Is China taking away foreign direct investment from other Asian economies?: An analysis of Japanese, US and Korean FDI

Salike, Nimesh

Waseda University, Graduate School of Asia Pacific Studies

April 2009

Is China taking away foreign direct investment from other Asian economies? -An analysis of Japanese, US and Korean FDI

Nimesh Salike*

Abstract

This paper applies the dynamic panel model to investigate whether China is crowding- out FDI from other Asian economies. In addition to an analysis of aggregate FDI like prior studies, an investigation is carried out for FDI from three major investors in the region: Japan, the United States and Korea. It order to deal with possible problems of serial correlation and simultaneous causality bias, refined estimation techniques; namely, Arellano Bond and Instrumental Variable estimations were undertaken. We found that the study on aggregate FDI did not produce any evidence on so called crowding- out of FDI by China, which is consistent with other studies. In FDI source country specific analysis, we did not find any "China effect" on Japanese and Korean FDI. However, the analysis of US FDI found that FDI in China had positive impact on FDI to other Asian economies. These findings led us to conclude that the rise of China could be seen as an opportunity rather than threat in attracting FDI for other Asian economies in the region.

Key words: China, FDI, crowding- out

* Graduate School of Asia Pacific Studies, Waseda University, Doctoral Degree Program;

1. Introduction

China emerged as one of the favorite foreign direct investment (FDI) destinations beginning in the 1990s. The inward FDI flows in China increased by more than 17 times from mere $3.5 billion in 1990 to $60.6 billion in 2004 (UNCTAD, 2006). China attracted 41% of total FDI inflows to Asia during the early 2000s, an increase from 38% during 1990s and from 15% during 1980s. The growth of FDI flow from 1995 to 2004 for China was 42.6% while it was 27.5% for the rest of Asia. The share of newly industrialized economies (NIEs)[1] in FDI inflows to Asia declined from 48.3% in 1990 to 35.1% in 2004. Four economies from the Association of Southeast Asian Nation (ASEAN-4)[2] witnessed the biggest drop in FDI share in Asia from 30.2% in 1990 to 4.2% in 2004 (UNCTAD, 2006).

The rise of China as a major FDI attracting economy coupled with declining share of other Asian economies has raised serious concerns of whether FDI in China is coming at the expense of other economies in the region. This is because FDI inflow brings various benefits to FDI host economies such as much needed capital, technology and international networks (Blomstrom and Kokko 1997, Urata and Kawai 2000). From the theoretical perspective, the rise of China may have both diversion and creation effects. On the one hand, China's image as a low wage production site that could possibly take away FDI from other economies epitomizes the diversion effect, on the other hand; China may promote FDI inflows in the other economies of the region if the establishment of a production base in China necessitates the establishment of production bases in other countries in order to construct regional production network involving international production fragmentation (Chantasasawat et. el, 2004).

Previous studies on this subject suggest that either China has no effect or crowding- in effect in the region, rather it exhibits a crowding- out effect. Unlike the previous literature on the subject which focused only on aggregate FDI, this paper tries to contribute to the debate by analyzing FDI from three major source countries: Japan, the United States (US) and Korea. We undertake statistical analysis on panel data to empirically examine the effect of FDI to China on FDI to a group of Asian economies. We found that China has no effect on FDI to other Asian economies in the case of Japanese and Korean FDI while the China effect was positive in the case of US FDI, indicating that US FDI to China promoted US FDI to other Asian economies.

This paper is organized as follows. In section two, we provide background information including the perspectives from three major investors and also present reviews of previous studies. In section three, we explain the econometric model used in the analysis, data and

[1] Hong Kong, Korea, Singapore and Taiwan
[2] Indonesia, Malaysia, Philippines and Thailand

methodology. Section four discusses the results of the empirical analysis on aggregate and source country specific FDI. Section five concludes the paper.

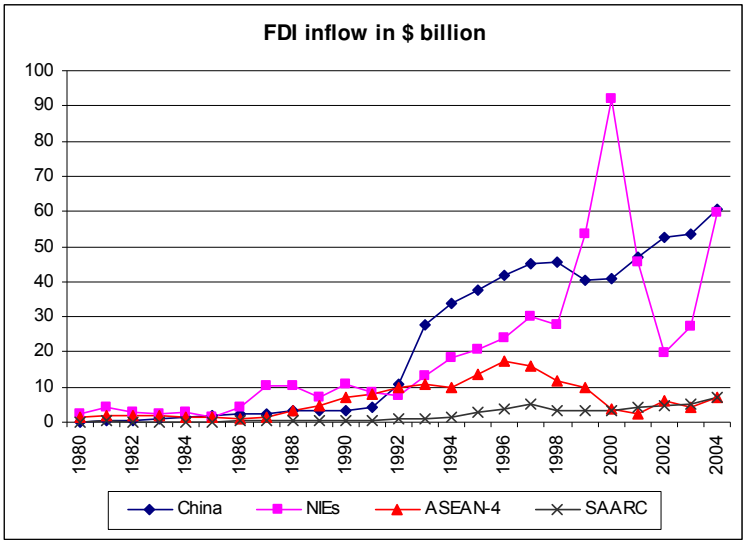
2. Background, theory and literature review

