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Facilitating Development: The Role of Business Groups

RAYMOND FISMAN
Columbia University, Cambridge, MA, USA

and

TARUN KHANNA *
Harvard Business School, Boston, MA, USA

Summary. — A defining characteristic of developing countries is the inadequacy of basic services normally required to support organized economic activity. One way in which the private sector acts to facilitate development is through investments orchestrated by agglomerations of firms called business groups. Such groups dominate the landscape of virtually all developing countries. Our study of plant location decisions in India shows that group-affiliates are more likely to (profitably) locate in less-developed states than unaffiliated firms; the magnitude of this "group effect" is large and significant. Furthermore, this result is stronger for more recent location decisions that are less likely to have been driven by political economy considerations. We suggest that this is because the scale and scope of groups, and the *de facto* property rights enforcement within groups in environments where legal enforcement is lacking, permit them to overcome some of the difficulties that impair production in underdeveloped regions.

Key words — Asia, India, business groups, location decisions

1. INTRODUCTION

One of the defining characteristics of developing countries is the inadequacy of basic inputs normally required to support organized economic activity. Physical infrastructure amenities are either inadequate or lacking entirely, while social services are often severely underfunded, hampering the hiring and maintenance of a productive workforce. Owing to such inadequacy of basic services, shortages in ancillary industries that provide other essential inputs are also common. These difficulties are often so extreme that it is a mystery how anything gets done at all. In this paper, we draw attention to the role played by agglomerations of firms in the private sector, called business groups, in ameliorating the costs of such shortages. Since business groups are a prominent feature of the landscape of most, if not all, developing countries, their role in facilitating development deserves attention.

Economic theory predicts that private enterprise should step in to provide these basic services where it is economically efficient to do so. [1] In most countries where such failures take place, however, private firms are constrained from making this provision. In many cases, government monopolies control industries such as telecommunications, health care, transportation,

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and power; competition from the private sector is prohibited. In recent years, these industries have been opened to competition in a host of countries. Nonetheless, private enterprise has made little headway, as government bureaucracy and regulation often make entry too expensive and time-consuming, and weak property rights and contract enforcement prevent firms from capturing economic rents from the goods and services they provide. Finally, government reputations may also play a role—often, regimes are unstable in developing countries, and the nationalization of infrastructure assets may discourage firms from making investments in such projects.

Much time and effort has gone into imputing the costs of these inefficiencies and evaluating the productivity of various infrastructure goods. [2] Relatively little has been done, however, to understand how firms behave *given* the constraints of operating in underserviced regions. Understanding how firms react to such shortages is essential to determining the true costs and benefits of infrastructure provision, and is likely to be useful in informing future development policy.

The reality is that firms do exercise choices in the manner in which they deal with these shortages. Some firms simply make do with the services that are publicly provided, accepting low productivity and poor product quality as the price of doing business in an underdeveloped area. One obvious alternative is for companies to supply inputs for their own private use. A host of companies in India have invested in V-Sat (very small aperture terminal) connections to bypass ubiquitous communications bottlenecks. In Nigeria, where public telecommunications are similarly unreliable, a 1998 World Bank Study found that many firms had purchased radio equipment for communications. The study also found that 92% of Nigerian manufacturers and 64% of Indonesian manufacturers owned their own electricity generators (Anas & Lee, 1998). Firms in less-developed regions may similarly be required to ensure their own supplies of physical inputs. For example, in a study of Indian automobile parts manufacturers, it has been found that plants in less-developed regions keep higher inventories, since most inputs cannot be sourced locally (Gulyani, 1999).

We contend that the business groups [3] that dominate the landscape of virtually all developing countries provide an organizational structure that is better suited to dealing with the poor availability of basic inputs and services. Such groups are comprised of a diverse set of businesses, often initiated by a single family, and bound together by equity cross-ownership and common board membership. Group-affiliates often share a common brand identity (e.g., Salim Group in Indonesia, the Tata Group in India, Samsung in Korea, etc.), draw on a common labor pool, and rely on each other for financing. The common family bond that often runs through group-affiliates acts as a social mechanism that reduces the likelihood of reneging of contracts (see, for example, Granovetter, 1994). These characteristics may put groups in a better position to deal with the failures in financial, labor, and product markets that are ultimately responsible for the difficulties facing producers in less-developed regions. As a result, we may expect group-affiliated firms to be relatively more likely to locate in such regions. For example, in the case of infrastructure provision, groups may be able to take advantage of economies of scale by co-locating a number of group-affiliated plants and sharing the costs of infrastructure services. Failures in labor and financial markets caused by poor information flows may be similarly mitigated by groups through the internalization of these markets.

In principle, many of the advantages accruing to group-affiliates can plausibly be argued to accrue to multiple plants within a single (presumably large) firm. It is not immediately conceptually clear whether groups or large firms are better able to orchestrate investments in underdeveloped areas. On the one hand, the parts of a firm are more closely tied together (by 100% ownership) than are the affiliates of a group, making coordination more difficult in the latter case. On the other hand, the typically quite unrelated businesses in a group probably ensure a smoother overall internal cash flow than that which is available to a firm whose activities are concentrated in a single business. This may be of value in the face of severely imperfect external capital markets, and may allow groups to undertake ambitious investments that a firm needing access to costly external capital might rationally forego.

In any event, even after allowing for the possibility that large firms might facilitate location in underdeveloped regions, we expect that diversified groups may be an important means by which industrial activity is brought to regions where governments have failed to provide basic services. That is, groups may provide

one mechanism for providing a partial solution to one of the fundamental issues in economic development, with significant implications for government policies in developing countries.

In this paper, we attempt to infer the extent to which group-affiliates are better positioned to deal with the difficulties associated with underdeveloped areas by looking at firms' plant location decisions in India. Consistent with the above arguments, we find group-affiliated plants were more likely to locate in less-developed regions during 1975–95. Furthermore, we find that this effect is stronger for younger plants, where the location decision was less likely have been the result of political economy considerations driven by India's industrial licensing regime. Furthermore, we find that group firms are more profitable (or at least equally profitable) in low-infrastructure regions, relative to unaffiliated firms.

Our empirical estimation focuses on a single country because both features that we wish to explore—level of development and business groups—are difficult to measure, making attention to detail important. Membership of business groups is typically quite secretive. Often firms are members of more than one group, raising the potential for specification error. There is no universal definition of a "group" that adequately captures what it means to be a group-affiliate across different countries. These factors argue against a cross-country study.

India has a number of characteristics that make it particularly well suited for such a study. A large proportion of Indian group-affiliates are publicly traded, and firms are affiliated with only one group. [4] Further, the large number of groups in India facilitates statistical analysis. There is also much variation in the level of development across the regions of the country, which allows us to look at firm decisions as a function of development. [5] While the variance in the level of development is high, the average is low. This is important, as we are primarily interested in studying firm reaction to difficulties stemming from underdevelopment. [6]

Finally, we note that this study lies at the intersection of two vast literatures. First, it is linked to the literature on industrial business groups (Khanna, 2000) and the role of such groups in the development process. As we are looking at their particular role in attenuating infrastructure shortages, this paper also ties into the broader literature on infrastructure development generally, and its role in promoting economic growth (see Gramlich, 1994, for an earlier review, and Fernald, 1999, for more recent work in this area).

We proceed as follows: section 2 introduces and describes our data; in section 3, we look at why firms might locate in low-infrastructure states; we describe our main results in section 4; section 5 discusses alternative explanations; section 6 provides some evidence from interviews supportive of the role of groups in facilitating development; section 7 concludes.

2. DATA

(a) *Firm-level data sources*

The data are obtained primarily from a publicly available database maintained by CMIE, Centre for Monitoring the Indian Economy. CMIE is a privately run, 20-year old, Bombay-based firm that maintains databases on private and public sector economic activity in India. These databases have become the standard sources of information on microeconomic and macroeconomic activity, and are commonly used by public and private-sector firms in India, international development banks, and the media. [7] While there are other possible data sources, CMIE data are the most reliable and comprehensive.

