Chapter 1

CAN THE WHOLE ACTUALLY BE GREATER THAN THE SUM OF ITS PARTS? LESSONS FROM INDIA'S GROWING ECONOMY AND ITS EVOLVING STRUCTURE

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India's economy today is much larger than what it was half a century ago, with most of that growth occurring since the early 1990s—an indication that it has flourished in the postglobalization phase. Since 1991, GDP growth has averaged 6 percent, with the rate hitting close to 9 percent in recent years (before the recent slowdown in the last couple of years to roughly 5 percent). While some modest "business-friendly" reforms in the 1980s resulted in higher growth rates relative to the earlier years (Rodrik and Subramanian 2005), the big economic reforms were announced in 1991.

What is behind India's rapid growth in the past two decades? At the sectoral level, we see that, unlike emerging economies like China and South Korea, the big push in India has come from an expanding services sector, rather than an expanding (labor-intensive) manufacturing sector. Keep in mind that in the early 1960s, India and South Korea had similar growth rates. When India became independent in 1947, more than half of its GDP came from agriculture—a share that has dropped considerably over time to less than 15 percent today.

However, today around half of India's labor force is still in agriculture, although down from 70 percent in 1960 (Figure 1.1a). This means that while agriculture's output share has decreased significantly, its employment share has declined only modestly—a clear sign that agriculture's relative productivity has fallen. Yet workers leaving agriculture have largely sidestepped manufacturing, whose share of GDP remains quite low, at about 13 percent, and whose share of total employment is even lower, at about 12 percent. This contrasts sharply with China and South Korea, where about a third of GDP comes from manufacturing. Instead, India's services sector constitutes nearly 60 percent of its GDP (Figure 1.1b), although the employment share is lower, at around 28 percent.

For India, the obstacles to developing a vibrant manufacturing sector have been many, such as poor infrastructure, land constraints, and restrictive labor

FIGURE 1.1a Agriculture accounts for about half of India's workers . . .

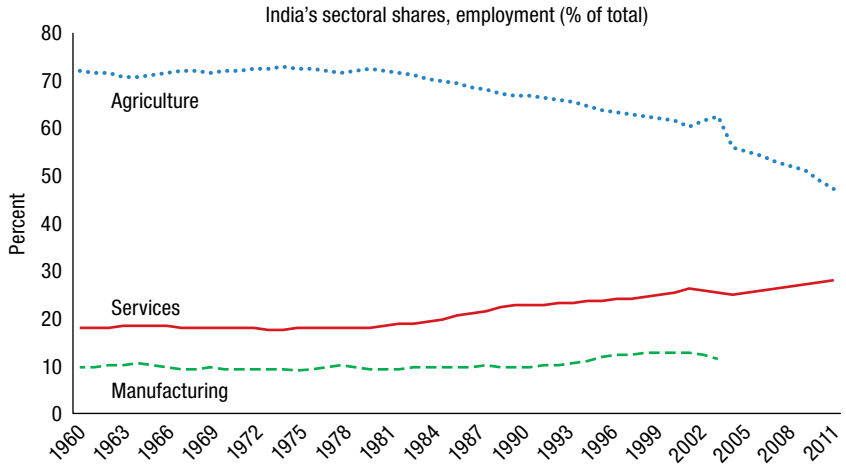
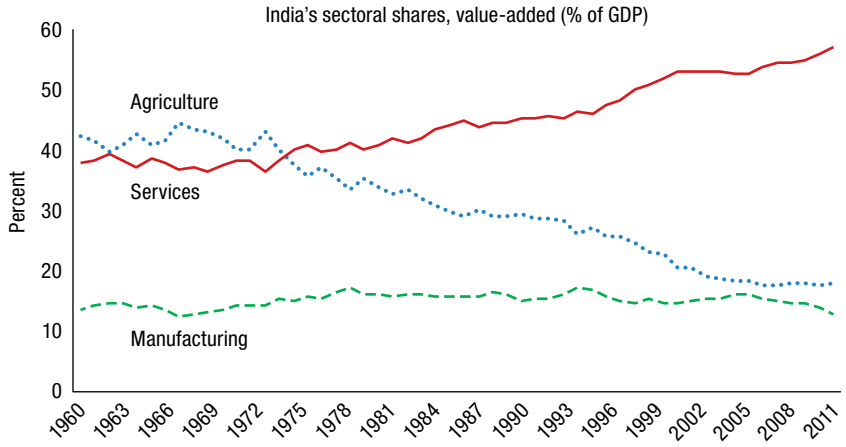


FIGURE 1.1b . . . but the growth in gross domestic product is coming from services



Source: Groningen Growth and Development Centre database, extended from 2004 to 2012, using the World Bank's World Development Indicators database (along with interpolations).

Note: The manufacturing employment share is only available for the period 1960–2004.

regulations. For example, numerous labor regulations in India make for a rigid labor market by making hiring and firing workers and reassigning them from one task to another difficult, if not impossible. In contrast, the restrictive labor laws do not apply to India's services sector. Also, the relatively higher value-added services depend more on the global rather than the local infrastructure.

The global infrastructure we are referring to is basically the Internet and the various modern means of telecommunications, whose connectivity in India has been rather good over the last couple of decades. However, at India's stage of development, there is a limit to which the services sector can be the prime contributor.

It needs to be pointed out, however, that India has managed its globalization phase much better than most Latin American countries and African countries south of the Sahara. An important recent study by McMillan and Rodrik (2011), which looks at 38 developing and developed countries from 1990 to 2005, finds that changes in the sectoral composition of the economy were "growth enhancing" in India and Thailand, but were "growth reducing" in Argentina, Brazil, Nigeria, and Zambia. They also argue that globalization by itself cannot deliver this growth. Rather, what matter are the availability of factors, such as the type of factor endowments a country possesses, the kind of specialization globalization leads to, and, above all, how globalization is managed. They contend that sectors that are exposed to foreign competition through globalization need to receive government support, as they have in most of Asia—unlike in Latin America, where not only import-competing sectors failed to receive government support in the form of subsidies, but also trade barriers were eliminated rapidly. Making matters worse, exchange rates were overvalued in Latin America (unlike in Asia), thereby encouraging imports and discouraging exports. Also, McMillan and Rodrik (2011) underscore the importance of labor-market flexibility.

India is now one of the BRIC countries, along with Brazil, Russia, and China. Together, these large emerging economies account for about 40 percent of the world population and more than 25 percent of the world GDP. Yet the differences among them are huge. In 2010, India's per capita GDP (in purchasing power parity terms) was $3,477, which is less than a quarter of Russia's per capita income, about 40 percent of Brazil's, and about half of China's—a stark change from 1991 when India and China had similar per capita GDP levels (Figure 1.2a).[1] Moreover, India's per capita income is less than one-seventh of that of South Korea (they had similar levels until the mid-1960s) and one-tenth of that of the United States. And its GDP level is less than half of China's (they had similar levels until the late 1970s) (Figure 1.2b).

As India weighs how to increase growth in a sustainable, inclusive manner, the key will be raising the economy's average labor productivity (that is, its output per worker). The possible sources of growth are (1) greater productivity

1 We present purchasing power parity adjusted GDP and GDP per capita numbers in Figures 1.2a and 1.2b to facilitate meaningful intercountry comparisons of real incomes.

FIGURE 1.2a China leads India in GDP per capita . . .

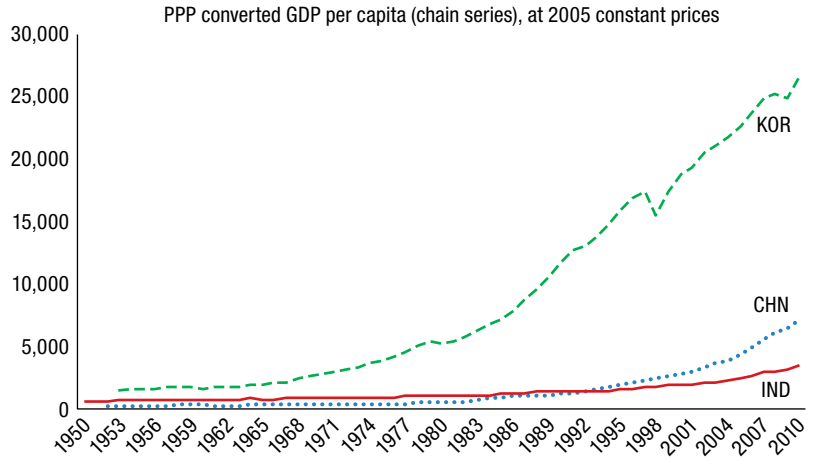
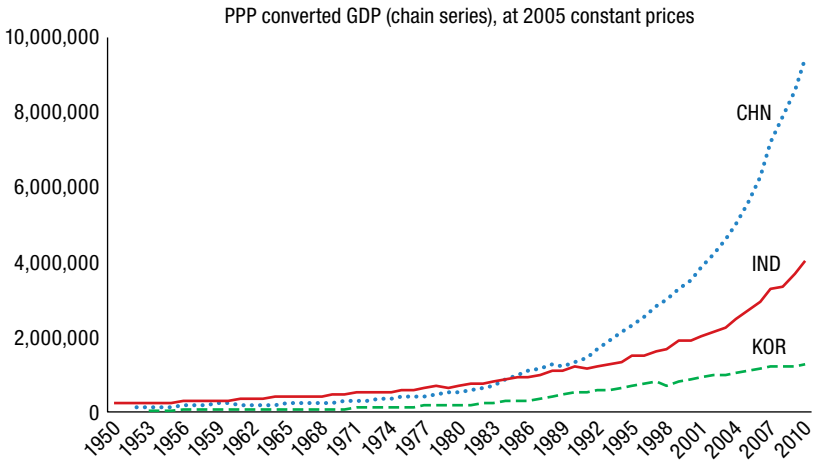


FIGURE 1.2b . . . and is on a much faster growth trajectory



Source: Penn World Tables 7.1, Heston, Summers, and Aten (2012).
Note: CHN = China; GDP = gross domestic product; IND = India; KOR = South Korea; PPP = purchasing power parity.

within individual sectors (typically triggered by technological improvements), and (2) greater productivity arising from the movement of resources toward high-productivity sectors—known as "structural change." According to Kuznets (1971), modern economic growth is characterized by rapid innovation and rapid structural change. It can take the form of changes in the output

and employment composition of an economy in terms of broad sectors, such as agriculture, manufacturing, mining, and services. Or it can take the form of changes in the shares of the rural and urban components of the economy, such as urbanization. But keep in mind that the contribution of structural change can be positive or negative, leading to the whole being greater or less than the sum of its parts.

