Does Environmental Governance Matter for Foreign Direct Investment? Testing the Pollution Haven Hypothesis for Indian States

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This paper attempts to examine the role of environmental governance on foreign direct investment by testing the pollution haven hypothesis for 21 Indian states for the period 2002–2010. To test for the hypothesis, this study computes an abatement expenditure index adjusted for industrial composition at the state level using Annual Survey of Industries plant-level data. The methodology used is based on that proposed by Levinson (2001). The index compares actual pollution abatement expenditures in a particular state, unadjusted for industrial composition, to predicted abatement expenditures in the same state. (The predictions are based on nationwide abatement expenditures by industry and each state's industrial composition.) If the adjusted index is low for a state, it implies that the state has poor environmental governance, which would be expected to induce foreign firms to invest. However, the results do not find any evidence of the pollution haven hypothesis in the Indian context. Other infrastructure and market-access-related variables are more important in influencing a foreign firm's investment decisions than environmental stringency.

Keywords: abatement expenditure, environmental governance, India, pollution haven hypothesis
JEL codes: F18, F23

I. Introduction

Over the past 3 decades, developing economies have witnessed a significant inflow of foreign direct investment (FDI). Total FDI flows to developing economies as a share of the world total increased from 17% in the early 1990s to 52% in 2013 (UNCTAD 2013). FDI inflows to developing economies were buttressed by the liberalization process embarked on by many economies in the early 1990s and

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the high growth rates that resulted from such reforms. Many host economies also devised suitable incentives to attract FDI. Another reason often cited in the literature is that relatively lenient environmental regulations in an economy can attract FDI. This is a process that has been described as a "race to the bottom" (Grossman and Krueger 1991, Xing and Kolstad 1998). Keller and Levinson (2002) posited that a key factor influencing a foreign firm's choice of location could be the compliance costs of local environmental regulations.

One of the ways in which compliance costs can be measured is to look at how much firms are spending on pollution abatement. If these costs are aggregated across firms in a particular location, they reflect the environmental governance aspects in that location. All other things being equal, a firm in one Indian state having higher pollution abatement expenditures in comparison with another firm in the same sector in a different state indicates more stringent environmental governance in the first state. This paper seeks to identify the impact of actual abatement expenditures on the location choices of foreign firms in India by computing an index of abatement expenditure for firms in each state using plant-level data from the Annual Survey of Industries for the period FY2002–2003 to FY2009–2010.[1]

Earlier studies attempting to measure environmental regulations have used either pollution intensity (see, for example, Mani, Pargal, and Huq 1997; Jha and Gamper-Rabindran 2004; Dietzenbacher and Mukhopadhyay 2007) or pollution abatement costs divided by one of the following: total employment, gross state domestic product (GSDP), or a state's manufacturing output without controlling for industry characteristics (see, for example, Friedman, Gerlowski, and Silberman 1992; Duffy-Deno 1992; Crandall 1993). A key problem with such measures is that they fail to adjust for industrial composition. States that are home to pollution-intensive industries such as steel, fertilizers, and chemicals will incur relatively high pollution abatement costs whether or not they have stringent regulations. Thus, pollution abatement costs that account for industrial composition are needed to assess a state's regulatory stringency.

In this paper, I compute industrial-composition-adjusted abatement costs using unit-level data from the Annual Survey of Industries for the period FY2001–2002 to FY2009–2010. The data are aggregated at the National Industrial Classification (NIC) 3-digit and 2-digit levels, and then computed as an index. Subsequently, I use panel data techniques to test for the pollution haven hypothesis for 21 major states in India. The results do not validate the pollution haven hypothesis in the Indian context.

The remaining paper is organized as follows. Section II explores how FDI and the environment are linked. Section III discusses measurements of

[1] In India, a fiscal year (FY) is the period between 1 April and 31 March. FY2002–2003 implies the fiscal year running from 1 April 2002 to 31 March 2003.

environmental governance in the literature. This is followed by an explanation of the methodology used to assess the role of environmental governance on FDI in different Indian states in section IV, which also explains the methodology used to construct the industrial-composition-adjusted environmental governance index. Descriptive statistics and other control variables are given in section V. Section VI reports the estimation results. The paper concludes with a discussion of the policy implications in section VII.

II. The Relationship between Foreign Direct Investment and the Environment

The relationship between FDI and the environment in the literature can be grouped into three main strands: (i) environmental effects of FDI flows, (ii) competition for FDI and its effects on environmental standards, and (iii) cross-border environmental performance (Pazienza 2015). Despite extensive empirical work and case study evidence, there is still not a clear understanding of the associated phenomena (Erdogan 2014, Pazienza 2015).

With respect to the environmental effects of FDI flows, Pazienza (2015) argues that greater integration of the world economy through increased investment flows (and trade) and mobility of factors will impact the environment through the (i) scale effect (moving from a small to global scale), (ii) technique effect (adoption of cleaner technology), and (iii) composition effect (a shift in preferences to cleaner products and greater environmental protections with increases in income) (Kathuria 2008, Pazienza 2015). The net of these three effects is reflected in the ultimate impact on the environment.

The literature exploring the relationship between FDI and environmental regulations discusses two distinct phenomena: (i) the pollution haven hypothesis, and (ii) the "race to the bottom" or "regulatory chill hypothesis." In the context of FDI, the pollution haven hypothesis emphasizes the possibility that investors seek economies in which to locate with fewer regulatory requirements and therefore cheaper costs of operation for industries. Interestingly, most authors who focus on the pollution haven hypothesis have adopted an empirical approach (see Dean 1992 for a survey taken before 1990 and Erdogan 2014 for a recent survey).

This strand in the literature has often been used to oppose globalization given the impacts of foreign investment on local environmental standards. Generally known as the "race to the bottom" or "regulatory chill effect," the argument states that foreign firms may induce governments to reduce local environmental standards or freeze them at suboptimal levels (Erdogan 2014). Evidence shows that in the People's Republic of China, provinces compete intensely for foreign capital by offering promises of preferential treatment to potential foreign investors, which can include a tacit (or explicit) commitment to lax enforcement of environmental standards (Esty and Gentry 1997). In resource-seeking industries, where products are homogeneous, minor cost differences can translate into large gains in market

share. Consequently, foreign investors occasionally exert considerable pressure on recipient economies (Erdogan 2014). These competitive pressures can also operate in the opposite direction as investors insist on higher environmental standards. For example, foreign investors in Costa Rican banana production have insisted upon the application of high environmental standards as their European customers demand an environmentally sound product (Gentry 1999, Erdogan 2014).

The focus of the present study is on testing for the pollution haven hypothesis in Indian states rather than on the responsiveness of environmental standards to FDI.

III. Pollution Abatement Costs as a Measure of Environmental Governance

Three broad methods have been used in the literature to characterize environmental stringency (Keller and Levinson 2002): (i) qualitative indexes of regulatory stringency, (ii) quantitative measures of enforcement on the part of states and economies, and (iii) compliance costs incurred by plants. Crandall (1993) and Friedman, Gerlowski, and Silberman (1992) were among the first to use industrial-composition-unadjusted pollution abatement costs (as a share of either GSDP or employment) as a measure of environmental regulation. Later studies by Levinson (2001) and Keller and Levinson (2002) used industrial-composition-adjusted pollution abatement costs to measure the level of environmental regulation.

