Environmental Regulations and Foreign Direct Investment

Provincial Evidence from China

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1. Introduction

One of the most contentious debates in the foreign direct investment (FDI) and environment literature focuses on whether inter-country differences in environmental regulations are turning poor countries into 'pollution havens'. The rationale for the pollution haven or race-to-the-bottom hypothesis is that stringent environmental standards in developed countries will drive up production costs by requiring certain equipment and prohibiting certain inputs and outputs. It may, therefore, be in the firms' interest to close pollution-intensive plants at home and to relocate their production facilities to those developing countries with lower environmental regulations. The suggestion is that the profit-maximising pollution-intensive multinational firms will move operations to developing countries to take the advantage of less stringent environmental regulations. A corollary is that developing countries may 'race to the bottom' - undervalue their environmental damage in order to attract more foreign direct investment. Either way, the result is excessive levels of pollution and environmental degradation. (Dean *et al.* 2004)

This argument centres on the cost effects of environmental regulations and presumes that production cost differentials are a sufficient inducement for a firm to relocate production facilities. To date the empirical evidence is mixed. Generally, empirical studies suggest that there is little evidence to support the pollution haven hypothesis, though the theoretical and methodological studies imply that it exists.

Using provincial socioeconomic and environmental data for China, this paper tests the pollution haven hypothesis. It examines whether differences in the stringency of environmental regulations affect the location choice of FDI in China. We follow previous studies of the FDI location choice in the presence of inter-provincial differences in environmental stringency.

Rather than using zero-one type measures of the status of environmental enforcement, our two measures of regional environmental stringency vary across time and province. One of them is the anti-industrial pollution investment in the province and the other is the administrative punishment cases related to environmental issues in each province.

These two measures of environmental stringency divide the dataset into two samples due to the availability of data. Other independent variables capture the provincial differences in income level, labour cost and quality, infrastructure, agglomeration, and population density.

To control for the endogeneity, we take one period lag for all the independent variables. Data for independent variables are for the period 1998 to 2002, and the FDI data is from 1999 to 2003. Using panel data helps to control for the unobserved provincial characteristics that may lead to bias in the estimates of the relationship between environmental stringency and FDI. To specify unobserved provincial effects, we use three estimators, feasible generalised least square (FGLS) estimator, fixed effects estimator and random effects estimator.

The results suggest that both measures of environmental stringency have significant negative effects on FDI. Hence, FDI prefers to locate into regions with weaker environmental regulations. The evidence provides some support for the existence of pollution havens within China.

This paper is organised as follows. Section 2 discusses previous literature on the pollution haven hypothesis. In section 3, we describe FDI inflows into China and China's environmental regulation system. Section 4 presents our methodology and data, while section 5 reports and discusses the empirical results. The final section concludes.

2. Literature Review

2.1 Trade and Investment Theory and the Environment

According to the theory of comparative advantage, in order to allocate resources efficiently and hence maximise global output and income, countries should specialise in the production and export of products that use in the production a relatively large amount of the resources the country has in relative abundance. Therefore, countries should produce and export products for which they have a comparative advantage, and they should import products in which they have a comparative disadvantage.

Pearson (1987) argues that in a country with low income levels, the absence of industry or low competing demand for waste disposal services, means that the economic price of these environmental services should also be low. A low price means a relative abundance. Other things being equal, this country would have a comparative advantage in ‘dirty’ industries, and a comparative disadvantage in ‘clean’ industries. Conversely, countries where assimilative capacity is exhausted and incremental residuals discharge has a high cost would have a comparative disadvantage in dirty industries and a comparative advantage in clean industries. Thus, specialisation through comparative advantage and international trade (investment) efficiently allocates resources, increases production and improves world welfare. Therefore, the supply and demand for environmental services can be treated as an additional factor of production, and that an efficient pattern of world production will reflect that factor.

Baumol and Oates (1988) set up a simple partial equilibrium model that focuses on the environmental impacts of international trade in a two-country (one rich, one poor), two-good (one whose production can, but need not, be dirty and one whose production is non-polluting) world where the rich country successfully adopts an environmental control program while the poor country does not. The results show that developed countries control pollution emissions. Developing countries will therefore become ‘pollution havens’. Other theoretical studies (for example, Copeland (1994)) support the findings of Baumol and Oates (1988). However, the resulting pattern of production and trade is based on a general presumption that developing countries neglect the environment and pursue a 'pollution haven' strategy which according to Pearson (1987) is ill-founded.

2.2 Empirical Evidence on Pollution Haven Hypothesis

Although there are many articles focusing on trade and environment, few studies have studied the relationship between foreign investment and environmental issues. Of those papers that do examine the relationship between FDI and the environment, most of them are centred on US data or OECD data, with only a few studies looking at developing countries, and, even less that look at China.

Thus far, the empirical evidence on pollution haven hypothesis (PHH) is mixed. Generally, the empirical studies suggest that there is little evidence support the pollution haven hypothesis. Dean *et al.* (2004) has summarised three approaches which have been adopted in recent econometric studies on whether or not FDI flows are a result of pollution haven effects. They are 1) *inter-state plant location choice*; 2) *inter-industry FDI flows within a country* and; 3) *inter-country FDI location choice*. The results of these studies are mixed.

Using the first approach, Levinson (1996a) finds little evidence that inter-state differences in environmental regulations affect the US plant location choice. Levinson (1996b) finds only one of six environmental stringency indicators has a significant impact on the location choice of new branch plants in the US, and its impact is small. Keller and Levinson (2002) test whether FDI in US states has responded significantly to relative changes in state's environmental compliance costs. This paper controls for unobserved heterogeneity among states and uses a panel of pollution abatement cost indices that control for states' industrial composition. It robustly documents moderate effects of pollution abatement costs on capital and employees at foreign-owned manufacturing, particularly in pollution-intensive industries, and on the number of planned new foreign-owned manufacturing facilities. A similar approach is adopted by List and Co (2000), who estimate the effect of state environmental regulations on foreign multinational corporations' new plant location decisions between 1986 and 1993, using four measures of regulatory stringency. They find that the environmental stringency and attractiveness of a location are inversely related. Similarly, Fredriksson *et al.* (2003), which uses US state-level panel data from four industrial sectors over the period 1977-1987, finds that environmental policy plays a significant role in determining the spatial allocation of inbound US FDI and such effect depends critically on the exogeneity assumption of environmental policy.

There is a scarcity of research that assesses the relationship between the distribution of foreign investment and pollution intensity. One exception is the recent work of Eskeland and Harrison (2003), which adopts the second approach to examine the pattern of FDI across industries in Mexico, Venezuela, Morocco and Cote d'Ivoire. The results suggest that it is difficult to find a robust relationship between pollution abatement and the volume of US outbound investment. They find a positive relationship between FDI share and air pollution-intensity of an industry but negative relationship between FDI share and both water pollution and toxic release-intensity. They also find foreign ownership is associated both with lower levels of energy use as well as with the cleaner types of energy. In addition, the results suggest that any impact of abatement costs on the distribution of FDI is small, if not zero. It is suggested that these results are because pollution abatement costs are only a small fraction of overall costs.

Xing and Kolstad (1998) present a statistical test on how US FDI is influenced by the environmental regulations of foreign host countries. The results show that the laxity of environmental regulations in a host country is a significant determinant of FDI from the US for heavily polluting industries and is insignificant for less polluting industries. Their findings provide indirect support to the pollution haven hypothesis. But the small size of the data and the imperfect coverage of sulphur emissions data mean that care must be taken with the reliability of those results. A more recent paper employing this approach is Smarzynska and Wei (2001), which examines the relationship between cross country FDI flows and environmental stringency of 534 multinational firms in Eastern Europe and the former Soviet Union. They put emphasise on the omitted variables in previous work, such as bureaucratic corruption, which deters FDI but at the same time is correlated with laxity of environmental protection. However, they find little evidence for the hypothesis that lower environmental standards attract investment, nor for the hypothesis that these countries are more attractive for pollution-intensive FDI. They find some evidence for the PHH when regressions employing Treaties as the proxy for environmental standards in a host country, but the overall evidence is relatively weak and does not survive numerous robustness checks.

A recent contribution to Chinese evidence is Dean *et al.* (2004) mentioned above. It estimates the strength of pollution haven behaviour by examining inter-provincial FDI flows into China. It derives a location choice model that incorporates firm's production and abatement decisions, agglomeration and factor abundance. It estimates a conditional logit model using data sets including information of 2886 manufacturing joint venture projects, effective environmental levies on water pollution, and estimates of Chinese emissions and abatement costs for 3-digit ISIC industries during 1993-1996. The results show that FDI flows to provinces with high concentrations of foreign investment, relative abundance of skilled labour, concentration of potential local suppliers, and special tax incentives. Environmental stringency just affects certain types of projects. FDI originating from Hong Kong, Macao and Taiwan is attracted to provinces with relatively weak environmental controls. In contract, FDI from non-Chinese sources is not attracted by low levels of pollution levies, regardless of the pollution intensity of the industry.

2.3 Weaknesses of Previous Empirical Studies

The lack of support for the pollution haven hypothesis from previous studies are summarised by Dean *et al.* (2002) as follows:

First, as Pearson (1987, pp.124) pointed out, 'environmental control costs are a small fraction of production costs in virtually every industry, and the effect on trade will be correspondingly small'. This is reinforced by the results of Eskeland and Harrison (2003). Second, FDI may be combined with new techniques, including the latest abatement technologies, rendering the relative stringency of the host country's environmental regulations unimportant. Third, if firms are producing for export, then they may have to meet the environmental product standards of developed countries in able to gain the access to these markets. Finally, firms may predict that there will be future increases in environmental regulations, and hence choose a production process today that will meet the higher standards of the future.

Smarzynska and Wei (2001) point out there are two possible ways to summarise the existing empirical studies on pollution haven hypothesis. "The first possibility is that the 'pollution haven' hypothesis is after all just a popular myth that does not hold in reality. An alternative view is that the 'pollution haven' hypothesis is valid but the empirical researchers have not tried hard enough to uncover this 'dirty secret'." There exist several weaknesses in previous studies that may have impeded the exposure of the 'dirty secret'.

First, in some studies the absence of some important variables, such as relative factor abundance and agglomeration, will lead to omitted variable bias. Markusen and Zhang (1999), Head and Ries (1996), Cheng and Kwan (2000) have demonstrated the importance of these variables in explaining FDI incidence (Dean *et al.* 2004).

Second, it is difficult to quantify international differences in environmental regulations (Smarzynska and Wei 2001 & Keller and Levinson 2002). 'This difficulty is further exacerbated by the possibility that laws on the book may not be the laws that are actually enforced' (Smarzynska and Wei 2001).

Third, Keller and Levinson (2002) & Levinson and Taylor (2001) both demonstrate that cross-section analyses cannot control for unobserved heterogeneity among countries. These unobserved characteristics, such as unobserved resources and unobserved protection of polluting industries, may be correlated with both regulatory compliance costs and investment. If the estimation does not allow for these unobserved characteristics, it will generate an omitted variable bias to the predicted effect of regulatory compliances costs on investment. Therefore, using of a continuous, time-varying (panel) dataset becomes important.

Finally, most literature uses cost-based measures of environmental standard stringency. Copeland and Taylor (2003) developed a model linking the firm's production and abatement cost. It suggests a particular specification for testing firm's responsiveness to changes in environmental regulations, which raises the specification error.

In this paper we adopt a five-year panel dataset for 31 provinces in China. These provinces have the similar environmental regulation standards. The data includes factor abundance and agglomeration. We control for unobserved heterogeneity by using FGLS estimator to specify fixed effects. Rather than cost based measures of status of environmental enforcement, we use two measures of regulations which vary across time and province.

3. FDI Inflows and Environmental Stringency in China

3.1 FDI Inflows in China

At the beginning of China's economic reforms in late 1970s, FDI inflows were not significant. FDI increased in the mid-1980s and reached a peak level in the early 1990s. Since the mid-1990s, China has been a major host country for FDI. By the end of 2003, China overtook the US as the biggest recipient of FDI in the world. China had received FDI in contracted value of US$ 115.07 billion in 2003, compared with US$ 5.93 billion in 1985 (China Statistical Yearbook 2004). Table 1 shows the number of contracted projects, the amount of contracted and the amount of actually used FDI, and the corresponding growth indices from 1979 to 2003.[1] However, there are significant imbalances in FDI stock across China, in terms of its source, form and sectoral and geographical distribution.

According to the report from China's Ministry of Commerce (MOFCOM), the share of FDI from Hong Kong, Taiwan and Macao was about 53% between 1979 and 2003. Among developed countries, US and Japan have been the most important investors in China, taking about 8.79% and 8.25% respectively. Other developed countries have made rather smaller amounts of FDI into China. In recent years the share of FDI from Hong Kong, Macao and Taiwan has decreased while that of US and EU has increased.

[1] The number of projects refers to the project numbers from enterprises with foreign investment. The amount of contracted FDI refers to the amount of project investment supplied by foreign businessmen in terms of approved or signed contracts. The amount of actually used FDI refers to the amount which has been actually used according to the agreements and contracts.

In terms of the form of FDI, the establishment of new enterprises like joint ventures and foreign invested companies seem to be the main forms of FDI into China at the current time. Until 2003, equity joint ventures took about 41% of the inward actually used FDI and wholly owned foreign invested enterprises took about 40%. Cooperative operations have been the third important mode, which took 17.27% in terms of actually used FDI.

In China, industry can be split into three main categories, primary industry, secondary industry and tertiary industry.[2] Thus far, the majority of FDI has flowed into the secondary industry. Among secondary industries, manufacturing has taken 63.66% of the total cumulative contracted FDI by 2003, with construction taking a significant proportion (2.57%). The tertiary industry comes second. In this category, the proportion in real estate is about 20% (the leading sector). The primary industry attracted less than 2% of the total FDI inflows.

The geographical distribution of FDI in China is very unbalanced. Eastern region have received most of the FDI inflows. In addition to the natural and historical advantages of the eastern regions, the government's favourable policies towards FDI also offer a better business environment in this region than the others.[3] Table 2 demonstrates that 86.27% of cumulative FDI was located in the eastern region, 8.93% in the central region and only 4.8% in the western region, during the period from 1979 to 2003. Among the eastern region provinces, Guangdong has attracted more than a quarter of the total cumulative FDI (Figure 1). Jiangsu and Fujian, which have received 14.24% and 8.75% of the total FDI respectively, ranked second and third among China's thirty-one provinces. Other eastern provinces, Shanghai, Shandong, Liaoning, Zhejiang, Beijing, Tianjin and Hebei also ranked in the top group.

[2] Primary industry refers to extraction of natural resources, i.e. agriculture (including farming, forestry, animal husbandry and fishery). Secondary industry involves processing of primary products, i.e. industry (including mining and quarrying, manufacturing, production and supply of electricity power, gas and water) and construction. All the other industries not included in primary or secondary industry belong to the tertiary industry, which provides services of various kinds of production and consumption.

[3] China has a vast territory with coastal plains in the east and altiplano in the west. Eastern regions have an advantagous geographical position, which is favourable for international trade. The SEZs and fourteen opened coastal cities are the traditional industrial and commercial centres, which offer better infrastructure than the inner areas of China. Numerous development zones have been established in China's eastern regions, such as Yangtze River delta, the Pearl River delta, Bohai Sea Coastal Region and Pudong District of Shanghai.

3.2 Pollution and Environmental Stringency in China

China has been a large polluting country with rapidly increasing industrial production, domestic and foreign trade and investment. China's State Environmental Protection Administration (SEPA) reported that five of the ten most polluted cities worldwide are in China; acid rain is falling on one third of the country; half of the water in the seven largest rivers is 'completely useless'; a quarter of China's citizens lack access to clean drinking water; one third of the urban population is breathing polluted air; and less than a fifth of the rubbish in cities is treated and processed in an environmentally sustainable way.

Manufacturing is a primary source of the environmental problem. SEPA reported that industrial air pollution accounts for over 80% of the national total, including 83.0% of SO_2 emissions, and 80.7% of flue dust in 2003. Although industrial water pollution decreases year by year, it still accounts for about 46.2% of national total, including 38.4% of COD (Chemical Oxygen Demand) and 31.1% of Ammonia and Nitrogen.

Table 3 provides a regional perspective observe chart. The eastern region, which covers only 11.1% of the country's surface, has more than 50% of the wastewater and waste gas emissions. However, in terms of solid wastes, the western region, which covers 70.1% of the country's surface, discharged 56.8% of the total volume; while the eastern region only discharged 5.0%.

Central and local governments and some industrial managers have recognised the problem and made an effort to reduce pollution and to encourage cleaner production. Environmental protection has been one of the 'national fundamental policies' in China. Every year, China's government has invested significant amounts of money on environmental pollution treatment. In 2003, this investment increased to 162.73 billion RMB (about USD 19.66 billion), which took up 1.39% of the country's GDP. Among this investment, 107.2 billion (65.88%) was used for city environmental infrastructural construction. About 22.18 billion (13.63%) was applied to industrial pollution treatment. This is more than six times the 1987 value. The disparity of investment in industrial pollution treatment also exists across provinces. Figure 2 shows that the provincial share of pollution treatment investment related to GDP varies across province. And this imbalance does not consistent with those of GDP level.

