

Home Country Effects of Foreign Direct Investment: from a Small Economy to a Large Economy

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Abstract

Since the beginning of the 1990s 10% of the world FDI (foreign direct investment) flows into the developing country of China. China's official statistics of FDI stock accumulated to 2005 indicate up to 57% of China's inward capitals are contributed by only the Asian Four Tigers. Previous studies on home country effects mainly focused on FDI from large developed economies, such as the U.S. and Japan, to other countries. But China is a relatively larger economy than its investors and many of these investors are not classified as "developed economies." A simple *Ak* type model implies that a small and more developed country investing in a large and less developed country will experience decreases in both employment and income disparity (compared to the recipient country) as the less-developed recipient country gains the higher technology of production through FDI inflows. The empirical results for the Four Tigers (source countries) and China (recipient country) are consistent with our theoretical model of FDI outflows. We also find that FDI outflows to China decrease the ratio of exports to GDP only for small source countries, even though a higher investment in China raises the share of these countries' exports-to-China to China's total imports.

Keywords: Foreign Direct Investment; Capital Outflows; Home Country Effects

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1. Introduction

The phenomenon that foreign direct investment (from now on, FDI) flows between developed countries rather than flows from developed ones to developing ones indicates a vital flaw in the neoclassical prediction on capital flows (Lucas 1990). Since the beginning of the 1990s 10% of the world FDI flows into one non-developed country: China.¹ This amount is amazing because the approximate 150 non-developed countries share only one-third of the world's FDI inflows. Despite the below average rate of FDI returns flowing to China as well as an alleged Chinese economic collapse, the procurement ability of China is unique (Hsiao and Hsiao, 2004). Along with the many studies that investigate the economic effects of general inward FDI, great efforts have been devoted to studying the "cause and effects" of China's FDI inflows.² Among them, the causality between inward FDI and economic growth is always an issue, and most researchers confirm the contribution of FDI in promoting China's growth.³ Compared with the above mentioned issues, however, studies on the home country effect of FDI outflows to China are relatively rare.⁴

¹ Refer to Appendix 1 for the definition of the country groups.

² As for studies devoted to the economic effects of inward FDI, see, for instance, Borensztein, de Gregorio and Lee (1998), Balcão Reis (2001), Mencinger (2003), Lee and Tcha (2004), Girma (2005), Schneider (2005), Zhang (2005a); or Nunnenkamp (2004) for a survey study. On the "cause and effects," see, Wu (2000), Zhang (2001), Tseng and Zebregs (2002), Dayal-Gulati and Husain (2002), Hsiao and Hsiao (2004), and Baharumshah and Thanoon (2006) as examples.

³ For instance, see Zhang (2001), Tseng and Zebregs (2002), Dayal-Gulati and Husain (2002), and Baharumshah and Thanoon (2006).

⁴ Sung and Wong's (2000) Honk Kong study and Kim's (2000) Korea study are two exceptions. The former noted that, besides huge FDI from Hong Kong to China, there are many immigrants from China to Hong Kong, thus Hong Kong's outward FDI effects are hard to identify. The latter used very

Among the few studies discussing home country effects of capital outflows, previous researchers mainly focused on FDI from developed and/or large economies, such as the U.S. and Japan, to other countries. For example, an empirical study of industrialized countries by van Pottelsberghe de la Potterie and Lichtenberg (2001) showed that FDI transfers technology in one direction: a country's productivity is increased if it invests in foreign countries with intensive R&D. As for the theoretical models, Gao's (2005) significant work provided a North-South model to derive endogenous FDI from the core country to the peripheral country and their growths. It pointed out no direct causal relationship between FDI and growth. Baldwin, Braconier and Forslid (2005) considered a world with two symmetric countries and a monopolistic-competitive manufacturing sector and discussed the parameter set consistent with FDI equilibrium. Aizenman (1996), on the other hand, considered a global economy composed of a large number of small countries with and without FDI to analyze employment volatility, cyclical dumping, and welfare. However, China is a very big economy relative to many of its newly industrialized investors which, though more advanced than China, are not classified as a "developed" economy. Is there any lesson in home country effects of FDI from a more advanced small economy to a less developed large economy?

The huge outward FDI to China has changed the exports of its newly industrialized investors, especially Hong Kong, Korea, Singapore, and Taiwan, so-called the Asian Four Tigers. One common feature of the Four Tigers is their export-led growth, which contributed to their economic miracle. The close connection between exports and growth in the Four Tiger has been confirmed by a large amount of studies, yet its theoretical base is still unclear. Recently, along with

limited Korean data and found no evidence for FDI affecting Korean economic performance.

the handsome FDI flows, the replacement of China for the Four Tigers as the outstanding performer in growth and exports has brought attentions (see, for example, Lall and Albaladejo, 2004; Zhang, 2005b). From the trade theory approach to analyze FDI and exports (imports), some models suggest FDI flows and trade are substitutive to each other while some others predict they are complementary.⁵ Lipsey (2002) pointed out that no definite evidence on production abroad would cause home country exports and employment to fall in the development of developed countries. Because of the complexity of the linkages between FDI and trade and no unambiguous conclusion about the relationship between FDI and exports, we leave the substitution or complement of FDI outflows of the Four Tigers and their exports as an empirical phenomenon.

This paper tries to address the home country effect of FDI from a small economy to a larger and less developed one. Section 2 provides some facts about China and its main investors. Assuming FDI increases technology levels through knowledge spillovers and imitations, a simple endogenous growth model in Section 3 is solved and a panel data regression which is employed to examine some of the theoretical implications. Section 4 investigates the relationship between outward FDI and exports, which has been a growth engine in the Four Tigers. We empirically analyze the relationship between FDI outflows from a small open economy to a large, less-developed economy and the small economy's exports. Some concluding remarks are presented in Section 5.

⁵ The Heckscher-Ohlin-Samuelson model, more recent proximity-concentration trade-off models, and Markusen and Venables (1998) imply there is a substitutive relationship between trade and FDI. On the contrary, the vertical integration model of Helpman (1984) can explain the complementary effect of FDI and trade.

2. The facts

Four Tigers - small but rich source countries

After the fast economic growth of the past forty years, rich Asian NICS (newly industrialized countries), particularly Hong Kong, Singapore, Taiwan, and Korea (the Four Tigers), now have enough wealth to invest abroad. The “economic miracle” of the Four Tigers could be recalled by their economic growth rates. Table 1 presents the Four Tigers’ 5-year average economic growth rates, as well as those of the U.S. and Japan as a comparison. To compare the growth rates of per-capita real GDP across countries, our variables come from the Penn World Table 6.2 which uses the purchasing power parity (PPP) as its deflator.⁶ Obviously, the growth performance of the benchmark country, the U.S., pales beside the Asian economies in the past half century while the leader of flying geese, Japan, gave way to the Four Tigers since the 1970s. The other noticeable common feature in Table 1 is the decreases of the Asian economies’ growth rates in the mid-1980s when China opened its markets.

