significance of coefficients does not change when the trade data is deflated by Consumer Price Index of the US (not reported). Same is the case when China's trade with GMS countries is divided by dollar exchange rate of individual GMS countries. The exchange rate is also not fund to be significant when the same is included as one of the explanatory variables.

Data Source: UN COMTRADE (Reporting Country China).

Table 3: Regression Results for Chinese imports from the GMS, 2000-2009

Dependent Variable: China's Import from GMS Countries

Variables	Classic Pool	LSDV	Within Transformed	Random Effect
PRI	0.539*** (0.068)	0.707*** (0.099)	0.717*** (0.099)	0.727*** (0.093)
IMI	-0.056 (0.065)	-0.035 (0.072)	-0.031 (0.072)	-0.032 (0.068)
FMI	0.572*** (0.053)	0.588*** (0.061)	0.592*** (0.061)	0.596*** (0.057)
D1	-	1.41e-08 (0.123)	-	-
D2	-	-9.36e-09 (0.123)	-	-
D3	-	9.59e-09 (0.123)	-	-
D4	-	-8.92e-09 (0.123)	-	-
Constant	2.40e-09 (0.038)	0.401** (0.175)	0.425** (0.157)	0.415*** (0.148)
Time Dummy	No	Yes	Yes	Yes
Obs.	50	50	50	50
R^2	0.92	0.92	0.94	0.94
F Test /Wald Test	194.15***	35.07***	46.77***	629.22***

*** Significant at 1 %, ** Significant at 5 %
Figures in the parenthesis are standard errors.
All variables except dummies are standardized by subtracting mean and dividing by standard deviation.
PRI –total of primary and resource based import at SITC 2 digit (listed in Table 8)
IMI –total of intermediate and machinery import at SITC 2 digit (listed in Table 8)
FMI –total of final manufactured goods import at SITC 2 digit (listed in Table 8)

The significance of coefficients does not change when the trade data is deflated by Consumer Price Index of the US (not reported). Same is the case when China's trade with GMS countries is divided by dollar exchange rate of individual GMS countries. The exchange rate is also not fund to be significant when the same is included as one of the explanatory variables.

Data Source: UN COMTRADE (Reporting Country China).

5. CONCLUSION

Our result and evidence suggests that Chinese firms are shifting their production base from mainland China to destination such as the GMS, with a lower cost of production. Such expansion in outward investment is made possible by various pull factors that exists in the GMS countries. Chinese investment in the GMS, which were mostly into energy and resource intensive sectors during the earlier period, has now expanded into diversified manufacturing activities. China has been shifting some of the manufacturing activities which are becoming expensive to produce in mainland China, and also to avoid trade restrictions from its trading partners. Such investment is also motivated by accessing wider market in ASEAN and the rest of the world.

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 unmilled cereals)
09	Miscellaneous edible products and preparations
11	Beverages
12	Tobacco and tobacco manufactures
21	Hides, skins and furskins, 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: Author's classification based on SITC3 provided by United Nations Statistics Division

http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=14

A Brief Note on Commodity Classification: One of the widely used classifications was first put forward by Lall (1998, 2000) in which exports are grouped into different categories namely primary, resource based and low, medium and high technology products. For further discussion see (Lall et al., 2005). Keeping in view the objective of our study we classify the two-digit commodities into three groups. Although our classification is not based on technology intensity *per se*, we very much draw from earlier classification by Lall (2000). Our primary and resource based group contains all those commodities that were placed in primary and resource based category by Lall (2000), usually all SITC items under headings 0 to 4. Nonetheless, the remaining two categories namely the (industrial) intermediate and machinery, and final manufactured goods in our classification are based on product description (and author's understanding of production stages) and not explicitly on technology intensity. However, it is to be noted that most of the commodities in the intermediate and machinery group belong to medium and high technology products. And most of the commodities in our final manufactured good belongs to low and medium technology goods. It is to be noted that commodity classification such as ours is a derived one, which is used to test the hypothesis of the current study.