The database [8] from which we draw our information contains data similar to those contained in Compustat, CRSP and Mead Data Central's Nexis databases, though our data are not nearly as comprehensive or detailed. The database has computerized information drawn from annual reports, other regulatory filings, and press releases of several thousand firms operating in India, as well as daily stock price data for stocks traded on the Bombay Stock Exchange. The accounting information is available from the mid-1980s, with coverage improving greatly in 1989. The year for which there is the best coverage in the version of the database to which we have access is 1993. Coverage for 1994 and 1995 is sparser, due to delayed release of information by the firms, and delays in updating the database. We therefore use 1993 data in the analyses that follow. The majority of firms in the database are public firms (95%). Of these, approximately half are traded on the Bombay Stock Exchange, with the remainder traded on several of the other stock exchanges in the country.

(b) *Business group classification*

The identification of business groups is of particular interest for this study. Between the years 1989 and 1995, the database identifies a range of business groups, from the smallest two-firm groups to the largest Tata Group. For the analyses in this paper, we adopt the database's classification of firms into groups. [9] Unlike in a variety of countries (Goto, 1982; Strachan, 1976), firms are members of only one group. Further, there is virtually no movement of firms across groups. [10] Khanna and Palepu (2000) have carefully examined the quality of the *CMIE* group classification, and found that it passes a number of "reality checks."

Our initial sample, consisting of the entire cross-section of firms in the *CMIE* database, contained 4,230 firms; many of these are multi-plant firms, yielding a total sample of 5,653 observations on location decisions. Since we were unable to obtain adequate aggregate data for Union Territories (see below), plants located in these regions were dropped (452 plant-level observations). We also removed government-run firms and foreign-owned firms from the sample, because we felt that they were sufficiently different from other Indian firms as to distort our results (217 government-run or joint-sector firms and 90 foreign firms dropped). [11] Firms were then removed that lacked observations on the variables used in our basic regression, i.e., sales (1027), [12] age (23), and plant location (890).

During interviews with both executives and government officials in Bombay and Delhi, we found there to be a consensus that, prior to 1975, plant location decisions were made entirely by government bureaucrats rather than business leaders. This was because a government license was required for any new enterprise, and the license was generally given conditional on the firm locating in the home state of the government official who made the licensing decision (or in the state of another official to whom a political favor was owed). After 1975, a series of reforms and shifts in government steadily eroded the ability of bureaucrats to control the location of firms' plants. The destabilization of government that came with the Congress Party's fall from power in 1978 was also repeatedly cited as significant. We outline in the appendix the evolution of Indian industrial reform that gradually led to more profit-based plant location decisions. As indicated there, 1991 is a particularly important year in the deregulation process.

Our claim that delicensing was a gradual process that occurred throughout the post-1975 period is bolstered by an examination of the number of licenses issued, by year, following 1974. While industrial production in India grew at a fairly steady pace of 6% or more throughout the 1980s, we observe a marked decline in the number of licenses issued, simply because fewer and fewer businesses required licenses to undertake new ventures. In addition, the number of licenses issued (scaled by level of industrial production) decreased far more rapidly in less-developed regions (according to development as defined below), further suggesting that, while the Indian government may have been forcing firms to locate in underdeveloped regions early on, this effect was attenuated over time.

Recent econometric evidence bolsters our claim of a gradual evolution of delicensing. DeLong (2001) shows that the structural break in India's growth rate occurs in response to a wave of reforms—including delicensing—in the mid-1980s, rather than in response to the 1991 reforms. Indeed, an architect of the Indian 1991 deregulation has recently characterized India's overall reform as exhibiting a particular form of gradualism (Ahluwalia, 2002a).

For the aforementioned reasons, we restrict our sample to firm location decisions that came after 1975. We use 1975 as a cut-off date, as it allows us to take an extremely agnostic/uninformed perspective on the rate of reforms; however, we expect a larger/more significant effect among younger firms that had greater freedom in choosing location. [13] The existence of these gradual reforms provide us with an additional dimension of variation to further examine our primary hypothesis on plant location below. Our best proxy for the dates of location decisions is firm incorporation date, so we drop all firms with incorporation dates prior to 1975. This yields a final sample of 957 firms and 1,193 plant-level observations.

(c) *Measuring development*

In assessing a state's level of development, we attempted to aggregate a number of distinct elements that we felt were important for firm location decisions. Moreover, we hoped that using an aggregate score would allow us to iron out some of the idiosyncratic components that are present in each individual measure. The four basic categories included were power generation, telecommunications, transporta-

tion, and social services. Where possible, we tried to obtain proxies that reflected the *quality*, rather than the quantity, of services available. We also avoided "per unit area" measures, using instead per capita statistics, since vast undeveloped expanses could seriously bias the former type. Telecommunications and transportation data were taken from CMIE's *Infrastructure in India* (Economist Intelligence Service, 1996), power generation statistics were drawn from CMIE's *India's Energy Sector* (Economist Intelligence Service, 1995), and information on social services were taken from the Indian government's *Statistical Abstract* (1992). [14]

We used three basic measures of energy infrastructure: deficit in production, i.e., the percentage by which demand exceeds supply; percentage loss in transmission; and generating capacity per capita. All of these factors affect the likelihood and frequency of brownouts and blackouts. Moreover, percentage loss in transmission is correlated with the consistency of voltage supplied (i.e., greater losses imply higher variance in voltage), which is of serious concern for firms using advanced technologies (Dugger, 1999).

Our data on telecommunications and transportation are somewhat sparser. To assess the accessibility of communications, we used direct phone lines per capita and telephone exchanges per capita. [15] For transportation, we used the percentage of roads that are surfaced. [16]

Finally, for social services, we look at the public provision of education and healthcare. For education, we use the percentage of teachers with formal training, as well as total expenditure on education per capita. Our healthcare proxies are hospital beds per capita and healthcare workers per capita.

We convert each of these values into a normalized score using the following:

$$T_{si} = \frac{V_{si} - V_i}{V_i},$$

where V_{si} is the measure of amenity i in state s, and V_i is the mean over states for amenity of type i. This transformation preserves the degree of dispersion associated with each measure, while normalizing its mean to zero. [17] The score for each type of service is a simple average of its components; our overall measure of development (DEV) is the sum of these four scores, scaled to make the lowest score equal to zero and the highest equal to one. Table 1 summarizes our scores by state. Note that while there are 25 states in India, we list only 16; the rest are omitted from this table because there are no firms in the *CMIE* data with plants located in these states. In addition, there are two kinds of administrative entities in India—states and union territories. The fundamental difference between the two is that territories are centrally administered, while the states have a greater degree of political autonomy. Unfortunately, the data available for territories are incomplete; for this reason, we were unable to include plants located in union territories in our sample.

