The impact of China's FDI surge on FDI in South-East Asia: panel data analysis for 1986-2001

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China's surge in foreign direct investment inflows is raising concerns that it is taking such investment away from other South-East Asian economies. This article assesses whether this is the case, using fixed-effects estimation to test for the relationships between FDI in South-East Asian economies within a simple model of location determinants of foreign direct investment, assuming the supply of FDI to be elastic. The results suggest that China raised rather than diverted such investment into neighbouring economies during 1986-2001; the results obtain whether inflows are lagged or not. This may be because countries do not compete for foreign direct investment in market and resource-seeking activities; the only competitive segment is likely to be export-processing – here China may be complementing other countries in electronics, where they are being integrated into a regional production network. There may be FDI substitution in other export-oriented industries, but the effect is not large enough to influence the results. However, the data do not allow different types of FDI to be tested separately, and this conclusion remains speculative.

**Key Words:** FDI, China, South-East Asia

1. Introduction

In 2002, China surpassed the United States as a foreign direct investment (FDI) destination for the first time and, with an inflow of $53 billion, became the largest recipient of FDI in the world. In 1990, the other countries of South-East Asia[1] attracted four times as much FDI as China; today the opposite is true (figure 1). China's FDI surge is raising concerns among its regional neighbours,[2] most of which depend heavily on transnational corporations (TNCs) to drive their industrial, services and export growth. Since the signs are that China will continue to attract large FDI inflows, most neighbours fear that their inflows are under threat of substitution by China;[3] the threat is very similar to the one in manufactured exports, on which similar concerns have been raised.[4]

**Figure 1. FDI inflows to South-East Asia and China,
1990 and 2002**
(Billion dollars)
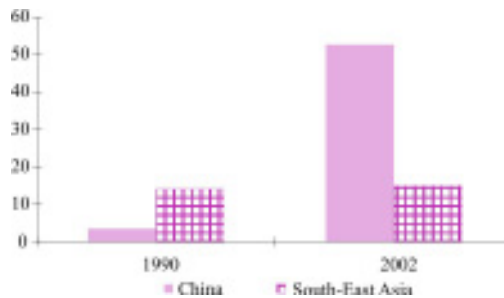
Source: UNCTAD, 2003.

[1] South-East Asia is taken here to include Indonesia, the Republic of Korea, Malaysia, Philippines, Singapore, Taiwan Province of China and Thailand. The FDI data are taken from different editions of UNCTAD's *World Investment Report.*

[2] The neighbours are described collectively as "South-East Asia" and include all developing and newly industrializing economies in East and South-East Asia. However, the statistical analysis in this article is confined to the major FDI recipients, described below.

[3] Chantasasawat *et al.* (2003) cite several comments by political leaders and analysts in South-East Asia on the threat to FDI inflows posed by China.

[4] On the Chinese threat to East Asian manufactured exports, see Lall and Albaladejo (2004).

While fears of a Chinese "threat" to FDI inflows are understandable, it is not clear that they are justified. The supply of FDI to the region is not strictly limited. Whether or not countries compete for FDI depends on the nature of the investment: a large portion of FDI flows into activities that do not actually compete with each other. There may still be FDI substitution by China, but it should be considered in an analytical framework that takes the other determinants of FDI location into account.

The article analyzes econometrically the relationship between FDI in China and other major recipients in the region. Section 2 describes China's FDI performance; section 3 discusses what "FDI competition" means; section 4 presents the statistical methodology; section 5 gives the results; and section 6 concludes.

2. Background

FDI inflows to China in 2002 were 28 times higher than in 1986, and its share of global FDI inflows increased from 1.4% to 8.1% over this period. China's large and fast growing market, cheap and productive labour, large pool of technical skills, growing export competitiveness and accession to WTO all increased TNC interest in locating operations there. In addition, China greatly liberalized its FDI regime over time, opening up various activities to foreign ownership; with greater liberalization of FDI in services following WTO accession, opportunities for foreign investors are likely to grow significantly.

Figure 2 shows the value of annual FDI inflows, and illustrates a clear break after 1991. FDI jumped by 244 % in 1992 as compared to 1991, and grew rapidly until 1997, when the financial crisis in the region slowed inflows (largely as a "contagion effect" from its neighbours, since China, with a tightly controlled capital account, did not itself fall into crisis). Inflows revived in 2000, and have since resumed their growth.

Figure 2. FDI inflows to China, 1986-2002
(Billion dollars)
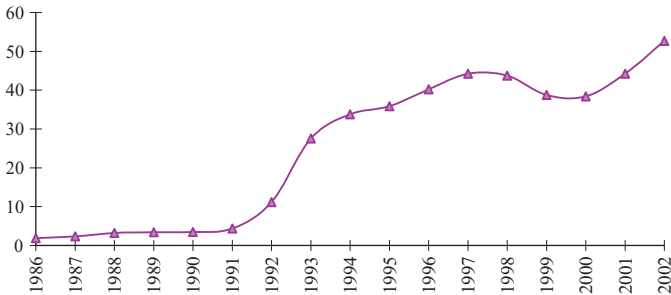
Figure 3 shows FDI inflows into China as compared to South-East Asia,[5] and figure 4 the share of South-East Asian countries in global FDI inflows over 1986-2002. Both figures illustrate why China's neighbours feel threatened, particularly after 1992: while China's global FDI share rose steadily, that of most regional neighbours declined after 1991.