Table 8: China's Export and Import of Various Commodities by Country in GMS, 2000-2009

Panel A. China's Export to GMS

I. Primary and Resource Based	**SITC Code**
LPDR	00, 03, 04, 05, 06, 07, 08, 09, 11,12, 22, 23, 24, 25, 26, 27, 29, 32, 33, 34, 35, 43
Thailand	00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 11, 12, 21, 22, 23, 24, 25, 26, 27, 28, 29, 32, 33, 41, 42, 43
Vietnam	00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 11, 12, 21, 22, 23, 24, 25, 26, 27, 28, 29, 32, 33, 34, 35, 41, 42, 43
Cambodia	00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 11, 12, 22, 23, 24, 25, 26, 27, 28, 29, 32, 33, 34, 42, 43
Myanmar	00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 11, 12, 21, 22, 23, 24, 25, 26, 27, 28, 29, 32, 33, 34, 35, 41, 42, 43
II. (Industrial) Intermediate and Machinery	**SITC Code**
LPDR	51, 52, 53, 54, 55, 56, 57, 58, 59, 64, 65, 67, 69, 71, 72, 73, 74, 75, 76, 77, 78, 79, 81, 87, 89
Thailand	51, 52, 53, 54, 55, 56, 57, 58, 59, 64, 65, 67, 69, 71, 72, 73, 74, 75, 76, 77, 78, 79, 81, 87, 89
Vietnam	51, 52, 53, 54, 55, 56, 57, 58, 59, 64, 65, 67, 69, 71, 72, 73, 74, 75, 76, 77, 78, 79, 81, 87, 89
Cambodia	51, 52, 53, 54, 55, 56, 57, 58, 59, 64, 65, 67, 69, 71, 72, 73, 74, 75, 76, 77, 78, 79, 81, 87, 89
Myanmar	51, 52, 53, 54, 55, 56, 57, 58, 59, 64, 65, 67, 69, 71, 72, 73, 74, 75, 76, 77, 78, 79, 81, 87, 89
III. Final Manufactured Goods	**SITC Code**
LPDR	61, 62, 63, 66, 68, 82, 83, 84, 85, 88
Thailand	61, 62, 63, 66, 68, 82, 83, 84, 85, 88
Vietnam	61, 62, 63, 66, 68, 82, 83, 84, 85, 88
Cambodia	61, 62, 63, 66, 68, 82, 83, 84, 85, 88
Myanmar	61, 62, 63, 66, 68, 82, 83, 84, 85, 88

Panel B. China's Import from GMS

I. Primary and Resource Based	**SITC Code**
LPDR	00, 01, 03, 04, 05, 07, 09, 11, 22, 23, 24, 25, 27, 28, 29, 32, 33
Thailand	00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 11, 12, 21, 22, 23, 24, 25, 26, 27, 28, 29, 32, 33, 34, 41, 42, 43
Vietnam	00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 11, 21, 22, 23, 24, 25, 26, 27, 28, 29, 32, 33, 34, 41, 42, 43
Cambodia	00, 01, 03, 04, 05, 06, 07, 11, 22, 23, 24, 26, 27, 28, 29, 33, 42
Myanmar	00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 21, 22, 23, 24, 25, 26, 27, 28, 29, 32, 33, 34, 35, 42
II. (Industrial) Intermediate and Machinery	**SITC Code**
LPDR	54, 55, 57, 58, 59, 64, 65, 67, 69, 72, 74, 75, 76, 77, 81, 87, 89
Thailand	51, 52, 53, 54, 55, 56, 57, 58, 59, 64, 65, 67, 69, 71, 72, 73, 74, 75, 76, 77, 78, 79, 81, 87, 89
Vietnam	51, 52, 53, 54, 55, 56, 57, 58, 59, 64, 65, 67, 69, 71, 72, 73, 74, 75, 76, 77, 78, 79, 81, 87, 89
Cambodia	52, 53, 54, 55, 57, 58, 59, 64, 65, 67, 69, 71, 72, 74, 75, 76, 77, 78, 79, 81, 87, 89
Myanmar	51, 53, 55, 57, 58, 59, 64, 65, 67, 69, 71, 72, 74, 75, 76, 77, 78, 79, 81, 87, 89
III. Final Manufactured Goods	**SITC Code**
LPDR	62, 63, 66, 68, 82, 84
Thailand	61, 62, 63, 66, 68, 82, 83, 84, 85, 88
Vietnam	61, 62, 63, 66, 68, 82, 83, 84, 85, 88
Cambodia	61, 62, 63, 66, 68, 82, 83, 84, 85, 88
Myanmar	61, 62, 63, 66, 68, 82, 83, 84, 85, 88