How does India fit into this picture of growth-enhancing (that is, "desirable") structural change in Asia? In this chapter, we try to answer this question, starting with a brief synopsis of how the Indian economy has evolved since independence in 1947. We then study the relative contributions of within-sector growth and structural change to overall labor productivity growth in the past five decades at the economywide and state levels, using the McMillan and Rodrik (2011) decomposition approach. We document how this decomposition varies across both time and sectors. We also see how various industry characteristics—including industry-level labor force characteristics, state-level characteristics, and institutions—are correlated with the ability of an industry in a state to attract workers. Next we illustrate the differing paths of two high-performing states—Gujarat and Maharashtra. Then we analyze whether India's structural change has been growth enhancing, before concluding with thoughts on possible paths for India going forward.

Encouragingly, we find that, overall, structural change has contributed positively to India's growth, since workers have moved from sectors with low value-added per worker to those with relatively high value-added per worker. Indeed, the contribution of structural change to productivity growth has been mainly positive, with negative (growth-reducing) structural change concentrated mainly in the 1970s. In the postreform period (1991–2004), structural change has contributed slightly less than a fourth of the overall productivity growth rate of slightly more than 4.0 percent. In the 2000s, structural change was a small fraction of the overall productivity growth rate of 6.5 percent.

In addition, sectors in the right policy and institutional environments have benefited. High-productivity sectors located in states where workers have been exposed to foreign competition (through their employment composition being skewed toward the relatively less protected sectors) have seen labor flows in their direction. Education (especially in rural areas) and urbanization have also aided these flows, and must continue to do so in the years and decades ahead. Also vital will be tackling rigid (and even some arcane) labor regulations that serve as impediments to the creation of a vibrant manufacturing sector that can boost overall growth and generate jobs for India's still rapidly growing population.

Evolution of the Indian Economy

After independence from British rule in 1947, India did not start out with a closed economy (Panagariya 2008). In fact, during the first postindependence phase (1951–1965), beginning with the launch of its first five-year plan in 1951–1952, trade and foreign investment policies were quite open and liberal.[2] While the industrial policy regime was somewhat restrictive and an important role was given to the public sector, the policy regime did not act as a major barrier to private initiative. The purpose of the public sector was to complement the private sector. India's first prime minister, Jawaharlal Nehru, emphasized the growth of industry, in particular heavy industry, and some have argued that he did this at the cost of agriculture. In any event, in this 14-year phase, growth rose from 1.0 percent to 4.1 percent per year.

In the second phase (1965–1981), there was a sharp fall in the GDP per capita growth rate, brought about by a combination of wars, droughts, and inward-looking policies. Foreign aid declined, economic policies emphasized equity (sometimes at the cost of efficiency), and progress with poverty alleviation was unsatisfactory. For all practical purposes, until the early 1980s, India pursued a strategy of import substitution. Complicating matters, India's labor laws made it difficult, if not impossible, to lay off workers in response to changes in demand or even on grounds of incompetence. In turn, firms were reluctant to hire for fear of being stuck with those workers in bad economic times.

These two phases can be seen as a period when the focus was on self-sufficiency, as would be expected of a country recently freed from foreign rule (Kochhar et al. 2006). This argument points to a series of government five-year plans that aimed at promoting rapid industrialization, especially the creation of domestic heavy capital-producing industries (1947–1980), with trade restrictions following as a result. These plans also promoted a "mixed economy" in which the public sector and a controlled private sector would coexist, with some industries (especially the large-scale, capital-intensive ones like steel and machine tools)—the "commanding heights"—reserved for the public sector. Note that the emphasis was not on labor-intensive industries, as would have been expected in a populous developing country. Moreover, the manufacturing sector was subject to several regulatory constraints, such as investment licensing, import licensing, foreign exchange controls, controls on credit allocation, and price controls. To encourage labor-intensive manufacturing in the private sector, small-scale firms enjoyed significant government benefits, and

2 We follow here the division into the different time phases (along with some of the description) presented in Panagariya (2008).

some goods (usually those produced by labor-intensive methods) were reserved for production by these firms. However, by preventing the existence of large-scale firms in most labor-intensive industries and thereby also preventing the reaping of economies of scale, this policy turned out to be counterproductive and detrimental to employment generation (and overall output expansion in labor-intensive manufacturing activities).

In the third phase (1981–1988), there were some industrial policy reforms, including a partial relaxation of constraints on capacity expansion, changing the product mix by firms and creating product lines. Also, some piecemeal incentives were provided to exports—in fact, there was some liberalization in almost every dimension of economic policy—and the growth rate reverted to that experienced in the first phase. Overall, the reforms could be described as "business friendly" (Kochhar et al. 2006; Rodrik and Subramanian 2005).

But it was the next phase, notably in 1991, when the major trade reforms were launched—a response to the balance-of-payments crisis, which was exacerbated by the dramatic rise in oil prices originating from the Gulf War. At the time, the International Monetary Fund (IMF) helped the Indian government with financial assistance, but attached the conditionality that India embark on major economic reforms, which were to be implemented almost immediately. The reforms took the form of rationalization of rules, the gradual removal of price and quantity restrictions on import and export barriers, and a movement toward the full convertibility of the Indian rupee for foreign exchange transactions. There were also significant devaluations of the Indian rupee in 1991 and 1992. At the same time, foreign direct investment (FDI) stopped being highly restricted—up to a 51 percent foreign equity stake was allowed in many industries—facilitating a steep acceleration in FDI flows (Sivadasan 2009). However, it was difficult to reap the full benefits of these trade and FDI reforms in light of the rigid labor regulations that created impediments to resource reallocation, underscoring the need for labor reforms (Box 1.1).

What is the economic verdict for the period 1980–2000? Kochhar et al. (2006) found that manufacturing growth (in output and especially employment) was below that of other countries, controlling for the level of development and overall economic growth, while services' growth in output was much more rapid—constituting a much bigger proportion of value-added—although there was not a commensurate growth in employment. There was a movement toward more skill-intensive manufacturing industries and services, especially in the faster-growing states. But it is important to note that India's performance in labor-intensive manufacturing was not satisfactory for its level of development.

BOX 1.1 Are India's labor regulations a problem?

For India, a high priority is making the labor market more flexible. But to do so, policy makers will have to tackle long-standing labor regulations based on a wealth of complex labor laws. To understand India's regulatory framework for labor issues, it is important to note two important features of India's labor regulations. First, under the Indian constitution, both the central (federal) government as well as state governments are empowered to legislate on labor-related issues, with the latter having the authority to amend central labor laws and the responsibility to enforce all labor regulations. Second, there is considerable disagreement regarding the impact of labor market regulations on the various aspects of economic performance.

Much of the controversy surrounds Chapter VB of the Industrial Disputes Act (IDA), which requires employers with more than 100 workers to seek prior government approval before workers may be dismissed. Given that governments have often been unwilling to grant permission to retrench (Datta-Chaudhuri 1996), critics argue that this labor rule creates a strong disincentive to hire (additional) workers and generates a bias in favor of capital-intensive techniques of production. But some analysts counter that most of India's labor regulations have been either ignored (Nagaraj 2002) or circumvented through the increased use of temporary or contract labor (Dutta 2003; Ramaswamy 2003). However, it is hard to imagine that temporary or contract (casual) workers will always be as productive and will have as much incentive to learn on the job as permanent workers.

A seemingly obvious and natural way to determine whether Chapter VB of the IDA has been binding in practice has been to check whether there has been clustering or bunching of firms around the 100-worker mark. Most studies have not found such a clustering. However, we believe, for several reasons, that we should not infer from this lack of clustering that labor regulations in India are not binding or that they lack any bite. First, technologies could be discrete or lumpy (and not continuous), in that production techniques could be available in discrete steps (for example, very small, small, medium, large, very large). A firm that chooses a small-scale production technique in response to Chapter VB may well find it optimal to employ significantly fewer than 100 workers. Also, there could be fixed costs of moving into larger scales of production, which could restrict a firm well before it reaches the 100-worker threshold. In addition, there is the issue of enforcement (Hasan and Jandoc 2013).

Finally, we believe that there is one important feature of firm-level employment in India that makes it obvious that the labor laws are binding. Close to the 100 regular workers mark, there is a sudden spike in the use of "workers

hired through contractors" (temporary workers). This is important, as Chapter VB of the IDA has its threshold at 100 regular workers (not all workers). Specifically, ongoing work with Annual Survey of Industry data for 2005 reveals for labor-intensive industries the average share of temporary workers (more specifically, "workers hired through a contractor" divided by the sum of "workers hired through a contractor" and "directly hired workers") at firms with 90–99 regular workers ("directly hired workers") to be double the share for firms with 80–89 and 100–109 regular workers. The prevalence of contract workers also shows a similar spike. These patterns are repeated for all manufacturing industries as a whole (though the spikes are not as sharp).[1]

[1] Personal communication with the Asian Development Bank's Rana Hasan, who is carrying out this research.

Source: Authors.

Role of Structural Change in India

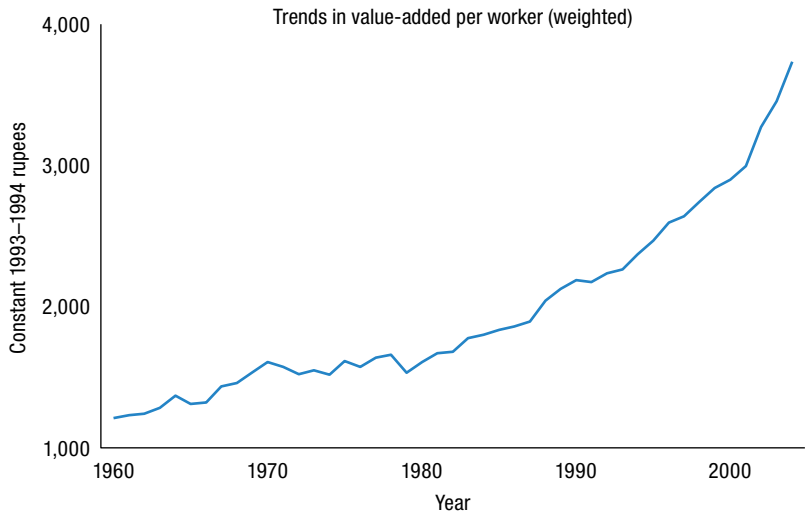
How big of a role has structural change played in India's growth? To understand the role structural change could play, suppose there is no within-sector productivity growth, but let workers move between sectors. As long as labor productivity is different across sectors, this movement will lead to some changes in average labor productivity in the economy. In particular, if workers move from low-productivity sectors into relatively high-productivity sectors, we will see positive productivity growth in the economy as a whole (through structural change). However, if misguided and restrictive policies or various types of frictions prevent labor from flowing from low- to high-productivity sectors, we will not see structural change that makes a positive contribution to labor productivity growth. While the contribution of within-sector growth to overall productivity growth in an economy is measured by the weighted sum of productivity growth rates in the various parts of the economy called sectors (with employment shares of the sectors as weights), the contribution of structural change comes about through the movement of workers across sectors with differing labor productivities.