Table 1. *Normalized infrastructure scores*

	POWER	TELE	ROADS	SOCIAL	DEV
Assam	−0.23	−1.01	−1.61	−0.47	0.00
Bihar	0.39	−1.28	−0.68	−0.46	0.18
Gujarat	0.25	1.11	1.51	0.91	1.00
Haryana	0.01	0.46	1.80	−0.12	0.77
Himachal Pradesh	−0.43	1.79	−0.24	0.29	0.66
Jammu & Kashmir	−0.19	−0.37	0.32	0.21	0.46
Karnataka	0.56	0.97	0.26	−0.19	0.69
Kerala	−0.36	0.67	−1.44	0.59	0.39
Madhya Pradesh	−0.21	−0.42	0.28	−0.53	0.34
Maharashtra	0.41	−0.09	1.02	0.71	0.76
Orissa	−0.11	−0.75	−1.79	−0.44	0.03
Punjab	0.72	1.08	1.19	0.36	0.94
Rajasthan	−0.54	−0.32	−0.06	−0.27	0.30
Tamil Nadu	−0.04	0.04	0.65	−0.20	0.53
Uttar Pradesh	−0.30	−0.96	−0.22	−0.41	0.20
West Bengal	−0.29	−1.27	−0.19	−0.37	0.17

We may be concerned about the accuracy of our measurement of the level of development by state. We do a "reality check" based on Table 1. Our classifications accord quite well with common conceptions about the level of development by state. Moreover, our development score is highly correlated with other measures of Indian states' development. Perhaps the most relevant alternative score is an annual ranking of the "Best States to Invest In" published by one of India's premier business newsmagazines: *Business Today*. The correlation between this rank ordering of states and our development score is 0.74, and we obtained qualitatively identical results using this measure. [18]

Summary statistics of our variables from the *CMIE* database are listed in Table 2, Panel A; we also include statistics broken down by group affiliation in Table 2, Panel B. Note that the size distribution of firms is very different for the group and nongroup samples. It will therefore be particularly important to allow for a lot of flexibility in the size–location relationship, which we look at in section 6 below. Note also that the mean of *DEV* is lower for group-affiliates than for unaffiliated firms (with the difference in means significant at the 5% level), consistent with the hypothesis that groups should locate more in low-infrastructure regions.

3. WHY LOCATE IN A LOW-INFRASTRUCTURE REGION?

(a) *A simple illustrative model*

Consider a continuum of identical firms with measure 1 in an economy with two regions, A and B, and two factors of production, I ("infrastructure") and L ("labor"). Firms decide which region to locate in, and how much labor to hire. Infrastructure varies across the regions, is given exogenously, and enters into production as: $f(L, I_X)$, where $X = A$ or B. All firms produce an identical product, whose price is defined by $Q = D(p)$, and hire labor from (immobile) labor pools according to $L_X = S(w_X)$, where w_X is the wage in each region. Assume the $f_2, f_{12} > 0$, and that $I_A > I_B$, i.e., region A is "high-infrastructure." If firms are price-takers in product and labor markets, each firm faces:

Table 2. *Summary statistics (Panel A). Summary statistics by MEMB (Panel B)*

	Mean	Std. dev.	Min	Max	# of Obs.
Panel A					
MEMB	0.39	0.49	0.00	1.00	957
ASSETS	50.79	155.62	0.34	3,390.11	957
SALES	41.65	114.18	0.01	2,984.49	957
AGE	12.41	4.38	2.00	21.00	957
DEV	0.56	0.30	0	1	1,193
Panel B					
MEMB = 0					
ASSETS	23.44	37.21	1.08	530.95	579
SALES	22.88	33.26	0.04	306.57	579
AGE	12.08	4.33	2.00	21.00	579
DEV	0.58	0.30	0	1	694
MEMB = 1					
ASSETS	92.69	237.44	0.34	3,390.11	378
SALES	70.40	173.18	0.01	2,984.49	378
AGE	12.93	4.42	3.00	21.00	378
DEV	0.53	0.29	0	1	499

Variable definitions: *MEMB*—dummy variable denoting group membership; *ASSETS*—Book value of assets, 1993; *SALES*—Value of sales, 1993; *AGE*—Years since incorporation; *DEV*—Level of development of the state(s) where the firm's plants are located.

Note: the number of observations for *DEV* is larger since the level of observation is at the plant level, while all other variables are firm-level.

$$\Pi = \underset{L}{\text{Max}} pf(L, I_X) - w_X L.$$

Since firms may locate in either region, we get the arbitrage condition:

$$pf(L_A, I_A) - w_A L_A = pf(L_B, I_B) - w_B L_B,$$

where w_i is the market-clearing wage. Since $pf(L, I_A) > pf(L, I_B)$ for all L, we must have $w_A > w_B$, i.e., in order for markets to clear, labor must be less expensive in the low-infrastructure region to compensate companies locating there for the higher costs of production resulting from low-infrastructure.

Now, imagine that there are some firms of type g (with production function g) that are better able to deal with infrastructure shortages, i.e., $g(L, I_B) > f(L, I_B)$; $g_1(L, I_B) > f_1(L, I_B)$ (though g_{12} is still positive), while $g(L, I_A) = f(L, I_A)$. Then, in equilibrium, we must have one of the following conditions hold:

$$pf(L_A, I_A) - w_A L_A = pf(L_B, I_B) - w_B L_B, \quad \text{(i)}$$

$$pg(L_A, I_A) - w_A L_A = pg(L_B, I_B) - w_B L_B. \quad \text{(ii)}$$

If a firm of type f is making the marginal location decision, then (i) will hold; otherwise, (ii) holds. In the first case, all type g firms will locate in region B, with type f firms being split between the two regions such that markets clear; type g firms earn strictly higher profits in this scenario. In the latter case, type f firms all locate in region A, while type g firms are distributed so as to make markets clear; since $f = g$ in region A, all firms earn the same profits. Thus, in both cases, there is a higher ratio of type g firms in region B than in region A, and these firms weakly earn higher profits than type f firms. In all cases, we have $w_A < w_B$.

The basic point is that firms that are best able to deal with infrastructure shortages will be more likely to locate in low-infrastructure regions, as it allows them to take advantage of cheap factors of production that arise in equilibrium in order for markets to clear.

(b) *Evidence*

The data provide some casual evidence of the costs and benefits of locating in a low-infrastructure region. Firms in states with $DEV < 0.5$ benefit from lower wage rates (about 30% less, on average, than wage rates in more developed states) and tax rates (average of 8.2% in developed, *vs.* 7.0% in undeveloped states), as well as a higher average rate of government "fiscal benefits" (0.8% *vs.* 0.6%). [19] All of these differences are significant at 10% or higher. [20]

4. RESULTS

(a) *The basic result: differences in locational choice*

If it is true that group-affiliated firms are better able to minimize the costs of locating in less-developed areas we would expect that, all else equal, these firms would be more likely to locate their plants in states with lower values of *DEV*. The basic summary statistics suggest that this theory is promising: the mean value of *DEV* for group firms is 0.531, while it is 0.582 for nongroup firms. [21] Figure 1 shows the relationship between a state's development score, and the percentage of plants in that state that are group-affiliated—the pattern is quite striking.

Our basic regression model is given by

$$DEV_{ij} = \alpha + \xi * MEMB_i + \boldsymbol{\beta} * \boldsymbol{X}_i + \varepsilon_{ij} + \boldsymbol{\eta}_I, \quad (1)$$

where $\boldsymbol{X}_i$ is a vector of covariates, i is a firm index, j indexes the firm's plants, and $\boldsymbol{\eta}$ is a vector of industry dummies, indexed by I. DEV_{ij} captures the level of development of the state in which plant j belonging to firm i is located. [22] We allow the error structure to be correlated across plant-level observations within the same firm (i.e., $\text{cov}(\varepsilon_{ij}, \varepsilon_{ik}) \neq 0$). [23]

Controls in the regressions include log(*SALES*) as a proxy for firm size, and AGE. Not surprisingly, there is a negative correlation between *AGE* and *DEV*: almost by definition, industry has been later in coming to less-developed regions, so we expect firms in such regions to be younger on average. The omission of *AGE* may be particularly serious, since it is negatively correlated with *MEMB*; that is, group-affiliated firms are older than nongroup firms. The preceding pair of relationships could result in a bias away from zero on *MEMB*'s coefficient if *AGE* were excluded.

