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Firm location choice in cities: Evidence from China, India and Brazil

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Research Paper No. 2007/56

Firm Location Choice in Cities

Evidence from China, India, and Brazil

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Abstract

We use large survey data sets of firms provided by the World Bank for China, India, and Brazil—Investment Climate Surveys—to address the important question: what determines the locational choice of firms among cities in these countries. We find that capital cities in all countries are attractive for firms to locate. In India and China, labour-intensive firms tend not to locate in mid-sized or large cities, when compared with smaller ones, perhaps due to higher wage, training and attrition costs. Labour regulations both in India and China deter firms from locating in the larger cities, but not in Brazil. Exporter firms prefer to locate in large cities in these two countries, but not so in the largest cities of Brazil. Finally, while the size of a firm has no impact on its location decision in China, large firms in India prefer to locate in the largest cities, but not in mid-sized cities. Proximity to inputs within the city has a positive impact on firm location. The post-reform firms in China tend to locate in the large cities whereas in the case of India, post-1991 firms refrain from locating in the mid-sized or large cities. These findings have important policy implications for urban governance in these countries, which are summarized in the paper.

Keywords: India, China, Brazil, location choice, industry location, firm location
JEL classification: P52, R3, R12, R58

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1 Introduction

It is well known that the economies of China and India have performed remarkably well recently. To some extent, the growth of the global economy is critically dependent on the rate of growth in China and India. Also, Brazil is a key player in the world economy, with a population of over 160 million, a land area larger than the continental USA, and an economic output of nearly \$800 billion. These three economies (abbreviated as CIB hereafter) are now having major effects on the global economy.

Along with their rising economic power, the CIB countries are also forging political alliances among themselves, with other developing countries, and with Europe. They are increasingly active and vocal on the world stage, especially in the context of trade with the developed countries. It is easy to gage that the 'rise of CIB' will eventually have profound implications for international governance, and developments in other countries, not only in the economic sphere, but in other spheres as well.

It is instructive to note the significance and contribution of the private sector to capital accumulation, employment and industrial growth in India and China. The private sector in China has grown exponentially in the past two decades and now contributes almost as much to the economy as the state sector. According to a study conducted by the International Finance Corporation (2000), despite difficult conditions, the output of the private sector in China had grown an average of 71 per cent per year, and non-state employment had risen at 41 per cent per year since 1980.

In India, according to the Central Statistical Organization, aggregate employment in the private large industries increased by an annual compound rate of 0.9 per cent during 1993-94 to 2001-02, whereas it declined by 0.4 per cent in the public sector (Sridhar 2005). The private sector's share in the country's organized sector employment increased from 25.6 to 27.6 per cent over this period, whereas the public sector's share declined from 71 to 69 per cent in 2001-02. While the larger share of employment growth in India's private sector was accounted for by the service industry (finance, real estate and insurance), India's manufacturing sector also witnessed increased employment growth during the period 1993-94 to 2001-02, at an annual rate of 0.6 per cent, raising its share in total employment from 16.9 to 17.9 percent. In contrast, employment in public sector manufacturing fell by 3.5 per cent annually during the same period.

In all CIB economies, the industrial sector constitutes a large component of the national GDP, ranging from 28 per cent (India) to 38 per cent (Brazil), and 46 per cent (China). Given the significance of industrial growth in these economies and their relevance for the global economy, it is critical to understand what factors determine locational choice of firms within these countries.

2 Background and research objective

It is worth noting the importance of urbanization in CIB. Thirty per cent of India's and 37 per cent of China's population was urbanized as of 2001. For China, the urbanization rate is 10 percentage points lower than its industrialization level. As of 2000, 81 per

cent of Brazil was urbanized, with 90 per cent of its GDP being created in cities (Avila and Mandell 2005; da Mata et al. 2005). At present, cities in China account for 70 per cent of the nation's GDP, and the corresponding contribution by cities in India is about 50 per cent, which is expected to reach 65 per cent by 2011. Overall, there are a total of 667 cities in China (Anderson and Ge 2005), and India has over 5,000 cities and towns as of 2001. Among the 123 major urban agglomerations in Brazil, only three were above 2 million people in 1970 versus ten in 2000. The number of agglomerations with population between 250,000 and 2 million had grown to 52 by 2000, compared with only 25 in 1970 (da Mata et al. 2005). So the scale of urbanization in all CIB economies is too large to be ignored.

In all these countries, major reforms and changes have taken place, which are bound to affect their urban areas significantly. Wu, Xu and Yeh (2007) argue how the market has been created in post-reform (post-1978) cities of China, challenging state regulation with respect to land and housing development. In India, too, the landmark 74th Constitutional Amendment Act of 1992 recognized cities, or urban local bodies, as the third tier of government. Similarly, in 1994, the Cardoso administration in Brazil initiated sweeping investment and infrastructural reforms, which substantially boosted business confidence in Brazil and opened the doors to the modernization and expansion of key infrastructure industries such as telecommunications, energy, transportation, and the environment, in addition to bringing rampant inflation under control.