Although environment protection is important and urgent, economic growth still has priority. The general public does not have a strong awareness of the threats of environmental degradation. China's environmental standards are also much lower than those of developed countries. Screening and monitoring mechanisms are also much more flexible than those of developed countries, and even those of the more developed developing countries. For these reasons it provides opportunities for some TNCs to take advantage of the weakened environmental standards and transfer their out-of-date technologies and pollution-intensive production to China. A study shows that about 30 per cent of the FDI in China was in pollution-intensive industries, out of which 13 per cent were in highly-pollution-intensive industries (Xian *et al.* 1999). Additionally, the performance in the implementation of the environmental management system varies across regions. For example, some coastal areas have better environmental management systems than many of the poorer interior regions. Such weak and uneven enforcement of environmental regulations also discourages industries from reducing pollution and increasing efficiency. The disparity of economic growth and enforcement of environmental regulations has resulted in accumulated environmental problems, especially in certain areas.

Dean *et al.* (2004) grouped the provinces into three income levels based on income averages from 1987 to 1995 and found that the rich-province share of FDI declines fairly steadily, and flows in to the low-income group appears stagnant, while the share of the moderate-income group nearly doubles. Figure 3 also shows the trend from 1997 to 2003 using similar methods to Dean *et al.* (2004). The provinces in each group are relatively similar. It indicates that the shares of each group have remained relatively stable over the seven years, except for a small increase in the moderate group and a corresponding reduction in the rich group in 2003.

Similarly, two indicators of environmental stringency are illustrated in Figures 4 and 5. In Figure 4, provinces are grouped by wastewater discharge intensity, which is captured by 100 tons of discharged wastewater per million yuan gross industrial product. To some extent that discharge intensity is an index of laxity of standards and/or concentration of pollution-intensity industries (Dean *et al.* 2004). It is obviously that the largest shares of FDI inflows (approximately 80%) are concentrated in provinces with low level of discharge intensity, i.e. with higher standards or lower concentration of pollution-intensity industries. The shares of the three groups have remained steady over the period; there is only slightly increase of low group and reduction in moderate group.

Figure 5 adopt another indicator of environmental stringency – wastewater treatment efficiency – which is defined as the percentage of discharged industrial wastewater meeting the discharge standards. To the extent it is a measure of levy system. The results show that more than 60% of FDI flows into provinces with the highest treatment efficiency, i.e. with the most stringent environmental regulations. Additionally, the share of the high efficiency group appears to increase in the most recent three years (which is responsible for the decline of the moderate group).

These trends therefore, indicate that FDI does not necessarily to flow into provinces with the least stringent regulations. Since per capita income and pollution levies are strongly correlated (Dean 2002, Wang and Wheeler 2002b), the provinces with the most stringent levies have higher income levels. Most provinces with strict regulations are also eastern provinces (the higher income level provinces). However, in contrast to the findings of Dean et al. (2004), there is an increase in the share of FDI going to group with high treatment efficiency (low discharge intensity) and a reduction in the share going to group with moderate treatment efficiency (moderate discharge intensity). Since provinces with stringent regulations show increased levies over time, Figures 4 and 5 have illustrated that FDI likely to flow into stricter regulation provinces over time. This is consistent with the findings of Dean *et al.* (2004).

4. Hypothesis, Estimating Models and Data

4.1 Hypothesis and Estimating Models

One approach mentioned in the literature review is inter-state plant location choice. It is adopted here to investigate the interaction between FDI flows and environmental regulations in China. The research is based on the PHH. Multinational firms are assumed to seek to maximise profit, i.e. to minimise costs. A MNC will view and compare different locations to assess differences in, for example, production costs, government regulations, infrastructures, agglomeration level and so on. To examine whether FDI is attracted to provinces with relatively weaker environmental enforcement, we observe the location of FDI across 31 regions (including 22 provinces, 4 municipalities, and 5 autonomous regions, excluding Hong Kong SAR, Macao SAR and Taiwan province). For simplicity we refer to regions or provinces. The hypothesis that we test using the provincial level data is whether FDI has increased in regions/provinces with the weakest environmental regulations.

An empirical model that is adopted by some FDI researchers is given by

$$FDI = f(X, \eta) \tag{4.4}$$

where X is the regional characteristics that may affect the inflows of FDI; and η is the unobserved provincial/regional effect.

When considering the impact of environmental regulations on the foreign plant location choice, a variable $\boldsymbol{E}$ (the vector of level of environmental stringency) is put into the above function as:

$$FDI = f(X, E, \eta) \tag{4.5}$$

which could be expressed in levels as

$$FDI_{it} = \alpha + \beta_1 E_{it} + \beta_2 X_{it} + \eta_i + \varepsilon_{it} \tag{4.6}$$

and in logs as

$$\ln(FDI_{it}) = \alpha + \beta_1(\ln E_{it}) + \beta_2 \ln(X_{it}) + \eta_i + \varepsilon_{it} \tag{4.7}$$

where

FDI is the amount of FDI inflow into region *i* in time period *t*;

E is the vector of measures that capture environmental stringency;

X is the set of other regional characteristics that may affect FDI;

η is regional effects; and

ε is the idiosyncratic error term.

We employ two variables to capture FDI inflow, one of which is the value of FDI divided by regional GDP (FDI_1) and the other is FDI divided by regional population (FDI_2).

Factors that may influence provincial level FDI are environmental stringency, factor prices, infrastructure, and agglomeration effects. The level of environmental stringency in different provinces is captured by two variables: the share of investment in anti-industrial pollution projects in total innovation investment (*En. Inv.*), and the total number of administrative punishment cases filed by the environmental authorities in each region normalised by the number of enterprises in each region (*Puni. Cases*). [4] These two measures are time varying, which is an improvement on the 0-2 type of measure of environmental stringency used in Smarzynska and Wei (2001).

Manufacturing wage is included in the analysis to capture factor prices in different regions, and quality of labour is captured by labour productivity and illiteracy rate. Population density is the proxy of land price and potential market size, under the

[4] Anti-industrial pollution investment is included in innovation investment, which is one part of the total investment of fixed assets. Administrative punishment cases are the cases that breach of environmental protection laws and regulations. According to the Measures on Administrative Penalty for Environmental Offences, the types of administrative punishment includes: 1) warning; 2) fine; 3) confiscation of illegal gains; 4) compelling to stop producing or using; 5) revoking licence / permit or other permission certificates; 6) other types of administrative punishments from Environmental Protection Law, laws and regulations. If the environmental illegal activity offends the criminal law, and is suspected of a crime, the case should be transferred to judicial authority to investigate the criminal responsibility according to law. The enterprises are all state-owned and non-state-owned enterprises above designated size, which refers to enterprises with an annual sales income of over 5 million yuan.

assumption that labour mobility between provinces is low. The availability and quality of infrastructure may also impact on the overall cost of doing business and hence is an attractive factor for FDI location. Railway density and road density are used to measure the transportation network in each region and thus the cost and availability of material inputs. Gross regional product (GRP) per capita captures the average quality of government, infrastructure, and the effect of market size differences across regions. The regional gross industrial output value (GIP) measures the agglomeration effects whereby it is possible that firms will locate where hubs of economic activity already exist. [5] It is also an indication of the availability of intermediate supplies.

Our five-year time period and time-varying measures of environmental stringency help to control for unobserved heterogeneity. In addition, an estimating model includes lagged independent variables on the right hand side of the equation. We use one-year lag of independent variables to control for the endogeneity of these determinants.

The estimating model used in this paper is therefore expressed as:

$$\begin{aligned} FDI_{it} &= \alpha + \beta_1 E_{it-1} + \beta_2 GRPperCapita_{it-1} + \beta_3 Wage_{it-1} + \beta_4 GIP_{it-1} \\ &+ \beta_5 Pop.Density_{it-1} + \beta_6 Rail.Density_{it-1} + \beta_7 RoadDensity_{it-1} \\ &+ \beta_8 IlliterateRate_{it-1} + \beta_9 productivity_{it-1} + \eta_i + \varepsilon_{it} \end{aligned} \tag{4.8}$$

and

$$\begin{aligned} \ln(FDI_{it}) &= \alpha + \beta_1(\ln E_{it-1}) + \beta_2(\ln GRPperCapita_{it-1}) + \beta_3(\ln Wage_{it-1}) + \beta_4(\ln GIP_{it-1}) \\ &+ \beta_5(\ln Pop.Density_{it-1}) + \beta_6(\ln Rail.Density_{it-1}) + \beta_7(\ln RoadDensity_{it-1}) \\ &+ \beta_8(\ln IlliterateRate_{it-1}) + \beta_9(\ln productivity_{it-1}) + \eta_i + \varepsilon_{it} \end{aligned} \tag{4.9}$$

in levels and in logs, respectively.

[5] See Bartik (1988).

If FDI does not show any change across regions with relatively stringent environmental regulations, it is expected that $\beta_1 = 0$. If $\beta_1 < 0$, we cannot reject the hypothesis, that there is evidence for the existence of a pollution haven effect.

Since more stringent environmental regulations will generate higher pollution tax or more pollution abatement costs, the environmental regulation stringency should have the similar impact to factor prices on foreign investment location choice. It is expected that FDI is attracted to provinces with weaker regulations, i.e. with less share of investment in anti-industrial pollution investment, and/or with less normalised administrative punishment cases with environmental issues.

Following the literature, foreign investors are seeking a location with comparative advantages such as cheaper factors that they use in higher proportions. It is therefore expected that foreign investment is attracted to provinces with high relative supplies of unskilled labour, i.e. with higher illiterate rate or lower productivity. Since unskilled labour is associated with lower labour costs, thus FDI is expected to be flowing into provinces with lower manufacturing wage. But wage also has positive relationship with local income levels so that the expected sign of manufacturing wage is ambiguous. According to the previous work of Head and Ries (1996) and Dean *et al*. (2004), it expected that FDI would like to flow into provinces with better industrial agglomeration and infrastructure. In addition, foreign investors are seeking for large local market and hence are expected to invest in areas that have large consumption capability and potentials which could be measured by population density and per capita income. However, population density also proxies land price. In more densely populated areas, land price is usually higher than that in less densely populated areas. The sign of population density is therefore expected to be ambiguous.

Therefore, the expected signs of the coefficients are as followings:

Coefficients	β_1	β_2	β_3	β_4	β_5	β_6	β_7	β_8	β_9
Expected Signs	-	+	-/+	+	-/+	+	+	+	-

4.2 Data Description and Sources

A complete description of all variables definitions and sources is provided in Appendix 1 and Table A1. The China Statistical Yearbook (various years) was used to compile data on manufacturing wage, illiteracy rate, infrastructure, agglomeration, market size and population data. China Foreign Economic Statistical Yearbooks provide productivity in all foreign funded enterprises.

Because of the availability of environmental data, the whole dataset is divided into two samples.[6] In sample 1 the measure of environmental stringency is the share of anti-industrial pollution investment and in sample 2 it is the number of administrative punishment cases. Because one year lags are used for all independent variables in the estimation, all the socioeconomic independent variables of 31 regions are from 1998 to 2002. FDI data used for estimations are therefore from 1999 to 2003.

To gauge the consistency of the sample with what is known about the provincial distribution of foreign investment, Table 4 compares the provincial shares of total actually used FDI value in the sample. It illustrates that most FDI inflows were located in eastern regions/provinces – Guangdong, Jiangsu, Shanghai, Fujian, Shandong, Liaoning, Zhejiang and Beijing – which are consistent with Figure 3.1.

Table 5 shows the summary data for the provincial characteristics in 2003. The values of the two environmental variables, Env. Inv. and Puni. Cases, vary quietly widely across province, from a high share of 5.68% in Fujian to a low of 0.42% in Tibet for the former, and from 4.53 in Liaoning to 0.012 in Tibet for the latter.

The values of all the data are deflated by the GDP deflator, which set 100 for year 1990. All the FDI data, which are measured by US dollars, are transferred to RBM at the middle exchange rate of the year. Table 6a and 6b show the descriptive statistics of the variables in both sample 1 and 2.

[6] *Env. Inv.* data is available for the period from 1998 to 2003 and *Puni. Cases* from 1999 to 2003.

Figures 6a and 6b plot the share of FDI flowing to each province and anti-industrial pollution investment in the province in 1998 and 2003. There is a positive relationship in the original data (without any construction): foreign investment shares tend to be larger for provinces with higher anti-industrial pollution investment. Figures 7a and 7b also plot the share of FDI and administrative punishment cases in each province in 1999 and 2003. The relationship between these two variables is ambiguous. The correlations between the variables in these two samples are displayed in Tables 7a and 7b. FDI variables seem to have a negative correlation with both environmental stringency variables. The correlations between both FDI variables and other independent variables implies that FDI prefers to flow into provinces with better infrastructure, higher population density, higher income level, better agglomeration, higher quality of labour and higher labour costs.

4.3 Selection of Estimators

A problem faced when estimating the model is whether the η_i should be treated as random variables or as parameters to be estimated for each cross region observation i. Both fixed effects and random effects models are employed in this paper. For fixed effects models, we use within regression estimator which in fact is a pooled OLS estimator based on the time-demeaned variables, or uses the time variation in both dependent and independent variables within each cross-sectional observation (Wooldridge, 2000). For random effects models, we choose the GLS (generalised least square) estimator, which produces a matrix-weighted average of the between and within estimator results.[7]

Few assumptions are required to justify the fixed effects estimator. In the estimation, however, η_i are not assumed to have a distribution, but are treated as fixed and estimatable. The random effects estimator requires no correlation assumptions, that is η_i and all independent variables are uncorrelated. In order to make the estimation results unbiased, it is necessary to state a strictly exogeneity assumption of the independent variables conditional on η_i, i.e.

[7] The between estimator is obtained by using OLS to estimate the models which use the time-averages for both dependent and independent variables and then runs a cross sectional regression. (Woolridge, 2000, Chapter 14, pp442). GLS estimators produce more efficient results than between estimators because they use both the within and between information.

$$E(\varepsilon_{it} | X_i, \eta_i) = 0, t = 1, \ldots, T. \quad (4.10)$$

ε_{it} is the residual which should have the usual properties, mean 0, uncorrelated with itself, uncorrelated with $\boldsymbol{X}$, uncorrelated with η, and homoskedastic.

When using the data on different provinces that have variation of scale, it is usually inevitable that the variance for each of the panels will differ. Both of the fixed effects and random effects estimators can solve the problem of heteroskedasticity across panels. However, neither of them could control for the autocorrelation within the panels. In order to test whether the errors suffer from autocorrelation or not, it applies to the following dynamic regression model

$$\varepsilon_t = \rho \varepsilon_{t-1} + v_t, t = 2, \ldots, T. \quad (4.11)$$

The null hypothesis is H_0: $\rho = 0$. Thus, ρ should be estimated from the regression of ε_t on ε_{t-1}, for all t = 2,…,T. The *t* statistics (See Table 4.5) for $\hat{\rho}$ show that we cannot reject the null hypothesis except when taking logs to estimate the effects of environmental stringency on FDI using the share of investment in anti-industrial pollution project in total innovation investment. That is there is AR(1) autocorrelation within panels in the cases of column 2 and 4 for sample 1 in Table 8.

One solution is to use the feasible generalised least square estimator (FGLS). In this study, we have a large number of panels (31 provinces) relative to time period (5 years). FGLS estimator is appropriate for such a case. FGLS models allow cross-sectional correlation and heteroskedasticity. It is also allows models with heteroskedasticity and no cross-sectional correlation. In addition, it is possible to relax the assumption of nonautocorrelation within panels. FGLS is therefore more efficient than the other two estimators mentioned above. However, in FGLS method, η_i is treated as the sectional specific constant term in models, i.e. FGLS and fixed effects models are the same in essence.

In all of the models, time dummy variables are included. And all the estimations are run using econometric software STATA 9.[8]

5. Empirical Results

Since the FGLS estimator controls for both autocorrelation and heterskedasticity, we only report the FGLS results (see Appendices 2 and 3 for fixed effects and random effects results respectively). In the main text, we report the results for a log specification. Equivalent, levels estimations can be found in the Appendix 4.

Tables 9- 12 present the FGLS regression results of the impact of different levels of environmental stringency on two measures of provincial level FDI inflows using data in logs for both samples on all provinces in China. In these tables, independent variables are added incrementally, in order to find whether they have stable and significant effects on FDI inflows. Tables 9 and 10 are the results for sample 1 and 11 and 12 are for sample 2.

In Table 9, the dependent variable is the amount of FDI inflows divided by the regional GDP. The results show that the share of anti-industrial pollution investment has a negative effect on FDI inflows into a province. The coefficients in these nine regressions are relatively stable and statistical significant. In column (9) the coefficient is -0.062, indicating that 10 per cent increase in the share of environmental investment of a province leads to 0.62 per cent decrease in the amount of FDI inflows.

Turning to the other explanatory variables, as expected, per capita income generally has a positive and statistically significant coefficient, which means that the richer the province, the more foreign investment it attracts. Among all the independent variables, per capita income level has the strongest effect on FDI inflows. The coefficient could be treated as the income elasticity of FDI inflows. From column (9), a 10 per cent increase in provincial income level could lead to more than 33 per cent increase in FDI. The coefficients on manufacturing wage do not have consistent signs and are not

[8] The major syntaxes include *xtreg* with *fe* and *re*, and *xtgls*.

significantly different from zero. If wage is interpreted as a measure of labour cost, the sign should be negative according to a standard profit function. However it also has strong positive correlation with income levels in the province. That may be the reason why the sign are positive in some regressions.