We begin with a look at real value-added per worker—which measures labor productivity—using the National Income and Employment data from the Groningen Growth and Development Centre database for the period 1960–2004 (also used by McMillan and Rodrik 2011). This dataset provides value-added at constant prices (in 1993–1994 Indian rupees) for 10 broad sectors in India for the period 1950–2005 and employment data for those sectors

for the period 1960–2004. Because of data limitations, we follow McMillan and Rodrik (2011) and convert the 10-sector database to a 9-sector database by combining the government services sector with the community and social services sector. Dividing real value-added by employment, we are able to construct a 9-sector real labor productivity series for the period 1960–2004.

We find that real value-added per worker has been steadily rising in India over the 1960–2004 period, barring some minor dips in the mid-1960s and late 1970s (Figure 1.3). But while in the first 30 years labor productivity increased by around 70 percent, it roughly doubled in the final 14 years (1990–2004), with the longest-lasting high-growth phase. The sharp difference between performances in the two periods (1960–1990 and 1990–2004) can be attributed to the difference in their economic policy regimes—initially restrictive and distortionary, then more open. The acceleration since 1990 parallels that of Malaysia, South Korea, and Taiwan, but it is far behind that of China (Table 1.1). Between 1990 and 2005, India's value-added per worker grew at 4.23 percent per year—a distant second to China, whose value-added per worker grew at 8.78 percent per year. For this reason, by 2005, China's value-added per worker was $9,518.31 (in 2005 purchasing power parity (PPP) US dollars), which was well ahead of

FIGURE 1.3 Labor productivity has risen sharply since 1960



Source: Constructed from the National Income and Employment data from the Groningen Growth and Development Centre database.

Note: The weights are each sector's share of total employment.

TABLE 1.1 China's labor productivity has grown much faster than India's International comparison of value-added per worker, 1990 and 2005

Country	Value-added per worker in 1990 (constant 2000 PPP US dollars)	Value-added per worker in 2005 (constant 2000 PPP US dollars)	Annual growth rate of value-added per worker (%)
China	2,692.58	9,518.31	8.78
India	4,135.26	7,700.01	4.23
Indonesia	7,437.95	11,222.20	2.78
Malaysia	17,951.44	32,712.26	4.08
Philippines	8,810.10	10,145.76	0.95
South Korea	18,908.86	33,552.34	3.90
Taiwan	25,647.95	46,128.77	3.99
Thailand	8,818.66	13,841.79	3.05

Source: Constructed from the National Income and Employment data from the Groningen Growth and Development Centre database.

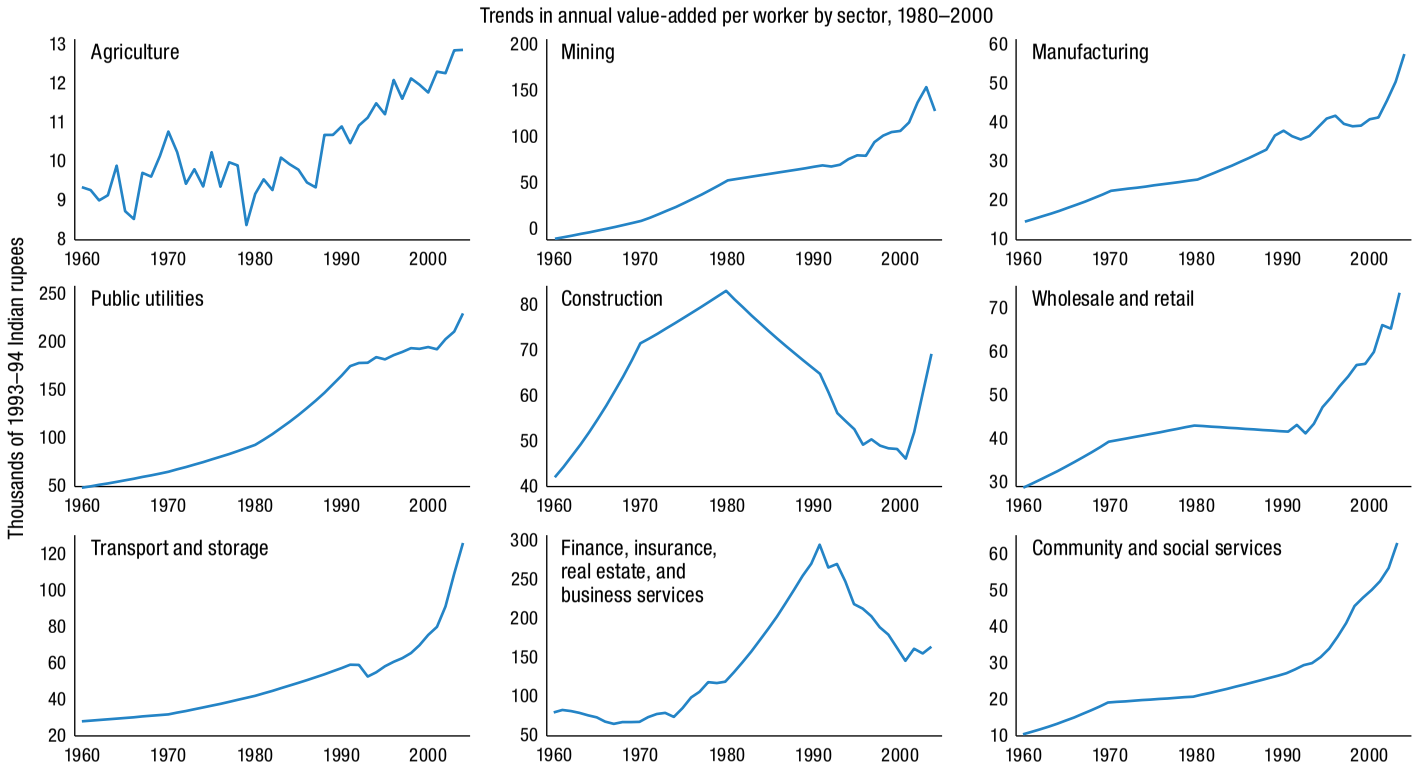
Note: PPP = purchasing power parity.

India's at $7,700.00—although in 1990, India's value-added per worker was 50 percent higher than China's.

Digging a little deeper, we look at the trends in productivity in India's nine key sectors and find that not everyone sees an increasing secular trend over the time period (Figure 1.4). Those sectors whose productivity did grow include (1) mining (except for the last two years and a minor dip in the mid-1990s); (2) public utilities; (3) wholesale and retail (especially in the last decade, which is not surprising, given the spread of department stores and supermarkets, along with their distribution networks); (4) transport and storage; and (5) community and social services.[3] Construction followed an up-and-down path, rising rapidly in the first 20 years, followed by a rapid decline in the next 22 years, although the last two years show a rapid uptick. This pattern in construction is not surprising, given that it coincided with the start of a real estate boom, plus the establishment of call centers and the arrival of various multinationals. Manufacturing saw fairly big fluctuations in the 1990s, but grew quite rapidly in the early 2000s. Agriculture was highly volatile until the late 1980s, probably because of the uncertainty in rainfall, coupled with inadequate irrigation facilities. But since the late 1980s agriculture has settled down, giving way to a rising secular trend (perhaps thanks to better irrigation facilities and higher-quality inputs).

3 Following McMillan and Rodrik (2011), we combined "community, social, and personal services" and "government services" into a single sector. We refer to this combined sector as "community and social services."

FIGURE 1.4 Some sectors are doing a lot better than others



Source: Constructed from the National Income and Employment data from the Groningen Growth and Development Centre database.

The story on finance, insurance, real estate, and business services (FIREBS) is somewhat confusing, given that different datasets show different outcomes for the final 14 years—which matters, especially for such a vibrant sector. What does not seem controversial is that value-added per worker kept growing until the early 1990s. However, after then, according to the Groningen Growth and Development Centre data, value-added has been falling steeply, leading to a halving of the 1990 productivity level by 2005. But this outcome is not confirmed by our sectoral data at the state level (discussed later) for the 15 major states for which consistent data are available. Most of the states (10 out of 15) saw a fair amount of increase in FIREBS productivity between 1993 and 1999, although there was some decline in many of the states between 2000 and 2004. But only in one state (Orissa) do we see a much lower FIREBS labor productivity in 2004 relative to 1993. In all other states, the 2004 productivity is higher, roughly the same as, or slightly lower than in 1993. Thus, our state-level data for FIREBS show much more plausible trends than the Groningen Centre data for the same sector. In any event, whichever data we use, what is important is that labor productivity in FIREBS is much higher than in other sectors, and it is overall an expanding sector in terms of employment.

As for the trends in the sectoral composition of employment from 1960 to 2004, we see a drop in the share of agriculture in national employment, from 71.48 percent to 61.51 percent (Table 1.2). Over the same period,

TABLE 1.2 Agriculture's share has fallen

Sector composition (percentage of total employment), 1960–2004					
	Decade				
Sector	1960–1969	1970–1979	1980–1989	1990–1999	2000–2004
Agriculture	71.48	72.26	70.05	64.81	61.51
Mining	0.55	0.44	0.47	0.59	0.55
Manufacturing	9.80	9.44	9.64	11.09	12.42
Public utilities	0.21	0.29	0.29	0.34	0.40
Construction	1.48	1.21	1.37	2.44	3.32
Wholesale and retail	4.88	4.99	6.05	7.56	8.27
Transport and storage	2.06	2.43	2.58	3.01	3.32
Finance, insurance, real estate, and business services	0.32	0.43	0.40	0.78	1.68
Community and social services	9.21	8.50	9.15	9.38	8.53

Source: Constructed from the National Income and Employment data from the Groningen Growth and Development Centre database.

manufacturing's share rose from 9.80 percent to 12.42 percent, wholesale and retail's share increased from 1.48 percent to 3.32 percent, transportation and storage's share rose from 2.0 percent to 3.3 percent, and FIREBS's share inched up from 0.3 percent to 1.7 percent. Even though this looks like a small change, FIREBS, as we will see later, makes a substantial contribution to structural change, because worker productivity in FIREBS is much higher than the national average.