FDI in China began in 1979 following the initiation of the 'open-door' policy of then paramount leader Deng Xiaoping. Throughout the 1980s and 1990s, the Chinese government put in enormous efforts in attracting FDI by adopting various policy measures to improve the investment environment. From 1992, the country enjoyed a significant inflow of FDI after the removal of several restrictions on FDI inflow. Furthermore, China's rapid economic growth was another pull factor for FDI. As shown in Figure 1, FDI flows to China during 1980s was below NIEs and ASEAN-4, however, it increased significantly during 1990s reaching around $ 60 billion in 2004 from a mere $ 3.5 billion in 1990. During the 1980s, most of the FDI to Asia was diverted to NIEs and later also spread to ASEAN-4 beginning in the early 1990s. Hong Kong received unprecedented amounts of FDI spiking in 2000 and eventually making NIEs at par with China in 2004. Singapore comes in second among NIEs. The Asian financial crisis has been a major setback in the FDI performance for ASEAN-4 economies. A major fall, even disinvestments in the case of Indonesia, was recorded for all the economies involved. Even though the situation has improved and FDI performance is much more stable in the 2000s, FDI inflows in ASEAN-4 economies never went above pre- crisis level. Their share in the region dropped from around 40% in early 1990s to approximately 10% in 2004. In the southern part of Asia, SAARC (South Asian Association for Regional Cooperation) economies have been rather passive in terms of FDI inflow until the rise of India in recent years (UNCTAD, 2006).

Multinational Enterprises (MNEs) from US, Japan and European Union (EU) have been the major sources for East Asia's cumulative FDI flows which collectively accounted for about 40% in average during 1990s and 2000s. Moreover, FDI within East Asian economies is also of growing importance in recent years. FDI from Asian NIEs, especially Korea and Hong Kong, accounted for 33% of the total FDI flows to ASEAN countries in 2004, particularly in Indonesia, Malaysia and Vietnam. These economies are increasingly investing in China as well.[3]

[3] In this study, we focus primarily on Japan, US and Korea owing mostly to data availability.

Figure 1: FDI flow in Asia



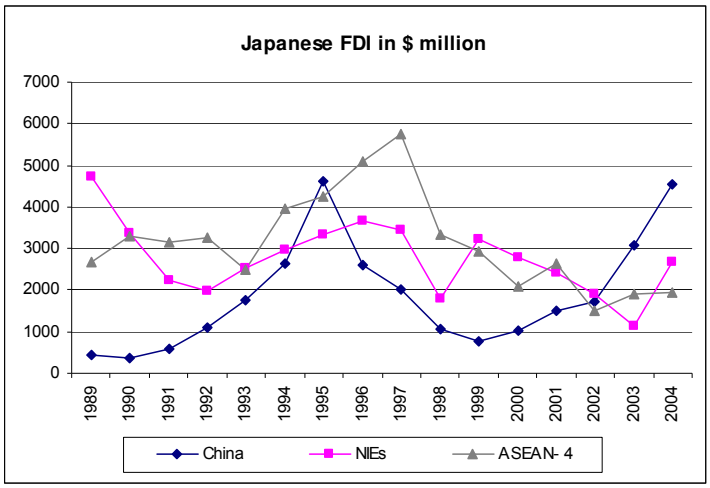
Data Source: UNCTAD, 2006

Out of total Japanese outward flow, investment in Asia on average accounted around 18.5% throughout 1990s and 2000s. The shares of ASEAN economies, particularly Thailand, experienced a significant increase during the early 1990's, surpassing that of the NIEs. However, the share declined considerably after the financial crisis of 1997. Total FDI flows into the ASEAN region from Japan declined markedly from $12.3 billion in 1997 to as low as $5.5 billon in 2000. As shown in Figure 2, Japanese FDI in China started to get its momentum beginning in 1999 and within a year its relative share increased to 16.8%, making China the largest recipient of FDI from Japan as a single country in Asia. By 2004, it overtook both the regions with an inflow of $4.5 billion.

As for US FDI, Asian share of total US outward FDI is around 8- 9%. Traditionally, major destinations for US investors in Asia had been to the NIEs (especially, Singapore, Hong Kong and Taiwan) and in later years China as could be seen in Figure 3. ASEAN- 4 economies which were relatively well placed up until first half of 1990s faced a sharp decline in and after 1997. Except for a couple of years in early 2000s, US FDI has declined in ASEAN and China received prominence instead. US FDI in China increased up to $3.5 billion in 2004, a significant contrast to the $30 million in 1990.

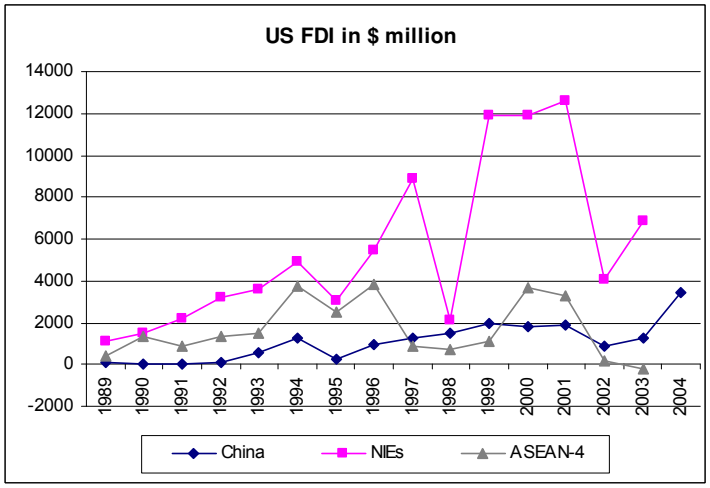
Korea is a relatively new and small investor compared to Japan and US. However, the acceleration of FDI since 2002 (after it recovered from the shock of financial crisis) could not be overlooked given its importance in Asia. Out of its total FDI outflow, more than 44% was focused in Asia amounting to $60.6 billion as total outflow stock in 2006. As could be seen in Figure 4, China has clear dominance over other economies from early 1990s. Korean FDI in China skyrocketed to $2.3 billion in 2004 where as NIEs-3 (Hong Kong, Singapore and Taiwan) and ASEAN as a whole received just $500 million.