GIP, which captures the degree of agglomeration in a province, is expected to have positive effect on FDI. However, none of the coefficients on GIP are positive and a statistically significant negative coefficient is found in columns (4) and (5).[9] The coefficient on population density is negative and significant. FDI therefore would like to locate in less densely populated areas due to the higher land price.

The coefficients on railway density are contrary to our prior expectation. It has significant negative effects on FDI inflows and is also found in all the other regression results in Tables 10 – 12 and tables in Appendices 2 – 4. A possible explanation could be the relatively lower railway density in some higher income coastal provinces. For example, Guangdong attracted the greatest FDI flows in China and its GDP accounts for about 10% of total. But the railway length is 2112.5 km with a density of 0.01 km/km^2, which is ranked at the 11th from the bottom, only slightly higher than the average level of the country.[10] The situations in other FDI preferred provinces, such as Hainan, Fujian, Zhejiang and Jiangsu, are similar as Guangdong. Although other eastern regions, such as Beijing, Tianjin, Shanghai, Liaoning, Hebei and Shandong, have very high railway density, these six region account for 28 per cent of national GDP and 36 per cent of FDI inflows comparing with 31 per cent in GDP and 50 per cent in FDI inflows of the other five provinces with lower railway density. In contrast, highway density is an alternative measure of a region infrastructure. It has a positive

[9] We have estimated the regressions using numbers of enterprises as a proxy of agglomeration. These enterprises include all state-owned and non-state-owned industrial enterprises with an annual sales income of over 5 million yuan. The results do not ruin our conclusion.

[10] Account from the land area in China, the average railway density is 0.0077 km/km^2. The 10 provinces with the lowest railway density are Tibet, Qinghai, Xinjiang, Gansu, Inner Mongolia, Yunnan, Sichuan, Hainan, Chongqing, and Guizhou. These provinces all have geographical restriction in building railways. Tibet and Qinghai are located on Qinghai-Tibet Plateau; Xinjiang and Gansu both have large areas of Gobi; Inner Mongolia has the largest grassland; Yunan, Sichuan, Chongqing and Guizhou are in mountainous regions; and Hainan is an island province. Except Hainan, other nine regions are all located in western China.

and significant coefficient in all regressions in all the four tables. The value of the coefficient remains relatively stable.[11]

The rate of illiteracy in a province has a positively significant coefficient as expected, indicating that FDI prefers to locate into the regions with higher proportion of unskilled labour. Similarly, productivity has the consistent sign but is not significant, indicating productivity does not play an important role in investment location decision making.

Using the per capita FDI inflows as dependent variable, the specifications of Table 10 are the same as in Table 9. The coefficients on all the independent variables are robust across all regressions. Therefore, for both FDI measures, a 10 per cent increase of anti-industrial pollution investment in a province would lead to 0.6 per cent decrease of the amount of FDI inflows into the province.

Table 11 shows the FGLS regression results for sample 2. The coefficients on punishment cases, as expected, are negative and statistically significant in all regressions. However the absolute values are not stable. In column (9), the coefficient is -0.061, which means that 10 per cent increase in environment litigiousness of the province leads to 0.61 per cent decreases in the amount of FDI inflows. As a result, the provinces with stricter environmental standards attract less FDI inflows.

The effect of per capita income is still significantly positive. But the magnitudes are a little smaller than those in sample 1. The coefficients on manufacturing wage are now negative and significant, in contrast to the results of Table 9. The results show that FDI is attracted to provinces with lower labour costs. Correspondingly, FDI is also found to locate into areas with a lower education level and lower productivity. The coefficients on GIP are still not statistically different from zero, and its sign turns to expected positive in columns (8) and (9). Population density is negative though not significant in this sample. And the absolute values are much smaller than those in

[11] We have estimated the regressions including railway density and road density separately but the results were very similar. We also estimated the regressions respectively including numbers of ports in each province and dummy variable for coastal provinces, and both of the coefficients are positive but not significant.

sample 1. Railway and highway density are similar to Table 9. Their coefficients are robust for both signs and magnitudes.

The results in Table 12 are also similar to those in Table 11, except the coefficients on GIP. In addition to the negative coefficients in columns (4) and (5), other four coefficients are all positive as the previous expectation. And they are statistically significant in the last two columns, illustrating the importance of regional agglomeration levels in the decision making of investment location.

Comparing with the results with the levels equations in Appendix 4, the results are much more significant and robust. In the tables of Appendix 4, the share of environmental investment is found to have significantly negative impacts on the amount of FDI inflows, while the punishment cases do not have significant coefficients. The per capita income and GIP can only find robust coefficients in Table 4B and 4D when using per capita FDI inflows as dependent variable. The coefficients on other variables are either not significant or not robust across the two samples.

It is also necessary to compare the FGLS results with those in Appendix 2 that use standard fixed effects estimator. Although the values of some coefficients are similar to Tables 9 - 12 and tables in Appendix 4, most of them are not statistically significant. One possible explanation for the weaker results in Appendix 2 may be that the OLS fixed effect estimator does not specify AR(1) autocorrelation within the panel.

A random effects estimator is also employed to check the characteristics of unobserved effect. The results (Appendix 3) are no better than those in Appendix 2, although the regressions have higher R^2 values.

6. Conclusion

This paper uses provincial data in China to examine whether the foreign investment is more or less likely to be attracted to provinces with stringent environmental regulations. We employ two proxies of the stringency of environmental regulations across provinces.

Our proxies are the share of anti-industrial pollution investment in innovation investment in each province and the normalised administrative punishment cases. We also use two measures of FDI inflows, FDI divided by regional GDP and regional per capita FDI. The regressions results from FGLS estimator indicate that both measures of environmental stringency have significant negative effects on both measures of FDI inflows. That is to say FDI prefers to locate into regions with weaker environmental regulations. These results are robust for logged data rather than level data. The results from fixed effects and random effects estimators are also relatively weak.

The results also find other independent variables are significant determinants of investment. Income level has the strongest positive impact on the amount of FDI inflows. FDI is also found to be attracted to provinces with good infrastructure, low population density, low manufacturing wage, low educational level and low productivity. It shows the importance of reliable infrastructure and factors of production in the investment location decision.

The limitation in this paper is that we assume environmental stringency to be strictly exogenous, although we take one-year lag for all the explanatory variables to control for their endogeneity. In this paper we just considered the impact of environmental regulations on FDI inflows into China. However, the overall environmental impact of FDI is a mix of positive and negative effects. In some cases, FDI helps the improvement of China's environment. In other cases, FDI damages the environment and increases environmental risks. Simultaneously, some other provincial differences, such as income level, and education level, also have impact on the environmental status and regulations.

At present, the lack of systematic empirical evidence makes it difficult to quantify the real relationship between FDI and environment in China. To consider the endogeneity of environmental regulations, therefore becomes our major work for further research.

In sum, this paper has addressed the limitations in pervious empirical studies. We provide the first study to examine the impacts of regional differences in environmental stringency on the amount of FDI inflows in China.

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Table 1 FDI Inflows into China 1979-2003

USD 100 million Preceding year=100

Year	# of Projects	Growth Indices	Contracted Value	Growth Indices	Actually Used Value	Growth Indices
Total	464801		9428.78		4997.60	
1979-1982	922		60.1		11.66	
1983	470	100.00	17.32	100.00	6.36	100.00
1984	1856	394.89	26.51	153.06	12.58	197.80
1985	3073	165.57	59.31	223.73	16.61	132.03
1986	1498	48.75	28.34	47.78	18.74	112.82
1987	2233	149.07	37.09	130.88	23.14	123.48
1988	5945	266.23	52.97	142.81	31.93	137.99
1989	5779	97.21	56.00	105.72	33.93	106.26
1990	7273	125.85	65.96	117.79	34.87	102.77
1991	12978	178.44	119.77	181.58	43.66	125.21
1992	48764	375.74	581.24	485.30	110.07	252.11
1993	83437	171.10	1114.36	191.72	275.15	249.98
1994	47549	56.99	826.80	74.20	337.67	122.72
1995	37011	77.84	912.82	110.40	375.21	111.12
1996	24556	66.35	732.77	80.28	417.25	111.20
1997	21001	85.52	510.04	69.60	452.57	108.46
1998	19799	94.28	521.02	102.15	454.63	100.46
1999	16918	85.45	412.23	79.12	403.19	88.69
2000	22347	132.09	623.8	151.32	407.15	100.98
2001	26140	116.97	691.95	110.92	468.78	115.14
2002	34171	130.72	827.68	119.62	527.43	112.51
2003	41081	120.22	1150.70	139.03	535.05	101.44

Source: China Statistical Yearbook

Table 2 FDI in Different Regions in China 1979-2003

USD 100 million

Region	# of Project	%	Contracted Value	%	Actually Used Value	%
Total	465277	100	9431.30	100	5014.71	100
Eastern Region	381527	82.00	8191.64	86.86	4326.07	86.27
Central Region	52424	11.27	712.12	7.55	447.90	8.93
Western Region	31326	6.73	527.54	5.59	240.74	4.80

Eastern region: *Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan*;
Central region: *Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan*;
Western region: *Inner Mongolia, Guangxi, Sichuan, Chongqing, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Tibet*.
Source: http://www.chinafdi.org.cn

Table 3 Regional Comparison of Industrial Pollutions 2003 (proportions of total in brackets)

Region	Area (10 000 km^2)	Industrial Wastewater Discharge (million tons)	Industrial Waste Gas Emission (billion cu.m)	Industrial Solid Wastes Discharge (10 000 tons)
Eastern Region	106.7 (11.1%)	10793 (50.9%)	10071 (50.6%)	98 (5.0%)
Central Region	168.2 (17.5%)	5611 (25.6%)	5345 (26.9%)	742 (38.2%)
Western Region	672.5 (70.1%)	4821 (23.0%)	4475 (22.5%)	1101 (56.8%)

Figure 1 Provincial Shares of Total National FDI Inflows for 1979-2003

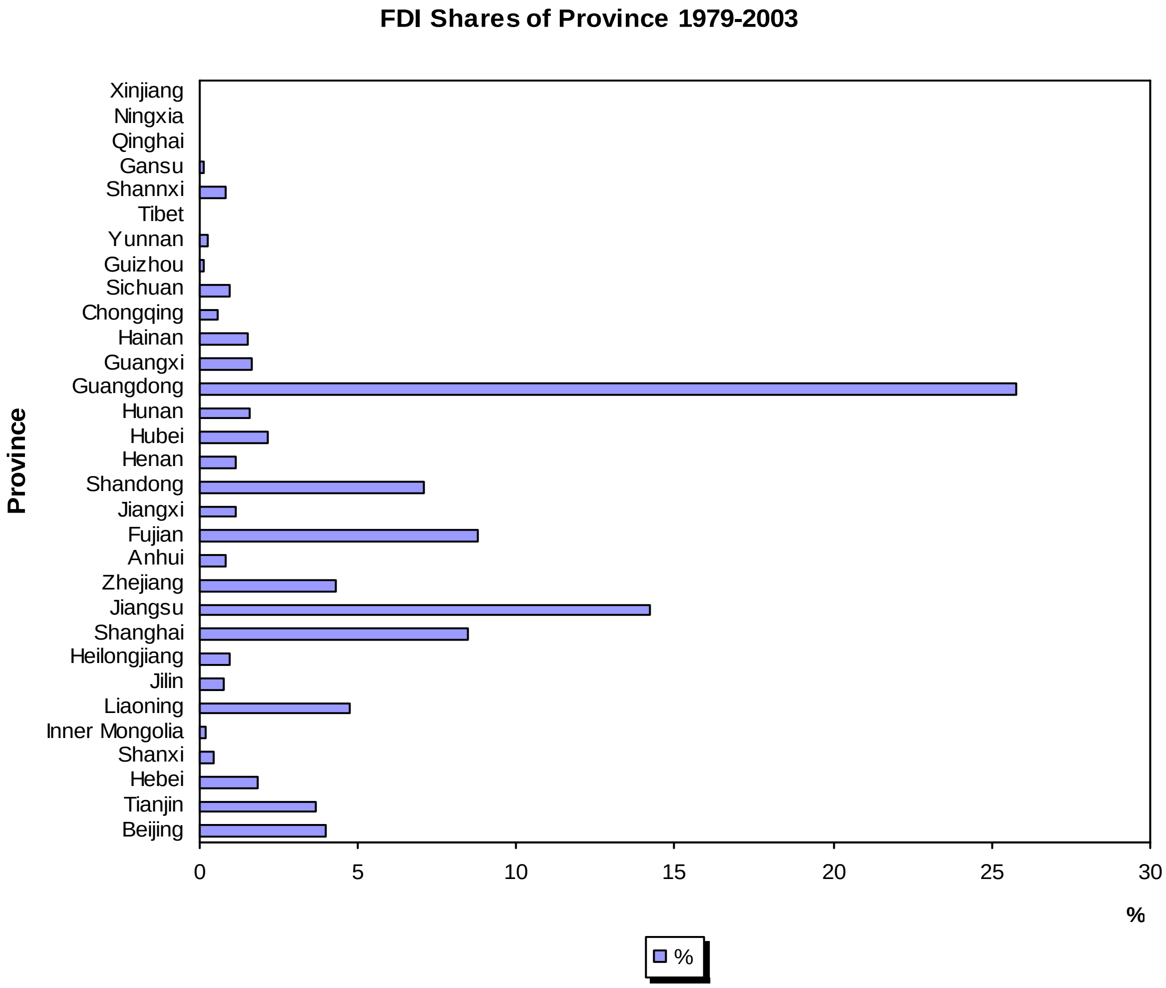
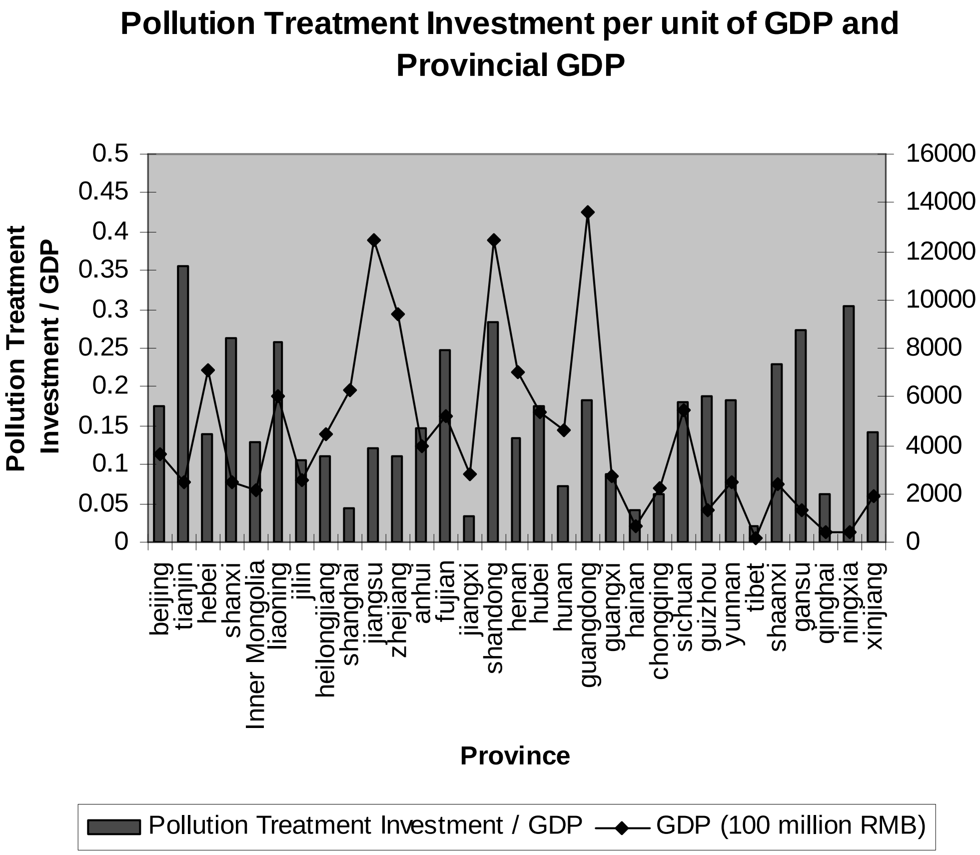
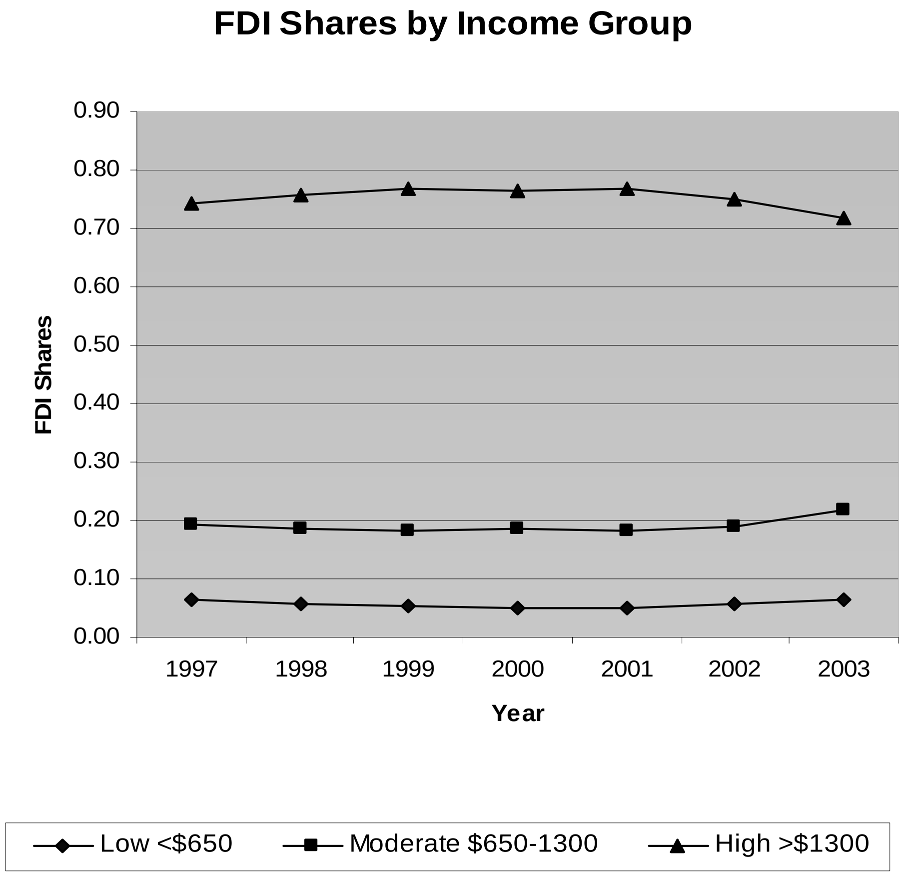