Turning to relative labor productivity in the various sectors, we see a more dramatic switch in which sectors are leading growth (Table 1.3). While agricultural labor productivity in the 1960s was 30 percent lower than the economywide labor productivity, it fell to 62 percent below overall labor productivity in the 2000s. Over the same period, manufacturing's productivity rose from 32 percent to 45 percent; wholesale and retail's productivity in relative terms stayed high, moving down a bit from two and a half times the economy's average to twice the economywide average; and transport and storage's relative productivity inched up from 2.28 percent to 2.92 percent. However, construction's relative productivity dropped from 4.0 percent to 1.68 percent, and FIREBS rose significantly from 5.62 percent in the 1960s to 9.80 percent in the 1990s. For the 2000–2004 period, the Groningen data show an implausible drop of FIREBS relative productivity to 4.87 percent.

TABLE 1.3 Finance, insurance, real estate, and business services leads the way in productivity

	Relative labor productivity, 1960–2004				
	Decade				
Sector	1960–1969	1970–1979	1980–1989	1990–1999	2000–2004
Agriculture	0.70	0.62	0.54	0.47	0.38
Mining	3.56	4.42	5.16	4.50	4.47
Manufacturing	1.32	1.51	1.64	1.60	1.45
Public utilities	4.17	4.88	6.62	7.45	6.30
Construction	4.00	4.86	4.17	2.29	1.68
Wholesale and retail	2.46	2.58	2.33	1.91	1.96
Transport and storage	2.28	2.34	2.68	2.47	2.92
Finance, insurance, real estate, and business services	5.62	5.71	9.88	9.84	4.87*
Community and social services	1.06	1.28	1.29	1.34	1.64

Source: Constructed from the National Income and Employment data from the Groningen Growth and Development Centre database.

Note: Relative labor productivity is defined as a sector's value-added per worker in any given year divided by the economywide value-added per worker in that same year. *For the 2000–2004 period, the Groningen data show an implausible figure for FIREBS relative productivity of 4.87. Aggregation using our state-level productivity data shows the figure at roughly 7.50.

Our aggregated state-level productivity data tell a more positive story, with the sector's relative productivity for this period at about 7.50 percent.

To measure how much of the labor productivity growth over the period 1960–2004 was the result of structural change, we follow the decomposition methodology used by McMillan and Rodrik (2011). (See the Overview in this book for details on the methodology.)[4]

We should note here that there is little research on structural change in India, apart from the work by McMillan and Rodrik (2011), who examine India as part of their comparative analysis of structural change in various regions. They show that India has been successful in moving labor from low-productivity sectors to relatively high-productivity sectors, thereby resulting in a positive contribution made by structural change to overall labor productivity growth. Another related contribution is a paper by Hasan, Lamba, and Sen Gupta (2013) that looks at how the two components of state-level labor productivity growth are associated with poverty reduction across states in India. They find that structural change and within-sector growth are equally important in poverty reduction. The focus of the work by Hnatkovksa and Lahiri (2013) and by Verma (2010, 2012a, 2012b) is different from, but complementary to, our own work. Verma analyzes the recent structural transformation of India's national output toward services and concludes that it was driven by higher total factor productivity growth in services than in other sectors, which was the result of "market-based liberalization policies." Hnatkovksa and Lahiri's (2013) study highlights the importance of technological progress along with urbanization in dealing with the rural–urban divide—with a special role for rural education.

What did McMillan and Rodrik (2011) find for India as a whole? They estimate 4.23 percent annual growth in overall labor productivity between 1990 and 2005, of which the "within-sector" component was 3.24 percent and the "structural change" component was 0.99 percent. We follow the same procedure to calculate within-sector and structural change components over various subperiods between 1960 and 2004 to trace the story over a longer

4 Algebraically, the decomposition is:

$$\Delta P_t = \sum_{i=1}^{N} \theta_{i,t-k} \Delta p_{i,t} + \sum_{i=1}^{N} p_{i,t} \Delta \theta_{i,t}$$

where ΔP_t is the change in aggregate labor productivity between period $t-k$ and t. The first term is the "within-sector" component, which is a weighted average of the change in labor productivity in each of the N sectors, with the weight for sector i being the labor share of that sector in period $t-k$, measured by $\theta_{i,t-k}$. The second term is the "structural change" component, which is a weighted average of the change in labor shares in the N sectors, with the weights captured by the labor productivity of the sector in period t.

period and to illustrate how the shares of these components changed over time (Table 1.4).

We find that while 2000–2004 saw by far the largest growth in labor productivity—6.5 percent per year—most of this growth was accounted for by within-sector growth (6.24 percent). The biggest contribution of structural change was in the 1990s (1.26 percent out of a total of 2.93 percent growth per year), followed by the 1980s (1.06 percent out of a total of 3.14 percent per year). The only period that seems to have experienced truly undesirable structural change in the form of a negative contribution to growth was the 1970s—a period that also saw negative within-sector growth. This period can be regarded as the peak of the "License-Permit Raj," during which firms had no flexibility in their input and output decisions in their response to shocks to the system. In addition, the public sector was given an important role in every sphere of economic activity. In the 1960s, the contribution of structural change, even though positive, was small (0.26 percent).

During these subperiods, the trends in within-sector change are much more volatile than those of structural change (Figure 1.5a), especially in the 1980s (Figure 1.5b). The reason may be that labor mobility is costly and changing employment from one sector to another is a longer-term decision, whether made by employers or employees, while technological change is an uncertain process. It is important to note that both components lie in the positive region much more often than in the negative region, with negative contributions of both components concentrated in the 1970s—a time of distortionary and restrictive economic policies.

TABLE 1.4 Structural change, albeit still low, contributed the most during the 1990s

Within-sector and structural change components of productivity by various periods (%), 1960–2004			
Period	Annual growth	Within-sector	Structural change
1960–1969	2.671	2.411	0.261
1970–1979	–0.515	–0.266	–0.250
1980–1989	3.141	2.077	1.064
1990–1999	2.930	1.669	1.262
2000–2004*	6.535	6.242	0.293

Source: Constructed from National Income and Employment data collected by the Groningen Growth and Development Centre database.

Note: See footnote 4 in this chapter for how within-sector and structural change components are constructed. *As a result of issues with the Groningen data on finance, insurance, real estate, and business services for this period, as explained later in this book, the true figure for structural change should be considerably higher (more than 0.5), but still a small fraction of the overall growth.

FIGURE 1.5a "Within-sector" productivity growth tends to be much more volatile than structural change . . .

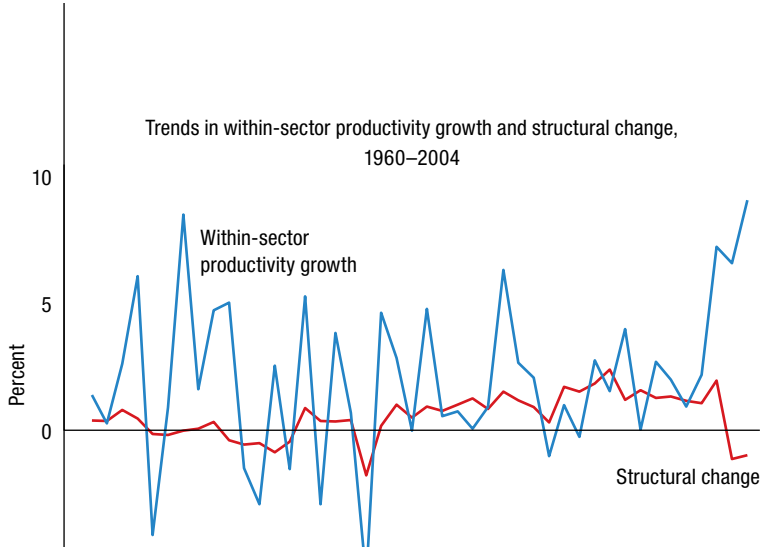
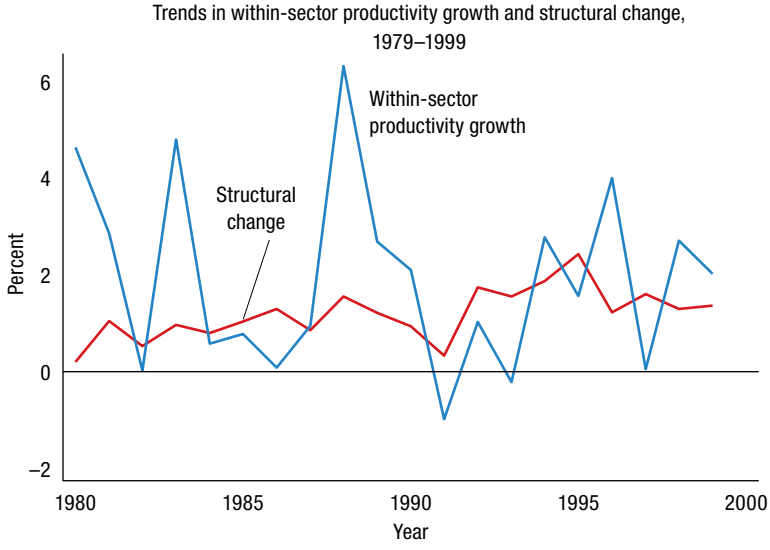


FIGURE 1.5b . . . with "within sector's" greatest volatility in the 1980s



Source: Constructed from National Income and Employment data collected by the Groningen Growth and Development Centre database.

At the sectoral level, we find that in the postliberalization period (1990–2004), FIREBS made the biggest contribution to structural change—between 0.5 and 1.0 percent, as Figure 1.6a shows—although the range may have been 0.75–1.0 percent using our back-of-the envelope correction.[5,6] During the period 2000–2004, manufacturing made a negative contribution (roughly minus 0.5 percent), with its employment share declining, even though its labor productivity was higher than the economywide average.[7] Substantial contributions to within-sector productivity growth have been made in the postliberalization period by manufacturing (up to 2.0 percent in 2000–2004), wholesale and retail (up to 1.0 percent in 2000–2004), transport and storage (up to roughly 1.2 percent in 2000–2004), and community and social services (roughly 1.0 percent throughout 1990–2004) (Figure 1. 6b).

