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Abstract

In this paper, we examine empirically whether hard infrastructure, in the form of more highways and railroads, or soft infrastructure, in the form of more market-oriented institutions through deeper reform, lead to more foreign direct investment (FDI) in China. We use data of outward FDI from the United States, Japan, Hong Kong, Taiwan and Korea to various regions of China from 1990 to 2002. We control for the standard determinants of FDI, namely regional market size, wage rates, human capital and tax policies. We add indices of hard and soft infrastructure and find that soft infrastructure, in the form of more market-oriented institutions through deeper structural reform, consistently outperforms hard infrastructure as a determinant of FDI.

Keywords: China, FDI determinants.

JEL classification numbers: F21, F23.

1 Introduction

One of the most important elements of China's economic reform has been the promotion of foreign direct investment (FDI) inflow. As Table 1 shows, when China initiated its 'open-door' policy in 1978, only a very small amount of FDI flowed into China. Since then, both the central and the local governments have provided a complex set of preferential treatments to foreign investors to attract FDI. After more than two decades of China's economic reform, China became the world's most attractive destination for FDI in 2002, overtaking the United States.

China has also achieved economic growth at an unprecedented rate. Tseng and Zebregs (2002), Graham and Wada (2001), and Dayal-Gulati, Anuradha and Aasim M. Husain (2000) have shown that China's inward FDI plays an important role in stimulating growth. However, the surge in FDI to the coastal regions has contributed to increased inter-regional economic disparities within China. Such inequalities can create social and political instability with very negative consequences for economic growth.

The Chinese government now faces severe challenges to lure foreign investors to the interior and the western parts of the country. China launched the Western Development Strategy in 2000 in an attempt to close the economic gap between the coastal and the western regions.[1] The 10th Five-Year-Plan formally announced the framework of the strategy to develop the western regions. The strategy aims to increase this region's income through *improving infrastructure* and attracting FDI. The strategy contains a massive plan for building infrastructure, such as roads, airports, west-to-east natural gas pipelines, electricity transmissions and railroads. In addition to the Chinese government's financial commitments, foreign capitals as well as foreign loans are sought to achieve the projects.

There is a growing economic literature on China's inward FDI. Some have concentrated on the determinants of FDI into China, such as Zhang and Song (2001), Liu, Wang and Wei (2001) and Zhang and Felmingham (2001). In addition, Cheng and Kwan (2000), and Bao, Chang, Sachs and Woo (2002) used a locational determinant approach in examining FDI in China.[2]

This paper, together with the paper by Wakasugi (2005), focuses on the determinants of different *sources* of FDI in China. Our paper examines whether *hard* infrastructure, in the form of more highways and railroads or *soft* infrastructure, in the form of more market-oriented institutions through deeper structural reform, help attract multinational corporations to the various parts of China. The analysis intends to shed light on what kind of FDI strategy the Chinese government should implement in order to narrow the economic gap between the coastal regions and the vast inland.

Specifically, we examine the locational determinants of US, Japanese, Hongkonese, Taiwanese and Korean FDI in different regions of China, being the major foreign

1. The western regions on the development list consist of six provinces (Sichuan, Yunnan, Guizhou, Shaanxi, Qinghai and Gansu), five autonomous regions (Ningxia, Xinjiang, Inner Mongolia, Tibet and Guangxi), and one municipality (Chongqin).