Concurrent with the high economic growth, the Four Tigers’ economic miracle is distinguished by low levels of their unemployment rates and national income equality. Table 2 presents the unemployment rate of the Four Tigers, Japan, and the U.S. It shows that the Asian economies’ unemployment rates are significantly lower than that of the U.S., even though the latter’s rate is much less than those in European industrialized countries. However, just like the eventual turn of income growth for the Five Asian economies, there is a new rising trend for unemployment rates in these economies since the mid-1980s.

Figure 1 shows the FDI outflows relative to the world for the Four Tigers and other developing countries. From this figure, we see that capital outflows mainly

⁶ See Heston and Summers (1996) for a discussion about PPP.

come from developed countries. Non-developed economies contribute to roughly 10% of FDI outflows in the 1980s, then rose to 20% and swung back down significantly in the 1990s. Next, among about 150 non-developed countries, the Four Tigers alone provide more than 40% of the FDI outflows since 1990. An ingoing analysis of the data finds that Hong Kong is the number one economy of capital outflows, followed by Singapore, then Taiwan, and Korea.

Since the Four Tigers are relatively small economies, the amounts of their FDI outflows are amazing. Table 3 presents the 5-year averages of their per capita FDI outflows and FDI outflows to GDP ratios.⁷ From Table 3 we find that the Four Tigers' per capita FDI outflows are far higher than the average of the developing economies. The amount of per capita FDI outflows from highest to lowest is Hong Kong, Singapore, Taiwan, and Korea, consistent with the importance of their financial service for China. The statistics in Table 3 also show that Hong Kong spends more than 10% of her output on outward FDI, Singapore spends near 10%, Taiwan spends 1.5%, and Korea spends less than 1% of her products in FDI outflows.⁸ Did the Four

⁷ Canada is a rich small open economy and trades closely with her next door neighbor, the U.S., who is one of the strongest attractors of FDI inflows and has many similar institutions, culture, and language. In this way, it is similar the Four Tigers to China, except the degree of their economic development. So Canadian case is a helpful comparison and its five year average of per capita FDI and FDI/GDP during the corresponding period are (35.62, 0.69), (83.71, 0.95), (147.13, 1.22), (195.0, 1.20), (208.52, 1.05), (662.84, 3.22), and (1127.15, 4.39). We find that Hong Kong's per capita FDI outflows overtook Canada's in the late 1980s, while Singapore's per capita FDI outflows overtook Canada's in the early 1990s. The recent amount of per capita FDI outflows of Taiwan reaches closely to Canada in the 1990s, while Korea stays around Canada's 1970s' levels.

⁸ In addition, the FDI outflows/GDP ratios are three to four times higher in Hong Kong than in Canada and about two times higher in Singapore than in Canada. Taiwan's FDI outflows/GDP ratio stays at Canada's 1990's average levels. However, Korea's FDI outflows/GDP ratio is still below 1% so far.

Tigers' FDI flow into China?

China - a super recipient in the world

Today's China, a country with an area only slightly smaller than the third largest country (the U.S.), includes more than 20% of the world's population while the entire population of all developed economies still totals less than the same 20%. According to the *World Economic Outlook 2006* of the IMF, China's GDP based on PPP share of world total rose from 3% in 1980 to 15% in 2004 and is predicted to keep increasing while the share of the U.S. ranges from 20% to 22% during the same period and is forecasted to be lower. How did China accomplish this?

Technology, human capital, funds, and basic infrastructure are key factors for the economic takeoff of less developed countries. Foreign investors not only fill the need for funds but also transmit new technology by their production processes and management. FDI has definitely contributed to China's speedy development.⁹

China Foreign Economic Statistical Yearbook reveals the information where foreign capital originates. As shown in Table 4, the top ten investors of FDI stock accumulated to 2005 (sequentially from most to least) are: Hong Kong, Japan, the U.S., British Virgin Islands, Taiwan, Korea, Singapore, the U.K., Germany, and Cayman Islands.¹⁰ Among the ten main investors the four developed countries' FDI

⁹ See note 3 for studies confirm the contribution of FDI in promoting China's growth.

¹⁰ Hong Kong, Singapore, and Taiwan are the main investors in the British Virgin and Cayman Islands. According to the Singapore Department of Statistics, British Virgin Islands and China are the top two destinations of its outward FDI (in stock) since 2001. The Taiwan government approved outward investment statistics provided by its Investment Commission, Ministry of Economic affairs, and confirmed that China and British Central America area are its first and second highest capital recipients accumulated from 1991 to 2005.

total 20% of the inward capital in China.¹¹ The Four Tigers and the two free ports contribute up to 65% of the inward capitals in China, with Hong Kong alone providing 41% of that inward capital! If we calculate the FDI inflows to China to home country's GDP ratio for individual economy, the statistic is even more impressive. Since 1990, the average ratio is less than 0.1% for the U.S., slightly more than 0.1% for Japan, 0.5% for Korea, 1% for Taiwan, 2.5% for Singapore, and 11% for Hong Kong. It is surprising that the Four Tigers invest so much more abroad than the general developed countries do.

Make the most from China or by China?

As we look into the future of the world economies, no one should ignore China's contribution. Figure 2 shows China's shares of the world's total trade. The dramatic increase of China in the world commodity market signals its growing importance. Poor economies cannot afford large R&D expenditures on original invention and innovation; instead, technological progress and economic growth are achieved through the diffusion and transfer of technology. In its strictest form, the gravity equation says that trade between two countries is proportional to the product of their outputs, and inversely related to the distance between them. On the one hand, Figure 3 suggests that the Four Tigers put ever-increasing weight on trade with China. On the other hand, Figure 4 shows none of China's main investors gaining more importance as a China's import partner since 1997. The rise of Chinese competitiveness in manufacturing products is a challenge to all the other countries, whereas the expanding Chinese market is an opportunity for them. Their future success will undoubtedly depend on how well they respond to the challenges and take advantage of the opportunities.

¹¹ Wei (2000) therefore asks 'why does China attract so little FDI from developed countries?'

The Asian economies' overwhelming outward FDI to China has attracted much attention. Hsiao and Hsiao (2004) suggested that there are some qualitative unobservable variables, such as cultural similarity and ethnicity, economic policy, political factors, potential crises, etc., which play very prominent roles in determining FDI to China. Conceivably, cultural similarity and ethnicity have a positive effect on FDI inflows from Hong Kong and Taiwan, and to a lesser extent from Korea and Japan. In addition, favorable economic policy and political measures encourage FDI inflows. Detractive factors such as massive corruption, huge national debt, the fragile banking system, etc. have negative effects on FDI inflows. Hsiao and Hsiao (2004) found that Hong Kong, Taiwan, Korea, and Japan, in that order, have smaller negative fixed effects than the U.S. from their panel data regression. This would be because the U.S. and, to a lesser degree, Japan are unable to take full advantage of cultural similarity and ethnicity.