The Stories of Gujarat and Maharashtra

We next turn to what was going on at the state level to discern whether the more productive sectors and states have experienced larger increases in employment. Our results for all the 15 major states (except Assam) show a positive growth in labor productivity between 1987 and 2004 (Figure 1.7). The average within-sector growth was positive for all states (except Assam), while the contribution of structural change was positive everywhere, except for Gujarat, where it was slightly negative. Ironically, Gujarat was one of the fastest-growing states in India during this period, but it appears that this growth was driven strictly by within-sector growth. Gujarat's within-sector

5 This is the change in the share of employment in FIREBS times labor productivity in FIREBS (as a fraction of overall change in national output), in turn multiplied by the overall growth rate of national output per worker.

6 The back-of-the-envelope calculation is very rough. If we assume that FIREBS average productivity was roughly unchanged for the period 1993–2004 (as roughly seen from the aggregation of the state-level data from the Central Statistics Office (CSO) and National Sample Survey Organisation (NSSO)), then actual productivity in 2004 is about 50 percent.

7 Note that the contribution to structural change is being measured by looking at the productivity level in each industry, rather than looking at the productivity level in an industry relative to the average productivity in the economy. In other words, what we are looking at is the contribution of individuals moving into a sector relative to those individuals remaining unemployed (making zero output or income), rather than relative to those individuals earning the economy's average income. Therefore, according to our measure, any expanding sector makes a positive contribution to structural change. With the alternative measure of contribution to structural change mentioned above, even a sector that is expanding its employment share can make a negative contribution to structural change if its productivity is less than the economywide labor productivity. We believe these are alternative measures of contribution to structural change, and that both these measures are useful in their own ways.

FIGURE 1.6a Finance, insurance, real estate, and business services is contributing most to structural change …

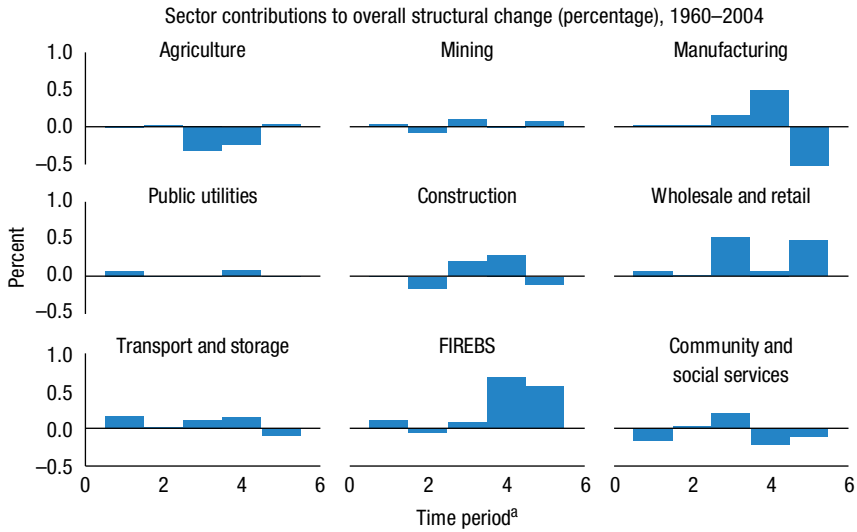
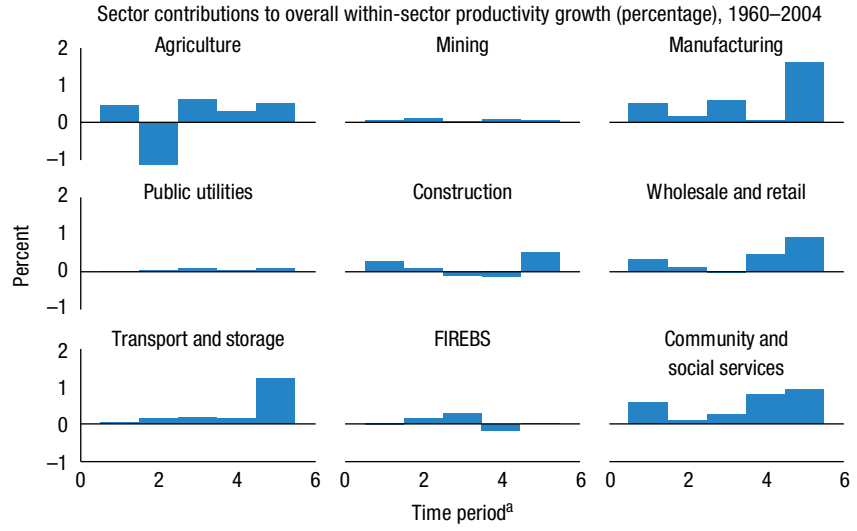


FIGURE 1.6b . . . and since 2000, manufacturing is significantly helping "within-sector" change



Source: Constructed from National Income and Employment data collected by the Groningen Growth and Development Centre database.

Note: [a]Period values are (1 = 1960–1969; 2 = 1970–1979; 3 = 1980–1989; 4 = 1990–1999; 5 = 2000–2004). FIREBS = finance, insurance, real estate, and business services.

average annual growth rate of labor productivity of 4.58 percent was the highest in India, while the contribution of structural change was the lowest, at −0.60 percent. The best performer in terms of structural change was Maharashtra. While its annual growth rate of labor productivity was 3.65 percent, structural change contributed 1.85 percent, with the remainder coming from within-sector growth.[8,9]

Why was there such a sharp contrast between Gujarat and Maharashtra in terms of their growth patterns? A closer look at what happened at the sectoral level is quite revealing. We see that in almost every sector—apart from FIREBS and mining (which had a negative productivity growth rate in Gujarat and accounts for only around 1 percent of the labor force in each of these two states)—Gujarat shows higher value-added per worker growth than Maharashtra (Table 1.5). In construction, Gujarat's growth rate in value-added per worker was 14.12 percent, while Maharashtra's was only 1.40 percent—although Gujarat saw a rapidly declining employment share (about 14.10 percentage points), while Maharashtra saw a slight increase. In agriculture, Gujarat's growth rate was more than five times that in Maharashtra (1.66 percent versus 0.31 percent), and if the expanding employment in this sector is also factored in, clearly the size of this sector was growing quickly. Even so, for both states agriculture still has the lowest value-added per worker—although its employment share expanded by 10 percentage points in Gujarat, while it contracted by 6.40 percentage points in Maharashtra.

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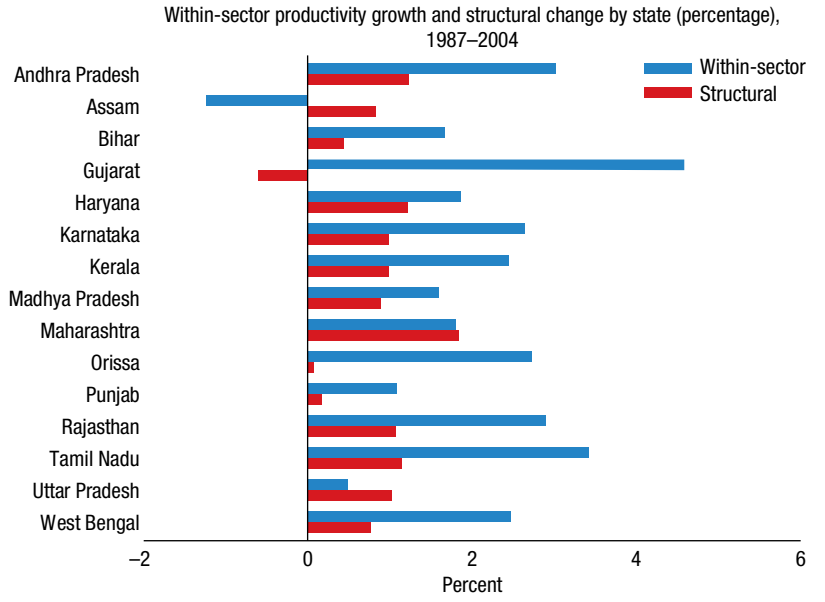
8 Our estimates differ from those of Hasan, Lamba, and Sen Gupta (2013), who also use Central Statistical Office (CSO) and National Sample Survey Organisation (NSSO) data to construct state-level structural change. However, their estimation differs in the following ways: (1) they use an additional round of NSSO data (2009–2010), and (2) they define an NSSO worker's sector using the worker's principal industry of employment, whereas we use an NSSO worker's current weekly industry of employment. Nonetheless, the results in Hasan, Lamba, and Sen Gupta (2013) support our finding that growth arising from structural change has been more positive (and constitutes a much bigger proportion of overall growth) in Maharashtra relative to Gujarat.

9 It is very important to note here that in the 1960s and 1970s, Punjab performed spectacularly in the agriculture sector. Of all Indian states, it was the most successful in terms of agricultural productivity growth—propelled mainly by the "Green Revolution," which involved the use of high-yielding varieties of seeds and modern agricultural production techniques. The contribution of agricultural productivity growth to overall growth falls in the category "within-sector growth." While a case study of Punjab's agricultural growth and Green Revolution should be an important component of any serious analysis of the Indian growth experience during the last half century, our main focus in this chapter is on the last quarter century and the relative importance of structural change and within-sector growth. Given that the overall productivity levels in manufacturing and services remain much higher than in agriculture, direct growth-enhancing structural change will come through a movement of employment out of agriculture (even though agriculture can have an indirect effect in this regard by providing inputs to the other sectors). For the above reasons and because of space constraints, we decided not to present a case study of Punjab's agricultural performance in this chapter.

FIGURE 1.7 Gujarat and Maharashtra follow different growth paths



Source: Constructed from India's National Accounts Statistics data from the Central Statistical Office, along with employment survey data from the National Sample Survey Organisation.

One explanation for Gujarat's superior performance in most sectors is the state's fast pace of infrastructure development (with investments in ports, roads, rail, power, and so on), reflecting incentives designed to attract private capital and governance geared toward facilitating private investment (for example, by rapidly clearing projects and flexibility in land use) (Sood 2012). Even agriculture has been "corporatized" with a switch to cash crops (like cotton, vegetables, groundnuts, and fruits), where profits are high and growing. As explained in Sen and Mallik (2012), farmers are able to directly sell their output to wholesalers, thereby leading to greater profitability, and noncultivable land (including wasteland) has been brought under cultivation, leading to a rapid decline in landlessness. In addition, high-yielding, genetically engineered varieties of crops have been spread throughout the state, with active technical education provided to farmers in the cultivation of these varieties. A few new agricultural universities have also been established. And rapid expansion of irrigation facilities (including incentives for micro-irrigation to tap the state's groundwater potential) has led to less dependence on the vagaries of monsoons.