Though variation in state-level environmental stringency is less than variation across economies, state-level variation provides three benefits. First, there are much better data on a state's environmental costs than on costs at the international level. Second, states are more comparable with one another than different economies on nonenvironmental parameters (Keller and Levinson 2002). In cross-economy studies, costs are different due to prevailing market conditions in different economies rather than purely the result of abatement-related costs. This bias is less if an analysis is conducted across states within the same economy. Third, most studies on decision-making processes with regard to location show that environmental regulations have a very small role in these decisions (OECD 1997). Factors like political stability, size and growth potential of markets, access to other markets, labor costs, ease of repatriation of profits, transparency and predictability of administrative and legal frameworks, cultural affinity, infrastructure, and quality of life are more important (Erdogan 2014). Many of these factors are the same across states within an economy; thus, the major key variable influencing the locational choices of foreign firms would be environmental costs.

The use of pollution abatement (operating) expenses as a measure of abatement costs is preferred for two reasons (Keller and Levinson 2002). First, operating expenses for pollution abatement equipment are easier to identify separately. Abatement capital expenses may be difficult to disentangle from other investments in the production process that have little to do with pollution abatement. Second, abatement capital expenditures are highest when new investment takes

place. This implies that Indian states with thriving economies such as Gujarat and Tamil Nadu that have sufficient manufacturing investment also tend to have high abatement capital expenses regardless of the stringency of their environmental laws. Moreover, operating costs show a more consistent year-to-year pattern (Levinson 2001), while capital expenses can vary in line with industry business cycles. This implies that pollution abatement expenditure can be used as a proxy variable for environmental regulation. Incidentally, the Annual Survey of Industries includes the following three variables: (i) expenses incurred in the repair and maintenance of pollution equipment (which was discontinued in 2008), (ii) gross addition of pollution control equipment expenses during the year, and (iii) gross closing expenses of pollution control equipment at the end of the year.[2] In this paper, I use the latter two measures (gross addition expenses and gross closing expenses on pollution control equipment) to compute an index of environmental governance.

IV. Methodology

A. Measuring Environmental Governance

Friedman, Gerlowski, and Silberman (1992); Crandall (1993); and List and Co (2000) used measures like pollution abatement costs divided by either total employment or GSDP. A key problem with such measures is that they fail to adjust for industrial composition. Based on Levinson (2001), I compute an industry-adjusted abatement expenditure index for 25 Indian states for different time periods to see if FDI inflows are affected by any variation in abatement expenditure (reflecting the degree of environmental governance). The index compares actual pollution abatement expenditure in a particular state, unadjusted for industrial composition, to the predicted abatement expenditure in the same state. These predictions are based solely on economywide abatement expenditures by industry and each state's industrial composition. This paper improves on Levinson (2001) and Keller and Levinson (2002) by computing industry-adjusted abatement expenditure at the NIC 3-digit level instead of the NIC 2-digit level.

Let the actual abatement expenditure per unit of output be denoted as follows:[3]

$$S_{st} = \frac{P_{st}}{Y_{st}} \tag{1}$$

[2] Neelakanta (2015) is the only study in the Indian context that used repair and maintenance expenses to compute an abatement cost index for 2 years, 2002 and 2005. There seems to be a problem with the computations as the industry-adjusted abatement cost index is well below 1 for all Indian states. Since it is a relative measure, the states with higher abatement costs should have an index value greater than 1.

[3] This paper uses the same notations as used by Levinson (2001) and Keller and Levinson (2002).

where P_{st} is pollution abatement expenditure in state s in year t, and Y_{st} is the manufacturing sector's contribution to the GSDP of state s in year t. S_{st} is the unadjusted measure of compliance costs. By failing to adjust for the industrial composition of each state, it probably overstates the compliance costs of states with more pollution-intensive industries and understates the costs in states with relatively clean industries. To adjust for industrial composition, compare equation (1) to the predicted pollution abatement expenditure per unit of GSDP in state s:

$$\hat{S}_{st} = \frac{1}{Y_{st}} \sum_{i=1}^{N} \frac{Y_{ist} P_{it}}{Y_{it}} \tag{2}$$

where N is the total number of industries. In India's case, industries are indexed from 15 through 36 (covering 22 industries) following the 2-digit manufacturing NIC codes. Y_{ist} is the contribution of industry i to the GSDP of state s at time t, Y_{it} is the economywide contribution of industry i to national GDP, and P_{it} is the economywide pollution abatement expenditure of industry i. In other words, S_{st} is the weighted average pollution abatement expenditure (per unit of GSDP), where the weights are the relative shares of each industry in state s at time t. To construct the industry-adjusted index of a state's stringency, S^*_{st}, I compute the ratio of actual expenditures in equation (1) to the predicted expenditures in equation (2):

$$S^*_{st} = \frac{S_{st}}{\hat{S}_{st}} \tag{3}$$

when S^*_{st} exceeds 1, industries in state s at time t spend more on pollution abatement than similar industries in other states. When S^*_{st} is less than 1, industries in state s at time t spend less on pollution abatement. By implication, states with large values of S^*_{st} have relatively more stringent regulations than states with small values of S^*_{st} (Levinson 2001).

B. Hypothesis

A low adjusted index score for a state implies that the state has poor environmental governance, which would induce foreign firms to invest. In other words, this study tests for the pollution haven hypothesis; that is, a negative relationship between FDI and environmental governance. To test for this hypothesis, I have used the following equation that relates FDI to environmental governance after controlling for several state-specific effects such as net state domestic product (NSDP) per capita, share of manufacturing in NSDP, quality of infrastructure, and geographic dummy (proximity to coast):

$$FDI_{s,t} = \alpha + \beta S^*_{s,t-1} + X'_{s,t}\gamma + \varepsilon_{s,t} \tag{4}$$

β is the estimated parameter of a state's abatement expenditure index and is predicted to have a negative influence on FDI inflows; that is, the more stringent a state's environmental governance, the smaller its FDI inflows. The index also uses a lag given that a firm's decision to invest, especially with regard to FDI, is not instantaneous. Rather, an established pattern of governance may induce a firm to invest in the subsequent period. γ's are the coefficients of control variables. The control variables included are per capita net income of the state (NSDPc); share of manufacturing in NSDP; quality of infrastructure, especially the availability of electricity as measured by installed capacity (Instlcap) and transmission and distribution (T&D) losses; investment received by the state that has been implemented through an industrial entrepreneurs memorandum (IEM); availability of human capital (Literacy); and proximity to the coast. The likely effects of these control variables are summarized below.

C. Control Variables

Market size and demand

A bigger market attracts FDI (Kathuria, Ray, and Bhangaonkar 2015), due to significant potential demand and economies of scale (Walsh and Yu 2010). Market size is measured by NSDPc. A larger market size is hypothesized to have a positive sign (List and Co 2000; Keller and Levinson 2002; Fredriksson, List, and Millimet 2003; Drukker and Millimet 2007). The variable is used in log form.

Manufacturing share

NSDP accrues from the primary (agriculture), secondary (manufacturing), and tertiary (services) sectors. The manufacturing sector is relatively more capital and energy intensive in comparison with the agriculture and service sectors. A large manufacturing share in a state's NSDP reflects its status as an industrial state, which is likely to attract more FDI. Therefore, the current study uses the share of manufacturing in NSDP (Manushr) as a control variable.

