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CHINA'S FDI AND NON-FDI ECONOMIES AND THE SUSTAINABILITY OF FUTURE HIGH CHINESE GROWTH

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ABSTRACT

This paper presents assesses of the contribution of inward FDI to China's recent rapid economic growth using a two stage growth accounting approach. Recent econometric literature focuses on testing whether Chinese growth depends on inward FDI rather than measuring the contribution. Foreign Invested Enterprises (FIEs), often (but not exclusively) are joint ventures between foreign companies and Chinese enterprises, and can be thought of as forming a distinctive subpart of the Chinese economy. These enterprises account for over 50% of China's exports and 60% of China's imports. Their share in Chinese GDP has been over 20% in the last two years, but they employ only 3% of the workforce, since their average labor productivity exceeds that of Non-FIEs by around 9:1. Their production is more heavily for export rather than the domestic market because FIEs provide access to both distribution systems abroad and product design for export markets. Our decomposition results indicate that China's FIEs may have contributed over 40% of China's economic growth in 2003 and 2004, and without this inward FDI, China's overall GDP growth rate could have been around 3.4 percentage points lower. We suggest that the sustainability of both China' export and overall economic growth may be questionable if inward FDI plateaus in the future.

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1. Introduction

Since the mid 1980s Chinese GDP growth performance has averaged around 9.3 percent annually according to official data[i]. Although the reliability of these estimates has been questioned (see Rawski, 2001; Young, 1997 and 2000), whether this growth performance is sustainable over the next several decades has been also actively debated both inside and outside China. In this paper, accepting these estimates as reliable, we assess the part played by inward (and heavily export platform based) FDI since the early 1990s using a two stage growth accounting decomposition approach. Our results suggest that the contribution of FDI to growth may have been large and that without inward FDI China's growth rate may have been around 3.4 percentage points lower in the last few years. A plateau or decline in inward FDI in the future could thus significantly lower growth performance in the next few years.

Key to our analysis is to suggest thinking of China's economy today as comprising two distinct sub-economies. One involves Foreign Invested Enterprises (FIEs), often joint ventures between foreign companies supplying FDI, product design, and a sales network abroad and Chinese enterprises (predominately state-own enterprises, township and village enterprise) supplying land and labor. FIEs are heavily, but not exclusively, involved in manufacturing activities. The other is the non-FIE part of the economy in manufacturing, agriculture and services.

These two parts are clearly interlinked to some degree, but they nonetheless stand in sharp contrast to each other. FIEs employ only a small part of the workforce (24 million out of a workforce of 752 million) and their labor productivity is around 9 times that in the non-FIE sub-economy. FIEs account for over 50% of exports and 60% of imports. Industrial FIEs account for over 30% of China's industrial output. FIEs focused on export typically produce separate and distinct products designed abroad and rely on the distribution systems of foreign enterprises to sell products in foreign markets. FIEs are also regionally concentrated in Southern and Eastern China, intensifying inequality from rapid growth.

Under an assumed partition of the economy into these two sub-parts, we extend Solow's (1957) growth accounting approach to capture a two stage production structure including both the FIE and non-FIE parts of the economy. This allows us to decompose China's growth into that originating from FDI in the FIE sector and that from the non-FDI/FIE portion of the economy.

The FIE sub-economy is currently growing at around 18%/year, while the non-FDI portion is only growing at around 5-6%/year. This, in turn, suggests that if FDI inflows plateau (as appears to be the case for 2005), the sustainability of future Chinese growth in the 7-10% range may be questionable. The

absorptive capacity of OECD markets for China's export volumes may also eventually bound Chinese growth. In contrast, if FDI inflows continue to grow the dualism we highlight may generate further increased inequality in China, Thought of in this way, China's economy seems currently unbalanced, and perhaps only capable of sustaining growth if these imbalances are addressed. Some of the current reforms represent a move in this direction, but ultimately the non-FDI portion of the economy seems to need to be addressed for high growth to continue.

The paper is organized as follows. Section two provides background on China's inward FDI along with a brief review of prior literature on the impact of inward FDI on China's economy. Section three presents decompositions yielding the contributions of the FDI and non-FDI parts of China's economy for GDP growth. Section four discusses the sustainability of China's growth in light of these results.

2. China's FDI economy and foreign invested enterprise (FIEs)

2.1 Overview of China's FDI inflows

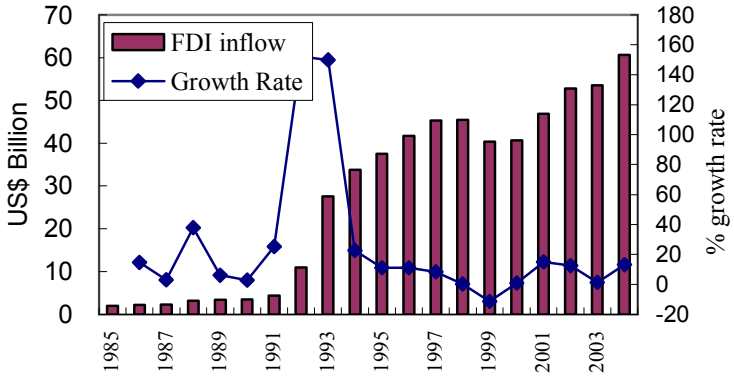
FDI inflows into China have increased rapidly over the last two decades. Before 1979, FDI was prohibited in China, a restriction which was lifted following the adoption of China's open door policy in 1979, when a new foreign investment law was adopted. In its early stages, FDI was restricted to China's Four Special Economic Zones and limited to equity joint ventures. Most of the FDI went into hotel construction and energy extraction. In 1984, a new foreign investment law was adopted to accelerate FDI growth and a number of preferential policies were used by both central and local governments to attract FDI. A sharp increase occurred after 1992 when China reaffirmed policies of openness and market-oriented reforms introduced earlier.

As Figure 1 indicates, growth in China's inward FDI has been spectacular. In 1985, annual FDI inflows were less than US$ 2 billion; while in 2004, they were US$ 61 billion, 30 times those of 20 years earlier. Between 1985 and 1991, the annual growth rate of FDI inflows into China was 14%, and annual FDI inflows during this period remained less than US$ 4.5 billion. FDI inflows increased sharply to US$ 11 billion in 1992 and again to US$ 28 billion in 1993, with growth rates of over 150% in both years.

By 1997, China had FDI inflows of US$ 49 billion. Although the late 1990s saw a small decrease in FDI inflows, the annual growth rate of FDI inflows into China increased again to over 10% after China joined the WTO in 2001. During the three years 2001, 2002 and 2003, world FDI inflows declined sharply by 41%, 13% and 12% respectively (UNCTAD, 2005), but China registered FDI growth of 15%,

13% and 1.4% (NBSC, 2004).Global FDI inflows increased only 2% in 2004, while China registered an inward FDI growth rate of 13% (NBSC, 2005). China's share of FDI flows has thus increased sharply in recent years. China is now the world's largest developing country FDI recipient and the world's 2nd largest FDI recipient overall after the US. By way of contrast, FDI inflows into India were only US$5 billion in 2004.

Figure 1: China's inward FDI flows and their annual growth rates (1985-2004)



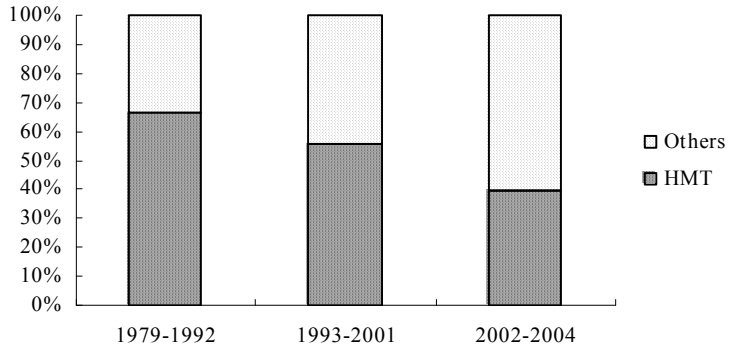
Sources: FDI inflows in billion US$ are from NBSC (2005, p643; and various issues); growth rates are calculated by authors.

China's FDI inflows fall into two broad categories. One is horizontal FDI involving the transfer of production from abroad to China to service the Chinese internal market. The other is vertical FDI which seeks to take advantage of low cost production (and especially low wage rates) for export of products abroad. Most export-oriented FDI inflows originate from other Asia economies, including South Korea, Taiwan, and Hong Kong, and are in the vertical category which seeks to exploit low production costs. FDI flows from North America and Western Europe are more heavily in the horizontal category, which seeks to exploit the Chinese domestic market (Lemonie, 2001). U.S. origin FIEs sold more than 80% of their products locally in China in 2002 according to Fung (2004). Japan lies between these two groups, with 45% of production for China's domestic market.