Figure 2 Provincial Difference in Pollution Treatment Investment per unit of GDP and GDP in levels 2003



Source: China Statistical Yearbooks

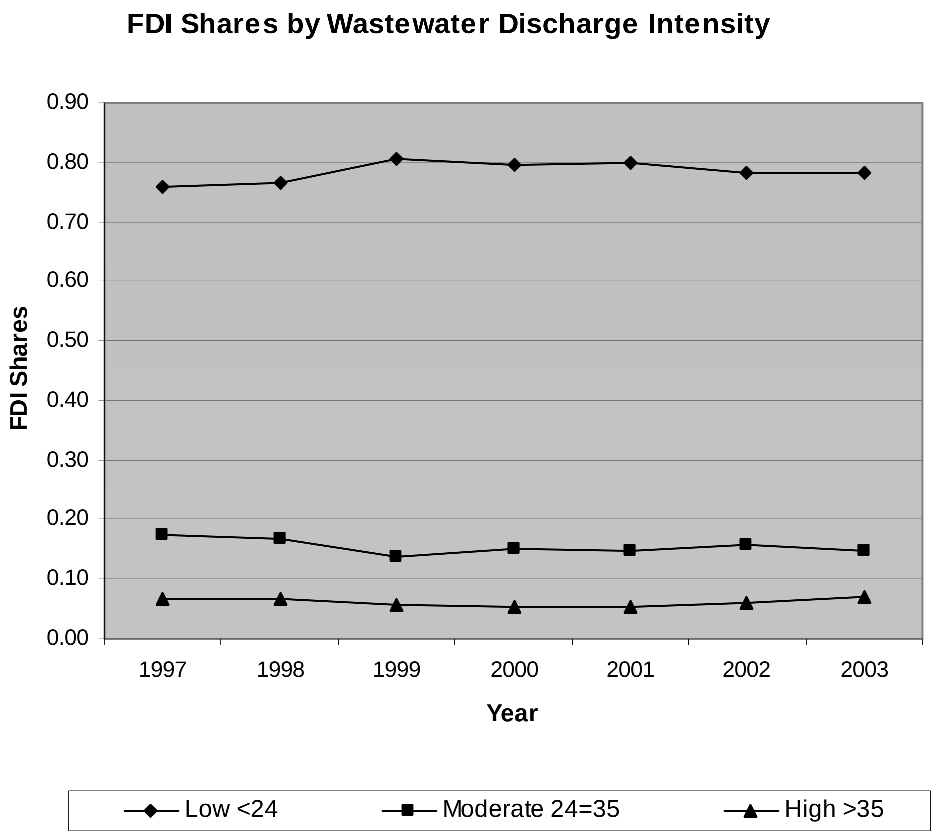
Figure 3 FDI Shares by Income Group 1997-2003



High: Shanghai, Beijing, Tianjin, Zhejiang, Guangdong, Jiangsu, Fujian, Liaoning;
Moderate: Shandong, Heilongjiang*, Hebei, Xinjiang**, Hubei*, Jilin*, Hainan, Inner Mongolia**, Hunan*, Henan*, Shanxi*, Chongqing**;
Low: Qinghai**, Anhui*, Jiangxi*, Ningxia**, Sichuan**, Tibet**, Shaanxi**, Yunnan**, Guangxi**, Gansu**, Guizhou**.
The provinces in each group are in order from high to low of income level (measured by per capita income, exchange rate at $1=RMB8.28). * indicates central provinces, and ** western provinces

Source: China Statistical Yearbook

Figure 4 FDI Shares by Wastewater Discharge Intensity 1997-2003



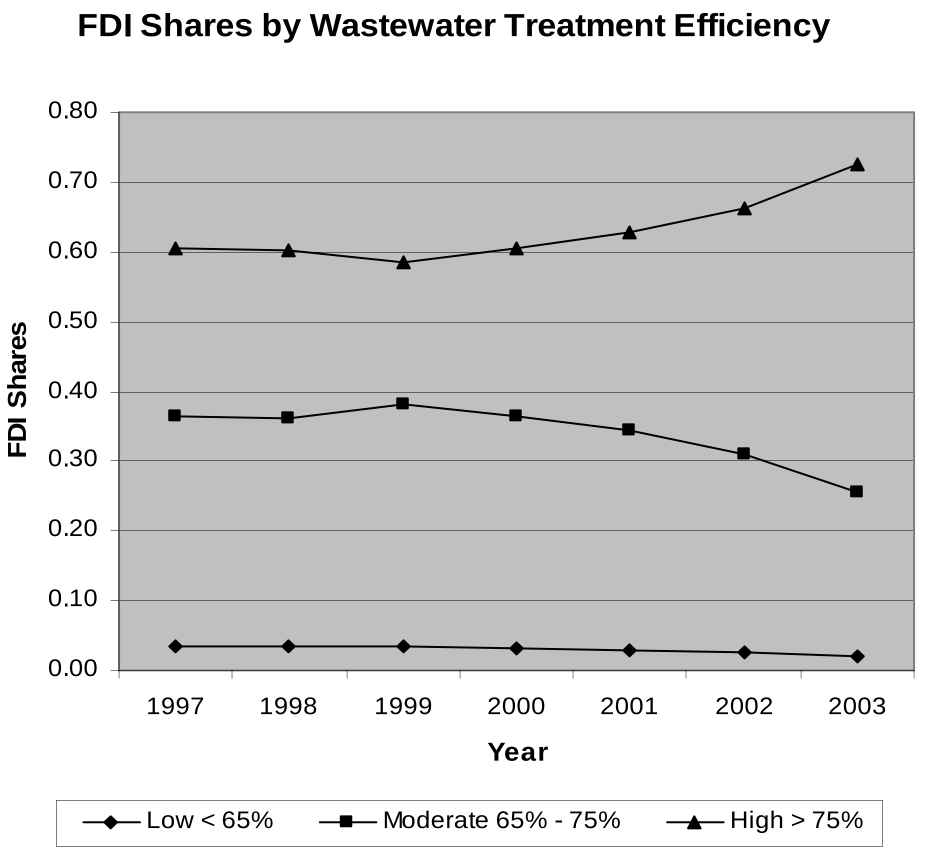
High: Guizhou**, NingXia**, Jiangxi*, Sichuan**, Chongqing**, Hunan*, Guangxi**, Tibet**;

Moderate: Heilongjiang*, Shaanxi**, Liaoning, Hebei, Shanxi*, Henan*, Inner Mongolia**, Yunnan**, Gansu**, Hainan, Hubei*, Anhui*;

Low: Tianjin, Guangdong, Beijing, Shanghai, Shandong, Zhejiang, Jiangsu, Xinjiang**, Jilin*, Qinghai**, Fujian.

The provinces in each group are in order from low to high of discharge intensity, which is defined in Figure 3.12 above. * indicates central provinces, and ** western provinces

Figure 5 FDI Shares by Industrial Wastewater Treatment Efficiency 1997-2003



Wastewater treatment efficiency is the percentage of discharged industrial wastewater meeting discharge standard.

High: Hebei, Henan*, Heilongjiang*, Liaoning, Shandong, Anhui*, Zhejiang, Fujian, Jiangsu, Beijing, Tianjin, Shanghai;

Moderate: Shanxi*, Hunan*, Jilin*, Jiangxi*, Qinghai**, Shaanxi**, Hubei*, Guangdong, Hainan, Chongqing**;

Low: Tibet**, Ningxia**, Guizhou**, Yunnan**, Xinjiang**, Inner Mongolia**, Sichuan**, Gansu**, Guangxi**.

The provinces in each group are in order from low to high of discharge intensity, which is defined in Figure 3.12 above. * indicates central provinces, and ** western provinces

Table 4 FDI Distribution by Province, 1997 – 2003

Province	**Actually Used FDI (USD 10 000)**	**Actually Used FDI at 1990 Constant Price (RMB 10 000)**	**Shares of Actually Used FDI (%)**
Beijing	1310387	5815223	**4.07**
Tianjin	1280512	5672872	**3.97**
Hebei	666722	2956008	2.07
Shanxi	178562	793673	0.56
Inner Mongolia	70689	313866	0.22
Liaoning	1625324	7198150	**5.04**
Jilin	222258	986177	0.69
Heilongjiang	289843	1281901	0.90
Shanghai	2785602	12333008	**8.63**
Jiangsu	5223803	23164792	**16.21**
Zhejiang	1593502	7047179	**4.93**
Anhui	237861	1053567	0.74
Fujian	2622015	11640383	**8.15**
Jiangxi	458042	2022498	1.42
Shandong	2419679	10716822	**7.50**
Henan	379491	1682195	1.18
Hubei	780580	3461605	2.42
Hunan	579593	2567306	1.80
Guangdong	7775815	34530807	**24.17**
Guangxi	414575	1837714	1.29
Hainan	373810	1656758	1.16
Chongqing	201419	892107	0.62
Sichuan	294891	1310028	0.92
Guizhou	27274	120812	0.08
Yunnan	85341	378856	0.27
Tibet	0	0	0.00
Shaanxi	250234	1106355	0.77
Gansu	34249	152273	0.11
Qinghai	11603	51419	0.04
Ningxia	15025	67126	0.05
Xinjiang	14422	64018	0.04
Sum	32223123	142875499	100

Table 5 Provincial Characteristics in 2003 (All the values are at 1990 constant price)

Province	En. Inv.	Puni. Cases	Rail. Density	Road Density	Pop. Density	GIP	GRP per capita	Illiterate Rate	FDI_1	FDI_2	Manu. Wage	Productivity
	%	Norma-lised	km/km^2	km/km^2	per km^2	100million yuan	yuan	%	Yuan / 10000yuan	yuan	yuan	yuan/person
Beijing	2.96224	0.112	0.0676	0.860	866.9	2010	16910	4.6	0.0495	656.82	10580	52974
Tianjin	4.17746	0.223	0.0590	0.900	895.0	2136	13994	6.4	0.0519	662.50	8533	49175
Hebei	1.92779	0.369	0.0250	0.344	356.3	3011	5545	7.4	0.0112	62.17	5348	35164
Shanxi	2.55246	0.447	0.0201	0.405	212.5	1287	3921	5.8	0.0072	28.14	4717	26264
In. Mongolia	1.59557	0.593	0.0056	0.067	21.6	715	4733	13.7	0.0034	16.24	5301	37772
Liaoning	3.33960	4.533	0.0286	0.344	288.9	3224	7520	4.7	0.0389	292.84	6438	37400
Jilin	1.24430	0.362	0.0190	0.234	144.6	1404	4925	3.9	0.0063	30.77	5870	42351
Heilongjiang	2.11102	1.683	0.0117	0.139	81.3	1535	6126	5.8	0.0060	36.82	5307	53999
Shanghai	0.72389	0.207	0.0414	1.046	2759.7	5455	24640	5.9	0.0724	1395.25	13437	67914
Jiangsu	2.17178	0.242	0.0136	0.639	721.8	9513	8866	14.5	0.0702	622.70	7127	43268
Zhejiang	2.93042	0.232	0.0123	0.454	459.7	6785	10626	13.2	0.0439	464.63	7525	33899
Anhui	1.63525	0.436	0.0160	0.500	461.2	1377	3405	13.7	0.0077	25.01	5117	31215
Fujian	5.68107	0.483	0.0121	0.457	290.7	2613	7900	13.6	0.0411	325.29	6444	34514
Jiangxi	0.46936	0.391	0.0138	0.368	255.4	777	3522	8.3	0.0471	165.42	5077	24515
Shandong	3.86091	0.212	0.0206	0.498	596.4	8112	7205	13.7	0.0400	287.82	5274	41642
Henan	2.56557	0.539	0.0219	0.442	578.9	2830	3993	9.2	0.0063	24.34	5037	28923
Hubei	2.46149	0.434	0.0127	0.469	320.3	2126	4752	11.8	0.0240	114.12	5351	36244
Hunan	1.12829	0.371	0.0142	0.406	317.3	1377	3984	8.5	0.0182	66.72	5966	29579
Guangdong	3.80481	0.123	0.0114	0.593	427.6	11347	9079	7.6	0.0475	429.35	8314	40691
Guangxi	1.63646	0.245	0.0119	0.254	211.2	758	3148	8.9	0.0127	37.62	5884	28395
Hainan	2.10685	0.053	0.0065	0.614	238.4	176	4386	9.1	0.0520	226.89	5237	42313
Chongqing	1.16319	0.824	0.0088	0.383	381.7	838	3802	8.4	0.0096	36.38	6267	27948
Sichuan	2.68354	0.925	0.0061	0.231	178.3	1787	3385	11.7	0.0063	20.69	5892	30493
Guizhou	1.81148	0.209	0.0112	0.266	227.6	516	1900	19.7	0.0028	5.10	5428	27886
Yunnan	3.02182	0.267	0.0059	0.422	111.1	821	2986	21.5	0.0028	8.36	6669	59292
Tibet	0.41991	0.012	0.0000	0.034	2.2	11	3624	54.9			6285	23569
Shaanxi	3.19044	0.559	0.0141	0.244	180.0	991	3418	11.9	0.0115	39.27	5422	31722
Gansu	2.20889	0.257	0.0051	0.090	57.9	605	2649	20.3	0.0015	3.93	6137	26303
Qinghai	0.59224	0.153	0.0015	0.034	7.4	131	3838	23.5	0.0053	20.63	6431	35264
Ningxia	2.88167	0.242	0.0120	0.181	87.9	186	3529	17.6	0.0037	13.11	5498	25305
Xinjiang	2.08064	0.695	0.0017	0.052	12.1	587	5116	6.9	0.0007	3.5	6425	61621

