POONAM GUPTA
Delhi School of Economics

RANA HASAN
Asian Development Bank

UTSAV KUMAR
The Conference Board, New York

Big Reforms but Small Payoffs: Explaining the Weak Record of Growth in Indian Manufacturing*

Introduction

The promotion of the manufacturing sector and its exports has been a key pillar of the growth strategy employed by successful developing countries, especially labor-abundant ones. In this context, India's recent growth experience is puzzling on two accounts. First, while India's economy has grown rapidly over the last two decades, the growth momentum has not been based on manufacturing. Rather the main contributor to growth has been the services sector. Second, the relatively lackluster performance of Indian manufacturing cannot be ascribed to a lack of policy initiatives to jumpstart the sector. India introduced substantial product market reforms in its manufacturing sector starting in the mid-1980s, but the sector never took off as it did in other high-growth countries. Moreover, insofar as subsectors within manufacturing have performed well, these have been the relatively capital- or skill-intensive industries, not the labor-intensive ones as would be expected for a labor-abundant country like India (Kochar et al., 2006).

One of the main components of reforms in India was the liberalization of the industrial licensing regime, or "delicensing." Under the Industries Development and Regulation Act of 1951 every investor over a very small size

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needed to obtain a license before establishing an industrial plant, adding a new product line to an existing plant, substantially expanding output, or changing a plant's location. Over time, many economists and policymakers began to view the licensing regime as generating inefficiencies and rigidities that were holding back Indian industry. The process of delicensing started in 1985 with the dismantling of industrial licensing requirements for a group of manufacturing industries. Delicensing reforms accelerated in 1991, and by the late 1990s virtually all industries had been delicensed. Large payoffs were expected in the form of higher growth and employment generation with this policy reform.

However, the payoffs till date have been limited. It can be argued that a lag between the announcement and implementation of the policy, and also a lag between implementation and the payoffs may be responsible. However, it has been as many as twenty years since the first batch of industries was delicensed and almost a decade since the last batch of industries was delicensed; the view that payoffs would occur with a lag is difficult to maintain.[1]

What then could be the reasons for the rather lackluster performance of the industrial sector? The following factors are usually offered: (*a*) strict labor laws have hindered growth, especially of labor-intensive industries (Krueger, 2007; Panagariya, 2006; Panagariya, 2008); (*b*) infrastructure bottlenecks have prevented industries from taking advantage of the reforms, and (*c*) credit constraints due to weaknesses in the financial sector may be holding back small- and medium-sized firms from expanding (Banerjee and Duflo, 2008; McKinsey Global Institute, 2006; Nagaraj, 2002). More recently, two other factors have also been raised. First, it has been pointed out that the evolution of Indian industry may be influenced by path dependence or hysteresis so that despite the reforms of the mid-1980s and early 1990s, the relative profitability of capital and skill-intensive activities remains higher than that of labor-intensive activities (Kochhar et al., 2006). Second, the major reform initiatives undertaken so far—focused mainly on product market reforms—have been national ones. However, the working of product markets in a federal democracy such as India is influenced not only by regulations enacted by the Central Government but also those enacted by individual state governments. Moreover, much of the authority on administration and enforcement of regulation also rests with state governments. Accordingly, it

1. There have been two other major reforms in the Indian industrial sector—trade reforms and the abolition of policies which reserved certain sectors for small-scale industries. We plan to examine these in our future works.

has been pointed out that regulatory and administrative bottlenecks at the state level may be blunting the impact of reforms undertaken at the Central level (OECD, 2007).

Even though the foregoing factors have been debated actively in academic and policy circles, the empirical evidence to support or negate these arguments is limited. Two prominent exceptions include Besley and Burgess (2004) and Aghion et al. (2006). These papers have primarily looked at the effect that labor regulations have had on industrial growth in India using state-level amendments to the Industrial Disputes Act (IDA) to classify states as pro-worker, neutral, or pro-employer. While the first finds that industrial performance has been weaker in Indian states with pro-worker labor laws, the second finds states with pro-worker labor laws to have experienced limited benefits from delicensing reforms.

But these findings have been contested. First, it has been argued that the entire burden of regulatory weaknesses that might be constraining Indian manufacturing is placed on labor. In particular, neither of the papers accounts for other regulatory weaknesses. Second, the coding of state-level amendments to the IDA as pro-worker, neutral, or pro-employer has been criticized (see, especially, Bhattacharjea, 2006).

In this paper, we attempt to address both of the criticisms. Thus, while this paper analyzes the impact of delicensing on industrial performance, as in Aghion et al., we pay attention to the role of factors other than just labor regulations in influencing industrial performance. In particular, we look at how weaknesses in infrastructure and cumbersome product market regulations at the state level may be affecting India's manufacturing sector.

Additionally, we deal with the criticism surrounding Besley and Burgess' coding of state-level labor regulations, and thus the robustness of their result that pro-worker labor regulations have undermined industrial performance, in two ways. First, we consider an alternative approach for classifying states' stance on labor regulations drawing upon the works of Bhattacharjea (2008) and OECD (2007) in addition to that of Besley and Burgess. Second, we consider an altogether different approach for identifying the impact of labor regulations on industrial performance. Instead of relying solely on cross-state heterogeneity in labor regulations, we rely on heterogeneity in industry-specific characteristics as well. In particular, to the extent that rigidities introduced by labor regulations are likely to have their greatest bite on labor-intensive industries, the performance of labor-intensive industries can be expected to be weaker than others, especially in states with pro-worker or inflexible labor regulations.

In this way, our empirical work attempts to answer the following questions in a manner that builds upon the recent literature: Does the impact of policy reform vary across industries? Does the impact depend on the state-specific regulatory framework governing not only labor issues but also product market regulations? Does infrastructure play a role in determining the payoffs from reforms? Could hysteresis be one reason behind the modest payoffs from reforms? We use state-level data on registered manufacturing published by the Annual Survey of Industry (ASI) at the three-digit level from 1980 to 2004 to answer these questions. This data is used along with a host of other data pertaining to industry and state-level characteristics of various kinds. The main findings of the paper are as follows:

1. The impact of delicensing has been highly uneven across industries. Industries that are labor intensive and/or depend on infrastructure (or are energy dependent) have experienced smaller gains from reforms.
2. Regulation at the state level matters. States with less competitive product market regulations have experienced slower growth in the industrial sector post-delicensing, as compared to states with competitive product market regulations. States with relatively inflexible labor regulations have experienced slower growth of labor-intensive industries and slower employment growth.
3. Infrastructure availability and financial sector development are important determinants of the benefits that accrued to states from reforms. Where supportive regulatory conditions prevailed and infrastructure was available, businesses responded by expanding their capacity and grew, and to that extent hysteresis does not seem to matter.

It is useful to note some features of our work that can help put our findings in a broader context. First, our analysis is limited to India's registered manufacturing, or in other words, the formal manufacturing sector. As is the case in other developing countries, India's manufacturing sector is characterized by a duality.[2] While registered manufacturing accounts for

2. The registered or formal manufacturing sector includes all manufacturing establishments that employ either ten or more workers using power or twenty or more workers without using power and which are registered under the Factories Act, 1948. Data pertaining to the registered manufacturing sector are collected annually through the ASI. All remaining manufacturing establishments belong to the unregistered or informal manufacturing sector. A key source of data on unregistered establishments, also known as unorganized sector establishments, is the National Sample Survey Organisation's (NSSO) survey of the unorganized sector carried out approximately every five years.

a very large share of total manufacturing value added in India, its share of employment is quite low. For example, registered manufacturing accounted for almost two-thirds of total manufacturing value added in India and only around 20 percent of employment in 2000–01.[3] Given that so much of manufacturing employment is in the unorganized sector, an understanding of how economic reforms have affected the sector is clearly a matter of considerable importance. A lack of comparable annual data on the unorganized sector makes it difficult to study it along with the registered sector, however, we follow previous literature by focusing on the registered sector. We do not consider this to be a serious limitation of our work. On average, firms in the formal sector can be expected to be more productive, pay higher wages, and provide better working conditions than firms in the informal sector. Indeed, from the perspective of economic development, one would want to see the formal sector expanding at the expense of the informal sector. If output and/or employment in the formal sector are growing slowly, we would like to know why and what can be done about it. Thus from several points of view, including the welfare of workers, the performance of the formal sector is important to monitor and analyze.[4]

Second, the unit of analysis in this paper is industry-level data (by state). It can be argued that analysis would be more appropriate at the firm-level or the factory-level data. However, there are some important drawbacks in using available micro data such as the firm-level Prowess database published by the

3. See Bosworth et al. (2007), for issues related to employment data in India.

4. A caveat to this reasoning is as follows. It has been pointed out by several analysts that the survey frame of the ASI has been deteriorating steadily over the last 10 to 15 years (see, for example, Manna 2008). A specific manifestation of this deterioration is that the ASI may not be picking up information from a number of smaller establishments as well as it used to. If the smaller establishments tend to be labor-intensive, or are to be found in states that are coded by us as having inflexible labor market regulations, it is possible that our results based on ASI data may be biased. Thus, for example, when we find employment growth to be lower post-delicensing in labor-intensive industries, this result may reflect the fact that employment in labor-intensive industries is increasingly being generated by smaller establishments that are missing from the ASI frame. Results from our research using data from unregistered manufacturing from 1994, 2000, and 2005 suggest that any deterioration in the ASI frame on account of under-coverage of establishments is not systematic in a way that biases the results we get in this paper. For example, treating all unregistered manufacturing establishments with ten or more workers as establishments that should have been covered by the ASI, we find no statistically significant differences in trend growth of employment, output, or value-added across labor- and non-labor-intensive industries. Similarly, we find no statistically significant differences in trend growth across states based on their labor market regulations. These results hold even when we limit our attention to unregistered manufacturing establishments with 20 or more workers.

Center for Monitoring Indian Economy (CMIE) and the ASI unit (factory)-level data. The Prowess data is available only since the early 1990s for listed firms, with poorer coverage in the earlier years of the data. In addition, it lacks information on employment and the state in which the firm operates, thus rendering it virtually useless for our exercise. As for ASI factory-level data, data are not available as a continuous time-series covering the period of interest. Moreover, extensive discussions with researchers working with this data convinced us that building a panel dataset is exceedingly difficult. In view of these limitations we settled for the ASI industry-level data for our analysis.[5]

Third, we do not consider reforms other than delicensing in the paper. Several other major reforms have been introduced insofar as Indian manufacturing is concerned, including reductions in barriers to trade and the dismantling of the policy of reserving particular industries for production by the small-scale sector. On a similar note, an important element of the post-reform economic landscape in India has been the opening up of the economy to foreign direct investment (FDI). It is indeed an important development and is likely to have affected industrial performance. However, studying its impact separately is beyond the scope of this paper.

Finally, regulations can affect firms and industries in many different ways. For example, they may create incentives for firms to operate in the informal sector, stay relatively small, or adopt particular types of techniques. While the analysis of aggregate data can shed (indirect) light on some of these effects, a more complete analysis would require the use of a micro-based approach utilizing plant-level data, ideally from both the formal and informal sectors. This type of analysis is clearly beyond the scope of this paper though we plan to tackle this in future works.[6]

The rest of the paper is organized as follows. In the second section, we highlight the performance of the industrial sector in India, including the heterogeneity in the industrial performance across industrial sectors and the

5. The terms plants and factories are often used interchangeably in the literature and refer to the actual premises where manufacturing activity is carried out. A firm on the other hand takes into account ownership. A firm may have several factories operating under its ownership. Industry is defined here as the aggregate of plants/factories producing similar goods (using NIC classification).

6. As may be inferred from the discussion above, such analysis will have to be limited to only a few years spaced roughly five years apart (on account of the fact that plant level data on informal sector firms cannot be obtained on an annual basis). Further, such analysis would not be able to take account of plant fixed effects (on account of the fact that plant identities cannot be known).

regional variation in industrial growth. In the next section, we discuss the econometric methodology and the sources of data used in the paper. In the fourth section, we present and discuss our results. The final section concludes the paper.

Performance of the Indian (Registered) Manufacturing Sector

The Indian growth process in the past 15 years (and some would argue in the entire post-Independence period) has been rather lopsided. Indian growth has been more about services rather than industries. There have been modest payoffs to reforms in the industrial sector. This is despite the fact that the liberalization efforts were focused mostly on improving the regulatory environment faced by the industrial sector and reducing trade protection. Within industry, labor-intensive sectors have gained much less from reforms than the capital-intensive sectors. Growth has also been uneven at the regional level. Certain states with higher per capita income and higher initial share of industry have done better than the rest. Let us first look at this heterogeneity in Indian industrial sector.

Indian Growth Momentum is about Services

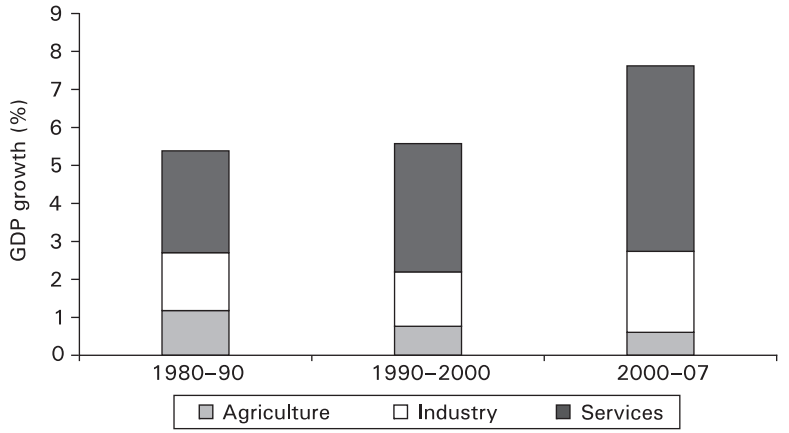
As has been documented in Gordon and Gupta (2004), the services sector has been the largest contributor to economic growth in India, and with services sector growth accelerating further in the post-liberalization period, its share in Gross Domestic Product (GDP) and contribution to growth has been increasing. As figure 1 shows, it has contributed almost two-thirds of GDP growth in India in recent years and currently constitutes close to 55 percent of GDP.

Modest and Unstable Pick-up in Industrial Performance Post-delicensing

The growth of manufacturing value added has not necessarily accelerated in the post-delicensing period.[7] The aggregate value added in registered manufacturing has increased from about Rs 2.8 billion in 1980 to Rs 16.4 billion in 2004 (as measured in 1993–94 prices), which translates into 5.6 percent

7. The performance in the post-delicensing period has also not been consistent. It has been marked by a sharp deceleration from 1996 to 2001 when the average annual growth rate dipped to 3 percent, from 11 percent a year in 1991–96, and a recovery in the ensuing period when the industrial growth recovered to an average 10 percent a year over the period 2001–06 as per the Central Survey Organisation (CSO) data.