Before 2002, FDI from Asian neighbors, especially from HMT (Hong Kong, Macau and Taiwan), dominated FDI flows into China. As Figure 2 indicates, FDI from HMT alone accounted for 66% of total FDI inflows between 1979 and 1992, and 55% between 1993 and 2001. After 2002, the sources of China's FDI inflows became more diversified with U.S and other OECD countries accounting for an increasing share. HMT's share in total inward FDI has steadily declined to around 40% today.

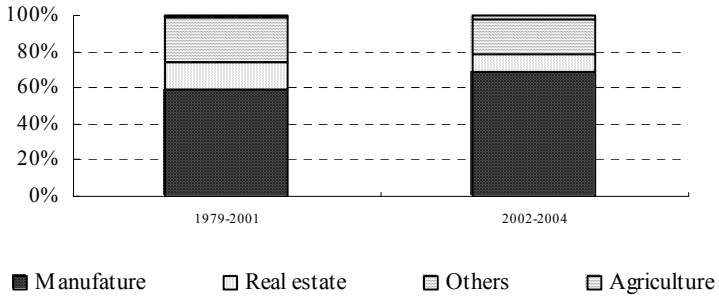
Before China's accession to WTO, less than 60% of inward FDI went to the manufacturing sector. But after China joined the WTO, more inward FDI went to the manufacturing sector and its share reached over 70% as the share of FDI going to the real estate sector decreased sharply. In agriculture, before China joined the WTO, only 1% of accumulated FDI went to this sector, but in recent years the agricultural share of new FDI increased to 2%.

Figure 2: China's Inward FDI by Source (1979-2004)



Notes: HMT refers to FDI inflows from Hong Kong, Macau and Taiwan, and others refer to the residual of total FDI inflows.
Sources: Calculations based on NBSC (2005, p644-646; and various issues).

Figure 3: Sectoral Composition of China's Inward FDI



Sources: Calculations based on NBSC (2005, p648; and various issues).

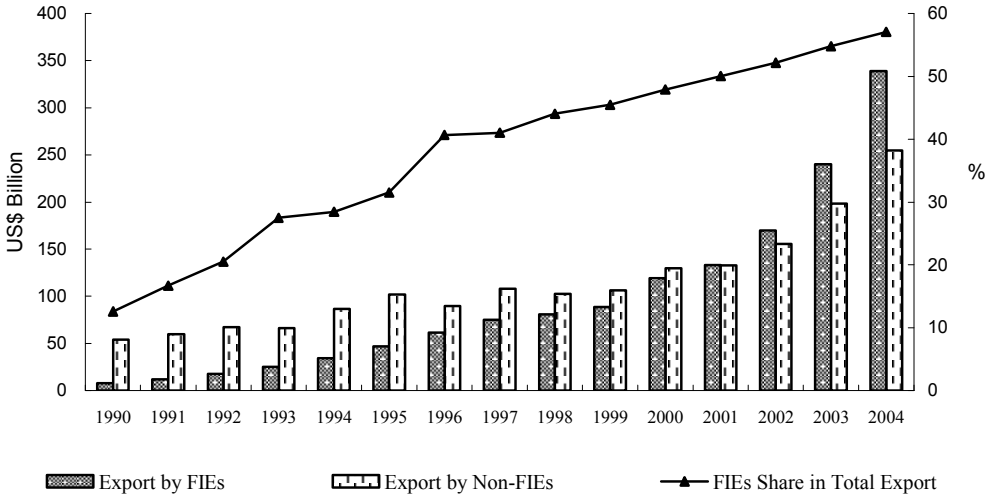
As a result of these FDI inflows, by 2004 500 thousand FIEs had been established in China although only around 50% of them were still operating. Among the 242 thousand functioning FIEs, 160 thousand were industrial enterprises. Only 43 thousand FIEs with annual sales income of over 5 million Yuan (0.61 US$ million equivalent) are tracked by statistical agencies in China for data purposes.

2.2 China's FDI and trade performance

The FIEs which use these FDI flows have played an important role in China's trade performance. A recent government agency (MOC, 2004) estimate is that 46% of the output of FIEs' in the manufacturing sector is for export from China, while for non-FIEs it is only 16.7%. The export growth rate of FIEs in most years after 1991 was over 30% and over 40% in some years; a growth rate that is much higher than that of non-FIEs. As Figure 4 indicates, in 2004 exports from FIEs were 57% of China's total exports compared to less than 2% in 1985. Figure 4 also indicates that this ratio has been increasing steadily since 1990, reaching 30% in 1995, more than 40% in 1996, and 50% by 2001.

Along with rapid export growth, FIEs have also accounted for progressively more of China's imports. In 2004, the ratio of imports by China's FIEs to total imports was about 60%. Compared to exports, the ratio of import by FIEs to China's total imports is more volatile. This ratio reached a record high of 55% in 1998, declined to 37% by 2001, and rebounded by almost 20 percentage points in 2002, one year after China joined the WTO.

Figure 4: Exports from China by FIEs and Non-FIEs (1990-2004)



Sources: Data on exports by FIEs in billion US$ are from NBSC (2005, p642; and various issues) and exports by non-FIEs are the residual of total exports (2005, p627). The FIEs share in total exports is the ratio of exports by FIEs to total exports.

Table 1: Export Growth Performance of China's FIEs (1991-2004)

	Total export growth rate	*Share of FIEs in exports*	*FIE Export growth rate*	*Export growth rate without FIEs*
	(1)	(2)	(3)	(4)
1991	15.8	16.7	53.9	6.82
1992	18.1	20.5	45.0	8.90
1993	8.0	27.5	44.9	-4.32
1994	31.9	28.4	36.4	21.56
1995	22.9	31.5	36.4	11.49
1996	1.5	40.7	31.1	-11.13
1997	21.0	41.0	21.9	12.03
1998	0.5	44.1	8.0	-3.03
1999	6.1	45.5	9.5	1.81
2000	27.8	47.9	34.7	11.20
2001	6.8	50.1	11.6	0.99
2002	22.4	52.2	27.5	7.99
2003	34.6	54.8	41.4	11.91
2004	35.4	57.1	41.1	11.96

Sources: Columns (1) and (3) are calculated using export data in billion US$ directly from NBSC (2005, P627, p642; and other various issues); Column (2) is the ratio of exports by FIEs to total exports; Column (4) is obtained by using column (1) minus the product of column (2) and column (3).

Table 1 indicates that since 1990 FIEs have accounted for most of China's export growth. In 2004, China experienced a record export growth rate of 35.4%; exports increased by US$155 billion to reach US$ 593.4 billion (36% of China's GDP). In 2004, the ratio of international trade (exports plus imports) to GDP reached 70%, 10 percentage points higher than in 2003. Without growth in FIE exports, China's export growth rate would have been only about 10% in most years after 1991, and negative in some years.

2.3 Data on FDI inflows and FIEs and factors behind FDI growth

In our two stage growth accounting analysis that follows, we use data on inward FDI flows as reported by the National Bureau of Statistics of China (NBSC) as our starting point. China's official data only reports performance indicators for the 43 thousand FIEs with annual sales over 5 million RMB and furthermore these data are available only after 1997. Before 1997, performance indicators were reported by the NBSC only for FIEs with independent accounting. We supplement information on these 43 thousand FIEs by other data and calculations based on various assumptions which in total we use for our decomposition analysis.

We first calculate the FIE share in China's total GDP using some key assumptions. We assume that the marginal revenue of per FDI dollar is equalized across aggregate sectors of the economy (agriculture,

manufacturing, and services). The share of FIEs in China's industrial value added can then be estimated by using value added for FIEs divided by the value added of the industrial sector from NBSC (2005, p488; and other various issues). We multiply this share by China's industrial share in total GDP (NBSC, 2005, p52), and then divide by the industrial FDI share in total inward FDI ((NBSC, 2005, p648 and other various issues) to estimate the FIE share in China's total GDP. The shares of HMT and FFE enterprises in China's total GDP are estimated similarly using data from NBSC (2005, p488; and other various issues).We separately calculate the GDP share of Foreign Funded Enterprises (FFEs) excluding FDI from Hong Kong, Macao, and Taiwan from the share of those using FDI originating from Hong Kong, Macao, and Taiwan FDI (HMT).

Relevant to our discussion is the accuracy of FDI inflow data as reported by the National Bureau of Statistics China (NBSC) since there are discrepancies between FDI figures as reported by China and by individual investing countries (UNCTAD, 2005; Gao, 2005; Xiao, 2004). Taking Hong Kong and the U.S. as examples, UNCTAD (2005) reports FDI inflows from Hong Kong in 2002 of U.S. $ 17.9 billion by China compared to U.S.$ 15.9 billion reported by Hong Kong; FDI inflows from U.S. in 2002 were reported by China as U.S.$ 5.4 billion compared to U.S.$ 0.9 billion as reported by the U.S.[ii] Some authors raise the possibility that for some investing countries there is under-reporting of FDI in China to Chinese statistical agencies (UNCTAD, 2005; Gao, 2005). In 2001, FDI inflows from the United Kingdom were U.S.$ 0.9 billion as reported by China (NBSC), but U.S.$ 1.1 billion reported by the United Kingdom (UNCTAD, 2005); and in 2000 FDI inflows from Hong Kong were U.S.$ 15.5 billion as reported by China, and U.S.$ 46.4 billion as reported by Hong Kong[iii].