In contrast with China's dramatic growth, Korea, Singapore and Taiwan's economic growth has been slower in the 1990s than in the 1980s. Partly due to structural changes in the countries' economies, the average growth rate of relative per-capita GDP of the Four Tigers compared to China fell since the beginning of the 1980s. The relative GDP per capita in terms of current PPP for these economies and Japan, as displayed in Figure 5, shows the procurement by China. It can be seen that the Four Tigers' per capita GDP measures had ever increased relative to China's until the late 1970s, decreased before the beginning of the 1980s, and reached their historic lowest points at the end of the statistics. The decreasing trend of the relative GDP of Japan to China came earlier than those of the Four Tigers, which may be due to the slowdown in technology progress in the mid-1970s in Japan. The GDP ratio dropped from 24.5 times (in 1973) to 4.6 times for Japan, 17.3 (in 1977) to 5.5 for

Hong Kong, 16.3 (in 1977) to 5.5 times for Singapore, 8 (in 1977) to 3.7 for Taiwan, and 6.8 times (in 1977) to 3.5 for Korea. Interestingly, this swing and China's marketization occurred simultaneously.¹²

Lipsev (2002), based on a survey of studies in the U.S., Japan, and Sweden, and his own study, concluded no universal relationships between production abroad by a firm or a country's firms and exports by the investing firms, their industries, and the country's firms and exports. There are both circumstances in which foreign production tends to add to exports and circumstances in which it tends to reduce exports. However, a market share comparison done by Taiwan government between Taiwan and China just provides new evidence. Market shares since 1989 listed in Table 5 indicates an ever-decreasing trend of Taiwan's exports in the U.S. market and contrarily an ever-increasing trend of China's in there. During 1989-2005 Taiwan's market share in the U.S. has shrunk to less than one-half while China's has grown nearly six times! Both economies' market shares in their neighboring country - Japan is listed in Table 6. It is shown that Taiwan's market share in Japan decreases mildly but China's is four times larger than its old share in 1989.

3. The economic model of FDI

This section tries to use an economic model to describe the evolution of domestic employment in a small economy which invests into a large economy and the income disparity between the small economy and its big recipient. In this paper, we define an economy being relatively small to a large one as its output production and labor hiring in the large economy not having direct effects on the large economy's market prices. Since the paper aims to investigate small economies' home country effects of

¹² For the same period, Canada's relative GDP to the U.S. stays between 0.7 and 0.9. In 2004 the ratio is 0.8, back to her 1960s level and roughly equals the average of the sample.

FDI outflows to large economies, the premise is that there is no relationship between the foreign factor prices and their FDI inflows from the domestic economy.

Assume a Cobb-Douglas production technology with capital stock and labor being its two input factors and an externality of capital accumulation for the representative firms as:

$$Y_t^i = A_t^i (K_t^i)^\alpha (\bar{K}_t^i N_t^i)^{1-\alpha}, \quad i = d, f, \quad (1)$$

where terms Y_t^i denote products of representative firm in country i , K_t^i and N_t^i denote the firm's capital input and labor input in production, A_t^i denotes the stationary technological parameter in the production function, \bar{K}_t^i is an average capacity augmenting labor productivity, and d and f refer to a domestic country and a foreign one, respectively.

The Ak type setup has several advantages as follows: first, the production function admits sustainable economic growth and allows us to easily derive the growth rate; second, it allows a simple assumption on parameters to capture different growth rates; and third, it simplifies the derivation of optimal employment and the change in economic disparity among a capital recipient country and the home country. The parameter of technology level A_t^i is assumed to be stationary and with a constant mean which, compared to a domestic country, is higher in an advanced country and lower in a less developed country. Assume further that once a less developed economy invests into or gets investment from a more developed economy, its technology will rise gradually to a higher level as in the more developed economy through knowledge spillovers and imitations. The influence of FDI flowing through technology transfers can be interpreted as its indirect effects on human capital, except its direct effects on physical capital. On the contrary, investment into or from a less

developed economy doesn't change the technology level of the home economy.¹³

In the case of a foreign country being "advanced," $f = a$, and in the case of it being "less developed," $f = l$. Assume that technology level (A_t^i) is sufficiently distinct, so that the interest rate and wage are highest to lowest, respectively, in the advanced country, domestic country, and the less developed one before their openness to the foreign capital market.¹⁴ The ranking of the factor prices means $r_0^a > r_0^d > r_0^l$ and $w_0^a > w_0^d > w_0^l$, in which interest rate $r_0^i = \alpha A_0^i (N_0^i)^{1-\alpha}$ and wage rate $w_0^i = (1-\alpha) A_0^i K_0^i (N_0^i)^{-\alpha}$ with $i = a, d$, and l .

After the openness to the foreign capital market, domestic firms can invest either in a more advanced or in a less developed country and earn profit from its production as:

$$A_t^d (k_t^f)^\alpha (\bar{K}_t^f n_t^f)^{1-\alpha} - w_t^f n_t^f, \quad f = a \text{ or } l, \quad (2)$$

where n_t^f and k_t^f denote the home firm's own capital input and local labor input in production abroad. Note that the profit function comes from the assumptions that labor is immobile across borders, factor share is the same for a domestic firm and a foreign firm in one economy, and know-how is (at least temporarily) private. The first and third assumptions appear to be relatively natural while the second is made for manifesting restrictions faced by FDI firms. Re-define K_t^d as the capital stock

¹³ It is hard to imagine unbalanced growth in a perfect connected world market. There is no reason for a less developed country, once it obtains technology from some intermediate developed countries, to stop chasing higher technology in advanced countries. Thus, the steady state of our single product model implies a situation where all countries gain the highest technology and grow at the same pace.

¹⁴ Note that the marginal productivity of input factor not only depends on A but also factor inputs and parameters. Here we simply assume that the difference between domestic inputs/parameters and

located in the domestic country. Assume that, given the initial stock of capital, the domestic representative firm chooses N_t^d , n_t^f , K_t^d , and k_t^f to maximize its total profits (from foreign and domestic production).

The first order condition for n_t^f reflects the marginal productivity of labor of FDI firms being equal to its price in the invested economy, which in turn is equal to be the marginal productivity of labor of local firms in the recipient country. Thus, the relationship is easy to derive:

$$n_t^f = \bar{N}_t^f \left(\frac{A_t^d}{A_t^f} \right)^{1/\alpha} \left(\frac{k_t^f}{\bar{K}_t^f} \right), \quad (3)$$

where \bar{N}_t^f is the equilibrium labor employed by the foreign representative firm.

In the case where the foreign country is a less developed country ($f = l$), because of the higher technology level domestic country owns, FDI firms tend to hire more labor than typical local firms do; and/or if both FDI firms and local firms hire the same amount of labor, to earn the maximum profit, FDI firms can install less capital stock than local firms do. On the contrary, in the case where the foreign country is more advanced ($f = a$), FDI firms tend to hire less labor than local firms do; and/or if both FDI firms and local firms hire the same amount of labor, FDI firms must install more capital stock than local firms to earn the maximum profit. Since individual firms take technology levels as exogenous variables, immediate profits obtained with lower factor costs become their main concern. From this view, it is much easier for firms to invest and produce in a less developed foreign country than in a more advanced one, even though we know that direct investment in a more advanced economy is helpful for the long-term development of the home country.

foreign inputs/parameters is relatively insignificant.