FIGURE 1. Sectoral Contribution to Growth—Selected Periods



Source: CSO national accounts data at 1999–2000 prices. Sectoral shares used in the calculation of contribution of the three sectors to overall GDP growth are based on the average shares in the three periods respectively. GDP statistics for the fiscal year 2007–08 are based on advanced estimates and are subject to revision.

Note: Data in this figure pertain to industry as opposed to manufacturing [and includes manufacturing (registered and unregistered), construction, and utilities] and is drawn from the National Accounts Statistics (NAS). In the regression analysis in the rest of the paper, we use the industry-level data for only registered manufacturing, drawn from the Annual Survey of Industries. Thus the data in figure 1 for industry are not directly comparable with the data used in figure 2 onwards. In fact, the data for registered manufacturing in NAS is derived from the data for registered manufacturing in the ASI, but it does not match exactly with the latter. This is because while the estimates in NAS in the base year 1999–2000 are drawn from the data in ASI in that year, the base year numbers are extrapolated for subsequent years using the growth rates observed in the series for Index for Industrial Production (IIP) and the wholesale price index (WPI) at the NAS compilation category.

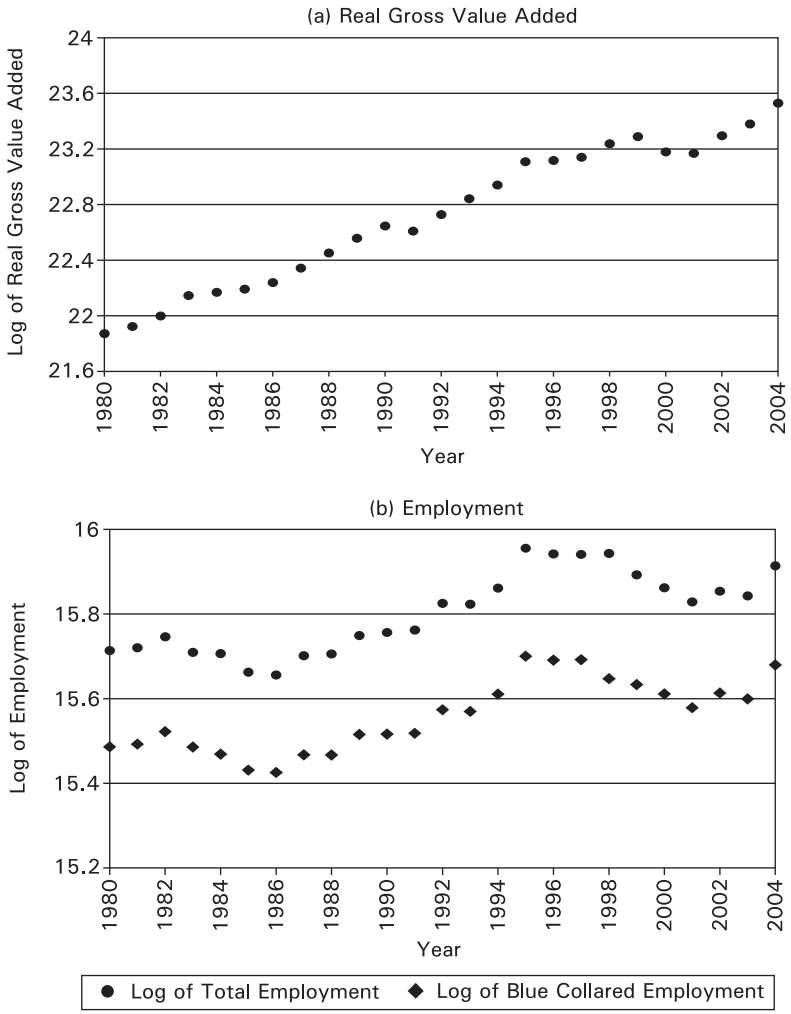
a year average growth rate in the sample period, with value added growing by an additional 15 percent between 1993 and 2004 (that is, a little more than 1 percent a year). This modest pick-up in value added has not been accompanied by additional growth in employment or in the number of factories.[8, 9] As figure 2(a) shows, employment, of blue-collared workers as well as total employment stagnated in the mid-1990s and subsequently declined until about early 2000s, and experienced a modest pick-up in recent years. When we

8. As highlighted in Gupta et al. (2008), performance varies across different sectors: the industries which depend more on infrastructure on average experienced lower growth in value added post-delicensing, as compared to the industries which are less reliant on infrastructure. Similarly, the industries more dependent on the financial sector or the labor-intensive industries have fared much worse than the industries that do not rely as much on the financial sector and capital-intensive industries.

9. As per the Factories Act, 1948, a factory refers to any premises where 10 or more workers are working when the manufacturing process is carried on with the aid of power or where 20 or more workers are working and the manufacturing process is carried on without the use of power.

compare this performance with the pace of growth in the manufacturing sector of many East Asian countries including China, we realize that, especially in terms of value added, the performance of Indian manufacturing has not been close to that of East Asian countries. For example, manufacturing value added in South Korea grew at an average annual real growth rate of approximately 17 percent between 1960 and1980, and China's manufacturing sector grew at an average rate of 12 percent per year between 1990 and 2005.

FIGURE 2. Performance of Indian Manufacturing (Registered)



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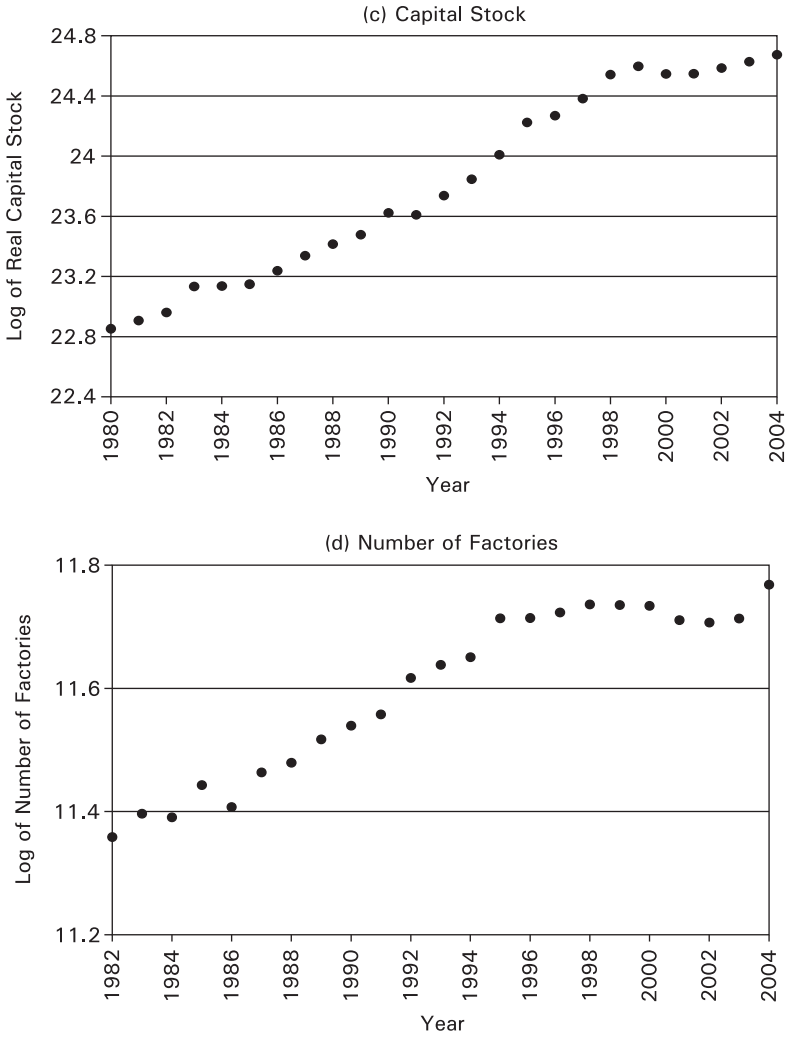


Source: Annual Survey of Industries from 1980–81 to 2004–05.

Note: The aggregate numbers at the all-India level used above are only for the manufacturing sector and leave out six industries due to lack of complete time series. Please see appendix 5 for details.

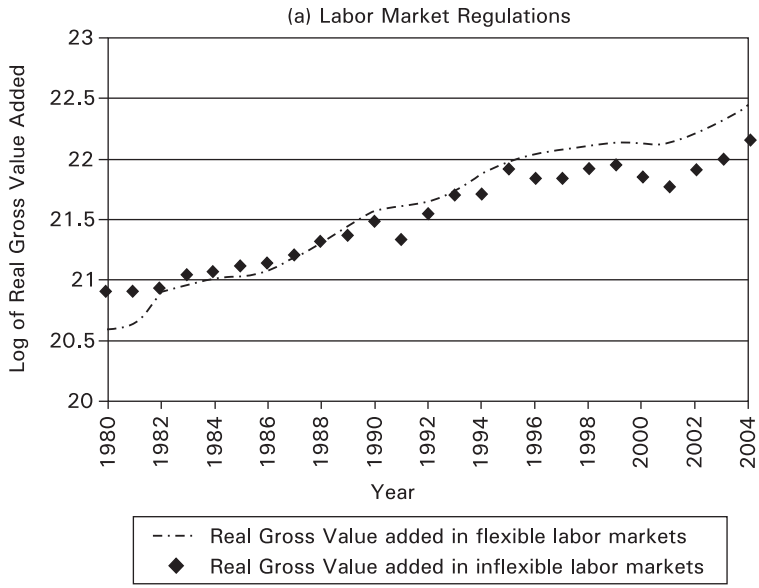
In addition, we note in figure 3 that the performance has been uneven across states and industries. As can be seen from the figure, there has been a divergence in the performance of the labor-intensive and capital-intensive industries in India. The labor-intensive industries have grown relatively slowly post-delicensing. Different panels in figure 3 depict the industrial

sector growth across different industries and across states characterized by different regulatory framework and different infrastructural developments. First, in figure 3(a), we see that the industrial performance is similar across states with different labor market regulations. In figure 3(b), we see that industrial output grew faster in states with competitive product market regulations post-delicensing. Industrial performance is also seen to be better in states with more developed infrastructure or more developed financial sector in figures 3(c) and 3(d). As can be seen in 3(e), the growth seems to be broadly similar in labor-intensive and capital-intensive industries before the liberalization, but has accelerated in the capital-intensive industries, post-delicensing. Finally, the last two figures 3(f) and 3(g) show that the performance of labor-intensive industries is, in particular, better in the states with labor regulations that are considered to be flexible (pro-employer).

Data and Methodology

Our analysis is based on the ASI data for 42 three-digit manufacturing industries for the period 1980–2004 for 15 major states of India. As mentioned earlier, we capture only registered manufacturing in our analysis using

FIGURE 3. Regulations, Infrastructure, and Indian Industry



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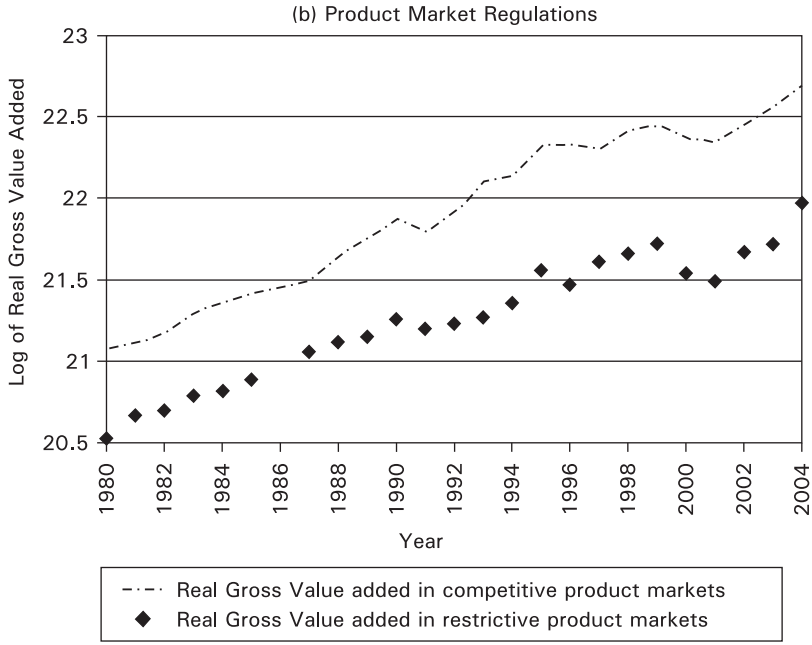

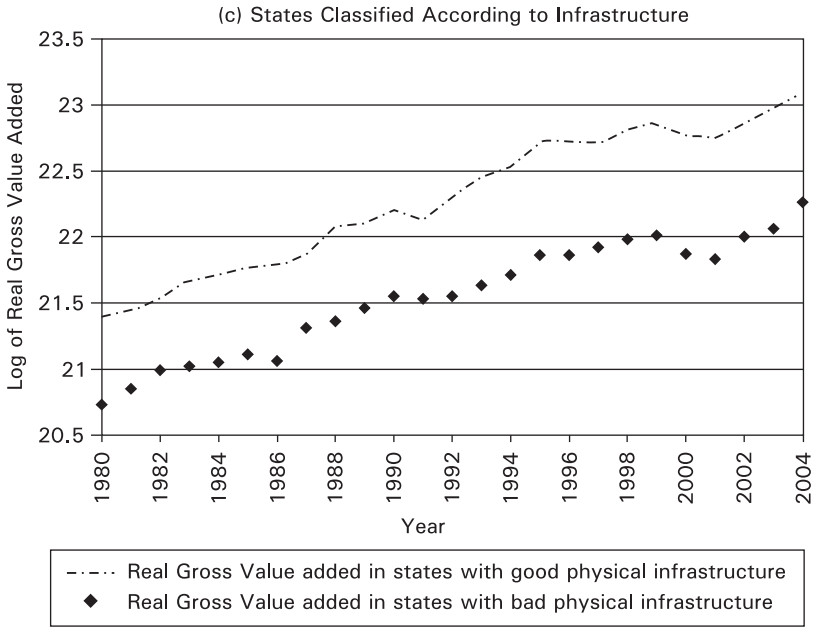

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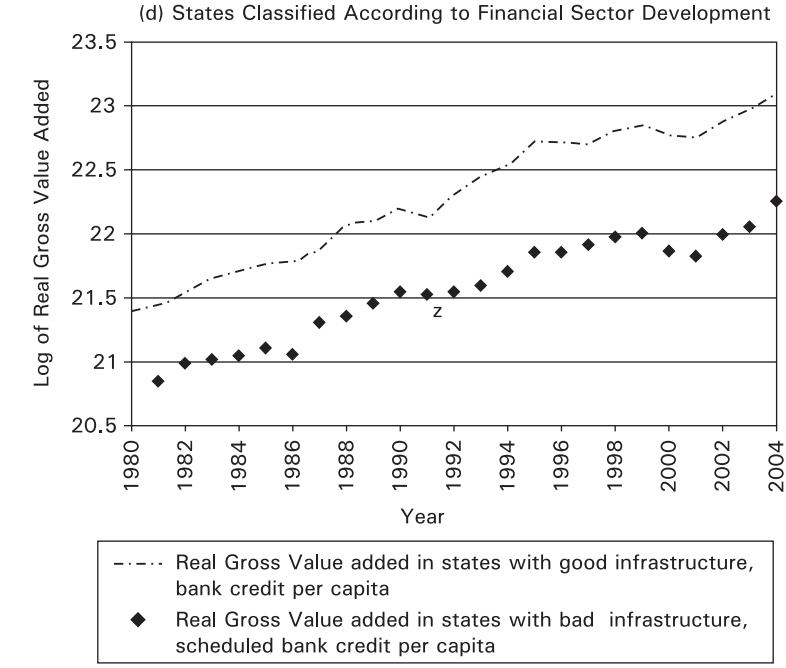

