

China's FDI-income growth nexus^{*}

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ABSTRACT

A clear understanding of how FDI has impacted upon income growth in China is important not only for policy making in China but also in other developing countries that are seeking to learn from China's experience. The present state of the literature surrounding the FDI-income growth nexus, however, is anything but clear. On the one hand, stylised facts are indicative of FDI strongly promoting income growth at national and provincial levels and many econometric studies also report a positive and statistically significant relationship between these two variables. On the other hand, the insights afforded by growth models and the findings of the latest growth accounting studies fail to convincingly establish such a link. An attempt is made to account for these apparent divergences and this leads to a number of important policy implications being drawn.

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1. INTRODUCTION

Since the 1990s, China has attracted more FDI than any other developing country. It has also experienced by far and away the world's fastest rates of income growth (Table 1). OECD (2000) further documents that over the period 1983-1998, 87.3 per cent of the accumulated FDI in China was located in the 12 coastal provinces. The remaining 12.7 per cent was shared amongst the other 19 inland provinces. The annual rate of income growth in the coastal provinces that attracted the overwhelming majority of FDI was on average two per cent higher than in the inland provinces over the period 1980-2000 (Table 2). These differential rates of income growth have translated into large differences in living standards across China over time. Given these stylised facts, it is not surprising that a strong FDI-income growth nexus is often assumed at the national and provincial level. Moreover, econometric studies conducted on a variety of administrative levels (provincial, city, etc) report a positive and statistically significant relationship between the foreign capital stock and the level of labour productivity (Zhang and Zhang, 2003), and between FDI and total factor productivity (TFP) growth (Miyamoto and Liu, 2005), technological innovations (Cheung and Lin, 2004) and per capita income growth (Demerger, 2001; Jones, et al. 2003). IMF economists Tseng and Zebregs (2002) describe FDI as having been "a driving force" of China's exceptional income growth performance and accordingly hold that its experience in attracting FDI offers important lessons for other developing countries.

However, in spite of the above stylised facts and econometric findings, the FDI-income growth nexus in China is not in fact so clear cut. Juxtaposed to the above view are the insights provided by growth models and the findings of latest growth

accounting studies. Section two of this paper applies the analytics presented in Krugman (1993) to China. Krugman used standard growth models to show that the scale of FDI in most developing countries was simply too small to play an appreciable role in capital accumulation and income growth. Data collected for China reveals that Krugman's observation largely holds true even in the coastal provinces and even as the dollar value of FDI each year continues to reach new highs. Some economists point out that FDI might primarily impact on income growth through promoting technological progress rather than capital accumulation. However, in section three the findings of the latest growth accounting studies are reviewed which show no positive correlation between the provincial distribution of FDI and TFP growth. Given that FDI has been highly concentrated in the coastal provinces, this finding is extremely difficult to reconcile with the view that FDI is strongly associated with technological progress. Studies that consider the productivity spillovers associated with FDI are also reviewed and again the role of FDI is shown to be in need of qualification. Section four seeks to account for the apparent divergences in the literature surrounding FDI-income growth nexus. Several factors are believed to be relevant.

1. To the extent that a relationship between FDI and income growth is assumed based on stylised facts, the impact of FDI will be overstated. This is because while the coastal provinces attract the bulk of FDI, they have also acquired a disproportionate share of the nation's stock of other income-generating factors such as infrastructure.

2. Some econometric studies fail to account for the expected endogeneity between FDI and income growth, i.e., while FDI may impact on income growth, it is equally likely that FDI will be attracted to those regions that are experiencing the

fastest rates of income growth. To the extent that endogeneity goes unaddressed, econometric evidence will overstate the impact of FDI on income growth.

3. A positive and statistically significant relationship between FDI and income growth is often interpreted as meaning that FDI has been an important driver of income growth. However, it is the size of the estimated coefficient to FDI that shows the scale of its impact. The sometimes inappropriate interpretation of econometric results has also contributed to the impact of FDI on income growth being overstated.

4. The strength of the impact that FDI has had on income growth will be dependent upon the administrative level being considered. While FDI may not have driven income growth at the national or provincial level, it may have done so at lower administrative levels. Because the perspective of the observer is to see FDI impacting on a local level, this impact can be “scaled up” with the outcome being that the impact of FDI on income growth at higher levels is overstated.

5. The role FDI has played in impacting upon income growth is likely to have changed over time. When China first began to open its doors, FDI was relied upon as a catalyst to address a host of shortcomings that encumbered the domestic economy. Nowadays however, the magnitude of these shortcomings has fallen and the emergence of a domestic, non-state sector has meant that China’s reliance on FDI has also lessened. With the role of FDI changing, its current impact on income growth is easily overstated. However, one must be careful on this point since without FDI’s earlier catalyst role, creating the conditions needed for high rates of income growth to become self-sustaining would have taken much longer. In this sense, current high rates of growth owe much to FDI.