Availability of power

Due to the significant capital investment required, a potential foreign investor often assesses whether a state has sufficiently available power before making an initial investment. Relatively high installed capacity implies the likelihood of available power, which is also likely to attract more FDI (Mukherjee 2011). Although installed capacity is often a good measure of power availability, this may not be the case in the Indian context where many states have T&D losses as high as 50% (Srivastava and Kathuria 2014). Actual power availability is more important

for an investor than installed capacity. The level of T&D losses also indicates the effectiveness of industrial regulations in the state. Thus, I take both installed capacity (Instlcap) and T&D losses as control variables impacting the likelihood of foreign firms investing in a state. A state with low installed capacity and high T&D losses is expected to have low levels of FDI.

Proximity to a coast

Many foreign firms invest in developing economies due to cheap labor and to establish a manufacturing hub for exporting and participation in worldwide supply chains (Zhang and Song 2000). From a foreign investor's point of view, a manufacturing hub requires international connectivity in the form of a seaport so that components and final goods can be imported and exported easily. Proximity to a port reduces the transaction costs of the producer. Therefore, a state that is home to a seaport will attract more FDI (Neelakanta, Gundimeda, and Kathuria 2013). A dummy variable that is equal to 1 if a state has a seaport and 0 otherwise is used.

Clustering effect

An existing stock of investment in a state can generate positive spillovers through linkages (Kathuria 2016). It is also indicative of conducive conditions for investment. The IEM implemented in each state may capture this clustering effect as it reflects the readiness of a state to attract investment.[4] The IEM is also a reflection of better institutional characteristics like good governance, political stability, low levels of corruption, and ease of doing business. We hypothesize that the more the IEM is implemented in a state, the more FDI it will attract unless the congestion costs exceed the cost of relocating (Adsera and Ray 1998).

Human capital effect

Dunning (1998) has argued that though FDI in developing economies is often prodded by traditional factors—such as market size, lower input (labor) costs, and the cheap availability of natural resources—physical and human infrastructure, along with the host economy's macroeconomic environment and institutional framework, play a crucial role. At the state level, physical infrastructure is reflected by the availability of power and *pucca* (permanent) roads, while the literacy rate indicates the availability of human capital. The present study controls for the human capital effect through the state-specific literacy rate (Literacy).

[4]IEM is an application for acknowledgment of a unit not requiring any kind of license. The more IEMs implemented in a state, the more units in the state.

Time dummy

As my data are for 9 years, a time dummy (TIME) is employed that accounts for any macroeconomic changes occurring during the period that would affect all Indian states.

D. Data

One key problem to undertake the empirical analysis is the nonavailability of appropriate FDI data. I need state-wise FDI in the manufacturing sector. However, data on FDI inflows available from the Reserve Bank of India (RBI) and the Department of Industrial Policy & Promotion under the Ministry of Commerce and Industry are either by sector or by RBI region. RBI regions correspond to regional offices, and cover several states.[5] To solve this problem, I use responses to questions raised by members of Parliament on state-wise FDI. Data are summarized in Table A1. The data for all other variables were collected from different government agencies. The data for NSDP per capita and manufacturing share were obtained from the Central Statistical Organisation, power availability and T&D losses from the Ministry of Power and various reports of the Planning Commission, and IEM data from the Ministry of Industry and the Handbook of Statistics on Indian Economy. State-wise literacy rates were taken from 2001 and 2011 census data.

E. Econometric Specification

For the given objective, several estimation models exist. However, a simple pooled ordinary least squares (OLS) model would yield biased and inconsistent parameters if time-invariant covariates are omitted. If omitted time-invariant variables are correlated with the environmental governance variable, a fixed effects (FE) model will provide a consistent and unbiased estimate of the parameters while simultaneously controlling for unobserved unit heterogeneity. On the other hand, if these omitted time-invariant variables are uncorrelated with the environmental governance variable, a random effects (RE) model would provide a more efficient estimate than an FE model. The validity of these assumptions is examined by a Hausman test. In case of the presence of autocorrelation and heteroskedasticity, I will be using the generalized least squares method that corrects for these two problems. For the estimation purpose, I limit the sample to only 21 states and union territories for which data are available for all the variables for the period FY2002–2003 to FY2009–2010.[6] This is because many northeastern states and

[5] For example, the region Bhopal covers the states of Madhya Pradesh and Chhattisgarh.

[6] A union territory is an area under the direct administration of the Government of India. A union territory in India is similar in legal status to the District of Columbia in the United States. Though analysis in this paper includes both states and union territories, they are generally addressed collectively as "states."

union territories have neither received FDI nor are any consistent data available for their T&D losses or power consumption, thereby restricting the number of states and union territories for analysis to 21.[7]

The final econometric model estimated is

$$\ln FDI_{st} = \alpha + \beta S^{*}_{s,t-1} + \gamma_1 \ln NSDPc_{s,t} + \gamma_2 InstlCap_{s,t} + \gamma_3 T\&DLoss_{s,t} + \gamma_4 Manushr_{s,t} + \gamma_5 \ln IEM_{s,t} + \gamma_6 Coastal_s + \gamma_7 Literacy_s + \gamma_{8-15} Time_t + \varepsilon_{s,t} \quad (5)$$

The estimations were carried out in STATA 12.

V. Descriptive Statistics

Table 1 presents state-wise summary statistics for abatement costs after controlling for industrial composition (S^{*}) at the 3-digit and 2-digit NIC levels (equation 3) and without controlling for industrial composition (S) (equation 1). The correlation between adjusted (3-digit NIC data) and unadjusted abatement expenditure index is 0.9.

From Table 1, it can be inferred that several states which appear to have higher abatement expenditures as per the unadjusted index have a much lower ranking once industrial composition is accounted for. States like West Bengal and Meghalaya, which are among the top five in terms of unadjusted pollution abatement expenditure, get a much lower ranking once industrial composition is accounted for. Similarly, states like Uttarakhand and Jharkhand have a higher ranking after controlling for industrial composition. This implies that using the unadjusted measure of compliance would give a misleading picture of some states' relative stringency. Column 2 of the table gives adjusted abatement expenditure using a 2-digit NIC code. The rankings and values hardly change. The correlation between the two is 0.99. Table 1 also indicates that there are nine states for which industry-adjusted abatement expenditure is greater than 1, implying that they are spending much more than their industrial composition suggests.

Table 2 gives the trend of environmental stringency measures over three periods: period 1 (2002–2004), period 2 (2005–2007), and period 3 (2008–2010). From Table 2, it can be seen that there are six states—Andhra Pradesh, Punjab, Rajasthan, Odisha, Goa, and Haryana—which show an increasing environmental stringency trend during the entire 9-year period under review. On the other hand, there are eight states—Assam, Chhattisgarh, Gujarat, Delhi, Uttar Pradesh,

[7] To reflect popular sentiments, the official names of some states have recently been changed. For example, Pondicherry was renamed Puducherry in 2006, Uttaranchal was renamed Uttarakhand in 2007, and Orissa was renamed Odisha in 2011. This study refers to all states using their current names only.