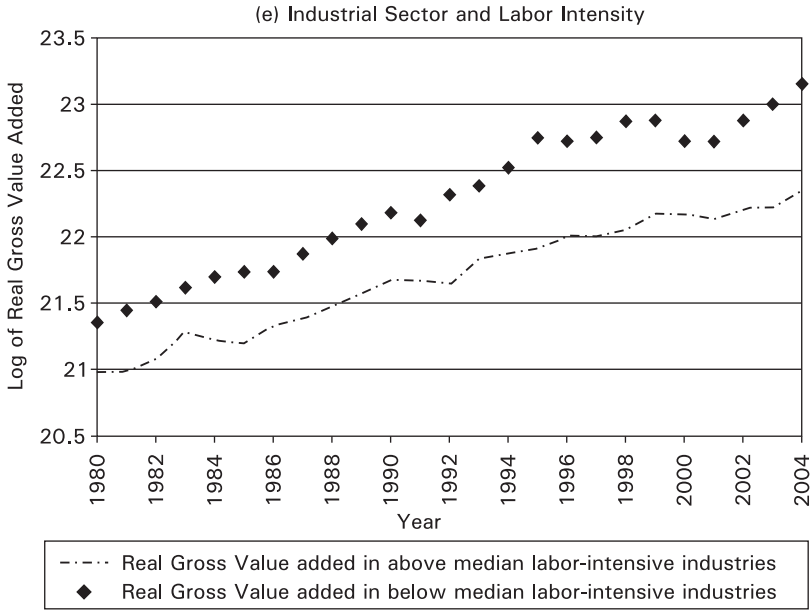

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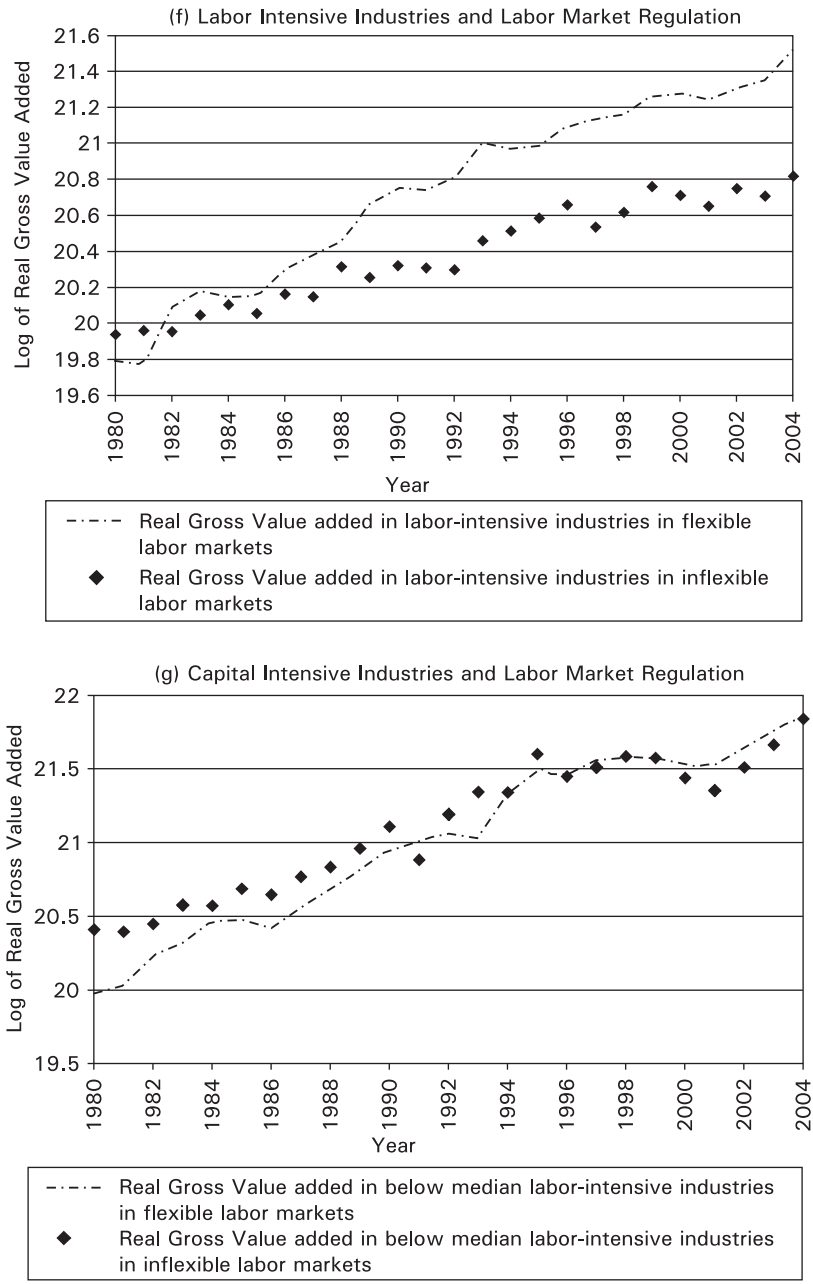


Source: ASI data (from 1980–81 to 2004–05) for registered manufacturing at three-digit level of classification.

this data. We utilize variation in industry and state characteristics in order to identify how factors such as labor regulations, product market regulations, availability of physical infrastructure, and financial sector development may have influenced the impact of delicensing on industrial performance. Our measures of industrial performance include gross value added, gross value of output, employment, and number of factories. Definitions of these variables are provided in appendix 1. Next, we discuss methodological issues in more detail, including how we measure delicensing and pertinent industry and state-specific characteristics for our econometric analysis.

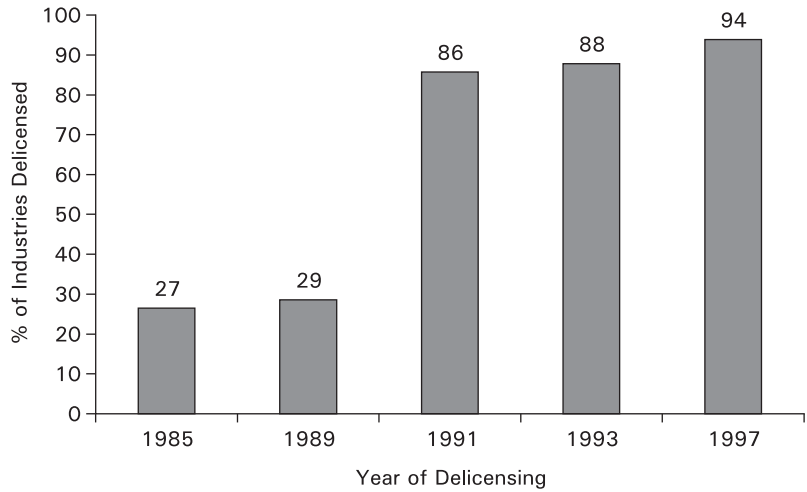
Delicensing, Industry Characteristics, and State Characteristics

DELICENSING: From the early 1950s up until the early 1980s the evolution of India's manufacturing sector was guided by industrial and trade policies that protected domestic industry and gave the State a central role in investment decisions. While a strict regime of import and export controls defined trade policy, industrial policy worked through an elaborate system of industrial licensing. Under the Industries Development and Regulatory Act of 1951, every investor over a very small size needed to obtain a license before establishing an industrial plant, adding a new product line to an existing plant, substantially expanding output, or changing a plant's location.

Industrial stagnation since the mid-1960s—increasingly blamed on the policy framework—led to some tentative steps aimed at liberalizing these regimes in the late 1970s and early 1980s (Ahluwalia, 1987, 1991). Relaxations of the industrial licensing system were introduced and import licensing requirements were eased. Serious liberalization efforts began in 1985 with delicensing—the exemption from the requirement of obtaining an industrial license—of 25 broad categories of industries, which map into 13 industries in our three-digit-level data. The next major reform of the licensing regime came in 1991 when industrial licensing was abolished except in the case of a small number of industries (see figure 4 and appendix 2 for the time path of delicensing).

Thus delicensing is one of the most comprehensive reform programs undertaken by the Government of India and this is the reform variable that we work with. Information about it is also readily available (Aghion et al., 2006; Gupta et al., 2008). Additionally, there is a good reason to believe that the specific timing of delicensing of particular industries was unanticipated by firms. Further, it is unlikely that the industries that were delicensed were chosen on the basis of expected future performance (Aghion et al., 2006). In other words, delicensing represented an unanticipated reform and also a

FIGURE 4. Cumulative Share of Industries Delicensed



Source: Based on Aghion et al. (2006) and extended by the authors.

reform measure that is unlikely to be subject to endogeneity concerns. To the extent that implementation of delicensing may have lagged its announcement, we lag the date of delicensing by a year.[10]

INDUSTRY CHARACTERISTICS: For technological reasons, industries need different inputs in different combinations, with specific industries often relying more heavily on certain inputs. For example, some industries may rely more on labor, some on skilled labor, and some may make more extensive use of physical infrastructure such as roads, electricity, ports, and so on. As a result, the size and growth of industries can be expected to depend on the cost and availability of inputs that are used most intensively in their production. Here, we look at industries which are labor intensive, unskilled-labor intensive, spend more heavily on energy and other infrastructure, or export a larger share of their total output, and examine whether the payoffs from reforms differ across these industries. If industries requiring a certain input have gained less from reforms, it could be because of the limited availability of that input and/or its price being too high.[11]

10. As mentioned earlier, studying the impact of other important policy reforms such as trade reforms or delisting of industries from the ambit of the small-scale industry reservation policy is beyond the scope of this paper. We, however, plan to analyze the impact of these policy reforms in our future work.

11. We are presuming, of course, that the production of these goods is not constrained by inadequate demand, but due to supply-side constraints imposed on their growth.

For example, if industries dependent on infrastructure have not grown much post-reforms, it may well be on account of the unavailability of adequate infrastructure. A similar finding for labor-intensive industries would be hard to reconcile in the same way, however. Given the large size of India's labor force and the level of wages, a more natural explanation for the relatively weak performance of labor-intensive industries could lie in appealing to issues such as the quality of labor and/or regulations on employment that make the effective price of hiring labor too high.

We construct indicators of industries' reliance on labor and infrastructure inputs using data from several different databases for Indian industries and Indian firms, as well as using data for the US. The idea behind using the latter is that input needs are sufficiently technical in nature and specific to an industry (or a small group of industries), and not to countries. Also, the *relative* need of industries of various inputs is unlikely to change over time. Thus, for example, while all industries may be becoming more capital-intensive over time, the set of industries that can be characterized as relatively labor-intensive at any given point of time will be more or less unchanged across countries.[12]

In order to get around the concern that these input-related industry characteristics would reflect the equilibrium conditions between the demand and supply of the respective inputs, we use data from an earlier year rather than contemporaneous data. Furthermore, to smooth out the noise in the data we use five-year averages of the relevant variables to calculate the industry-specific indicators. We also confirmed, where possible, that the relative industry rankings across various characteristics do not change over time. This robustness check gives credence to the belief that there are perhaps external technological reasons for why an industry uses more labor per unit of capital or depends more on infrastructure than others. We also find that these characteristics are highly correlated when calculated using different databases, and that the various characteristics are not highly correlated with

12. For all industrial characteristics (except skill intensity) we have used different databases for India. Since this could be subject to the criticism that it is not truly exogenous, we use the Indian data for an earlier year. We also check the robustness of the results to using the US data, and we find the industries are highly correlated using the US and the Indian data. For skilled-labor intensity, we had to rely exclusively on the US data since these data are not available for India. We conduct two more robustness tests to make sure that the results are robust to the way these industries have been classified. First, instead of using an index value we use a dummy variable for above and below median labor-intensive industries (since the actual values might differ across countries, but in a relative sense the intensities should be similar). Second, we just look at the top and the bottom tercile (since the measurement error is likely to be the largest in the middle rank) of industries.

each other. Thus, there is independent variation in these characteristics (see appendix 3 for details).

STATE CHARACTERISTICS: Have all states benefited equally from the delicensing reforms? If not, what factors can explain why some states were better positioned to gain from the reforms than others?

Given its importance in production and the fact that it varies across states, physical infrastructure is certainly one such factor. Appendix 4 describes the data we use to capture infrastructure differences across Indian states. Another factor that many observers point to concerns the regulatory environment faced by manufacturing firms. Importantly, the regulatory environment can vary by state. This is because India's Constitution distinguishes areas of regulatory responsibility in terms of whether authority rests with the Central Government, the state government, or both. For example, bankruptcy procedures and "exit policy" are under the exclusive purview of the Central Government; inspections and compliance with regulation come under the purview of the state government; labor regulation and "entry" are areas of joint responsibility (Conway and Herd, 2008).

We consider two types of regulations that can vary across states in this paper: labor market regulations and product market regulations.