The expected sign of the coefficient on log(*SALES*) is less clear—we might weakly expect larger firms to be more likely to locate in less-developed regions for the same reasons that larger groups choose to locate in these areas. Larger firms, however, are generally more capital intensive, so complementarities

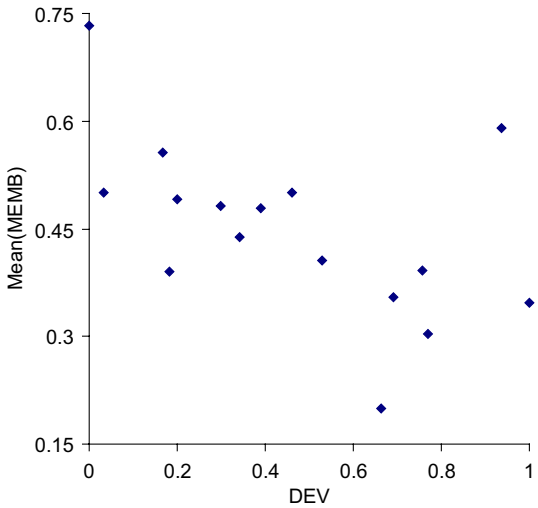

Figure 1. *Relationship between state's development score and the percentage of group-affiliated plants in the state.*

between public and private capital may result in a higher proportion of large firms in more developed regions. Since group affiliation is quite highly correlated with log(*SALES*), it will be crucial to control carefully for size effects; we return to these issues later in section 6.

Finally, we include regressions both with and without industry (at the two-digit ISIC-level) fixed-effects. It is certainly true that group-affiliated firms may differ from nongroup firms in their distribution across industries. It is not clear, however, that we want to absorb the effects resulting from these differential distributions. Consider the following: if there are certain industries that are more amenable to being located in less-developed regions, it may be that group-affiliates will be more common in these industries *because* they are better able to locate in underdeveloped areas. By including industry dummies, this "group industry effect" is lost.

The results from these regressions are listed in Table 3. The coefficient on *MEMB* ranges from −0.05 to −0.04; this is basically the same as the unconditional difference reported above. This difference is statistically significant at least at the 5% level in all regressions. Hence, on average, group-affiliated firms are more likely, all else equal, to locate in less-developed regions.

Interpreting the economic significance of the coefficient on *MEMB* is not straightforward, so to illustrate its size, consider the following thought experiment: a firm is deciding whether to locate its plant in an "average" underdeveloped region, say, Rajasthan ($DEV = 0.30$), or an "average" developed region, say, Haryana ($DEV = 0.77$). Faced with such a choice, our results suggest that, all else equal, a group-affiliated firm would be more than 10% points more likely to locate in Rajasthan than a non-group firm (0.53 *vs.* 0.425). The difference, given the multitude of factors that goes into a firm's locational decision, is very large.

As outlined in section 2, reforms in India throughout the sample period gradually increased the ability of firms to choose plant locations without government interference. This would have resulted in a shift away from political economy-based locational choices and toward location decisions dictated by economic efficiency. To the extent that groups were better able to locate *efficiently* in less-developed regions, we expect the coefficient on *MEMB* to be larger for younger firms. We examine this prediction empirically by adding the interaction term $MEMB * AGE$ to our basic specification. These results are reported in columns (4) and (5) of Table 3. The coefficient on *MEMB* is now far higher (−0.095); this may be interpreted as the effect of group membership on "new" firms (i.e., $AGE = 0$, incorporation date of 1993). We conclude that younger group-affiliates are more likely to locate in less-developed regions, consistent with our thesis. Since 1991 is a landmark deregulation date, we run a similar regression,

Table 3. *The effect of group affiliation on locational choice*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Var: DEV							
MEMB	−0.051***	−0.044**	−0.043**	−0.040**	−0.095**	−0.115*	−0.042***
	(0.018)[a]	(0.019)	(0.020)	(0.018)	(0.039)	(0.019)	(0.016)
log(*SALES*)		−0.008	−0.006	−0.004	−0.004	−0.001	−0.007
		(0.006)	(0.007)	(0.006)	(0.012)	(0.011)	(0.013)
AGE			−0.002	−0.002	−0.005*		−0.001
			(0.002)	(0.002)	(0.003)		(0.003)
MEMB ∗ *AGE*					0.005*		
					(0.003)		
D1991						−0.109***	
						(0.036)	
MEMB ∗ D1991						0.079	
						(0.063)	
CAPIN							0.012
							(0.078)
MEMB ∗ *CAPIN*							−0.24**
							(0.11)
Constant	0.583	0.603	0.618	0.053	0.607	0.047	0.62
	(0.011)	(0.019)	(0.027)	(0.008)	(0.032)	(0.007)	(0.11)
Industry FE	No	No	No	Yes	Yes	Yes	No
R^2	0.007	0.009	0.009	0.077	0.012	0.076	0.018
Observations	1,193	1,193	1,193	1,193	1,193	1,193	1,193

[a] Heteroskedasticity-corrected standard errors in parentheses, allowing for firm-level clustering.
*Significant at 10%.
**Significant at 5%.
***Significant at 1%.

proxying for age using a dummy D1991, defined as one if incorporation date is on or after 1991. Similar results, reported in column (6) ensue: the coefficient on *MEMB* is −0.04, and the coefficient on the interaction term is −0.08 (though it is not significant at conventional levels).

(b) *Nonlinearities in the sales–location relationship*

In theory, our regressions control for size effects by including log(*SALES*) as a regressor. Note that the distribution of *SALES* is substantially different for group *vs.* nongroup firms (see Table 2, Panel B). Our specifications are reasonable as long as the relationship between *SALES* and *DEV* does not deviate too drastically from the log linear specifications that we use. If this is not so, however, our results may be driven simply by our assumptions of functional form. To examine this further, we run a spline regression, letting the slope on *SALES* change every 20 units, i.e., we use the following model:

$$DEV_i = \alpha + \beta X_i + \gamma MEMB_i + \sum_{m=1}^{5} \zeta_M I_{SALES_i \geqslant 20 * M} \ * \ SALES_i + \varepsilon_i,$$

where

$$I_{SALES \geqslant x} = \begin{cases} 0, & \text{if } SALES < x, \\ 1, & \text{if } SALES \geqslant x. \end{cases}$$

In this specification, the coefficient on *MEMB* is almost identical to that obtained in our original regressions.

(c) *Using performance as a dependent variable*

The above models assume a high degree of "economic" rationality in the location decisions of firms. But, these decisions likely involve a lot of unobservable, noneconomic, considerations. For example, many groups are family, rather than professionally, managed; in such cases, close proximity to familial homes tends to dominate locational choices. Moreover, issues of endogeneity arise with any firm-level characteristics that we might use as

regressors. Using locational choice as the dependent variable may thus introduce a lot of unnecessary noise and potential biases. While any observational study encounters such problems, they would be reduced here by looking at a purer *economic* outcome as the dependent variable. As our model in section 3 (as well as common sense) suggests, if group-affiliates are better able to minimize the costs of locating in less-developed regions, then they should be (weakly) more profitable in these regions relative to nongroup firms.

It may also be the case that, while groups facilitate development by locating in underdeveloped regions, they do not do so efficiently. For example, it may be that, in the extreme, the company towns described below (Pirojshanagar, Tatanagar, Birlagram etc.) are not manifestations of any particular efficiency, but rather monuments to the family that constructed them. By looking at economic outcomes, we seek to verify, at a minimum, that groups are at least no worse than nongroups in bringing development to underdeveloped regions.

We use an approximation of Tobin's Q, as well as accounting profits (return on assets, or ROA) as our measures of performance. [24] There are disadvantages associated with each measure of profitability, which is why we report both sets of results. By using ROA, we are relying on accounting data, which may not be reliable and are certainly very noisy. There are also difficulties with using Tobin's Q: due to data limitations, we may only use a coarse approximation of the true value of Q; also, the lack of efficient equity markets adds a lot of noise to any measure based on stock price.