Given the above, a careful examination of locational choice of firms in cities of these countries can help highlight specific problem areas of the business environment, which has direct impacts on the sustainability of their economic growth. While location of domestic firms and that of multinational corporations (MNCs) are driven by different considerations, the preconditions necessary for location of domestic firms would represent the bottom line for MNC firms. This provides the motivation to model location choice of firms in these countries. To be more specific, in this paper we attempt to explore determinants of locational choice of firms between large million-plus cities, and other smaller cities. Towards this objective, we model the locational choice of firms in cities in each of these countries using large data sets—Investment Climate Surveys (ICS)—of firms surveyed by the World Bank. Such a comparative analysis may uncover problems and lessons that the CIB economies can learn from each other, as well as provide lessons for other developing economies to promote industrial growth. Further, it is possible that factors that influence firm location decisions are different in these countries. A comparison of these differences, particularly in terms of city-level economic geography factors, has important implications for urban policies to attract new firms and for the sustainability of industrial growth in these countries.

This paper is organized as follows. The next section presents literature review. This is followed by data description and modelling methodology in Section 4. Empirical results are provided and discussed in Section 5. Finally policy implications are summarized in Section 6.

3 Literature review

The earliest explanation on the existence of cities and industry is provided by Lösch's central place theory. As summarized by Parr (2002), the theory assumes that firms locate in such a way as to maximize profits. Krugman (1995) extended the central place

explanation to include market size, agglomeration and localization economies. In addition to such market-based factors, policy-related factors such as favouritism towards certain regions can also explain location of industry (Markusen 1999). Henderson et al. (2000) offer a review on agglomeration.

Recent theory on international trade predicts that increased globalization is associated with increased locational concentration of particular economic activities, and hence increased specialization of national and regional economies. Resmini (2003) finds that border regions in Central and Eastern Europe indeed increased their shares of national employment and had been changing their patterns of specialization, the determinants of these relocation processes being FDI and proximity to the EU. However, Forslid and Wooton (1999) provide a counter-example to this familiar result. Egger and Falkinger (2003) present a model in which final goods producers outsource intermediate input production. They find that national public infrastructure investment has a positive effect on both the number of intermediate input producers and the return to the immobile factor in the home country, consistent with other literature.

There are a number of empirical studies on firm locations in CIB. Head and Ries (1996) find that in post-liberalization China, foreign firms located in cities where other foreign firms had located earlier, after controlling for fiscal incentives and infrastructure, highlighting the importance of agglomeration economies. Sridhar (2005), based on an anecdotal survey of India's firms, argues that infrastructure is an important determinant of firm location in the growth centres of India. Without the infrastructure (power, telecom, roads and banking), many firms (even some representing local entrepreneurship) would not have located there. This is consistent with Rajaraman et al. (1999) who reported that abundant power was an important factor attracting investment into a major Indian state during the eighties. According to Mani et al. (1996), power availability (rather than its price), reliable infrastructure and factors of production played a significant role in firm location decisions across major Indian states. Tulasidhar and Rao's (1986) analysis of a large number of medium- and large-scale industries in an Indian state indicated that the sales tax incentive, whichever way designed, was not the appropriate instrument to raise the level of investment or spread this to backward areas.

Lall et al. (2003) analyse the influence of economic geography on the cost structure of manufacturing firms in India. They find that industrial diversity is the only economic geography variable that has a significant, consistent, and substantial cost-reducing effect, particularly for small firms. This finding calls into question the fundamental assumptions regarding localization economies, and raises further concerns on the industrial development prospects of lagging regions in developing countries. Most recently, Sridhar (2006a) examines locational choice of firms using the ICS, concluding that India's highly efficient firms are much more adaptable and efficient than their Chinese counterparts. Sridhar (2006b, 2007) find that Indian firms tend to follow people and hence supply of labour could be the constraint in reducing unemployment rate in developing countries.

A study by the World Bank (2002) examines investment climate and the bottlenecks that deter private investment and productivity growth in India, drawing upon the World

Bank's Firm Analysis and Competitiveness Surveys (FACS).¹ It states that while China and India are both low-inflation countries, interest expenses occupy a higher share of costs for Indian firms (12.3 per cent, relative to 5.9 per cent for Chinese firms). Meanwhile, freight as a percentage of traffic units is a mere 5 per cent in India compared to 79 per cent in China, highlighting the much poorer utilization of freight infrastructure in India.

Turning to Brazil, Batista da Silva and Silveira Neto (2005) estimate the effects of external economies on employment growth in manufacturing. They find positive association between the growth of employment, market linkages and industrial diversity, which favour specialization.