Better understanding the impact that FDI has had on income growth in China is important for several reasons. Firstly, it can help inform policy in China today. One of the major challenges policy-makers presently face is the widening income disparity between coastal and inland provinces. If FDI has indeed fueled income growth in the coastal provinces, then a case can be made that inland provinces ought to put in place aggressive incentive schemes that act to lure FDI. If, on the other hand, the role played by FDI has been marginal then the use of such incentives will be wasting resources at best and distorting market signals at worst. Secondly, other developing countries, most notably India, are looking to draw policy lessons from China's development experience. In a recent review article on the development experience of China and India, *The Economist* (05/03/2005) cited the latter's relatively less successful track record in attracting FDI as being one reason why it has so far been unable to achieve "Chinese levels of growth". The policy implications that follow from the analysis undertaken in this paper are presented in section five.

Table 1. China's real GDP growth rate and FDI inflows

| Annual average | China | |
|----------------|--|---------------------------------------|
| | Real GDP growth (%) (per capita GDP growth in brackets) | FDI inflow (current \$US millions) |
| 1980-84 | 9.6 (8.2) | 617 |
| 1985-89 | 9.9 (8.2) | 2620 |
| 1990-94 | 10.7 (9.3) | 16028 |
| 1995-99 | 8.8 (7.7) | 42057 |
| 2000-04 | 8.5 (7.8) | 50894 |

Sources – Real GDP growth and per capita GDP growth is from the World Bank's World Development Indicators database. FDI data is from the United Nations Council on Trade and Development's (UNCTAD) World Investment Report.

Table 2. Chinese provincial average real GDP per capita growth rates, 1980-2000

| China | | | |
|-------------------|----------------------|------------------|----------------------|
| Coastal provinces | Real GDP growth rate | Inland provinces | Real GDP growth rate |
| Beijing | 8.0 | Anhui | 9.9 |
| Fujian | 11.7 | Chongqing | - |
| Guangdong | 11.8 | Gansu | 7.7 |
| Guangxi | 7.8 | Guizhou | 7.5 |
| Hainan | 10.6 | Heilongjiang | 6.7 |
| Hebei | 9.7 | Henan | 9.2 |
| Jiangsu | 11.8 | Hubei | 9.3 |
| Liaoning | 8.1 | Hunan | 7.8 |
| Shandong | 10.9 | In. Mongolia | 9.0 |
| Shanghai | 9.0 | Jiangxi | 9.0 |
| Tianjin | 8.4 | Jilin | 9.1 |
| Zhejiang | 12.3 | Ningxia | 7.0 |
| | | Qinghai | 6.0 |
| | | Shaanxi | 8.3 |
| | | Shanxi | 7.4 |
| | | Sichuan | 8.2 |
| | | Tibet | 6.8 |
| | | Yunnan | 8.4 |
| | | Xinjiang | 8.5 |
| <i>Average</i> | <i>10.0</i> | | <i>8.1</i> |

Source: State Statistical Bureau (SSB), China Statistical Yearbook

2. FDI AS A SOURCE OF CAPITAL FORMATION

By the 1990s, a consensus had developed amongst peak economic bodies such as the IMF and the World Bank that openness to international capital flows could serve as an engine of income growth in developing countries. Krugman (1993), however, responded with skepticism and contended that such a view was “...not solidly grounded either in economic theory or in the evidence of the past”. Rather than focusing on the short-run disruptions that volatile international capital flows might cause, as many other authors have done, Krugman outlined his skepticism in terms of the standard analytical model of long-run income growth – the Solow growth model. Taking an aggregate production function of the Cobb-Douglas form, the growth rate in national income can be expressed as –

$$\hat{Y} = \alpha \hat{K} + (1 - \alpha) \hat{L} + R$$

where K and L represent the capital and labour stock respectively, hats represent growth rates, α the share of capital in national income and R , total factor productivity (TFP) growth. If a “typical developing country” with a capital-output ratio of 3 and a capital share α of 1/3 experienced a large net capital inflow – equivalent to say the financing of a current account deficit in the order of 5 per cent of GNP – then, assuming the capital inflow is used to fund investment, the growth rate of the capital stock would be equal to -

$$\hat{K} = \frac{I}{K} = \frac{0.05Y}{3Y} = 0.0167 \text{ (or 1.67\%)}$$

where I is the level of investment, a proxy for the change in the capital stock. Accordingly, when the capital share is equal to 1/3, the impact on income growth will be –

$$\hat{Y} = 1.67 \times \frac{1}{3} = 0.56\%$$

Thus, net capital inflows are shown to increase income growth rates but at the same time their impact is shown to be limited, particularly when one further allows for the possibility that net inflows might be spent on consumption and that few developing countries have been able to sustain current account deficits of the above magnitude in the past¹.