Figure 3. FDI flows to South-East Asia, 1992, 2002
(Billion dollars)
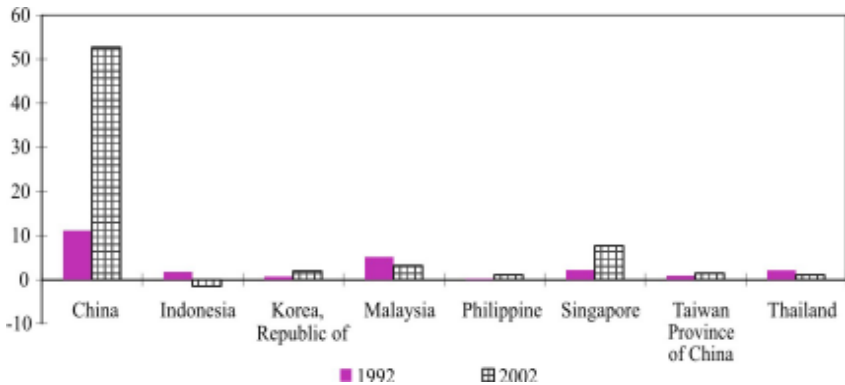
[5] In 2002, FDI in China was 49.3 times larger than that in Thailand, 47.4 times larger than that in the Philippines, 26.7 times larger than that in the Republic of Korea, 16.5 times larger than that in Malaysia and 6.9 times larger than that in Singapore.

**Figure 4. Share of South-East Asian countries in global inward
FDI flows, 1986, 1992, 2002**
(Per cent)

We do not include Hong Kong, China in these figures or
in the statistical analysis. This is for two reasons: first, a large
part of FDI in Hong Kong, China is destined for China, and it is
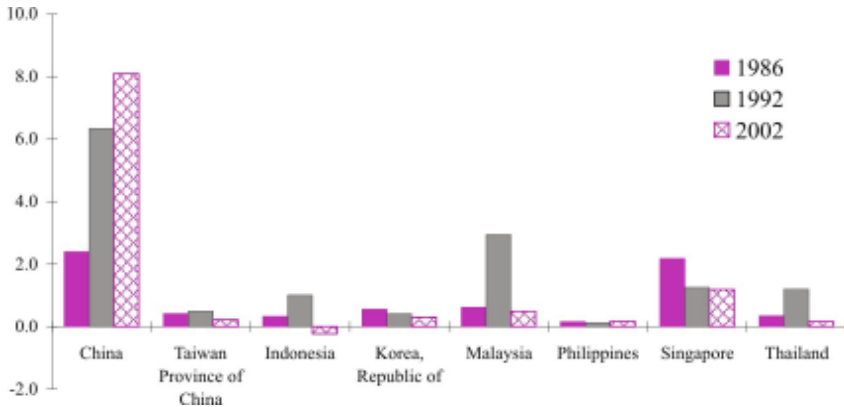difficult to separate the two. Second, part of FDI from Hong
Kong, China to China actually comes from the latter ("round-
tripping" by mainland enterprises to evade taxes and other
restrictions[6]). Both factors make the Hong Kong, China data
volatile and unreliable.

While the absolute value of FDI inflows into China is
impressive, it is much less so in per capita terms. The per capita
FDI inflow to China in 2002 was lower than in Singapore (which
is exceptionally high in the region), Malaysia, Taiwan Province

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[6] Capital is moved out of China by a variety of mechanisms including
transfer pricing, the establishment of holding companies in Hong Kong,
China and tax havens by enterprises in China, and informal payment flows
and cash outflows between the mainland and Hong Kong, China. Statistics
show that tax haven economies were both one of the largest recipients and
sources of FDI related to Hong Kong, China during 1998-2000. Perhaps
much as 40 % of total FDI inflows to Hong Kong, China in 1998 was "Hong
Kong-tax haven routing". It is now interwoven with the "mainland-Hong
Kong round-tripping" (UNCTAD, 2001).

of China and the Republic of Korea (figure 5). However, China had surpassed Thailand, the Philippines and Indonesia, all of which were suffering the after-effects of the financial crisis. The relatively low value of China's per capita FDI may reinforce fears of a threat in that it still has some way to go before it reaches "normal" levels.