Figure 2: Japanese FDI in Asia



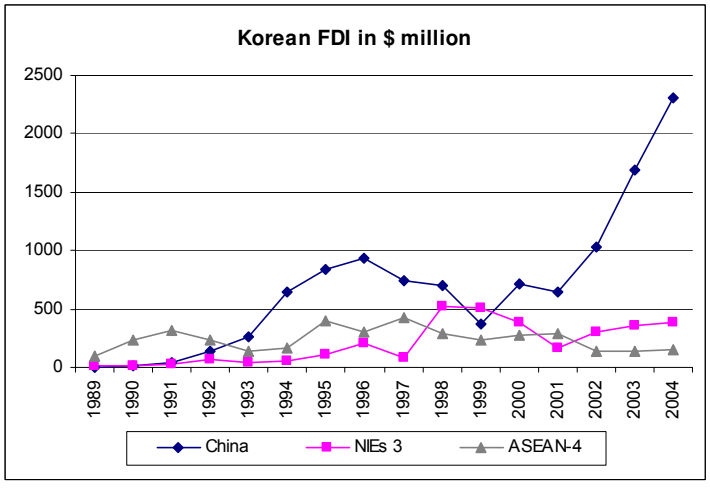
Data source: MOF, Japan, 2006

Figure 3: US FDI in Asia



Data source: BEA, US, 2007

Figure 4: Korean FDI in Asia



Data source: EXIM, Korea, 2007

The notion that China's success in attracting FDI is at the expense of other economies can not be fully supported from both theoretical and empirical aspects. According to Chantasasawat et. al (2004), hypothetically, we can find two sets of arguments for the growing influence of China on FDI allocation. Firstly, in examining which low- wage export platform to locate, MNEs may choose between China and another Asian economy. In this case, MNEs will study a whole host of factors, including wage rates, political risks, infrastructure, etc. that make a country desirable as a site for low- cost production. Investing in China would then reduce FDI in other economies, resulting in investment diversion effect. China's big domestic market may be another factor for MNEs to decide in favor of China. Secondly, the production and resource linkages between China and the rest of Asia must also be considered. In manufacturing, this takes the form of further specialization and growing fragmentation of the production processes. A MNE sets up factories in both China and another destination to take advantage of their respective competitiveness in distinct stages of productions. Components and parts are then traded among China and other economies. An increase in China's FDI is then positively related to an increase in another nation's FDI. Again, another complementary argument is that as China grows, its market size increases and its appetite for minerals and resources also rises. So, MNEs invest in other parts of Asia to extract minerals and resources to export to fast growing China in need of a whole spectrum of raw materials. This could be called as investment creation effect.

Existing empirical studies to date have failed to identify the so called crowding- out phenomenon as well. They assert that there has been negligible effect of China in the diversion of investments away and they even argue that China had in fact played the complementary role on attracting FDI into Asia. These studies used aggregate FDI data and employed similar approach of incorporating a "China indicator" variable to capture the effect in an equation of FDI determinants. Nonetheless, there are difference in coverage, estimation technique and control variables among the studies.

In a paper by Chantasasawat et. al. (2004), eight Asian economies of data from 1985 to 2001 and sixteen Latin American economies of data from 1990 to 2002 were used to test the "China effect". Authors took China's inward FDI as an indicator and estimate equations for China's FDI inflows and other Asian economies' FDI inflows by Two Stage Least Square (TSLS). They found that China's FDI inflow and other Asian economies' FDI inflows are positively, not negatively correlated, while mostly insignificant for Latin American economies. Mercereau (2005) analyzed this effect using dynamic panel approach, dependent variable being FDI as a share of GDP. He used two indicators for measuring the "China effect", FDI to China over the combined GDP of other economies in the region and FDI to China over total FDI to the region. Taking the sample of fourteen Asian economies from 1984 to 2002, he concluded that China did not have much impact on FDI to other economies

on average. 10% increase in China FDI appears to have lowered only 0.4 % of FDI in average. He also estimated the diversion in terms of country- specific crowding- out and found that crowding- out so measured is evident only for two economies: Singapore and Myanmar. Moreover, low income economies with low levels of education or scientific development do not seem to have been affected by China either. Eichengreen and Tong (2005) uses the gravity model as a framework for the analysis where the log of FDI is related to measures of the economic size of the source & destination economies and the distance between them. It is then regressed by TSLS. The bilateral FDI flow data of 29 source countries and 63 destination countries from 1988 to 2002 were considered in the study. They found that FDI to China is complementary to the FDI inflows to other Asian economies. Similarly, Liu et al. (2007) employed augmented gravity model to include the indicators that measures other factors of economy in addition to traditional gravity variables. In investigating the determinants of FDI among the OECD economies and between the OECD and emerging market economies, they did not find any basis to support the claim that China has diverted FDI flow from its developing neighbors.