Levine (2001) objected to Krugman’s focus on the contribution of foreign capital to capital accumulation on the basis that foreign capital might primarily impact on income growth via technological change. This point is explicitly returned to later. In this section what is noted is that in the context of China the contribution that FDI has

¹ Krugman further illustrates the robustness of his critique to New Growth Theory, which posits that capital accumulation might be characterized by increasing returns. This extension however is not necessary for the purposes of this paper.

made to capital accumulation takes on particular significance because the bulk of income growth, particularly since the 1990s, is explainable by the accumulation of capital. Using standard analytical techniques, i.e., an aggregate production function of Cobb-Douglas form, IMF economists Hu and Khan (1997) found that over the period 1978-1994, capital accumulation contributed 45.6 per cent of the growth in real GDP compared with 41.6 per cent for TFP. The latest such study by World Bank economists Kuijs and Wang (2005) found that during 1993-2004 capital accumulation contributed 62 per cent of the growth in real GDP compared with 30 per cent for TFP. The results of Wu (2003) are also worth reporting since his analysis utilizes stochastic frontier analysis, which does not impose a strict functional form on the aggregate production function. In the latest time period he examines (1992-1997) the contribution of capital accumulation to real GDP growth was four times larger than that of TFP. The declining importance of TFP growth can crudely be seen in China's high and rising incremental capital-output ratio (ICOR). The ICOR divides the investment to GDP ratio by the growth rate in real GDP and so seeks to measure the investment input required to produce one extra dollar of income. Farrell, et al. (2006) reports that China's ICOR deteriorated from 3.3 during 1991-1995 to 4.6 during 1996-2000 to 4.9 during 2001-2003. Achieving China's real GDP growth rate of 9.9 per cent in 2005 required a stunning investment to GDP ratio of 48.8 per cent (*People's Daily*, 26/01/2006). During Japan's high-speed growth decade from 1961-1970, its ICOR was 3.5. Korea's ICOR during 1981-1990 was 3.7. Thus, if one holds that foreign capital had its greatest impact on income growth via technological progress, then the evidence suggests that the strongest supposition one can make is that FDI has contributed strongly to a minority source of China's income growth.

Krugman's focus on capital accumulation is a useful starting point to consider the impact that openness to international capital flows has had on China's income growth, and in particular, the impact of FDI. Based on the results of previous studies (e.g., Chow and Li, 2002), China's capital-output ratio can be put at around 4 and its capital share around 0.6. At first appearance these numbers suggest that openness to international capital flows might have a relatively larger impact in China since net capital inflows equal to 5 per cent of GDP would lead to income growth of around 0.75 per cent, as opposed to 0.56 per cent in Krugman's "typical developing country". That is, however, until it is recognized that during the reform period China has never recorded a current account deficit anywhere near this magnitude in need of financing. In fact, while the dollar value of FDI increased dramatically during the 1990s, China's current account during this period was consistently in surplus; that is, China remained a net capital exporter. What this means is that international capital flows have made no net positive contribution to the rate of capital accumulation in China.

Even if we abstract from outflows of Chinese capital abroad and simply consider FDI, the ratio of FDI to GDP has averaged just 2.6 per cent over the period 1980-2004, according to official data (Table 4). The dominance of domestic sources of capital accumulation is evidenced by the fact that the ratio of gross fixed capital formation to GDP averaged 36.1 per cent over the same period. Moreover, official data overestimate the scale of FDI since they retain a round-tripping component. That is, a sizeable component of China's FDI is actually of mainland origin, which has first been moved abroad through unofficial channels only to return under the guise of FDI in order to take advantage of the preferential policies extended to FDI (e.g., lower income tax rates). In the most detailed study of this phenomenon to date, Xiao (2004)

concluded that round tripping capital likely accounts for between 30-50 per cent of China's total FDI inflows. As a result, the ratio of FDI to GDP is more accurately placed at around 1.5 per cent of GDP. Assuming a capital-output ratio of 4 and a capital share of 0.6, the Solow growth model concludes that FDI of this magnitude would annually increase the capital stock by 0.38 per cent and income growth by 0.23 per cent. During a period of time in which real GDP has been growing at average annual rates of around 10 per cent, the importance of FDI as a driver of income growth is therefore seriously called into question.

Table 4 also highlights that rising dollar values of FDI paint a distorted picture of its importance for capital accumulation. While China became the world's number one recipient of FDI in dollar terms in 2002 and its value continues to rise, the ratio of FDI to GDP in the 2000s, which is what is relevant for income growth, actually fell slightly.

Table 4. FDI versus gross fixed capital accumulation (% GDP)

| | FDI inflows | Gross fixed capital accumulation |
|---------|-------------|----------------------------------|
| 1980-04 | 2.6 | 36.2 |
| 1980-89 | 0.6 | 36.6 |
| 1990-99 | 4.0 | 33.6 |
| 2000-04 | 3.9 | 40.7 |

Source – UNCTAD.

Table 5 considers the scale of FDI on a provincial level in 2003, a year in which actually utilized FDI reached \$US53.5 billion. FDI averaged 4.4 per cent of GDP in the coastal provinces, according to official data. If the round-tripping component of 30-50 per cent is excluded - and most round-tripping capital is routed via Hong Kong back through coastal provinces such as Guangdong - the real figure is expectedly

around 3 per cent of GDP. The ratio of gross fixed capital accumulation to GDP meanwhile averaged 41.9 per cent. Thus, on both national and provincial levels, FDI appears to have been a relatively unimportant source of capital accumulation.