Figure 5. Per capita FDI flows to South-East Asia, 1986-2002
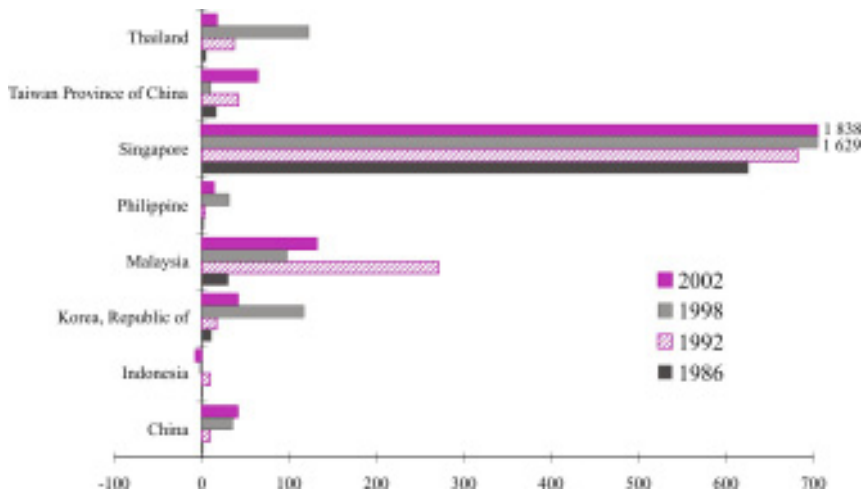
Source: UNCTAD, 2003 and World Bank, World Development Indicators, 2003..

FDI in China is concentrated in manufacturing, which accounted for nearly 70% of total inflows by 2002 (table 1). The primary sector (agriculture and mining) accounted for only 3% in that year, with services, including R&D, accounting for the remainder.

The sectoral pattern of FDI in China has changed over the past 20 years, shifting from labour-intensive activities in the 1980s to capital and technology-intensive ones in the 1990s (Lemoine and Unal-Kesenci, 2002). One aspect of importance is the growing focus of FDI on high technology products, particularly (but not only) for export. TNCs' electronics exports (the main products in the hi-technology category) from China

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increased from \$4.5 billion in 1996 to \$29.8 billion in 2000 (*ibid.*), and accounted in the latter year for one-fourth of exports by foreign affiliates and 81% of China's exports of high-technology products (UNCTAD, 2002).

Table 1. Shares of utilized FDI, by sector and industry, 2000-2002

(Per cent)

Sector	2000	2001	2002
Farming, forestry, animal husbandry and fisheries	1.66	1.92	1.95
Mining and quarrying	1.43	1.73	1.10
Manufacturing	63.48	65.93	69.77
Electricity, gas and water	5.51	4.85	2.61
Construction	2.22	1.72	1.34
Geological prospecting	0.01	0.02	0.01
Transport, storage, post and telecommunication services	2.49	1.94	1.73
Wholesale and retail trade and catering	2.11	2.49	1.77
Banking and insurance	0.19	0.08	0.20
Real estate management	11.44	10.96	10.74
Social services	5.37	5.54	5.58
Health care, sports and social welfare	0.26	0.25	0.24
Education, culture and arts, radio, film and television	0.13	0.08	0.07
Research and development services	0.14	0.26	0.37
Other	3.57	2.24	2.50

Source: National Bureau of Statistics of China, *China Statistical Yearbook* (2003).

The significance of electronics exports for this article is that TNCs are integrating China into a close-knit production and export network spanning much of East Asia (Lall, Albaladejo and Zhang, 2004),[7] making the region the world's leading base

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[7] See UNCTAD, 2002; Ernst and Kim, 2002; Hobday, 2001; Lall, Albaladejo and Zhang, 2004. However, two leading East Asian exporters, the Republic of Korea and Taiwan Province of China, are integrated into global production systems in a different way from the other countries, relying more on arm's length subcontracting relations with developed country TNCs. However, their national firms are major TNCs in their own right and are building global production networks that encompass China and other South-East Asian countries.

for assembly, testing, integrated production and, increasingly, research and development (R&D). While TNCs also dominate some other export activities in the region, they have not developed similar integrated systems. The reason lies in the ease of transportability and high value of electronic products, along with their need for labour-intensive assembly and testing, which make them eminently suitable for segmentation of functions and processes across countries (*ibid.*). This raises the possibility that FDI in electronics is complementary across countries in the production network, with growing capacities in one country stimulating similar capacities in others.

Studies are starting to appear on FDI "diversion" by China. The two known to the present authors conclude that China does not pose a competitive threat to the region. F. Wu and P. K. Keong (2002), in a qualitative analysis of FDI flows to East Asia, conclude that much of the growth in FDI in China was due to increased FDI from Hong Kong, China and did not detract FDI from ASEAN. However, this analysis is fairly impressionistic and lacks a proper analytical framework to analyse FDI substitution.

C. Busakorn *et al.* (2003) use econometric analysis to test whether China diverts FDI from eight South-East Asian economy.[8] They regress annual FDI inflows in the eight countries on a set of location determinants of FDI, using FDI to China as an independent variable. They find that FDI in China is positively related to *levels* of FDI in these other economies but negatively to their *shares* in total FDI in Asia and total FDI in developing countries. This article is the closest to our analysis and reaches similar conclusions; however, there are some problems with the methodology used, to which we turn later.