In spite of these problems, the raw data seem to bear out our hypothesis—mean ROA is higher for group firms in undeveloped regions (0.091 *vs.* 0.087 in developed regions), and mean Q differs only slightly (1.56 in developed *vs.* 1.57 in undeveloped). For nongroup firms, however, both mean ROA and Q are higher in developed states (0.096 *vs.* 0.093 for ROA; 1.48 *vs.* 1.35 for Q). Note, that neither of these "difference in differences" (i.e., the difference between groups and nongroups, in the change in performance in moving from developed to undeveloped states) is statistically significant.

Multivariate analyses also weakly support the hypothesis that group-affiliated firms are better able to profitably locate in low-infrastructure regions than nongroup firms. Our basic regressions model is given by:

$$ROA_i = \alpha + \beta_1 * MEMB_i + \beta_2 * DEV_i + \beta_3 * MEMB_i * DEV_i + \boldsymbol{\beta}_4 * \boldsymbol{X}_i + \boldsymbol{\eta_I} + \varepsilon_{ij}.$$

A similar set of regressions were run with Q as the dependent variable. The coefficient on the $MEMB^*DEV$ interaction term is negative in both the ROA and Q regressions. In the ROA regression, the coefficient on $MEMB^*DEV$ equals −0.023; the mean of ROA is approximately 0.095, implying that a shift to locating in a low-infrastructure region (say, $DEV = 0.25$) from a high infrastructure region (say, $DEV = 0.75$) will reduce the ROA of a nongroup firm by about 12% relative to the effect of such a shift on a group-affiliated firm. The comparable value when Q is the dependent variable is also 12%. While these effects are not significant at conventional levels (t-statistics were in the range of 1.2–1.5), we interpret the results as indicating that groups are at least no less efficient than nongroups in bringing industrial activity to underdeveloped regions.

5. ALTERNATIVE EXPLANATIONS

(a) *Responding to regulatory distortions and government bureaucracy*

Regulatory distortions relevant to plant location decisions decreased following 1975 but did not completely cease until 1991. A different explanation for our results having to do with responses to existing regulations can thus be constructed. It may be that groups were restricted from plant expansions because of a societal bias against large organizations, spawned by a socialist regime in India (and enshrined in the Monopoly and Restrictive Trade Practices Act—MRTP). If the MRTP was relaxed for groups only for plants in underdeveloped regions, and if nongroups faced no such constraints, we might expect to see exactly the patterns that we do find.

The results of two tests lead us to believe that this explanation cannot completely account for the patterns in the data. First, we refer back to the results in columns (4)–(6) in Table 3. If this alternative explanation is correct, and groups were forced into underdeveloped regions purely because that was the only place they were allowed to invest, we should see the effect that we identify become weaker as the age of firms decreases. Our results on the interaction term,

*MEMB*AGE*, go in the opposite direction, undermining the credibility of this political economy-based explanation.

The second test exploits interindustry variation in capital intensity. Under our posited explanation, group location in underdeveloped regions should be especially pronounced for capital-intensive industries, because we conjecture that (capital) market failures will matter most here. Under the alternative explanation, there is no clear reason why the propensity to locate in underdeveloped regions should vary with capital intensity. We defined the capital intensity of a firm to be given by (Property, Plant, and Equipment)/Sales; in other words, the physical assets required per unit of sales. We then calculated the capital intensity of each industry (*CAPIN*) by taking an average over all firms in the industry. [25] For ease of interpretation, these values were then scaled to take on values between zero (services) and one (cement and glass). The results, listed in the final column of Table 3, are consistent with our hypothesis. The coefficient on the interaction term *MEMB*CAPIN* is negative, significant, and very large (−0.23), i.e., in capital-intensive industries, the effect of group affiliation is significantly stronger.

It is, of course, possible that government intervention in the location process might work in myriad other ways. It may be that underdeveloped regions are particularly prone to be highly politicized and that groups are uniquely able to do business in such environments, perhaps due to superior political connections. Our data suggest that this conjecture is worth probing because the fiscal benefits (normalized by sales) granted by governments to firms is indeed higher in underdeveloped regions for group firms but lower for nongroup firms than it is in developed regions. Accordingly, we split our sample into those firms that did not receive any fiscal benefits (893 of 1,193 observations) and those that did. Our results, in both magnitudes and statistical significance, are qualitatively identical in both subsamples. Therefore, while there may be a group effect in obtaining such benefits, it does not seem to account for our results.

Another proxy for the degree of bureaucratic corruption comes from the results of a 1997 survey on corruption conducted by a newsmagazine, *India Today*. In this survey, respondents were asked to rate the three most corrupt states in India in order. They were then asked to do likewise for the three least corrupt states. Based on the survey results, each state was assigned a scalar "corruption score" (*CORR*). This measure was only moderately correlated with *DEV* ($\rho = -0.32$). Moreover, *CORR* and *MEMB* were almost completely (though slightly negatively) uncorrelated. There was similarly almost no relationship between *CORR* and *MEMB* in multivariate analyses. Thus, the bureaucratic corruption hypothesis does not seem to explain our observed pattern in locational choice.

Finally, we make note of a conceptual argument that is independent of deregulation. The fall of the dominant Congress Party in the late 1970s, after three decades of single-party rule, signaled the onset of political instability, in the form of a changed opposition in Parliament and in the form of routine coalition governments. Conceptually, as we detail in the appendix it is much more difficult for bargains to be struck between politicians and firms when the tenure of politicians became so much less secure.

(b) *Intrastate heterogeneity*

Many of India's states are vast, both in size and population, and there is good reason to believe that there would be considerable variation in development within states. While it is not clear that this should be the source of any systematic bias, replicating our findings with some district-level data would certainly bolster our confidence in the results. While there are obvious benefits from moving to more disaggregated data, there is a cost as well. Our only district-level data come from the *Census of India, 1981*, which provides much weaker infrastructure proxies than are available at the state level.

We obtained district-level data for Gujarat, Karnataka, Maharashtra, Tamil Nadu, and West Bengal. [26] As our measure of telecommunications development, we use the percentage of villages with access to telephones. We similarly define measures for other development amenities by looking at the percentage of villages with the following: availability of power (Power); access to the village via permanent road (Transportation); access to primary schools and medical services (Social Services). We aggregate these items in the same manner as with the state-level data, and ran our analyses with this new district-level development measure. Our results were very similar in

terms of the magnitude of the implied effect, though admittedly somewhat noisier (p-values ranging from 0.01 to 0.15). We attribute this to the extremely coarse nature of our district-level development proxies. It is also interesting to note that most of the variation between districts is absorbed by state fixed-effects. That is, our use of the state as the level of analysis seems justified by district-level data.

(c) *Firm diffusion*

Suppose that the first few plants of any organization are more likely to be located in a more developed region due to the proximity of product markets and input suppliers. Suppose further that the construction of future plants diffuses outward to take advantage of new opportunities in other areas. Under this process of plant location, a larger organization will have a larger proportion of plants in less-developed regions simply because of this diffusion process, rather than any productive advantages. [27] This story, however, yields a separate prediction: the plants that an organization builds early on should be more likely to be located in a more developed region than those that it builds later. To test for this possibility, we repeated the basic analyses of this paper, adding a "counter" designating the order in which a group's firms were incorporated. So, a group's first firm was assigned a value of one, the second firm to be incorporated was assigned a two, and so on. When this variable was added to our regressions, its coefficient was extremely close to zero. Hence, we do not find evidence to support the firm diffusion hypothesis.

6. THE ROLE OF GROUPS IN LESS-DEVELOPED REGIONS

To get a better understanding of the factors that cause groups to locate in less-developed regions, we conducted a series of interviews with Indian managers and executives at both group and nongroup firms. The dominant reasons are described below. All but the last two are consistent with our hypothesis that group-affiliates are more likely to locate in underdeveloped regions because they are better able to mitigate the effects of market failures. Unfortunately, we are unable to test the relative importance of these explanations with our current data, but we hope to pursue this line of research in the future.