While India's labor regulations have been criticized on many counts including, for example, the sheer size and scope of regulations, their complexity, and inconsistencies across individual pieces of regulation, a few specific pieces of legislation are the controversial ones. The key ones involve Chapter VB of the IDA and Section 9A of the IDA and the Industrial Employment (Standing Orders) Act. The first of these makes it necessary for firms employing more than 100 workers to obtain the permission from state governments in order to retrench or lay off workers—permission which some analysts argue is rarely forthcoming and thereby ends up raising the effective cost of labor usage in production.[13] As for the second and third, these pertain to the terms and conditions of work. While they seek to make labor contracts complete, fair, and legally binding, they can constrain firms

13. Until 1976, the provisions of the IDA on retrenchments or layoffs were fairly noncontroversial. The IDA allowed firms to lay off or retrench workers as per economic circumstances as long as certain requirements such as the provision of sufficient notice, severance payments, and the order of retrenchment among workers (last in first out) were met. An amendment in 1976 (the introduction of Chapter VB), however, made it compulsory for employers with more than 300 workers to seek the prior approval of the appropriate government before workers could be dismissed. A further amendment in 1982 widened the scope of this regulation by making it applicable to employers with 100 workers or more.

from making quick adjustments to changing conditions, especially in view of weaknesses in collective bargaining mechanisms.[14]

It is important to note that not all analysts agree that India's labor laws have made for a rigid labor market. In particular, a counter-argument to the views above is that the rigidity inducing regulations have been either ignored (Nagaraj, 2002) or circumvented through the increased usage of temporary or contract labor (Datta, 2003; Ramaswamy, 2003).[15] Ultimately, whether India's labor laws have created significant rigidities in labor markets or not is an empirical issue.

Unfortunately, quantifying differences in labor market regulations across states—a critical step in evaluating whether labor regulations have been a dampener on industrial performance—has proved to be contentious. For example, Besley and Burgess (2004) exploit state-level amendments to IDA—arguably the most important set of labor regulations governing Indian industry—and code legislative changes across major states as pro-worker, neutral, or pro-employer. While, in principle, the approach of Besley and Burgess has considerable merit, it is not without controversy. Bhattacharjea (2006), in particular, has argued that deciding whether an individual amendment to the IDA is pro-employer or pro-worker in an objective manner is quite difficult. Even if individual amendments can be so coded, the actual workings of the regulations can hinge on judicial interpretations of the amendments. Moreover, if noncompliance with the regulations is widespread, then even an accurate coding of amendments that takes into account the appropriate judicial interpretation loses its meaning.

We take the following approach in this paper. We start with the various attempts by different researchers at quantifying differences in labor regulations across India's major states. In addition to Besley and Burgess (2004), this includes OECD (2007) and Bhattacharjea (2008). A useful feature of the OECD measure of labor market regulations across states is that it incorporates state-specific information on the enforcement machinery. For example, information is provided on whether actions have been taken to reduce the transaction costs associated with the inspection regime. We calculate the labor market regulation variable by using a simple majority rule across different indicators.[16] Based on this rule we code the states as pro-labor,

14. See Anant (2000) for a discussion on this.

15. For a detailed review of Indian labor regulations and the debate surrounding the issue of rigidity, see Anant et al. (2006).

16. This is based on an approach used in Gupta et al. (2007) to find the currency crisis dates for different countries that differ across various studies in the literature. Rather than relying on a particular study or approach, they use the majority rule to find the currency crisis dates.

pro-business, or neutral if the majority of the studies in the literature that have calculated these codes do so. The advantage of calculating our variable in this way is that if a particular methodology or data source used by a researcher is subject to measurement error, then it will be weeded out in the rule. So unless several different sources systematically make a mistake in coding the states, we would not pick it up in our coding. Full details, including our final composite coding of states' labor market regulations (referred to as LMR in the tables on our regression results below) is given in appendix 5.

Notwithstanding the delicensing reforms, product markets in India remain highly regulated relative to other countries. It is widely believed that a number of the regulations in place limit competition in product markets. According to the World Bank's *Doing Business* survey, for example, starting a business in India is found to take a large amount of time due to the nature of regulations and administrative procedures involved (World Bank, 2008): 73 days compared to 24 days in Pakistan and only one day in New Zealand! Similarly, the time taken to close a business in India is one of the longest in the world.

As in the case of labor market regulations, some aspects of product market regulation are determined at the Central level while others, including the enforcement of product market regulations, are determined at the state level. Thus, product market regulations can be expected to vary across states. Conway and Herd (2008), described in OECD (2007), collected data from state government officials belonging to various regulatory departments, as well as from a law firm operating in all of India's major states, on the state-specific requirements for setting up a business. For example, they collected information on the administrative rules and procedures for obtaining clearances and approvals of various types. All the information collected is then coded and aggregated into state-level indicators of product market regulations. As described in more detail in appendix 5, we use the OECD indicators along with results from surveys of enterprise managers carried out as part of World Bank's investment climate studies in order to create a composite classification of states' product market regulations (PMR). In particular, India's major states are classified as having either competitive, neutral, or restrictive product market regulations. In addition to capturing the nature of product market regulations at the state level, the classification can be interpreted as capturing the willingness of states to implement delicensing reforms undertaken at the central level.

In appendix 5 we also show the correlations between various state-level characteristics. We observe that the labor market regulations at the state level are not correlated with other state-level indicators of regulation or

infrastructure whereas the product market regulations, the infrastructure variables, financial development variables, and per capita income are correlated highly with each other. In our regressions, therefore, when we include more than one of the latter characteristics simultaneously, the coefficients of individual variables are less significant.

Econometric Framework

The basic specification we use to analyze industrial performance is similar to the one used by Aghion et al. (2006). However, we extend this basic specification using the approach of Rajan and Zingales (1998). That is, in addition to exploiting variation in state characteristics, we also exploit variation in industry characteristics. The most general specification used in our paper is given as follows:

$$y_{ist} = \alpha_{is}\, d_{is} + \beta_{st}\, d_{st} + \theta_i\, trend_i + \Upsilon\,(delicensing_{it}) + \delta\,(industry\ characteristic_i * delicensing_{it}) + \pi\,(state\ characteristic_s * delicensing_{it}) + \tau\,(state\ characteristic_s * industry\ characteristic_i * delicensing_{it}) + \mu\ other\ controls + \varepsilon_{ist} \quad (1)$$

In Equation 1, y_{ist} is an industrial performance outcome (gross value added or employment) measured in logs. The first three right-hand side terms include fixed effects of various types and industry specific time trends. The d_{is}'s are industry–state fixed effects and d_{st}'s are state–year fixed effects. In lieu of industry–year fixed effects, which we cannot include in the regressions since the delicensing variable varies over industry and year, we include industry-specific time trends. The state–year fixed effects account for any omitted variables that might vary over states or over state and year, such as developmental spending. The state–industry fixed effects can account for variables that are specific to state and industry combinations, for example, if a state has a comparative advantage in certain industries because of geographical or historical reasons. Finally, industry-specific trends can account for different rates of technological change in different industries.

The next term in Equation 1 is the delicensing dummy which varies over time and industry. The dummy takes the value 1 for the year when the delicensing requirement for a particular industry was removed and remains 1 for the rest of the sample period. Since we are including state–industry and state–year fixed effects in the regressions, the only additional variables we can include are the ones that vary over state, industry, and year, or over industry and year.

The next term is an interaction of various industrial characteristics with the delicensing dummy. How do we interpret the coefficient of the interaction term involving the delicensing dummy and a particular industry characteristic? Consider the case where the particular industry characteristic is the labor intensity of industries and the coefficient for the interaction term is negative and significant. The coefficient then indicates that the industries that use labor more intensively have grown less post-delicensing as compared to the industries that use labor less intensively. This could be due to the fact that labor-intensive industries are constrained by the unavailability of certain inputs specific to these industries; alternatively, there may be regulatory barriers which inhibit their growth.

The next term in Equation 1 is an interaction between the delicensing dummy and either the state-level regulatory variables, or the state-level infrastructure related variables, or financial development. The coefficient π measures the impact of state regulations/infrastructure on the payoffs from reforms. State-level regulatory variables include state-specific measures of labor market regulations and product market regulations. The next term involving the delicensing dummy is an interaction of it with both industry characteristics and state characteristics. A particular combination for this interaction term that is of special interest to us involves the dummy for labor-intensive industries and a variable capturing labor market regulations at the state level. The results from this equation can shed further light on the effect of labor market regulations on industrial performance post-delicensing.

Finally, Equation 1 includes various control variables including initial per capita income of states interacted with delicensing, where initial per capita income can account for omitted variables that might vary across states and may affect the payoffs from reforms. Thus per capita income could proxy for geographical, cultural, and institutional factors. We also include a variable initial share of industry *i* in state *s,* interacted with delicensing. This variable accounts for initial comparative advantage that might affect regulation, for example, an initial comparative advantage of a state in labor-intensive industries might imply that the state develops pro-labor regulations and these sectors might be growing more slowly—thus erroneously attributing the slow growth of labor-intensive industries to labor market regulations. These other control variables can also help us test for regional convergence and hysteresis.

The variable ε_{ist} is an error term. To allow for heteroskedasticity and to deal with possible serial correlation in the error term, the standard errors are clustered by state–industry combinations.[17] We start our analysis in an

17. The results are robust to clustering by state and year of delicensing.

exploratory way and first establish the heterogeneity in industrial performance post-delicensing by estimating a more parsimonious specification given by Equation 2:

$$y_{ist} = \alpha_{is}\, d_{is} + \beta_{st}\, d_{st} + \theta_i\, trend_i + \Upsilon\,(delicensing_{it}) + \delta\,(industry\ characteristic * delicensing_{it}) + \mu\ other\ controls + \varepsilon_{ist} \quad (2)$$

Next we look at the effect of state-level regulations on the payoffs from reforms by estimating specifications based on Equation 3:

$$y_{ist} = \alpha_{is}\, d_{is} + \beta_{st}\, d_{st} + \theta_i\, trend_i + \Upsilon\,(delicensing_{it}) + \pi\,(state\ characteristic_s * delicensing_{it}) + \mu\ other\ controls + \varepsilon_{ist} \quad (3)$$

Then we estimate the full specification in Equation 1 to test whether the states with strict labor regulations affect labor-intensive industries in particular.

Empirical Results and Interpretation

Effect of Delicensing on Different Industries

Aghion et al. (2006) find that delicensing had an uneven effect on the industrial performance of different states. They looked at this issue from the perspective of differences in the policies related to the labor market at the state level. Here we first establish that post-delicensing performance varies across different industrial sectors as well.[18] We look at the labor-intensive industries, skilled-labor intensive industries, infrastructure dependence of industries (and separately the dependence on electricity and fuel, and distribution).

Did Labor-intensive Industries Benefit Less from Delicensing?

A common concern with the industrial performance in India has been that labor-intensive industries and the industries that can absorb the unskilled labor have not performed well post-reforms; consequently, employment generation has been sluggish as well. Hence, we first look at the labor-intensive industries.

18. In Gupta et al. (2008) we establish these patterns using the data aggregated at the all-India level.

In table 1 we include the initial size of each industry interacted with delicensing to account for convergence in real value added at the industry level. In columns II–IV we include a dummy for labor-intensive industries interacted with delicensing. In column III we also include intensity of industries for infrastructure, interacted with delicensing. In column IV we include the size of the establishment (average fixed capital required per factory) to account for the fact the labor-intensive industries might be capturing some other characteristic of industries such as size. Results show that the effect of delicensing does differ significantly for labor- and capital-intensive industries. There is weak evidence to show that in addition to labor-intensive industries, industries that used unskilled labor intensively grew less.[19]

Next, we test whether other kinds of industries also benefited less from reforms. The results of this exercise also ensure that the results on labor-intensive industries are not driven by the fact that these industries might be relying on some other factors of production affecting the gains from reforms.

TABLE 1. Did Labor-Intensive Industries Benefit Less from Delicensing?

	I	*II*	*III*	*IV*
	Dependent variable: Log real value added			
Delicense	–0.001	0.07	0.17**	0.26
	[0.02]	[1.27]	[2.52]	[0.59]
Share of industry *i* in value added in 1980* delicense	0.003	0	0.003	0.001
	[0.47]	[0.08]	[0.50]	[0.13]
Size (log of fixed capital)* delicense				–0.018
				[0.43]
Labor-intensive industry* delicense		–0.15**	–0.16**	–0.18**
		[2.24]	[2.32]	[1.97]
Infrastructure-intensive industry* delicense			–0.33***	
			[2.76]	
State–industry fixed effect	Yes	Yes	Yes	Yes
State–year fixed effect	Yes	Yes	Yes	Yes
Industry–year fixed effect	No	No	No	No
Industry trends	Yes	Yes	Yes	Yes
Observations	13257	13257	13257	13257
Number of state–industry	579	579	579	579
R-squared	0.87	0.87	0.87	0.87

Source: Computed by the authors.

Note: Robust t statistics are given in brackets. *Significant at 10 percent; **significant at 5 percent; ***significant at 1 percent. Standard errors are clustered by state–industry pairs in all specifications.

19. Results on size and low skilled-labor intensity variables are stronger if we drop the industry Railway Locomotives, which seems to be an outlier.

We, in particular, consider the industries that spend more on energy, or energy and distribution (a broader measure of infrastructure). As seen from table 1, industries that use more energy or rely on distribution infrastructure grew less post-delicensing (relative to industries that spend less on energy and distribution and thus have less infrastructural needs).

Even after controlling for the infrastructure intensity of industries, labor-intensive industries have a negative coefficient. These results are robust to several different indices of infrastructure needs of the industries. Thus after controlling for many other characteristics, including the average size of enterprises in industries and the initial size of the industry, we still find that the labor-intensive industries have experienced smaller growth in value added post-delicensing.

Is There Divergence across Indian States in Industrial Production? And Does Hysteresis Matter?

Next we turn to performance of the industries at the state level. As has been well established elsewhere, the regional income disparities have been increasing in India—the richer states have been growing faster than the poorer states. Here we first see whether the same pattern of regional divergence exists in organized Indian industries as well. Continuing to look at the three-digit ASI industrial data, we estimate the regression equation given by Equation 4:

$$\begin{aligned} Y_{ist} = {} & \sum \alpha_{is}\, d_{is} + \sum \beta_{st}\, d_{st} + \sum \theta_i\, \text{Trend}_i + \Upsilon\, (\text{delicensing}_{it}) \\ & + \delta\, (\text{initial share of state } s \text{ in industry } I * \text{delicensing}_{it}) \\ & + \pi\, (\text{initial per capita income of state } s \text{/or initial per} \\ & \text{capita income originating in the industrial sector in} \\ & \text{state } s) * \text{delicensing}_{it} + \varepsilon_{ist} \end{aligned} \tag{4}$$

In Equation 4 we include states' share in each industry at the beginning of the period as a proxy for the inherent comparative advantage of the state in a particular industry given factor endowments and either per capita state domestic product or per capita income in the industrial sector, both interacted with delicensing.