3. Econometric model, data and methodology

With the above background in mind, this research aims to test the "China Effect" in relation to three individual FDI source countries: Japan, US and Korea. Provided that the existing crowding- out analyses were conducted on aggregate FDI, this effort of analyzing the effect from an individual country could provide specific insights in the investing behavior of individual countries and could help in the policy formulations for the host economies. The research strategy adopted in this paper is to control for the standard determinants of FDI like, market size, openness, macroeconomic condition, etc, and consider the "China effect" as one of the additional determinants that affects the flow of FDI in recipient economy. The indicator that we have chosen for the purpose of measuring the effect is the "Chinese share of FDI inflow in the region"[4].

For the purpose of quantitative analysis, the dynamic panel model was used as an econometric tool, with log of FDI appearing on left hand side. The basic regression model on inward FDI for Asian economies could be written as a linear specification in the following form:

$$FDI_{j,t} = \delta FDI_{j,t-1} + \beta X_{j,t} + \alpha China_t + \mu_j + \varepsilon_{j,t} \quad \text{.....(1)}$$

where,

[4] Detailed discussion on the choice of "China indicator" will be made on passage to follow.

$FDI_{j,t}$ is the log of FDI in country j at time t (in current prices)

$FDI_{j,t-1}$ is the log of FDI with one year lag

$X_{j,t}$ is the x- vector of explanatory variables

$China_t$ is the China Indicator, FDI to China over total FDI to the region.

μ_j is the variable for country specific effect

$\varepsilon_{j,t}$ is the error term

The host country samples included eleven economies from Asia- Hong Kong, India, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan, Thailand, Vietnam and China. The study uses panel data from 1989 to 2004 for all the economies involved that were collected in annual basis. Considering the fact that China emerged as a magnet of FDI starting from early 1990s, we did not consider data prior to 1989. India was included in the analysis since it has emerged as another big FDI recipient and competition between China and India is much discussed topic in recent time. Major data sources included Asian Development Bank (ADB), United Nations Conference on Trade and Development (UNCTAD), Ministry of Finance (MOF) Japan, World Development Indicators (WDI) - World Bank. Other related data were collected from concerned authorities.

3.1 Choice of "China Indicator"

The choice of the China indicator for this study requires more discussion. Chantasasawat et al. (2004) and Eichengreen and Tong (2005) both used the log of inward FDI flows to China in their equations to capture crowding- out effect. However, there is a problem in the interpretation of results with a logarithmic expression. It assumes that the crowding- out depends on the rate of change of FDI flows to China rather than the level of these flows. Another potential issue with such an estimation strategy is that coefficient on the logarithm of FDI to China which might capture global shocks affecting all economies in the region and would produce bias in the coefficient. In addition to this indicator, Chantasasawat et al. (2004) also used the country's share of FDI to the region in the left-hand side and FDI to China (in log) on the right-hand side to measure crowding- out. But, as the authors acknowledge, given the large size of FDI flows to China, an increase in FDI to China mechanically reduces the share of other countries. Therefore, a negative sign on the corresponding coefficient cannot be taken as evidence that China diverts FDI from other economies. Mercereau (2005) suggests the possibility of nominal FDI being non- stationary which could lead to spurious regression; therefore needs to be scaled. Using FDI to GDP ratio in China assumes that for a given level of FDI to China, crowding- out is inversely related to the size of the Chinese economy, which is unwarranted. It might also capture global factors which affect all economies in the region, which would again bring bias in the estimated coefficient. Using the rate of growth of FDI could be another possibility however it

also has the problem in interpretation as that of log specification. Using per capita FDI as used by Zhou and Lall (2005) is also not desired since scaling with population could be misleading, for example per capita FDI in China is lesser than that of Singapore, Malaysia or Thailand though in absolute terms it is much higher. Mercereau (2005) uses two indicators to measure the effect- "FDI flow to China scaled by combined GDP of other economies in the region" and "FDI flow to China scaled by total FDI to the region". Although the author claims it to be a valid indicator the first indicator has the potential problem with the assumption that FDI diversion from country is proportional to the size of its economy relative to region. It is so because the relative size of FDI to GDP varies substantially across the economies in the region.

Considering these factors, the best candidate for the "China indicator" to capture the crowding- out effect is FDI flow to China over total FDI flow to the region (including that in China) as suggested by second indicator of Mercereau's study. This literally means share of China in total FDI inflow in the region.

The indicator, FDI to China over total FDI to the region, has an intuitive interpretation which makes this indicator illustrative enough for our purpose of measuring crowding- out. Referring to equation (1), if FDI to China diverts flow from other economies, then the coefficient of indicator should show up with negative sign. If FDI to China does not reduce flows to other economies, then the coefficient should not be significantly different from zero. And if the flow to China adds up more FDI in the region (complementary effect), the estimated coefficient should be positive.