Table 1. **Adjusted versus Unadjusted Abatement Cost Index Averages, 2001–2009**

State Code	State Name	Abatement Cost Index S^* (3 digit)	Abatement Cost Index S^* (2 digit)	Unadjusted Index, S
2	Himachal Pradesh (HP)	0.309	0.284	0.00127
3	Punjab (Pb)	0.640	0.605	0.001934
5	Uttrakhand (Uk)	1.568 **(4)**	1.469	0.005045
6	Haryana (Hr)	0.570	0.528	0.001081
8	Rajasthan (Rj)	1.077	1.099	0.005496
9	Uttar Pradesh (UP)	1.267	1.282	0.004616
10	Bihar (Bi)	0.098	0.104	0.000483
20	Jharkhand (Jh)	1.642 **(3)**	1.401	0.004923
21	Odisha (Or)	2.165 **(1)**	2.263	0.01251 **(1)**
19	West Bengal (WB)	1.447	1.476	0.00646 **(4)**
11	Sikkim (Si)	0.269	0.252	0.001755
13	Nagaland (Na)	0.002	0.001	0.000004
14	Manipur (Ma)	0.002	0.002	0.000013
16	Tripura (Tr)	0.000	0.000	0.000000
17	Meghalaya (Mg)	0.829	0.789	0.00647 **(3)**
18	Assam (As)	0.062	0.069	0.000424
22	Chhattisgarh (Ch)	1.287	1.242	0.005559
23	Madhya Pradesh (MP)	0.966	0.914	0.003674
24	Gujarat (Gj)	0.994	0.993	0.004878
27	Maharashtra (Mh)	0.875	0.851	0.00291
30	Goa (Go)	0.388	0.390	0.001821
28	Andhra Pradesh (AP)	1.467 **(5)**	1.474	0.00643 **(5)**
29	Karnataka (Ka)	2.150 **(2)**	2.176	0.00715 **(2)**
32	Kerala (Kl)	0.911	1.023	0.003778
33	Tamil Nadu (TN)	0.663	0.691	0.002045
35	Andaman and N. Island (ANN)	0.000	0.000	0.000000
4	Chandigarh (Cg)	3.223	2.910	0.007468
26	Dadra and Nagar Haveli (DNH)	0.091	0.086	0.000349
25	Daman and Diu (DD)	0.168	0.144	0.000431
7	Delhi (Dl)	0.128	0.118	0.000206
34	Puducherry (Po)	0.097	0.082	0.000317
	Average for lowest 5 states	0.035	0.033	
	Average for highest 5 states	1.772	1.760	

Notes: State codes 2, 3, 5, 6, and 8 are in the North; 9, 10, and 19–21 are in the East; 11, 13, 14, and 16–18 are in the Northeast; 22 and 23 are in the Central part; 24, 27, and 28 are in the West; 28, 29, 32, and 33 are in the South; and 4, 7, 25, 26, 34, and 35 are union territories of India.
Source: Author's calculations.

Uttarakhand, and Dadra and Nagar Haveli—which started with a high level of environmental stringency but became more lenient during the review period. Of the remaining states, eight experienced a decline in the value of the index with an increase in the middle period (2005–2007), while five showed increased stringency over the entire 9-year period with a decline in the value of the index in the middle period. The last row of Table 2 gives the average value of the abatement index for all three periods, which indicates that there is hardly any change in environmental stringency across all states over the entire review period.

Table 2. **Adjusted Abatement Cost Index, Period-Wise Analysis**

State	Period 1 (2002–2004)	Period 2 (2005–2007)	Period 3 (2007–2010)	% Change from Period 1 to Period 3	Environmental Stringency Pattern
Andhra Pradesh	1.315	1.320	1.767	34.4	Increasing
Assam	0.071	0.067	0.049	−30.9	Decreasing
Bihar	0.149	0.070	0.077	−48.5	Declined
Chandigarh	3.932	3.959	1.779	−54.8	Declined
Chhattisgarh	1.379	1.298	1.184	−14.1	Decreasing
Dadra and Nagar Haveli	0.152	0.062	0.058	−62.0	Decreasing
Daman and Diu	0.228	0.133	0.142	−37.6	Declined
Delhi	0.179	0.135	0.069	−61.3	Decreasing
Goa	0.236	0.315	0.612	159.1	Increasing
Gujarat	1.115	1.016	0.850	−23.7	Decreasing
Haryana	0.479	0.571	0.659	37.6	Increasing
Himachal Pradesh	0.218	0.193	0.516	136.2	Increased
Jharkhand	1.982	1.188	1.757	−11.3	Declined
Karnataka	2.286	2.410	1.754	−23.3	Declined
Kerala	0.886	0.932	0.916	3.4	Increased
Madhya Pradesh	0.925	0.927	1.047	13.2	Increased
Maharashtra	1.049	0.883	0.693	−33.9	Decreasing
Manipur	0.000	0.000	0.006		Increased
Meghalaya	0.201	1.452	0.834	315.4	Increased
Odisha	1.555	2.273	2.669	71.7	Increasing
Puducherry	0.118	0.086	0.087	−26.4	Declined
Punjab	0.615	0.649	0.658	7.0	Increasing
Rajasthan	0.688	1.227	1.317	91.4	Increasing
Tamil Nadu	0.727	0.597	0.664	−8.7	Declined
Tripura	0.000	0.000	0.000		No change
Uttar Pradesh	1.500	1.153	1.149	−23.4	Decreasing
Uttarakhand	2.342	1.651	0.712	−69.6	Decreasing
West Bengal	1.520	1.390	1.431	−5.9	Declined
Average	0.923	0.838	0.927	0.4	

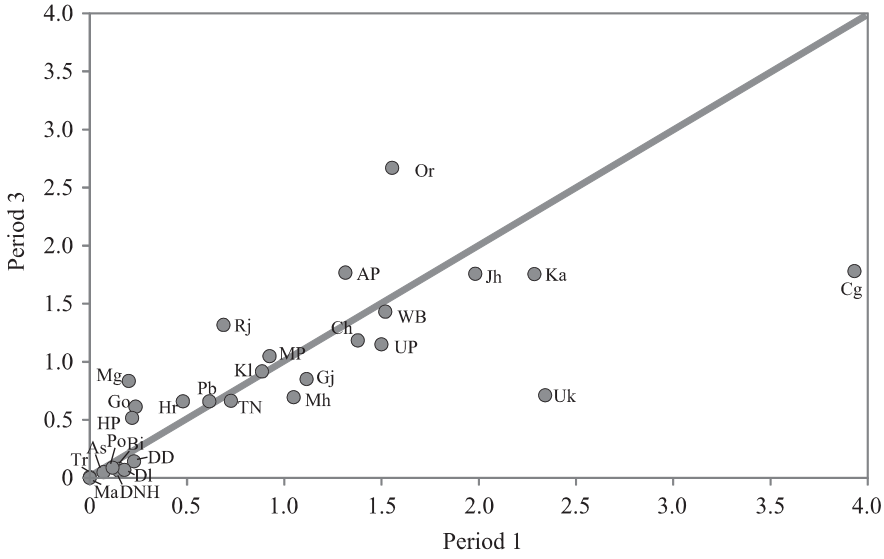
Source: Author's calculations.

Figure 1 gives the plot for environmental stringency measure between period 1 and period 3. States lying above the 45-degree line showed increased stringency between the two periods, while states falling below the line experienced a decline in environmental stringency. With the exception of Andhra Pradesh and Odisha, the stringency of environmental governance declined in all states between period 1 and period 3.