We find that states with higher initial per capita income or higher per capita income originating in the industrial sector have experienced faster growth in industrial value added post-delicensing (table 2). Thus the divergence in industrial production has increased post-delicensing. One apparently anomalous result is that the states with higher shares of particular industries pre-delicensing experienced slower growth in those industries. At

TABLE 2. Divergence across States in Industrial Production

	I	*II*	*III*	*IV*	*V*
	Dependent variable: Log real value added				
Delicense	0.09*	–0.01	–0.016	0.11**	–0.01
	[1.86]	[0.23]	[0.35]	[2.32]	[0.11]
Share S, I in 1980* delicense	–0.015***	–0.016***	–0.016***	–0.004	–0.01
	[3.40]	[3.43]	[3.44]	[1.14]	[1.44]
Initial PCY in state *s** delicense		0.016**			0.02***
		[2.38]			[2.79]
Initial industrial output per capita in state *s** delicense			0.01**		
			[2.54]		
Initial output share* income level* delicense				–0.02***	–0.02***
(income level: 2=lowest;				[4.02]	[4.07]
1=medium, 0=highest)					
State–industry fixed effects	Yes	Yes	Yes	Yes	Yes
State–year fixed effects	Yes	Yes	Yes	Yes	Yes
Industry–year fixed effects	No	No	No	No	No
Industry trends	Yes	Yes	Yes	Yes	Yes
Observations	13,257	13,257	13,257	13,257	13,257
R-squared	0.87	0.87	0.87	0.87	0.87

Source: Computed by the authors.

Note: Robust t statistics are given in brackets. *Significant at 10 percent; **significant at 5 percent; ***significant at 1 percent. Standard errors are clustered by State–Industry pairs in all specifications.

first blush, this result seems to convey that the diversification in industrial structure across states has increased. But when we dig deeper, it turns out to be primarily because industrial production growth has been slower in the poorer states even in industries in which these states had a higher initial share (perhaps because of comparative advantage, for instance, Bihar in extractive industries; or because of the presence of public sector units). This is captured by the interaction term between the initial share of each state in particular industries and the income group that the state belongs to (we divide states into three groups based on their per capita income).

The variable income level takes three different values. It takes a value 2 if the state belongs to the lowest per capita income level, 1 if it has the medium per capita income level, and 0 if it belongs to the highest per capita income level. The coefficient of this variable is negative and significant, and when we include it, the coefficient for the initial share of states in industries becomes insignificant. This interpretation would then point to increasing divergence at the aggregate level as well as at the specific industries level. Post-delicensing, richer states have experienced higher industrial growth and the growth has been higher in richer states even in industries in which they had a small share in 1980.

Does Hysteresis (Path Dependence) Matter?

Although not systematically documented, one explanation for the slow response of Indian industries to reforms has been an appeal to hysteresis. The argument is as follows. Post-Independence, Indian states inherited an industrial structure that was primarily determined by the government, either through setting up of state enterprises or through encouragement of particular industries in particular states. The earlier set of interventions and policies ended with the policy reforms undertaken since the mid-1980s. Yet, the industry-specific capabilities that they created have persisted so that states have not been able to break away from earlier industrial patterns by either entering new industries or exiting old ones.

In our results in table 2, a positive and significant coefficient on the initial share of state *s* in industry *i* would have implied hysteresis. But this coefficient is either negative and significant, or insignificant. In either case, it does not seem to be the case that industrial growth is determined by inherited capabilities.

Does Infrastructure and Financial Development Matter for Benefits from Liberalization?

In table 3, we include indicators of infrastructure availability at the state level in the regression specification given by Equation 3, where other controls are the same as before, that is, per capita income and initial share of state *s* in industry *i*, both interacted with delicensing. We include several different indicators of infrastructure and use data from many different sources. These include indicators of physical infrastructure, overall infrastructure and human capital, and financial development. These measures are highly correlated with each other (table A-3 in appendix 5) as well as with per capita income. Hence, when we include more than one indicator of infrastructure these are individually not significant (due to lack of space we do not report all the results here). In order to avoid reverse causality we include the availability of infrastructure at the beginning of the period. Besides, at least for some of the indicators of financial development, we use variables such as number of scheduled bank branches per capita and credit by nationalized banks, the concern of reverse causality is less serious. In the Indian banking sector, which is largely publicly owned, these variables are determined more by the objectives of social equity rather than expected economic performance of states (Burgess and Pande, 2005).

In different columns in table 3, we include indicators of physical infrastructure, such as the composite indices for physical infrastructure

TABLE 3. Infrastructure and Payoffs from Delicensing

	I	*II*	*III*	*IV*	*V*	*VI*	*VII*
	Dependent variable: Log real value added						
Delicense	−0.01	−0.01	−0.01	−0.01	−0.01	−0.01	−0.01
	[0.13]	[0.16]	[0.11]	[0.19]	[0.13]	[0.14]	[0.13]
Share S, I in 1980* delicense	−0.02***	−0.02***	−0.02***	−0.02***	−0.02***	−0.02***	−0.02***
	[3.50]	[3.44]	[3.58]	[3.52]	[3.66]	[3.55]	[3.70]
Initial PCY in state s* delicense	0.013*	−0.24*	−0.11*	−0.018	−0.18**	−0.02	−0.11**
	[1.95]	[1.95]	[1.96]	[0.81]	[2.00]	[1.10]	[2.08]
Physical infrastructure* delicense	0.12**						
	[2.25]						
Roads* delicense		0.32**					
		[2.09]					
Electricity* delicense			0.22**				
			[2.26]				
Literacy* delicense				0.006*			
				[1.66]			
Credit by scheduled banks* delicense					0.25**		
					[2.19]		
Branches* delicense						0.008**	
						[2.03]	
Credit by national banks* delicense							0.25**
							[2.40]
State–Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State–Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry–Year FE	No	No	No	No	No	No	No
Industry trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,257	13,257	13,257	13,257	13,257	13,257	13,257
Number of state–industry	579	579	579	579	579	579	579
R-squared	0.87	0.87	0.87	0.87	0.87	0.87	0.87

Source: Computed by the authors.

Note: Robust t statistics are given in brackets. *Significant at 10 percent; **significant at 5 percent; ***significant at 1 percent. Standard errors are clustered by state–industry pairs in all specifications.

constructed by Kumar (2002), as well as indices for more specific aspects of infrastructure, including roads and electricity generation. We include literacy rate as an indicator of human capital. For indicators pertaining to the financial sector, we use the data put together by Purfield (2006), and include indicators of credit per capita by scheduled banks, number of branches per capita, and credit per capita by nationalized banks.

The results indicate that infrastructure does matter for the payoffs from reforms. Although since the alternative series are correlated highly, it is difficult for us to say what kind of infrastructure is more important for industrial growth. Moreover, there seems to be variation independent of per capita income because when we include the indicators of infrastructure with per capita income (both interacted with delicensing) the infrastructure variable remains significant, and with several of these infrastructural variables, the per capita income variable becomes either insignificant or negative and significant. This result could be interpreted to imply that infrastructure availability might be one factor behind increasing regional divergence.[20]

Does Regulatory Framework across States Matter for Growth?

In order to assess the impact of regulatory burden on growth we include indexes pertaining to labor market regulations (LMR) and product market regulations (PMR), either one-at-a-time or together in the regression specification given by Equation 3. As explained in appendix 5, both regulatory variables can take three values. In the case of labor regulations, the index takes a value of 1 if regulations are pro-employer, 0 if they are neutral, and –1 if they are pro-worker. Similarly, the product market regulation index takes a value of 1 if regulations are supportive of competition, 0 if they are neutral, and –1 if they impede competition.

The results described in table 4 show that states did not experience differential growth in production post-delicensing based on their labor regulations (we revisit this result shortly). States with a more liberal business environment, however, experienced faster growth post-delicensing. The product market regulation variable can also be interpreted as a measure of the willingness of states to carry out product market reforms initiated at the Center. Hence, states with a higher score on product market regulations may

20. As is evident from the regressions results, the R^2s are quite high and do not seem to vary across different specifications. The reason is of course that the fixed effects explain a great deal of variation in the data, and as compared to fixed effects, the individual regressors add little to R^2. As is customary, in order to gauge the appropriateness of individual regressors, we look at the significance of each individual variable rather than R^2.

TABLE 4. Does the Regulatory Framework across States Matter for Growth?

	I	*II*	*III*	*IV*	*V*	*VI*	*VII*
	Dependent variable: Log real value added						
Delicense	−0.01	−0.01	−0.01	−0.01	−0.01	−0.01	−0.01
	[0.23]	[0.16]	[0.15]	[0.14]	[0.13]	[0.13]	[0.15]
Share S, I in 1980* delicense	−0.02***	−0.02***	−0.02***	−0.02***	−0.02***	−0.02***	−0.02***
	[3.38]	[3.56]	[3.55]	[3.65]	[3.48]	[3.42]	[3.65]
Initial PCY, State s* delicense	0.02**	0.02**	0.02**	−0.11**	0.01*	0.01*	−0.15
	[2.23]	[2.38]	[2.35]	[2.06]	[1.88]	[1.92]	[1.49]
LMR* delicense	0.01		−0.03	0.02	−0.01	−0.01	0.04
	[0.09]		[0.33]	[0.26]	[0.10]	[0.18]	[0.50]
PMR* delicense		0.11*	0.12*			0.03	−0.06
		[1.69]	[1.85]			[0.31]	[0.50]
Bank credit* delicense				0.25**			0.33*
				[2.39]			[1.66]
Infrastructure*					0.12**	0.10	
Delicense					[2.30]	[1.31]	
State–Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State–Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry–Year FE	No	No	No	No	No	No	No
Industry trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,257	13,257	13,257	13,257	13,257	13,257	13,257
Number of state-industry	579	579	579	579	579	579	579
R-squared	0.87	0.87	0.87	0.87	0.87	0.87	0.87

Source: Computed by the authors.

Note: Robust t statistics are given in brackets. *Significant at 10 percent; **significant at 5 percent; ***significant at 1 percent. Standard errors are clustered by state–industry pairs in all specifications.

well be the ones where delicensing, which was a reform measure passed by the Center, was implemented either more effectively or earlier as compared to other states. Interpreted this way, the results indicate that the benefits from liberalization accrued to the states if their willingness to reform matched those of the Center. In column III we include labor regulations and product market regulations simultaneously in the regression; indicators of infrastructure with regulatory variables are included in columns IV–VII. Results on labor regulations do not change, and since product market regulations and infrastructure are correlated strongly (table A-3 in appendix 5), when we include them together their individual coefficients are smaller and less significant.

Next, we explore the possibility that delicensing affected labor intensive and capital-intensive industries differently across states with different labor regulations. Thus we include the following two variables in our base specification: (*a*) a dummy for labor-intensive industries interacted with delicensing and (*b*) a three-way interaction among labor intensity of industries, labor market regulation, and delicensing.

Results indicate that while labor-intensive industries grew less post-delicensing and states with different labor regulations do not show any specific patterns post-delicensing, labor-intensive industries have performed particularly worse in states with pro-labor regulations. Thus it seems that the pro-labor regulations hurt where it matters the most—industries that employ more labor. In various columns in table 5, we check the robustness of this key result by changing the sample and by including other controls in the regressions. Thus in column II, we only look at the states where the labor market regulations are either considered to be pro-labor or pro-business, and drop the states with neutral labor regulations. In column III we drop tobacco, and petroleum industries, and in columns IV–VI we respectively include product market regulations, infrastructure, and financial sector variables, interacted with delicensing.[21]

The results are robust as the coefficient and significance of our key variable of interest does not change.

One concern remains and this is that our results might be driven by omitted variables. There can be two kinds of omitted variables—those related to states and those related to industries. For example, there could be another set of industries, correlated with labor intensity, which has performed poorly in states

21. Other robustness tests conducted but not shown here include clustering by state–delicense; and by including the full set of fixed effects: state–industry, industry–year, and state–year instead of other control variables that vary along these dimensions alone. Results are found to be robust.

TABLE 5. Labor Market Regulations and Labor-intensive Industries

	I	*II*	*III*	*IV*	*V*	*VI*
	Dependent variable: Log real value added					
Delicense	−0.01	−0.06	−0.02	0.00	0.00	0.00
	[0.11]	[0.94]	[0.38]	[0.04]	[0.02]	[0.03]
Share S, I in 1980* delicense	−0.02***	−0.01**	−0.02***	−0.02***	−0.02***	−0.02***
	[3.30]	[2.21]	[3.53]	[3.46]	[3.40]	[3.57]
Initial PCY in state s* delicense	0.02***	0.02*	0.03***	0.02***	0.02***	−0.10*
	[2.97]	[1.94]	[3.58]	[3.07]	[2.64]	[1.88]
Labor intensive industry* delicense	−0.18**	−0.21**	−0.20***	−0.18**	−0.18**	−0.18**
	[2.57]	[2.27]	[2.79]	[2.54]	[2.54]	[2.55]
LMR* delicense	−0.07	−0.05	−0.04	−0.10	−0.08	−0.05
	[0.74]	[0.50]	[0.48]	[1.13]	[0.93]	[0.57]
LMR* labor intensive* delicense	0.16*	0.16*	0.15*	0.15*	0.16*	0.15*
	[1.77]	[1.71]	[1.69]	[1.75]	[1.77]	[1.75]
PMR* delicense				0.12*		
				[1.81]		
Infrastructure* delicense					0.12**	
					[2.28]	
Bank credit* delicense						0.25**
						[2.38]
State–Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
State–Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry–Year FE	No	No	No	No	No	No
Industry trends	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,257	7,540	12,728	13,257	13,257	13,257
Number of state–industry	579	322	550	579	579	579
R-squared	0.87	0.87	0.88	0.87	0.87	0.87

Source: Computed by the authors.

Note: Robust t statistics are given in brackets. *Significant at 10 percent; **significant at 5 percent; ***significant at 1 percent. Standard errors are clustered by state–industry pairs in all specifications.

with inflexible labor regulations post-delicensing and our interaction term involving labor regulations, labor-intensive industries, and delicense could be picking up the effect on value added due to these industries. Similarly, there could be another state characteristic correlated with labor regulations that is associated with poor performance of labor-intensive industries post-delicensing. However, we think that omitted variables are not a problem for our results since labor intensity is not correlated with most other industry characteristics and labor regulation is not correlated with other state features that we have considered in the paper. Nevertheless, we conduct robustness tests where starting with our base specification in column I in table 6, we include other industry characteristics and other state characteristics.