The main factor responsible for Gujarat's poor performance relative to Maharashtra's in the structural change component appears to be the fairly

TABLE 1.5 Gujarat has a higher labor productivity growth rate in every sector than Maharashtra

	Gujarat				Maharashtra			
Sector	Value-added per worker (thousands of constant 2004–2005 rupees)	Value-added per worker growth rate (percent)	Share of state employment (percent)	Change in share of state employment (percentage points)	Value-added per worker (thousands of constant 2004–2005 rupees)	Value-added per worker growth rate (percent)	Share of state employment (percent)	Change in share of state employment (percentage points)
Agriculture	27.25	1.66	58	9.8	20.75	0.31	54	–6.4
Mining	469.87	–1.94	1	0.2	179.34	0.83	1	0.2
Manufacturing	159.60	3.73	17	3.0	180.51	2.34	12	0.5
Public utilities	1,069.90	4.51	0	0	656.39	4.46	0	–0.1
Construction	167.93	14.12	4	–14.1	131.01	1.40	5	0.7
Wholesale and retail	171.43	3.00	9	1.8	164.86	2.34	11	3.0
Transport and storage	160.51	4.32	4	0.9	171.81	3.32	5	1.3
Finance, insurance, real estate, and business services	925.60	1.14	1	0.6	892.81	1.69	3	1.9
Community and social services	64.19	3.87	6	–2.1	67.51	4.44	9	–1.1

Source: Constructed from India's National Accounts Statistics data from the Central Statistical Office, along with employment survey data from the National Sample Survey Organisation.

Note: Value-added per worker is for 2004. Value-added per worker growth is the compound annual growth rate in value-added per worker over the period 1987–2004. The share of state employment is for the year 2004. Change in share of state employment is the change between 1987 and 2004.

rapid expansion of the employment share of the relatively low-productivity agriculture sector and the rapid contraction of the employment share of the high-productivity construction sector. However, the reasons for the employment expansion in agriculture were probably no different from those responsible for agricultural productivity growth in Gujarat. After all, most of the construction activities were publicly funded in the 1980s, and they were primarily aimed at protecting agricultural workers from the uncertainties of monsoons—typically for drought relief (Lalitha and Orza 2002). Workers were also sometimes employed for building irrigation facilities. Given that Gujarat's agriculture was later made virtually independent of the vagaries of monsoons, employment in publicly funded construction projects was probably not needed as much. In addition, the high and fast-growing productivity of Gujarat's construction sector probably meant that less labor was needed to meet demand.[10]

By far, the most productive sector for both states was FIREBS, where the value-added per worker was 35–45 times that in agriculture and around 6 times that in manufacturing. However, while Gujarat saw only a 0.6 percentage point increase in employment share, Maharashtra saw almost a 2.0 percentage point increase—a difference that can lead to a big difference in how much structural change contributes to growth because of the extremely high labor productivity of FIREBS relative to the economy's average. In this context, it is important to reiterate that for Maharashtra, FIREBS has been a big contributor to structural change. Not only has the change in its employment share of FIREBS been more than three times that in Gujarat, its actual employment share level in this sector (3 percent) is also three times that of Gujarat's (1 percent). This is not unexpected, as Mumbai, Maharashtra's capital city, is India's financial capital, with the country's premier stock exchange. Also, the capacity of FIREBS to absorb labor is limited in Gujarat relative to Maharashtra by the much lower levels of education—especially in terms of outcomes (reading, writing, and math), the proportion of the population with eight years of education or higher, and the standard literacy rate measure (Drèze and Sen 2013; Ghosh 2012).

Is the agriculture–construction story of Gujarat and Maharashtra evident in other states? Our results show that in agriculture, all states—except

10 It is important to note that what appears as structural change or alternatively "within-sector growth" depends on the degree of aggregation or disaggregation of the analysis. For instance, if we could treat food grain production and cash crops as two separate sectors, it is quite possible that some of the within-sector growth contribution of Gujarat's agriculture would get converted to structural change.

Gujarat—have seen a decline in the share of employment (Table 1.6). In construction, all states—except for Gujarat (major decline) and Rajasthan (minor decline)—have seen an increase in their employment share. But this increase may have more to do with the role of the public construction sector (to tackle the seasonality of agricultural employment, which is also subject to the vagaries of monsoons) than anything else in employment generation.

Forces for "Desirable" Structural Change

The final step in our examination of India's growth patterns is using econometric analysis to determine whether—and to what extent—structural change was "growth enhancing" (or what we call "desirable") and which factors played the biggest roles. Our work picks up on that of McMillan and Rodrik (2011), who used their nine-sector data at the national level to examine patterns in a number of countries. They find that structural change was growth enhancing in India and Thailand, but it was "growth reducing" in Argentina, Brazil, Nigeria, and Zambia.

TABLE 1.6 Agriculture is down everywhere, except Gujarat

Changes in agriculture and construction employment between 1987 and 2004				
	Agriculture		Construction	
Sector	Share of state employment in 1987 (percent)	Change in share of state employment 1987–2004 (percentage points)	Share of state employment in 1987 (percent)	Change in share of state employment 1987–2004 (percentage points)
Andhra Pradesh	63.5	–6.4	3.6	1.6
Assam	71.4	–3.6	1.6	1.4
Bihar	73.1	–5.4	2.5	3.1
Gujarat	47.7	9.8	17.8	–14.1
Haryana	57.5	–4.6	4.0	3.2
Karnataka	64.7	–1.9	2.9	1.1
Kerala	44.4	–10.1	5.5	5.7
Madhya Pradesh	73.0	–4.2	3.5	1.9
Maharashtra	60.8	–6.4	4.5	0.7
Orissa	66.2	–5.5	4.6	1.8
Punjab	52.2	–0.4	3.8	4.2
Rajasthan	63.6	–3.1	11.6	–1.3
Tamil Nadu	48.2	–2.4	4.2	2.4
Uttar Pradesh	69.1	–8.4	3.1	2.5
West Bengal	50.1	–4.7	2.9	2.1

Source: Constructed from India's National Accounts Statistics data from the Central Statistical Office, along with employment survey data from the National Sample Survey Organisation.

They also argue that globalization by itself cannot deliver the "desirable" kind of structural change. Rather, what matters is the availability of such factors as the type of factor endowments a country possesses, the kind of specialization globalization leads to, and, above all, how globalization is managed. They contend that sectors that are exposed to foreign competition through globalization need to obtain government support, as they have in most of Asia—unlike in Latin America, where not only import-competing sectors failed to receive government support in the form of subsidies, but also trade barriers were eliminated rapidly. Making matters worse, exchange rates were overvalued in Latin America (unlike in Asia), thereby encouraging imports and discouraging exports. Plus, they underscore the importance of labor-market flexibility.

We begin by asking about the nature of the relationship between productivity and employment share—an indicator of whether structural change is growth enhancing or growth reducing—in India's sectors between 1987 and 2004. In particular, we examine whether the more productive sectors and states have experienced larger increases in employment. We do so by estimating the following econometric specification:

$$\Delta\theta_{jst} = \alpha_2 + \beta_1 X_{jst-1} + \varphi_{st} + \varphi_j + \varepsilon_{jst} \qquad (2)$$

where $\Delta\theta_{jst}$ is the one-period difference in sector j's share of state employment in state s and year t. X_{jst} is a vector of one-year lagged variables that vary by sector, state, and year. The key variable included in X_{jst} is one-year lagged value-added per worker in natural logarithm. If $\beta_1 > 0$ when X_{jst} is one-year lagged labor productivity, it follows that the more productive sectors are experiencing higher increases in employment. This is evidence of positive structural change. Other variables that are sequentially included in X_{jst} are one-year lagged values of the fraction of casual workers, the fraction of workers with a primary education, and the fraction of rural workers.[11] φ_{st} and φ_j are state-by-year and sector fixed effects, respectively. Finally, ε_{jst} is a classical error term.

We find that the change in employment share of a sector in overall state-level employment is positively related to the value-added per worker in that sector (column 1, Table 1A.1). A 1 percent increase in the value-added per worker leads to an increase in the change in the share of the sector in state-level employment of about a 0.02 percentage point between two consecutive National Statistical Survey rounds (roughly six years).

So what is behind this desirable structural change? Using our state-by-industry-level data, we next look at the underlying factors that enable this

11 Note that these alternate state characteristics are used in place of labor productivity.

positive outcome. We find that a 1.0 percentage point decline in the fraction of casual workers leads to a 0.04 percentage point increase in the change in employment share of a sector—in other words, sectors with a smaller share of casual workers have been expanding in their relative employment size (column 2, Table 1A.1). We also find a weak (statistically insignificant) relationship between this employment share increase and both the fraction of workers with primary education and above, and the rural share of a sector's employment (columns 3 and 4, Table 1A.1).

As for the trend over time, we find that desirable structural change is stronger in the postliberalization period than in the preliberalization period (columns 5 and 6, Table 1A.1)—which is consistent with the McMillan and Rodrik (2011) story that globalization has been managed better in India than in most of Latin America, and good management of globalization can deliver good results. We also see that education and urbanization matter in the postliberalization phase (columns 7 and 8, Table 1A.1). Indeed, employment increased more (or decreased less) in sectors with a bigger share of educated workers (those with primary education and above). And the employment share rose more in sectors with a smaller proportion of rural employees in their total employment.

A Bigger Role for "Labor Pull" Than for "Labor Push"

What about the roles of agricultural and modern-sector productivity—that is, whether the impetus is "labor push" or "labor pull" (Matsuyama 2008)? The assumption that demand for agricultural goods is less responsive to income than demand for modern goods means that growth in agricultural labor productivity will push labor out of agriculture and toward the modern sector (which represents all nonagriculture sectors). This is called "labor push." "Labor pull" occurs when growth in labor productivity in the modern sector pulls labor out of agriculture. In analyzing whether trade liberalization complements or works against the above role of agricultural and modern-sector productivity, much will depend on how this liberalization affects agricultural and nonagricultural prices.