One further issue is the size of the portion of China's FDI inflows that involve round-trips, namely FDI originating from Mainland China and returning through Hong Kong (Graham and Wada, 2001; Dees, 1998). Some estimates suggest that up to 20% of FDI flows seemingly originating from Hong Kong are in reality round-tripping (Dees, 1998; Harod and Lall, 1993). Xiao (2004) estimated that China's overall round-trips FDI ratio is likely to be 40%. FDI inflow data is thus a little problematic; even though there seems little doubt that that there has been substantial growth in FDI inflows into China over the last two decades.

Literature discussion of the factors that account for China's rapid inward FDI growth is also relevant. Taube and Ogutcu (2002) , Lim (2001) and Tseng and Zebregs (2002) cite such factors as market size, agglomeration effects, wage costs, fiscal incentives, the business and investment climate, political/economic stability and political risk, and trade barriers and increasing openness as factors influencing FDI flows both positively and negatively. Sicular's (1998) study indicates that structural

changes in China's economy, especially the rapid growth in TVEs, have also contributed to its attractiveness to foreign investors. Survey data reported by Grub et al (1990) indicates that for U.S. investments the size of the potential market and cheap labor are the most important determinants. A survey by the World Bank in 1994, covering 173 Japanese firms investing in China shows market size, the cost of labor, and FDI policies as the most important determinants (Kawagguchi, 1994).

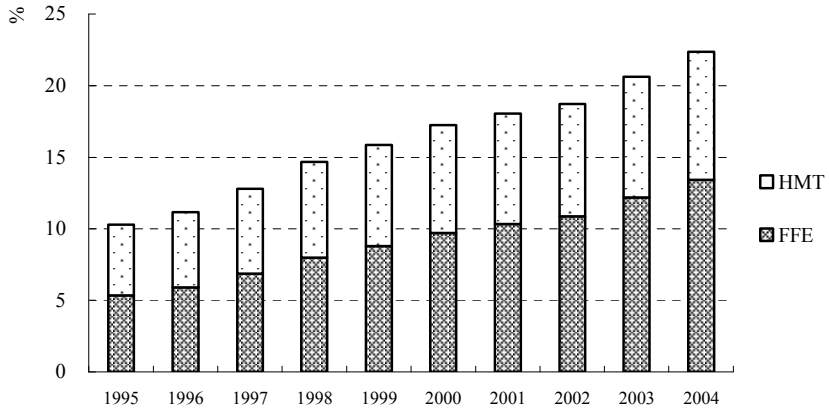
Other authors stress China's improved policy environment, and especially preferential policies for FDI, its large market and its rapid growth rate as the most important determinants (Lim, 2001; Fung, 2002 and 2004; Berthelemy and Demurger, 2000, and Grub et al, 1990). The reduced political role of SOEs, as the share of non-SOEs in China's economy has fallen, also tends to generate more inward FDI flow according to Branstetter and Feenstra (2002). Another factor has been improved convertibility of domestic currency and the lifting of some mandatory restrictions on repatriation of export earnings. Convertibility and the repatriation of earnings, as well as mandatory restrictions on local content and joint ventures were disincentives to early inward FDI flows.

2.4 FIEs, China's GDP growth, and labor productivity

Figure 5 reports the FIE share in China's economy estimated as above. In 1995, this was around 10%, and reached over 20% in the last two years. The portion attributable to FDI originally from HMT drops from 50% in 1995 to around 40% in 2004. Despite these large shares of FIEs in GDP, the FIEs' share in total employment is small, with only about 24 million people employed in 2004 (or around 3% of China's total labor force) even though total employment in FIEs has been increasing over 15% annually in recent years. Not surprisingly, labor productivity in FIEs is significantly higher than that of the non-FIEs since only 3% of labor produces 22% of China's GDP and over 55% of China's exports in 2004. The remaining 97% of China's labor force produces 78% of GDP.

Figure 6 indicates that the labor productivity of FFE's is considerably higher than that of the average FIE, and HMT enterprises. The labor productivity gap between FIEs and Non-FIEs is around 9:1 in 2004. Not including agriculture, the labor productivity ratio of FIE to non-FIE is around 6:1. The ratio is 4:1 comparing FIEs with non-FIEs only in the industrial sector.

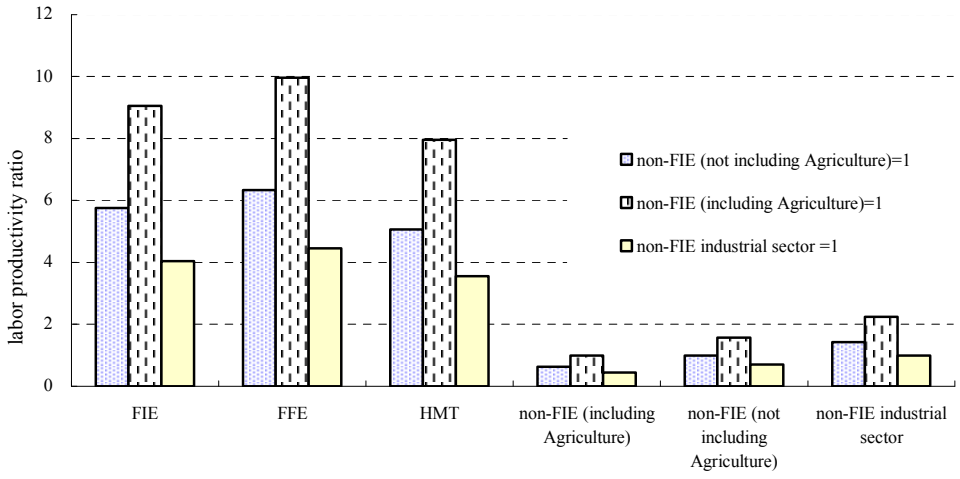
Figure 5: The GDP share of FIEs in China (1995-2004)



Notes: (1) FFE refers to Foreign Funded Enterprises excluding FDI from Hong Kong, Macao, and Taiwan; (2) HMT refers to those based on FDI from Hong Kong, Macao, and Taiwan.

Sources: (1) The share of FIE in China's industrial sector is estimated first by using value added of FIEs divided by value added of the industrial sector. These are from NBSC (2005, p488; and other various issues). We then multiply this share by China's industrial share in total GDP (NBSC, 2005, p52), and then divide by the industrial FDI share in total inward FDI ((NBSC, 2005, p648 and other various issues) to yield the FIE share in China's total GDP. (2) The shares of HMT and FFEs in China's total GDP are estimated similarly using data from NBSC (2005, p488; and other various issues).

Figure 6: The Labor Productivity Ratios of FIEs and non-FIEs in China (2004)



Notes: (1) FFE refers to Foreign Funded Enterprises excluding FDI from Hong Kong, Macao, and Taiwan; (2) HMT refers to those based on FDI from Hong Kong, Macao, and Taiwan.

Sources: (1) labor productivity in FIE, FFE, HMT, non-FIE (including or not including agriculture), and non-FIE industrial sector is calculated using labor value added divided by the labor force. (2) The labor productivity ratio is the ratio of the labor productivity of FIEs (FFE and HMT) divided by the corresponding labor productivity in denominator; (3) The share of non-FIEs (including agriculture) in China's GDP is 1 minus the share of FIEs; (4) The share of non-FIEs (not including agriculture) in China's GDP is (3) minus the share of agricultural non-FIEs in China's GDP; (5) The share of the non-FIE industrial sector is the share of industrial sector (NBSC, 2005, p51) in China's GDP minus the FIE share as estimated in previous parts of this paper; (6) Labor 's share is calculated in the same way as for GDP share. The labor data is from NBSC (2005, p121 and other various issues). The total labor force in FIEs in 2004 was 24 million (MOC, 2005).

2.5 Literature on the impact of FDI/FIEs on China's economy

While there is, to our knowledge, no prior literature that decomposes China's growth in the way we do here, there has nonetheless been substantial econometric literature in recent years seeking to assess the impacts of inward FDI on China's economic performance. A majority of the literature supports the position that inward FDI has played an important role in both China's economy and its fast growth (Tseng and Zebregs, 2002; Lemoine, 2001; Berthelemy and Demurger, 2000; Graham and Wada, 2001; Chen, 1995; Liu, 2002; Wei, 1993; OECD, 2000; Dees, 1998; Sun and Parikh, 2001; Wei, 1999; and Borensztein et at, 1998). This literature however is mainly econometric and tests whether China's GDP growth rates are affected by FDI flow, and does not decompose China's growth in the way we report here.

One strand of literature, including Berthelemy and Demurger (2000), Borensztein et at, (1998), Graham and Wada (2001), Chen (1995), Liu (2002), Wei (1993), Wu (2000), and Dees(1998) uses econometric methods to regress GDP (or GDP growth) on FDI and other variables. If the estimated coefficient on FDI is positive and significant, the claim is that FDI has played an important part in China's GDP growth. Some studies use national level (panel) data, some use regional level (panel) data (usually, China is divided into 3 or six large regions), some use provincial level (panel) data, and a few use sub-industry data. Models, variables, and estimation methods all vary.