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[8] The eight economies are Hong Kong, China, Taiwan Province of China, the Republic of Korea, Singapore, Malaysia, the Philippines, Indonesia and Thailand. Our analysis also uses these economies with the exception of Hong Kong, China.

3. Defining "FDI competition"

When do countries "compete" for FDI? The most obvious case for any resource flow is when the available amount of the resource in question is limited; in the extreme case, greater flows to one country reduces flows to others by the same amount. This "zero-sum" definition is difficult to justify for FDI: the amount of FDI available is not fixed. At the global level, FDI forms only 12 % of global gross domestic capital formation (UNCTAD, 2003), and additional resources can easily be added should investment opportunities arise, from domestic resources or other international capital flows (e.g. portfolio investment). While annual FDI flows fluctuate widely in response to changes in the investment climate and stock market performance, business cycles, non-economic events (wars and the like) and shifts in investment opportunities, the *supply of investible funds* does not normally appear as a major determinant of FDI. [9]

At a regional level, in East Asia there is even less reason to expect investible resources to be limited. This region accounted for only 16% of global inward FDI flows over 1986-2002 (14% in 2002). In any case, TNCs do not allocate investment on a regional basis – say, allow only a given sum for East Asia – and so forego profitable opportunities in one country there because they have already invested in its neighbour (i.e. used up their regional quota). Even if one TNC were unable to undertake an investment at a given time because of resource constraints, in most industries there would be several others that would seize a promising opportunity within a short period. Over the medium term, therefore, there is little reason to expect FDI in the region to be supply-constrained.[10]

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[9] Zhan (2002) has a good analysis of the different implications of competition for FDI, focusing on policy measures used to attract FDI. Chantasasawat *et al.* (2003) do not discuss the concept of "FDI competition", simply using FDI in China as an independent variable in a model of FDI location.

[10] This assumes that the investment climate in all the countries is equally attractive, in terms of political and economic stability, FDI regulations, legal systems and so on. While these do differ within South-East Asia – Indonesia, in particular, has suffered from a deteriorating climate since the financial crisis of 1997 – in general this is not a major factor differentiating East Asian countries and we abstract from it here.

However, there may be "FDI competition" even with an elastic supply of investible resources. Its nature and incidence will depend on whether FDI in one country pre-empts that in another due to market rather than resource constraints. Consider this for the four main types of FDI (following the classification developed by Dunning, 1993):

- *Market-seeking FDI*, determined by the size, growth and attractiveness of the domestic market in a host country and its investment climate, does not incur competition across countries. While China offers attractive investment opportunities, this does not *per se* "threaten" its neighbours if their markets are also attractive. One of the main areas of FDI activity in this category is services, and there is no indication that there is substitution in investment between countries here.

- *Resource-seeking FDI* is similar to market-seeking FDI, and does not induce substitution between countries. In any case, China is not a resource-rich country by normal standards and, as table 1 shows, does not receive much FDI in resource-based activities. It is therefore unlikely to threaten resource-seeking investments in neighbours like Indonesia.

- *Asset-seeking FDI*, searching for resources that can add to TNCs' advantages (e.g. new technology or skills) is not relevant to most of the East Asian region (though the Republic of Korea and Taiwan Province of China are emerging as innovators) and has not been an important determinant of FDI there. In any case, asset-seeking FDI also does not result in country-specific competition.

- *Efficiency-seeking FDI*, where TNCs invest to serve external markets, is where direct competition is most likely. Since the number of export-oriented facilities worldwide in any industry is given by the size of the market, one country can potentially pre-empt another by attracting TNC facilities. However, a vital caveat is that, in integrated

production networks, FDI in one country may lead to greater FDI in another.[11] Countries in South-East Asia offer different operating environments for efficiency-seeking FDI: apart from different wage levels, they have different levels of skills, technology, supplier development, infrastructure, logistical facilities and support institutions.[12] Thus, TNCs spread their production networks over countries in response to differences in such factors, fitting them into a complex production hierarchy to optimise overall efficiency.[13] The electronics industry is particularly prone to FDI complementarity in this region.

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[11] FDI complementarity may also arise in other circumstances. For instance, it may lead to higher demand for imported raw materials and so lead to greater FDI in primary producers (Latin America may benefit from growth in China in this way, and some of the FDI will come from China itself). Or FDI may lead, via higher incomes in China, to greater demand for various new exports by other countries and so to FDI in relevant industries.

[12] Incentives may also make a difference, at least in the short term, but as they are unlikely to matter significantly over the long term, we ignore them here.