Figure 6 a

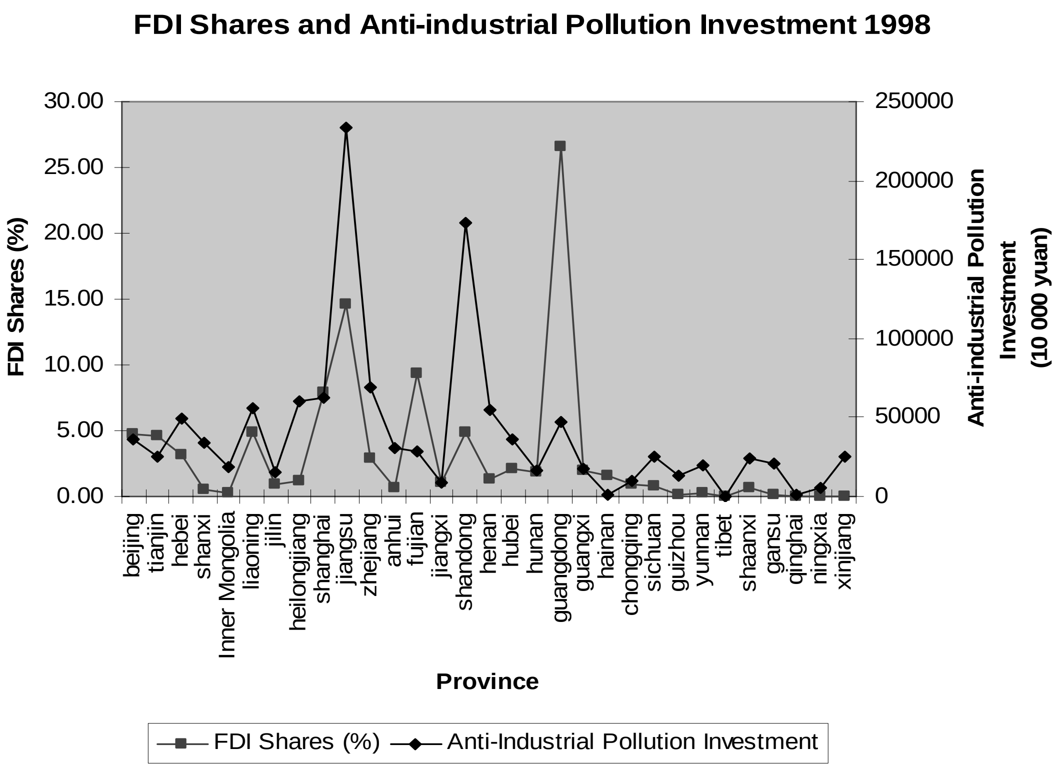


Figure 6 b

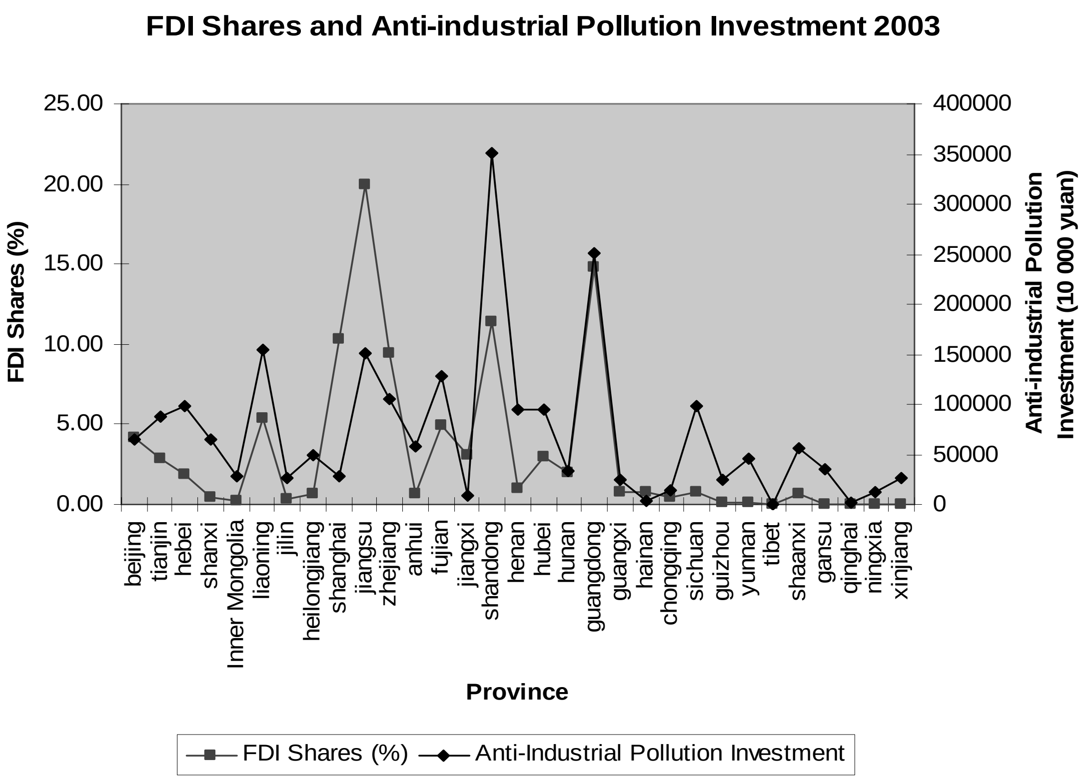


Figure 7 a

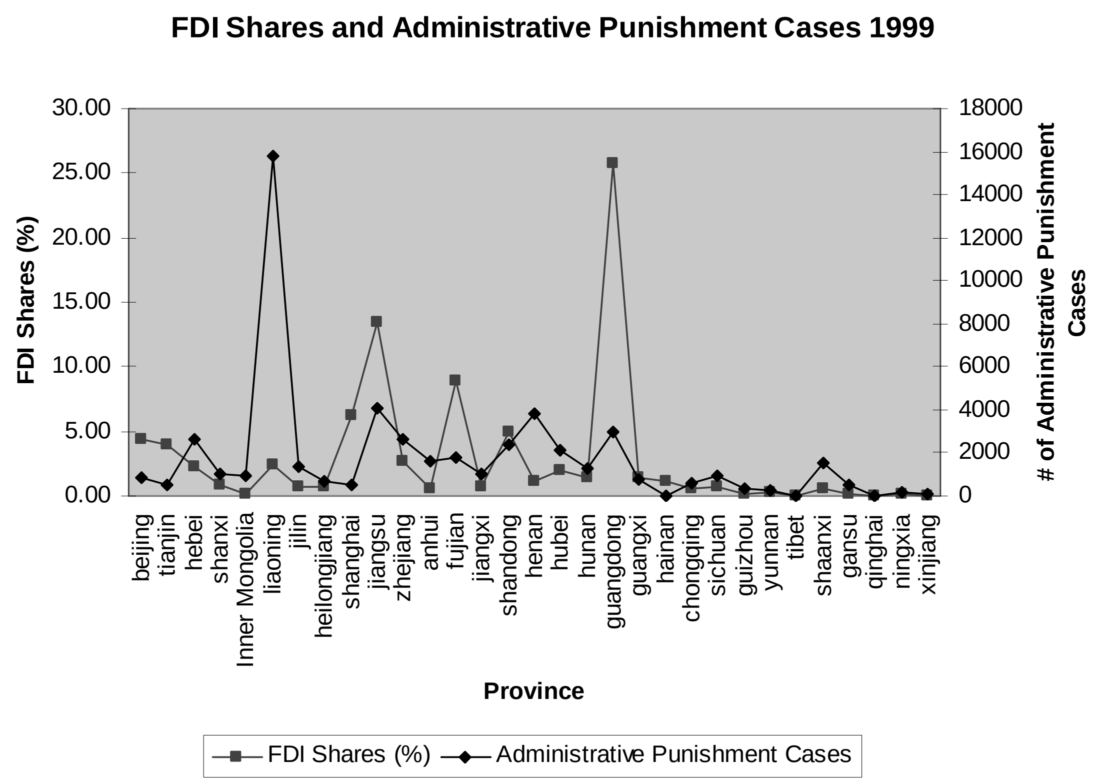


Figure 7 b

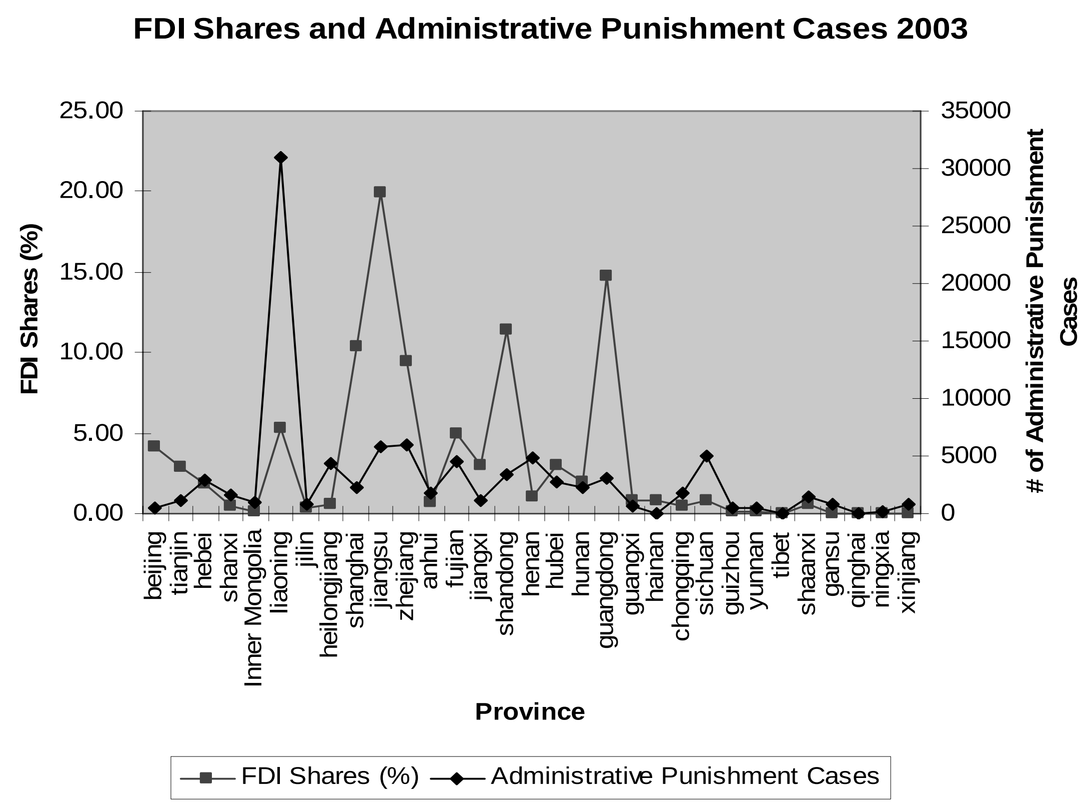


Table 6a Descriptive Statistics of the Variables in Sample 1

Variable	Obs.	Mean	Std. Dev.	Min	Max
FDI_1 (FDI in RMB per 10000 yuan)	149	0.02658	0.02711	0.00067	0.11401
FDI_2 (RMB)	149	188.6236	276.0376	3.188683	1395.25
En. Inv. (%)	152	3.397056	2.157873	0.3165413	11.63744
Rail. Density (km/ km^2)	150	0.0151391	0.0145084	0.0008381	0.0690833
Road Density (km/ km^2)	155	0.3240869	0.2147677	0.0184057	1.013871
Pop. Density (per km^2)	155	364.0475	457.84	2.065574	2700
GIP (100 million yuan at 1990 price)	155	1506.318	1707.657	6.87567	8815.178
GRP per capita (yuan)	155	8693.121	6586.511	2342	40646
Illiterate Rate (%)	155	14.47619	9.851994	4.36	66.18
Productivity (yuan/person at 1990 price)	155	39842.74	19815.77	2235.734	156645.8
Wage (yuan at 1990 price)	155	4690.704	1536.371	2614.684	11885.36

Table 6b Descriptive Statistics of the Variables in Sample 2

Variable	Obs.	Mean	Std. Dev.	Min	Max
FDI_1 (FDI in RMB per 10000 yuan)	119	0.025817	0.025575	0.000676	0.096653
FDI_2 (RMB)	119	191.0179	278.2582	3.188683	1395.25
Puni. Cases	120	0.4886969	0.7653667	0.0185185	5.877362
Rail. Density (km/ km^2)	120	0.015426	0.014746	0.001155	0.069083
Road Density (km/ km^2)	124	0.336317	0.22273	0.018422	1.013871
Pop. Density (per km^2)	124	367.1081	465.352	2.098361	2700
GIP (100 million yuan at 1990 price)	124	1590.15	1796.562	8.209907	8815.178
GRP per capita (yuan)	124	4881.252	3701.057	1356.331	21876.21
Illiterate Rate (%)	124	13.66315	9.414343	4.36	66.18
Productivity (yuan/person at 1990 price)	124	42349.48	20844.62	2235.734	156645.8
Wage (yuan at 1990 price)	124	4940.036	1547.537	2967.671	11885.36

Table 7a Correlations of the Variables in Sample 1

	FDI_1	FDI_2	Env. Inv._1	Rail. Density_1	Road Density_1	Pop. Density_1	GIP_1	GRP per capita_1	Illiterate Rate_1	Produc-tivity_1	Wage_1
FDI_1	1.0000										
FDI_2	0.8586	1.0000									
Env. Inv._1	-0.0942	-0.1175	1.0000								
Rail. Density_1	0.3928	0.6169	-0.0089	1.0000							
Road Density_1	0.6960	0.7954	-0.0999	0.7214	1.0000						
Pop. Density_1	0.5017	0.8072	-0.1424	0.6065	0.7279	1.0000					
GIP_1	0.5441	0.5517	0.0184	0.1197	0.4559	0.4285	1.0000				
GRP per capita_1	0.6175	0.9040	-0.0827	0.7234	0.7691	0.8645	0.4811	1.0000			
Illiterate Rate_1	-0.3201	-0.3503	0.0063	-0.4493	-0.4307	-0.2782	-0.2657	-0.4195	1.0000		
Productivity_1	0.0050	0.1436	-0.1168	0.2466	0.1607	0.1785	-0.0013	0.2494	-0.1496	1.0000	
Wage_1	0.5110	0.7811	-0.1062	0.5554	0.6926	0.6736	0.4323	0.8613	-0.3421	0.3524	1.0000

Table 7b Correlations of the Variables in Sample 2

	FDI_1	FDI_2	Puni. Cases._1	Rail. Density_1	Road Density_1	Pop. Density_1	GIP_1	GRP per capita_1	Illiterate Rate_1	Produc-tivity_1	Wage_1
FDI_1	1.0000										
FDI_2	0.8586	1.0000									
Puni. Cases._1	-0.0871	-0.1054	1.0000								
Rail. Density_1	0.3942	0.6088	0.0069	1.0000							
Road Density_1	0.7308	0.8132	-0.1899	0.7340	1.0000						
Pop. Density_1	0.5351	0.8306	-0.1592	0.6039	0.7405	1.0000					
GIP_1	0.5857	0.5660	-0.0331	0.1204	0.4469	0.4256	1.0000				
GRP per capita_1	0.6514	0.9199	-0.0334	0.7252	0.7718	0.8694	0.4746	1.0000			
Illiterate Rate_1	-0.3528	-0.3683	-0.2280	-0.4674	-0.4194	-0.2913	-0.2664	-0.4278	1.0000		
Productivity_1	-0.0097	0.1225	0.0184	0.2335	0.1057	0.1539	-0.0490	0.2155	-0.0516	1.0000	
Wage_1	0.5572	0.8202	-0.0968	0.5750	0.6963	0.7132	0.4232	0.8808	-0.3057	0.2823	1.0000

Table 8 Autocorrelation Tests

	Sample 1				Sample 2			
	FDI_1		FDI_2		FDI_1		FDI_2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	In level	In logs	In level	In logs	In level	In logs	In level	In logs
$\hat{\rho}$	0.157	**0.251**	-0.112	**0.240**	0.085	0.086	-0.226	0.089
t Statistics	1.61	**2.82**	-1.14	**2.68**	0.66	0.69	-1.90	0.72
p-value	0.110	**0.006**	0.258	**0.008**	0.513	0.490	0.061	0.473

Table 9 FGLS Regression Results on FDI_1 for Logged Data of Sample 1

log(FDI_1)	Sample 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Env. Inv._1†	-0.071 (-2.30)**	-0.081 (-2.92)***	-0.083 (-2.93)***	-0.10 (-3.36)***	-0.10 (-3.16)***	-0.066 (-2.13)**	-0.065 (-2.21)**	-0.063 (-1.97)**	-0.062 (-2.02)**
GRP per capita_1		2.77 (5.02)***	2.53 (4.10)***	2.87 (4.36)***	3.41 (4.88)***	3.37 (5.12)***	3.34 (5.17)***	3.32 (4.77)***	3.34 (4.87)***
Wage_1			0.23 (0.65)	0.32 (0.85)	0.055 (0.13)	0.018 (0.05)	-0.19 (-0.49)	0.11 (0.25)	-0.13 (-0.29)
GIP_1				-0.44 (-1.65)*	-0.59 (-1.99)**	-0.27 (-0.89)	-0.16 (-0.53)	-0.28 (-0.87)	-0.21 (-0.66)
Pop. Density_1					-1.35 (-1.87)*	-1.43 (-2.26)**	-1.51 (-2.38)**	-1.56 (-2.46)**	-1.65 (-2.58)***
Rail. Density_1						-0.24 (-2.27)**	-0.27 (-2.53)**	-0.26 (-2.36)**	-0.28 (-2.62)***
Road Density_1						0.38 (4.03)***	0.41 (4.83)***	0.38 (4.09)***	0.41 (5.06)***
Illiterate Rate_1							0.27 (2.37)**		0.27 (2.33)**
Productivity_1								-0.15 (-1.21)	-0.16 (-1.27)
Constant	-2.72 (-29.10)***	-28.38 (-5.55)***	-28.15 (-5.49)***	-28.96 (-5.53)***	-21.69 (-3.11)***	-23.27 (-3.74)***	-21.94 (-3.53)***	-21.13 (-3.26)***	-19.61 (-3.02)***
Wald χ^2	4902.88	6449.04	6788.35	6436.34	6172.89	7743.38	8159.36	7048.79	7659.51
# of Observations	149	149	149	149	149	149	149	149	149

z-statistics in parentheses. Time dummies are included. † All the independent variables are logged.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 10 FGLS Regression Results on FDI_2 for Logged Data of Sample 1

log(FDI_2)	Sample 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Env. Inv._1†	-0.079 (-2.61)***	-0.080 (-2.59)***	-0.083 (-2.74)***	-0.092 (-2.85)***	-0.097 (-2.83)***	-0.062 (-1.95)*	-0.065 (-2.09)**	-0.058 (-1.79)*	-0.060 (-1.89)*
GRP per capita_1		3.38 (6.13)***	3.04 (4.93)***	3.25 (5.00)***	3.92 (5.87)***	4.03 (6.55)***	3.94 (6.51)***	3.88 (5.82)***	3.85 (5.87)***
Wage_1			0.37 (0.99)	0.38 (1.00)	0.083 (0.20)	0.028 (0.07)	-0.15 (-0.39)	0.14 (0.33)	-0.060 (-0.14)
GIP_1				-0.25 (-0.90)	-0.40 (-1.28)	-0.093 (-0.29)	0.044 (0.14)	-0.099 (-0.30)	-0.0063 (-0.02)
Pop. Density_1					-1.48 (-1.99)**	-1.64 (-2.40)**	-1.70 (-2.49)**	-1.67 (-2.44)**	-1.74 (-2.55)**
Rail. Density_1						-0.20 (-1.75)*	-0.23 (-2.05)**	-0.21 (-1.78)*	-0.24 (-2.07)**
Road Density_1						0.39 (4.24)***	0.41 (4.80)***	0.39 (4.30)***	0.41 (5.02)***
Illiterate Rate_1							0.28 (2.35)**		0.27 (2.23)**
Productivity_1								-0.13 (-1.02)	-0.13 (-1.06)
Constant	6.43 (74.21)***	-24.90 (-4.87)***	-24.88 (-4.84)***	-25.23 (-4.83)***	-17.95 (-2.54) **	-20.03 (-3.08)***	-18.78 (-2.90)***	-18.06 (-2.67)***	-16.77 (-2.49)**
Wald χ^2	8255.26	9891.48	10168.32	10041.17	10195.23	14123.13	14909.38	13534.99	14696.21
# of Observations	149	149	149	149	149	149	149	149	149

z-statistics in parentheses. Time dummies are included. † All the independent variables are logged.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 11 FGLS Regression Results on FDI_1 for Logged Data of Sample 2