In column II we report the results where along with labor intensity we include the infrastructure variable. Results for variables involving labor regulations and labor intensity of industries are unchanged. In the second robustness test we include per capita income interacted with delicensing and interacted with labor regulations and delicensing. Again, the results on variables involving labor regulations and labor intensity are preserved and are somewhat stronger. We also include variables pertaining to infrastructure and the financial sector in a similar fashion and find the results to be robust (these are not shown here for brevity). In the last two columns we experiment with different samples for the specification in column II—in column IV we drop states with neutral labor regulations and in the last column we drop petroleum and tobacco industries. We also estimate kitchen sink regressions with indicators of financial sector development and physical infrastructure variables thrown into the base specification in Tables 4 and 5. The results mostly show that the individual state level variables have insignificant coefficients (perhaps because of multicollinearity). In some specifications, indicators of physical infrastructure are found to be positive and significant.

Among other robustness tests that we conducted (the results are not reported here but are available upon request), we included the skill-intensive industries interacted with delicensing in our regressions to see whether the relatively worse performance of the labor-intensive industries, that is, the relatively better performance of the capital-intensive industries, is driven by the fact that the latter might be skill intensive, which, as has often been pointed out in the literature, have done better because of the capacities that India generated early on in the post-Independence period. This does not seem to be the case though. If it was, then the coefficient of labor-intensive industries would be insignificant once we included skill intensity in the regressions.

TABLE 6. Labor Market Regulations and Labor-intensive Industries, Robustness

	I	*II*	*III*	*IV*	*V*
	Dependent variable: Log real value added				
Delicense	–0.01	0.00	0.00	–0.06	–0.01
	[0.11]	[0.08]	[0.02]	[0.92]	[0.29]
Share S, I in 1980* delicense	–0.015***	–0.015***	–0.016***	–0.012**	–0.018***
	[3.30]	[3.26]	[3.49]	[2.36]	[3.75]
Initial PCY in state s* delicense	0.024***	0.03***	0.02***	0.02**	0.03***
	[2.97]	[3.40]	[2.98]	[1.99]	[3.59]
Labor intensive Industry* delicense	–0.18**	–0.19***	–5.9***	–6.82	–5.7***
	[2.57]	[2.73]	[2.85]	[1.55]	[2.74]
LMR* delicense	–0.07	0.07	–0.07	–0.05	–0.04
	[0.74]	[0.74]	[0.77]	[0.54]	[0.49]
LMR*labor intensive* delicense	0.16*	0.15*	0.22**	0.22*	0.21**
	[1.77]	[1.71]	[2.34]	[1.95]	[2.22]
Infrastructure industry* delicense		–0.12*			
		[1.71]			
LMR* infrastructure industry* delicense		–0.22***			
		[2.82]			
PCY* labor intensity* delicense			0.67***	0.77	0.64***
			[2.77]	[1.51]	[2.65]
State–Industry FE	Yes	Yes	Yes	Yes	Yes
State–Year FE	Yes	Yes	Yes	Yes	Yes
Industry–Year FE	No	No	No	No	No
Industry trends	Yes	Yes	Yes	Yes	Yes
Observations	13,257	13,257	13,257	7,540	12,728
Number of state–industry	579	579	579	322	550
R-squared	0.87	0.87	0.87	0.87	0.88

Source: Computed by the authors.

Note: Robust t statistics are given in brackets. *Significant at 10 percent; **significant at 5 percent; ***significant at 1 percent. Standard errors are clustered by state–industry pairs in all specifications.

Instead, results show that even after controlling for skill intensity all the key results on labor-intensive industries hold.

Another test that we perform is to look at the value of output rather than value added as the dependent variable. The rationale is that if labor-intensive industries are outsourcing more of their activities in recent years, especially post-delicensing (perhaps because it is easier to do so technologically), then one would see these industries growing less in terms of value added. According to this argument, if we appropriately account for outsourcing, then the performance of labor-intensive industries would be similar to other industries. Our results using the value of output as a dependent variable are similar to those using value added. Thus, the outsourcing argument is not valid.

Looking at the role of labor regulations in determining the payoffs from reforms we consider another key variable where labor regulations are supposed to be making the biggest dent—employment (table 7). For employment, we use a slightly different specification: since employment can be expected to move closely with production, in order to examine movements in employment that are independent of changes in production, we include gross value added in the regressions. Results show that post-delicensing employment generation has been higher in the states with flexible labor regulations.

We include several other state characteristics in columns II–IV, to see whether these are associated with similar patterns in employment, but unlike the case of value added, we do not find state-level product market regulations and infrastructure and financial development variables to be associated with any specific patterns in employment gains stemming from delicensing. Interestingly, also unlike the case of value added, the effect on employment does not seem to differ across labor-intensive and capital-intensive industries, as may be seen in the last column of the table.

Conclusion

In this paper we analyze the effects of the reforms that liberalized India's industrial licensing regime, on the performance of registered manufacturing, using ASI data at the three-digit level for major Indian states, for 1980–2004. Following the existing literature, we use the date of delicensing, a policy whose timing varied across industries, but was national in scope, as our measure of policy reform. We highlight the heterogeneity in industrial performance across Indian states as well across industries. In particular, we

TABLE 7. Labor Market Regulations and Employment

	I	*II*	*III*	*IV*	*V*
	Dependent variable: Log employment				
Delicense	–0.03	–0.03	–0.03	–0.03	–0.03
	[1.30]	[1.26]	[1.25]	[1.27]	[1.25]
Share state in industry in 1980* delicense	0.00	0.00	0.00	0.00	0.00
	[0.19]	[0.33]	[0.24]	[0.31]	[0.18]
Initial PCY in state s* delicense	0.00	0.00	0.00	–0.01	0.01
	[1.16]	[1.20]	[1.01]	[0.62]	[1.54]
Gross value added (log)	0.45***	0.45***	0.45***	0.45***	0.45***
	[29.9]	[29.9]	[29.9]	[29.9]	[29.8]
LMR* delicense	0.09**	0.08**	0.08**	0.09**	0.08**
	[2.45]	[2.26]	[2.34]	[2.50]	[2.26]
PMR* delicense		0.03			
		[1.02]			
Physical infrastructure* delicense			0.02		
			[1.22]		
Bank Credit* delicense				0.03	
				[0.78]	
Labor-intensive industry* delicense					–0.04
					[1.18]
LMR* Labor-intensive industry*delicense					0.01
					[0.22]
State–Industry FE	Yes	Yes	Yes	Yes	Yes
State–Year FE	Yes	Yes	Yes	Yes	Yes
Industry–Year FE	No	No	No	No	No
Industry trends	Yes	Yes	Yes	Yes	Yes
Observations	13,257	13,257	13,257	13,257	13,257
Number of state–industry	579	579	579	579	579
R-squared	0.92	0.92	0.92	0.92	0.92

Source: Source: Computed by the authors.

Note: Robust *t* statistics are given in brackets. *Significant at 10 percent; **significant at 5 percent; ***significant at 1 percent. Standard errors are clustered by state–industry pairs in all specifications.

find that the impact of delicensing has been highly uneven across industries. Industries that are labor intensive, use unskilled labor, or depend on infrastructure or are energy dependent), have experienced smaller gains from reforms. We also find that the regulations at the state level matter. States with less competitive product market regulations have experienced slower growth in the industrial sector post-delicensing, as compared to states with competitive product market regulations. States with relatively inflexible labor regulations have experienced slower growth of labor-intensive industries and slower employment growth. Infrastructure availability and financial sector development are found to be important in determining the benefits that accrued to states from reforms.

The results imply that though important steps have been taken by liberalizing several specific policies to promote industrial growth in India, the task is not complete yet. These policy reforms have yielded gains that have been uneven geographically and modest overall. The relative magnitude of gains across states has depended on the availability of infrastructure, regulations governing the use of labor, and overall regulatory burden. In order to achieve favorable results at a wider level the reforms need to be carried forward. In particular, promoting the growth of labor-intensive industries and employment will require some rationalization of labor regulations governing industrial workers. In addition, in a federal democracy like India, reforms at the Center need to be complemented by reforms at the state level. Finally, provision of better infrastructure, both physical and financial is critical for faster industrial growth.

APPENDICES

Appendix 1: Data Sources

The primary data used in this paper comes from the Annual Survey of Industries (ASI) for 1980–81 to 2004–05. The ASI is the principal source of industrial statistics in India and it is undertaken by the Ministry of Statistics and Programme Implementation, Government of India. Aggregated tables at the all-India and the state level based on three-digit National Industrial Classification for India are used.

There are four different classifications (NIC 1980, NIC 1987, NIC 1998, NIC 2004) in use over this 25-year period. The first step in developing comparable data over time was to prepare a concordance matching industries across the four different classifications. The concordance exercise leaves us with forty-nine industries. This is a unique database on industrial statistics in India in terms of its coverage at the state–industry level and the time length. Data seems good and comparable pre- and post-1998, when there was a change in the sampling framework.

The following industries were excluded from the analysis: dressing and dyeing of fur, saw milling, publishing, processing of nuclear fuels, and reproduction of recorded media. In addition, following Aghion et al. (2008) we dropped "other manufacturing" (NIC-98 code 369) as this industry category is a grouping of different activities, and the activities are likely to vary from one state to the other rendering this industry category incomparable across states. For the purposes of this paper, since we are working with aggregated data, the sampling unit is the state–industry pair and the data are representative at that level. We observe repeated entry and exit of various state–industry pairs in the data. To minimize the role played by these observations, we further restrict the data following Aghion et al. We use only state–industry pairs with at least 10 years of data, and further, use only those industries that exist in at least eight states in each year. We further restrict ourselves to "major" Indian states only. The list of states included in the analysis is Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal. The remaining states/union territories either have poor time-series data, or have very few industries, or their share in manufacturing Gross Value Added (GVA) is less than 1 percent. Newly formed states of Chhattisgarh, Jharkhand, and Uttarakhand were added to the respective states they were carved out from to create old states of Madhya Pradesh, Bihar, and Uttar Pradesh respectively and make the data comparable over time. The state characteristics of the original states in these cases have been used as if they would apply to the old state.

The ASI frame is based on the list of registered factories/units maintained by the Chief Inspector of Factories in each state/union territory. Factory is the primary unit of enumeration in the survey for the case of manufacturing industries, defined as the unit that is registered under sections 2m (i) and 2m (ii) of the Factories Act, 1948, that is, premises whereon 10 or more workers work with the aid of power or twenty or more workers without the aid of power.

Variables

Value added: Increment to the value of goods and services that is contributed by the factory.

Total employment: Includes all blue collar workers and persons receiving wages and holding clerical, supervisory, or managerial positions or engaged in the administrative office, store-keeping section, or the welfare section, sales department, and so on.

Delicense: Dummy that takes a value 1 from when an industry was delicensed.

Share of industry *i* in value added (VA) in 1980: Share of each industry in total industrial value added in 1980.

Size (log of fixed capital): Average fixed capital per factory in each industry in 1980.

Labor-intensive industry: Dummy that equals 1 when the industry has labor intensity above the median for industries.

L**o**w-Skill labor intensive: Dummy that takes a value 1 if the share of compensation to low-skilled workers in total value added exceeds the median for industries in 1980.

Infrastructure-intensive industry: Dummy that takes a value 1 if the share of expenditure on fuel and distribution is above the median for industries.

Share S, I in 1980: Share of state *s*, in industry *i's* value added in 1980.

Initial per capita income (PCY) in state *s*: State domestic product per capita in each state in 1980.

Initial industrial output per capita in state *s*: Industrial value added per capita in each state in 1980.

Income level: Takes a value 2 if the state belongs to the bottom one-third of the states on the basis of per capita income in 1980, 1 if the state belongs to middle one-third of states, and 0 if the state belongs to the top one-third of the states.

Physical infrastructure: Index of physical infrastructure at the state level in 1980 from Kumar (2002).

Roads: Log length of roads per capita (or per sq km) in each state in 1980.

Electricity: Log electricity generated per capita in each state in 1980.

Literacy: Literacy rate in 1980.

Credit by scheduled banks: Log credit per capita in each state by scheduled banks in 1980.

Branches: Bank branches per capita in 1990 in each state.

Credit by national banks: Log credit per capita in each state by nationalized banks in 1980.

Labor market regulations (LMR): Takes three values: +1 if the state is considered to have pro-business labor regulations, –1 if the state is deemed to have pro-labor regulations, and 0 if it has neutral regulations.

Product market regulations (PMR): Takes three values: +1 if the state has competitive regulations, –1 if the state has cumbersome regulations, and 0 if the state has neutral product market regulations.

Appendix 2: Delicensing

Year of delicensing	*Industry code*	*Description*
1985	151, 191, 210, 252, 261, 281, 300, 311, 319, 321, 322, 331, 341	Meat, fish, fruit, vegetables etc.; leather; paper; plastic products; glass; metal products; office/computing machinery; electric motors; other electric equipment; electronic components; television; radio transmitters; medical appliances and motor vehicle.
1989	251	Rubber products
1991	152, 153, 154, 155, 171, 172, 173, 181, 182, 192, 202, 221, 222, 233, 241, 269, 271, 272, 289, 313, 314, 332, 333, 351, 352, 359, 361, 369	Dairy products; grain mill products; other food products; beverages; spinning, weaving; other textiles; knitted fabrics; weaving apparel; articles of fur; footwear; wood products; publishing; printing; processing of nuclear fuels; basic chemicals; non-metallic; iron and steel; basic precious/non-ferrous metals; fabricated metal products; insulated wire and cable; accumulators, cells/batteries; optical and photographic equipment; watches; ships and boats; railway locomotives; transport equipment not elsewhere classified (nec); furniture; and manufacturing nec.
1993	293	Domestic appliances
1997	201, 223, 232	Saw milling; recorded media; and refined petroleum products.

Source: We update the data provided in Aghion et al. (2006) and map according to our three-digit classification, in Gupta et al. (2008).

Appendix 3: Industry Characteristics

Labor intensity: Defined as an index of the ratio of employment to real invested capital using the all-India ASI data averaged over the years 1980–84. Real invested capital is calculated by deflating nominal values of invested capital by the wholesale price index for the industry "other electrical equipment" (NIC industry 319).

Infrastructure dependence (distribution intensity): Calculated as the ratio of distribution and power and fuel expenses to gross value added using the Prowess data (ratio of distribution expenses to gross value added). It is the average of the ratio over the period 1994–98.

Energy dependence: Calculated as the ratio of power and fuel expenses to gross value added using the ASI data, averaged for 1980–84. Another series was calculated using the data for the US using the EU KLEMS database.