[13] Industries differ in the extent to which they can be integrated into production networks (and so be complementary), depending on technological characteristics. Some industries have highly fragmentable processes (Arndt and Kierzkowski, 2000; Lall, Albaladejo and Zhang, 2004): production can be separated into discrete stages, with different processes placed in different countries. The most fragmentable activities are engineering-based, like machinery, automobiles and electronics. The least fragmentable are activities with continuous processes like chemicals, paper or food processing; here it is not possible to break production up and locate segments in different countries to take advantage of fine cost differences, though some functions like R&D, back-office services and logistics can be relocated (see UNCTAD, 2004). Even engineering industries differ in the extent to which they can be fragmented. The degree of fragmentation depends on the value-to-weight ratio of the product (light, high value products can be transported long distances to take advantage of small differences in production costs, while heavy, low value ones cannot) and the skill needs of processes (only those with relatively simple processes can relocate to low wage, low skill countries). The industry most prone to fragmentation is electronics: it has light, high-value products and simple final assembly processes. Heavy machinery and automobiles fragment to a lesser extent because products are heavier and skill needs more demanding (Lall, Albaladejo and Zhang, 2004).

A significant part of FDI in the region, depending on the country, is market seeking (reinforced by the recent growth of FDI in services), and in countries like Indonesia a large part is also resource-seeking; both sets are likely to be non-competing. In efficiency-seeking activities, significant for many countries in the region, there is more possibility of substitution, with the major exception being FDI in integrated systems, led by electronics. There is also cross-country specialization within other FDI-dependent export industries in the region, but there is less intense integration. Low-technology industries like textiles and apparel, footwear and toys *are* linked across countries, but the subdivision of activity is not as fine or as advanced as in electronics. The automotive industry, the other complex industry with integrated production systems, has not established a regional production system in East Asia in the way that it has in parts of Latin America (Lall, Albaladejo and Zhang, 2004). It is likely, therefore, that there is more direct competition for FDI in other export-oriented activities than in electronics.

Ideally, our analysis should have tested for the impact of Chinese FDI for each major category of FDI (and for each major export-oriented activity) separately. However, data are only available for total FDI for most countries (though some, like Malaysia, also give industrial breakdown for FDI approvals, though not for projects actually realized). Without comparable FDI data for all countries for each year by industry, however, we must confine the analysis to total FDI inflows. The exercise thus covers the whole range of competitive, non-competitive and complementary trends in different types of FDI, and the result is the net outcome of their interactions.

4. Methodology

We analyze the impact of FDI inflows to China on FDI in the following South-East Asian economies: Indonesia, Malaysia, Philippines, Republic of Korea, Singapore, Taiwan Province of China and Thailand. As control variables, we include major locational factors affecting FDI and a dummy variable for the impact of the 1997 financial crisis. We employ a panel data analysis to estimate the impact of these variables, using

data for the 16 years from 1986 to 2001. This provides 99 observations in total, along with sub-period data with 42 observations for 1986-1991 and 66 for 1992-2001. The panel data analysis allows us to control for country-specific effects in estimating how FDI flows are determined. Fixed-effects estimation enables us to analyse the relationship among different economies over time (Kevin, 2001). We use the following specification:

$$\text{lnper capita } FDI_{it} = \beta_i + \ddot{a}\ln \mathbf{X_{it}} + \overset{\circ}{a}_{it}D_{it} + u_{it}, \quad (1)$$

where the subscripts "i" and "t" stand for country I and period t; $\mathbf{X_{it}}$ is a set of FDI determinants for inward FDI of country i at time t; per capita FDI_{it}, total FDI divided by population, indicates FDI flows into the ith economy in year t, and X_{it} denotes the independent variables which vary across economies and over time. $\mathbf{X_i}$ represents per capita FDI in China, GDP, per capita GDP, per capita stock of FDI and economy-specific effects are captured by β_i. D_{it} indicates that dummy variables are employed to estimate how the Asian financial crisis influenced FDI flows. u_{it} is a random disturbance. Data on FDI, population and GDP are taken from UNCTAD's *World Investment Report 2003*. All variables are converted to logs.

a. Variables

Dependent variable. To test for the impact of China's FDI inflows, we measure FDI in per capita rather than absolute terms. Absolute FDI would give a distorted picture as it would be dominated by the size of the economy, a particular problem when comparing relatively small countries with a giant like China. As noted, we cannot predict whether FDI flows are competitive, non-competitive or complementary.

Independent variables.

FDI in China, measured in per capita terms, is the main variable of interest here. However, to capture its true impact we use a number of variables to capture the other main determinants of inward FDI.

Market size, measured by total GDP, is widely considered a key factor in attracting FDI (Globerman and Shapiro, 2002; Dunning, 1993; Chandprapalert, 2000). The theoretical link between the size of GDP and FDI inflows is clear: a larger market lowers distribution and information costs when production and distribution facilities are established in a market, and a clustering of other producers and suppliers in a large market creates or accentuates agglomeration economies. However, most models of FDI location test for the effect of market size on the absolute value of FDI inflows; as we use per capita FDI as the dependent variable, our results may not be comparable to those of others. Market size may affect the level of per capita FDI but not its change from year to year.