3.2 The variables used

The dependent variable used in this study is the log of inflow of FDI. The use of the log is one of the most widely accepted formats for scaling down absolute values however not always favored because the interpretation takes the form of percentages. Nevertheless, in this particular study, we are more interested in the sign of the variables than the actual change in it. Therefore the log of FDI flow is the best mode for the purpose of our study although there are several other choices like absolute FDI flow, FDI stock or FDI scaled by GDP.

The x- vector explanatory variables used on the estimation process are chosen after the careful study of earlier papers which dealt with the issue of determinants of FDI. The determinant variables that were used in this study along with their explanations, expected signs and data sources are provided in Appendix 1. The one year lag of dependent variable is taken as one of the independent variable to represent the "inertia" effect on nature of FDI. This also takes into consideration the time lag which normally occurs in Greenfield Investment. Market size variable, measured in terms of GDP, by far, has been one of the

most significant variables in almost all of the studies indicating the importance of the host market in attracting FDI. Among other variables, macro- economic stability (indicated by inflation), exchange rate effects in terms of volatility and openness have been found to have strong explanatory power in the previous studies. Furthermore, host economy's environment (in terms of civil liberties, political rights, governance, market capitalization, market liquidity) and host economy's domestic credit situation have been well researched themes in establishing a determinant relationship.

3.3 Limitations of the model

On the specified model of dynamic panel regression, there are some serious problems which need to be resolved. First, in the equation, there was an issue of country specific fixed effects, μ_j, to be taken care of. We undertook fixed effect regression to remedy it. Second, since the equation included a lagged dependent variable, $FDI_{j,t-1}$, as a regressor, it is most likely to produce serially correlated errors. Being serially correlated, the correlation between values of Y at two adjacent periods, Y_t and Y_{t-1}, could result in biased and inconsistent estimations (Stock and Watson, 2004). In order to get rid of this problem, we used the estimation technique as suggested by Arellano and Bond (1991)[5]. Arellano Bond (AB) estimation starts by transforming all regressors, usually by differencing, and uses Generalized Method of Moments (GMM), so is called "difference GMM". In its advanced form, the transformation of forward orthogonal deviations, proposed by Arellano and Bover (1995), is also performed instead of differencing. The Arellano- Bover/ Blundell- Bond (1991, 1995, 1998) estimator augments Arellano- Bond by making an additional assumption, that first differences of instrument variables are uncorrelated with the fixed effects. As suggested by Mercereau (2005), Arellano Bond estimator could serve our purpose to get bias- free estimations in dynamic panel equation with endogenous variables and relatively long time series. This technique is effective in handling not only for the serial correlation in dynamic panels but also could take care of the problem of endogeneity in the equation, whether it is created because of omitted variable or simultaneity. We consider a dynamic panel data model of following form, consistent with our equation of crowding- out.

$$Y_{i,t} = \beta_0 + \delta Y_{i,t-1} + \beta_1 X_{1,i,t} + \ldots\ldots\ldots + \beta_k X_{k,\,i,t} + \mu_i + \varepsilon_{it}$$

The transformation in this equation with difference GMM will make the equation as follows:

$$\Delta Y_{i,t} = \delta \Delta Y_{i,t-1} + \beta_1 \Delta X_{1,i,t} + \ldots\ldots\ldots + \beta_k \Delta X_{k,\,i,t} + \Delta\varepsilon_{it}$$

We can see that the fixed effect has disappeared in this transformation. And the problem of autocorrelation would disappear in $\Delta Y_{i,t-1}$. This could be tested by checking at second order autocorrelation coefficient for respective equations.

[5] Also refer Arellano and Bover (1995), Blundell and Bond (1998) and Roodman (2006) for detailed discussion.

Third and lastly, another issue in the equation is the problem of "simultaneous causality" caused by the "China indicator", $China_t$, being endogenous. We assume the causality to run "backward" as well as "forward" between the dependent variable and the independent variables because if FDI in left hand side (LHS) country is affected by FDI flow to China, it is also true that FDI to China is affected by flow to LHS country. Simultaneous causality leads to the correlation between regressor and the error term which make an Ordinary Least Square (OLS) regression to pick up both effects so the OLS estimator becomes biased and inconsistent (Stock and Watson, 2004). In order to deal with this problem, we used Instrumental Variable (IV) regression.

Although it has been argued in the above paragraph that the use of Arellano Bond estimation would possibly take care of any other endogeneity problem (including that of simultaneous causality), IV regression in this paper has been used to obtain the best possible result. Therefore, the combined acceptance of both AB and IV estimations could be set as the most precise mode of analysis and set as a rule of thumb in making conclusion. In order to run IV, we need instrumental variables that are uncorrelated with error. The instruments used for our purpose of predicting "$China_t$" that satisfy the conditions of relevance and exogeneity are "Openness of China" and "Infrastructure Index of China". IV is performed by using the following two equations.

$$FDI_{j,t} = \delta FDI_{j,t-1} + \beta X_{j,t} + \alpha China_t + \mu_j + \varepsilon_{j,t}$$

$$China_t = \beta_0 + \alpha_1(COpenness_t) + \alpha_1(CInfrastructure_t) + v_{it}$$

Apart from the problems in the model, there was a problem of multicollinearity[6] which was likely given to the large number of interrelated independent variables previously considered. To avoid this, the regression analysis was carried out in eight different specifications so that variables that are highly correlated are not included simultaneously. This, while on the one hand has helped us in avoiding use of highly correlated variables, on the other hand was able to fulfill the purpose of robustness check (Chakrabarti, 2001). In the dataset, there was also the concern of outlier. We used Grubbs test to identify them and omitted three observations of FDI flow for Vietnam from 1989 to 1991.