The first order condition for optimal distribution of capital stock shows, to maximize total profits, the marginal productivity of capital across national borders must be equal. Together with the optimal n_t^f in equation (3), we have the optimal labor demand in the domestic economy as

$$N_t^d = \bar{N}_t^f \left(\frac{A_t^d}{A_t^f} \right)^{1/\alpha} . \quad (4)$$

One important implication in equation (4) is that there is a positive relationship between the ratio of the domestic to the foreign technology level and the domestic employment. If there is a "cost down" investment policy and firms choose to invest in the less developed large country, domestic prosperity in terms of high employment and therefore high marginal productivity of capital and high investment spikes in the beginning of capital outflows but fades as the recipient country's technology level increases and the gap in the technology level narrows. On the contrary, if the firms' policy is to invest in an advanced large country, domestic employment and marginal productivity of capital gradually rise as the domestic country's technology level increases and the gap of technology level narrows. Since the growth rate of GDP depends positively on the marginal productivity of capital stock, $\alpha A_t^i (N_t^i)^{1-\alpha}$, the domestic rate in turn dependent upon $\alpha (A_t^d)^{1/\alpha} (\bar{N}_t^f)^{1-\alpha} (A_t^f)^{-(1-\alpha)/\alpha}$ while the foreign rate on $\alpha A_t^f (\bar{N}_t^f)^{1-\alpha}$. This is to show that FDI into a more advanced country decreases the gap in income through stimulating domestic economic growth while FDI into a less developed country decreases the gap in income through suppressing domestic economic growth and increasing foreign economic growth. Therefore, our theoretical implication of income convergence is consistent with Choi's (2004) findings of empirical studies on FDI and income gap.

4. Empirical results

Home country effects of FDI outflows — growth and employment

First, we examine the effects of FDI outflows on home country's growth and employment using panel data. In our panel data analysis, we concentrate our analysis on China's six major investors: Hong Kong, Korea, Singapore, Taiwan, Japan, and the U.S. Our purpose is to find the influence of investment in China by the six economies on their relative income to China, unemployment rate, and exports. Note that, relative to the Chinese economy, Hong Kong, Korea, Singapore, and Taiwan are small economies while Japan and the U.S. are large ones. According to our theory, a small and more developed country investing in a large and less developed country will experience decreases in both employment and income disparity (compared to the recipient country) as the less-developed recipient country gains the higher technology of production through FDI inflows. In addition, examining whether or not FDI outflows substitutes exports from the home country is useful to predict its effect on domestic industries (Kim and Kang, 1996; Lim and Moon, 2001; Lipsey, Ramstetter, and Blomström, 2000; Liu and Huang, 2005). Hence, in the empirical part, we explore the home country's exports effects as well as employment and income disparity.

This article employs the fixed effects model of the panel data analysis, using unbalanced panel data from 1986 to 2005 (1986-2005 for Hong Kong, Japan, and the U.S., 1989-2005 for Taiwan, 1993-2005 for Korea and Singapore). As well known, there are two econometric procedures to deal with the panel data: the fixed effects model and the random effects model. The choice between the two models depends on whether the individual-specific and time-specific effects are independent of the explanatory variables and the Hausman test is a simple procedure to check for this independence condition. The results of the Hausman test for our relative income,

unemployment rate and exports ratio models are 54.11, 27.69, and 23.82 respectively. It shows that the independence hypothesis is to be rejected for these models. In other words, the fixed effects model is efficient compared to the random effects model.

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In this paper, the fixed effects model has three other regressors. The first regressor is the one-period lagged dependent variable which is to capture the persistent characteristic of time series. The second regressor is our one-period lagged FDI variable. The third is a product of a dummy variable and the second regressor. The dummy variable is one for Japan and the U.S. and zero for the Four Tigers. Whether FDI's effects depend on the size of the source country can be shown through the significance of the third regressor. We use the GDP share of FDI outflows to China in the source country (FDI/Y) to measure the depth of investment in China. The data of FDI in China is from the *China Statistical Yearbook* and the web site: www.fdi.gov.cn/common.¹⁶ Nominal GDP data comes from *IFS* of the IMF. The first independent variable is a relative income to China ($rGDP$) and is measured as per capita output on PPP valuation of country GDP of a source country,

¹⁵ We have not employed random effects model for two additional reasons. First, the six major investor countries are not selected by random sampling from the population. Second, the number of cross-section units (6 investors) is smaller than the number of years (12 years or more). Therefore the random effects model cannot be used.

¹⁶ There were a variety of regulation on outward FDI to China by governments of Taiwan, Korea, and Singapore before the 1980s and the early 1990s. The official FDI data toward China thus might be underestimated by the three governments and inward FDI from China might be relatively reliable. An unavoidable underestimation arises from all the investors indirectly investing through a "tax haven." Another data flaw between Hong Kong and Taiwan's FDI to China is that a lot of Taiwanese firms use nominal firms in Hong Kong to invest in China. But the actual data are unavailable.

divided by that of China. The data source comes from the *World Economic Outlook* (WEO) of the IMF. The second independent variable is unemployment rate (U), which is from the Directorate General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. for Taiwan and the International Labour Organization for others. The third is exports to GDP ratio (X/Y) and it is from *IFS* of the IMF.

The second to fourth columns of Table 7 present the estimated results from the fixed effects model for per capita relative income and unemployment rate for each regression. We find that the coefficients for the lagged dependent variables are significantly high, as expected. We also find a higher FDI outflows to China (FDI/Y) leads the source country's per capita income (rGDP) to be relatively lower but raises its unemployment rate (U). Note that the increase in unemployment and the decrease in relative income are both significant but the exports ratio is not. As our theory implies: small but more advanced countries investing into a large but less developed country will experience decreases in both employment and income disparity. In addition, the product of the large country dummy and lagged FDI ratio is significantly positive for the exports ratio regression, so it indicates a different outward FDI effect for large source countries. In view of the exports effect, let us then consider the effects of outward FDI on the exports of export-led-countries in the next subsection.

Home country's exports effects of FDI outflows into China

Liu, Wang and Wei (2001) examined the causal relationship between inward FDI and trade in China, and found that the growth of China's imports causes the growth of its FDI, then the growth of FDI causes the growth of its exports, and the growth of exports causes the growth of its imports. Our purpose, on the other hand, is to find out the effects of outward FDI on the exports of export-led-countries. Specifically,

we investigate the effects of outward FDI into China on the exports of Hong Kong, Korea, Singapore, and Taiwan, which's economic growths are closely related to exports.

This article employs the fixed effects model of panel data analysis to find the influence of investment in China by the Four Tigers, with Japan and the U.S. as comparisons, on a variety of exports measures. To investigate the outward FDI effects, we construct another FDI measure—the ratio of China's FDI inflows from the individual source country to China's total FDI inflows (FDI/CHINA). The second to fourth columns of Table 8 show the estimated results from the fixed effects model for the ratio of source country's exports to China to total imports in China ($X_c/CHINA$), the ratio of source country's exports to China to its total exports (X_c/X), and its exports to GDP ratio (X/Y) for each regression. Total exports and export-to-China data for Hong Kong, Korea, Singapore, the U.S. and Japan are from IMF, Direction of Trade Statistics (DOT). Taiwan's data are from Cross-Strait Economic Statistics Monthly, Mainland Affairs Council, R.O.C.