$\log(FDI_1)$	Sample 2								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Puni. Cases._1†	-0.025 (-2.60)***	-0.029 (-2.74)***	-0.044 (-2.47)**	-0.054 (-2.11)**	-0.055 (-2.05)**	-0.082 (-2.84)***	-0.071 (-2.46)**	-0.078 (-2.56)***	-0.061 (-2.01)**
GRP per capita_1		0.75 (1.76)*	1.63 (2.57)***	1.89 (2.30)**	2.03 (2.42)**	3.22 (4.14)***	3.33 (4.52)***	2.75 (3.55)***	2.63 (3.65)***
Wage_1			-1.03 (-1.98)**	-1.07 (-2.02)**	-1.17 (-2.12)**	-1.17 (-2.12)**	-1.49 (-2.69)***	-1.09 (-1.79)*	-1.42 (-2.38)**
GIP_1				-0.18 (-0.57)	-0.21 (-0.64)	-0.24 (-0.78)	-0.30 (-1.00)	0.20 (0.76)	0.25 (1.00)
Pop. Density_1					-0.35 (-0.54)	-0.75 (-1.31)	-0.77 (-1.38)	-0.60 (-0.93)	-0.63 (-1.02)
Rail. Density_1						-0.26 (-2.05)**	-0.23 (-1.90)*	-0.32 (-2.46)**	-0.33 (-2.68)***
Road Density_1						0.51 (5.01)***	0.47 (5.39)***	0.52 (4.95)***	0.49 (6.11)***
Illiterate Rate_1							0.28 (2.22)**		0.40 (3.37)***
Productivity_1								-0.32 (-3.63)***	-0.35 (-4.27)***
Constant	-3.01 (-44.40)***	-10.02 (-2.51)**	-9.20 (-1.65)*	-9.88 (-1.71)*	-7.87 (-1.14)	-16.72 (-2.59)***	-14.83 (-2.33)**	-13.89 (-1.81)*	-10.40 (-1.39)
Wald χ^2	14482.84	16959.28	8493.95	8458.66	8603.30	8496.54	10393.17	10310.04	14260.41
# of Observations	117	117	117	117	117	117	117	117	117

z-statistics in parentheses. Time dummies are included. † All the independent variables are logged.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 12 FGLS Regression Results on FDI_2 for Logged Data of Sample 2

$\log(FDI_2)$	Sample 2								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Puni. Cases._1†	-0.022 (-1.78)*	-0.039 (-2.95)***	-0.062 (-3.00)***	-0.068 (-2.65)***	-0.068 (-2.51)**	-0.073 (-2.48)**	-0.060 (-2.01)**	-0.078 (-2.66)***	-0.057 (-1.91)*
GRP per capita_1		1.41 (3.53)***	2.30 (4.12)***	2.49 (3.44)***	2.47 (3.34)***	4.05 (5.80)***	4.15 (6.20)***	3.55 (5.44)***	3.48 (5.80)***
Wage_1			-1.18 (-2.31)**	-1.20 (-2.35)**	-1.18 (-2.20)**	-1.29 (-2.38)**	-1.55 (-2.88)***	-1.10 (-1.93)*	-1.46 (-2.59)***
GIP_1				-0.11 (-0.37)	-0.091 (-0.30)	0.040 (0.16)	0.038 (0.15)	0.45 (2.24)**	0.55 (2.86)***
Pop. Density_1					0.11 (0.19)	-0.50 (-0.88)	-0.53 (-0.94)	-0.16 (-0.28)	-0.29 (-0.54)
Rail. Density_1						-0.21 (-1.67)*	-0.18 (-1.53)	-0.29 (-2.38)**	-0.29 (-2.60)***
Road Density_1						0.47 (5.00)***	0.45 (5.55)***	0.52 (6.05)***	0.48 (6.94)***
Illiterate Rate_1							0.25 (2.15)**		0.33 (3.02)***
Productivity_1								-0.30 (-4.26)***	-0.31 (-4.67)***
Constant	6.23 (96.96)***	-6.96 (-1.86)*	-4.92 (-1.06)	-5.70 (-1.14)	-6.65 (-1.10)	-17.74 (-2.67)***	-16.44 (-2.44)**	-16.90 (-2.53)**	-13.38 (-2.07)**
Wald χ^2	15626.94	20387.20	15342.18	15298.07	15340.90	19151.96	23440.64	22826.37	31404.52
# of Observations	117	117	117	117	117	117	117	117	117

z-statistics in parentheses. Time dummies are included. † All the independent variables are logged.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Appendix 1

Dependent Variables:

FDI_1: FDI inflows in each region divided by regional GDP
FDI_2: FDI inflows in each region divided by regional population

$$FDI_1 = \frac{regional \quad actually \quad used \quad FDI \times exchange \quad rate}{regional \quad GDP}$$

$$FDI_2 = \frac{regional \quad actually \quad used \quad FDI \times exchange \quad rate}{regional \quad population}$$

Independent Variables:

En. Inv.: The share of investment in anti-industrial pollution project in total innovation investment

Puni. Cases: The total number of administrative punishment cases filed by the environmental authorities in each region normalised by the number of enterprises

Rail. Density: Railway density = Length of railway / Area of region

Road Density: Highway density = Length of highway / Area of Region

Pop. Density: Population density = Population at the end of year / Area of Region

GIP: Regional gross industrial output value

GRP per capita: Gross regional product per capita

Illiterate Rate: illiterate rate and semi-illiterate rate aged 15 and above (values for 2000 are calculated as the average of the values in 1999 and 2001)

Productivity: Overall labour productivity for all foreign funded industrial enterprises (values for 1998 are the average of those for 1997 and 1999)

Wage: Average wage of staff and workers in manufacturing

Note: All the values are deflated by the GDP deflator, which set 100 for year 1990.

Table A1 Data Sources

Data	Source
FDI inflows	China Statistical Yearbooks, National Bureau of Statistics of China
Investment in anti-industrial pollution projects	
Innovation investment	
number of enterprises above designated size	
Length of railway	
Length of highway	
Regional population	
Regional gross industrial output value	
Gross regional product per capita	
Illiterate and semi-illiterate rate aged 15 and above	
Average wage of staff and workers in manufacturing	
Administrative punishment cases with environmental issues	China Environment Yearbooks, State Environmental Protection Administration of China
Areas of region	http://www.usacn.com/china/brief/population.htm
GDP deflator	Econ Stats, http://www.econstats.com/weo/C035V021.htm
Overall labour productivity for all foreign funded industrial enterprises	China Foreign Economic Statistical Yearbooks

Appendix 2 Fixed Effects (within) Regression Results for Data in Levels and Logs in Sample 1 and 2

Table 2A Fixed Effects Estimation Results on FDI_1 for Level Data in Sample 1

FDI_1	Sample 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Env. Inv._1	-0.00079 (-1.82)*	-0.00082 (-1.85)*	-0.00083 (-1.87)*	-0.00089 (-1.77)*	-0.00081 (-1.64)	-0.00064 (-1.42)	-0.00064 (-1.41)	-0.00062 (-1.36)	-0.00062 (-1.35)
GRP per capita_1		-1.01e-06 (-0.49)	-2.15e-06 (-0.78)	-1.62e-06 (-0.47)	-3.01e-06 (-0.75)	2.67e-07 (0.07)	4.23e-07 (0.11)	2.22e-07 (0.06)	3.76e-07 (0.09)
Wage_1			2.72e-06 (0.55)	2.35e-06 (0.44)	1.87e-06 (0.37)	-2.92e-06 (-0.51)	-3.05e-06 (-0.52)	-2.91e-06 (-0.51)	-3.03e-06 (-0.52)
GIP_1				-1.40e-06 (-0.25)	-9.60e-06 (-0.17)	8.46e-07 (0.16)	7.74e-07 (0.14)	9.17e-07 (0.17)	8.38e-07 (0.15)
Pop. Density_1					0.000044 (1.42)	0.000027 (0.90)	0.000027 (0.91)	0.000027 (0.92)	0.000027 (0.92)
Rail. Density_1						-2.05 (-2.99)***	-2.04 (-2.97)***	-2.05 (-2.99)***	-2.04 (-2.98)***
Road Density_1						0.0069 (0.30)	0.0070 (0.30)	0.0070 (0.31)	0.0071 (0.31)
Illiterate Rate_1							-0.00014 (-0.29)		-0.00013 (-0.27)
Productivity_1								1.39e-08 (0.28)	1.16e-08 (0.24)
Constant	0.032 (12.28)***	0.036 (3.72)***	0.030 (2.22)**	0.032 (2.11)**	0.022 (1.39)	0.057 (2.70)***	0.059 (2.50)**	0.057 (2.62)***	0.058 (2.41)**
R^2	0.079	0.082	0.085	0.088	0.097	0.20	0.20	0.20	0.20
# of Observations	149	149	149	149	149	149	149	149	149

t-statistics in parentheses. Time dummies are included.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 2B Fixed Effects Estimation Results on FDI_2 for Level Data in Sample 1

FDI_2	Sample 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Env. Inv._1	-8.21 (-2.39)**	-6.79 (-1.83)*	-6.84 (-1.83)*	-6.10 (-1.69)*	-4.76 (-1.36)	-3.31 (-1.06)	-3.30 (-1.05)	-3.26 (-1.03)	-3.27 (-1.03)
GRP per capita_1		0.048 (2.32)**	0.043 (1.82)*	0.036 (1.27)	0.011 (0.34)	0.033 (1.10)	0.034 (1.11)	0.032 (1.09)	0.034 (1.11)
Wage_1			0.013 (0.40)	0.018 (0.52)	0.0089 (0.28)	-0.028 (-0.92)	-0.029 (-0.92)	-0.028 (-0.91)	-0.029 (-0.91)
GIP_1				0.018 (0.46)	0.026 (0.63)	0.039 (1.02)	0.039 (0.99)	0.040 (1.03)	0.039 (0.99)
Pop. Density_1					0.80 (2.47)**	0.68 (3.19)***	0.68 (3.17)***	0.68 (3.19)***	0.68 (3.16)***
Rail. Density_1						-15552.73 (-2.64)***	-15473.65 (-2.63)***	-15564.22 (-2.64)***	-15482.18 (-2.63)***
Road Density_1						132.44 (0.73)	133.13 (0.72)	132.73 (0.73)	133.30 (0.72)
Illiterate Rate_1							-0.93 (-0.34)		-0.91 (-0.32)
Productivity_1								0.000042 (0.15)	0.000025 (0.93)
Constant	201.27 (13.10)***	2.96 (0.03)	-22.88 (-0.19)	-37.41 (-0.31)	-208.60 (-1.65)	46.74 (0.35)	59.66 (0.39)	44.99 (0.33)	58.34 (0.37)**
R^2	0.10	0.25	0.25	0.26	0.31	0.41	0.41	0.41	0.41
# of Observations	149	149	149	149	149	149	149	149	149

t-statistics in parentheses. Time dummies are included.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 2C Fixed Effects Estimation Results on FDI_1 for Logged Data in Sample 1

$\log(FDI_1)$	Sample 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Env. Inv._1†	-0.068 (-0.79)	-0.060 (-0.70)	-0.059 (-0.71)	-0.066 (-0.80)	-0.077 (-0.93)	-0.058 (-0.69)	-0.057 (-0.68)	-0.059 (-0.72)	-0.058 (-0.71)
GRP per capita_1		2.60 (2.10)**	2.43 (2.09)**	2.87 (2.19)**	3.47 (2.67)***	3.41 (2.54)**	3.41 (2.53)**	3.45 (2.52)**	3.44 (2.51)**
Wage_1			0.47 (0.33)	0.44 (0.31)	0.24 (0.17)	0.014 (0.01)	0.0020 (0.00)	-0.08 (-0.06)	-0.093 (-0.07)
GIP_1				-0.43 (-0.64)	-0.46 (-0.69)	-0.078 (-0.11)	-0.086 (-0.12)	-0.16 (-0.21)	-0.17 (-0.22)
Pop. Density_1					-2.30 (-1.85)*	-2.52 (-2.16)**	-2.53 (-2.15)**	-2.38 (-1.91)*	-2.39 (-1.90)*
Rail. Density_1						-0.35 (-1.57)	-0.35 (-1.56)	-0.32 (-1.38)	-0.32 (-1.37)
Road Density_1						0.30 (1.22)	0.29 (1.19)	0.32 (1.29)	0.31 (1.25)
Illiterate Rate_1							0.11 (0.36)		0.11 (0.38)
Productivity_1								0.13 (0.38)	0.13 (0.38)
Constant	-4.05 (-30.57)***	-25.24 (-2.49)**	-27.69 (-1.89)*	-28.13 (-1.90)*	-18.90 (-1.17)	-19.07 (-1.18)	-19.10 (-1.17)	-20.01 (-1.20)	-20.05 (-1.19)
R^2	0.087	0.13	0.13	0.14	0.16	0.18	0.18	0.18	0.18
# of Observations	149	149	149	149	149	149	149	149	149

t-statistics in parentheses. Time dummies are included. †All the independent variables are in logs.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 2D Fixed Effects Estimation Results on FDI_2 for Logged Data in Sample 1

$\log(FDI_2)$	Sample 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Env. Inv._1†	-0.067 (-0.78)	-0.057 (-0.67)	-0.057 (-0.68)	-0.061 (-0.73)	-0.072 (-0.86)	-0.055 (-0.65)	-0.053 (-0.64)	-0.056 (-0.67)	-0.055 (-0.67)
GRP per capita_1		3.25 (2.61)***	3.07 (2.67)***	3.32 (2.60)**	3.93 (3.12)***	3.88 (2.96)***	3.88 (2.95)***	3.93 (2.95)***	3.92 (2.94)***
Wage_1			0.47 (0.32)	0.45 (0.32)	0.25 (0.18)	0.48 (0.03)	0.39 (0.03)	-0.070 (-0.05)	-0.080 (-0.06)
GIP_1				-0.24 (-0.34)	-0.26 (-0.39)	0.082 (0.11)	0.076 (0.11)	-0.016 (-0.02)	-0.023 (-0.03)
Pop. Density_1					-2.36 (-1.83)*	-2.56 (-2.09)**	-2.57 (-2.09)**	-2.38 (-1.84)*	-2.38 (-1.83)*
Rail. Density_1						-0.30 (-1.32)	-0.30 (-1.31)	-0.26 (-1.11)	-0.26 (-1.10)
Road Density_1						0.29 (1.16)	0.28 (1.13)	0.31 (1.25)	0.31 (1.21)
Illiterate Rate_1							0.077 (0.25)		0.083 (0.27)
Productivity_1								0.16 (0.48)	0.16 (0.48)
Constant	4.14 (30.58)***	-22.30 (-2.19)**	-24.73 (-1.66)*	-24.97 (-1.65)	-15.52 (-0.93)	-15.64 (-0.95)	-15.67 (-0.94)	-16.83 (-1.00)	-16.86 (-0.99)
R^2	0.064	0.13	0.13	0.13	0.16	0.17	0.17	0.18	0.18
# of Observations	149	149	149	149	149	149	149	149	149

t-statistics in parentheses. Time dummies are included. †All the independent variables are in logs.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 2E Fixed Effects Estimation Results on FDI_1 for Level Data in Sample 2