(a) *Direct infrastructure substitution*

Because of the high degree of fixedness in the costs of the infrastructure investments described in the introduction, it is efficient to spread these expenses over a large volume of assets. [28] Capital sharing across unaffiliated firms may be difficult because of government regulations and restrictions, and because the absence of property rights reduces the incentive to invest. [29] Agglomeration within a single firm is also a possibility, but this may not always be desirable or practical.

An alternative solution to the problem of scale is the sharing of capital within closely knit sets of companies affiliated with a single group. This sharing of resources is observed in varying degrees throughout India, but is most striking at the self-contained industrial "cities" constructed by a number of India's largest groups. These facilities include Jamshedpur (or Tatanagar, affiliated with the Tata Group), Pirojshanagar (Godrej Group), Birlagram (Birla Group), and Modinagar (Modi Group). In each case, the group provides such basic services as power generation, roads, schools, and employee housing for the joint use of its co-located companies.

(b) *Human resource considerations*

The lower quality of schools and healthcare, as well as the lack of cultural amenities in less-developed areas, makes it a serious challenge to recruit competent managers and engineers to work in these regions. Skilled workers are often much sought after in the labor market, and have ample opportunities available to remain in more cosmopolitan areas. Because of the shared infrastructure facilities listed above, groups are often able to make life in backward areas more palatable for skilled employees. Another advantage was described by a manager from the Tata Group, who explained that groups often recruit young managers to spend a few years at a facility in a less-developed region, with the promise that a job would later be available with the Group in a major center. [30] Moreover, since many groups have large pools of shared labor resources, they are able to rotate skilled workers through facilities in less-developed areas on shorter-term assignments.

(c) *Supply of inputs*

Since the concentration of industries is relatively sparse in less-developed areas, there is usually insufficient demand to stimulate the development of supporting industries. Basic inputs and repair services must therefore be sourced from relatively distant suppliers. A potential producer with only a local operation may have trouble establishing and coordinating these relationships, particularly given the poor quality of communications in less-developed areas. Group firms, on the other hand, already have well-established supplier networks, and are able to coordinate the delivery of materials through a corporate headquarters. Often, the supplies will come from a company which is itself a group-affiliate. For example, when the Godrej Group opened a new factory in Goa, it had materials shipped to it from the Group's principal facility near Bombay for the first few years of its operation.

(d) *Financing*

One particularly important input that may be difficult to access from less-developed regions is bank financing. India's financial institutions are concentrated in the country's major urban centers, particularly Bombay; because of deficient contract enforcement, reputations established via word-of-mouth contact are very important in banking relationships. The establishment and maintenance of the necessary reputation requires a strong presence in a major center, which makes it particularly difficult for independent firms in less-developed areas to obtain financing. In contrast, a group is likely to have a head office in a major city that may handle financing on behalf of its rural subsidiaries.

Many groups also reportedly utilize internal capital markets, even though there are some legal restrictions on borrowing and lending among the publicly traded group companies. This may be yet another avenue for financing that is not available to unaffiliated firms.

(e) *Risk and diversification*

Locating a production facility in a region without supporting services is more risky, simply because there are more things that can go seriously wrong. Groups are more capable of bearing this risk because of their greater size and diversification.

(f) *Land-intensive projects—groups and the government bureaucracy*

While many aspects of the Indian economy have been liberalized since 1975, land acquisition and land use are still highly regulated. For smaller plots of land, there are few bureaucratic barriers to be overcome. If a project requires a lot of land, however, it must be rezoned for industrial use. This process may take years to work its way through the bureaucracy, resulting in potentially costly project delays. There exist considerable economies of scale in dealing with the Indian bureaucracy—many large groups reportedly maintain "industrial embassies" in New Delhi whose sole purpose is to handle group relations with the government (Encarnation, 1989). Large groups are thus often able to expedite the rezoning process due to superior political contacts.

Now, it is usually preferable to locate projects with significant land requirements in less-developed regions, where property costs are lower. [31] Hence, land-intensive projects, for which group-affiliated firms are at an advantage, will be more common in less-developed (i.e., low property cost) regions.

(g) *Accounting profits*

Firms locating in backward areas receive, among other benefits, a five-year tax holiday. Since these areas are overwhelmingly concentrated in less-developed states, [32] firms in these states will, on average, pay lower taxes on their profits (see section 3 for a confirmation of this fact). As an accountant with a large Indian group pointed out, this provides an incentive for firms to locate their most profitable operations in less-developed states. This effect will be particularly strong for vertically integrated groups for the following reason: a group may build an "upstream" plant in a backward area, and sell its output to a group-affiliate that does not enjoy the same tax advantages at an inflated transfer price. This will artificially increase the profits of the untaxed operation at the expense the more heavily taxed operation, thereby lowering the total taxes paid by the group as a whole.

7. DISCUSSION

In this paper, we have shown that firms associated with business groups are more likely

to locate in less-developed regions. We interpret this as evidence that business groups are locating in these areas because they are better able to cope with the shortages associated with less-developed regions.

This result has important implications for evaluating both the development process and the value of groups. If we are to evaluate fully the costs of underdevelopment, we need to first understand how firms are dealing with current shortages, and how they might react to changes in the provision of basic services. Until now, there has been very little work done on the behavior of firms (and industrial organization in general) in developing countries. [33]

(a) *Private vs. public sector development*

Of course, an alternative mechanism for stimulating development in underdeveloped regions is for government-owned firms to deliberately locate their plants in less-developed areas. When we revisited the sample of government-owned companies that we discarded for our main analyses (a total of 235 plants, 217 firms), we found a mean level of *DEV* for these firms of 0.47, considerably lower than the average for any class of private firms. This basic finding held after we controlled for industry and size effects.

This begs the question of who is more effective at bringing industry to underdeveloped areas: government firms or group firms. If we take profitability as a measure of performance, then the basic statistics suggest that government firms are not doing a very good job of anything at all—operating ROA is only 0.4%, and net ROA is well below zero. While profits may not be a fair benchmark for analyzing the performance of government-run entities, which probably have other primary objectives, Indian government run firms are notorious enough for their operating inefficiency (Kelkar & Rao, 1996) that it would be a stretch to imagine that they could facilitate development more efficiently than private-sector group affiliates. [34]

(b) *Foreign vs. domestic infrastructure development*

Just as business groups might use cross-industry (but within-country) internal markets to substitute for unavailable external markets to locate in underdeveloped regions, one might expect that multinationals could similarly use crosscountry (but usually within-industry) internal markets (Foley, 2003). On the other hand, multinationals are less likely to be able to get around problems of contract enforcement than are domestic business groups, making the issue of multinational location in underdeveloped regions an empirical one. When we include foreign firms in our sample, we find that they are unambiguously more likely to locate in developed regions, and that our result regarding group-affiliates' location in underdeveloped regions is strengthened.

(c) *The effect of group plant location on development*

Godrej's experiences at Pirojshanagar highlight an important role of groups in the development process. Soon after the township was built, small-scale industries sprang up in the surrounding areas to serve the needs of the factories and their employees. Eventually, basic infrastructure was built to serve the needs of this new population. Thus, with basic services and ancillary industries present, other enterprises were able to locate in the area. Therefore, Godrej's original decision to locate at Vikroli subsequently spurred development in the surrounding area. [35] The Tata Group's steel facility at Jamshedpur (sometimes called Tatanagar) is another particularly striking illustration of this phenomenon. Jamshedpur began as a self-contained facility in the jungles of Bihar, but has grown into a major city of nearly 700,000 inhabitants.