Table 5. FDI versus gross fixed capital accumulation (% GDP) in China's provinces, 2003

| Coastal provinces | | | Inland provinces | | |
|-------------------|-----|----------------------------------|------------------|-----|----------------------------------|
| | FDI | Gross fixed capital accumulation | | FDI | Gross fixed capital accumulation |
| Beijing | 5.0 | 60.4 | Anhui | 0.8 | 34.3 |
| Fujian | 4.2 | 33.9 | Chongqing | 0.9 | 53.5 |
| Guangdong | 4.8 | 36.2 | Gansu | 0.1 | 40.7 |
| Guangxi | 1.3 | 36.2 | Guizhou | 0.3 | 57.1 |
| Hainan | 5.2 | 39.2 | Heilongjiang | 0.6 | 29.9 |
| Hebei | 1.1 | 37.4 | Henan | 0.6 | 35.0 |
| Jiangsu | 7.0 | 44.0 | Hubei | 2.4 | 34.9 |
| Liaoning | 3.9 | 35.0 | Hunan | 1.8 | 34.8 |
| Shandong | 4.0 | 42.4 | Inner Mongolia | 0.3 | 55.7 |
| Shanghai | 7.2 | 42.4 | Jiangxi | 4.7 | 45.9 |
| Tianjin | 5.2 | 48.2 | Jilin | 0.6 | 38.4 |
| Zhejiang | 4.4 | 47.4 | Ningxia | 0.4 | 82.6 |
| | | | Qinghai | 0.5 | 74.5 |
| | | | Shaanxi | 1.1 | 58.0 |
| | | | Shanxi | 0.7 | 44.2 |
| | | | Sichuan | 0.6 | 39.9 |
| | | | Tibet | n/a | 54.7 |
| | | | Yunnan | 0.3 | 41.8 |
| | | | Xinjiang | 0.1 | 57.5 |
| Average | 4.4 | 41.9 | Average | 0.9 | 48.1 |

Source – SSB, China Statistical Yearbook.

3. FDI AS A SOURCE OF TFP GROWTH

Even if the scale of FDI has been relatively small, the potential impact of FDI on TFP growth needs to be considered because economic theory can identify numerous channels through which FDI might promote technological progress and also because the strength of the link might also be compounded by associated externalities, or so-

called “spillover effects”. Most obviously, when a foreign firm enters the domestic market, it might bring with it more advanced technology than previously existed. In addition however, domestic firms might be forced to become more efficient in order to compete with the foreign entrant. Domestic firms might also be able to copy the technology brought by foreign firms. This need not just refer to copying or innovating upon the physical output. Some local staff trained by foreign firms, for example, will start their own companies taking with them the management skills they have acquired.

Graham and Nada (2001) point out that the most obvious test of the strength of the link between FDI and technological progress is to consider whether those provinces that attracted the bulk of the FDI also experienced the fastest rates of TFP growth. We would expect TFP in Guangdong province, for example, to have accelerated relative to other provinces in the early 1980s as it was the first province in China to receive substantial FDI flows after the open door policy was adopted. In the case of Shanghai, which took off as an FDI host a decade later than Guangdong, we would expect to see a similar effect in the 1990s. And we would expect TFP across the coastal provinces to have grown more rapidly than across the inland provinces throughout the reform period. However, according to the most recent growth accounting exercises conducted on a provincial level, few such effects are observable. Miyamoto and Liu (2005) find that during 1981-2000, TFP growth contributed 40.07 per cent of the growth in real GDP in the coastal provinces. The comparative figure in the middle and western provinces was 44.56 per cent and 37.84 per cent respectively. In Guangdong during the period 1981-1990, TFP contributed 47.19 per cent to real GDP growth. While this was higher than the average across all coastal provinces of 37.34 per cent, numerous other provinces scattered across the country recorded an even higher figure including

several that received virtually no FDI such as Anhui, Hubei, Hunan, Yunnan and Xinjiang. In Shanghai during the period 1991-2000, the contribution of TFP to real GDP growth was 35.45. This compared with an average of 42.31 per cent across the coastal provinces and 52.52 per cent and 52.42 per cent across the middle and western provinces respectively.

Even starker are the findings of Qian and Smyth (2006) who consider the period 1990-2000 and in addition to the stock of physical capital and labour include in their aggregate production function a measure of the human capital stock. They find that the contribution of TFP to real GDP growth in Guangdong was just 17.33 per cent and is actually negative in the case of Shanghai. The average contribution of TFP to real GDP growth across all coastal provinces was 19.39 per cent compared with 24.04 per cent in the inland provinces. The faster rate of income growth in the coastal provinces can predominantly be explained by their faster rate of capital accumulation².