Per capita GDP is used as an indicator of the sophistication and differentiation of a market – and so for demand for the advanced and differentiated products in which TNCs often have advantages – as well as of some other factors that affect FDI flows, e.g. the level of skills, infrastructure, institutions, legal systems and so on. Several empirical studies have found, as expected, a significant and positive relationship between per capita GDP and FDI.[14] For instance, V.N. Bandera and J.T. White (1968), using pooled data on United States manufacturing FDI in seven European economies over the period 1958-1962, strongly support the hypothesized dependency of the level of FDI (but not the first order change in FDI) on the level of national income in a host country. P. Tsai (1994), in an econometric analysis of a non-linear simultaneous equations model using pooled aggregate data for 62 countries over the period 1975-1978 and for 51 countries over the period 1983-1986, finds that higher per capita GDP is associated with a higher level of inward FDI.

The per capita stock of FDI is used to capture the general investment climate for FDI. A large existing stock of FDI is taken as evidence that a country has a good regime for foreign investors (i.e. stability, low regulations, appropriate taxes, other

[14] See, for instance, Bandera and White, 1968; Lunn, 1980; Pain, 1993; Lucas, 1993 and Tsai, 1994.

economic factors affecting operations). While something of a "catch all" variable, it is appropriate for our purposes since our objective is not to comprehensively explain the location of FDI but to test for the impact of FDI in China. Since the investment climate for FDI has been relatively stable in the region, it meets our needs for a control variable rather well.

We include a dummy variable for the Asian financial crisis. In the second half of 1997, turmoil erupted in some South-East Asian economies. Large amounts of short-term capital left the most affected ones: Indonesia, the Republic of Korea, Malaysia, the Philippines and Thailand. However, FDI inflows remained positive; indeed, inflows in 1997 to these five countries together were similar to those of 1996. In 1998, however, they fell by 13.2 % (UNCTAD, 1998) and started to recover a year so later; however, Indonesia remained an outlier because of political instability and economic adjustment problems, and continued to suffer from low or negative inflows. Over the period as a whole, therefore, we do not expect a strong effect for this variable: we define D_{it} to equal one for 1997 and 1998, the years when the financial crisis was at its peak, and zero otherwise.

Let us conclude this section with a comparison of our model with that of A. Chantasasawat *et al.* (2003). The latter use the total value of FDI inflows as their dependent variable, while we use FDI per capita to control for the large size differences between China and its neighbours. They also use FDI shares in Asia and the developing world, but we do not as this is equivalent to assuming that FDI is a "zero sum game" – the rise in the share of China in Asia must be accompanied by a fall in that of other countries. It is not surprising, therefore, that Chantasasawat *et al.* (2003) find a negative impact of FDI in China for this dependent variable: this simply follows from the fact that FDI in China has grown faster than in its neighbours.

Chantasasawat *et al.* (2003) use many more explanatory variables than we do. They use GDP growth, import duties, trade openness, the illiteracy rate, the corporate tax rate, government stability, corruption, the average manufacturing wage, the number of telephone lines per 1,000 people and per capita GDP.

The rationale for some of these variables, and sometimes their measurement, are not convincing. The "openness" variable (exports plus imports/GDP) is dubious, for instance: many analysts distrust this measure because it captures country size, primary resources and a number of other factors apart from trade policy that affect it. The illiteracy rate is a weak indicator of human capital, which is relevant for FDI. Corporate taxes are not sufficiently variable in the region to matter for long-term investments. Government stability and corruption are based on very subjective measures. There is little theoretical rationale for using the level of wages as a determinant of FDI: market and resource seeking FDI are not affected by this and export-oriented FDI is affected by overall efficiency rather than wages *per se*. The proxy for physical infrastructure is of dubious value.

We tried a few similar variables in early analysis but decided to drop them for lack of hard data or because of a weak theoretical rationale for the measure. We dropped GDP growth for a lack of significance. We did not use a trade regime variable since such regimes did not vary across the seven countries in the 1990s sufficiently to matter to foreign investors. We did use dummy variables to capture the impact of the financial crisis, while Chantasasawat *et al.* (2003) ignore this factor.

Finally, Chantasasawat *et al.* (2003) run their analysis for the whole period 1985-2001, but do not differentiate between periods before and after 1991, when there was a structural shift in FDI into China. We differentiate between 1986-1991 and 1992-2001 to capture this structural break.

b. Specifying the model

All variables are measured in logarithms to adjust for heteroskedasticity; thus, their coefficient measures the elasticity of FDI flows. To bring out possible structural variations over the period, separate estimations of the model are conducted for three periods: 1986-2001 as a whole, and 1986-1991 and 1992-2001 separately. The division into two sub-periods is undertaken to account for the possibility that foreign investors responded

to changes in China's investment and trade environment.[15] In addition, we test each independent variable in current values as well as with a one-year lag to capture possible lags.

5. Estimation results

Both dependent and independent variables are computed by taking mean values of the variables over the relevant periods for each sub-period. The estimates of panel data for the full sample are conducted by the fixed effects approach. Tables 2 and 3 present parameter estimates from the panel estimates for the two sub-periods (1986-1991, 1992-2001) and from the panel data for the entire sample (1986-2001), using both current values (table 2) and with a one-year lag (table 3).