Unskilled labor intensity: Calculated as the share of labor compensation to low-skilled workers in gross value added for USA using the data from EU KLEMS.

TABLE A-1. Correlations between Different Industry Characteristics

	Labor intensity	*Low skilled labor*	*Infra-structure intensive*	*Fuel intensity*	*Distribution intensity*	*Energy dependence (ASI)*	*Energy intensive, US (EU KLEMS)*
Low-skilled labor	0.08	1					
Infrastructure intensive	–0.13	0.17	1				
Fuel intensity	–0.11	0.14	0.95***	1			
Distribution intensity	–0.13	0.15	0.60***	0.31**	1		
Energy dependence	–0.22	0.14	0.73***	0.76***	0.24	1	
Energy dependence—US	–0.31**	–0.12	0.31***	0.21	0.35***	0.45***	1
Exporting industries	0.18	0.29***	–0.15	–0.22	0.14	–0.20	–0.18

Source: Authors' own calculations.

Note: *, **, and ***indicate that the correlation coefficients are significant at 10, 5, and 1 percent levels of significance respectively.

Table A-1 shows that the correlation of similar industry characteristics calculated using different sources is high; correlation across different characteristics is not high. For each of these series, we have data from various points in time. The values of these series are highly correlated over time.

This reinforces the point that the relative input usage across industries reflects the technical requirements of various industries and is thus unlikely to change much over time or across countries.

Appendix 4: Infrastructure Indices for States

Various researchers have developed infrastructure indices at the state level that aggregate information on different kinds of infrastructure into one indicator. We use the infrastructure index developed by Ghosh and De, 2004 and Kumar, 2002. Both studies construct different sub-components of infrastructure, that is, physical infrastructure development index, social infrastructure development index, and financial infrastructure development index for the major Indian states and at different points in time. Kumar also constructs an overall infrastructure development index.

TABLE A-1. Infrastructure Indices: Variables and Sources

	Ghosh and De, 2004 (GD)	*Kumar, 2002 (TRK)*
Physical infrastructure development index	Transport facilities, irrigated area, consumption of electricity, telephone mainline.	Villages electrified, electricity consumption, railways and surfaced roads, post offices, telecommunication, irrigation extent.
Social infrastructure development index	Literacy rate, infant mortality rate, people living in *pucca* (concrete structure) houses.	Population with primary education, literacy rate, educational institutions, public health institutions, registered doctors per capita.
Financial infrastructure development index	Credit/deposit ratio in nationalized banks, the state's own tax effort (tax revenue/NSDP), and number of post offices per 10,000 population.	Bank offices per unit area, per capita bank deposits, per capita bank credit.
Overall infrastructure development index	Not constructed.	Village electrified, railways, and surfaced roads, post offices, irrigation extent, educational institutions, public health institutions, bank offices.

In a background paper for the Eleventh Finance Commission, Anant et al. (1999) also develop an infrastructure index at the state level. The different infrastructure series are correlated highly across different sources as well as across different points in time.

Appendix 5: Labor Market and Product Market Regulations

As noted in the text, India's Constitution gives its states control over various areas of regulation. In these areas, states have the authority to enact their own laws and amend legislations passed by the Center. Typically, states also have the authority to decide on the specific administrative rules and procedures for enforcing legislations passed by the Center (Conway and Herd, 2008). Labor market regulations and product market regulations are two areas in which states have such control over regulation and enforcement. Accordingly, various studies have attempted to codify state-level differences in regulation.

In what follows, we describe these studies' approach for characterizing states' stance on labor regulations and product market regulations. We also describe our attempt at combining the information from different studies, reconciling major differences when they come up, and coming up with a composite classification of regulatory regimes at the state level.

Labor Market Regulations

Besley and Burgess (2004): Besley and Burgess work with state-level amendments to the Industrial Disputes Act (IDA) between 1958 and 1992.[1, 2] Each amendment is coded as a 1, –1, or 0 depending on whether the amendment in question is deemed to be pro-worker, pro-employer, or neutral. The scores are then cumulated over time with any multiple amendments for a given year coded to give the general direction of change.

Since the actual time-series variation in the cumulated amendments within states is quite limited for the period we are interested in (1980 and beyond), we compute the average value for each state over 1980–97. These averages range from a high of 3.17 in West Bengal to a low of –2.28 in

1. The IDA lays down procedures for settlement of disputes as well as the conditions under which layoffs, retrenchment, and closure of an establishment can take place and the appropriate level of compensation in each case. The IDA also prescribes the terms under which employers may change the "conditions of service" of workers.

2. Given very limited amendment activity in the 1990s and beyond, the original Besley and Burgess coding can be treated as applicable up to the present period considered in this paper. As noted in OECD (2007), only eight amendments have been recorded since 1990. All of these can be accounted by three states. Most importantly, only one amendment—passed in 2004—appears "to be of any consequence to labor market outcomes" (OECD 2007).

Andhra Pradesh. Next, we use the following rule to assign to each state a particular stance on labor regulations: pro-worker (or inflexible), neutral, pro-employer (or flexible). States with an average greater (less) than zero are deemed to have inflexible (flexible) labor regulations; states with an average of zero are treated as having a neutral stance on labor regulations. Thus, for example, Andhra Pradesh would be classified as having flexible labor regulations while West Bengal would be classified as having inflexible labor regulations.

We make two important changes to the original coding. Gujarat has been designated as pro-worker by Besley and Burgess. As noted by Bhattacharjea (2006), this is on account of a "solitary amendment passed in 1973, allowing for a penalty of 50 rupees a day on employers for not nominating representatives to firm-level joint management councils." Given the fairly inconsequential nature of this amendment, we modify Besley and Burgess' coding of labor regulations in Gujarat as neutral. Similarly, in the case of Madhya Pradesh, the average of the Besley and Burgess cumulative amendments is very mildly negative over 1980–97. Since it is so close to zero, we treat it as effectively zero, or in other words, neutral. This is exactly how the state tends to appear based on a majority of the other studies. Column 1 of appendix table A-1 describes our final coding of states' stance on labor regulations based on Besley and Burgess' cumulative amendments data and the changes described above.

Bhattacharjea (2008): Bhattacharjea focuses his attention on characterizing state-level differences in Chapter VB of the IDA (which relates to the requirement for firms to seek government permission for layoffs, retrenchments, and closures). In a fairly radical departure from the work of Besley and Burgess, Bhattacharjea considers not only the content of legislative amendments but also the judicial interpretations to Chapter VB in assessing the stance of states vis-à-vis labor regulation. Moreover, Bhattacharjea carries out his own assessment of legislative amendments as opposed to relying on that of Besley and Burgess.[3] He considers two types of regulatory changes—those pertaining to the employment threshold beyond which permission for retrenchments, layoffs, or closures is required; and those to the requirement

3. Bhattacharjea (2006) argues that Besley and Burgess' coding of state-level amendments to the IDA as pro-worker, neutral, or pro-employer were flawed on several accounts, including misinterpretation of various amendments, assignment of identical scores to both minor procedural amendments as well as major changes in job security norms, and the use of a "misleading" cumulation of coded amendments over time.

of obtaining permission—for example, whether permission is needed for closure or for both closure and retrenchment.

Bhattacharjea's detailed account of legislative and judicial interventions affecting Chapter VB enables him to identify points at which one or more states has diverged from the rest of the country. Based on this account, the following characterization appears to emerge. Insofar as the employment threshold is concerned, West Bengal has the most pro-worker regime (a threshold of 50 workers since 1980) while UP has the most pro-employer regime (a threshold of 300 applies throughout the period under consideration). Maharashtra emerges as more pro-worker than the average state because of the lower threshold of 100 introduced in 1982 instead of 1984 as in most other states. Orissa emerges as slightly more pro-worker than the average state on similar grounds.

We accordingly classify Uttar Pradesh as having a flexible regime and West Bengal, Maharashtra, and Orissa as having an inflexible regime vis-à-vis the employment threshold. Admittedly, it may seem rather strong to treat Maharashtra and Orissa as inflexible on account of employment thresholds on the basis of two years (1982 and 1983). But the fact that a certain state passes a legislative amendment or judicial interpretation one way or the other probably suggests something meaningful about a state's stance on labor regulation over a non-trivial period of time.

States have also differed in terms of the requirement for government permission for retrenchments and closures. Maharashtra and Orissa emerge as having required permission on more counts than the typical state at various points of time in the early 1980s (two years for Maharashtra and one year for Orissa). We classify both states as inflexible insofar as the requirement for permission is concerned. Karnataka, Uttar Pradesh, West Bengal, and Tamil Nadu emerge as having had less stringent requirements on permission than the typical state over various years (3, 13, 11, and 3 years respectively, between the mid-1980s and 2001). We classify these four states as flexible.

Columns 2 and 3 of appendix table A-1 describe our coding of states' stance on the need for permission for retrenchments, layoffs, and closures and the threshold employment levels at which permission becomes necessary for retrenchments and/or closures, based on Bhattacharjea (2008). Column 4 describes a composite measure of labor regulations combining the information in columns 2 and 3. This composite measure is constructed as follows. We assign a score of 1 for flexible regulations, 0 for neutral regulations, and –1 for inflexible regulations. We next consider the average across the scores in columns 2 and 3. A positive number is deemed to represent flexible regulations while a negative number represents inflexible regulations.

OECD (2007): A recent OECD study on state-level labor reforms in India uses a survey to identify the areas in which states have made specific changes to the implementation and administration of labor laws. In particular, the survey scores progress in 21 states in introducing changes in recent years to not only regulations dealing with labor issues, but also to the relevant administrative processes and enforcement machinery. The regulations covered by the state-specific survey go well beyond the IDA and include the Factories Act, the Trade Union Act, and Contract Labour Act among others. Within each major regulatory area, a number of issues are considered. Scores are given on the basis of whether or not a given state has introduced changes. A higher score is given for changes that are deemed to be pro-employer.

The OECD study aggregates the responses on each individual item across the various regulatory and administrative areas into an index that reflects the extent to which procedural changes have reduced transaction costs vis-à-vis labor issues. The reduction in transaction costs can come about for different reasons including reductions in the scope of regulations, removing ambiguities in their application, and simplifying compliance procedures.

Based on the values of the index, we partition the states that are the concern of this paper into three equal groups of five. States with a flexible labor related regime include Andhra Pradesh, Gujarat, Haryana, Rajasthan, and Uttar Pradesh. States with an inflexible labor related regime include Assam, Bihar, Kerala, Maharashtra, and West Bengal. The remaining are treated as having a neutral stance. Column 5 of appendix table A-1 describes our coding of states' stance on labor regulations based on OECD (2007).

A Composite Measure of Labor Regulations across States

As noted in the text, labor market regulations can be notoriously hard to quantify. However, there do seem to be certain patterns that are common across the various studies of state-level labor regulations. This can be seen from a quick look at the various columns of appendix table A-1 where diametrically opposite classifications are unusual and not the norm. We create a composite classification of states' stance on labor regulations by first assigning scores of 1 for flexible regulations, a 0 for neutral regulations, and –1 to inflexible regulations in columns 1, 4, and 5, and then adopting a simple majority rule to decide on the overall composite stance of labor regulations. This composite classification is provided in column 6.

TABLE A-1. Labor Market Regulations (LMR) across States

State	*BB*** *(1)*	*AB** permission* *(2)*	*AB-threshold* *(3)*	*AB-composite* *(4)*	*OECD* *(5)*	*LMR* *(6)*
Andhra Pradesh	Flexible	0	0	0	Flexible	1
Assam	0	0	0	0	Inflexible	0
Bihar	0	0	0	0	Inflexible	0
Gujarat	0*	0	0	0	Flexible	0
Haryana	0	0	0	0	Flexible	0
Karnataka	Flexible	Flexible	0	Flexible	0	1
Kerala	Flexible	0	0	0	Inflexible	0
Madhya Pradesh	0*	0	0	0	0	0
Maharashtra	Inflexible	Inflexible	Inflexible	Inflexible	Inflexible	–1
Orissa	Inflexible	Inflexible	Inflexible	Inflexible	0	–1
Punjab	0	0	0	0	0	0
Rajasthan	Flexible	0	0	0	Flexible	1
Tamil Nadu	Flexible	Flexible	0	Flexible	0	1
Uttar Pradesh	0	Flexible	Flexible	Flexible	Flexible	1
West Bengal	Inflexible	Flexible	Inflexible	0	Inflexible	–1

Notes: *Original coding was changed on the basis of narrative/evidence from other studies. In the last column a 1 refers to flexible, 0 to neutral, and –1 to inflexible labor market regulations.

**BB: Besley and Burgess; AB: Bhattacharjea.

Product Market Regulations

Unlike the case of labor market regulations, studies characterizing product market regulations across Indian states are much fewer. In fact, only one study appears to have dealt with this issue in a systematic manner (OECD, 2007).[4] Below, we describe the measures of product market regulations based on OECD (2007). We also consider another indicator based on the World Bank's investment climate study (ICS) for India (World Bank, 2005).

OECD (2007)

OECD (2007) uses a survey instrument in order to assess the regulatory environment facing businesses across Indian states. The survey collects data from state government officials belonging to various regulatory departments as well as from a law firm on the state-specific requirements for setting up two different types of businesses. The information gathered pertain to two sets of issues: the extent of "state-control" and the "barriers to entrepreneurship." The former covers such issues as public ownership of enterprises, the scope of the public enterprise sector, its size, and the extent of direct control over business enterprises. Barriers to entrepreneurship cover administrative burdens on startups and administrative rules and procedures for obtaining clearances and approvals of various types, among other things. The information collected is used for constructing indicators of product market regulation.

In our analysis, we consider the indicator based on "barriers to entrepreneurship." A higher value on the indicator represents a more restrictive regulatory regime in product markets. Out of the fifteen states we consider, we consider the five states with the highest scores as having a restrictive regulatory climate in product markets. Five states with the low scores are treated as having a competitive regulatory climate. The remaining five are deemed to have a neutral regulatory climate. Column 1 of table A-2 also presents this coding.