As may be clear from the above literature survey, firm-level studies and city-level data regarding firm locations are sparse. One such study is by Byrnes et al. (1999) on the USA. Another is by Sridhar (2006a) on locational choice of firms using the ICS, for India and China. This is surprising as firm-level data are authentic for assessing investment climate or highlighting crucial aspects of city-level governance and policies, which can thwart or promote their ability as engines of national economic growth in these countries.

This motivates the modelling and comparison of firm location in urban areas across CIB. This paper contributes to the industrial location literature and examines why industry locates or refrains from locating in large urban areas, using invaluable firm level data across three fast growing economies of the world. This enables comparison of the factors that determine firm location across the three countries in the context of a common framework, which has important implications for urban and industrial policy.

4 Model and data

4.1 Model

One technique to gather empirical evidence on investment climate is primary surveys of firms (Bartik 1991). Sridhar (2003) takes this approach. Another technique is empirical modelling of firm location choices. Given the invaluable firm-level data available in the ICS, we use the latter approach in this paper. Let i index firm and j index city size where the firm is located. Our model, a multinomial choice equation, can be written as:

$$L_{ij} = f(G_{ij}, I_{ij}, B_{ij}, F_{ij}, E_{ij}) \quad (j = 1, 2, \text{ or } 3) \quad (1)$$

where L_{ij} represents the location choice of the i -th firm in city size j ($j = 1, 2, \text{ and } 3$ corresponding to large, medium and small city, respectively). G_{ij} represents firm-level economic geography variables, I_{ij} refers to infrastructure and services in city size j , and B_{ij} represents factors governing business–government relationships at the firm level.

¹ All countries in CIB are now covered under the PICS (Productivity and Investment Climate Surveys) project; a new World Bank initiative that combines surveys carried out since the mid 1990s under the Firm Analysis and Competitiveness Surveys (FACS), the World Business Environment Surveys (WBES), and the Regional Program for Enterprise Development (RPED).

F_{ij} represents firm-level characteristics such as size, labour intensity, post-reform and export status. E_{ij} represents the efficiency of the i th firm located in city size j .

While information on economic geography factors such as proximity to market and agglomeration are available for China's firms at the city level in the ICS, they are not available for India or Brazil's firms at such a disaggregated level (they are available at the state level). In the interests of model consistency we use proximity to inputs for firms, an indicator directly available from ICS, as our measure of economic geography (G_{ij}) in all countries. The expectation is that the greater the extent to which inputs are accessible in the city or state, the higher would be the odds for firm locating there.

I_{ij} represent city-level characteristics such as electricity cost, existence of paved roads and telephone lines. While the ICS contains data on these variables, they are available only for the current year, making them endogenous with firm location choice. Thus, we use a dummy for a capital city as a proxy for these city-level characteristics. It is widely understood that capital cities attract firms for various services and agglomeration economies, notably infrastructure of national/international standards such as highways, mass transport, high tele-density, international airport, relatively large international community and culture, and world-renowned cultural institutions and universities. As argued by Henderson et al. (2000), national governments' favouritism frequently allocates local public services in favour of national capitals, where decision makers live.

As a measure of B_{ij} , we use the optimum employment as a proportion of the firm's existing labour force to indicate the extent of labour regulation. As is known, regulation affects the location and functioning of businesses. Panagariya (2006), for instance, argues that labour market rigidities are a reason why India lags behind China. Specifically, the greater the extent of restrictions on labour hire and fire, the lower would be the likelihood of firm location. As measured in the ICS, a value of B_{ij} greater than 100 indicates that a firm would have liked to expand if there were no restrictions on labour recruitment. The reverse holds if B_{ij} is less than 100.

Other firm characteristics (F_{ij}) include labour intensity of firm, firm size and exporting status, proportion of government or private ownership, and a dummy indicating year of its establishment. Firm size is represented by its number of employees, as is conventionally done in Kumar et al. (1999), Hall (1986), Glancey (1998) and Kim et al. (2004).

While we expect exporting firms to locate in large cities (for the ease of logistics and availability of infrastructure), and larger firms to locate in larger cities, the impact of labour intensity on firm location cannot be a priori determined. This would depend on the relative advantages of the availability of skills and a labour pool in cities of different countries, and matching skill availability with requirement. For instance, different types of skills are required for steel firms than that required by water treatment plants.² If there is a good match of skill availability with those required by a firm, then labour intensity will have a positive impact on firm location. If not, the impact would be negative.

² While the type of skills required would be different for manufacturing and service firms as well, only manufacturing firms are covered by the ICS in the set of core surveys used here.