There are also debates in the literature over whether or not FDI has had effects on China's economy growth beyond capital formation. Using city-level data, Wei (1993) arrives at the conclusion that FDI contributes to economic growth (using industry output value) through technological and managerial spillovers between firms as opposed to simply providing new capital. Others, such as Dees (1998), Sun and Parikh (2001), and Wei (1993), econometrically estimate the transfer and spillover effects of FDI. These papers support the idea that inward FDI affects China's economic growth in ways beyond simple capital formation.

Other literature concludes that technology transfer and the spillover effects are more limited, and argues that much if not most of the correlation between FDI and superior economic performance is driven by reverse causality: (Lim, 2001; Yong and Lan, 1997; Huang, 1999; Woo, 1995; Rodrik, 1999; and Lemoine, 2001). Woo (1995) argues that the role of FDI in spillover effects is overstated because FDI has occurred in regions that have been liberalized. Rodrik (1999) also expresses doubts over spillover effects, arguing that greater productivity in domestic firms in producing for exports does not necessarily suggest efficiency spillovers from foreign firms, since more productive firms, domestic or

foreign, tend to locate in export sectors.

3. China's growth performance and the FDI and non-FDI economies

To determine the portion of China's growth which can be attributed to FDI inflows, as distinct from econometrically test whether FDI flows play a significant role in China's growth, we use an extension of the growth accounting approach long associated with Solow (1957) and Dennison (1967). In this earlier literature, an aggregate production function is assumed of the form,

$$Y(t) = A(t)F(K(t), L(t)) \tag{1}$$

where capital (K(t)) and labor (L(t)) are the inputs in aggregate production in period t, technical progress is disembodied and Hicksian neutral and reflected in the term A(t), and Y(t) is output.

Taking a total derivative through the production function and yields the well-known Solow growth accounting equation,

$$\frac{\dot{Y}}{Y} = \frac{\dot{A}}{A} + S_K \frac{\dot{K}}{K} + S_L \frac{\dot{L}}{L} \tag{2}$$

where $\dot{Y}$, $\dot{A}$, $\dot{K}$ and $\dot{L}$ are time derivatives, and S_k and S_L are shares of capital and labor.

Solow's original purpose was to investigate the contribution of technical progress relative to factor accumulation in U.S. long term growth, which he put at 87.5% of growth. Dennison (1967) later used Solow's framework to explore the factors explaining why growth rates differed across OECD counties and Jorgenson and Griliches (1967) investigated the role of embodied technical progress on growth, concluding it was substantial. Young (1995) later used this growth accounting approach to analyze growth experiences more broadly in Asia, finding that the higher growth in the newly industrializing countries of east Asia was not due to rapid technological progress and other factors affecting the Solow residual, but rather capital accumulation. The Solow framework has recently been extended to open economies by Kohli (2003a and 2003b) to capture terms of trade effects in growth performance of open economies.

Here we extend the original Solow framework in a different way by using a two stage production growth accounting approach. Following trade literature (see Dixit and Norman, 1980), we first write a GDP function in which the outputs of the FIE and non-FIE portions of the Chinese economy discussed earlier aggregate to yield GDP,

$$O(t) = g(FIE(t), NFIE(t)) \tag{3}$$

where O(t) refers to aggregate output, and FIE(t) and NFIE(t) are outputs of the FIE and non-FIE portions of the economy.

In the second stage we use separate production functions for each sector,

$$FIE(t) = A^F(t) f(FDI(t), L^F(t)) \tag{4}$$

$$NFIE(t) = A^N(t) h(K(t), L^N(t)) \tag{5}$$

where $A^F(t)$ and $A^N(t)$ are the Hichsian neutral technical change terms, $L^F(t)$ and $L^N(t)$ are the labor inputs used in the FIE and non-FIE parts of the economy, FDI(t) and K(t) are the stocks of accumulated FDI and capital used in the FIE and non-FIE parts of the economy. We make the strong assumption that foreign supplied capital (FDI) is the only non-labor input in the FIE portion of the economy. .

Taking time derivatives through (4) and (5) yields,

$$\frac{\dot{FIE}}{FIE} = \frac{\dot{A}^F}{A^F} + S^F_{FDI}\frac{\dot{FDI}}{FDI} + S^F_L\frac{\dot{L}^F}{L^F} \tag{6}$$

and,

$$\frac{\dot{NFIE}}{NFIE} = \frac{\dot{A}^N}{A^N} + S^N_K\frac{\dot{K}}{K} + S^N_L\frac{\dot{L}^N}{L^N} \tag{7}$$

where S^F_L and S^F_{FDI} are the shares of labor and FDI in FIE production and S^N_L and S^N_K are the shares of labor and capital in non-FIE production.

The economy wide growth accounting equation for this two stage production structure can thus be expressed as,

$$\frac{\dot{O}}{O} = g^F\left(\frac{\dot{A}^F}{A^F} + S^F_{FDI}\frac{\dot{FDI}}{FDI} + S^F_L\frac{\dot{L}^F}{L^F}\right) + g^N\left(\frac{\dot{A}^N}{A^N} + S^N_K\frac{\dot{K}}{K} + S^N_L\frac{\dot{L}^N}{L^N}\right) \tag{8}$$

where g^F and g^N are shares of FIE and non-FIE output in the GDP function. If (3), (4), and (5) are Cobb Douglas, then the associated share parameters are constant. If (3), (4), and (5) are CES then the share parameters in (8) change over time. The role of changing shares where rates of factor accumulation differ significantly by factor was stressed by Weitzman (1970) in his application of Solow growth accounting to Soviet post war growth.

For the FIE part of the economy we can also decompose this into FFE and HMT sub-parts since the FFE share is increasing relative to that of HMT enterprises. In this case, (8) becomes

$$\frac{\dot{O}}{O} = g^{FFE}\left(\frac{\dot{A}^{FFE}}{A^{FFE}} + S_{FDI}^{FFE}\frac{\dot{FDI}^{FFE}}{FDI^{FFE}} + S_{L}^{FFE}\frac{\dot{L}^{FFE}}{L^{FFE}}\right) + g^{HMT}\left(\frac{\dot{A}^{HMT}}{A^{HMT}} + S_{FDI}^{HMT}\frac{\dot{FDI}^{HMT}}{FDI^{HMT}} + S_{L}^{HMT}\frac{\dot{L}^{HMT}}{L^{HMT}}\right) \quad (9)$$
$$+ g^{N}\left(\frac{\dot{A}^{N}}{A^{N}} + S_{K}^{N}\frac{\dot{K}}{K} + S_{L}^{N}\frac{\dot{L}^{N}}{L^{N}}\right)$$

In our decompositions, the parameter g^F is estimated using the methods set out in section 2.4 above. The parameter g^N can then be obtained by residual since the sum of g^F and g^N is one. The labor share parameters, S_L^F and S_L^N in FIE and non-FIE production functions are estimated using the labor force wage bill divided by value added for the two parts of the economy, and S_{FDI}^F and S_K^N are obtained by residual. The wage bill of FIEs is estimated by multiplying wage rate (NBSC, 2005, p174) and labor force data (NSBC, p506, p121). The wage bill of non-FIEs is China's total labor remuneration[iv] (NBSC, 2005, p62; and other various years) minus the FIE wage bill. Data on China's labor force is from NBSC (2005, p118) and the labor force in non-FIEs is taken to be the total labor force minus that in FIEs.

To determine the capital stock and growth variables, we first estimate the Chinese total capital stock along with the FIE capital stock as accumulated FDI net of depreciation. We use the total capital stock minus the FDI stock as our estimate of the non-FIE capital stock.

The Chinese capital stock is obtained by firstly deflating annual capital formation data using a fixed investment price index NSBC (2005, p301)[v]. A depreciation rate of 0.04, similar to that used by Chow (1993 and 2003), is assumed for the depreciation of the annual capital stock after 1985. Before 1985, a depreciation factor of 0.10 is used instead to account for outmoded fixed equipment. Annual capital formation is from the World Bank database (WB, 2005) in US$.

The resulting growth rates of variables from 1995 to 2004, along with the estimated share parameters are reported in Table 2. Labor force, wage rates and annual FDI inflows for FFE and HMT data are from NBSC (2005, p121, p174, p506, p644-646; and other various issues). Corresponding parameters and growth rate variables for FFEs and HMTs are listed in Table 3.

These data indicate that while FIEs produce one fifth of China's total GDP, the FIE subpart of the Chinese economy grew three times faster than the non-FIE portion between 1995 and 2004, considerably faster than China's economy as a whole. In the last two years (2003 and 2004), over 40% of China's growth comes from FIEs and in the last decade (from 1995 to 2004), over 30% of China's economic growth.