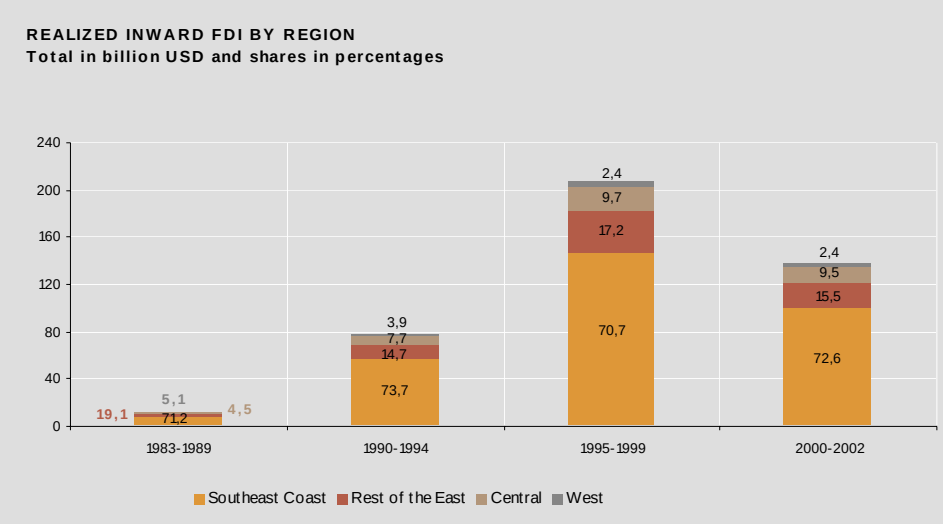
2. Several other studies look into the impact of FDI into China on the rest of the world. This includes García-Herrero and Santabarbara (2005); Fung, Iizaka and Siu (2003); Fung, Iizaka and Parker (2002); Chantasasawat, Fung, Iizaka and Siu (2003, 2004a and b), and Eichengreeen and Tong (2005).

direct investors. By far Hong Kong has consistently been the largest investor in China. Between 1983 and 2002, the realized amount of FDI from Hong Kong accounted for about 45.4% of the total inflow from the world. Taiwan has also been an important source of foreign funds for China. In recent years, the United States, Japan and Korea have started to invest heavily in China. From 1983 to 2002, the shares of U.S. and Japanese investment in the cumulative value of realized FDI accounted for 8.9% and 8.1%, respectively, of total FDI inflows into China.

The next section shows some stylized facts on Chinese regional growth and the distribution of inward FDI among Chinese regions. Section 3 presents our estimation strategy and the estimation results. Section 4 draws some conclusions, which may be of interest for Chinese policy makers.

2 Regional Distribution of FDI and GDP growth in China

Chinese inward FDI has been concentrated in the most dynamic regions. On average, between the years 1983 and 1989, more than 71% of realized FDI was located in the Southeast Coast (See Graph 1 below). The remaining provinces in the East were second with over 19% of total FDI. The proportion of FDI that went to the rest of the country, the central and the western regions was less than 10%. The uneven regional distribution of inward FDI continued throughout 1990's, with the Southeast coast accounting for nearly 74% and 71% during the first and second half of the 1990's, respectively. The rest of the Eastern region lagged further behind between 1990 and 1994, absorbing less than 15% of total FDI. During the latter half of the 1990's, though, it improved slightly to 17%. The share for thee rest of the country increases only slightly in the 1990s at slightly more than 11%. From 2000 onwards, the pattern remains practically the same for all regions although the total amount is slightly lower.