We investigate the importance of the above factors by estimating the following econometric specification:

$$\Delta\theta_{jst} = \alpha_3 + \beta_2 \ln (VAPW)_{jst-1} + \beta_3 \ln (VAPW)_{jst-1} \times Z_{st-1} + \varphi_{st} + \varphi_j + \varepsilon_{jst} \quad (3)$$

where $(VAPW)_{jst-1}$ denotes one-period lagged value-added per worker (which is a measure of labor productivity) at the level of industry (sector) by state. Z_{st-1} is a vector of state-level variables that are also lagged by one

period. It includes the one-period lagged labor productivity of the agriculture sector in state *s*, the one-period lagged labor productivity of the modern sector in state *s*, the one-period lagged relative labor productivity of the modern sector (modern sector productivity / agriculture sector productivity) in state *s*, or the one-period lagged state tariffs. Note that these measures vary only by state and time and not by sector. As a result, we have omitted the level effects of Z_{st-1} from equation (3) because of its collinearity with the state and year interaction fixed effects.

Our results suggest that agricultural productivity did not have a statistically discernible effect on structural change (column 1, Table 1A.2). But there is strong evidence (column 2, Table 1A.2) for the positive role of modern-sector productivity in fostering desirable structural change (that is, increasing employment shares in favor of the relatively productive sectors). We also see a positive role of the relative labor productivity of the modern sector (versus the agriculture sector) in stimulating structural change, once again in favor of high-productivity sectors (column 3, Table 1A.2). In other words, these results suggest that labor pull factors were a much more important determinant of positive structural change in India than labor push factors. However, the postliberalization period tells a story slightly different from the previous subperiod, in that now there is a strong positive role for not only absolute modern-sector productivity and relative modern-sector productivity but also agricultural productivity (columns 4–6, Table 1A.2). It is important to note that while both coefficients are statistically insignificant in column 1, and also some coefficient estimates are insignificant in the other columns of Table 1A.2, in each of those other columns there is at least one important coefficient estimate (of the level and/or interaction terms(s)) that is statistically significant.

Trade Liberalization, Flexible Labor Markets, and Education Help, Too

Another key factor to evaluate is trade liberalization, by using state-level employment-weighted tariffs as an inverse measure of the state's labor force exposure to foreign competition (with time-invariant state-level industry employment weights—that is, of the year 1993—applied upon the national industry tariff vector varying from one year to another). We find that in states where the labor force is relatively more exposed to foreign competition, more productive sectors experience a relatively larger increase in employment share (column 1, Table 1A.3). We also have some fairly strong evidence that labor market flexibility increases the positive structural

change effect of trade liberalization (column 3, Table 1A.3), which is consistent with McMillan and Rodrik (2011). Also, at higher values of the share of workers with primary education, we have a more positive relation between the changes in the shares of employment and labor productivity (column 4, Table 1A.3). The impact of the share of the educated workers itself changes from negative to positive as the value-added per worker increases. As for the role of higher road density, our results show a possible, but weak, improvement (column 5, Table 1A.3). All together, these results suggest that trade restrictions, restrictive labor regulations, the lack of basic education, and possibly low road density can act as impediments to positive structural change.

What if we focus on just the manufacturing sector? Here, too, we find that the change in the employment share of the manufacturing sector increases with value-added per worker in that sector (column 1, Table 1A.4), which indicates that structural change is of the desirable kind. We also again find that trade liberalization enhances this positive relationship between employment share change and labor productivity, especially in states with relatively flexible labor markets (column 4, Table 1A.4). In states where the labor force is more exposed to foreign competition, we see that labor regulations that make for a more flexible labor market strengthen the positive relationship between labor productivity and the change in the employment share of the manufacturing sector (column 6, Table 1A.4).

But Informality Is Not a Big Factor

As for the level of casualization (also known as informality) of the work force, we see a slight increase during the period 1987–2004 from almost 41 percent to 42–43 percent, with manufacturing having roughly the same degree of informality as the overall economy (Table 1.7). However, there is quite a wide variation across sectors. Agriculture and construction have a much higher degree of informality (91–94 percent) than FIREBS and public utilities (below 10 percent). Is this variation correlated with certain industry characteristics? We do see a negative, albeit weak, correlation between the change in the proportion of casual workers and labor productivity (column 1, Table 1A.5)—that is, the greater increase in informality is taking place in the relatively lower-productivity sectors. But this negative impact is stronger (larger) in the preliberalization period than during the postliberalization period (column 2, Table 1A.5), possibly reflecting the fact that globalization requires firms to be much more agile and respond to shocks quickly by hiring or firing workers, which is easier to do with informal workers than with formal workers under

TABLE 1.7 Informality is up slightly

Casualization of the labor force by year and by sector	
Year and sector	Percentage casual worker
Panel A: By year	
1987	40.6
1993	42.3
1999	43.2
2004	42.9
Panel B: By sector	
Agriculture	91.7
Mining	63.9
Manufacturing	42.4
Public utilities	8.6
Construction	94.0
Wholesale and retail	27.6
Transport and storage	30.3
Finance, insurance, real estate, and business services	6.9
Community and social services	15.6

Source: Constructed from India's employment survey data from the National Sample Survey Organisation.

Note: Percentage casual worker refers to the percentage of wage workers in each state and sector who are not regular employees. All household employees were excluded when constructing this measure.

the Indian labor laws. Our results also suggest that labor market flexibility does not affect the relationship between labor productivity and changes in the share of casual workers (columns 3 and 4, Table 1A.5).

The bottom line is that the sectors where employment expansion is not taking place (because of their relatively lower productivity) seem to be the sectors where informality is growing, relatively speaking, while the expanding sectors (which are the relatively high value-added sectors) are seeing either a decline in informality or a relatively small increase in informality. Thus, this evidence indicates that the structural change in informality is probably not a cause for concern. The macro numbers, on the other hand, show an increase in informality. It is quite possible that other variables not included in our regressions are driving the aggregate numbers.

Ways to Drive "Desirable" Structural Change

Encouragingly, we find that structural change has been of the desirable kind in India. In other words, the contribution of structural change to productivity growth has been mainly positive, with negative (growth-reducing)

structural change concentrated mainly in the 1970s. In the postreform period (1991–2004), structural change has contributed slightly less than a fourth of the overall productivity growth rate of slightly more than 4.0 percent. In the 2000s, structural change was a small fraction of the overall productivity growth rate of 6.5 percent.

At the sectoral level, while FIREBS was the leading contributor to structural change in the postreform period, manufacturing was the leading contributor to within-sector growth in the 2000s. Yet despite its high rate of productivity growth, manufacturing's role has not grown in terms of either output or employment. We argue that labor regulations are a big impediment in this regard and that labor-market reforms are needed, especially because the future potential of agriculture and services in generating overall growth is limited (beyond a point) at India's stage in the development process.

On average, more productive sectors have gained in employment shares relative to the less productive sectors, at both the national and the state levels. This structural change has been aided by trade liberalization (especially in states that have labor regulations that make for a relatively flexible labor market) and by the greater exposure of the labor force to foreign competition (an inverse measure of which is the employment-weighted tariff). Thus, we see the importance of less distortionary policies in leading to a more efficient allocation of resources. We also see the value of the right kind of domestic policies and institutions in reaping the gains from globalization. And we find that investing in infrastructure—such as improving the road density and investing in social services like education—can help generate desirable structural change. In other words, the state can play a critical role in ensuring that positive structural change occurs.

We also see that there is some—albeit somewhat weak—evidence that the greater increase in informality is taking place in the relatively low-productivity and slow-growing sectors (during our entire sample period). This evidence suggests that the structural change in informality is probably not a cause for concern. On the other hand, the macro numbers show an increase in informality. It is quite possible that some other variables not included in our statistical analysis are driving the aggregate numbers. However, it is important to note that the negative relationship mentioned above between a sector's labor productivity and the change in its informality has been weaker (smaller in size) in the postliberalization phase, probably driven by the need to hire casual workers to rapidly respond to shocks in the presence of global competition.

The solution to this problem, we feel, is the reform of labor laws to make labor markets more flexible.

Very complementary to our work is the work by Hasan, Lamba, and Sen Gupta (2013), who show that growth-enhancing structural change has played an important role in poverty reduction in India. They have argued that this kind of structural change can be brought about by policies that make the business environment more competitive, make labor markets more flexible, and eliminate financial market imperfections. In turn, these policies become an important part of the toolkit to fight poverty.

The recent work by Hnatkovska and Lahiri (2013) has shown the importance of technological progress and urbanization in dealing with the rural–urban divide. In that context, education—especially rural education—has an important role to play. Our work also shows that both urbanization and investment in education may have a role to play in determining the type of structural change that takes place—that is, whether it has a positive or negative impact on the growth of overall labor productivity (and, therefore, of per capita income).

Thus, while urbanization can help draw some of the underemployed rural labor force from agriculture to higher-productivity manufacturing, for this to actually happen the rural labor force has to have the requisite education to make that transition. That is one of the main reasons why rural education has such an important role to play, making education and urbanization complementary forces for desirable structural change.

Appendix 1A: Data for Our Disaggregated Analysis of Labor Reallocation

We combine National Accounts Statistics data from the Central Statistical Office (CSO) with employment survey data from the National Sample Survey Organisation (NSSO). The CSO dataset provides us with real value-added data for nine broad sectors separately for the 15 major Indian states. The sectors are agriculture, forestry, and fishing; mining and quarrying; manufacturing; public utilities; construction; wholesale and retail trade; transport, storage, and communications; FIREBS; and government services and community, social, and personal services. The included states are Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal. Note that these are not all the Indian states, but are the

15 major states (out of a total of 28 states and seven union territories). Thus, the total value-added by summing up the value-added from these states will be somewhat lower than for the overall country value-added from the Groningen Growth and Development Centre dataset (when both sets of data are converted into common base year prices). While the value-added in the Groningen data is in 1993–1994 Indian rupees, these state-level data are in 2004–2005 Indian rupees.