It is important to control for a firm's ownership structure. This is because government-owned firms might be required by law or policy to locate in cities of a certain size or certain regions (considered industrially backward). Sridhar (2006b) discusses one such policy initiative in India, in which firms which locate in industrially backward regions are provided with infrastructure incentives. As argued by Lall and Mengistae (2005) and Dollar et al. (2004), inherently more efficient firms could tolerate more inhospitable business environments (e.g., restrictive labour regulations) or more adverse geography (e.g., difficult access to inputs) and locate in such cities. Therefore, it is appropriate to control for firm efficiency in the firm location choice model. We measure efficiency by the net sale value (total revenue from sales minus total production costs) as a proportion of its total costs (consisting of labour, material, energy and other costs). To ensure its exogeneity, this variable is lagged by one year before being included in equation (1).

Finally, given sweeping economic reforms that have taken place in each of these countries, a dummy for post-reform establishment of firms is included to account for the impact of nationwide reforms on the investment climate in cities of different sizes.

4.2 Data

The World Bank's ICS covers more than 1,000 firms in over 50 countries, providing data on many aspects of conducting business. Two types of dataset exist for each survey: country dataset and the core dataset. The former consists of all variables for each country while the latter contains questions asked in all countries. For purposes of comparison, we use the core datasets in this paper. Although data are collected from China in 2002 and 2003, and from India in 2000, 2002 and 2005, only 2003 data are available as far as Brazil is concerned.

The business establishment rather than the firm *per se* is the sampling unit. Each country survey covers a minimum number of sectors that are common to all or most countries. Within each country, major export and/or growth industries are adequately represented. Due to budget considerations, coverage in the ICS is limited to areas of minimum concentration of activity. Probability sampling rules are used within each stratum defined by locations and sectors of activity chosen on the basis of those criteria. The ICS contains data on infrastructure and services, business-government relations, labour relations, and firm-level characteristics. The firm-level information on government-business relations pertains to restrictions on recruitment and retrenchment of workforce. For some countries such as China, the ICS provides information on city-level economic geography factors such as proximity to inputs and markets, and the existence or otherwise of competitors.

For each establishment, the ICS records city of location, year of establishment, exporting status, ownership structure, major constraints on successful operation, and so on. It is noted that the location of a firm is a stock variable. That is, firms locate in these cities at a single point in time. Even in the case of India and China where the survey was conducted for several years, the same firms were not followed. So it is not possible to track the mobility of footloose firms.

Table 1 describes the size distribution of cities in China, India, and Brazil. It was not possible to use the same classification of city sizes in our models for all countries, given

Table 1: Size distribution of cities in China, India, and Brazil

Size of city	Number
China	
Population over 1 million	164
Population 500,000-1 million	273
Population <500,000	230
All cities	667
India	
Population >5 million	6
Population 1-5 million	29
Population >100,000	379
Population 50,000-99,999	503
Population 20,000-49,999	1,391
Population 10,000-19,999	1,558
Population 5,000-9,999	1,040
All cities*	5,161
Brazil	
Population >5 million	3
Population 2-5 million	7
Population 1-2 million	8
Population 500,000-1 million	14
Population 250,000-500,000	30
Population 100,000-250,000	46
Population <100,000	15
All cities	123

Note: *This category includes cities with population <5,000 in addition to those in the city sizes mentioned above.

Source: Anderson and Ge (2005) for China, data current as of 1999; Census of India, 2001 for India; da Mata et al. (2005) for Brazil.

that firm distribution across city sizes in the three countries was quite varied. Based on Table 1, Brazil had 18 million-plus cities as of 2000, India had 35 of them in 2001, and China, several times more. Given this size distribution of cities, the location choice of firms among the ‘million plus’ and other large cities is intriguing.

Table 2 describes the location of surveyed firms in CIB. While a majority of firms in India (52 per cent) and in China (77 per cent) were located in cities with 2 million or more population, in Brazil more than 70 per cent firms were located in cities with population of less than a million.

Table 2: Location of surveyed firms, by city size

Population of city	Number of firms and percentage distribution		
	India	China	Brazil
	2000, 2002 and 2005 data	2002 and 2003 data	2003 data
Less than 1 million	1,167 (23%)	200 (5%)	1,136 (72%)
1-2 million	1,222 (24%)	700 (18%)	134 (8%)
More than 2 million	2,613 (52%)	3,048 (77%)	318 (20%)
All firms	5,002 (100%)	3,948 (100%)	1,588 (100%)

Note: The total number of firms surveyed is 5,008 for India and 1,642 for Brazil. Not all firms are included in the table as some industry categories are omitted to ensure comparability across countries.

Source: World Bank ICS, and authors' computations.