Figure 2, which gives a scatter plot between ln(FDI) and the lagged value of the industry-composition-adjusted abatement cost index, does not indicate any perceptible relation between the two.

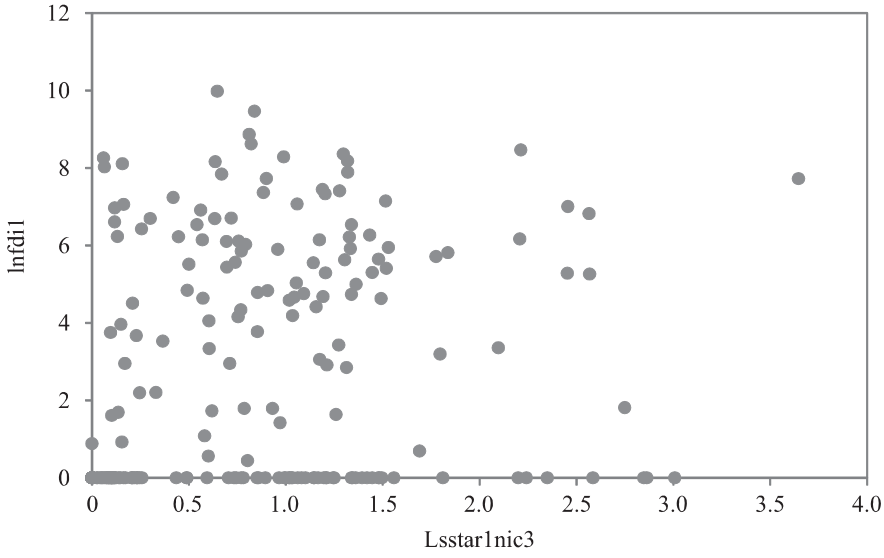
Table 3 reports the mean values of different variables used in the analysis. It shows huge variation in the values for all variables. There are states like Assam, Bihar, and Jharkhand, which hardly received any FDI. On the other hand,

Figure 1. **Change in Industry-Adjusted Abatement Expenditure Index (S^*), 2002–2004 versus 2007–2010**



Note: For actual names of states, please refer to Table 1.
Source: Author's calculations.

Figure 2. **Relation between S^*_{t-1} and ln(FDI)**



Source: Author's calculations.

Table 3. **State-Wise Descriptive Statistics**

State	FDI (INR crore)	NSDP per Capita (INR)	Manufacturing Share (%)	T&D Loss (%)	Installed Capacity (MW)	IEM Implemented (INR crore)	Literacy Rate (%)
Andhra Pradesh	1,235.72 **(5)**	22,343.95	9.52	22.12 **(5)**	6,898.51 **(2)**	988.33	63.88
Bihar	0.02	7,538.11	4.40	41.08	598.98	11.44	54.94
Chhattisgarh	207.36	15,631.20	15.07	31.75	1,650.47	214.89	67.79
Delhi	1,716.93 **(3)**	53,459.52 **(2)**	7.61	37.26	883.87	1.33	83.98 **(3)**
Goa	66.18	55,533.31 **(1)**	29.17 **(2)**	18.03 **(2)**	0.02	32.00	84.67 **(2)**
Gujarat	811.23	26,142.58	25.56 **(3)**	28.10	5,486.40 **(4)**	6,202.11 **(1)**	74.10
Haryana	174.95	33,853.01 **(4)**	16.89 **(5)**	32.76	2,603.76	144.33	72.18
Himachal Pradesh	97.13	28,461.27	9.70	19.47 **(4)**	443.81	1,114.33 **(4)**	80.07 **(5)**
Jharkhand	0.35	13,050.24	21.71 **(4)**	47.13	1,384.47	59.44	60.30
Karnataka	1,253.97 **(4)**	22,083.08	14.14	29.14	5,188.08 **(5)**	438.11	71.02
Kerala	68.99	28,824.82	6.92	27.51	2,080.99	3.11	92.37 **(1)**
Maharashtra	4,462.78 **(1)**	29,134.55	16.57	33.59	10,254.19 **(1)**	1,297.22 **(3)**	79.85
Madhya Pradesh	38.89	12,818.05	7.51	42.42	3,737.53	1,571.56 **(2)**	67.12
Odisha	22.59	14,356.21	10.76	46.91	2,385.60	43.78	68.12
Punjab	2,919.88 **(2)**	30,155.99 **(5)**	13.00	23.60	4,716.60	205.67	73.10
Puducherry	99.50	45,401.04 **(3)**	50.98 **(1)**	13.83 **(1)**	32.83	12.56	83.86 **(4)**
Rajasthan	81.68	16,298.58	8.72	40.40	3,724.64	476.33	63.67
Tamil Nadu	695.85	24,645.73	16.75	18.14 **(3)**	5,620.21 **(3)**	694.89	76.83
Uttarakhand	3.18	20,414.71	12.08	37.12	1,160.33	510.89	75.55
Uttar Pradesh	132.97	11,065.36	9.96	36.01	4,721.37	1,073.56 **(5)**	62.73
West Bengal	609.64	20,642.13	8.28	28.70	4,312.42	642.22	72.77
Average	699.99	24,830.63	15.01	31.20	3,232.62	749.43	72.81

FDI = foreign direct investment, IEM = industrial entrepreneurs memorandum, MW = megawatt, NSDP = net state domestic product, T&D = transmission and distribution.

Notes: INR crore = 10 million Indian rupees. N = 189. Figures in parentheses represent the five highest-ranked states for each of the variables.

Source: Author's calculations.

Maharashtra tops the list with an average of INR44.62 billion over this 9-year period.[8] Similarly, the share of manufacturing in NSDP is less than 5% in Bihar, compared with more than 25% in Gujarat, Goa, and Puducherry. Regarding installed capacity, Maharashtra, Andhra Pradesh, Karnataka, Gujarat, and Tamil Nadu each have more than 5,000 megawatts of power generation capacity, while states like Goa do not produce any electricity. The northern states, which do not receive much FDI and have fewer electricity installations, are also plagued with high T&D losses. Four states—Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh—account for 40% of all T&D losses during the review period, which may discourage FDI from coming to these states. Of the five states with the highest values for human capital, as measured by the literacy rate, only Delhi has received substantial FDI, while the other four states are not even among the top 10 recipients of FDI.

VI. Results and Discussion

Before estimating the model, correlations are noted between the different control variables. Table 4 gives the Spearman correlation matrix and reports the significance of the correlation coefficient at the 5% level. A state with higher NSDP per capita is able to attract more FDI (correlation = 0.33) and have a high manufacturing share (positive correlation) with very high literacy (correlation = 0.86) and low T&D losses (negatively correlated). A state with high installed capacity is not only able to attract more FDI (correlation = 0.57), but also more domestic investment (IEM) (correlation = 0.69), and does not have any correlation with T&D losses. Similarly, a coastal state has high FDI (correlation = 0.35) and a high manufacturing share (correlation = 0.3). As expected, a literate state has a high manufacturing share and low T&D losses. Consequently, with partial correlation being statistically significant for several of the variables, I could not use all the controlled variables together.