According to the results of Table 8, first, it is found that a higher FDI to China ratio (FDI/CHINA) leads the exports to China ratio ($X_c/CHINA$) to rise significantly, but there is an additional counter effect for large countries. Overall, large countries' FDI to China ratio has no effect on its exports to China ratio. That is to say, for Hong Kong, Korea, Singapore, and Taiwan, exports to China accompany their FDI outflows to China, but exports from Japan and the U.S. to China are independent of their investment in China. The regression result from the ratio of exports to China to total exports (X_c/X) provides weak evidence. The effect of the FDI to China ratio on the exports to China ratio is positive but insignificant for a small source country and negative but insignificant for a large source country. Higher FDI outflows to

China might increase the importance of small source countries' exports to China's market. The last interesting finding is from the regression for exports ratio (X/Y). It is found that a higher FDI to China ratio leads the exports share of the source country to decrease significantly while there is an additional significant counter effect for large countries. Overall, a large country's FDI to China ratio has no effect on its exports share. This means, for Hong Kong, Korea, Singapore, and Taiwan, higher FDI outflows to China harm their exports to the world market, but similar exports from Japan and the U.S. are independent of their investment in China.

5. Concluding remarks

Since the beginning of the 1990s 10% of the world FDI (foreign direct investment) has flowed into one developing country - China. The procurement ability of China makes her neighbor economies uncomfortable, even though fears that production abroad would cause home country exports and employment to fall have not been confirmed by evidence in the development of developed countries. However, the side effects of FDI outflows may have worked on the production and employment of small economies who aggressively invest in China.

This article first provides an endogenous growth model to analyze the relationship between outward FDI and production. A simple Ak type model implies that a more advanced small country investing in a less developed large country will experience gradual decreases in employment and income disparity (compared to the recipient country) as the less-developed recipient country gains the higher technology of production through FDI inflows. However, since individual firms take technology levels as exogenous variables, immediate profits obtained with lower factor costs, rather than national development, become their main concern. The conflict between firms and their nation has important policy implication.

To empirically examine the home country effects of FDI outflows, we apply a panel data regression of fixed effects model to six major investors in China: small economies included in the Four Tigers and two large economies: Japan and the U.S. The empirical results show that, FDI outflows to China lead the relative income between the source country and China to decrease and raise the source country's unemployment rate. These findings are consistent with our theoretical implications. In addition, we find that FDI outflows to China decrease the exports to GDP ratio only for small source countries, even though a higher investment in China raises the share of their exports-to-China to China's total imports. Since Hong Kong, Korea, Singapore, and Taiwan are all export-led growth countries, the negative effects of FDI to China cause concern.

Despite the novelty of the study on the home country effects of outward FDI into a less-developed large economy in a small economy, the relationship between FDI and the source country's employment and GDP growth (which, in turn, relates to income disparity between the source and the recipient) is introduced through a simple *Ak* type model in this article. To capture the export-led-growth of the Four Tigers, a more complete model including both FDI and exports in generating the dynamics of the aggregate variables and can explain the empirical findings is needed. The model may be a mixture of the trade model modified from Markusen and Venables (1998) or Helpman, Melitz and Yeaple (2004) and an endogenous growth model. The derivation of that model, while not being a simple matter, surely deserves further research.

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Appendix 1: the definition of country groups

The United Nations includes Australia, Austria, Belgium, Canada, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Gibraltar, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom, and the United States as developed economies. This article defines all economies not included in the developed countries group, but included in developing countries group and South-East Europe and CIS group in the United Nations classification, as non-developed economies.

Table 1. The United States, Japan, and the Four Tigers' Economic Growth Rates (%)

	the U.S.	Japan	Hong Kong	Korea	Singapore	Taiwan
1951-1955	2.91	6.69	na	2.25 ^a	na	6.03 ^b
1956-1960	0.44	7.03	na	0.42	na	3.05
1961-1965	3.62	8.26	10.96	3.12	1.57	6.44
1966-1970	2.33	10.49	5.14	7.88	8.61	7.14
1971-1975	1.83	3.12	4.47	5.73	6.51	6.92
1976-1980	2.65	3.35	9.04	5.82	6.83	8.33
1981-1985	2.45	2.36	3.86	6.35	2.41	5.23
1986-1990	2.16	4.43	6.52	9.15	5.97	8.08
1991-1995	1.52	1.12	4.10	6.72	5.83	6.11
1996-2000	3.25	0.95	0.40	3.65	2.77	4.80
2001-2004	1.25	0.72	2.18	4.08	0.16	2.17
average	2.24	4.48	5.25	5.20	4.62	5.91

Note: Statistics are five-year average of growth rates of constant price GDP per capita. ^a 1954-1955. ^b 1952-1955.

Data source: RGDPPL in Penn World Table 6.2 (1951-2004).

Table 2. The United States, Japan, and the Four Tigers' Unemployment Rates (%)

	the U.S.	Japan	Hong Kong	Korea	Singapore	Taiwan
1966-1970	4.10 ^a	1.10 ^a	na	4.65 ^a	6.00 ^b	2.12
1971-1975	5.98	1.44	9.10 ^c	4.24	4.50	1.68
1976-1980	6.66	2.06	3.76	3.98	3.68	1.55
1981-1985	8.26	2.50	3.76	4.16	3.10	2.31
1986-1990	5.92	2.50	1.66	2.88	3.68	1.91
1991-1995	6.58	2.58	2.18	2.38	2.52	1.56
1996-2000	4.60	4.06	4.16	4.42	3.52	2.78
2001-2005	5.44	4.96	6.54	3.66	4.95 ^d	4.66
average	6.09	2.78	3.85	3.73	3.74	2.32

Note: Statistics are five-year average of unemployment rates. ^a 1969-1970. ^b 1970. ^c 1975. ^d 2001-2004.

Data source: The U.S., Japan, Hong Kong, Korea and Singapore's unemployment rate are from International Labour Organization and Taiwan's unemployment rate is from Directorate-General of Budget, Accounting and Statistics, Executive Yuan, R.O.C.

