



Economic Premise

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India's Spatial Development

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Should developing countries focus on the development of urban infrastructure and in general facilitate the location of employment in its large cities to exploit the still important agglomeration economies? Or should they develop infrastructure in medium-density locations to remove some of the growth impediments present in these areas? This note examines the recent spatial development of India.¹ Services, and to a lesser extent manufacturing, are increasingly concentrating in high-density clusters. This stands in contrast with the United States, where in the last decades services have tended to grow fastest in medium-density locations, such as Silicon Valley. India's experience is not common to all fast-growing developing economies. The spatial growth pattern of China looks more similar to that of the United States than to that of India. What is preventing India's medium-density cities from growing and taking full advantage of agglomeration forces? Future research should focus on identifying the barriers to growth in medium-density places.

In the last two decades, the Indian economy has been growing at unprecedented rates, but that development has led to widening spatial disparities (Ghani 2010a). While some cities, such as Hyderabad, have become major high-tech hubs with world-class companies and real estate development reminiscent of Silicon Valley, many others remain mired in poverty and stagnation.

Rising geographic disparities are obviously not specific to India, they are common to the development experience of many countries. As documented by the 2009 *World Development Report*, growth is often accompanied by an increasing spatial concentration of economic activity. In China, for example, the coastal provinces have attracted the lion's share of the country's economic growth, and much of Brazil's economic activity is concentrated in the metropolitan areas of São Paulo and Rio de Janeiro.

Policy makers tend to frown upon the uneven distribution of economic activity, and are keen on promoting policies aimed at reducing such spatial differences. Given the huge

congestion in cities such as Mumbai or Kolkata, this seems to be a reasonable policy concern in the context of India. However, those cities also benefit from important agglomeration economies, so there is a need to analyze the trade-offs between the costs and benefits of economic density before articulating policy recommendations. Such an analysis should provide valuable insights into what types of spatial and regional policy interventions may be useful and effective.

Geographic Distribution of Economic Activity

Compared to other countries at similar levels of development, India's growth stems disproportionately from its burgeoning service sector (Ghani 2010b). When focusing on the geographic distribution of economic activity, this difference is relevant. Evidence from the United States and Europe suggests that manufacturing and services behave very differently (Desmet and Rossi-Hansberg 2009). In both the United States and Europe, manufacturing is becoming more equally

tion. That is, the high-density services clusters are gaining relative to those locations with slightly lower employment density. Many of the well-known information technology (IT) clusters are in the upward-sloping area of the estimated relation, suggesting that they continue to benefit from agglomeration economies. For example, services employment in Hyderabad and Chennai is growing at an annual rate of 11 percent and 4 percent, respectively. If a simple regression is used, the predicted growth rate of these two cities would be -7.1 percent and -8.2 percent, respectively. This underscores the importance of accounting for nonlinearities in the scale dependence of growth. Note that the upward-sloping area is also driven by some of India's largest cities, such as Mumbai. But not all large cities exhibit high growth in services, as illustrated by Delhi.

A reasonable question may be whether these results are driven by particular subgroups of manufacturing or services. To answer this question, the sample was split to distinguish between the formal and the informal sectors. This distinction on informality may be relevant, since firms in the informal sector are less subject to laws and regulations, and thus perhaps more free to operate and choose their location. Differentiating between the formal and the informal sectors does not change the results. The service sector is becoming increasingly concentrated in high-density clusters, whereas in manufacturing, the picture is more mixed. A second analysis examines two-digit sectors for which there are data (22 manufacturing subsectors and 12 service subsectors). Still the main result holds: services, and to a lesser extent manufacturing, are becoming increasingly concentrated in high-density clusters, and this is not driven by a few subsectors. In the case of services, around 90 percent of employment is in subsectors that exhibit increasing concentration in high-density clusters, whereas the corresponding figure in manufacturing is around 60 percent.