REFERENCES

1. Anderson, J. E. (1979), 'A Theoretical Foundation for the Gravity Equation', *American Economic Review*, 69, 1, 106–116.

2. Ando, M. (2006), 'Fragmentation and Vertical Intra-industry Trade in East Asia', *North American Journal of Economics and Finance*, 17, 3, 257-281.

3. Banik, N. (2011), 'China's New Found Love: The GMS', *Journal of World Trade*, 45, 5, 1037-1057.

4. Bergstrand, J. H. (1985) 'The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence', *Review of Economics and Statistics*, 67, 3, 474–481.

5. Blundell, R.W. and S.R. Bond (1998), 'Initial Conditions and Moment Restrictions in Dynamic Panel Data Models', *Journal of Econometrics*, 87, 1, 115–143.

6. Côte, A. (1994), 'Exchange Rate Volatility and Trade', Bank of Canada Working Paper, No. 94-5. (Ottawa: Bank of Canada).

7. Deardorff, A. (1998), 'Determinants of Bilateral Trade: Does Gravity Work in a Neo-Classical World?', in Frankel J. (ed.) *Regionalization of the World Economy*, , University of Chicago Press, Chicago.

8. Devonshire-Ellis, C. (2011), 'China Now Has Third Highest Labor Cost in Emerging Asia', *China Briefing*, January 19.
9. http://www.china-briefing.com/news/2011/01/19/china-near-top-of-the-list-for-wage-overheads-in-emerging-asia.html (Accessed: April 21, 2011).

10. Fukao, K., H. Ishido and K. Ito (2003), "Vertical Intra-industry Trade and Foreign Direct Investment in East Asia', *Journal of the Japanese and International Economics*, 17, 4, 468-506.

11. Gaulier, G., F. Lemoine and D. Unal-Kesenci (2007), 'China's Emergence and the Reorganisation of Trade Flows in Asia', *China Economic Review*, 18, 3, 209-243.

12. Hummels, D., J. Ishii and K. Yi. (2001), 'The Nature and Growth of Vertical Specialization in World Trade', *Journal of International Economics*, 54, 1, 75-96.

13. John, S., S. Phadnis, and P. Nambiar (2010), 'China Sourcing Loses Charm for Indian Cos', The Economic Times, December 8.
14. http://articles.economictimes.indiatimes.com/2010-12-08/news/27584030_1_chinese-exports-sourcing-india-and-china (Accessed: December 12, 2010)

15. Koopman, R., Z. Wang and S. Wei (2008), 'How much of Chinese Exports is Really Made in China? Assessing Domestic Value Added when Processing Trade is Pervasive', NBER Working Paper No. 14109.

16. Li, S. and J. He (2007), 'Excess Liquidity Control Requires a Multi-pronged Approach,' *China Economist*, September, 1, 5, 19-29.

17. Linneman, H. (1966), '*An Econometric Study of International Trade Flows*', Amsterdam: North Holland.

18. Poyhonen, P. (1963), 'A Tentative Model for Volume of Trade between Countries', Welwirtschaftliches Archiv, 90, 1, 93–99.

19. Tinbergen, J. (1962), '*Shaping the World Economy: Suggestions for an International Economic Policy*', New York: Twentieth Century Fund.

20. Tyers, R. and Y. Zhang (2011), 'Appreciating the Renminbi', *The World Economy*, 34, 2, 265-297.

21. Yu, X. (2007), 'The Pattern of Exchange Rate Effects on Chinese Prices', *Review of International Economics*, 14, 4, 683-699.