Table 3. Per Capita FDI Outflows and outward FDI /GDP of Developing Economies, and the Four Tigers (Five-year Average)

	Unit: US\$, %				
	Developing econ.	Hong Kong	Korea	Singapore	Taiwan
1970-1974	0.12; 0.03	na; na	0.12; 0.03	6.95; 0.38	0.09; 0.02
1975-1979	0.54; 0.09	na; na	0.43; 0.04	38.41; 1.19	0.22; 0.02
1980-1984	1.10; 0.11	67.62; 1.14	2.07; 0.11	41.82; 0.70	2.46; 0.09
1985-1989	2.88; 0.34	356.23; 3.80	17.19; 0.56	113.34; 1.34	119.54; 1.78
1990-1994	7.15; 0.63	1761.33; 9.13	34.20; 0.46	654.36; 3.91	140.78; 1.52
1995-1999	16.02; 1.15	3535.30; 14.20	94.39; 1.02	1885.32; 7.86	187.67; 1.45
2000-2004	17.36; 1.17	3940.89; 14.28	77.28; 0.71	2233.49; 10.28	266.44; 1.96
average	6.45; 0.48	1380.20; 5.84	32.24; 0.41	710.53; 3.47	102.46; 0.95

Data source: Preliminary data are from UNCTAD, FDI Database on-line.

Table 4. China's Foreign Capital Inflows by Economies

Economies	1979 - 2005 Cumulative				
	Projects	Contracted Amount (US\$ 100 million)	Percentage (%)	Realized Amount (US\$ 100 million)	Percentage (%)
Hong Kong	254059	5278.86	41.06	2595.22	40.90
Japan	35124	785.69	6.11	533.75	8.41
The U.S.	49006	1121.20	8.72	510.90	8.05
Virgin Islands	14011	1034.36	8.05	459.17	7.24
Taiwan	68095	896.93	6.98	417.57	6.58
Korea	38868	703.24	5.47	311.04	4.90
Singapore	14367	532.05	4.14	277.44	4.37
The U.K.	4897	240.49	1.87	131.96	2.08
Germany	4762	214.20	1.67	114.39	1.80
Cayman Islands	1429	178.22	1.39	86.59	1.36
Total (top 10)	484618	10985.24	85.46	5438.03	85.69
Total (all econ.)	552960	12856.73	100.00	6545.06	100.00

Source: Foreign Investment Administration, Ministry of Commerce, P.R.C., FDI Statistics, 2005.

Table 5. Market Shares of Taiwan and China's Export Goods in the U.S.

Unit: US\$ 100 million, %

Period	Taiwan			China		
	Amount Export to the U.S.	Growth rate	Market share	Amount Export to the U.S.	Growth rate	Market share
1989	243.26	-	5.14	119.89	-	2.53
1990	226.67	-6.82	4.58	152.24	26.99	3.07
1991	230.36	1.63	4.72	189.76	24.64	3.89
1992	246.01	6.79	4.62	257.29	35.59	4.83
1993	251.05	2.05	4.32	315.35	22.56	5.43
1994	267.11	6.40	4.02	387.81	22.98	5.84
1995	289.75	8.48	3.90	455.55	17.47	6.13
1996	299.11	3.23	3.78	514.95	13.04	6.51
1997	326.24	9.07	3.75	625.52	21.47	7.19
1998	331.23	1.53	3.62	711.56	13.75	7.79
1999	351.99	6.27	3.43	817.86	14.94	7.98
2000	405.14	15.10	3.33	1,000.63	22.35	8.22
2001	333.91	-17.58	2.92	1,022.80	2.22	8.96
2002	321.99	-3.57	2.77	1,251.68	22.38	10.76
2003	316.00	-1.86	2.51	1,523.79	21.74	12.10
2004	346.17	9.55	2.36	1,966.99	29.09	13.38
2005	348.38	0.64	2.08	2,434.62	23.77	14.57

Source: USA Customs Statistics.

Table 6. Market Shares of Taiwan and China's Export Goods in Japan

Unit: US\$ 100 million, %

Period	Taiwan			China		
	Amount export to Japan	Growth rate	Market share	Amount export to Japan	Growth rate	Market share
1989	89.79	9.92	4.25	111.46	21.36	5.29
1990	84.71	0.04	3.64	112.01	12.75	5.11
1991	94.93	3.98	4.01	142.16	10.63	6.00
1992	94.49	-6.32	4.06	169.53	12.07	7.26
1993	96.78	-10.16	4.02	205.65	6.21	8.49
1994	107.54	2.06	3.91	275.66	23.41	10.00
1995	143.66	22.46	4.27	359.22	20.26	10.72
1996	150.33	20.83	4.28	405.41	30.13	11.58
1997	125.61	-7.17	3.69	420.61	15.05	12.36
1998	101.56	-11.56	3.65	368.55	-4.30	13.22
1999	129.51	8.91	4.13	435.76	0.58	13.84
2000	178.10	37.99	4.71	548.78	26.38	14.53
2001	141.17	-20.74	4.06	575.29	4.83	16.57
2002	136.41	-3.37	4.03	621.73	8.07	18.32
2003	143.09	4.90	3.74	757.76	21.88	19.76
2004	167.47	17.01	3.67	948.30	25.04	20.74
2005	179.72	7.32	3.50	1,078.81	13.76	21.04

Note: The annual growth rate is calculated with yen amount.

Source: Japan Customs, Ministry of Finance, Japan.

Table 7. Panel Data Regression of FDI/Y

Dep.	Relative income (rGDP)	Unemployment rate (U)	Exports ratio $\left(\frac{X}{Y}\right)$
Slope			
Dep.(1)	0.954 (55.328)	0.783 (9.513)	1.057 (10.602)
$\frac{FDI}{Y}$ (1)	-4.157 (-2.707)	9.762 (1.905)	-0.224 (-0.659)
Dummy $\times \frac{FDI}{Y}$ (1)	-89.10 (-0.372)	368.0 (1.519)	5.864 (2.426)
Fixed effects			
Hong Kong	0.330	-0.588	0.005
Korea	-0.035	0.199	0.005
Singapore	0.002	0.071	-0.023
Taiwan	0.009	0.038	-0.003
Japan	-0.116	-0.005	0.003
the U.S.	-0.201	0.391	0.006
Adjusted R^2	0.992	0.770	0.992

Note: Panel regression includes a common constant. Statistics in parentheses are t statistics, which is corrected by White cross-section standard errors.

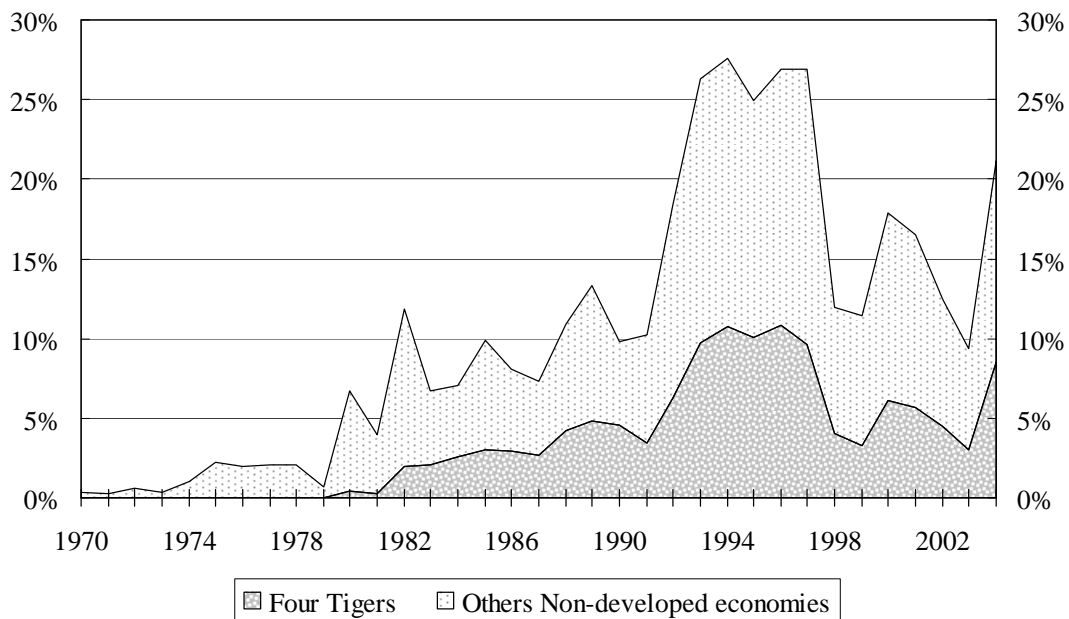
Table 8. Panel Data Regression of FDI/CHINA