Discussions with Indian managers suggest that this is part of a more general phenomenon—being the first to locate in a less-developed region is difficult because of the absence of infrastructure and ancillary industries. But an enterprise of sufficient scale will spur the development of these services, which in turn makes the area more attractive as a site for other industries. Our discussions suggest that group firms often play this leading role. Unfortunately, our current data do not allow us to test this hypothesis directly, but we hope that it will be a topic for future research.

Recognition of the role of business groups in facilitating development is important in evaluating the effects of groups, particularly given that they are so often portrayed as rent-seeking monopolists. We are certainly not claiming that this is *the* reason for the existence of business groups—certainly, there are many (see, for example, Amsden & Hikino, 1994; Ghemawat & Khanna, 1998; Granovetter, 1994; Khanna,

2000; Leff, 1976). But, given the presence of groups in developing countries, understanding their role in the development process is important in evaluating the implications of their existence.

Finally, we note that understanding the role of groups (and of firms, more generally) can further our understanding of some of the quandaries in the literature on infrastructure. For example, Gramlich's (1994) review points out that much attention has been devoted to analyzing the extent of infrastructure shortfall. Answering this question completely would require appreciating how firms invest privately in response to lack of public infrastructure, so as to partly alleviate *de facto* scarcity. Gramlich also points out that there are numerous empirical quandaries regarding the effects of public infrastructure. Whereas he focuses on measurement-related issues that fuel this puzzle, our paper suggests that the effects of public infrastructure might well be conditioned by the extent to which firms privately substitute for public infrastructure.

NOTES

1. This would, at least, be the prediction of the Coase theorem. But, infrastructure has a number of public goods characteristics that might make private provision difficult. This is implied by some of what follows.

2. See Jimenez (1995) for a comprehensive literature survey; see Morrison and Schwartz (1996) for a recent contribution to the literature on physical infrastructure; see Psacharopoulos (1994) for a review of the literature on the productivity of educational expenditure.

3. These take different names in different countries, e.g., *grupos* in Latin America, *chaebol* in Korea, business houses in India.

4. In most developing countries, group-affiliates are, for the most part, privately held. For example, Indonesia's Salim Group has an estimated 300–400 firms, but only five of these are publicly listed. In addition, firms in Indonesia, Central America and other countries are often partially held by several groups, making it difficult to determine the group membership of a particular firm.

5. As a headline in an Indian news magazine proclaimed in February 1996, India's "infrastructure is stretched beyond capacity and will soon have domestic production ... in a hopeless bind." The article cites chronic shortages of electricity, communications, and transportation facilities as among the most serious problems facing Indian industry.

6. Other countries satisfy the low level of development and high variance in level of development criteria, for example, China, but the lack of reliable measures of group affiliation makes these less appropriate sites for our analysis. Moreover, we have been unable to obtain plant location data for these countries.

7. As a recent example, Ahuja and Majumdar (1998) use these data to examine the performance of Indian state-owned enterprises, and Khanna and Palepu (2000) use these data to show that the performance consequences of diversification in India are different from those in advanced economies.

8. CMIE database: Computerized Information on Magnetic Medium.

9. While a group is not a legal construct, CMIE uses a variety of sources to classify firms into groups. Prior to the repeal of the MRTP (Monopolies and Restrictive Trade Practices) Act in 1991, a comprehensive list of firms belonging to "Large Industrial Houses" was published by the government. This forms a starting point for the CMIE classification for a number of the groups. Other significant sources of information include the following: (a) identifying the promoters of a firm when it was first started and tracing whether the original owners retained their affiliation with the firm, (b) announcement by individual firms of the groups of which they are a part, and by the groups of lists of affiliated firms. Such announcements appear periodically in annual reports, advertisements, or at the time of public offerings and news releases about the groups' and firms' future plans, and (c) identifying the interest that a group has in a particular firm through the membership of its board of directors. CMIE also regularly monitors changes in group structure. Shifts in group affiliation are extremely rare, but when they do occur, they are reflected in the database. Note that the database does not contain a historical record of each firm's affiliation

with different groups; rather the group membership variable reflects the most current affiliation. There is no ambiguity between CMIE's classification of firms into groups and those attempted by other sources against which we crosschecked the data. For example, list of "top 100 firms" are often published by India's leading business magazines. When their group affiliation is included, it does not contradict that from our source.

10. In the case of family-controlled groups, succession from one generation to another often results in the group being split into multiple parts. We identified several prominent groups that had gone through such periods of succession in the past 20 years, and checked to see that CMIE had indeed classified each subgroup separately. Thus, the Birla group is classified in several different parts, as is the group originally run by the Goenkas.

11. The case for excluding government-run firms is strong, as they differ markedly from other firms in our sample along many important observable dimensions, for example, earning negative profits on average. Moreover, it is very likely that the locational choice decisions of government-run firms would be made based on entirely different criteria from private firms. Similarly, we expect that foreign firms would use different criteria, though their inclusion actually strengthens our result (see below).

12. Number of observations dropped are listed in brackets; the attrition is done sequentially. Firms with zero sales were also omitted, since this is often entered if data are unavailable. For these observations, no accounting data were available. We might be concerned that this would cause the following selection bias: suppose that data were unavailable for less well-established firms. Then we might expect that the dropped observations would be excessively weighting nongroup firms, with a particularly strong bias in less-developed areas. The combination of these two biases could mean that our results are biased upward. While the former is definitely the case (76% of the firms dropped were nongroup firms), the latter does not seem to be true (the average value of *DEV* for these firms is 0.62, somewhat higher than the full sample average of 0.55). This suggests that the bias is more likely to run the other way. When we look at some basic regressions without size controls, we do in fact find that the group effect for this subset of firms is larger than the full sample value.

13. As the appendix implies, *de facto* delicensing only began in the early 1980s; if we use 1983 as our cut-off date, the group effect reported below is considerably stronger. We are, in effect, stacking the deck against ourselves by using such a conservative starting point.

14. While these data are more recent than most of the plant location decisions in our sample, this should not be problematic. While industrial reforms did indeed begin in the 1980s, reform of the infrastructure sector is a much more recent development. Furthermore, since infrastructure is a stock (rather than flow) variable, requiring substantial capital outlays, changes in infrastructure levels are very slow-moving. This is confirmed by Ahluwalia's (2002b) reporting of indices that assess the quality of infrastructure provision in the 14 largest Indian states for three time periods: 1980–81; 1991–92; and 1996–97. The correlation of the 1996–97 index with that of 1991–92 and 1980–81 is 0.996 and 0.968 respectively.

15. Unfortunately, we have not yet found more direct measures of telecommunications "quality." It is of some consolation, however, to note that in crosscountry data, telephone lines per capita is highly correlated with more quality oriented measures, including telecom investment (0.76), overall quality as assessed by the *World Competitiveness Report* (0.65), and faults per 100 calls (−0.52).

16. It has been pointed out that the quality of surfaced roads varies drastically; this is only a problem if we believe that surfaced road quality is negatively related to the percentage of roads that are surfaced. Conventional wisdom, however, would argue for the opposite.

17. With this measure, the *magnitudes* of the differences in each measure matters. We also ran our analyses using a rank order statistic to measure the various components of development. This resulted in a measure that was highly correlated with the one used in our analyses below. Not surprisingly, using this rank order-based measure yielded almost identical results to those we report here.

Another concern might be the weighting that the various measures are accorded. To check of the degree to which this might be driving how states are classified, we repeated our classification algorithm, adopting the (nonagricultural) weights used by Shah (1970) in his assessment of infrastructure in India. This had almost no effect on the ordering of states in terms of development, and thus did not substantially affect our results.

18. Note that the *Business Today* score is not ideal for our purposes, since it takes into account such factors as financial investment incentives that are relevant for a company's location decision, but do not reflect the state's level of economic development.