4.3 Comparisons of the profile of firms across countries

Overall, 1,642 firms in Brazil, 5,008 firms in India and 3,948 firms in China were surveyed by the ICS over different years. In Brazil and India, almost all the surveyed firms (100 and 99 per cent respectively) were manufacturers. In the case of China, roughly 29 per cent of firms were in services (accounting, marketing, advertising and business services), with the remaining being in manufacturing. Table 3 shows the sectoral distribution of the surveyed firms within manufacturing and suggests that a majority of China's firms are high-tech (i.e., in electronics manufacturing), when compared with firms in India or Brazil.

Table 3: Sectoral distribution of surveyed firms

Sector	Brazil (2003)	India (2000, 2002, 2005)	China (2002, 2003)
Textiles	105 (6.39%)	707 (14.12%)	NA
Leather**	171 (10.41%)	139 (2.78%)	465 (11.78%)
Garments**	444 (27.04%)	783 (15.63%)	NA
Food	128 (7.8%)	330 (6.59%)	290 (7.35%)
Metals and machinery	184 (11.21%)	661 (13.20%)	178 (5.27%)
Electronics	78 (4.75%)	316 (6.31%)	953 (24.14%)
Chemicals and pharmaceuticals	81 (4.93%)	603 (12.04%)	102 (2.58%)
Wood and furniture	324 (19.73%)	16 (0.32%)	NA
Auto and auto components	127 (7.73%)	472 (9.42%)	431 (10.92%)
All firms	1,642	5,008*	3,948*

Notes: * The number of firms may not total to 5,008 or 3,948 as some industry categories have been omitted in the interests of comparability across countries. ** In the case of China, garments and leather products are combined.

Source: World Bank ICSs, and authors' computations.

As far as employment size is concerned, Brazil and India are characterized by a large number of small firms, whereas most of China's firms are medium, big or very big. On average, the number of employees was 568 for China's firms, 156 for India and 125 for Brazil. Based on this, it does seem that in China, the small town and village enterprises (TVEs) are excluded from the ICS and our data set. Regarding ownership, almost all the firms in India and Brazil were privately owned whereas, in the case of China, on average, government ownership was about 22 percent. Nearly 47 per cent of firms were exporters in India. This percentage is 31 in the case of Brazil and only about 23 per cent for China.

The year of establishment or initial operation for a typical firm surveyed in Brazil is 1983, whereas this is 1985 for India's firms, and much more recent for those in China, being 1987. Thus, a large proportion (81 per cent) of surveyed firms started operations in the post-reform (i.e., post-1978) period in China, whereas only 40 per cent of India's firms (i.e., post-1991) and 29 per cent of surveyed Brazil's firms (being post-1994) were post-reform firms.

Speaking of the importance of capital cities emphasized by Henderson et al. (2000), we observed from the data that 87 per cent of China's surveyed firms were located in capital cities, whereas only 44 per cent of India's firms and 24 per cent of Brazil's firms were located in capital cities. In terms of labour intensity, 22 per cent of the total costs of production in Indian and China's firms was on labour. Surveyed Brazilian firms were more labour intensive, with labour costs accounting for 31 per cent on average.

4.4 Input linkages

In the ICS, information exists on economic geography factors for CIB firms such as availability of inputs and proximity to markets. In the case of China, there exists more information on input linkages. For example, in terms of average expenditure, 31 per cent of suppliers of Chinese firms were located outside the same district, but within the *same city*. In the case of India and Brazil, proximity to input suppliers is measured only at the level of *state*, not at the city level as in China. Almost 50 per cent of surveyed Indian firms located in the same state where they obtained their supplies of key natural resources as raw materials. In Brazil, nearly 44 per cent of domestic inputs came from the same state in which the plant was located. It appears that economic geography factors measured by proximity to inputs do play an important role in firm location in all the countries.

4.5 Labour regulation

On average, the optimal level of employment as a proportion of the current workforce is below 100 in all the three countries. This implies that these firms would have liked to retrench some of their employees if restrictions had not been imposed on compensation, pension and so forth. To be more precise, this optimal level of employment as a proportion of the existing workforce was respectively 91, 95 and 36 for firms in China, India and Brazil. Clearly, labour force regulations are more restrictive in Brazil than in China or India as Brazilian firms would have liked to retrench more than 60 per cent of their workforces if restrictive policies had not been in place. Clearly, firm location decisions are expected to be negatively impacted by such regulation.

4.6 Firm-level efficiency

In this paper, efficiency is indicated by firms' net value of sales as a proportion of its total costs. This is an output-based measure of efficiency. An input based approach could focus on capacity utilization, defining firms as being efficient if they utilized a large proportion of their capacity in terms of equipment and labour shifts. However, such firms need not be efficient in their turnover, production, and sales as a proportion of their costs of production. Yet, another approach is to take advantage of the frontier functions or data envelopment analysis (Goaied and Ayed-Mouelhi 2000; Chapell and Plane 2005).