A striking feature of these data is the high capital share in the non-FIE portion of the economy (declining from 70% to only 50% in 2004), and the even higher share of FDI in FIE output (over 80% in

most all years since 1995). The high (and volatile) $\dot{L}^F/L^F$ variable reflects rapid labor growth forces in FIEs from a lower base, and the high $\dot{K}/K$ variable reflects high rates of domestic saving in China.

If we follow Solow's original procedure of specifying no functional form for the production functions (4) and (5), and allow shares to vary each year, we can use data from Tables 2 and 3 and (8) and (9) to decompose the growth performance of the FIE and non-FIE parts of China's economy and assess their respective contributions to the total GDP growth. If instead we assume (4) and (5) to be Cobb Douglas, and time invariant, shares are constant over time. If we assume CES, then shares vary over time in ways which reflect the elasticity of substitution, output, and factor input data and need not be the same as observed shares. For the Cobb Douglas case, we use the average shares of labor over the period 1995-2004 (in the FIE sub-economy 0.19 and 0.37 in the non-FIE sub-economy) and corresponding shares of capital as constant share parameters in (8).

Table 2: Growth rates of output and accumulated FDI, capital stock and labor force in FIEs and the non-FIEs portion of the Chinese economy and share parameters

	$\frac{\dot{FIE}}{FIE}$	$\frac{\dot{NFIE}}{NFIE}$	g^F	g^N	S_L^F	S_{FDI}^F	S_L^N	S_K^N	$\frac{\dot{L}^F}{L^F}$	$\frac{\dot{FDI}}{FDI}$	$\frac{\dot{L}^N}{L^N}$	$\frac{\dot{K}}{K}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1995	-	-	10.3	89.7	19.6	80.4	29.9	70.1	41.0	41.8	0.5	14.0
1996	18.9	8.5	11.2	88.8	20.8	79.2	30.2	69.8	26.4	32.6	1.0	14.2
1997	24.8	6.8	12.8	87.2	19.8	80.2	30.3	69.7	5.3	26.6	1.2	13.3
1998	23.5	5.5	14.7	85.3	21.1	78.9	32.8	67.2	7.6	20.7	1.1	12.3
1999	15.9	5.6	15.9	84.1	20.1	79.9	34.9	65.1	2.2	14.2	1.1	11.4
2000	17.4	6.2	17.2	82.8	18.4	81.6	36.9	63.1	7.7	11.9	0.8	10.5
2001	12.5	6.5	18.0	82.0	18.7	81.3	40.4	59.6	10.1	12.4	1.1	11.2
2002	12.3	7.4	18.7	81.3	19.5	80.5	42.7	57.3	12.3	12.5	0.7	11.5
2003	20.4	6.7	20.6	79.4	18.5	81.5	45.2	54.8	19.4	10.6	0.5	13.0
2004	18.8	7.1	22.4	77.6	15.9	84.1	48.8	51.2	14.8	10.4	0.6	13.3

Source: authors' own calculations.

Column (1) and (2): The growth rates of FIEs and non-FIEs are calculated using the FIE share in China's GDP as in section 2.4;

Column (3): Calculated using the methods set out above in section 2.4.

Column (4): 1 minus the corresponding entry in column (1);

Column (5): Estimated using the labor force wage bill of FIE divided by labor value added. The wage bill of FIEs is estimated by multiplying wage rate (NBSC, 2005, p174) and labor force data (NSBC, p506, p121).

Column (7): Calculated using the labor force wage bill of non-FIEs divided by labor value added. The wage bill of non-FIEs is China's total labor remuneration (NBSC, 2005, p62; and other various years) minus the FIE wage bill. Data on China's labor force is from NBSC (2005, p118) and the labor force in non-FIE is the total labor force minus the labor force in FIEs.

Column (6) and (8): We first calculate the Chinese capital stock and accumulated FDI (net depreciation). We then use the total capital stock minus the FDI stock to generate an estimate of the non-FIE capital stock data. The total capital stock is obtained by deflating annual capital formation using fixed investment price index NSBC (2005, p301) A depreciation rate of 0.04, similar to that used by Chow (1993 and 2003), is used to depreciate the annual capital stock after 1985. Before 1985, a depreciation factor of 0.10 is used to account for outmoded fixed equipment. Annual capital formation in US$ is from the World Bank database (WB, 2005).

Column (9)-(12): Calculations use similar data sources for columns (5), (6), (7) and (8).

Table 3: Growth rates of output and accumulated FDI and labor force in FFEs and HMTs and share parameters

	Growth rate of FFEs	*Growth rate of HMTs*	S_L^{FFE}	S_{FDI}^{FFE}	S_L^{HMT}	S_{FDI}^{HMT}	$\frac{\dot{L}^{FFE}}{L^{FFE}}$	$\frac{\dot{FDI}^{FFE}}{FDI^{FFE}}$	$\frac{\dot{L}^{HMT}}{L^{HMT}}$	$\frac{\dot{FDI}^{HMT}}{FDI^{HMT}}$	g^{FFE}	g^{HMT}
1995	-	-	17.3	82.7	18.4	81.6	37.9	51.6	43.8	33.2	5.4	4.9
1996	20.8	16.8	21.7	78.3	21.3	78.7	37.0	40.6	16.9	26.1	5.9	5.3
1997	26.8	22.5	20.3	79.7	20.1	79.9	6.7	34.9	3.7	20.5	6.9	5.9
1998	25.5	21.2	20.6	79.4	20.8	79.2	4.0	29.2	11.4	14.6	8.0	6.7
1999	17.8	13.7	19.1	80.9	19.5	80.5	2.2	18.9	2.1	10.3	8.8	7.1
2000	19.3	15.1	18.5	81.5	18.5	81.5	11.4	15.8	4.0	8.5	9.7	7.5
2001	14.3	10.2	19.1	80.9	18.9	81.1	9.6	16.5	10.6	8.8	10.3	7.7
2002	14.1	9.9	19.5	80.5	19.5	80.5	12.6	16.6	11.9	8.7	10.9	7.8
2003	22.4	17.7	18.7	81.3	18.6	81.4	21.6	14.2	17.0	7.0	12.2	8.4
2004	20.7	16.1	16.5	83.5	16.3	83.7	19.0	14.3	10.1	6.5	13.4	8.9

Notes: (1) FFE refers to Foreign Funded Enterprises excluding FDI from Hong Kong, Macao, and Taiwan;
(2) HMT refers to those based on FDI from Hong Kong, Macao, and Taiwan.

Sources: authors' own calculations using a similar procedure for FIEs as in Table 2. The growth rates of FFEs and HMTs are calculated using the FFEs and HMTs shares in China's GDP set out as in section 2.4; Labor force, wage rates and annual FDI inflows for FFE and HMT data are from NBSC (2005, p121, p174, p506, p644-646; and other various issues).

In the CES case, the share parameters in our decomposition (8) are not constant. We thus depart from Weitzman's (1970) in allowing technological progress to change over time. Specifically, the CES function for each sub-economy takes the form,

$$FIE(t) = \gamma^F e^{\lambda(t)^F t}[\delta^F L^F(t)^{\rho^F} + (1-\delta^F)FDI(t)^{\rho^F}]^{1/\rho^F} \tag{10}$$

$$NFIE(t) = \gamma^N e^{\lambda(t)^N t}[\delta^N L^N(t)^{\rho^N} + (1-\delta^N)K(t)^{\rho^N}]^{1/\rho^N} \tag{11}$$

where γ^F and γ^N are unit parameters; δ^F and δ^N are labor share parameters in production functions; $\lambda(t)^F$ and $\lambda(t)^N$ are time dependent technical progress terms over time; and $\rho^F = 1-1/\sigma^F$, $\rho^N = 1-1/\sigma^N$, σ^F and σ^N are elasticity of substitution parameters. $\lambda(t)^F$ and $\lambda(t)^N$ are allowed to vary so that the resulting growth accounting equation can fit the year by year data[vi].

The share parameters in (8) thus take the form,

$$S_L^F = \delta^F[\gamma^F e^{\lambda(t)^F t}\frac{L^F(t)}{FIE(t)}]^{\rho^F} \tag{12}$$

$$S_{FDI}^F = \delta^F[\gamma^F e^{\lambda(t)^F t}\frac{FDI(t)}{FIE(t)}]^{\rho^F} \tag{13}$$

$$S_L^N = \delta^N[\gamma^N e^{\lambda(t)^N t}\frac{L^N(t)}{NFIE(t)}]^{\rho^N} \tag{14}$$

$$S_K^N = \delta^N[\gamma^N e^{\lambda(t)^N t}\frac{K(t)}{NFIE(t)}]^{\rho^N} \tag{15}$$

and S_{FDI}^F=1-S_L^F, and S_K^N=1-S_L^N.

Using (12) and (13), and data for 1996 (σ^F=0.8 and an average $\lambda(t)^F$=0.024) we can recover the share parameter δ^F and the unit parameter γ^F by calibration. We can use the same procedure (σ^N=0.8 and average $\lambda(t)^N$=-0.013) to also recover the share parameter δ^N (0.26). We also assume elasticities of substitution which take different values in our decompositions. We use the calibrated parameter values in (12)-(15) to obtain the parameters S_L^F, S_{FDI}^F, S_L^N, and S_K^N (Table 4).