Cheung and Lin (2004) is the only study we are aware of to examine the spillover effects associated with FDI across China, as opposed to the spillover effects in specific localities such as Special Economic Zones (SEZs). Using provincial level data over the period 1995-2000, a number of interesting findings are reported. It is shown that a positive and statistically significant relationship exists between FDI and technological innovation, as proxied by the number of patent applications of various types. There are two important qualifiers however. Firstly, the size of the coefficient associated with FDI is much smaller than that associated with the number of science

² Another relevant issue here is that because China's "floating population" of workers has congregated in the coastal provinces the official labour force data for these provinces may in fact be underestimated. To the extent that this is true, TFP in the coastal provinces would in fact be over-estimated.

and technical personal, which is the proxy for domestic technological capacity. Their panel data analysis with fixed effects concludes that a one per cent increase in the number of science and technical personal leads to a 0.34 per cent increase in total patent applications (0.56 per cent in a random effects model). A one per cent increase in FDI meanwhile leads to a 0.04 per cent increase in total patents (0.14 per cent in a random effects model). Secondly, when total patents are broken down into their different types, FDI is found to have its greatest impact with respect to minor innovations. The coefficient to major innovations is very small and is statistically significant only in the case of the random effects model. In contrast, the number of science and technical personal had its greatest impact on major innovations with the coefficients being large and statistically significant across a range of model specifications. Thus, while this study concludes in favor of the existence of spillover effects associated with FDI, these spillovers are at the same time shown to be small compared with domestic sources of technological progress. Part of the explanation for the above findings is that the applicability and usefulness of technology is context specific. Because developing countries such as China have different factor endowments relative to advanced economies (e.g., low capital-labour ratios), technologies need to be adapted. This cannot be done without sufficient domestic human capital.

The lack of evidence for a strong association between FDI and technological progress is perhaps not surprising when the scale of FDI is recalled. Nor is the absence of such a link unusual in a broader international context. For example, in a review of the international evidence on the spillover effects that FDI has on domestic firms, Görg and Greenaway (2004) found that while economic theory can identify a range of

channels through which technology spillovers might occur, the actual evidence for positive spillovers “...is at best mixed”. As the authors point out, this finding can be explained by the fact that it is in the interests of the foreign firms undertaking FDI to take measures that limit the extent of spillovers as technological superiority is the source of their competitive advantage. Mascus (2005) also observes that in an environment where intellectual property right (IPR) enforcement is weak both the volume and nature of FDI will be affected. Such impacts are clearly observable in the case of China. During the early stages of the reform period the Chinese government tightly regulated FDI. In particular, wholly foreign-owned FDI was discouraged in favour of joint ventures (Chai, 1998). Between 1979-1983, the FDI undertaken by wholly foreign-owned enterprises accounted for just 3 per cent of total FDI. This policy was designed to promote technology transfer but the end result was that the incentives foreign firms had to invest were blunted and the flows that did take place were directed toward labour-intensive manufacturing industries with a low technological content. In the second half of the 1980s FDI was given more autonomy. IPR enforcement remained lax, however, and the outcome was predictable. While the volume of FDI increased, more foreign firms entered China in the form of a wholly foreign-owned enterprise. In the first five months of 2006, 72.6 per cent of realized FDI value was undertaken by wholly foreign-owned enterprises. Also, of the FDI that entered China, the bulk continues to be concentrated in manufacturing sectors such as textiles and apparel, electronics assembly and real estate development. Accumulated contracted FDI in manufacturing and real estate accounted for 73 per cent and 10 per cent of the total through 1998 (OECD, 2000). By 2004, these shares had hardly budged with the manufacturing sector accounting for 71 per cent of actually utilized FDI and the real estate accounting for a further 10 per cent. Because

these destinations have a relatively low-tech content, FDI into them internationally has been shown to be insensitive to the strength of IPR enforcement and depend more upon input costs and market opportunities (Maskus, 2005).

Recently China's growing importance as an exporter of high-tech goods has received much attention. China is in fact now the world's number one exporter of information technology (IT) products. What is often missed, however, is that what China contributes is primarily a labour-intensive assembly service for foreign technology companies (Rosen, 2003). More than 90 per cent of China's IT exports are produced by FDI's and many of the key inputs in terms of embodied technology and value-added such as computer chips continue to be imported (*IHT*, 12/12/2005).

4. ACCOUNTING FOR THE FDI-INCOME GROWTH NEXUS PARADOX

The preceding discussion presents something of a paradox. On the one hand, there exist stylised facts consistent with a strong FDI-income growth nexus and there are also econometric studies that report a positive and statistically significant relationship between the two. On the other hand, growth models suggest caution regarding the scale of impact we should expect FDI to have and the findings of the latest growth accounting studies are also hard to reconcile with the view that FDI has strongly promoted technological progress. What follows is an attempt to account for the factors that might be driving these apparent divergences.