5 Location choice of firms

In what follows, we will discuss city classification and model estimation results for each of the CIB countries

5.1 Location choice of firms in China

All cities in which surveyed ICS firms are located will be classified into three groups: large, medium and small. For China, small cities are defined as those with less than 2 million population, mid-sized cities with population between 2-5 million, and large cities with population greater than 5 million.³ The classifications were defined after examining the distribution of firms across cities to ensure roughly equal distribution of firms among the three city groups.

Model (1) is fitted to data from China. Table 4 summarizes the multinomial logit estimation results. Several findings are noteworthy. First, post-reform firms are more likely to locate in larger (medium and large) cities. This is possibly attributable to the fact that markets are mostly created in major cities in post-reform China (Wu et al. 2007). Also, large cities have become the engines of growth with better infrastructure such as national highways, mass transport, and well-developed ports. The result is consistent with the significant coefficient estimate for the dummy variable of capital cities, indicating high odds for firms to locate in capital cities. This is particularly true for medium and big firms. It is noted that the capital dummy is used to capture effects of public services and infrastructure.

Second, the variable reflecting proximity to inputs is found to be significant. In other words, firms with greater share of suppliers from the same city are likely to locate in medium and large cities. This confirms the importance of geography factors in determining firm' location decisions in China.

Third, the probability is significantly higher for exporting firms to locate in medium and large cities. This is reasonable because exporting firms require good transport and logistic infrastructure, which is better in larger cities.

Fourth, labour intensity has a significant and negative impact on the likelihood that a firm will locate in a medium or large city. This is not surprising because wages, training

³ The list of cities in which ICS firms are located is available from the authors upon request.

costs and attrition rates are higher in large cities, and employees in large cities tend to be aware of labour regulations and their rights better than those in small cities.

Fifth, the optimum employment as a proportion of a firm's existing workforce is used as an indicator of restrictive labour regulation. This factor exerts a significant and negative impact on the probability that a firm will locate in a large city, but no significant impact on firm location in medium-sized cities. Thus, the more a firm plans to recruit, the more likely it is to move away from very large cities, implying more restrictive labour regulation and enforcement in large cities in China. This finding is also in line with the negative coefficient of the labour intensity variable.

Finally, more efficient firms are found to prefer large- and medium-sized cities, perhaps for larger markets and good infrastructure. This is contrary to earlier speculation that these firms can overcome inhospitable business environment. Rather, they continue to seek a favourable business climate to locate.

Table 4: Multinomial estimates of locational choice of firms in China

Variable	Medium city		Large city	
	Estimate	Z value	Estimate	Z value
Constant	-1.33 (0.25)***	-5.23	-1.78 (0.29)***	-6.05
Whether firm established in post-reform period (1 = yes; 0 = no)	0.55 (0.15)***	3.79	0.74 (0.15)***	4.91
State ownership of firms (%)	0.00 (0.00)	0.14	-0.00 (0.00)	-1.60
Whether capital city (1 = yes; 0 = no)	2.18 (0.15)***	14.57	2.96 (0.18)***	16.50
Proximity to inputs (% of suppliers located in the same city)	0.01 (0.00)***	2.60	0.01 (0.00)***	4.56
Firm size (average number of employees previous year)	0.00 (0.00)	0.79	0.00 (0.00)	1.34
Whether exporter (1 = yes; 0 = no)	0.44 (0.15)***	2.99	1.08 (0.15)***	7.40
Labour intensity of firms	-0.73 (0.25)***	-2.91	-1.19 (0.26)***	-4.54
Optimum employment as a size of existing labour force	-0.00 (0.00)	-1.71	-0.01 (0.00)***	3.87
Firm efficiency	0.01 (0.00)***	2.49	0.01 (0.00)***	2.52

Notes: Dependent variable: whether located in a medium or large city. Number of observations = 3,142. Base outcome: whether firm located in a small city. Standard errors in parenthesis. *** indicates statistically significant at the 1% level.

Source: World Bank ICS, and authors' computations.

5.2 Location choice of firms in India

As with China, the cities under study are classified into three groups by ensuring roughly equal distribution of firms across the three groups. Small cities are defined as those with less than 1 million population, mid-sized cities with 1-3 million population, and large cities with population over 3 million. Table 5 summarizes the multinomial log odd estimates of a firm locating in a mid or large city in India.

India and China share a few similarities and differences as far as the results are concerned. The differences are in the impacts of year-of-establishment and proximity to inputs. Post-reform firms in India are averse to locating in medium or large cities. This is likely because of the higher costs of doing business (real estate, skills attrition, and so on) in larger cities in post-reform India (see Sridhar 2006). It seems that larger cities in post-reform China have done a better job in attracting firms, when compared with their Indian counterparts.