4. Empirical results

This section presents the results of crowding- out analysis on aggregate and source country- specific FDI. While reporting the results, we also included "OLS with fixed country effects" as a benchmark specification along with two modified form of estimation techniques AB and IV, as described above. In order to draw conclusions, we use the general rule of

[6] Correlation coefficient matrix is provided in Appendix 2.

thumb to accept those estimated coefficients which have the same sign with statistical significance under both of these techniques.

4.1 Examination of crowding- out on aggregate FDI

Table 1 shows the estimation results from the first set of dynamic panel regression using the aggregate FDI flow as the dependent variable. As could be seen in the table, none of the coefficients for our variable of interest "China indicator" (afdic_afdir) are statistically significant in any of the estimation techniques. Therefore, as far as aggregate FDI is concerned, there is no evidence that China is crowding- out FDI from other Asian economies nor is there any complementary effect. Almost all of the other variables in the table are in line with the expected sign, the significant ones being inertia effect (llnafdi), market potential (rgdpg) and country environment (ce). This confirms the appropriateness of the use of the explanatory variables in the analysis.

Table 1: Estimation results of crowding- out on aggregate FDI[7]

		OLS			AB			IV		
Dependent: Log Aggregate FDI	**lnafdi**	**Coef.**	**t**		**Coef.**	**z**		**Coef.**	**z**	
Aggregate FDI to China to Aggregate FDI to Region	**afdic_afdir**	0.002	0.490		-0.004	-0.450		-0.041	-1.580	
Lagged Log Aggregate FDI	**llnafdi**	0.591	8.100	***	0.286	1.870	*	0.435	6.150	***
Real GDP Growth	**rgdpg**	0.048	2.330	**	0.030	1.840	*	0.041	1.970	**
Consumer Price Index Annual Change	**cpiac**	-0.008	-0.360		-0.041	-1.600		-0.014	-0.530	
Exchange Rate Volatility	**erv**	6.205	2.120	**	5.494	2.280	**	5.189	1.700	*
Openness Proxy	**op**	0.003	3.500	***	0.001	0.280		0.000	0.060	
Country Environment	**ce**	-0.276	-0.650		4.740	4.420	***	2.510	2.190	**
M2 to GDP	**m2_gdp**	0.003	1.800	*	0.001	0.260		0.007	1.500	
Constant	**_cons**	2.402	4.030		0.053	2.230		2.709	3.530	
Number of obs		140			118			140		
R-squared		0.709						0.592		
Wald Chi 2					751.4			23896.9		
Prob > z (Frist order autocorrelation)					0.020					
Prob > z (Second order autocorrelation)					0.187					

*, ** and *** denote statistical significance at 10 %, 5% and 1% respectively

4.2 Examination of crowding- out on source country- specific FDI

Next, our study focused on crowding- out analysis from the view point of three investing countries- Japan, US and Korea. Table 2 is the extraction out of eight specifications being conducted on FDI from these three source countries. In brief, our results indicated that FDI flow to China has positive effect on FDI to other Asian economies for US FDI while no China effect was seen in Japanese and Korean FDI.

[7] The table reports the specification with the highest number of significant variables. Detailed results of all eight specifications are available upon request.

Table 2: Estimation results of crowding- out on Japanese, US and Korean FDI[8]

		Japanese FDI			US FDI			Korean FDI		
Dependent: Log FDI	lnfdi	OLS	AB	IV	OLS	AB	IV	OLS	AB	IV
FDI to China to FDI to Region	fdic_fdir	0.000	-0.002	-0.001	0.010	0.001 *	0.094 **	0.002	0.003	0.005
Lagged Log FDI	llnfdi	0.725 ***	0.350 ***	0.427 ***	0.447 ***	-0.309 ***	-0.372 ***	0.564 ***	0.322 ***	0.401 ***
Real GDP Growth	rgdpg	0.029 **	0.041 **	0.037 **	0.033	0.045 **	0.121 **	-0.028	-0.056 ***	-0.026
Consumer Price Index Annual Change	cpiac	0.010	0.020	0.012	0.036	0.038	0.013	0.009	0.015	0.010
Exchange Rate Volatility	erv	0.179	-2.863	-0.089	-1.316	-11.401 *	-11.271 **	-2.651	-6.826	-3.744
Openness Proxy	op	0.000	-0.006 **	0.005	0.003 ***	-0.005	0.007	0.002 *	-0.005	-0.005
Country Environment	ce	0.307	2.735 **	0.595	2.758 *	0.873	3.720 *	-1.715 **	3.545 **	1.016 *
M2 to GDP	m2_gdp	0.000	-0.001	-0.001	-0.001	-0.001	-0.004	0.001	0.013 **	0.009
Constant	_cons	1.266	-0.004	3.368	1.727	0.190	2.521	1.969	-0.035	1.473
Number of obs		147	127	147	103	80	103	132	114	132
R-squared		0.663		0.575	0.440		0.548	0.581		0.516
Wald Chi 2			277.9	19184.4		1914.1	4988.1		135.6	2358.0
P>z (1st order autocorrelation)			0.019			0.019			0.024	
P>z (2nd order autocorrelation)			0.501			0.407			0.341	