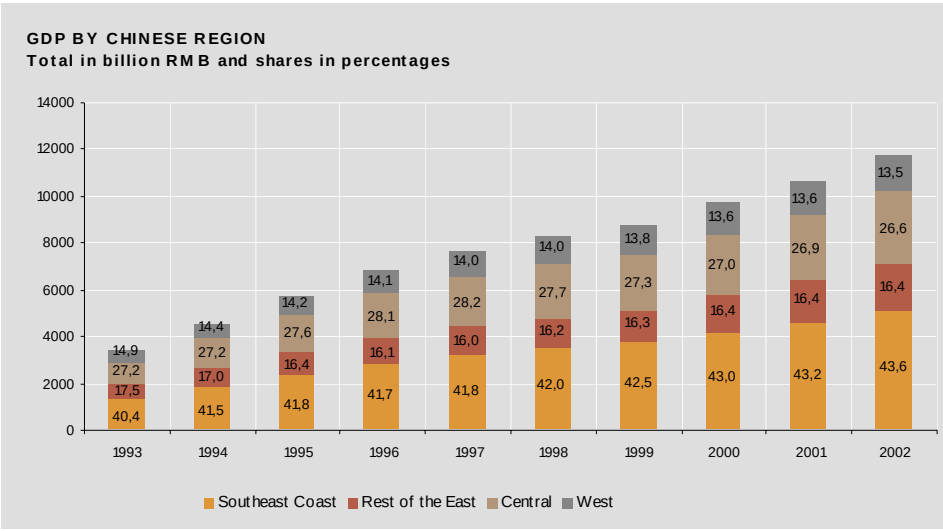
There are several reasons why the vast inland trailed behind the coastal regions of the East. First the government implemented various coast-oriented open-door policies in the hope that their development would spread over the inland. In fact, the first effort of attracting FDI was accomplished by establishing Special Economic Zones (SEZ). The first four cities considered SEZ are in Southeast coast, namely, in Guandong and Fujian. Hainan, another Southeast coastal region was approved as China's largest SEZ in 1988. The multinational enterprises (MNEs) that started to operate in SEZs enjoyed various favourable policies, such as reduced or exempted corporate income tax for a certain period of time, exemption from import tariffs on imported equipment and raw materials. Some of the policies were made particularly favorable for those MNEs using advanced technologies or exporting a large percentage of their products to overseas. In 1984, 14 cities were granted similar rights as those of SEZs. Out of those 14 cities, ten are located in the Southeast Coast and four are in rest of the Eastern region. In 1986, preferential policies were granted to coastal economic regions, such as Pearl River Delta, Yangtze River Delta and Minnan Delta, south of Fujian. In 1990, Pudong New Area in Shanghai was offered preferential policies even beyond those of SEZs. The central government provided Pudong not only with tax exemptions and preferential policies related to import and export tariffs but it also allowed

MNEs to extend their FDI in the tertiary sector such as department stores and supermarkets and in the financial sector. It also allowed international trading companies to establish and to conduct import and export business. The establishment of Pudong District seems to have contributed to an increase in the inflow of FDI to Shanghai and its two neighbor provinces, Jiangsu and Zhejiang. In parallel to SEZs and preferential zones, the Chinese government established Economic and Technological Development Zones (ETDZs), as another opportunity for MNEs to enjoy tax breaks and other preferential policies on custom duties and on land rent. These areas aim at attracting FDI from technologically advanced or export oriented foreign firms. They are often located in or near provincial capitals or transport hub cities. Since 1984, the government established 32 national-level ETDZs. Of those national-level ETDZs, 20 are located in the Southeast Coast, 6 are in the rest of the East, 4 in the central part of China, and 2 in the Western region of China.

Another important issue to take into account, other than the government preferential policies is that the coastal regions, in particular the Guangdong province, had clear advantages in attracting FDI from Hong Kong. This is because of their geo-cultural proximity. Similarly, Taiwanese firms were more attracted to Fujian province.

Third, the Western region –which covers more than 50% of China's land– is burdened with a limited water supply. This implies that the western regions have trailed behind the coastal regions even before China opens its doors to FDI. The past 20 years of highly skewed economic reforms in favor of the coastal regions have only widened the disparity between the coastal and the inland regions in terms of industrial infrastructure, technology, public utilities and education. Moreover skilled workers have migrated to the coastal regions in search of higher salaries, resulting in a clear brain drain from the inner regions.

Graph 2 presents GDP at current price across China's regions from 1993 to 2002. There are significant differences in GDP across provinces. In 1993, the provinces in the southeast coast region accounted for almost 40% of total Chinese GDP, with over 17% for the rest of the East, 27% for Central China and only 15% for the West. The differences between the Southeast coast and the other three regions have steadily increased, rather than declined, which implies that economic growth has been higher in the Southeast coast.