Table 4: Calibrated labor force share parameters in FIEs and the non-FIEs portion of the Chinese economy for CES production functions over the period 1995-2004

	S_L^F			S_L^N		
	σ^F=0.50 δ^F=0.20 γ^F=8.71	σ^F=0.80 δ^F=0.23 γ^F=8.75	σ^F=1.20 δ^F=0.25 γ^F=8.77	σ^N=0.50 δ^N=0.64 γ^N=3.04	σ^N=0.80 δ^N=0.38 γ^N=3.62	σ^N=1.20 δ^N=0.26 γ^N=3.94
1995	0.27	0.25	0.24	0.28	0.30	0.31
1996	0.28	0.25	0.24	0.30	0.30	0.30
1997	0.28	0.25	0.24	0.33	0.31	0.30
1998	0.28	0.25	0.24	0.37	0.32	0.29
1999	0.32	0.26	0.23	0.39	0.32	0.29
2000	0.30	0.26	0.24	0.39	0.32	0.29
2001	0.41	0.28	0.22	0.43	0.33	0.29
2002	0.44	0.28	0.22	0.44	0.33	0.29
2003	0.24	0.24	0.25	0.54	0.35	0.28
2004	0.22	0.24	0.25	0.58	0.36	0.27

Sources: Authors' own calculation using (12)-(15).

Table 5 reports growth accounting results using the conventional Solow methodology. These suggest that over 90% of growth in the non-FIE sub-economy in China between 1995 and 2004 has been from growth in the capital stock. In contrast, 20-40 percent of FIE growth came from technological progress and a further 15% from growth in the FIE labor force. Inside the FIE sub-economy, results in Table 6 suggest that FFEs played an increasingly important role The FFE contribution to China's total GDP growth increased from 12% in 1996 to 27% in 2004, while the HMT's contribution increased by only six percentage points, from 9 percent in 1996 to 14 percent in 2004.

These decomposition results also suggest that without FDI inflows, in 2004 growth in China would be lowered by the 1.8% attributed to the $\dot{FDI}/FDI$ term. If TFP growth in the FIE portion of the economy of 1.6% is attributed to technical progress embodied in FDI, this component of growth would also be lost. This yields an estimate of forgone growth were FDI growth to have been interpreted in 2004 of 3.4%. The 3% labor force growth rate in the FIE portion would remain as a growth contribution through redeployment of labor elsewhere.

Table 5: A two stage Solow decomposition of FIE and non-FIE growth rates in China by year and component (%)

	GDP growth rate	Growth rate (5A)								Contribution to GDP growth (5B)							
		FIE				Non-FIE				FIE				Non-FIE			
		Total	TFP	L	FDI	Total	TFP	L	K	Total	TFP	L	FDI	Total	TFP	L	K
1996	9.6	18.9	-12.4	5.5	25.8	8.5	-1.7	0.3	9.9	1.9	-1.3	0.6	2.7	7.7	-1.5	0.3	8.9
1997	8.8	24.8	2.4	1.0	21.3	6.8	-2.8	0.4	9.3	2.8	0.3	0.1	2.4	6.0	-2.5	0.3	8.2
1998	7.8	23.5	5.5	1.6	16.4	5.5	-3.1	0.3	8.2	3.0	0.7	0.2	2.1	4.8	-2.7	0.3	7.2
1999	7.1	15.9	4.2	0.4	11.3	5.6	-2.2	0.4	7.4	2.3	0.6	0.1	1.7	4.8	-1.8	0.3	6.3
2000	8.0	17.4	6.3	1.4	9.7	6.2	-0.7	0.3	6.6	2.8	1.0	0.2	1.5	5.2	-0.6	0.3	5.6
2001	7.5	12.5	0.5	1.9	10.1	6.5	-0.7	0.5	6.7	2.2	0.1	0.3	1.7	5.3	-0.6	0.4	5.5
2002	8.3	12.3	-0.2	2.4	10.0	7.4	0.5	0.3	6.6	2.2	0.0	0.4	1.8	6.1	0.4	0.3	5.4
2003	9.3	20.4	8.2	3.6	8.6	6.7	-0.6	0.2	7.2	3.8	1.5	0.7	1.6	5.5	-0.5	0.2	5.8
2004	9.5	18.8	7.7	2.4	8.8	7.1	-0.1	0.3	6.8	3.9	1.6	0.5	1.8	5.6	0.0	0.2	5.4

(Table 5 continued)

	GDP	Contribution share to total GDP growth (5C)								Factor Contribution share inside (5D)					
		FIE				Non-FIE				FIE			Non-FIE		
		Total	TFP	L	FDI	Total	TFP	L	K	TFP	L	FDI	TFP	L	K
1996	100	20.2	-13.3	5.9	27.6	79.8	-15.7	2.7	92.7	-65.8	29.1	136.7	-19.7	3.4	116.2
1997	100	31.4	3.0	1.3	27.0	68.6	-28.5	3.7	93.4	9.7	4.2	86.1	-41.5	5.3	136.2
1998	100	38.5	9.0	2.6	26.8	61.5	-34.2	3.9	91.9	23.5	6.8	69.7	-55.7	6.3	149.3
1999	100	32.7	8.5	0.9	23.3	67.3	-25.8	4.4	88.7	26.1	2.7	71.2	-38.3	6.5	131.8
2000	100	34.5	12.5	2.8	19.2	65.5	-7.6	3.3	69.8	36.3	8.2	55.5	-11.6	5.0	106.6
2001	100	28.8	1.2	4.3	23.2	71.2	-7.8	5.0	74.0	4.2	15.1	80.7	-11.0	7.1	103.9
2002	100	26.7	-0.4	5.2	21.8	73.3	5.0	3.1	65.2	-1.4	19.6	81.8	6.8	4.2	89.0
2003	100	41.1	16.5	7.2	17.3	58.9	-5.6	2.0	62.5	40.3	17.5	42.2	-9.5	3.3	106.1
2004	100	40.8	16.6	5.1	19.1	59.2	-0.5	2.6	57.1	40.8	12.5	46.7	-0.8	4.4	96.4

Sources: (1) The GDP growth rate for the whole economy is from NBSC (2005, p57); (2) The growth rates of FIEs and non-FIEs in sub-table Table 5A are from Table 2; (3) The growth rate of labor used in FIEs (non-FIEs) is calculated by multiplying labor's share in production and the labor force growth rate in Table 2; (4) The growth rate capital used in FIEs (non-FIEs) is calculated by multiplying capital's share in production and the capital growth rate in Table 2; (5) The TFP growth rate of FIEs is the FIE growth rate minus growth from labor and capital; (6) In sub-table 5B, the contribution of the FIE (non-FIE) sub-economy to GDP growth is calculated by multiplying the FIE (non-FIE) share in total GDP by the FIE (non-FIE) growth rate. We use the same method to calculate the contribution of labor and capital in FIEs (non-FIEs) to GDP growth. The contribution of TFP is the residual; (7) The contribution to GDP growth in sub-table 5C is calculated by dividing the figure in (4B) by the corresponding GDP growth rate; (8) The contribution to FIE (non-FIE) in sub-table 5D is calculated by dividing the figure in (4B) by the corresponding FIE (non-FIE) growth rate.

Table 7 presents sensitivity results for the components of FIE growth for 2003 and 2004 to the assumed production function adopted in the decomposition. Tables (5) and (6) use the Solow procedure of no specified functional form and share parameters in the growth accounting equation varying from year to year as in data. Table 7 also reports comparable results using specified functional forms as above. Results indicate changing production function assumptions only yields small changes to decomposition results. For 2003, the contribution of FDI to Chinese growth varies from 2.9%-3.1% and for 2004 it varies from 3.1%-3.4% using these alternative procedures.