FDI_1	Sample 2								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Puni. Cases._1	0.00040 (0.53)	0.00041 (0.55)	0.00036 (0.40)	0.00017 (0.19)	0.00031 (0.35)	0.00015 (0.16)	0.00019 (0.19)	0.00013 (0.13)	0.00017 (0.17)
GRP per capita_1		1.69e-07 (0.08)	5.55e-07 (0.22)	1.25e-06 (0.39)	-4.88e-07 (-0.13)	1.42e-06 (0.42)	1.27e-06 (0.37)	1.82e-06 (0.53)	1.70e-06 (0.49)
Wage_1			-1.09e-06 (-0.22)	-1.58e-06 (-0.30)	-1.15e-06 (-0.21)	-7.70e-06 (-1.24)	-8.11e-06 (-1.33)	-8.55e-06 (-1.31)	-9.19e-06 (-1.44)
GIP_1				-1.82e-06 (-0.31)	-1.27e-06 (-0.21)	-3.04e-07 (-0.05)	-1.15e-07 (-0.02)	-5.07e-07 (-0.08)	-2.91e-07 (-0.05)
Pop. Density_1					0.000049 (1.68)*	0.000031 (1.38)	0.000031 (1.37)	0.000030 (1.36)	0.000030 (1.36)
Rail. Density_1						-1.47 (-1.75)*	-1.50 (-1.80)*	-1.45 (-1.73)*	-1.50 (-1.79)*
Road Density_1						0.045 (2.38)**	0.045 (2.32)**	0.047 (2.45)**	0.046 (2.41)**
Illiterate Rate_1							0.00034 (0.59)		0.00044 (0.74)
Productivity_1								-6.61e-08 (-1.69)*	-7.51e-08 (-1.82)*
Constant	0.025 (18.48)***	0.025 (2.64)***	0.027 (1.64)	0.029 (1.61)	0.016 (0.82)	0.048 (1.78)*	0.045 (1.63)	0.052 (1.84)*	0.049 (1.72)*
R^2	0.048	0.048	0.048	0.053	0.071	0.22	0.23	0.23	0.24
# of Observations	117	117	117	117	117	117	117	117	117

t-statistics in parentheses. Time dummies are included.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 2F Fixed Effects Estimation Results on FDI_2 for Level Data in Sample 2

FDI_2	Sample 2								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Puni. Cases._1	-5.96 (-0.93)	-3.97 (-0.72)	-3.92 (-0.63)	-2.09 (-0.36)	0.30 (0.05)	-0.23 (-0.04)	-0.13 (-0.02)	-0.36 (-0.06)	-0.22 (-0.04)
GRP per capita_1		0.071 (2.83)***	0.070 (2.72)***	0.064 (2.06)**	0.034 (1.04)	0.047 (1.65)	0.046 (1.63)	0.049 (1.72)*	0.049 (1.70)*
Wage_1			0.0011 (0.03)	0.0057 (0.16)	0.013 (0.37)	-0.035 (-1.10)	-0.036 (-1.12)	-0.039 (-1.18)	-0.042 (-1.23)
GIP_1				0.017 (0.41)	0.026 (0.61)	0.032 (0.74)	0.033 (0.73)	0.031 (0.71)	0.032 (0.71)
Pop. Density_1					0.82 (2.93)**	0.70 (5.21)***	0.69 (5.17)***	0.69 (5.14)***	0.69 (5.08)***
Rail. Density_1						-10318.83 (-1.31)	-10412.51 (-1.32)	-10258.83 (-1.30)	-10392.81 (-1.31)
Road Density_1						376.91 (2.77)***	375.46 (2.70)***	384.54 (2.83)***	383.04 (2.77)***
Illiterate Rate_1							1.01 (0.27)		1.50 (0.40)
Productivity_1								-0.00035 (-1.37)	-0.00038 (-1.46)
Constant	160.45 (10.82)***	-148.70 (-1.30)	-151.58 (-0.92)	-165.89 (-1.00)	-385.27 (-2.61)**	-167.50 (-0.92)	-174.47 (-0.94)	-145.08 (-0.76)	-153.46 (-0.80)
R^2	0.10	0.32	0.33	0.33	0.40	0.51	0.51	0.51	0.51
# of Observations	117	117	117	117	117	117	117	117	117

t-statistics in parentheses. Time dummies are included.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 2G Fixed Effects Estimation Results on FDI_1 for Logged Data in Sample 2

$\log(FDI_1)$	Sample 2								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Puni. Cases._1†	-0.020 (-0.32)	-0.035 (-0.54)	-0.023 (-0.37)	-0.027 (-0.40)	-0.023 (-0.34)	-0.026 (-0.36)	-0.020 (-0.27)	-0.032 (-0.43)	-0.025 (-0.33)
GRP per capita_1		1.24 (0.79)	1.88 (1.36)	1.99 (1.38)	2.14 (1.46)	2.89 (1.99)**	2.81 (1.93)*	2.77 (1.87)*	2.69 (1.80)*
Wage_1			-1.80 (-1.52)	-1.81 (-1.50)	-1.88 (-1.47)	-2.45 (-1.97)*	-2.56 (-2.05)**	-2.54 (-2.03)**	-2.66 (-2.12)**
GIP_1				-0.11 (-0.16)	-0.11 (-0.16)	0.30 (0.42)	0.27 (0.39)	0.62 (0.82)	0.60 (0.81)
Pop. Density_1					-0.52 (-0.41)	-1.11 (-0.92)	-1.17 (-0.96)	-1.48 (-1.21)	-1.55 (-1.26)
Rail. Density_1						-0.27 (-1.06)	-0.27 (-1.06)	-0.36 (-1.44)	-0.37 (-1.44)
Road Density_1						0.63 (2.47)**	0.60 (2.38)**	0.58 (2.23)**	0.55 (2.11)**
Illiterate Rate_1							0.20 (0.75)		0.22 (0.84)
Productivity_1								-0.32 (-2.31)**	-0.33 (-2.36)**
Constant	-4.22 (-35.02)***	-14.39 (-1.12)	-4.70 (-0.31)	-4.79 (-0.32)	-2.58 (-0.15)	-3.94 (-0.25)	-2.50 (-0.16)	0.43 (0.03)	2.10 (0.13)
R^2	0.12	0.13	0.16	0.16	0.16	0.24	0.24	0.27	0.28
# of Observations	117	117	117	117	117	117	117	117	117

t-statistics in parentheses. Time dummies are included. †All the independent variables are in logs.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 2H Fixed Effects Estimation Results on FDI_2 for Logged Data in Sample 2

$\log(FDI_2)$	Sample 2								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Puni. Cases._1†	-0.016 (-0.25)	-0.041 (-0.63)	-0.028 (-0.44)	-0.025 (-0.36)	-0.022 (-0.31)	-0.025 (-0.33)	-0.020 (-0.26)	-0.030 (-0.39)	-0.025 (-0.32)
GRP per capita_1		2.12 (1.32)	2.81 (1.99)**	2.71 (1.87)*	2.82 (1.92)*	3.57 (2.47)**	3.51 (2.40)**	3.46 (2.35)**	3.39 (2.27)**
Wage_1			-1.94 (-1.63)	-1.92 (-1.58)	-1.98 (-1.52)	-2.50 (-1.96)*	-2.59 (-2.02)**	-2.58 (-2.02)**	-2.68 (-2.09)**
GIP_1				0.088 (0.12)	0.089 (0.12)	0.46 (0.62)	0.43 (0.60)	0.75 (0.97)	0.73 (0.96)
Pop. Density_1					-0.40 (-0.31)	-0.92 (-0.74)	-0.97 (-0.78)	-1.26 (-1.00)	-1.32 (-1.04)
Rail. Density_1						-0.22 (-0.84)	-0.22 (-0.84)	-0.30 (-1.18)	-0.30 (-1.18)
Road Density_1						0.63 (2.43)**	0.60 (2.36)**	0.58 (2.22)**	0.55 (2.12)**
Illiterate Rate_1							0.16 (0.60)		0.18 (0.68)
Productivity_1								-0.29 (-2.17)**	-0.30 (-2.20)**
Constant	4.05 (33.66)***	-13.37 (-1.01)	-2.92 (-0.19)	-2.85 (-0.19)	-1.18 (-0.07)	-2.68 (-0.16)	-1.52 (-0.09)	1.33 (0.08)	2.70 (0.16)
R^2	0.080	0.11	0.14	0.14	0.14	0.22	0.22	0.25	0.25
# of Observations	117	117	117	117	117	117	117	117	117

t-statistics in parentheses. Time dummies are included. †All the independent variables are in logs.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Appendix 3 Random Effects Regression Results for Data in Levels and Logs of Sample 1 and 2

Table 3A Random Effects Estimation Results on FDI_1 for Level Data of Sample 1

FDI_1	Sample 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Env. Inv._1	-0.00082 (-2.00)**	-0.00072 (-1.64)*	-0.00072 (-1.65)*	-0.00064 (-1.47)	-0.00060 (-1.44)	-0.00050 (-1.06)	-0.00050 (-1.05)	-0.00050 (-1.02)	-0.00050 (-1.03)
GRP per capita_1		2.94e-06 (3.99)***	2.48e-06 (1.78)*	2.04e-06 (1.15)	2.00e-06 (0.11)	1.64e-06 (0.73)	1.44e-06 (0.65)	1.60e-06 (0.70)	1.42e-06 (0.63)
Wage_1			1.17e-06 (0.33)	1.65e-06 (0.44)	2.43e-06 (0.65)	8.00e-07 (0.21)	1.51e-06 (0.39)	7.88e-07 (0.20)	1.48e-06 (0.38)
GIP_1				2.21e-06 (0.71)	2.37e-06 (0.78)	2.26e-06 (0.85)	1.89e-07 (0.70)	2.23e-06 (0.82)	1.84e-06 (0.67)
Pop. Density_1					0.000017 (1.63)	5.01e-06 (0.44)	5.31e-06 (0.47)	2.633e-06 (0.49)	5.88e-06 (0.52)
Rail. Density_1						-0.35 (-0.80)	-0.46 (-1.12)	-0.35 (-0.80)	-0.47 (-1.11)
Road Density_1						0.039 (1.34)	0.037 (1.30)	0.039 (1.31)	0.037 (1.27)
Illiterate Rate_1							-0.00077 (-2.41)**		-0.00078 (-2.40)**
Productivity_1								2.77e-09 (0.06)	-3.43e-09 (-0.07)
Constant	0.032 (5.06)***	0.020 (3.33)***	0.017 (1.85)*	0.014 (1.43)	0.012 (1.25)	0.010 (1.06)	0.024 (2.15)**	0.011 (1.03)	0.024 (2.15)**
R^2	0.015	0.41	0.41	0.49	0.41	0.58	0.58	0.57	0.57
# of Observations	149	149	149	149	149	149	149	149	149

z-statistics in parentheses. Time dummies are included.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 3B Random Effects Estimation Results on FDI_2 for Level Data of Sample 1

FDI_2	Sample 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Env. Inv._1	-8.48 (-2.70)***	-6.48 (-2.11)**	-6.42 (-2.12)**	-5.81 (-2.01)**	-5.36 (-1.93)*	-4.80 (-1.57)	-4.78 (-1.58)	-4.99 (-1.61)	-4.99 (-1.62)
GRP per capita_1		0.066 (9.16)***	0.058 (6.69)***	0.051 (4.63)***	0.036 (3.12)***	0.042 (2.72)***	0.041 (2.64)***	0.042 (2.71)***	0.041 (2.63)***
Wage_1			0.021 (1.04)	0.027 (1.27)	0.033 (1.59)	0.020 (0.83)	0.022 (0.90)	0.020 (0.83)	0.022 (0.89)
GIP_1				0.024 (1.32)	0.024 (1.31)	0.017 (0.96)	0.016 (0.89)	0.017 (0.93)	0.016 (0.85)
Pop. Density_1					0.13 (1.76)*	0.11 (1.25)	0.11 (1.25)	0.11 (1.26)	0.11 (1.27)
Rail. Density_1						-2699.78 (-0.89)	-3084.48 (-1.05)	-2684.51 (-0.88)	-3086.47 (-1.04)
Road Density_1						288.46 (1.15)	223.95 (1.13)	225.76 (1.13)	220.68 (1.10)
Illiterate Rate_1							-2.36 (-1.22)		-2.42 (-1.24)
Productivity_1								-0.00017 (-0.61)	-0.00018 (-0.61)
Constant	200.70 (3.67)***	-69.18 (-2.00)**	-118.55 (-1.96)**	-141.45 (-2.28)**	-149.53 (-2.46)**	-136.29 (-2.20)**	-95.50 (-1.36)	-130.80 (-2.08)**	-88.12 (-1.24)
R^2	0.01	0.83	0.84	0.86	0.85	0.87	0.86	0.87	0.86
# of Observations	149	149	149	149	149	149	149	149	149

z-statistics in parentheses. Time dummies are included.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 3C Random Effects Estimation Results on FDI_1 for Logged Data of Sample 1

$\log(FDI_1)$	Sample 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Env. Inv._1†	-0.072 (-0.79)	-0.064 (-0.73)	-0.064 (-0.71)	-0.064 (-0.71)	-0.062 (-0.72)	-0.044 (-0.51)	-0.043 (-0.50)	-0.043 (-0.50)	-0.042 (-0.50)
GRP per capita_1		1.50 (6.32)***	1.49 (4.46)***	1.31 (2.86)***	1.19 (2.93)***	1.40 (3.83)***	1.41 (3.41)***	1.37 (3.76)***	1.40 (3.40)***
Wage_1			0.052 (0.06)	0.15 (0..16)	-0.13 (-0.17)	-0.59 (-0.84)	-0.60 (-0.82)	-0.65 (-0.92)	-0.66 (-0.93)
GIP_1				0.13 (0.56)	-0.14 (-0.80)	-0.15 (-1.02)	-0.15 (-1.01)	-0.15 (-0.98)	-0.14 (-0.97)
Pop. Density_1					0.44 (2.41)**	0.29 (1.14)	0.29 (1.13)	0.28 (1.12)	0.28 (1.11)
Rail. Density_1						-0.31 (-2.54)**	-0.30 (-2.39)**	-0.31 (-2.48)**	-0.30 (-2.32)**
Road Density_1						0.49 (2.06)**	0.49 (2.04)**	0.51 (2.19)**	0.51 (2.17)**
Illiterate Rate_1							0.044 (0.16)		0.059 (0.23)
Productivity_1								0.18 (0.78)	0.18 (0.80)
Constant	-4.05 (-14.53)***	-16.29 (-8.01)***	-16.59 (-3.10)***	-16.73 (-3.07)***	-14.10 (-2.96)***	-11.84 (-2.79)***	-12.03 (-2.78)***	-12.91 (-2.76)***	-13.16 (-2.78)***
R^2	0.011	0.49	0.49	0.50	0.64	0.71	0.71	0.71	0.71
# of Observations	149	149	149	149	149	149	149	149	149

z-statistics in parentheses. Time dummies are included. †All the independent variables are in logs.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 3D Random Effects Estimation Results on FDI_2 for Logged Data of Sample 1

$\log(FDI_2)$	Sample 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Env. Inv._1†	-0.070 (-0.76)	-0.060 (-0.68)	-0.060 (-0.67)	-0.060 (-0.67)	-0.058 (-0.67)	-0.041 (-0.47)	-0.040 (-0.47)	-0.040 (-0.46)	-0.039 (-0.46)
GRP per capita_1		2.43 (9.97)***	2.44 (7.29)***	2.22 (4.90)***	2.13 (5.18)***	2.32 (6.32)***	2.33 (5.59)***	2.30 (6.27)***	2.31 (5.63)***
Wage_1			-0.020 (-0.02)	0.094 (0.10)	-0.18 (-0.22)	-0.62 (-0.87)	-0.63 (-0.85)	-0.69 (-0.97)	-0.70 (-0.97)
GIP_1				0.15 (0.67)	-0.10 (-0.58)	-0.11 (-0.74)	-0.11 (-0.73)	-0.11 (-0.70)	-0.11 (-0.69)
Pop. Density_1					0.41 (2.25)**	0.26 (1.02)	0.26 (1.01)	0.25 (0.99)	0.25 (0.98)
Rail. Density_1						-0.29 (-2.33)**	-0.28 (-2.20)**	-0.28 (-2.26)**	-0.27 (-2.11)**
Road Density_1						0.48 (1.98)**	0.48 (1.96)**	0.51 (2.12)**	0.50 (2.10)**
Illiterate Rate_1							0.035 (0.13)		0.052 (0.20)
Productivity_1								0.20 (0.90)	0.21 (0.91)
Constant	4.14 (11.64)***	-15.65 (-7.53)***	-15.55 (-2.87)***	-15.71 (-2.86)***	-13.23 (-2.73)***	-10.92 (-2.52)**	-11.09 (-2.51)**	-12.14 (-2.57)***	-12.36 (-2.57)***
R^2	0.0051	0.72	0.72	0.73	0.80	0.83	0.83	0.83	0.83
# of Observations	149	149	149	149	149	149	149	149	149

z-statistics in parentheses. Time dummies are included. †All the independent variables are in logs.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 3E Random Effects Estimation Results on FDI_1 for Level Data of Sample 2