A. Econometric Analysis

Table 5 reports the results for the econometric estimations. Equation (5) was estimated first by pooling the data for all states (column 1). As discussed, due to omitted variables, the OLS results were expected to be biased. Therefore, panel data techniques were also required and both FE and RE models were subsequently run. An F-test was carried out to see whether individual FEs exist or not. Since the F-value (6.2) is greater than the tabulated value, it implies that the null hypothesis (pooled OLS) is rejected and that FE and RE models need to be estimated separately. Columns 2 and 3 give the results of the FE and RE

[8] In July 2009, $1 = INR48.7.

Table 4. **Spearman Correlation Matrix**

	ln(FDI) (INR crore)	S^*_{t-1}	ln(NSDPc) (INR)	Manufacturing Share (%)	T&D Loss (%)	ln(Installed Capacity) (MW)	ln(IEM Implemented) (INR crore)	Coastal	Literacy Rate (%)
ln(FDI) (INR crore)	1								
S^*_{t-1}	0.048	1							
ln(NSDPc) (INR)	0.332*	−0.461*	1						
Manufacturing share (%)	0.047	−0.005	0.352*	1					
T&D loss (%)	−0.268*	0.315*	−0.660*	−0.321*	1				
ln(Installed capacity) (MW)	0.571*	0.457*	−0.121	−0.019	−0.002	1			
ln(IEM implemented) (INR crore)	0.333*	0.368*	−0.074	0.108	−0.031	0.691*	1		
Coastal	0.350*	0.158*	0.319*	0.295*	−0.439*	0.324*	0.115	1	
Literacy rate (%)	0.206*	−0.395*	0.857*	0.233*	−0.587*	−0.224*	−0.173*	0.389*	1

FDI = foreign direct investment, IEM = industrial entrepreneurs memorandum, MW = megawatt, NSDP = net state domestic product, T&D = transmission and distribution.
Notes: INR crore = 10 million Indian rupees. N = 168. *indicates significance at minimum 5% level.
Source: Author's calculations.

Table 5. **Testing for the Pollution Haven Hypothesis Dependent Variable = ln(FDI)**

Variables	Pooled Ordinary Least Squares (1)	Fixed Effects (2)	Random Effects (3)	Heteroskedastic Panels Corrected Standard Errors (4)
S^*_{t-1}	−0.329	0.203	0.0712	0.264
	(0.289)	(0.423)	(0.355)	(0.358)
ln(NSDPc)	2.964***	0.798	2.92***	3.205***
	(0.45)	(2.89)	(0.805)	(0.838)
ln(IEM)	0.213*	0.086	0.131	0.256***
	(0.085)	(0.106)	(0.093)	(0.090)
ln(Installed capacity)	0.729***	−0.215	0.662***	0.527***
	(0.116)	(0.577)	(0.183)	(0.128)
Coastal	1.395***		1.323*	1.16**
	(0.405)		(0.767)	(0.55)
Constant	−31.85***	−3.377	−31.06***	−33.73***
	(4.62)	(28.95)	(8.39)	(8.8)
Time dummies	Yes	Yes	Yes	Yes
Observations	168	168	168	168
R^2	0.51	0.112	0.50	0.40
F-test/Wald Chi^2	13.38 (0.00)	1.55 (0.12)	49.9 (0.00)	81.83 (0.00)
Number of states		21	21	21
Hausman test		4.96 (0.29)		

Notes: Figures in parentheses below the coefficients are standard errors. The numbers in parentheses in the F-test/Wald Chi^2 and Hausman test are p-values. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.
Source: Author's calculations.

estimations. Whether these omitted variables (state-specific differences) are fixed or random is tested using a Hausman test (last row). This is a test for the correlation between the error and the regressors. Under the null hypothesis of no correlation between both, the RE model is applicable and its estimated generalized least squares estimator is consistent and efficient. Under the alternative, it is inconsistent. Since the test's statistic (chi-square value = 4.96) is significant only at the 29% confidence level, one cannot reject the null hypothesis. To see whether RE are needed, a Breusch–Pagan Lagrange–Multiplier (LM) test is carried out. Results lead to the rejection of the null hypothesis, in favor of the alternative, i.e., the RE model.

Row 1 shows that the industry-composition-adjusted pollution abatement expenditure index (S^*) is negative, though statistically insignificant, and thus has no impact on FDI investment. This implies that states' environmental norms do not figure in the investment decision of foreign firms. With respect to control variables, a state with high per capita income (ln[NSDPc]), which reflects a bigger internal market, can attract more FDI. A state with more domestic investment (ln[IEM]) is not able to attract more foreign investment in statistical terms. On the other hand, proximity to the coast and the availability of infrastructure, as proxied by installed capacity, has a direct bearing on foreign firms' location decisions. High installed

capacity implies that power is more readily available in a state. Thus, foreign firms are expected to prefer these states. Similarly, coastal states attract more FDI due to their increased opportunities to export.

Given that panel data is used where values of different variables change over time, the possibility of autocorrelation exists. A Wooldridge test for autocorrelation (where the null is no first-order correlation) (F-value = 0.98, p = 0.33) negates this possibility. A Pesaran cross-sectional dependence test is then employed to check whether the residuals are correlated across panels, as cross-sectional dependence (contemporaneous correlation) can lead to biased results. The test value of 2.7 is significant at less than 1%, suggesting that there is cross-sectional dependence. A modified Wald test is also carried out to test for group-wise heteroskedasticity. A very high value of chi-square ($\approx$175) indicates that the null of homoscedasticity (constant variance) is rejected. Given the problem of heteroskedasticity, a panel corrected standard errors model was subsequently employed and the results are reported in column 4. S^* retains the same sign and significance level even after the correction. All other control variables also retain the same sign and significance level except for domestic investment (ln[IEM]), which becomes highly significant. The results suggest that FDI flows to states that are coastal and have high installed capacity, high per capita income, and more domestic investment. Environmental stringency does not influence a foreign firm's location decision when other infrastructure and market-access-related factors are considered. In other words, the results do not validate the pollution haven hypothesis in the Indian context.

B. Robustness Test

To see whether results are robust or not, I estimated several variants of the model. Table 6 reports the results where some of the control variables are either dropped or alternate control variables are used. Column 2 (model 2) uses T&D loss instead of installed capacity. The impact of the environmental governance index (S^*) variable on FDI remains the same. The coefficient of the T&D loss variable has the expected sign, though it is not statistically significant. In model 3, the coastal variable used in model 2 is dropped. In model 4, literacy is substituted for per capita income (ln[NSDPc]), which was used in the base model. In model 5, the manufacturing share is used instead of investment in the state (ln[IEM]). In model 6, only the environmental governance index variable (S^*) and year dummies with no control variables are used. Lastly, model 7 uses state dummies and time dummies while all of the control variables continue to be excluded.