Table 6: A two stage Solow decomposition of FFE and HMT growth rates in China by year and by component (%)

	GDP growth rate	Growth rate								Contribution to GDP growth							
		FFE				HMT				FFE				HMT			
		Total	TFP	L	K	Total	TFP	L	K	Total	TFP	L	K	Total	TFP	L	K
1996	9.6	20.8	-19.1	8.0	31.8	16.8	-7.4	3.6	20.5	1.1	-1.0	0.4	1.7	0.8	-0.4	0.2	1.0
1997	8.8	26.8	-2.4	1.4	27.8	22.5	5.4	0.8	16.4	1.6	-0.1	0.1	1.6	1.2	0.3	0.0	0.9
1998	7.8	25.5	1.4	0.8	23.2	21.2	7.3	2.4	11.5	1.7	0.1	0.1	1.6	1.3	0.4	0.1	0.7
1999	7.1	17.8	2.0	0.4	15.3	13.7	5.0	0.4	8.3	1.4	0.2	0.0	1.2	0.9	0.3	0.0	0.6
2000	8.0	19.3	4.3	2.1	12.9	15.1	7.4	0.7	6.9	1.7	0.4	0.2	1.1	1.1	0.5	0.1	0.5
2001	7.5	14.3	-0.9	1.8	13.4	10.2	1.1	2.0	7.1	1.4	-0.1	0.2	1.3	0.8	0.1	0.2	0.5
2002	8.3	14.1	-1.7	2.5	13.3	9.9	0.6	2.3	7.0	1.5	-0.2	0.3	1.4	0.8	0.0	0.2	0.5
2003	9.3	22.4	6.8	4.0	11.5	17.7	8.9	3.2	5.7	2.4	0.7	0.4	1.3	1.4	0.7	0.2	0.4
2004	9.5	20.7	5.7	3.1	11.9	16.1	9.0	1.6	5.4	2.5	0.7	0.4	1.4	1.4	0.8	0.1	0.5

(Table 6 continued)

	FIE	Contribution share to total GDP growth								Factor Contribution share inside					
		FFE				HMT				FFE			HMT		
		Total	TFP	L	K	Total	TFP	L	K	TFP	L	K	TFP	L	K
1996	20.2	11.6	-10.6	4.5	17.7	8.6	-3.8	1.9	10.6	-91.8	38.6	153.2	-43.8	21.5	122.4
1997	31.4	17.9	-1.6	0.9	18.6	13.5	3.2	0.4	9.8	-9.1	5.1	104.0	24.0	3.3	72.7
1998	38.5	22.4	1.3	0.7	20.4	16.1	5.5	1.8	8.7	5.6	3.2	91.2	34.4	11.2	54.4
1999	32.7	19.9	2.3	0.5	17.2	12.8	4.7	0.4	7.8	11.4	2.4	86.2	36.4	2.9	60.7
2000	34.5	21.2	4.8	2.3	14.1	13.3	6.6	0.7	6.1	22.4	11.0	66.6	49.2	4.9	45.9
2001	28.8	18.5	-1.1	2.4	17.3	10.2	1.1	2.0	7.2	-6.1	12.8	93.3	10.6	19.6	69.8
2002	26.7	17.5	-2.1	3.1	16.6	9.2	0.5	2.2	6.5	-12.1	17.5	94.6	5.8	23.6	70.6
2003	41.1	26.1	7.9	4.7	13.5	14.9	7.5	2.7	4.8	30.4	18.1	51.6	50.0	17.9	32.2
2004	40.8	26.5	7.3	4.0	15.3	14.3	8.0	1.5	4.8	27.3	15.2	57.5	55.9	10.2	33.9

Sources: Authors' own estimation the same way as we do in Table 5. The share parameters in second stage production function are from Table 3.

Table 7: Sensitivity analysis of component analysis of FIE growth to production function assumptions

	Contribution to FIE growth in 2003 and 2004				
	Year	Total	TFP	L	FDI
A. *Solow Decomposition*	2003	3.8	1.5	0.7	1.6
(No specified functional form)	2004	3.9	1.6	0.5	1.8
B. *Cobb-Douglas decomposition*	2003	3.8	1.5	0.7	1.6
	2004	3.9	1.5	0.6	1.7
C. *CES Decomposition*	2003	3.8	1.5	0.7	1.6
(σ =0.5 in both FIE and Non-FIE sub-economies)	2004	3.9	1.6	0.6	1.7
D. *CES Decomposition*	2003	3.8	1.5	0.7	1.6
(σ =0.8 in both FIE and Non-FIE sub-economies)	2004	3.9	1.5	0.6	1.7
E. *CES Decomposition*	2003	3.8	1.4	0.9	1.5
(σ =1.2 in both FIE and Non-FIE sub-economies)	2004	3.9	1.5	0.8	1.6

4. The sustainability of high Chinese GDP and export growth

Our decomposition results presented above suggest that while the FIE sub-economy in China is still only 20% of the economy, it nonetheless accounts for over 40% of China's recent economic growth. This part

of the Chinese economy thus has substantial implications for the sustainability of China's future economic growth, and whether rapid growth will continue into the future in turn depends on both continued growth in inward FDI and access to international export markets abroad.

While China's FDI inflow growth rate has averaged over 10% since 2002 and China's accession to the WTO, in 2005 it seems likely to plateau or slightly decline. An important implication of China's FDI performance has been the falling share of OECD FDI going to other non-OECD countries (in Brazil it fell to US$ 10 billion in 2003 and 18 billion in 2004 from US$33 billion in 2000). As overall OECD FDI has increased little, the prospects seem to be for plateauing or even falling FDI flows to China as some further FDI moves to other low wage countries such as Vietnam and Indonesia.

China's WTO commitments imply both capital market liberalization (in banking) and further progress on commitments on rule-based WTO issues, including TRIPs and TRIMs. These changes will help attract more FDI. China is also continuing to see changes in the legal forms that FIEs take, and this may also help with continued FDI inflows. Before 1993, cooperative joint ventures were the dominant legal form of FIE and the share of inward FDI in the form of wholly foreign owned firms was only 23.6%. The share of inward FDI through wholly foreign owned enterprises at the end of 2000 was 46.9% of accumulated FDI, and in recent years, wholly foreign owned enterprises provide the dominant legal form for inward FDI (over 66% of inward FDI in 2004) (NBSC, 2005 and various issues). This increasing share of wholly owned FIEs may accelerate technology transfer and products upgrading as in other countries (Mansfield and Romero, 1980; Kokko and Blomstrom, 1995; Ernst, 1998; Moran, 1998). Access to foreign equipment and technology and intermediate goods will improve with trade liberalization and lower tariffs will apply to imports.

China's rapid export growth also raises concerns over the continued absorptive capacities of the OECD. China's share of world exports is now around 6% and with a 35% growth rate in exports is doubling every three years. Continued FDI flows thus may also encounter problems here if they are export oriented. China's large trade surplus with the EU and the US also fuels protectionist pressure in these countries.

A final concern is whether regional disparities within China will growth further with additional growth in inward FDI. About 84% of China's inward FDI locates in the nine coastal provinces of Guangdong, Jiangsu, Shandong, Shanghai, Fujian, Liaoning, Zhejiang, Beijing, Beijing, and Tianjin in recent years (NBSC, 2005 and various issues). Among them, Guangdong and Jiangsu attracted over 40% of FDI. The remaining 20 provinces share the rest 12% of inward FDI (NBSC, 2005 and various issues). Several authors attribute a large portion of the growing regional income gap to the spatial distribution of

inward FDI (Wen, 2003). If growing inequality in China becomes constraint on growth, continued FDI flows could fuel further these pressures.

This leaves the issue of whether the non-FIE part of the economy can generate higher growth in the future to compensate for slowing growth in the FIE sub-economy. The reform process for SOEs and labor market and competition related reforms provide the major hope, but results from these reforms thus far are not conclusive.

Overall then, plateau or falling FDI, limits to FDI diversification from other non-OECD countries, and continued growth of exports all raise cautions for continued high growth in China in the future. These negatives are counterbalanced by an ever improving policy environment for FDI in China, but they seem unlikely to support get more FDI growth into China. Whether growth in the non-FIE sub-economy can compensate is the issue.

5. Conclusions

This paper uses a two stage decomposition approach to assess the contribution of inward FDI to China's recent rapid economic growth. The FIE share in China's whole economy reached over 20% in last two years and FIEs contributed over 40% of China's economic growth. Without FDI inflows in 2004, our results suggest that China's overall GDP growth rate would be lower by around 3.4 percentage points. Excluding FIEs whose FDI from Hong Kong, Macao and Taiwan, FIEs still account for around 30% of China's GDP growth. Our findings thus seem to confirm the view that inward FDI has played a substantial role in China's recent rapid economy growth, and perhaps even more than currently appreciated.

These findings raise the issue of the sustainability of both China's GDP and export growth, which in turn seem to depend on the performance of the FIE sub-economy. China could still see further modest growth of inward FDI, supplemented by improvements in legal arrangements in China. Existing FDI may also contribute more in the future to China's growth through accelerated technology transfer, and spillover effects not dependent on new FDI. But a problem for China remains ever growing trade pressures as the absorptive capacities of OECD markets become a constraint, and this casts further doubt on continued rapid export growth from FDI related activity. Seemingly more vigor in growth performance from the non-FIE sub-economy will be needed to compensate for further lagging growth performance from FIEs.

References

Berthelemy, J.C., and Sylvie Demurger, 2000. Foreign Direct Investment and Economic Growth: Theory and Applications to China, *Review of Development Economics,* 4(2), 140-155.

Borensztein, E., et al, 1998. How Does Foreign Direct Investment Affect Economic Growth, *Journal of International Economics*, 45, 115-135.

Branstetter, Lee and R. Feenstra, 2002. Trade and Foreign Direct Investment in China: A Political Economy Approach, *Journal of International Economics*, 58(2), 335-358.

Chen C., L. Chang, and Y.M., Zhang, 1995. The role of Foreign Direct Investment in China post-1978 Economic Development, *World Development*, 23, 691-703.