Table 5: Multinomial estimates of locational choice of firms in India

Variable	Medium city		Large city	
	Estimate	Z value	Estimate	Z value
Constant	1.40 (0.44)***	3.16	-0.77 (0.62)	-1.25
Whether firm established in post-reform period (1 = yes; 0 = no)	-0.22 (0.09)***	-2.53	-0.38 (0.12)***	-3.27
Firm's private ownership (%)	-0.01 (0.00)	1.45	0.01 (0.01)	1.27
Whether capital city (1 = yes; 0 = no)	0.76 (0.13)***	5.73	3.68 (0.14)***	26.47
Proximity to inputs (whether state has raw materials firm uses as inputs)	-0.11 (0.09)	-1.33	-0.33 (0.11)***	-2.88
Firm size (average number of employees previous year)	-0.00 (0.00)	-1.38	0.00 (0.00)***	4.30
Whether exporter firm (1 = yes; 0 = no)	0.11 (0.09)	1.20	0.24 (0.12)	1.94
Labour intensity of firm	-0.76 (0.21)***	-3.58	-0.62 (0.27)**	-2.29
Optimum employment as a size of existing labour force	-0.00 (0.00)	-1.45	-0.01 (0.00)***	-3.81
Firm efficiency	0.00 (0.62)***	3.11	0.00 (0.00)***	3.11

Notes: Dependent variable: whether located in a medium or large city. Number of observations = 3,363. Base outcome: whether firm located in a small city. Standard errors in parentheses. *** statistically significant at the 1% level; ** statistically significant at the 5% level.

Source: World Bank ICS, and authors' computations.

Another difference from China is that firms in India are less likely to locate in a larger city even if the state has key raw materials as production inputs. For medium cities, the availability of inputs in the state does not have a significant impact on location choice. This could be an artefact of the data since city-level information on proximity to inputs is unavailable in the ICS in the case of India's firms. Since a state represents a much larger geographical area than a city, the mere availability of inputs if in a remote or distant part of the state, does not ensure a firm's location in the city. Even if raw materials and other inputs were to be readily accessible within a state, it could well be the case that the city has some offsetting locational disadvantages. A final difference with China is that big firms in India are likely to choose large cities. This is likely due to the ready availability of skills, infrastructure and other support networks in large cities in India.

Other findings are similar to what we find for China. These include:

- (1) More labour-intensive firms tend to refrain from locating in medium-sized cities relative to smaller cities in India, possibly because labour cost has increased to a high level in those cities. A firm's labour intensity is a significant factor deterring firms from locating in the large cities of India as well. This indicates that labour costs must be a significant factor in determining firm location choices. In other words, labour-intensive firms are attracted to small cities for their low costs of training and low attrition rates.
- (2) Indian firms find capital cities attractive. This reinforces that public investments are biased in favour of capitals where policymakers live (Henderson et al. 2000).
- (3) Exporting firms prefer larger cities because the product value chain is better integrated in larger than in smaller cities.
- (4) The labour regulation indicator has a significant and negative impact on the odds of a firm locating in a large city in India. This is consistent with Besley and Burgess (2004) and Lall and Mengistae (2005), both showing that regional differences in labour regulation are part of the reason why some of India's states have lagged behind in industrial development.
- (5) Firm efficiency has a significant positive impact on the log odds of a firm locating in the large cities of India. This implies that more efficient firms prefer to locate in medium and large cities, a fact concurring well with reality, which again dispels the hypothesis of efficient firms being able to overcome inhospitable environments.

5.3 Location choice of firms in Brazil

The city sizes are defined as follows for Brazil. Small cities are those with less than 100,000 population, mid-sized cities with population between 100,000-1 million, and large cities with population greater than 1 million. This is quite different from the groupings we used for India and China. In Brazil the size distribution of cities is different as shown in Table 1, and the distribution of ICS firms is also different (Table 2). By classifying cities into the above groups, roughly equal numbers of firms in each group—484, 701 and 404 respectively—are obtained.

The modelling results can be found in Table 6. Interestingly, the greater the proportion of inputs coming from within the state, the less likely a firm will locate in a medium or

large city. This finding resembles that in India, possibly for the same reasons. In particular, had the data been available at the city level, proximity to inputs may turn out to be a positive determinant of firm's decision to locate in a medium or large city.

In Brazil, the higher the percentage of private ownership, the less are the odds of such firms locating in large and medium cities. This makes sense if private ownership refers to small entrepreneurs who may find it difficult and unaffordable to do business in large cities. In stark contrast with China and India, exporting firms in Brazil are found to shy away from larger cities, implying that in those cities the costs of exports (such as delays in clearing customs) might exceed the benefits of better infrastructure. As with India and China, capital cities are attractive to all firms even in Brazil. This reinforces the view that capital cities everywhere are good places to do business because of the availability of infrastructure, public services and other amenities.