As can be seen from Table 6, the environmental management index (S^*) variable remains statistically insignificant in all variants of the model. The results are thus robust to alternate control variables and to the noninclusion of control variables. Most of the control variables retain the same sign and significance as

Table 6. **Testing for Robustness of Results–Pollution Haven Hypothesis Dependent Variable = ln(FDI)**

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
S^*_{t-1}	0.264	0.52	0.47	−0.06	0.13	0.22	0.18
	(0.358)	(0.364)	(0.34)	(0.32)	(0.30)	(0.33)	(0.313)
ln(NSDPc)	3.205***	1.655***	1.50**		3.25***		
	(0.838)	(0.756)	(0.69)		(0.52)		
ln(Installed capacity)	0.256***			0.385***	0.616***		
	(0.090)			(0.12)	(0.103)		
ln(IEM)	0.527***	0.314***	0.343***	0.286***			
	(0.128)	(0.085)	(0.081)	(0.089)			
Coastal	1.16**	0.448		1.35**	2.03***		
	(0.55)	(0.62)		(0.63)	(0.465)		
T&D loss		−0.031	−0.048#				
		(0.202)	(0.031)				
Literacy				0.089**			
				(0.038)			
Manufacturing share					−0.06***		
					(0.02)		
Constant	−33.7***	−13.84*	−11.55#	−7.26***	−33.1***	2.79***	
	(8.8)	(9.61)	(7.58)	(2.8)	(5.27)	(0.65)	
State dummies	No	No	No	No	No	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	168	168	168	168	168	168	168
R^2	0.40	0.34	0.42	0.40	0.47	0.41	0.74
F-test/Wald Chi^2	81.83	46.61	47.9	114.41	176.38	21.96	2,301.80
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of states	21	21	21	21	21	21	21

Notes: ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively. # denotes significance at the 15% level.
Source: Author's calculations.

predicted. When state dummies are included in all the variants (models 2 to 5), the main variable remains statistically insignificant. When NSDP is used instead of NSDP per capita, the main variable retains its sign and significance. Lastly, the results did not change when all models were reestimated by computing S^* at the NIC 2-digit level. The results also remain the same irrespective of how I compute S^*. The use of both gross closing expenditure and gross addition expenses on pollution abatement yield the same outcome. Based on the results, this study does not validate the pollution haven hypothesis in the Indian context.

VII. Conclusion

This paper examines the impact of environmental governance on FDI by testing the pollution haven hypothesis for 21 Indian states for the period

2002–2010. An abatement expenditure index was computed and adjusted for industrial composition at the state level using the methodology provided by Levinson (2001). The industry-adjusted abatement expenditure index was greater than 1 for nine states, which implies that these states spend more on abatement measures than their industrial composition suggests. The index also shows that over the 9-year review period, six states showed an increasing trend of abatement expenditure, while eight states showed a decreasing trend.

The paper then uses this industry-composition-adjusted pollution abatement expenditure index to test the pollution haven hypothesis in a panel data framework. The study finds that environmental stringency does not influence FDI decisions once panel-specific heteroskedasticity is accounted for. The paper concludes that a coastal state with high levels of per capita income and available power will attract more FDI. Environmental stringency does not influence foreign firms' decisions when other infrastructure and market-access-related factors are considered. The results were subsequently tested for robustness by using alternate control variables in a panel corrected heteroskedastic model. The results were found to be robust for the inclusion of control variables. To conclude, the study does not validate the pollution haven hypothesis in the case of Indian states.

There are several possible reasons why the study was not able to either validate or refute the pollution haven hypothesis in the Indian context. First, though foreign firms establish operations abroad due to low operational costs, the relevance of pollution abatement costs in comparison to total operating costs may be limited (Erdogan 2014). Second, even if these costs are high, they may still be lower than in other economies from where FDI is originating or in alternate destinations. Therefore, it may not matter where to invest within a particular economy. Finally, studies have suggested that foreign firms generally seek consistent environmental enforcement over lax enforcement (see, for example, OECD 1997), which may also hold true in the case of Indian states.

While the paper's important findings have some limitations, it can be extended to address these limitations. As mentioned, parliamentary questions were relied on to get state-wise FDI data, which showed an extremely high value of FDI for one state in a particular year. Moreover, the paper considers all FDI inflows in the 21 states under review. Instead of total FDI, only manufacturing FDI could be considered to assess the effects of environmental governance. Another extension of the present study would be testing the pollution haven hypothesis only for FDI that is associated with pollution such as investment in the chemicals and fertilizer industries. Lastly, if a race-to-the-bottom dynamic, rather than the pollution haven hypothesis, is applied in the Indian context, then FDI and environmental governance would be endogenous; the testing of which requires the use of instrumental variable estimations, which would be a further extension of the present work.

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Appendix. List of Questions and Responses by Members of the Parliament on State-Wise Foreign Direct Investment

1. UNSTARRED QUESTION NO: 182
ANSWERED ON: 01.03.2005
FOREIGN DIRECT INVESTMENTS
ADHIR RANJAN CHOWDHURY

Will the Minister COMMERCE AND INDUSTRY be pleased to state:

(a) the details of proposals for foreign direct investments submitted during 2001–2002, 2002–2003, 2003–2004 and till date statewise with particular reference to West Bengal;

(b) whether the Government has agreed to all the proposals; and

(c) if not, the status of each of the proposals as on date?

ANSWER:

THE MINISTER OF STATE IN THE MINISTRY OF COMMERCE AND INDUSTRY (SHRI E.V.K.S. ELANGOVAN)

(a) to (c) Government has put in place a liberal and transparent foreign direct investment (FDI) policy under which FDI up to 100% is allowed under the automatic route in most sectors/activities.

No prior approval of the Government is required for FDI in sectors/activities under the automatic route. Proposals requiring prior Government approval are considered under the extant FDI policy on the recommendation of the Foreign Investment Promotion Board (FIPB). State-wise details of approval/amendment granted during 2001–2002 till 2004–2005 (up to December) is shown in the enclosed statement. No FDI proposal for West Bengal is pending for consideration of the FIPB.

Source: http://164.100.47.194/Loksabha/Questions/QResult15.aspx?qref=45181&lsno=14.

2. UNSTARRED QUESTION NO: 1032
ANSWERED ON: 01.08.2006
FOREIGN DIRECT INVESTMENTS
VIRJIBHAI THUMAR

Will the Minister COMMERCE AND INDUSTRY be pleased to state:

(a) The details of the proposals received from foreign investors for setting up of industries in the country during each of the last 3 years and the current year, statewise;

(b) The number of proposals accorded approval but have not set up industries in the country so far;

(c) If so, the reasons therefore; and

(d) The efforts made by the Government to facilitate setting up of these industries?

ANSWER:

THE MINISTER OF STATE IN THE MINISTRY OF COMMERCE AND INDUSTRY (SHRI ASHWANI KUMAR)

(a) to (d): Government has put in place a liberal and investor-friendly policy on foreign direct investment (FDI) under which FDI up to 100% is permitted on the automatic route in most sectors/ activities where no prior approval of the Government is required. For FDI proposals in sectors/activities requiring prior Government approval, the Foreign Investment Promotion Board (FIPB) acts as a single-window clearance authority. Under the liberalized economic environment, investment decisions of investors, including location, are based on techno-economic and commercial considerations.

A statement on state-wise foreign direct investment (FDI) proposals approved during the last 3 years is at Annex-I.

Statement on FDI inflows during the last 3 years as reported by the regional offices of the Reserve Bank of India is at Annex-II.

Currently, a tabular information regarding the status of establishment of industry pursuant to the approvals is not maintained.

Source: http://164.100.47.194/Loksabha/Questions/QResult15.aspx?qref=31608&lsno=14.