Chow, G.C., 1993. Capital Formation and Economic Growth in China, *Quarterly Journal of Economics*, Vol. 108, No.3, 809-842.

Chow, G.C., and A., Lin, 2003. Accounting for Economic Growth in Taiwan and Mainland China: A Comparative Analysis, EWP-GE/0306003.

Dees, S., 1998. Foreign Direct Investment in China: Determinants and Effects, *Economics Planning*, 31,175-194.

Dennison, E. F., 1967. Why Growth Rates Differ, Washington, DC: The Brookings Institution.

Dixit, A., and V. Norman, 1980. Theory of International Trade. Cambridge: Cambridge University Press.

Ernst, D., 1998. Globalization, Convergence, and Diversity: the Asia Production Networks of Japanese Electronics Firms, in Rivalry or Riches: International Production Networks in Asia. Ed. By D.Ernst, and S. Haggard, Cornell University Press, Ithaca, NY

Fung, K,C, H. Iizaka and S. Tong, 2002. Foreign Direct Investment in China: Policy, Trend and Impact, Paper prepared for International Conference on "China's Economy in the 21st Century", hold on June 24-25, 2002, Hong Kong.

Fung, K,C, H. Iizaka and Stephan Parker, 2002. Determinants of U.S. and Japanese Direct Investment in China, *Journal of Comparative Economics*, 30, 567-578.

Fung, K.C., 2004. Trade and Investment: China, the United States, and the Asia-Pacific Economies, U.S.-China Economic and Security Review Commission Hearing on China as an Emerging Regional and Technological Power: Implications for U.S. Economic and Security Interests, February, 12-13, 2004.

Gao, T., 2005. Foreign Direct Investment in China: How big are the roles of Culture and Geograph? *Pacific Economic Review*, 10:2, 153-166.

Graham E.M., and E. Wada, 2001. Foreign Direct Investment in China: Effects on Growth and Economic Performance, Achieving High Growth: Experience of Transition Economies in East Asia, Peter Drysdale ed., Oxford University Press.

Grub, Ph.G. and Lin, J.H., and Xia, M., 1991. Foreign Investment in China, New York, Quorum Books

Harrold P., and R. Lall, 1993. China Reform and Development in 1992-1993, World Bank Discussion Paper, #215, the World Bank.

Huang, Y.S., 1999. The Institutional Foundation of Foreign Invested Enterprises (FIEs) in China, Working Paper No. 264, Harvard Business School, Boston, MA.

Hu J.Y, 2005. China's Foreign Direct Investment Policy, www. china.org.cn /chinese/ MATERIAL /760645.htm.

Jorgensen, D.W. and Zvi Griliches, 1967. The Explanation of Productivity Change, *Review of Economic Studies* 34, no.3, 349-383.

Kawagguchi, O., 1994. Foreign Investment in Asia: Trends, Determinants, and Policy Implications, Internal Discussion Paper, World Bank.

Kohli, U., 2003a. Growth Accounting in the Open Economy: International Comparisons, *International Review of Economics and Finance*, 12, 417-435.

Kohli, U., 2003b. GDP Growth Accounting: A National Income Function Approach, *Review of Income and Wealth*, 49(1), 23-34.

Kokko, A., and M. Blomstrom, 1995. Policies to Encourage Inflows of Technoogy through Foreign Multinationals, *World Development*, Vol.23, No.3, 459-468.

Lenovie, F., 2000. FDI and the Opening up of China's Economy, CEPII Working Paper, Number 2000-11.

Lim, E.G., 2001. Determinants of, and the Relation between, Foreign Direct Investment and Growth: A Summary of the Recent Literature, IMF Working Paper, WP/01/175.

Liu, X., Wang, C., and Y. Wei, 2001. Causal Links Between Foreign Direct Investment and Trade in China, *China Economic Review*, 12, 190-202.

Liu, X.H., P. Burridge, and P.J.N. Sinclair, 2002. Relations between Economic Growth, Foreign Direct Investment and Trade: Evidence from China, *Applied Economics,* 34, 1433-1440.

Mansfield, E., and A. Romero, 1980. Technology Transfer to Overseas Subsidiaries by U.S.-based Firms, *Quarterly Journal of Economics*, Vol.95, No.4, 737-750.

Ministry of Commerce, China (MOC), 2004 and 2005. Foreign Investment Report, www.fdi.gov.cn

Moran, T., 1998. Foreign Direct Investment and Development: The New Policy Agenda for Developing Countries and Economies in Transition, Institute of International Economics, Washington, D.C..

National Bureau of Statistics of China (NBSC), 2005 and other various issues. China Statistical Yearbook, China Statistics Press, Beijing.

OECD, 2000. Main Determinants and Impacts of Foreign Direct Investment on China's Economy, OECD Working Papers on International Investment, No. 2000/4, Paris.

Rawski, T.G., 2001. What is happening to China's GDP statistics?, *China Economic Review*, Vol. 12(4), 347-354.

Rodrik, D., 1999. The New Global Economy and Developing Countries: Making Openness Work, Policy Essay No.24, Overseas Development Council, Washington D.C.

Sicular T., 1998. Capital Flight and Foreign Investment: Two Tales from China and Russia, *World Economy,* 21 (), 589-602.

Solow, R.M, 1957, Technical Change and the Aggregate Production Function, *Review of Economics and Statistics*, 39(3)., 312-320.

Sun, H.S., and A. Parikh, 2001. Exports, Inward Foreign Direct Investment and Regional Economic Growth in China, *Regional Studies*, Vol. 35.3, 187-196.

Taube, M., and M. Ogutcu, 2002. Main issues on Foreign Investment in China's Regional Development: Prospects and Policy Challenges, Foreign Direct Investment in China: Challenges and Prospects for Regional Development, OECD.

Tseng, W., and H. Zebregs, 2002. Foreign Direct Investment in China: Some Lessons for other Countries, IMF Policy Discussion Paper, PDP/02/3.

United Nations Conference on Trade and Development (UNCTAD), 2005. World Investment Report 2005, New York and Geneva.

Wei, S.J., 1993. The Open Door Policy and China's Rapid Growth: Evidence from City-level Data, NBER Working Paper No. 4602.

Wei, Y.Q., X.M., Liu, and D., Parker, and K., Vaidya, 1999. The Regional Distribution of Foreign Direct Investment in China, *Regional Studies*, 33(9): 857-867.

Weitzman, M.L., 1970. Soviet Postwar Economic Growth and Capital-Labor Substitution, *American Economic Review* 60, no. 4, 676-692.

Wen M., 2003. Foreign Direct Investment, Regional Geographical and Market Conditions, and Regional development: A Panel Study on China, Division of Economics, RSPAS, Australian National University, June 2003.

Woo, W.T., 1995. Comments on Wei's (1995) Foreign Direct Investment in China: Sources and Consequences, in Financial Deregulation and Integration in East Asia (Ed.), A. Kruger, The University of Chicago Press, Chicago, 166-189.

World Bank, 2005. WDI database, http://devdata.worldbank.org/data-query/.

Wu, Y.R., 2000. Measuring the Performance of Foreign Direct Investment: A Case Study of China, *Economic Letters*, 66(2), 143-150.

Xiao G., 2004. People's Republic of China's Round-tripping FDI: Scale, Causes, and Implications, Asia Development Bank Institute Discussion Paper No.7.

Young, A., 1995. The Tyranny of Numbers: Confronting the Statistical Reality of the East Asian Growth Experience, *Quarterly Journal of Economics*, 110, 641-680.

Young, A., 2000, Gold into Base Metals: Productivity Growth in the Peoples Republic of China during the Reform Period, NBER Working Paper W7856, National Bureau of Economic Research, Cambridge.

Young, S., and P. Lan, 1997. Technology Transfer to China through Foreign Direct Investment, *Regional Studies*, 31(7), 669-679.

Notes

[i] Chinese government adjusted its GDP data based on national survey conducted in 2005. Due to unavailability of more detailed data on FDI and FIEs economy, we still use the unadjusted data to keep track use of time series data.

[ii] In world wide, bilateral discrepancies between FDI flows as reported by home and host countries can be quite large. According to UNCTAD (2005) annual report, global FDI outflows were 13% higher than global FDI inflows.

[iii] These discrepancies are much larger than for 2002 data.

iv There is no data on the wage bill for rural farmers and other employees, such as labor force in township and village enterprises, private enterprises, who not belong to China's so called "UNIT" (*danwei*). NBSC only report the wage bills for those who work in and get payments from state ownership, collective ownership, joint venture, shareholding ownership, FIEs and their affiliates. On the other hand, labor remuneration is more accurately reflected in the total wage payments to the labor force.

[v] This fixed investment price index is only available since 1990. We use an inflation index from the World Bank data base (WB, 2005) to deflate annual capital formation before 1990.

[vi] In Weitzman's (1970) application of the growth accounting to Soviet postwar data using an aggregate CES function, with central planning, factor share data were not consistent with marginal value pricing of factors. Weitzman thus estimated a CES production function with constant λ over time and directly calculated shares for use in the growth accounting equation.