The overall performance of panel estimates in both models is satisfactory. The R^2 for all the estimates are fairly high, particularly for the panel estimates for the sub-periods 1986-1991 and 1992-2001. The relationships between the dependent variables and the independent variables in both formulations are strong, with the F-statistics significant at a 1% level in each model. On the whole, the lagged model works better than the current-value model.

Both the estimates for the whole period and for the sub-period 1986-1991 suggest that FDI inflows are *not* significantly related to FDI in China. The estimates for the sub-period 1992-2001, in both current and lagged terms, show a significant impact of Chinese FDI – with a *positive* sign (the estimates based on current values show higher complementarity that those based on lagged values). Thus, no estimate suggests that China is diverting FDI from the rest of the region; on the contrary, there

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[15] The government of China launched an economic adjustment programme in the late 1988 to reduce rapidly rising inflation, leading to a halt in all new FDI projects. The crackdown on the student demonstration at the Tiananmen Square in 1989 affected FDI because foreign investors began to question Chinese political stability (Kevin, 2001). The milestone year in terms of Chinese FDI policies was 1991, when Deng Xiaoping opened up the economy significantly.

appears to be growing complementarity between China and its major neighbours after 1992 and no significant effect before this.

Table 2. Panel estimates of determinants of FDI inflows to South-East Asia (dependent variable: per capita FDI (current value))

Independent variables	1986-2001	1986-1991	1992-2001
ln per capita FDI in China (current $)	-0.5039 (0.109)	-1.3578 (0.529)	12.3868* (0.070)
ln GDP (current $)	-0.2846 (0.824)	5.1141 (0.167)	-3.9357 (0.116)
ln per capita GDP (current $ per capita)	0.2366 (0.852)	-5.0894 (0.166)	3.2339 (0.184)
ln per capita FDI inward stock (current $ per capita)	1.7849*** (0.003)	-1.3578 (0.172)	-31.6091* (0.092)
dum97	0.2673 (0.68)	-	-0.2843 (-0.80)
dum98	-0.1176 (-0.72)	-	-0.6172 (-1.61)
R^2 (overall)	0.4670	0.8200	0.7773
F-statistics	5.53	5.06	4.10

Source: Zhou and Lall.
Notes: The number of observations for panel estimates is 108, and for panel estimates 1986-91, 1992-96 and 1997-2001 are 42 and 66, respectively. The data in parentheses show significance probabilities. The estimating results for constant terms are omitted to save space. The asterisks ***, **, and * indicate the levels of significance at the 1%, 5%, and 10% levels, respectively.

How can we explain this apparent complementarity?

- The complementarity may partly be only apparent rather than real: a large (possibly dominant) part of inward FDI in the region may be non-competing (market- and resource-seeking). Such FDI is rising in most countries in response

to fast growth and ongoing liberalization, and is not causally related across countries, except indirectly in the sense that the region shares in dynamic spillover benefits and a better investment image.

- Different countries in South-East Asia are at different levels of development and offer different advantages to foreign investors. In fragmented industries, as noted, countries attract different processes and functions within similar industries, and so genuinely complement each other.

Table 3. Panel estimates of determinants of FDI inflows to South-East Asia (dependent variable: per capita FDI (one year lag))

Independent variables	1986-2001	1986-1991	1992-2001
ln per capita FDI in China-1 (current $)	-0.1216 (0.694)	-6.1370 (0.134)	2.0726* (0.095)
ln GDP-1 (current $)	-1.8931 (0.173)	8.2048* (0.067)	-3.9264* (0.085)
ln per capita GDP-1 (current $ per capita)	1.7541 (0.202)	-8.1935* (0.066)	4.0176 (0.107)
ln per capita FDI inward stock-1 (current $ per capita)	1.1915** (0.046)	5.5626* (0.085)	-3.3692 (0.210)
dum97	0.1692 (0.2673)	- -	-0.0433 (-0.6811)
dum98	-0.1947 (-0.1176)	- -	-0.3903 (-1.0293)
R^2 (overall)	0.8549	0.8890	0.7737
F-statistics	5.61	4.32	4.39

Source: Zhou and Lall.
Notes: The number of observations for panel estimates is 101, and for panel estimate 1986-91 and 1992-2001 is 35 and 66 respectively. The data in parentheses refer to significance probabilities. The estimating results for constant terms are omitted to save space. The asterisks ***, **, and * indicate the levels of significance at the 1%, 5%, and 10% levels, respectively.

- The "flying geese pattern", a popular characterization of the pattern of intra-Asian FDI, explains part of the investment complementarity. As countries move up the development and industrialization ladder, they shift less advanced facilities to lower wage economies in the region. With Japan at the top, followed by the mature Asian Tigers (Singapore, Hong Kong, China, the Republic of Korea and Taiwan Province of China), ASEAN, China and finally other emerging economies, FDI is therefore flowing across the region in response to evolving comparative advantages (Sikorski and Menkhoff, 2000).