*, ** and *** denote statistical significance at 10 %, 5% and 1% respectively

On the Japanese FDI front, the "China indicator" (fdic_fdir) is not significant in either AB or IV suggesting no effect of China. We can conclude that despite considerable concerns, there is no evidence that China is crowding- out Japanese FDI from other Asian economies. Among other variables, inertia effect (llnfdi) and market variable (rgdpg) in Japanese FDI are found to have highly significant coefficients in both the estimation techniques. The results from US FDI data reveal interesting results. First and foremost, the result shows that there is a complementary effect on US FDI as the "China indicator" variable is positive in both AB and IV. This means China is adding up more US FDI in the region possibly because of the production fragmentation of the products taking place in the region. This indicates greater FDI allocation in the region as a whole. Among other variables, lagged FDI (llnfdi) has opposite sign indicating that investments tend to decrease if higher investment is made in the previous year. Market (rgdpg) along with exchange rate volatility (erv) is found to have important implications as well. Overall, the results of US FDI are able to provide sufficient economic explanations with most of the determinants in the line of our expected signs. As for Korean FDI, the "China indicator" variable (fdic_fdir) is not significant in any of the estimation techniques. This suggests that there is no China effect on the allocation of Korean FDI in Asia. Furthermore, inertia (llnfdi) along with country environment (ce) seemed to be key determinants to attract Korean FDI in the region.

[8] Detailed results of all eight specifications are available upon request.

5. Conclusion

This research is a step further, on existing studies of China's competitiveness in attracting FDI, by employing the analysis from source specific FDI of three countries. The problem is stated because of the growing concern about the China's expanded role in attracting FDI whereas the growth of FDI in other Asian economies has not been encouraging in recent years. The statistical analysis was first carried out with aggregate FDI flow in Asia and then looked into from three different sources- Japan, the United States and Korea.

While the concern of crowding- out by China in the region is very profound, the results of this analysis revealed interesting results. The macro level analysis of aggregate FDI could not find any "China effect". The analysis on Japanese FDI and Korean FDI also could not find any empirical basis to support the claim that FDI in China is crowding- out FDI from other economies of Asia. Therefore, China is neither competing nor complementing FDI from Japan and Korea. On the contrary, we found that surge of FDI in China is complementing US FDI in other economies of Asia. The case of complementarity is possibly explained by international production fragmentation taking place rapidly in recent years. It is most likely in the industries which are more integrated in nature like electronics and automobile. Our result also suggested that among other determinants, market is the single most important factor in attracting FDI of any origin. Inertia appeared to have positive effect on Japanese and Korean FDI whereas exchange rate volatility is found to have adverse effect on FDI from US.

China does not appear to have taken away FDI from other Asian economies. In fact, China is shown to have stimulated complementary investment in the region in the case of FDI from the United States. Therefore, policy makers of Asian economies may view the rise of China as a possible opportunity.

References

ADB, 2006, Asian Development Bank (ADB) - Key Indicators 2006, www.adb.org/statistics (Date accessed: 2006/10/23)

Arellano, Manuel, and Stephen Bond, 1991, Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, *The Review of Economic Studies* 58, 277-297.

Arellano, Manuel, and Olympia Bover, 1995, Another look at the instrumental variable estimation of error- components models, *Journal of Econometrics* 68, 29-51.

BEA, US, 2007, U. S. Direct Investment Abroad interactive database, United States U.S. Department of Commerce, Bureau of Economic Analysis, International Investment Division, http://www.bea.gov/interactive.htm (Date accessed: 2007/10/31)

Blomstrom, Magnus, and Ari Kokko, 1997, How Foreign Investment Affects Host Countries, Policy Research Working Paper 1745 (The World Bank, International Economic Department, International Trade Division, Washington DC)

Blundell, Richard, and Stephen Bond, 1998, Initial conditions and moment restrictions in dynamic panel data models, *Journal of Econometrics* 87, 115-143.

BOJ, 2007, Statistics: Bank of Japan, http://www.boj.or.jp/en/theme/stat/index.htm (Date accessed: 2007/2/1)

Chakrabarti, Avik, 2001, The Determinants of Foreign Direct Investment: Sensitivity Analyses of Cross- country Regressions, *KYKLOS* 54, 89-114.

Chantasasawat, Busakorn, K. C. Fung, Hitomi Iizaka, and Alan Siu, 2004, Foreign Direct Investment in East Asia and Latin America: Is there a People's Republic of China Effect? ADB Institute Discussion paper no. 17 (Asian Development Bank Institute, Tokyo).

Eichengreen, Barry, and Hui Tong, 2005, Is China's FDI coming at the expense of other countries? NBER Working Paper 11335 (National Bureau of Economic Research, Cambridge, Massachusetts).

EXIM, Korea, 2007, The Export Import Bank of Korea Foreign Investment Statistics, http://www.koreaexim.go.kr/en/fdi/m02/s01_01.jsp (Date accessed: 2007/2/7)

IMF, 2007, IFS online, http://www.imfstatistics.org/imf/ (Date accessed: 2007/4/20)

Kamaly, Ahmed, 2003, Behind the surge of FDI to Developing Countries in the 1990s- An Empirical Investigation, (Department of Economics, The American University in Cairo).