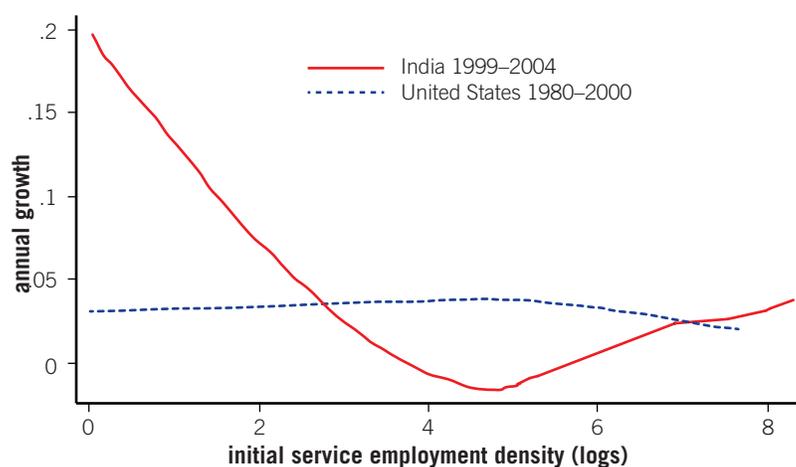
The strong evidence of agglomeration economies in the service sector is consistent with findings for the United States and Europe. Given the impact of ICT in India's rapidly growing service sector, this result was expected. Being a "young" industry, services benefit from knowledge spillovers, leading to the emergence of high-density service clusters. In contrast, the evidence for such agglomeration economies in manufacturing, though weaker than in services, differs from the tendency toward dispersion across the entire distribution in the case of the United States and Europe. This suggests that manufacturing in India is not as mature as in the United States or Europe.

Comparing Services in India, the United States, and China

Although the service sector in India shows some similarities with the service sector in the United States, both exhibit agglomeration economies, there are also some relevant differences. Figure 3 shows that in the United States, agglomeration economies in services dominate for medium-density locations, whereas in India, agglomeration economies dominate for high-density locations. Agglomeration economies in the U.S. service sector peak at a density of between 50 and 150 employees per square kilometer. Three of the main high-tech counties in the United States fall within that range: Santa Clara, California (Silicon Valley); Middlesex, Massachusetts (Route 128); and Durham, North Carolina (Research Triangle). In contrast, in India, agglomeration economies increase in the upper tail of the distribution, in places such as Hyderabad and Chennai, with service employment densities reaching into the thousands. For those levels of density, U.S. locations exhibit substantial congestion.

So what explains this? First, high-density locations suffer from local congestion, but benefit from the knowledge spillovers from nearby locations. As long as those neighboring areas gain in employment, spillovers continue to strengthen, thus allowing the high-density locations to grow at a fast pace. Therefore, in the early stages of spatial clustering, knowledge spillovers are likely to dominate congestion, even in the highest-density districts. However, given that the highest-density districts in India are in general denser than the highest-density counties in the United States, this is an unlikely explanation. Second, it might be the case that the high-density clusters in India are more successful, not because its mega cities are not congested, but because of the absence of agglomeration economies in medium-sized locations, implying higher-than-normal congestion in those places. Certain policies or

Figure 3. Services Density, India and the United States



Source: Authors' illustration based on LFS and BEA.

frictions, such as a lack of general infrastructure, may prevent these medium-sized cities from growing faster.

What Is Holding Back Medium-Density Locations?

Precisely identifying what those frictions or barriers might be is a separate exercise in itself. However, some suggestive evidence appears when controlling for certain district-level characteristics—the percentage of the population with a high school degree or more and the percentage of the population with postsecondary education; household access to infrastructure (for example, percentage of households with electricity, toilet, telecommunication services, or tap water); travel time to a top-ten city; and distance from a top-seven or a top-three city.

When exploring which of these controls can explain the advantage of high-density clusters, most can be ruled out. For example, being close to a major city or having access to some of the basic utilities, such as tap water or toilets, do not seem to matter. Only two variables, the percentage of the population with postsecondary education and the percentage of households with access to telecommunication services, have the potential to account for the relative advantage of high-density clusters. Once controlling for either of these two variables, there is no longer evidence of high-density service clusters growing particularly fast. In other words, if all locations had the same percentage of their population with postsecondary education, or if in all locations the households' access to telecommunication services was the same, then high-density service clusters would lose their attractiveness.

If part of the poor performance of India's medium-density locations is their deficient local infrastructure, it may be useful to compare India's experience, not just to that of the United States, but also to that of the other large emerging economy, China. The analysis in figure 4 shows that China looks very different from India. Once a threshold of around 150 employees per square kilometer is reached, agglomeration economies start dominating in India, whereas the opposite happens in China. For Chinese locations with a density above 150 employees per square kilometer, service employment growth strongly decreases with size, indicating important congestion costs.

Along that dimension, China looks more like the United States, where congestion costs also dominate for locations above the 150 employees per square kilometer threshold. Given that the overall level of local infrastructure is better in China than in India, this finding is consistent with the interpretation of frictions holding back the growth of medium-density locations in India, but not in China.