Dep.	Exports to China/ China's total imports $\left(\frac{X_c}{CHINA}\right)$	Exports to China/ Exports to the world $\left(\frac{X_c}{X}\right)$	Exports ratio $\left(\frac{X}{Y}\right)$
Slope			
Dep.(1)	0.786 (12.115)	1.116 (22.484)	0.960 (10.215)
$\frac{FDI}{CHINA}$ (1)	0.229 (5.119)	0.035 (1.269)	-0.238 (-1.878)
Dummy $\times \frac{FDI}{CHINA}$ (1)	-0.262 (-2.962)	-0.066 (-1.508)	0.240 (1.907)
Fixed effects			
Hong Kong	-0.041	-0.036	0.138
Korea	0.009	0.006	-0.034
Singapore	-0.006	0.006	0.043
Taiwan	-0.010	0.016	-0.023
Japan	0.028	0.008	-0.061
the U.S.	0.019	0.009	-0.063
Adjusted R^2	0.987	0.991	0.993

Note: Panel regression includes a common constant. Statistics in parentheses are

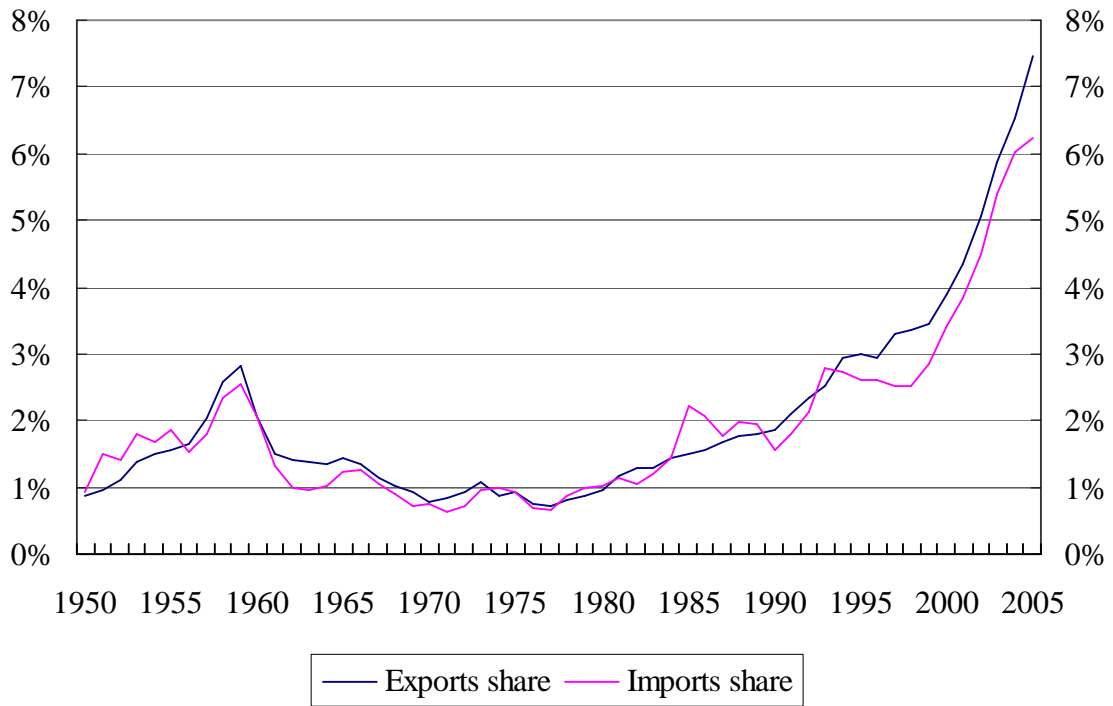
t statistics, which is corrected by White cross-section standard errors.

Figure 1. Capital Outflows Shares of the Four Tigers and Other Non-developed Economies



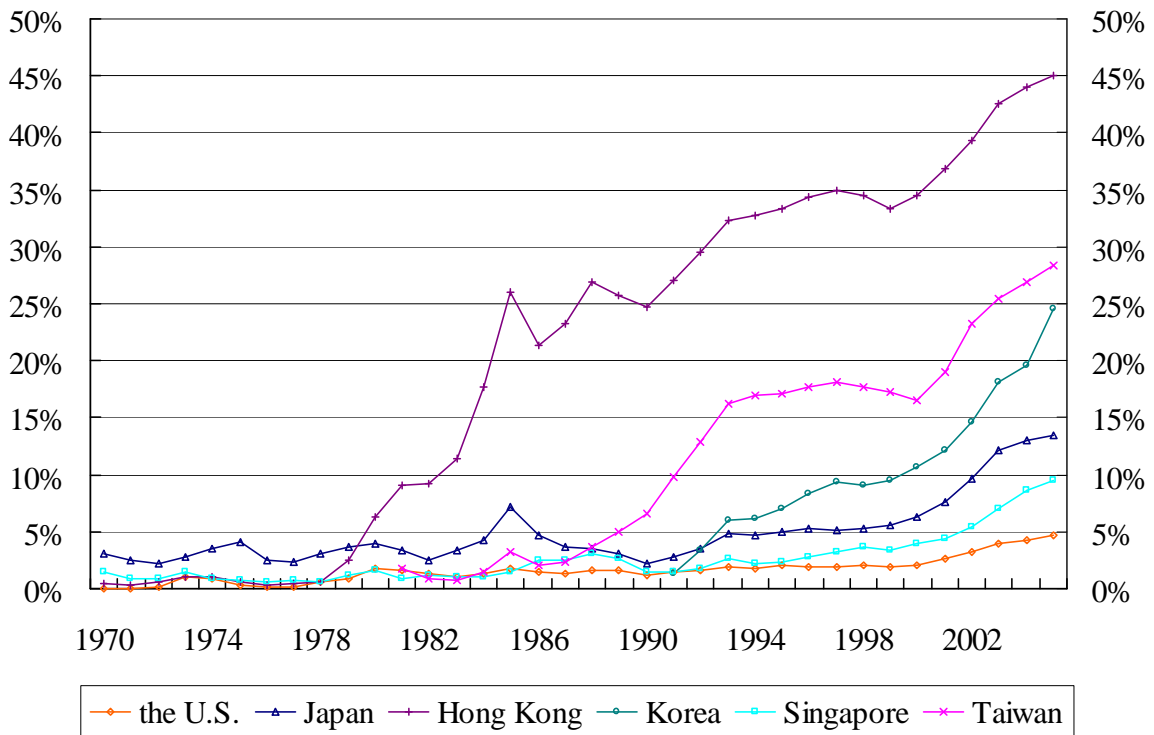
Data source: Preliminary data are from UNCTAD, FDI Database on-line.