Kawai, Masahiro, 2005, Trade and Investment Integration and Cooperation in East Asia: Empirical Evidence and Issues, in *Asian Economic Cooperation and Integration- Progress/ Prospects/ Challenges* (Asian Development Bank).

Kawai, Masahiro, and Shujiro Urata, 2004, Trade and Foreign Direct Investment in East Asia, in Riyana Miranti, and Denis Hew, eds.: *APEC in the 21st Century* (Institute of Southeast Asian Studies, Singapore).

Liu, Ligang, Kevin Chow, and Unias Li, 2007, Has China Crowded out Foreign Direct Investment from Its Developing East Asian Neighbors? *China and World Economy* 15, 70-88.

Mercereau, Benoit, 2005, FDI flows to Asia: Did the Dragon crowd out the Tigers? IMF Working Paper, WP/05/189 (International Monetary Fund, Washington, DC).

MOF, Japan, 2006, Foreign Direct Investment Statistics, Ministry of Finance Japan, http://www.mof.go.jp/english/e1c008.htm (Date accessed: 2006/7/3)

UBC, 2007, Pacific Exchange Rate Service, http://fx.sauder.ubc.ca/ (Date accessed: 2007/4/23)

Roodman, David, 2006, How to Do xtabond2: An Introduction to "Difference" and "System" GMM in Stata, Working Paper Number 103 (Center for Global Development).

Stock, James H., and Mark. W. Watson, 2004. *Introduction to Econometrics* (Addison Wesley Longman Inc.).

UNCTAD, 2006, Foreign Direct Investment Database, United Nations Conference on Trade and Development, http://stats.unctad.org/FDI/TableViewer/tableView.aspx?ReportId=1254 (Date accessed: 2006/5/12),

Urata, Shujiro, and Hiroki Kawai, 2000, The Determinants of the Location of Japanese Foreign Direct Investment by Japanese Small and Medium- sized Enterprises, *Small Business Economics* 15, 79-103.

WDI, 2006, World Development Indicators, World Bank http://publications.worldbank.org/WDI/ (Date accessed: 2007/5/8)

Wang, Chengang, Yingqi Wei, and Xiaming Liu, 2007, Does China rival its neighbouring economies for inward FDI? *Transnational Corporations* 16, 35-60.

Zhou, Yuping, and Sanjaya Lall, 2005, The impact of China's FDI surge on FDI in South-East Asia: panel data analysis for 1986- 2001, *Transnational Corporations* 14, 41-65.

Appendix- 1: List of variables used

Variable name	Code	Exp. Sign	Explanation	Data Source
Dependent Variable				
Log of FDI flow	lnfdi			UNCTAD (2006), MOF Japan (2006)
Variable of Interest (measuring "China Effect")				
China's share of Total FDI flow into the region	fdic_fdir	-	China indicator	UNCTAD (2006), MOF Japan (2006)
Other Independent variables				
Lagged log FDI flow	llnfdi	+	Measuring Inertia/ Current year's investment amount depends upon the decision of last years's investment	UNCTAD (2006), MOF Japan (2006)
Real GDP growth	rgdpg	+	Market size/ potentiality	ADB (2006)
Inflation	cpiac	-	Measuing macroeconomic stability	ADB (2006)
Exchange Rate Volatility	erv	-	External competitiveness. Formula for Volatility= $\sqrt{1/n \sum_{i=1 \text{ to } n} (\Delta \ln ER_{t+i})^2}$	IMF (2007), UBC (2007)
Openness Proxy	op	+	Sum of Exports and Imports to GDP	ADB (2006)
Country Environment	ce	+	Composite Index average of Civil Liberties, Political Rights, Governance, Market capitalization to GDP, Market liquidity	Freedom House (http://www.freedomhouse.org), World Bank, Governance & Anti-Corruption Web (www.worldbank.org/wbi/governance), Standard and Poor's (Emerging Stock Markets Factbook) WDI, 2006 Ho Chi Minh City Securities Trading Center (http://www.vse.org.
M2 per GDP	m2_gdp	-	Domestic credit situation	ADB (2006), BOJ (2007)

Appendix 2: Correlation coefficient matrix

		FDI to China to FDI to Region	Lagged Log FDI	Real GDP Growth	Consumer Price Index Annual Change	Exchange Rate Volatility	Openness Proxy	Country Environment	M2 to GDP
		fdic_fdir	llnfdi	rgdpg	cpiac	erv	op	ce	m2_gdp
FDI to China to FDI to Region	fdic_fdir	1.00							
Lagged Log FDI	llnfdi	0.01	1.00						
Real GDP Growth	rgdpg	0.10	-0.02	1.00					
Consumer Price Index Annual Change	cpiac	-0.14	0.07	-0.26	1.00				
Exchange Rate Volatility	erv	-0.20	-0.01	-0.58	0.51	1.00			
Openness Proxy	op	0.10	0.22	-0.06	-0.29	-0.15	1.00		
Country Environment	ce	0.07	0.20	-0.19	-0.28	-0.04	0.40	1.00	
M2 to GDP	m2_gdp	0.15	0.29	-0.09	-0.34	-0.23	0.46	0.56	1.00