3. UNSTARRED QUESTION NO: 527
ANSWERED ON: 24.02.2009
FOREIGN DIRECT INVESTMENTS
MADHUSUDAN DEVRAM MISTRY

Will the Minister COMMERCE AND INDUSTRY be pleased to state:

(a) The details of investment proposed/received through industrial entrepreneurs memorandum (IEM), letter of intent (LOI), and foreign direct investment (FDI) in each of the last 3 years and the current year, statewise;

(b) The details regarding rate of utilization of such investment during the above period; and

(c) The details regarding employment generated through such investment?

ANSWER:

THE MINISTER OF STATE IN THE MINISTRY OF COMMERCE AND INDUSTRY (SHRI ASHWANI KUMAR)

(a) The details of statewise and yearwise break up of investments proposed through industrial entrepreneurs memorandum (IEM), letter of intent (LOI), and foreign direct investment (FDI) are at Annexure-I.

(b) The details of the implementation as reported by the entrepreneurs by way of filing Part B of IEMs and Letters of Intent Converted into Industrial Licence are at Annexure-II and the FDI inflow since 2005-2006 to 2008-2009 (upto September '08) is at Annexure-III.

(c) Employment for 62,06,119 persons have been proposed through the investment in terms of IEMs and LOIs during the said period. Employment generation through FDI is not maintained centrally.

Source: http://164.100.47.194/Loksabha/Questions/QResult15.aspx?qref=69930&lsno=14.

4. UNSTARRED QUESTION NO: 1074
ANSWERED ON: 28.11.2011
FOREIGN DIRECT INVESTMENTS
ASHOK KUMAR RAWAT

Will the Minister COMMERCE AND INDUSTRY be pleased to state:

(a) whether the domestic industries are lagging behind and their production has also decreased due to licenses being given to foreign companies;

(b) if so, the details thereof and the steps taken by the Government to protect/support the domestic industries; and

(c) the number of investment proposal received from foreign companies to set up industrial units in the States during the last 3 years and the current year?

ANSWER:

THE MINISTER OF STATE IN THE MINISTRY OF COMMERCE AND INDUSTRY (SHRI JYOTIRADITYA M. SCINDIA)

(a) Based on the index of industrial production (IIP) released by the Central Statistical Organisation, a table showing the growth figures in respect of industrial production (general), the three sectors of industry namely, mining, manufacturing and electricity and the 22 major industry groups of industries for the last 3 years is at Annexure 1. It does not suggest that the production is affected by foreign investments. However, under the Industrial (Development and Regulation) Act, 1951, industrial licenses are only granted to Indian companies.

(b) The steps taken/being taken by the Government for improving the industrial climate are the creation of world class infrastructure; promotion and facilitation of industrial investment including the foreign direct investment; improvement in business environment; and development of industry relevant skills. Government has also announced a national manufacturing policy with the objectives of enhancing the share of manufacturing in GDP to 25% within a decade and creating 100 million jobs. The policy seeks to empower rural youth by imparting necessary skill sets to make them employable. The policy is based on the principle of industrial growth in partnership with the States. The central government will create the enabling policy frame work, provide incentives for infrastructure development on a public–private partnership (PPP) basis through appropriate financing instruments and the State Governments will be encouraged to adopt the instumentalities provided in the policy. The proposals in the policy are generally sector neutral, location neutral and technology neutral except incentivisation of green technology. While the national investment and manufacturing zones (NIMZs) are an important instrumentality, the proposals contained in the policy apply to manufacturing industry throughout the country including wherever industry is able to organize itself into clusters and adopt a model of self regulation as enunciated.

(c) A statement showing the statewise details of foreign direct investment proposals approved during the last 3 years and current year is at Annexure 2.

Source: http://164.100.47.194/Loksabha/Questions/QResult15.aspx?qref=114624&lsno=15.

Table A1. **Trend of Approved State-Wise FDI Inflows**
(INR crore)

State	2001–2002	2002–2003	2003–2004	2004–2005	2005–2006	2006–2007	2007–2008	2008–2009	2009–2010
Andhra Pradesh	358.54	465.57	526.66	689.1	371.82	501.03	4,273.94	2,663.01	1,271.84
Assam	0	0	0	0.40	0.51	0	35.00	0	0
Bihar	0	0.18	0	0	0	0	0	0	0
Gujarat	2,042.35	414.53	148.04	1,711.81	153.05	65.79	365.15	2,274.65	125.66
Haryana	491.35	103.54	248.29	34.07	57.54	5.64	126.63	504.55	2.95
Himachal Pradesh	0.54	810.38	0.10	52.63	9.00	0	0	0	1.56
Karnataka	799.31	2,260.54	449.41	1,099.44	917.02	4,750.09	196.78	477.64	335.47
Kerala	178.06	5.99	21.22	230.43	76.77	0.09	0	107.62	0.75
Madhya Pradesh	85.64	43.55	0.44	0.05	6.00	0	0	116.34	98
Maharashtra	3,818.00	1,178.65	1527.34	1,579.60	3,961.85	12,916.78	5,551.92	7,086.16	2,544.70
Manipur	0	0	0	0	0	0	0	0	0
Meghalaya	0	0	0	0	0	0	0	0	0
Odisha	4.01	0.21	0.10	6.14	0.35	192.50	0	0	0
Punjab	16.46	0.03	465.5	690.49	19.11	1.75	3,506.00	21,579.62	0
Rajasthan	413.05	0.51	28.03	4.14	0.20	0	258.37	30.79	0
Tamil Nadu	1,123.55	446.55	815.18	348.17	261.63	805.14	1,394.82	1,003.63	64.02
Tripura	0	0	2.41	0	0	0	0	0	0
Uttar Pradesh	659.62	24.45	102.32	18.44	82.48	5.13	106.05	198.27	0
West Bengal	314.37	283.01	303.45	278.23	113.66	17.22	223.97	3,570.58	382.29
Chhattisgarh	16.05	0.03	0	200.16	0	1,650.00	0	0	0
Jharkhand	0	0.50	0.20	2.00	0	0	0	0.42	0
Uttarakhand	0	0	0	0	28.63	0	0	0	0
Chandigarh	4.22	43.13	5.75	127.99	0	0	0	0	0
Dadra and Nagar Haveli	0.04	0	0	0	0	0	0	0	0
Delhi	1,115.26	617.73	1,163.36	1,063.52	740.99	3,318.32	507.94	3,861.40	3,063.81
Goa	317.02	90.80	19.13	9.07	39.41	0	0.05	120.00	0.17
Puducherry	845.21	2.52	42.61	0.12	0	5.00	0	0	0
Daman and Diu	0	0	0.24	5.43	0	0	0	0	0
Remaining*	1,862.54	1,111.85	353.73	576.27	1,750.98	2,801.00	858.81	1,420.91	773.40
India	14,465.18	7,904.25	6,223.52	8,727.71	8,591.00	27,035.48	17,405.43	45,015.59	8,664.61

FDI = foreign direct investment.

Notes: * refers to FDI inflows in more than one state and cases when the location is not indicated; INR crore = 10,000,000 Indian rupees.

Source: Author's compilation based on the annexes to the questions raised by members of the Parliament (Lok Sabha). See the following links: http://164.100.47.193/Annexture_New/lsq14/4/au182.htm, http://164.100.47.193/Annexture_New/lsq14/8/au1032.htm, http://164.100.47.193/Annexture_New/lsq15/9/au1074.htm, and http://164.100.47.193/Annexture_New/lsq14/15/au527.htm (the latter was accessed in July 2015).