FDI is considered as one of the key ingredients in economic growth. FDI can raise GDP growth through larger capital accumulation and higher productivity growth. In fact the presence of foreign firms can increase the efficiency of local firms since they will have to face heightened competition. The local firms may also increase their efficiency by emulating the operations of the foreign firms. In addition, foreign companies will tend to employ better technology and foster human capital development. Technology advantages of multinational enterprises (MNEs) consist of embodied technologies in physical capital, managerial skills, production coordination skills, better knowledge of world markets and so on. Technology may be transferred locally through the following channels: first it may spill over to domestic firms which produce intermediate products for the foreign firms. For example, the MNEs may put efforts in training local suppliers of intermediate products to meet the higher standards of quality control, reliability, and speed of delivery required by MNEs. Second, domestic firms investing in research activities may be able to use the spilled knowledge from foreign firms. Then, their know-how will benefit other parts of the local economy. Higher human capital, in turn, may contribute to economic growth by increasing the productivity of more educated workers and through a higher ability to innovate and adopt new technology. In the latter case, more human capital is a catalyst of technological progress and technological diffusion. Providing training of labor and management, MNEs can facilitate an investment in human capital in the host economy.

3 Hard or Soft Infrastructures as Determinants of China's inward FDI

3.1 Model specification

We assess econometrically the relative importance of different determinants of the flow of direct investment into China from the US, Japan, Hong Kong, Korea and Taiwan for the period from 1990 to 2002.

We start with a basic model derived from a reduced form specification of the demand for inward FDI. Let FDI_i be the foreign direct investment from the main source economies (US, Japan, Hong Kong, Taiwan and Korea) to region i in China. Then, the relationship between FDI and its determinants can be written as $FDI_i = f(X_i)$, where X_i is a vector of variables that captures the overall attractiveness of region i to FDI. The variables included in this vector are all at the Chinese regional level.

The basic regression model can be written as a linear specification in the following form:

$$\ln(FDI_{i,t})=\alpha_i+\beta_1\ln(GDP_{i,t})+\beta_2\ln(LAGWAGE_{i,(t-1)})+\beta_3\ln(HE_{i,t})+$$

$$\beta_4\ln(RAIL_{i,t})+\beta_5\ln(HIGHROAD_{i,t})+\beta_6\ln(POLICY_{i,t})+\beta_7\ln(REFORM_{i,t})$$

Where the subscripts i and t stands for China's region i and period t and the names of the variables are explained below.

$FDI_{i,t}$: FDI from the US, Japan, Hong Kong, Taiwan, and Korea to Chinese region i at time t,

$GDP_{i,t}$: GDP of Chinese region i at time t,

$LAGWAGE_{i,(t-1)}$: average wage of region i at time t-1,

$HE_{i,t}$: the ratio of the number of students enrolled in higher education in region i to its population at time t,

$RAIL_{i,t}$: kilometers of railway in region i per square kilometer of land at time t,

$HIGHROAD_{i,t}$: kilometers of high quality roads in region i per square kilometer of land at time t,

$POLICY_{i,t}$: the number of Special Economic Zones (SEZ) in region i, the number of Open Coastal Cities in region i and the number of Economic and Technological Development Zones (ETDZ) in region i at time t,

$REFORM_{j,t}$: The proportion of manufacturing output produced by SOEs in region i at time t.

The hypothesis that well-developed regions with better hard infrastructure, such as superior transportation facilities, are more attractive to foreign firms is examined by including two proxies, density of railway (RAIL) and high quality roadway (HIGHROAD). In addition, we use the variable REFORM to represent soft infrastructure. This stands for the

degree of market oriented policies, i.e. of structural reform. The proxy we use is the share manufactured output still produced by state-owned enterprises in each Chinese region each year. The *a priori*, as for soft infrastructure, is that structural reform should also foster inward FDI. China's economic reform is transforming the country from a centrally planned economy, dominated by the state sector, to an increasingly market-oriented economy but the process is very uneven across regions. Apart from the loss in productivity, a larger proportion of state-owned output should indicate a less transparent legal system, more corruption and less market-oriented institutions. All things equal, foreign firms may prefer a region with less production from state-owned enterprises, and a higher degree of internal reforms in general, since it should create a better investment environment for their business.

In sum, in our panel regressions we compare the effects of hard infrastructure (as proxied by RAIL and HIGHROAD) and soft infrastructure (as proxied by REFORM) on FDI from the major source countries, after controlling for other standard determinants of FDI.