What Might Future Patterns Look Like?

After computing the counterfactual employment growth of Indian districts as if the relationship between density and growth was the same as estimated for the United States, two features stand out.

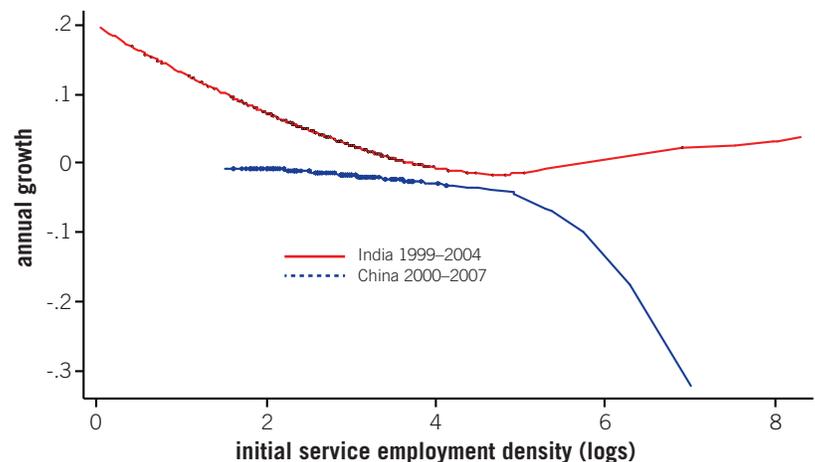
- First, many of the relatively slow-growing Indian districts would grow much faster. These correspond to medium-density places, similar in density to places such as Silicon Valley. As mentioned before, with few exceptions, these districts in India do not seem to be able to take advantage of the service revolution.
- Second, if India had the same scale dependence in growth rates as the United States, different areas of the country would benefit from growth in the service sector. Growth would be more concentrated in the coastal regions, especially in southern states such as Tamil Nadu and Kerala, as well as in northern states such as West Bengal, Bihar, and Uttar Pradesh. Of the well known IT clusters in India, the medium-density cities such as Ahmedabad and Pune, and especially Bangalore, have high growth rates in the counterfactual, whereas the high-density cities, such as Chennai and Mumbai, do not.

Conclusions and Future Research

These findings pose a potential policy dilemma. Should developing countries focus on the development of urban infrastructure and in general facilitate the location of employment in its large cities to exploit the still important agglomeration economies? Or should they develop infrastructure in medium-density locations to remove some of the growth impediments present in these areas?

The evidence of agglomeration in the U.S. service sector is in cities with densities of employment below 150 employees per square kilometer, while in India, evidence of agglomeration is found in cities with densities above this threshold. In other words, if the United States is used as the efficient

Figure 4. Services Density, India and China



Source: Authors' illustration based on LFS and China City Statistical Yearbooks

benchmark, then 150 employees per square kilometer is the ideal density to take advantage of agglomeration economies. In India, however, these medium-density cities are the worst places. This suggests that the costs of congestion in India are either much smaller than in the United States, the agglomeration forces are much larger than in the United States, or that there are some frictions, policies, and a general lack of infrastructure in medium-density cities that prevent them from growing faster, therefore favoring concentration in high-density areas. It is not obvious to us why Indian individuals should dislike congestion less than Americans, or should benefit more than Americans from agglomeration economies. These forces seem to be more technological and universal. Therefore, the likely culprits are restrictions to economic growth in medium-density cities or districts.

There is some suggestive evidence that two such barriers in medium-density cities may be the small share of highly educated workers and deficient local infrastructure, particularly poor access to telecommunication services. The findings for China, an emerging economy that has suffered less from a lack of infrastructure, support this interpretation. Similar to the United States, congestion in the Chinese service sector is strong in locations with high employment density.

What is therefore preventing medium-density cities in India from growing and taking full advantage of agglomeration forces? Why is their evolution, relative to low- and high-density areas, so different from that of advanced economies? Future research should focus on further identifying these barriers to growth in India's medium-density cities.

The success story of Bangalore—the Silicon Valley of India—is one of the notable exceptions to the general findings: that district has a density level of similar magnitude as the high-tech clusters in the United States. Interestingly, it traces

its history back to the so-called Electronics City, set up in the 1970s as an industrial park 18 kilometers south of the city. Perhaps this particular example points to a promising way to eliminate the growth restrictions that have been uncovered in many other medium-density districts.

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Note

1. This note is a summary of Desmet et al. (2012), "[The Spatial Development of India](#)."

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