- A significant part of FDI in China comes from Taiwan Province of China and Hong Kong, China (table 4). Most of this FDI is unlikely to deprive other economies, since it depends heavily on the investors' "Chinese connection" (linguistic, cultural and family) and may not have gone to other economies in any case.

- Risk-diversification strategies may lead TNCs to invest in different countries in the region, even if one in particular (China) were the most efficient producer for a given product or component. They would be reluctant to place all critical facilities in China: it would be too risky (Lall and Albaladejo, 2004).

- "Round-tripping" of FDI between Hong Kong, China and the mainland, which, as noted, may account for a significant part of FDI in China, does not divert FDI from other regions.

Coming now to the other independent variables, *market size* does not affect FDI in South-East Asia when current values are used. However, the lagged panel and panel data estimates for the two sub-periods suggest that market size has varying effects on FDI, positive in 1986-2001 and 1986-1991 negative in 1992-2001, both at the 10% confidence level. The unexpected result for the latter period may reflect either the possibility that market size does not affect per capita FDI or reflect the impact of the Asian financial crisis.

Table 4. Sources of FDI in China 1992-1998
(Million dollars)

Economy/region	1992-1998	
	Total inflows	Per cent
Asian developing economies	**173,090**	**74.00**
Hong Kong, China	124,300	53.57
Taiwan Province of China	19,458	8.32
Singapore	11,626	4.97
Korea, Republic of	8,005	3.42
Thailand	1,620	0.69
Others	7,081	3.03
Developed economies	**60,816**	**25.99**
Japan	18,890	8.08
United States	17,963	7.68
United Kingdom	5,830	2.49
Germany	3,332	1.42
France	2,046	0.87
Canada	1,876	0.80
Netherlands	1,535	0.66
Others	9,344	3.99
Total	**233,906**	**100.00**

Sources: Data for 1992-1997 are from International Trade (various issues) by MOFERT. Others are from *Almanac of China's Foreign Economic Relations and Trade* (various issues) by MOFERT and *China Statistical Yearbook* (various years). All data for FDI flows and stocks are realized investment in current values.

Per capita GDP at current values does not affect FDI flows in South-East Asia, while the lagged values show different effects according to the period. As with total GDP, the effect is positive for the period as a whole, but differs by sub-periods, being positive during 1986-2001 and 1992-2001 and negative during 1986-1991 (significant at the 10% confidence level).

Per capita inward FDI stock has a positive effect on FDI flows in Southeast Asia in both specifications, and is significant at a 1% confidence level. In both specifications, per capita

lagged FDI stock is significant and positively related to FDI inflows during 1986-1991, but negatively related during 1992-2001. It is not clear why this variable shows a negative coefficient in the latter period, but it may be picking up the delayed effects of the financial crisis that the dummy variables miss out.

The *dummy variables for the financial crisis* in 1997 and 1998 do not have significant effects on FDI flows in either model. This surprising result may be due to the inadequacy of the dummy variable as a measure, or to the effect of other variables that pick up the effects of the crisis, or perhaps that the negative effect on FDI over the medium term was largely confined to one country (Indonesia).

Our final result is similar to that of Chantasasawat *et al.* (2003) in that they also find that China's FDI complements FDI in the other economies (the results hold when, as with our model, Hong Kong, China is excluded). However, they find complementarity for the entire period while we find evidence of this only in the later period, i.e. we find *growing complementarity* over time – presumably the result of intensification of production networks. They also find that openness is highly significant, but given the nature of the measure employed, this finding is hard to interpret (high FDI may well be associated with greater trade due to other factors rather than to falling trade barriers). They find corporate tax rates to be significant, but not measures of corruption or stability. In general, their results support our conclusions.

6. Conclusions

While China's FDI surge has raised concerns in the region, our analysis suggests that much of the concern is unfounded. China does not seem to have crowded out FDI inflows to other countries. On the contrary, China is either not competing with them for FDI or is actually stimulating complementary investments in them. It is difficult to separate out the two effects (non-competing investments and

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complementarity). This does not imply, however, that there is *no* competition between China and its neighbours for FDI in all activities or that complementarity will continue to grow.

There are likely to be export-oriented activities where FDI in China deprives neighbours of foreign-owned facilities, or where more rapid expansion in China means lower growth in a neighbour. This is likely to be true of most export activities not organised in integrated systems, such as textiles and clothing, footwear, or toys. The substitution effect may grow over time as Chinese industrial capabilities (skills, technology levels, supplier bases, infrastructure) improve and its large market size allows it to reap scale and scope economies out of reach of its neighbours. There may also be growing substitution within electronics production networks, if China's growing capabilities lead TNCs to locate more or higher quality facilities there. However, these conjectures must remain speculative in the absence of better industry-level evidence.

Even if its neighbours become less competitive than China in traded activities, this may not lead to falls in overall FDI levels. TNCs may well invest in China's neighbours in domestic-market-oriented activities like services: the net effect on FDI will depend on how large and dynamic these other activities are. The main policy concern should be not to worry about FDI as much as about building the capabilities to maintain growth in activities that remain competitive in the face of the Chinese challenge. ■

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