To control for the standard determinants of foreign direct investment, we include three sets of explanatory variables based on the existing literature[3]: regional market size, regional labor market conditions such as wage rates and the level of human capital and, lastly, regional taxes on FDI and other preferential policies.

To examine the importance of the size of the local market, regional gross domestic product (GDP) is introduced as control (see Appendix A for details on data sources). For foreign investors, the size of the host market, which represents the host country's economic conditions and the potential demand for their output, should be an important element in their FDI decision-makings. Since this variable is used as an indicator of the market potential for the products of foreign investors, the expected sign is positive. Furthermore, the more that foreign investors target the local market, instead of exporting the produced goods, the larger should be the magnitude of this coefficient.

Since labor cost is a major component of total production cost, wage variables are frequently considered in the literature. A higher wage, other things equal, should deter inward FDI, particularly for firms that engage in labor-intensive production. Therefore, the expected sign for this variable is negative. However, regional wages may be high because of the already large share of foreign companies, which pay higher salaries. To avoid the potential simultaneity bias between FDI and wages, we use the nominal wage lagged one period (LAGWAGE).

To capture the average level of human capital in each region, we use the number of students enrolled in higher education (HE). While the aggregate expected sign is positive, its importance should be higher for technology- and capital-intensive industries than for labor-intensive ones. Furthermore, the coefficient may be large for Japanese firms, which practice job rotation and demand their workers to make decisions regaining a certain level of human capital [Aoki (1988), Fung (1991)].

The effects of policy incentives are examined by controlling for the number of SEZs, Open Coastal Cities and ETDZs in each region. These areas provide preferential tax and other

3. Examples of such work are Culem (1998), Wheeler and Mody (1991), Coughlin, Terza, and Arromdee (1991), Friedman, Gerlowski, and Silberman (1992), Woodward (1992), Smith and Florida (1993) and Hines (1996). For the case of China, the studies include Head and Ries (1996), and Cheng and Kwan (2000).

policies and can deal flexibly with foreign businesses. The expected sign is also positive. Details on data sources can be found in Appendix A.

3.2 Panel Estimation

The panel regression is run separately for the FDI of each home country analized (US, Japan, Hong Kong, Taiwan and Korea). Each estimation can be specified as follows:

$$y_{it} = \alpha + \beta' x_{it} + \varepsilon_{it} + u_{it}$$

where y_{it} is the FDI inflow from the source country into region i at time t. x_{it} is the set of characteristics in each region i at time t. The disturbance term, ε_{it} is associated with both time and regional differences and u_i is the random disturbance that is associated with the ith region and assumed to be constant over time. In another words, the region-specific constant terms are assumed to be randomly distributed over cross-sectional units. Further assumptions on the error terms are: $E[\varepsilon_{it}] = E[u_i] = 0$, $Var[\varepsilon_{it}] = \sigma^2_{\varepsilon}$, $Var[u_i] = \sigma^2_u$, $Cov[\varepsilon_{it} , u_j] = 0$ for all i, t, and j, $Cov[\varepsilon_{it} , \varepsilon_{js}] = 0$, if $t \neq s$ or $I \neq j$, and $Cov[u_i , u_j] = 0$ if $i \neq j$.

The regression disturbance, w_{it}, can be written as; $w_{it} = \varepsilon_{it} + u_i$. The variance and covariance of all disturbances are: $Var[w_{it}] = \sigma^2 = \sigma^2_{\varepsilon} + \sigma^2_u$, and $Cov[w_{it}, w_{is}] = \sigma^2_u$.. Therefore, the disturbances in different periods are correlated for a given i, because of their common component, u_i. Hence, the efficient estimator is the generalized least squares (GLS). The two-step estimators are computed by first running ordinary least squares (OLS) on the entire sample for each country. Then, the variance components are estimated by using the residuals from the OLS. Finally, these estimated variances are used in the second step to compute the parameters of the model.