Next, the NSSO dataset provides us with employment data for the same nine broad sectors and 15 major Indian states. We use these data, in conjunction with the above state-level sectoral value-added data, to construct a value-added per worker series for the years 1987, 1993, 1999, and 2004. These are the years in which the NSSO conducted its surveys. Additionally, we use this series to construct our measures of agricultural and modern-sector labor productivity. The NSSO data also allow us to create sectoral employment shares (in state employment), structural change at the state level, and within- state growth in labor productivity. In addition, we can use the NSSO data to create the sector- and state-level measures of the fraction of casual workers, the fraction of workers with a primary education, and the fraction of rural workers.[12]

For our labor laws measure, we use a partitioning of states that has recently been constructed and used by Gupta, Hasan, and Kumar (2009). This partitioning updates the classification constructed by Besley and Burgess (2004) with information from Bhattacharjea (2006) and OECD (2007), while focusing attention on characterizing state-level differences in Chapter VB of the Industrial Disputes Act (IDA) (which relates specifically to the requirement for firms to seek government permission for layoffs, retrenchments, and closures), and considering both the content of legislative amendments as well as judicial interpretations. Bhattacharjea (2006) also independently assesses legislative amendments, as opposed to the standard approach of relying on the assessments of Besley and Burgess (2004). The Organisation for Economic Co-operation and Development (OECD) study uses a very different approach and relies on a survey of key informants to identify the areas in which states have made specific changes to the implementation and administration of labor laws (including not only the IDA but other regulations as well). The OECD study aggregates the responses on

12 Note that the NSSO provides information on whether each worker surveyed operates in a rural or urban location, in addition to providing information on sector, state, casual/regular status, education level, and so forth. Thus, for example, the fraction of rural workers in a sector within a state would be the number of workers labeled as rural within a sector-state unit divided by the total number of workers in that sector-state unit.

each individual item across the various regulatory and administrative areas into an index that measures the reduction in transaction costs vis-à-vis labor issues brought about by procedural changes. Gupta, Hasan, and Kumar (2009) use the three studies to partition states into those with flexible, neutral, or inflexible labor regulations.

Our state-level trade protection measure used in our state-level analysis is from Hasan et al. (2012), who follow Topalova (2010) and Hasan, Mitra, and Ural (2007). They construct weighted state-specific measures of country-level ISIC two-digit industry trade protection. In particular, they weight two-digit industry-level tariff rates within the agriculture, mining, and manufacturing sectors by state- and industry-specific employment shares in 1993. Similar employment-weighted protection measures have been used in quite a few recent studies. Two such examples are Topalova (2010) and Edmonds, Pavcnik, and Topalova (2010). The idea here is that there is an interaction between the industry-level tariff vector and the employment vector in the determination of various outcomes. This measure of state-level protection has been theoretically justified by Kovak (2013) using a multiregion, multi-industry trade model with sector-specific factors and labor that is mobile across sectors, with all factors being totally immobile across regions. It is important to note in this context that the employment vector (that interacts with the time-varying tariff vector) is time invariant and is chosen for a particular base year. Since we will use the within-state variation to identify the effect of our state-level protection variable, it will be the time-varying tariff vector and not the time-invariant employment vector that will play the key role in our statistical analysis. However, the impact of the tariff vector will vary by the type of the employment vector. In other words, changes in state-level outcomes will be affected by changes in national industry-level tariffs in interaction with 1993 state-level industrial composition. Last, our road density measure is from Cain, Hasan, and Mitra (2012).

TABLE 1A.1 Determinants of desirable structural change

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	Δ (employment share)							
Ln (value-added per worker)	2.090*** (0.489)				–0.180 (0.601)			
Fraction casual		–4.480** (1.749)				–0.850 (1.842)		
Fraction with primary education			–1.200 (2.333)				–5.840** (2.789)	
Fraction rural				–1.900 (1.760)				3.830 (2.470)
Ln (value-added per worker) × liberalization					2.700*** (0.476)			
Fraction casual × liberalization						–3.910*** (1.099)		
Fraction with primary education × liberalization							7.600*** (1.954)	
Fraction rural × liberalization								–6.670*** (1.559)
Constant	–7.780*** (1.464)	2.800 (1.719)	0.180 (1.050)	1.920 (2.099)	1.330 (1.882)	2.840* (1.691)	1.280 (0.842)	–3.010 (2.372)
Observations	405	403	404	404	405	403	404	404
R-squared	0.528	0.501	0.493	0.494	0.596	0.534	0.529	0.547

Source: Authors' econometric estimations using data described in Appendix 1A.

Note: The dependent variable is the change in each sector's share in its state employment. The liberalization variable takes the value of 1 for all rounds of data beginning in 1993 and is 0 otherwise. All independent variables, except liberalization, are lagged by one period. All regressions include state and year interaction fixed effects and industry fixed effects. All regressions are also weighted by each sector's share of national employment. Robust standard errors in parentheses are clustered at the sector-state level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE 1A.2 Labor pull versus labor push

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Δ (employment share)					
Ln (value-added per worker)	0.490 (1.089)	–7.070** (2.970)	0.350 (1.037)	1.690* (1.010)	–0.380 (2.069)	2.000** (0.923)
Ln (value-added per worker) × ln (agriculture sector labor productivity)	0.340 (0.280)			–0.250 (0.277)		
Ln (value-added per worker) × ln (modern sector labor productivity)		1.890*** (0.629)			0.030 (0.394)	
Ln (value-added per worker) × (relative modern labor productivity)			0.920* (0.469)			–1.530*** (0.462)
Ln (value-added per worker) × liberalization				–1.150* (0.586)		
Ln (value-added per worker) × agriculture sector productivity × liberalization				0.360*** (0.136)		
Modern sector productivity × liberalization					–2.890*** (0.598)	
Ln (value-added per worker) × modern sector productivity × liberalization					0.560*** (0.096)	
Relative modern productivity × liberalization						–7.750*** (1.833)
Ln (value-added per worker) × relative modern productivity × liberalization						1.830*** (0.395)
Constant	–8.840*** (2.493)	–8.720*** (2.401)	–9.330*** (2.443)	–6.640** (2.877)	1.480 (2.244)	–0.860 (2.198)
Observations	360	405	405	360	405	405
R-squared	0.265	0.550	0.534	0.296	0.594	0.588

Source: Authors' econometric estimations using data described in Appendix 1A.

Note: The dependent variable is the change in each sector's share in its state employment. The liberalization variable takes the value of 1 for all rounds of data beginning in 1993 and is 0 otherwise. Modern sectors include all nonagriculture sectors. Ln (value-added per worker) is lagged by one period. All regressions include state and year interaction fixed effects and industry fixed effects. All regressions are also weighted by each sector's share of national employment. Robust standard errors in parentheses are clustered at the sector-state level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE 1A.3 The role of trade liberalization, flexible labor markets, and education

	(1)	(2)	(3)	(4)	(5)
Dependent variable	Δ (employment share)				
Ln (value-added per worker)	4.360*** (0.551)	2.150*** (0.498)	4.350*** (0.504)	0.760 (0.819)	1.640 (1.146)
Ln (value-added per worker) × state tariffs	–5.080*** (0.719)		–4.890*** (0.660)		
Ln (value-added per worker) × labor laws		0.190 (0.169)	1.000** (0.422)		
Ln (value-added per worker) × state tariffs × labor laws			–1.500** (0.724)		
Ln (value-added per worker) × fraction with primary education				3.470*** (1.284)	
Fraction with primary education				–20.580*** (6.486)	
Ln (value-added per worker) × road density					0.080 (0.190)
Constant	–14.760*** (1.927)	–6.650*** (1.708)	–17.160*** (2.149)	–0.400 (2.705)	–5.920*** (1.568)
Observations	405	405	405	404	405
R-squared	0.638	0.529	0.646	0.549	0.528

Source: Authors' econometric estimations using data described in Appendix 1A.

Note: The dependent variable is the change in each sector's share in its state employment. The labor laws variable takes the value of 1 for states that have flexible labor laws and is 0 otherwise. Ln (value-added per worker) is lagged by one period. All regressions include state and year interaction fixed effects and industry fixed effects. All regressions are also weighted by each sector's share of national employment. Robust standard errors in parentheses are clustered at the sector-state level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE 1A.4 The role of trade liberalization, flexible labor markets, and education in manufacturing

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Δ (employment share)					
Ln (value-added per worker)	6.880***	6.500***	6.700***	5.640***	7.160***	7.810***
	(1.426)	(1.783)	(1.442)	(1.600)	(1.632)	(1.528)
Ln (value-added per worker) × liberalization		0.350		1.060		
		(0.959)		(0.881)		
Ln (value-added per worker) × labor laws			0.970			–2.130
			(1.047)			(1.727)
Ln (value-added per worker) × liberalization × labor laws				0.310***		
				(0.106)		
Ln (value-added per worker) × state tariffs					–0.650	–1.240
					(1.514)	(1.428)
State tariffs					3.520	5.010
					(6.771)	(6.306)
Ln (value-added per worker) × state tariffs × labor laws						–0.830**
						(0.356)
Constant	–29.460***	–26.700***	–29.520***	–23.260***	–30.860***	–31.470***
	(6.437)	(7.140)	(6.453)	(6.407)	(7.235)	(6.670)
Observations	45	45	45	45	45	45
R-squared	0.643	0.645	0.654	0.734	0.647	0.726

Source: Authors' econometric estimations using data described in Appendix 1A.

Note: The dependent variable is the change in the share of manufacturing employment in each state's overall employment. The liberalization variable takes the value of 1 for all rounds of data beginning in 1993 and is 0 otherwise. The labor laws variable takes the value of 1 for states that have flexible labor laws and is 0 otherwise. Ln (value-added per worker) is lagged by one period. All regressions include state and year fixed effects. All regressions are also weighted by each sector's average share of national employment over the sample period. Robust standard errors in parentheses are clustered at the sector-state level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

TABLE 1A.5 Informality and structural change

	(1)	(2)	(3)	(4)
Dependent variable	Δ (casual employment share)			
Ln (value-added per worker)	–1.810 (1.249)	–3.380** (1.361)	–1.960 (1.244)	–3.720*** (1.343)
Ln (value-added per worker) × liberalization		1.870** (0.942)		2.050** (0.850)
Ln (value-added per worker) × labor laws			–0.480 (0.311)	0.550 (0.784)
Ln (value-added per worker) × liberalization × labor laws				–1.320 (1.023)
Constant	6.260 (4.240)	5.410 (4.211)	8.310* (4.673)	8.610* (4.838)
Observations	402	402	402	402
R-squared	0.320	0.326	0.321	0.329

Source: Authors' econometric estimations using data described in Appendix 1A.

Note: The dependent variable is the change in each sector's ratio of casual workers to all wage workers. The liberalization variable takes the value of 1 for all rounds of data beginning in 1993 and is 0 otherwise. The labor laws variable takes the value of 1 for states that have flexible labor laws and is 0 otherwise. Ln (value-added per worker) is lagged by one period. The interaction between the liberalization and labor laws indicator is omitted because of its collinearity with the state and year interaction fixed effects. All regressions include state and year interaction fixed effects and industry fixed effects. These regressions are also weighted by each sector's share of national employment. The standard errors are clustered at the sector-state level. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

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