Firstly, to the extent that the impact of FDI on income growth is gauged based on stylised facts, its impact will tend to be overstated. Stylised facts reflect the combined effect of all determinants of income growth, not just FDI. While FDI and provincial

rates of income growth may be positively correlated, so to are numerous other determinants of income growth. Demerger (2001), for example, showed that coastal provinces have acquired a disproportionately large share of the nation's transportation and communications infrastructure, and that this infrastructure, along with FDI, is linked to per capita income growth in a positive and statistically significant. Fan, et al. (2001) constructs a comprehensive index of the degree of marketisation³ across China's provinces. With the exception of Guangxi, all of the coastal provinces are shown to have liberalized their economies at a faster rate than the national average.

Secondly, some econometric studies fail to account for the expected endogeneity between FDI and income growth. Moreover, there is a tendency to interpret a statistically significant relationship between FDI and growth in income as implying that FDI has been driving income growth. However, statistical significance is simply a comparison between an estimated coefficient and standard error. In addition to being statistically significant, what matters in terms of the scale of the impact is the size of the estimated coefficient to FDI. In seeking to model provincial differences in the level of labour productivity over the period 1986-1998, Zhang and Zhang (2003) recognize that while FDI may be a determinant of labour productivity, it is equally likely that FDI will be attracted to those provinces where the level of labour productivity is highest. They seek to ameliorate the expected endogeneity bias by lagging right-hand side variables, which include the domestic capital stock, the foreign capital stock, a human capital proxy, trade openness and a locational dummy. As is theoretically expected, both the domestic and foreign capital stock display a

³ There are five components to the marketisation index including Government and Market, Ownership Structure, Commodity Market Development, Factor Market Development and the Legal Framework. The interested reader seeking more details can consult the original source.

positive and statistically significant relationship with labour productivity. The difference is, however, that the estimated coefficients suggest that a one per cent increase in the foreign capital stock is associated with a 0.04 per cent increase in labour productivity, whereas a one per cent increase in the domestic capital stock is associated with a 0.63 per cent increase. Aside from calculating provincial rates of TFP growth, Miyamoto and Liu (2005) also try to model provincial differences in TFP growth rates as a function of the ratio of FDI to GDP, along with several other variables. An attempt is made to account for the endogeneity problem using Generalised Method of Moments estimation techniques. They report a positive and statistically significant relationship between the ratio of FDI to GDP and TFP growth with a one per cent increase in the former being associated with a 0.2-0.3 per cent increase in the latter. In interpreting these findings, they conclude, "Since the coefficient [to FDI / GDP] is larger than the coefficients on the other variables except human capital means that FDI plays an important role in the growth of TFP in China". A more qualified interpretation may be in order. In their data set, the ratio of FDI to GDP is shown to average just 2.45 per cent across all provinces. This suggests that raising this ratio by even just one per cent would be a tall order for some provinces. Furthermore, in the event that these provinces were successful, TFP growth would only increase by 0.2-0.3 per cent. During 1981-2000, TFP and income across all provinces were found to be growing at average annual rates of 4.03 per cent and 9.70 per cent respectively. This implies that even if policies had been put in place that substantially raised the scale of FDI, TFP and income growth would not have grown at a much faster rate.

Thirdly, the strength of the impact of FDI on income growth will be dependent upon the administrative level being considered. While FDI may not have driven income growth at the national or provincial level, it may have done so at lower levels such as at the city, county or township, and particularly in SEZs. Because the perspective of the observer is to see FDI impacting on income growth at a local level, this impact can be “scaled up” to higher levels with the outcome being that the impact of FDI at higher levels is overstated. There are several reasons why FDI has a stronger impact at lower administrative levels. Firstly, a given volume of FDI will occupy a larger proportion of local GDP. For example, Kueh (1992) observes that throughout the 1980s, Shenzhen received no less FDI than that of any other single province or municipality in China. Its GDP in 1987, however, was just one-tenth the size of the municipality of Shanghai. Secondly, FDI may spur higher levels of domestic investment, particularly in infrastructure such as electricity, transportation and communications. Kueh (1992) cites Chinese estimates from the early 1990s that suggest for each dollar of foreign investment, an average of RMB3 is spent, not including the Chinese capital contribution to joint venture arrangements. Thus, the combined contribution of FDI and FDI-related domestic investment to gross capital accumulation can be large, particularly on a local level. For example, Kueh (1992) states that in 1990, FDI into Shenzhen totaled \$US2436 million, or 34.68 per cent of total fixed asset investment. Using the above estimate as a guide, one dollar of FDI would be associated with FDI-related domestic investment of $2436 \times 3 = \text{RMB}7308$ million. Converting FDI-related domestic investment at the then prevailing exchange rate of \$US1:RMB4.783, FDI and FDI-related domestic investment would equal \$US2436 million + \$US1528 million = \$US3964 million, or 55 per cent of total fixed investment. In China, domestic investment complementary to FDI has occurred