Estimation results of the model are presented in Table 1. Each source economy appears in different columns. The panel regression shows strong evidence that the quality of infrastructure, proxied by the density of high quality roadways (HIGHROAD) has a significantly positive influence on direct investment inflow in China from all FDI sources. The importance of the density of the railroad (RAIL), however, is only found for Korea and Japan.

More interestingly, the table reports that larger share of output by SOEs in the industrial sector (SOE), i.e., better soft infrastructure, discourages the inflow of FDI from all five countries. The coefficient is found to be negatively significant at the 1% level for all countries except Korea, whose level of significance is 5%. The result indicates that a large share of output by SOEs signal to the foreign investors that economic reforms are still far from complete and foreign investors should expect to face difficult political and economic challenges in that region.

Comparing the coefficients, in attracting FDI from the US and Japan, Hong Kong and Taiwan, soft infrastructure generally seems more important than hard infrastructure. Among the five countries there is, however, a wide variation in the size of the influence of soft infrastructure on the decision-makings of the multinationals. For the US and Japan, the coefficient of SOE is very large, while for Hong Kong and Taiwan it is much smaller. Korea finds itself positioned between the two groups. One potential explanation may be that the Hong Kong and the Taiwanese firms have the advantage of being “familiar” due to the longer association with China, as compared with the US, Japan, or Korea. Geographic as well as linguistic affinity may strengthen the network effect among Hong Kong and Taiwanese

investors on one hand and mainland Chinese businessmen on the other, even in the regions where structural reform has not gone too far.

China has launched a comprehensive effort to reform SOEs since the latter half of the 1990s. The Chinese government has acknowledged that support of SOEs has put a heavy drain on the economy and cannot be maintained indefinitely. As a result, reform of SOEs has been made a top priority. Some unprofitable SOEs have been closed, while others have been merged with more profitable enterprises. In addition, many firms have been allowed to issue stocks in order to raise funds. Based on our findings, reducing the state-owned sector seems to have the effect of encouraging more foreign participation in China. Furthermore, the structural change is expected to proceed further because of China's accession of the WTO. In fact, the Chinese Government has announced that SOEs will not be bailed out from end 2008 onwards. This suggests a great potential for further growth of inward FDI from all five economies.

Table 1

Determinants of U.S., Japan, Hong Kong, Taiwan, and Korean Direct investment in China, 1990-2002

Variable Names	USA		Japan		Hong Kong		Taiwan		Korea	
CONSTANT	-1.6357		0.0547		1.5905		3.1136		-2.5061	
	(-0.604)		-0.019		-0.58		-1.112		(-0.503)	
GDP	0.6146	***	0.7397	***	0.831	***	0.9944	***	0.2238	
	-4.066		-4.396		-4.847		-5.524		-0.575	
LAGWAGE	0.3799	*	0.1184		-0.1199		-0.546	**	0.6964	
	-1.431		-0.411		(-0.438)		(-1.946)		-1.282	
HE	0.3253	*	0.3547	*	0.224		0.3551	*	0.0394	
	-1.402		-1.419		-0.925		-1.427		-0.087	
RAIL	0.1473		0.3714	**	-0.0507		-0.0697		1.0584	***
	-0.896		-2.098		(-0.282)		(-0.376)		-2.624	
HIGHROAD	0.1099	***	0.2087	***	0.2177	***	0.2445	***	0.1904	***
	-2.413		-4.021		-4.86		-5.518		-2.542	
POLICY	0.643	***	0.906	***	0.6656	***	0.6557	***	1.1764	***
	-3.454		-4.486		-3.291		-3.15		-3.152	
JOE	-0.8901	***	-0.9657	***	-0.7341	***	-0.6091	***	-0.786	**
	(-3.927)		(-3.819)		(-3.233)		(-2.742)		(-2.289)	
d.f.	304		276		318		301		205	
ad. R2	0.66		0.72		0.62		0.63		0.46	

Note: t-statistics are reported in parentheses. *, **, *** represent the level of significance at 10%, 5%, and 1% level, respectively.