19. CMIE describes fiscal benefits as "benefits given by the government to companies operating in certain industries and/or to promote specific objectives. Fertilizer companies receive subsidies under the retention price support system. Tea companies receive replanting subsidies. Similarly, exporting companies receive subsidies under the duty-drawback scheme or the cash compensatory scheme or the international price reimbursement scheme."

20. The differences remain if we block on assets or industry.

21. While locational choices are observed that the plant level, these decisions are probably made at the firm-level. There is therefore likely to be some correlation among a firm's locational choices. To deal with multiplant firms, plant location observations are weighted by $1/n$, where n is the number of plants owned by the firm. This effectively assumes a high degree of correlation among the firm's decisions, collapsing n observations into one; this weighting is used for all nonregression calculations below. An alternative approach would be to assume complete independence among locational choices for each firm. This corresponds to using the unweighted data in the calculations; this approach yielded almost identical results.

22. Note that j differs across firms, since each firm has a different number of plants.

23. We repeated these analyses allowing for correlation among observations within the same group; this increased our standard errors a very small amount, and did not substantively affect the following results.

24. We approximate Q by

$$\frac{\text{Market Value of Equity} + \text{Book Value of Pfd.Stock} + \text{Book Value of Debt}}{\text{Book Value of Total Assets}},$$

where market value is based on the closing price on the last trading day of 1993. Data availability considerations preclude us from computing a better approximation to Q (see Lindenberg & Ross, 1981). The relevant measure of returns is operating income (see Khanna & Palepu, 2000). We therefore use tax-adjusted ROA, defined as $\text{ROA} = \{\text{Net Profit} + (1 - \text{Tax Rate}) * \text{Interest/Assets}$. The results are similar (though somewhat stronger) if we use nonadjusted ROA (i.e., (Net Profit)/Assets).

25. In calculating this average, we omitted observations greater than 10 and less than 0.10.

26. These states were chosen because they had the largest number of plant observations; we did not use Uttar Pradesh simply because it is divided into so many districts that entering data on all of its districts was impractical.

27. Note that the basic argument made in this paper is consistent with (though does not necessarily imply) the presence of a diffusion effect. That is, group-affiliates are able to diffuse outward *because* of the advantages they have in producing in less-developed regions.

28. As a result, smaller firms may bear a greater burden where public infrastructure is lacking—the World Bank study described above found that, while larger Nigerian firms spent around 10% of their machinery and equipment budget on infrastructure expenditures, smaller firms were spending closer to 25%. In the case of Indonesia, smaller firms were spending up to 25 times more for private power than larger companies.

29. For example, Nigerian firms are prohibited from selling any excess power capacity.

30. In a world of perfect labor markets, this would not be an important consideration—an unaffiliated company in a less-developed region could recruit skilled workers who would be able to simply find a new job in a more developed area after a few years. But, given the imperfect information flows that exist in reality, finding a job in Bombay if one is working in rural Orissa would be a tremendous challenge. There are also signaling considerations—if a Tata employee in Bihar wishes to look for a job in another state, he has the advantage of the Tata reputation, which is transferable across regions. The same cannot be said of a local firm's reputation.

31. Unfortunately, we have not been able to obtain any data to confirm these assertions; this section is based purely on interviews with Indian executives, and discussions with D. Kapur.

32. For firms located in states with $DEV < 0.5$, the percentage of firms located in backward areas is 64% as compared with 38% for firms in states with $DEV > 0.5$.

33. It is worth noting that private firms have often had to compensate for infrastructure deficiencies in history and currently. Some examples of companies that have done so profitably (or, at least, with no obvious impairment of productive efficiency) include India's leading software company today (Infosys), one of the

world's most celebrated furniture retailers, Ikea (investments in Almhult, its Swedish hometown).

34. Evidence from other countries like China also suggest that government, through state-owned enterprises, takes on the task of providing "cradle to grave benefits" (housing, health care, child care, retirement income, disability insurance, and unemployment insurance) when these are not generally available (Steinfeld, 1998). Recent press articles point to the great inefficiency with which these services are provided, however (see, for example, "Full speed ahead," p. 56, *Far Eastern Economic Review*, October 7, 1999). It is very important to note that a big difference between Chinese SOEs and Indian business groups is the absence of a hard-budget constraint in the former; the latter are entirely private-sector firms, that live and die by the rule of the market.

35. Ironically, this has resulted in an escalation in the costs that Godrej had hoped to avoid by building Pirojshanagar. The octroi surtax now applies to raw materials coming into Vikroli, while property prices and labor costs have skyrocketed. Because of its investments in infrastructure, as well as Indian regulations prohibiting the dismissal of employees, Godrej has faced many obstacles in moving once again to a low-cost region.

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APPENDIX A. EVOLUTION OF INDIAN INDUSTRIAL POLICY

The history of Indian industrial regulation is sufficiently convoluted and bizarre that it would be impossible to capture its many nuances and subtleties in a short description. We try here to give only a brief overview to illustrate the point that firms were given very little discretion in plant location decisions during 1950–75, and that beginning in 1975, there has been a fairly steady process of liberalization which continues to the present. There are several sources of information from which this section draws, including Kelkar and Rao (1996) and Joshi and Little (1997).

(a) Industries Act, 1951

In 1948, the Industrial Policy Resolution was drafted as a "programme of planned development in order to secure the most effective use of scarce resources, both domestic and external, for promoting balanced economic growth." This resolution was given legislative backing with the Industries (Development and Regulation) Act of 1951, which essentially gave the government complete control over India's industrial output. The Act created a licensing system under which government permission was required for any new enterprise, as well as any increase in the output of an existing enterprise. The government was actually given direct control over far more than just total output. For example, the degree of product differentiation was, strangely enough, dictated by government bureaucrats. Since imports were also severely limited, any firm that was able to procure a license enjoyed a considerable degree of market power. This lack of competition meant that a company could invest heavily in political rent-seeking, run a relatively inefficient operation, and *still* be highly profitable. One component of the bargain struck between politicians and prospective enterprises was usually that the location of any new production facilities be chosen at the discretion of the license-granting government official. Since this type of rent-seeking was less overt (and therefore easier to engineer) than outright bribery, it was almost always a part of the "informal" licensing agreement. Given India's democratic political structure, the incentives for license-granting officials are obvious: enterprises were often required to locate in the officials' home states, or in the states of other officials to whom the decision-maker owed political favors. Thus, the home states of top ministers received what was perceived to be a disproportionately large volume of new investment throughout 1951–75.

(b) 1975 Notifications

Beginning in 1973, the Indian government began to recognize that growth in certain industries was necessary in order to provide for a steadily growing national population (and economy). In 1975, the government announced that an annual capacity increase of 5% would automatically be allowed in 15 industries that were deemed to be "important from the point of view of the national economy or are engaged in the production of articles of mass consumption."

(c) 1977 Elections

From independence until the mid-1970s, the Congress party controlled both the federal and state governments, and did not face any serious threats to its rule. This stability facilitated the kinds of political deal-making that led to the politicization of plant location decisions outlined above. The situation changed drastically when the Janata party took control of the federal government in 1977; the government has seen much fracture and instability since then. This has meant that government officials over the past two decades have been drawn from different political parties; also, a politician's tenure has also been made less secure, which makes it less likely that he will be able to "pay back" any political favors. Both of these effects have made political deal-making much more difficult.

(d) Industrial reforms during the 1980s

India's industrial policy was steadily liberalized throughout the 1980s. The Industrial Licensing Policies of 1980 and 1982 further expanded the list of industries that were given automatic capacity expansion, and the amount of expansion was increased; some efforts were made at streamlining the licensing process. The delicensing of specific industries began in 1983, when nine industries "of national importance" were partially delicensed. This was followed by the announcement of a major liberalization in 1985, when 22 industries were delicensed. Over the next few years, a number of other industries were delicensed, leading up to the much-celebrated industrial policy reforms of 1991, which ended industrial licensing in all industries, except a handful deemed to be important for national security.