Interestingly in the case of Brazil, firm efficiency seems to have no impact on the location choice of firms. This, once again, dispels the hypothesis that more efficient firms might tolerate more inhospitable business environments and locate there.

Table 6: Multinomial estimates of locational choice of firms in Brazil

Variable	Medium city		Large city	
	Estimate	Z value	Estimate	Z value
Constant	1.81 (0.59) ^{***}	3.09	0.07 (0.83)	0.08
Whether firm established in post-reform (1991) period (1 = yes; 0 = no)	-0.19 (0.16)	-1.24	-0.20 (0.26)	-0.78
Firm's private ownership (%)	-0.01 (0.01) ^{**}	-2.32	-0.02 (0.01) ^{**}	-2.24
Whether capital city (1 = yes; 0 = no)	1.32 (0.40) ^{***}	3.34	5.25 (0.39) ^{***}	13.35
Proximity to inputs (% of inputs coming from within the same state)	-0.00 (0.00) ^{**}	-2.40	-0.01 (0.00)	-1.87
Firm size (average number of employees previous year)	-0.00 (0.00)	-0.19	-0.00 (0.00)	-0.19
Whether exporter firm (1 = yes; 0 = no)	-0.06 (0.17)	-0.37	-0.67 (0.30) ^{**}	-2.20
Labour intensity of firm	0.30 (0.37)	0.83	0.89 (0.61)	1.45
Optimum employment as a size of existing labour force	0.00 (0.00)	0.16	0.00 (0.00)	0.64
Firm efficiency	-0.17 (0.10)	-1.66	-0.27 (0.19)	-1.44

Notes: Dependent variable: whether located in a medium or large city. Number of observations = 1,139. Base outcome: whether firm located in a small city. Standard errors in parentheses. *** statistically significant at the 1% level; ** statistically significant at the 5% level.

Source: World Bank ICS, and authors' computations.

6 Summary and policy implications

It is important to identify factors that determine firm location in cities of CIB, as economic growth and its sustainability in these countries depend to a significant degree on urban development. Firm location can have long-lasting impacts on the sustainability of employment they create in cities, due to their hysteresis effects.⁴ Further, location of domestic firms provides strong signals to prospect MNCs, showcasing the area as a good place for businesses, their employees, and households to locate.

Fitting multinomial logit models to ICS data from CIB, we find that capital cities in all countries are attractive for firms to locate. In India and China, labour-intensive firms tend not to locate in medium or large cities, perhaps due to higher wage, training and attrition costs. In China and India but not in Brazil, labour regulations deter firms from locating in the larger cities and exporter firms prefer to locate in large cities. While the size of a firm has no impact on its location decision in China, in India big firms prefer to locate in large rather than mid-sized cities. Regarding economic geography factors, proximity to inputs within the city has a positive impact on firm location. However, availability of raw materials in the same state does not have a significant impact on firm location in India and does not have the expected impact on firm location in Brazil.

Firms established after 1978 in China tend to locate in large cities whereas post-1991 firms in India refrain from locating in the mid-sized or large cities. This vividly indicates that in post-1991 India, large cities have not been successful in creating a pro-business environment. They are faced with many infrastructure constraints, as Sridhar et al. (2006) highlight. However, municipal governments in post-reform China have formulated various competitive strategies to promote business development such as reconstruction of city centres, creating university towns, science parks and 'urban villages' (Wu et al. 2007). Although special economic zones are initiated in India to enable firms to overcome bureaucratic delays and regulation, they are currently mired in controversies of land acquisition.

The major findings uncovered in this paper have important policy implications for urban development. First, there is little need for capital cities to package various incentives for firms to locate, since firms are attracted to these cities due to their amenities, agglomeration effects, and political clout. Second, economic geography factors matter at the city level. For example, if an iron ore mine exists around a city, it makes sense for the city/local government to attract a car/tractor/aircraft or related equipment manufacturing plant, not a software or high-tech firm. In such instances of forward or backward integration, it is unnecessary to offer extra incentives to the firm, other things being equal. Third, efforts are needed for large cities of China and India to increase the supply of skilled labour so to narrow down the gap in labour cost between large and small cities. Meanwhile, labour regulation must be reformed to make hiring and firing easier. In the case of Brazil, logistics, infrastructure and port efficiency must be improved as exporting firms refrain from locating in the large cities there. Finally, small cities in China and India need to do more to attract efficient firms, perhaps by providing

⁴ Hysteresis is a term borrowed from physics to explain how the electromagnetic properties of certain materials are completely changed due to the temporary application of certain magnetic fields, and is frequently applied to the labour market.

them with infrastructure incentives (Sridhar 2006b). After all, small cities face limited market size and often mean higher transportation costs, even to efficient firms.

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