We next turn to a discussion of the standard explanatory variables. As previous studies confirmed, market size (GDP) appears to be another important factor in determining FDI from the US, Japan, Hong Kong, and Taiwan. The coefficients for this variable are positive and statistically significant at the 1% level, except for Korea. This confirms the hypothesis that the amount of FDI inflow is positively related to the host region's market size. Table 1 indicates that a one-percent increase in regional GDP is associated with a 0.61 percentage increase in US direct investment and a 0.74 percentage increase in Japanese direct investment. The impact is even higher for Hong Kong and Taiwan. The importance of the market size of Chinese provinces indicates that foreign firms are attracted to China not only as an export platform, but as a domestic market [Fung, Lau and Lee (2004)].

Interestingly, we find a positive coefficient for the cost of wages (LAGWAGE) for US, Japanese, and Korean FDI, although insignificant for Japan and Korea. This indicates that higher wage levels in the regions of China foster FDI from these two source countries. In contrast, higher wages have a negative influence on Hong Kong's and Taiwan's FDI, which is consistent with the fact that these countries' investment is concentrated to take advantage of cheap labor. However, the wage level may also reflect the quality of labor force, which seems to be more relevant for US and Korean FDI since they are more concentrated in high-technology sector FDI.

We find some evidence of a positive effect of education (HE) for the US, Japan, and Taiwan regressions, but only al 10% confidence level. In the case of Japan, in previous studies by Woodward (1992), and Smith and Florida (1993), we find a strong influence of the host country's education on Japanese outward FDI.

Finally, it has been argued that various preferential FDI policies employed in the SEZs, the Open Coastal Cities, and the ETDZ might be one of the importance factors that led to the surge of FDI inflow into the coastal regions. Our results also confirm the importance of these policies for all source countries given the very large coefficients estimated, particularly for Korea.

4 Conclusion

In this paper, we focus on the question of whether increased spending in hard infrastructure or improvement in institutional and market reforms are strong elements in attracting foreign direct investment. To focus on this issue, we collect data for US, Japanese, Hong Kong, Taiwan and Korean FDI in the different Chinese regions for the period 1990-2002. We control for the standard determinants of FDI inflows. Three sets of factors are included: regional market size, regional labor market indicators including wage rates and education and regional preferential taxes and other policies to attract foreign direct investors. We, then, add in our indicators of hard infrastructure and soft infrastructure at the regional level. Hard infrastructure is proxied by the density of railways as well as that of highways. To proxy for soft infrastructure, we construct a variable which is the share of output produced by SOEs accounted for by state-owned enterprises in each province in each year. A larger amount of this share should indicate a worse climate for foreign investment, more corruption, less transparency and, more generally, less market-friendly institutions.

The result of our panel regressions indicate that for almost all our cases, soft infrastructure is a more important determinant of foreign capital inflows than hard infrastructure US and Japanese FDI, soft infrastructure, in particular reducing the share of output produced by multinationals, is the most important element in attracting foreign direct investment. For inland China as well as other developing economies which are interested in attracting more foreign capital, it seems that proceeding with market reforms as quickly as possible is more important than building more roads and railways, even though both sets of infrastructure have positive effects on FDI inflows. Lastly, we can also conclude that better soft infrastructure generates *double dividends*: since it has already been shown that economic reforms by themselves generate growth (even without inducing FDI).

Appendix A: Data Sources

The following data are taken from the Almanac of China Foreign Relations and Trade (various issues):

Contracted Japanese direct investment (DI) for 1990 and 1993 to 20021

Contracted US DI for 1990 and 1993 to 2002

Contracted Hong Kong DI for 1990 to 2002.

The following data are taken from China Foreign Economic Statistical Yearbook 1994:

Contracted Japanese DI for 1991 and 1992

Contracted US DI for 1991 and 1992

The Korean DI data are taken from the Korean EX-IM Bank (various issues).

The following regional data for 1996 to 2002 are taken from the China Statistical Yearbook (various issues); for 1991 to 1995, they are taken from China Regional Economy: A Profile of 17 years of Reform and Opening-Up 1996:

GDP

Number of students enrolled in higher education

Distance of roadway

Distance of railway

Average nominal wage.

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