alongside FDI in some instances and preceded it in others. In the case of Shenzhen, which was little more than a fishing village when it was designated an SEZ in 1979 and FDI from Hong Kong began to flow into it, local authorities built up the infrastructure alongside FDI inflows. In the case of the Pudong district of Shanghai, which was designated an SEZ later and was a planned metropolis, the infrastructure was largely installed before the arrival of foreign firms. Thirdly, while constant returns to factor accumulation are a reasonable assumption at higher administrative levels, increasing returns as a result of agglomeration economies and networking effects are more likely to be observed at the local level. Enright (2005), for example, observes that, "Once the viability of producing a product in China has been shown, local and foreign companies dive into the fray, mobilizing capital and labor with breathtaking speed, often with strong support from local governments." In one stand out case, in an 18th month period two-thirds of the world's note-book computer capacity, primarily made up of Taiwanese and Korean firms, relocated to the same locality in China, Suzhou. While the number of econometric studies at lower administrative levels is limited, on balance the available evidence does suggest that the FDI-income growth nexus is stronger at these lower levels. Jones, et al. (2003) use an aggregate production function of the Solow form to investigate the determinants of income per capita growth at the city level over the period 1989-1999. After controlling for other relevant variables they report a one per cent increase in the FDI to GDP ratio is associated with a 0.7-1.0 per cent increase in the average annual growth rate of income per capita, depending on the model specification used. The mean value for the FDI to GDP ratio across all cities in the dataset was 5.2 per cent. One potential bias in this study, however, is that the endogeneity problem is not explicitly addressed. Liu (2002) uses an aggregate production function of the Solow

form to consider the determinants of real value-added in 29 manufacturing industries located in Shenzhen over the period 1993-1998. The findings are supportive of technology spillovers and indicate that a one per cent increase in the share of foreign equity participation in manufacturing will on average raise real value-added among manufacturing's constituent industries by 0.2 to 1.0 per cent, depending on the model specification used. A qualification is that while the spillover effects associated with FDI were found to be consistently positive and statistically significant, albeit widely varying in magnitude depending upon model specification, there was very little evidence of FDI having a more direct impact on technological change. The coefficient of foreign equity participation in a specific manufacturing industry was never positive and related to real value-added in that specific industry in a statistically significant manner.

Fourthly, and a factor we suspect to be particularly important, is that the role FDI has played in impacting upon income growth is likely to have changed over time. The empirical studies reviewed in section three focus on the period post-1990. By this time, China had already changed a great deal. When the open door policy was first adopted in 1979, the domestic economy was encumbered by a ubiquitous state sector, factors of production were used inefficiently and domestic output was of poor quality and not marketable overseas. In this context FDI showed how under-utilised factors of production such as rural labour could be mobilized and the quality of manufacturing output could be raised to exportable standards. China was also extremely fortunate to have on its doorstep Hong Kong and Taiwan. By the time China adopted the open door policy, Hong Kong and Taiwan had already established themselves as manufacturing hubs capable of competing on an international stage. Facing rising

labour costs at home they also had the necessary incentive to transplant labour-intensive manufacturing to the mainland. Nowadays, the magnitude of the initial deficiencies in China's economy has declined, as has China reliance on FDI to address them. The manufacturing sector on the mainland is now unrecognizable compared with the one that existed in the late 1970s. Also, as most FDI continues to flow into certain manufacturing sectors, the contribution that marginal FDI makes to moving production closer to the international technological frontier diminishes. One more FDI in the textile industry for instance would not exert a meaningful impact on TFP growth in the textile industry since textile firms in China have already attained international levels of competitiveness. A vibrant, domestic non-state sector has also emerged that assists in mobilising surplus rural labour, exporting manufactured goods and earning foreign exchange. Accordingly, extrapolating the past role played by FDI into the present makes its present impact on income growth easily overstated. One must be careful on this point, however, because what earlier FDI did was provide a catalyst effect, which, in a short space of time, helped to create some of the conditions that were needed in order for high rates of income growth to be self-sustaining. For example, FDI relaxed the foreign exchange constraint needed to buy necessary capital goods. In this sense, present rates of income growth owe much to FDI. While it is true that China did not necessarily need FDI to address the initial deficiencies in its economy, FDI reduced the time it took to address these deficiencies. The empirical evidence does suggest that TFP played a more prominent role in income growth during the early stages of the reform period, although it must be said that the particular role played by FDI remains less clear. Chow's (1993) famous study of aggregate productivity found large increases in TFP at the national level between 1979-1985 compared with virtual stagnation in the three decades prior. Similarly, Hu

and Khan (1997) found that the average annual growth rate of TFP increased from 1.1 per cent over the period 1953-1978 to 3.7 per cent over the period 1979-1994. More recently, Kuijs and Wang (2005) found that the average annual rate of TFP growth at the national level fell from 3.7 per cent over 1978-1993 to 2.7 per cent over 1993-2004. In contrast to later periods, Miyamoto and Liu's (2005) provincial-level study found that during 1980-1985, TFP growth contributed the majority of income growth, 51 per cent, across all provinces compared with 33 per cent as a result of capital accumulation. However, casting some doubt on the scale of the specific impact of FDI, the contribution of TFP to income growth in Guangdong during 1981-1985 was found to be 56.03 per cent, which was not significantly different from the average across all coastal provinces of 55.63 per cent or the average across middle and western provinces at 59.69 per cent and 50.77 per cent respectively. Using data from the period 1984-1993, Fleisher and Chen (1997) calculate the growth rate of TFP and investigate its determinants. They find the coefficient to the ratio of FDI to total investment implies a one per cent increase in this ratio would raise TFP growth by 3.32 per cent. The coefficient, however, is only marginally statistically significant.