FDI_1	Sample 2								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Puni. Cases._1	0.00019 (0.25)	0.00025 (0.28)	0.00026 (0.27)	0.00052 (0.53)	0.00066 (0.72)	0.0014 (1.25)	0.0012 (1.07)	0.0014 (1.21)	0.0012 (1.06)
GRP per capita_1		3.65e-06 (5.05)***	3.61e-06 (2.51)**	2.85e-06 (1.51)	1.75e-06 (0.96)	3.59e-06 (1.86)*	3.29e-06 (1.64)	3.68e-06 (1.85)*	3.38e-06 (1.63)
Wage_1			6.24e-08 (0.01)	8.03e-07 (0.18)	1.18e-06 (0.27)	-2.06e-06 (-0.54)	-1.38e-06 (-0.34)	-2.22e-06 (-0.57)	-1.60e-06 (-0.38)
GIP_1				2.79e-06 (0.90)	2.84e-06 (1.10)	1.67e-06 (0.69)	1.47e-06 (0.59)	1.51e-06 (0.61)	1.34e-06 (0.53)
Pop. Density_1					9.98e-06 (1.10)	-7.40e-06 (-0.66)	-6.61e-06 (-0.59)	-6.89e-06 (-0.62)	-6.08e-06 (-0.54)
Rail. Density_1						-0.62 (-2.13)**	-0.67 (-2.28)**	-0.61 (-2.10)**	-0.66 (-2.21)**
Road Density_1						0.074 (4.07)***	0.073 (4.01)***	0.074 (4.03)***	0.072 (3.98)***
Illiterate Rate_1							-0.00043 (-1.32)		-0.00040 (-1.15)
Productivity_1								-5.57e-08 (-1.25)	-4.58e-08 (-0.91)
Constant	0.025 (5.31)***	0.0093 (2.37)**	0.0093 (0.81)	0.0057 (0.45)	0.0051 (0.41)	0.0042 (0.36)	0.010 (0.96)	0.0067 (0.55)	0.012 (1.07)
R^2	0.048	0.44	0.44	0.53	0.50	0.72	0.71	0.71	0.71
# of Observations	117	117	117	117	117	117	117	117	117

z-statistics in parentheses. Time dummies are included.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 3F Random Effects Estimation Results on FDI_2 for Level Data of Sample 2

FDI_2	Sample 2								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Puni. Cases._1	-7.53 (-1.14)	-8.40 (-1.35)	-6.64 (-1.00)	-4.39 (-0.69)	-2.06 (-0.35)	2.52 (0.37)	2.70 (0.40)	2.30 (0.33)	2.57 (0.38)
GRP per capita_1		0.070 (10.53)***	0.063 (6.43)***	0.055 (4.52)***	0.044 (3.74)***	0.056 (4.25)***	0.056 (4.07)***	0.057 (4.20)***	0.057 (4.02)***
Wage_1			0.018 (0.74)	0.024 (0.99)	0.028 (1.18)	0.0038 (0.16)	0.0027 (0.11)	0.0030 (0.13)	0.0013 (0.05)
GIP_1				0.025 (1.43)	0.025 (1.39)	0.012 (0.72)	0.012 (0.73)	0.011 (0.68)	0.011 (0.68)
Pop. Density_1					0.93 (1.18)	0.025 (0.29)	0.025 (0.29)	0.025 (0.29)	0.026 (0.30)
Rail. Density_1						-4667.04 (-2.51)**	-4641.33 (-2.46)**	-4656.37 (-2.49)**	-4609.98 (-2.43)**
Road Density_1						433.33 (3.54)***	434.51 (3.53)***	431.65 (3.51)***	433.43 (3.51)***
Illiterate Rate_1							0.46 (0.23)		0.68 (0.33)
Productivity_1								-0.00027 (-0.86)	-0.00029 (-0.97)
Constant	158.10 (3.23)***	-140.11 (-6.10)***	-188.89 (-2.59)***	-213.43 (-2.88)***	-217.09 (-2.93)***	-195.32 (-2.70)***	-200.37 (-2.84)***	-183.96 (-2.45)**	-190.91 (-2.61)***
R^2	0.10	0.85	0.86	0.88	0.88	0.91	0.91	0.91	0.91
# of Observations	117	117	117	117	117	117	117	117	117

z-statistics in parentheses. Time dummies are included.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 3G Random Effects Estimation Results on FDI_1 for Logged Data of Sample 2

$\log(FDI_1)$	Sample 2								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Puni. Cases._1†	-0.030 (-0.45)	-0.033 (-0.48)	-0.040 (-0.58)	-0.039 (-0.57)	-0.044 (-0.72)	-0.046 (-0.75)	-0.040 (-0.64)	-0.054 (-0.88)	-0.048 (-0.77)
GRP per capita_1		1.42 (5.86)***	1.84 (5.17)***	1.70 (3.96)***	1.53 (4.00)***	1.73 (4.93)***	1.80 (5.01)***	1.78 (4.92)***	1.85 (5.03)***
Wage_1			-1.22 (-1.60)	-1.15 (-1.46)	-1.23 (-1.56)	-1.64 (-2.31)**	-1.72 (-2.42)**	-1.66 (-2.30)**	-1.73 (-2.41)**
GIP_1				0.096 (0.57)	-0.18 (-1.04)	-0.15 (-1.11)	-0.15 (-1.09)	-0.15 (-1.11)	-0.15 (-1.10)
Pop. Density_1					0.45 (2.87)***	0.16 (0.63)	0.16 (0.65)	0.17 (0.65)	0.17 (0.67)
Rail. Density_1						-0.29 (-2.13)**	-0.27 (-1.90)*	-0.29 (-2.13)**	-0.27 (-1.90)*
Road Density_1						0.65 (2.79)***	0.64 (2.75)***	0.62 (2.67)***	0.61 (2.61)***
Illiterate Rate_1							0.16 (0.78)		0.17 (0.81)
Productivity_1								-0.16 (-0.93)	-0.16 (-0.97)
Constant	-4.23 (-18.08)***	-15.86 (-7.83)***	-9.13 (-2.02)**	-9.28 (-2.03)**	-7.83 (-1.65)*	-5.05 (-1.20)	-5.44 (-1.24)	-3.72 (-0.86)	-4.11 (0.91)
R^2	0.011	0.49	0.49	0.50	0.64	0.70	0.70	0.70	0.70
# of Observations	117	117	117	117	117	117	117	117	117

z-statistics in parentheses. Time dummies are included. †All the independent variables are in logs.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 3H Random Effects Estimation Results on FDI_2 for Logged Data of Sample 2

$\log(FDI_2)$	Sample 2								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Puni. Cases._1†	-0.025 (-0.38)	-0.037 (-0.52)	-0.045 (-0.64)	-0.043 (-0.63)	-0.048 (-0.78)	-0.050 (-0.81)	-0.045 (-0.71)	-0.057 (-0.93)	-0.052 (-0.82)
GRP per capita_1		2.35 (9.53)***	2.82 (7.70)***	2.65 (6.22)***	2.50 (6.53)***	2.68 (7.60)***	2.75 (7.58)***	2.72 (7.52)***	2.79 (7.53)***
Wage_1			-1.39 (-1.81)*	-1.29 (-1.64)*	-1.37 (-1.74)*	-1.76 (-2.43)**	-1.83 (-2.53)**	-1.77 (-2.42)**	-1.84 (-2.53)**
GIP_1				0.12 (0.72)	-0.14 (-0.82)	-0.11 (-0.80)	-0.11 (-0.78)	-0.11 (-0.80)	-0.11 (-0.78)
Pop. Density_1					0.42 (2.70)***	0.12 (0.48)	0.13 (0.50)	0.13 (0.50)	0.13 (0.52)
Rail. Density_1						-0.27 (-1.95)*	-0.25 (-1.73)*	-0.27 (-1.94)*	-0.25 (-1.73)*
Road Density_1						0.65 (2.78)***	0.64 (2.73)***	0.63 (2.66)***	0.62 (2.61)***
Illiterate Rate_1							0.16 (0.72)		0.16 (0.74)
Productivity_1								-0.14 (-0.83)	-0.15 (-0.87)**
Constant	4.03 (13.40)***	-15.25 (-7.40)***	-7.62 (-1.69)*	-7.82 (-1.72)*	-6.46 (-1.36)	-3.60 (-0.84)	-3.97 (-0.89)	-2.41 (-0.55)	-2.77 (-0.61)
R^2	0.0051	0.72	0.73	0.73	0.80	0.83	0.83	0.83	0.83
# of Observations	117	117	117	117	117	117	117	117	117

z-statistics in parentheses. Time dummies are included. †All the independent variables are in logs.
*significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Appendix 4 FGLS Regression Results for Level Data of Sample 1 and 2

Table 4A FGLS Regression Results on FDI_1 for Level Data of Sample 1

FDI_1	Sample 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Env. Inv._1	-0.00041 (-2.20)**	-0.00040 (-2.23)**	-0.00038 (-1.99)**	-0.00036 (-1.89)*	-0.00037 (-2.02)**	-0.00037 (-1.99)**	-0.00038 (-1.99)**	-0.00038 (-2.04)**	-0.00039 (-2.03)**
GRP per capita_1		7.82e-07 (0.72)	7.10e-07 (0.59)	7.54e-08 (0.05)	-4.91e-07 (-0.34)	9.17e-07 (0.65)	9.72e-07 (0.67)	9.11e-07 (0.64)	9.97e-07 (0.69)
Wage_1			1.84e-07 (0.10)	5.40e-07 (0.30)	5.21e-07 (0.31)	-3.67e-06 (-2.00)**	-3.37e-06 (-1.83)*	-3.56e-06 (-1.96)**	-3.29e-06 (-1.80)*
GIP_1				1.99e-06 (0.92)	1.65e-06 (0.78)	4.33e-06 (2.03)**	4.22e-06 (2.01)**	4.30e-06 (2.02)**	4.20e-06 (2.00)**
Pop. Density_1					0.000028 (1.19)	0.000028 (1.31)	0.000027 (1.25)	0.000028 (1.28)	0.000026 (1.21)
Rail. Density_1						-1.18 (-3.29)***	-1.19 (-3.33)***	-1.17 (-3.24)***	-1.18 (-3.28)***
Road Density_1						0.0105 (1.47)	0.0101 (1.37)	0.0103 (1.44)	0.0099 (1.36)
Illiterate Rate_1							-0.000084 (-0.47)		-0.00010 (-0.57)
Productivity_1								-1.06e-08 (-0.33)	-7.07e-09 (-0.24)
Constant	0.058 (13.28)***	0.049 (3.57)***	0.048 (3.17)***	0.051 (3.32)***	0.036 (2.09)**	0.12 (4.00)***	0.12 (4.02)***	0.12 (3.97)***	0.12 (4.00)***
Wald χ^2	1814.28	1776.79	1806.09	1777.99	2012.32	2250.85	2290.66	2253.32	2288.52
# of Observations	149	149	149	149	149	149	149	149	149

z-statistics in parentheses. Time dummies are included.
* significant at 10% level; **significant at 5% level; *** significant at 1% level.

Table 4B FGLS Regression Results on FDI_2 for Level Data of Sample 1

FDI_2	Sample 1								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Env. Inv._1	-2.00 (-1.36)	-1.68 (-1.39)	-1.76 (-1.44)	-1.18 (-0.97)	-0.99 (-1.03)	-1.29 (-1.84)*	-1.54 (-2.05)**	-1.21 (-1.68)*	-1.41 (-1.82)*
GRP per capita_1		0.045 (4.47)***	0.042 (4.13)***	0.025 (2.18)**	0.014 (1.39)	0.028 (2.60)***	0.029 (2.66)***	0.028 (2.60)***	0.028 (2.62)***
Wage_1			0.010 (1.06)	0.019 (1.97)**	0.015 (1.53)	-0.0056 (-0.52)	-0.0051 (-0.47)	-0.0047 (-0.44)	-0.0037 (-0.35)
GIP_1				0.046 (3.47)***	0.045 (3.55)***	0.056 (4.68)***	0.055 (4.72)***	0.056 (4.69)***	0.055 (4.76)***
Pop. Density_1					0.51 (2.14)**	0.55 (2.55)**	0.54 (2.49)**	0.55 (2.53)**	0.54 (2.49)**
Rail. Density_1						-6902.47 (-3.37)***	-6603.44 (-3.21)***	-7025.18 (-3.40)***	-6773.02 (-3.27)***
Road Density_1						98.16 (2.13)**	105.39 (2.16)**	99.50 (2.15)**	105.45 (2.16)**
Illiterate Rate_1							-0.82 (-0.87)		-0.73 (-0.76)
Productivity_1								0.00011 (0.65)	0.00012 (0.82)
Constant	605.00 (19.34)***	72.43 (0.56)	36.01 (0.27)	122.79 (0.90)	-114.71 (-0.56)	201.34 (0.92)	183.13 (0.84)	199.11 (0.91)	182.89 (0.84)
Wald χ^2	1561.32	1935.00	2057.03	2437.06	2574.18	3247.65	3247.34	3247.45	3248.43
# of Observations	149	149	149	149	149	149	149	149	149

z-statistics in parentheses. Time dummies are included.
* significant at 10% level; **significant at 5% level; *** significant at 1% level.

Table 4C FGLS Regression Results on FDI_1 for Level Data of Sample 2

FDI_1	Sample 2								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Puni. Cases._1	0.00019 (0.92)	0.00017 (0.56)	0.000013 (0.05)	4.27e-06 (0.02)	9.44e-06 (0.04)	-0.00025 (-0.83)	-0.00027 (-0.77)	-0.00011 (-0.34)	-0.00003 (-0.08)
GRP per capita_1		9.55e-07 (0.92)	1.43e-06 (1.34)	1.34e-06 (1.12)	4.61e-07 (0.38)	8.41e-07 (0.74)	1.13e-06 (0.92)	7.27e-07 (0.70)	6.69e-07 (0.57)
Wage_1			-1.68e-06 (-1.30)	-1.82e-06 (-1.34)	-1.83e-06 (-1.48)	-5.69e-06 (-4.30)***	-6.33e-06 (-4.68)***	-7.05e-06 (-5.94)***	-7.00e-06 (-4.91)***
GIP_1				3.08e-07 (0.17)	6.56e-07 (0.36)	3.14e-07 (0.18)	2.00e-07 (0.11)	7.69e-07 (0.48)	1.38e-06 (0.81)
Pop. Density_1					0.000037 (1.96)**	0.000025 (1.42)	0.000024 (1.32)	0.000027 (1.76)*	0.000032 (1.89)*
Rail. Density_1						-0.66 (-2.52)**	-0.64 (-2.27)**	-0.62 (-2.56)***	-0.59 (-2.18)**
Road Density_1						0.0449 (7.83)***	0.045 (7.64)***	0.045 (9.37)***	0.038 (5.80)***
Illiterate Rate_1							0.000050 (0.34)		0.000041 (0.27)
Productivity_1								-5.43e-08 (-4.69)***	-5.45e-08 (-4.40)***
Constant	0.051 (21.00)***	0.039 (2.90)***	0.045 (3.17)***	0.047 (3.20)***	0.028 (1.66)*	0.072 (2.83)***	0.071 (2.68)***	0.081 (3.44)***	0.079 (3.13)***
Wald χ^2	2393.92	2432.05	2544.05	2421.58	2680.93	5911.27	10190.41	19301.06	5133.89
# of Observations	117	117	117	117	117	117	117	117	117

z-statistics in parentheses. Time dummies are included.
* significant at 10% level; **significant at 5% level; *** significant at 1% level.

Table 4D FGLS Regression Results on FDI_2 for Level Data of Sample 2

FDI_2	Sample 2								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Puni. Cases._1	-4.58 (-1.39)	-3.13 (-0.87)	-4.20 (-1.15)	0.24 (0.06)	-0.36 (-0.15)	-2.37 (-0.75)	-2.70 (-0.82)	-1.17 (-0.36)	-1.50 (-0.43)
GRP per capita_1		0.047 (4.17)***	0.052 (4.39)***	0.027 (2.13)**	0.021 (2.15)**	0.033 (3.15)***	0.037 (3.30)***	0.032 (3.00)***	0.036 (3.14)***
Wage_1			-0.011 (-1.40)	0.0023 (0.31)	0.0045 (0.74)	-0.010 (-1.10)	-0.010 (-1.03)	-0.017 (-1.66)*	-0.016 (-1.48)
GIP_1				0.055 (4.28)***	0.044 (3.89)***	0.045 (3.50)***	0.044 (3.32)***	0.046 (3.60)***	0.044 (3.35)***
Pop. Density_1					0.48 (2.64)***	0.62 (3.19)***	0.60 (2.96)***	0.61 (3.30)***	0.60 (3.12)***
Rail. Density_1						-3469.60 (-2.01)**	-3436.71 (-1.93)*	-3413.34 (-2.04)**	-3394.77 (-1.93)*
Road Density_1						204.09 (4.31)***	212.56 (4.25)***	226.34 (4.52)***	228.46 (4.35)***
Illiterate Rate_1							-1.32 (-1.00)		-0.66 (-0.53)
Productivity_1								-0.00016 (-2.04)**	-0.00015 (-1.61)
Constant	560.24 (26.69)***	-23.36 (-0.16)	-1.09 (-0.01)	139.24 (0.96)	-163.85 (-0.90)	-253.81 (-1.18)	-287.68 (-1.30)	-191.30 (-0.89)	-239.71 (-1.08)
Wald χ^2	2042.74	2413.07	2414.80	2581.75	3360.43	4576.75	4485.48	4642.64	4522.43
# of Observations	117	117	117	117	117	117	117	117	117

z-statistics in parentheses. Time dummies are included.
* significant at 10% level; **significant at 5% level; *** significant at 1% level.