Figure 2. China's Shares of the World's Total Trade



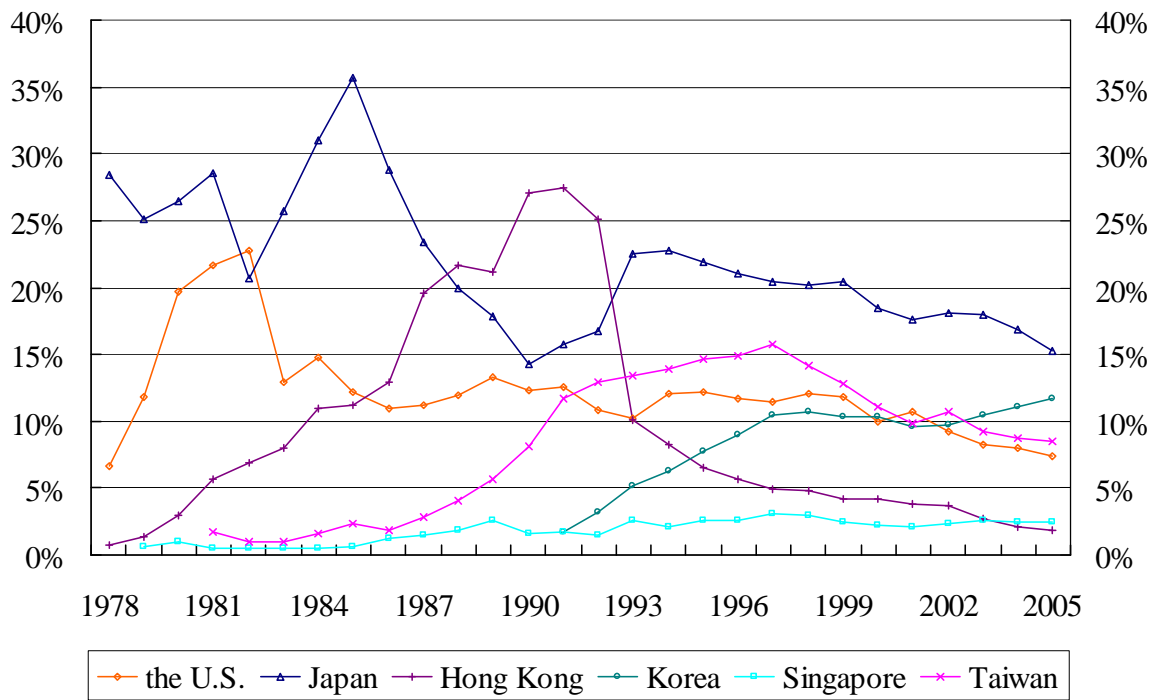
Data source: IMF, International Financial Statistics.

Figure 3. The Exports to China Share in the U.S., Japan, and the Four Tigers



Data source: Total exports and export-to-China data for Hong Kong, Korea, Singapore, the U.S. and Japan are from IMF, Direction of Trade Statistics (DOT). Taiwan's data are from Cross-Strait Economic Statistics Monthly, Mainland Affairs Council, R.O.C.

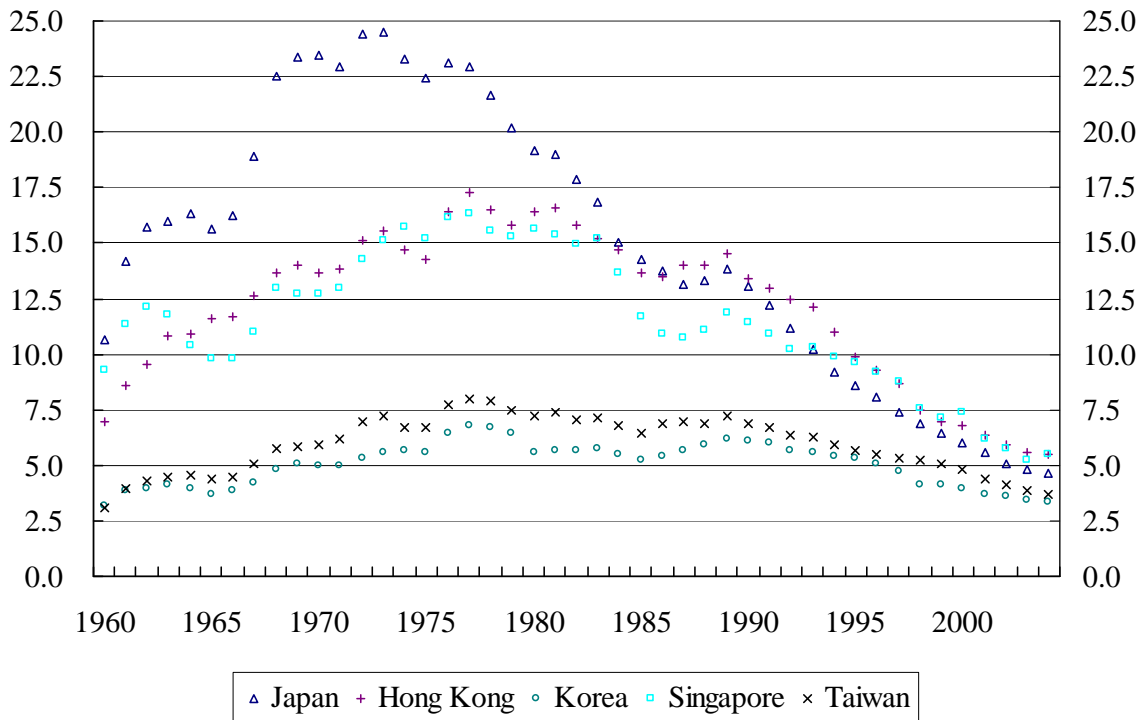
Figure 4. The Imports Share of China from the U.S., Japan, and the Four Tigers



Data source: Total imports in China and China's import-from-partner data for Hong Kong, Korea, Singapore, the U.S. and Japan are from IMF, Direction of Trade Statistics (DOT). Taiwan's data are from Cross-Strait Economic Statistics Monthly, Mainland Affairs Council, R.O.C.

Figure 5. China's Procurement Effect on Japan and Four Tigers

— the relative GDP of Japan and four tigers to China



Data source: Penn World Table 6.2. The relative GDP means the real GDP per capita (CGDP) of a target economy divided by that of China.