5. POLICY IMPLICATIONS

Policy implications at the national level in China are first discussed. In the coming years FDI is expected to exert a diminishing impact on income growth, although a still positive one. This is because some of the sources of productivity improvement that FDIs were able to exploit have now been exhausted, e.g., many manufacturing firms in China now operate using a level of TFP on par with international best practice. And while FDI will continue to mobilise surplus rural labour and contribute to China's growing stockpile of foreign exchange reserves, there is now a domestic non-state

sector performing a similar role. Nonetheless, the FDI-income growth nexus can at least be reinvigorated. As Enright (2005) observes, the manufactured goods in which China is internationally competitive are concentrated in a relatively limited number of labour-intensive consumer goods such as electronics, electrical equipment, home appliances, garments, textiles and footwear. In other manufacturing sectors, it remains “hopelessly weak”. When Lenovo bought IBM’s computer hardware business, for example, it insisted that IBM’s leading figures remain for at least a few years, indicating that Lenovo itself understood its expertise in effectively operating in a global market was limited. In many industries, such as banking, Chinese firms remain far behind international best practice and FDI into these industries remains highly restricted. It was only at the end of 2001 that HSBC became the first foreign bank to be given permission to acquire an equity stake in a domestic lender. Foreign ownership of domestic banks has since expanded and in the last year three of the big four state-owned banks also took on foreign equity partners equal to around 10 per cent of their total equity. Nonetheless, regulations remain that restrict foreign investment to a maximum of 25 per cent of total equity in Chinese banks and recently official approval for additional foreign investment in this industry has slowed amidst mounting criticism from some government officials that earlier equity parcels were sold too cheaply to foreigners. By opening up new sectors, FDI might once again provide a catalyst effect on income growth, albeit on a smaller scale than at the start of the reform period when the entire economy was backward. It is also apposite to mention that the benefits of removing sectoral restrictions on FDI will be muted so long as IPR enforcement remains weak. Even if a sector of the economy is opened up to FDI, foreign firms will be reluctant to transfer their best technology if they have concerns about it being misappropriated.

At the provincial level, the analysis suggests that putting in place incentive structures to increase the share of total FDI going to the inland provinces would be a grossly insufficient policy response to address widening regional income disparities in China. This is for two main reasons. Firstly, at a provincial level, there is scarce evidence that FDI has been one of the leading income growth drivers. Secondly, to the extent that FDI impacts on income growth by playing a catalyst role, the provinces that liberalized to FDI first would have already captured many of the benefits. Of course, inland provinces would still benefit from removing restrictions that actively prevent FDI.

Turning to the implications for other developing countries, the analysis pointed out that the benefits China has received from FDI have at least to some extent been dependent upon its initial conditions such as the backwardness of its economy on the eve of economic reforms and its close ties to Hong Kong and Taiwan. As a result, other countries may not reap similar benefits even if they are successful in attracting FDI on a similar scale. For example, as exemplified by its booming IT sector, Indian businesses today are far more capable and familiar with operating in global markets than were Chinese businesses in the late 1970s. In this aspect, it is difficult to imagine that FDI would play the same catalyst role that it did in China in the early 1980s. To be sure, many industries in India still lag international best practice and the economy suffers from numerous other black spots as poor quality infrastructure and a rigid labour market, which sees manufacturing firms often using capital-intensive technologies, even though India is clearly a labour abundant country. Accordingly, India has much growth potential left to exploit. However, what India needs most to

unlock this growth potential is domestic deregulation, not FDI. Another lesson other countries might draw from China's experience is the importance of mobilising domestic capital. The reason that China's national and provincial economies have been growing so quickly is primarily because of high rates of capital accumulation, which has been made possible by high rates of domestic savings. Over the period 1980-2004, the ratio of gross domestic savings to GDP in China was 37.3 per cent compared with 21.2 per cent in India. At the same time, however, other countries would do well to recognize the limitations inherent in the present Chinese growth model, which because of its reliance on capital accumulation, is of doubtful sustainability. Nor is it conducive to generating the improvements in standards of living that would result from TFP-led income growth.

The relationship between FDI and income growth in China is a complex one and beyond the scope of any single analytical framework to comment upon comprehensively - whether it be heuristics, regression analysis or growth accounting. In this paper we have reviewed the findings of the broad body of literature surrounding FDI-income growth nexus that is comprised of research that makes use of all of these analytical techniques. We then sort to point out those factors that might account for the apparent divergences in findings amongst them. In doing so an attempt has been made to synthesize the existing literature and provide a firmer basis for policy making to proceed in the future.

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