Investment Climate Study (World Bank, 2004)

Although, the ICS does not present a ready measure of product market regulations across states, it records the perceptions of managers in Indian manufacturing firms across the major states regarding various aspects of the

4. The OECD study is based on the work of Conway and Herd (2008) and Conway et al., 2008.

TABLE A-2. Product Market Regulations across States

State	*OECD—barriers to entrepreneurship (1)*	*ICS—best votes (2)*	*PMR (3)*
Andhra Pradesh	0	0	0
Assam	Restrictive	Restrictive	–1
Bihar	Restrictive	Restrictive	–1
Gujarat	Restrictive	Competitive	0
Haryana	Competitive	0	1
Karnataka	Competitive	Competitive	1
Kerala	0	0	0
Madhya Pradesh	0	Restrictive	–1
Maharashtra	Competitive	Competitive	1
Orissa	0	Restrictive	–1
Punjab	Competitive	0	1
Rajasthan	Restrictive	Restrictive	–1
Tamil Nadu	Competitive	Competitive	1
Uttar Pradesh	0	0	0
West Bengal	Restrictive	0	–1

Note: In the last column, 1 refers to competitive, 0 to neutral, and –1 to restrictive product market regulations.

"investment climate." A particularly robust question across various rounds of the ICS is one in which firms' managers are asked their opinion on which state, other than that in which they are located, has the "best" investment climate. We assign to each state the percentage of respondents choosing that state as having the best investment climate. States with relatively large (low) proportion of votes for best investment climate are deemed to have competitive (restrictive) product market regulations with those in the middle deemed to have a neutral stance on product market regulations. We considered an assignment whereby we would have an equal number of states in each of the three categories. However, this presented a problem. Andhra Pradesh was the fifth-ranked state from the top; therefore, it should be coded as having competitive product market regulations according to an equal three-way categorization. But the proportion of votes it received was very similar to that of Haryana (the sixth ranked) and quite different from Karnataka (the fourth ranked). Thus we coded Andhra Pradesh as having a neutral stance on product market regulations. Column 2 of table A-2 presents the coding.

A Composite Measure of Product Market Regulations across States

As may be seen, by comparing columns 1 and 2, the classification of states' product market regulations are fairly similar across the OECD and ICS

based measures. In other words, classifications based on a reading of actual regulations are fairly similar to perceptions of managers of manufacturing enterprises. In order to arrive at a composite measure of product market regulations, we assign a score of 1 for competitive regulations, 0 for neutral regulations, and –1 to restrictive regulations. We next consider the average across the scores in columns 1 and 2. A positive number is deemed to represent flexible regulations, while a negative number represents inflexible regulations.

It may be noted that Gujarat is the only state where the OECD and ICS-based measures yield diametrically opposite classifications of product market regulations. As noted in Conway et al. (2008), the low score of this state on the OECD indicators arises from a very large public enterprise sector and relatively high administrative burdens on firms. Why managers' perceptions are very different for this state is unclear. While it could be because of the manner in which regulations are enforced (perhaps in a light manner, as speculated by Conway et al.), managers' perceptions may also be influenced by the quality of public infrastructure.

TABLE A-3. Correlation between Regulatory and Infrastructure Variables

	LMR	*PMR*	*PCY*	*Infrastructure*	*Roads*	*Electricity*	*Bank credit*
Product market regulations	0.23	1					
Per capita income	–0.21	0.71***	1				
Infrastructure	0.10	0.78***	0.72***	1			
Roads	0.34	0.82***	0.71***	0.70***	1		
Electricity	–0.08	0.73***	0.83***	0.71***	0.81***	1	
Bank credit	–0.08	0.82***	0.86***	0.80***	0.72***	0.77***	1
Bank branches	0.05	0.78***	0.73***	0.86***	0.73***	0.73***	0.89***

Note: *, **, and *** indicate that the correlation coefficients are significant at 10, 5, and 1 percent levels of significance respectively.

Comments and Discussion

T. N. Srinivasan: The authors argue that India's growth experience in the period 1980–2004 is puzzling on two counts. First, the dominant contributor to the acceleration in growth after 1980 as compared to the three decades prior to 1980 has been the services sector and not manufacturing, Second, the relatively lackluster performance of manufacturing cannot be ascribed to lack of reform since there has been substantial product market reforms since the mid-1980s. The manufacturing sector did not respond to the reforms with growth acceleration as it did in other high-growth countries, and the subsectors within manufacturing that performed better happened to be relatively capital or skill-intensive and not labor-intensive industries whose rapid growth would be the desired goal in India's labor-abundant economy. The authors examine their puzzles using aggregate data at the three-digit level of industries for major Indian states from the Annual Survey of Industries (ASI). Their principal findings are (*a*) performance (measured as the logarithm of real value added) varied across states and industries; (*b*) labor-intensive and infrastructure-dependent industries performed relatively poorly; (*c*) performance of labor-intensive industries in states with relatively inflexible labor regulations was relatively poor; (*d*) states with relatively more competitive product market regulations and better infrastructure have performed relatively better in all industries. The authors do not note that the services sector grew faster than manufacturing except during 1950–51 through 1964–65, 1991–92, and 1996–97. The more rapid growth of manufacturing in the first three plans is no surprise, given the substantial increase in investment, particularly in heavy industry by the public sector. Thus the first puzzle, if it is indeed a puzzle, is a long-standing aspect of Indian growth and not just a post-reform phenomenon (Mohan, 2008, Table 1).

For those, such as myself, who believe in the virtues of competition as a means for enhancing efficiency and growth through efficiency gains, and in the deleterious consequences of Indian regulation that increased costs, broadly speaking, including costs of hiring (and firing once hired) of labor and more generally costs of entry, operation, and exit, costs of participation in world markets as well as costs of investment (for domestic and foreign

investors), the findings of the authors ought to be comforting. However, I do not feel as comforted as I ought to and thought I would because of several concerns with the empirical analysis. I had expressed some of these when the paper was first presented and to which the authors have responded though not altogether to my satisfaction, in the final revision.

Let me begin with the proxy for reforms in the empirical analysis called "delicense"—it is an industry- and time-specific dummy variable that takes the value 1 for the years and industries in which these industries did not require an industrial capacity license, or more precisely, permission from the government to set up new capacity or increase capacity or change product mix from existing capacity, and the value 0 for other years or industries. The license specified the amount of capacity licensed and the products for the production of which the capacity was licensed, with no freedom for an enterprise to change its product mix given its licensed capacity in response to market conditions. In fact, one of the reforms of the mid-1980s was the so-called broad-banding in which firms with a licensed capacity to produce specified product(s) were allowed flexibility to produce related products, also specified by the government. Although technically this is not delicensing in the sense of removal of the licensing requirement altogether, it certainly is an enabling policy reform that raised the potential output from existing capacity without additional investment. If I understood the authors' definition of "delicense" correctly, it does not include broad-banding.

The most important point to note is that delicensing and even broad-banding without delicensing are both *enabling policies* in that they either removed restrictions on capacity creation altogether or allowed a more flexible use of existing capacity. Whether or not the enabling policy reform in fact was utilized to add capacity and/or produce more from existing capacity than earlier and thus accelerated growth would depend on whether or not the constraint on capacity imposed by licensing was the binding constraint on the expansion of output. Without any presumption about this, one cannot say, *a priori*, whether capacity delicensing *per se* should raise output or its growth. Besides, even if licensed capacity in general was the only binding constraint, its removal will have differential effects over time and across industries. The authors' econometric specification in Equation 1 postulates a common regression coefficient gamma for the delicensing dummy variable that by definition ignores this heterogeneity.

To be fair to the authors, they try to tackle this problem in part by interacting the delicensing dummy with other possible constraining variables such as industry characteristics, state characteristics, and the interaction between state and industry characteristics. But this is inadequate—the point is simple,

the value of 1 for the delicensing dummy, say for industry 1 in year 1980 and 1985 (or say in year 1980 for industries 1 and 2) could in principle have different impacts on the log output or log employment of industry 1 in years 1980 and 1985 (or for output of industries 1 and 2 in year 1980), not only because of possible differences in the values of other variables with which it is interacted but also more importantly because the process of granting or withholding a license was discretionary and at the level of *individual firms*, whereas the authors' analysis is based on aggregate data. What a firm did with its license if it got one depended both on its *ex ante* motive for applying for a license, particularly for augmenting capacity, and its market environment after the license was issued. A firm may not create the capacity it was licensed to produce if *ex ante* it applied for the license only to prevent others from entering its market or if the market environment no longer made investment profitable.

I am afraid that judging the success or failure of a reform agenda of which capacity delicensing is only one component by the dummy variable methodology of the authors is inadequate. It is indirect, focusing on the impact of delicensing on output or employment of industries without explicitly bringing in the precise *mechanisms* through which capacity delicensing could potentially affect *both* and examining whether such mechanisms were present in the industry–states–time periods analyzed, and if one or more of them was present, whether their operation was not constrained in some way or the other. In other words, the authors' methodology is best viewed as estimating *one equation* of a set of reduced-form equations of an unspecified structural model by using variations across industries and states and over time in the pattern of delicensing as the identifying strategy. On the other hand, the problem requires the specification of a structural model, identifying and estimating it.

Let me cite just one example, namely, that of trade liberalization to illustrate the problems with the authors' estimation strategy. The pre-reform trade policy regime at different time periods included some or all of several elements: formal tariff barriers, non-tariff barriers of various kinds including, most importantly, quantitative restrictions on imports, multiple exchange rates as well as foreign exchange allocations, and import licensing, which not only distinguished between (and among) capital, consumer, and intermediate goods imports, both in the tariff structure and between importers such as traders and actual users, and so on. This structure of restrictions on foreign investment, import of technology, royalty payments, and so on, and of exchange control was also equally complex. Clearly, any *single* dummy variable, albeit time–state–industry specific, cannot capture the time-varying and

state-varying restrictiveness of such a complex regime and its liberalization and also allow for the fact that not all restrictions were removed at once (for example, the quantitative restrictions on imports were not eliminated until 2001). Moreover, the response of the system to removal of some of the restrictions would depend both on which restrictions remained and on whether resources (such as labor and capital) could move to sectors experiencing liberalization from those that are not. In fact, resource movement is a major mechanism by which trade liberalization is expected to improve efficiency, productivity, and growth. Any analysis that attempts to link an aggregate liberalization variable with proxies for efficiency or growth rates, without bringing in explicitly the mechanisms of resource movements and restrictions, if any, on their operation ignores the fact that the world of Indian or other liberalization is one of "second best." As is well known, predictions of the effects of trade liberalization based on a hypothetical world of "first best," such as growth and welfare gains, do not necessarily hold in the "second best" world. Alas, a lot of empirical research on India's trade liberalization and/or policy reform, including the authors', is fundamentally flawed for this reason.

Incidentally, external sector reform, an important, if not the most important component of the reform agenda, does not figure in the Gupta et al. analysis although the introduction claims that promotion of manufactured exports was a major objective of reforms. After all, given that external sector reforms (and indeed other components of reforms as well) largely excluded agriculture, in a paper focused on the manufacturing sector, not including external sector reforms is surprising.

I will conclude with some relatively less important issues. First, the authors' analysis is based on ASI data at the establishment-level and not firm-level data, but many of the controls operated at the firm level. Moreover, since ASI data include a "census" component covering all large establishments and a "sample" component that is based on a random sample of smaller establishments, the authors should make it clear whether they have used both components and if so, whether they distinguished them in the analysis. This matters because *a priori* one could argue that the behavior of census establishments could be different from that of sample ones since the two differ not only in size but possibly in other dimensions as well.

Second, figure 4 of the paper presents simplistic "head count" rates of the proportion of industries delicensed—no data are provided showing how significant the delicensed industries were in terms of their share of industrial value added, capital stock, or employment. Moreover, possible variations in the nature of delicensing across industries are not captured by these rates.

Third, the authors cite studies purporting to show that India's draconian labor laws had no impact on industrial performance since they have been either evaded or avoided. The authors do not recognize that most of these studies are flawed both because of their not taking into account that evasion and avoidance actions are not costless and because they are mostly static, based on data from firms in existence and thus subject to survivor bias, that is, the data obviously cannot take into account firms that could have entered an industry but did not because labor laws raised their hiring and firing costs, and also firms that entered and later exited because they could no longer afford such costs.

Fourth, the authors "assign" a code of –1 to inflexible labor laws, 0 to neutral ones, and 1 to flexible ones. Implicitly this means that the effect on performance of changing laws from inflexible to neutral would be the same as a move from neutral to flexible. There is no reason for such a presumption. Instead, the authors could have used these dummies for the three categories so that any pattern of the effects of inflexible, neutral, and flexible labor laws could emerge from the analysis. Moreover, they code the states as pro-labor, pro-business, or neutral "if the majority of studies in the literature which have calculated these codes do so" and claim that this way of coding weeds out those instances in which a "particular methodology or data used by a researcher is subject to measurement error." A moment's reflection is enough to convince anyone that this claim has no analytical foundation. Moreover in the majority-based coding, each study is treated symmetrically regardless of its methodology, its database, or any other relevant feature.

Fifth, the authors separately estimate their full model of Equation 1 and various versions of it. Since all these versions are nested in the full model, they could have derived all their conclusions from the estimates of the full model itself.

Sixth, as I had pointed out in my comments last year, the myriad fixed effects in the model (there are about 1000 of them!) explain most of the variation in industrial performance across industries, states, and over time, and the delicensing variable and its interactions, labor law codes, and so on, have collectively negligible explanatory power. While conceding this point, the authors suggest that the statistical significance of coefficients (that is, whether they are significantly different from zero) is of greater interest than their contribution to R squared. However, statistical significance is not the same as economic significance—the latter is proxied by R squared. Thus, the fact that fixed effects contribute virtually all of R^2 essentially means that we are largely ignorant of what drives the variation. To illustrate, if, say, the coefficient of a state's fixed effect is significantly negative, we know only that the state's

performance relative to the 1, which is the base comparator, is significantly worse, but we have no clue from this fact as to why it is worse.

Finally, the authors' response to some of my last year's comments is to claim that they are essentially following what is "common practice" in the *literature*, such as "borrowing" data of other countries without examining whether following common practice makes sense. True, the authors do some robustness checks, but these have their own limitations.

In sum, the authors are to be commended for attempting to analyze the impact of policy reforms empirically. Unfortunately, the weakness of their empirical methodology and data used warrant extreme caution in accepting their findings.

Rajiv Kumar: The paper by Gupta et al. is important because it helps us to improve our understanding of the Indian manufacturing sector especially in the context of the stagnation in manufacturing sector's share in the GDP. It is crucial that we identify the constraints on pushing up manufacturing sector growth because it is a myth that some people try to perpetrate that India can do without manufacturing and simply leapfrog this stage of development and achieve rapid growth only on the basis of services sector growth. But some people are now pointing out that the whole definition of manufacturing in India has changed with the sector now shedding or outsourcing a large segment of activities that were earlier subsumed under manufacturing and are now included in the burgeoning services sector. Apparently and expectedly, Professor Jagdish Bhagwati had already talked about the phenomenon of "disembodiment of manufacturing" as early as the 1970s or 1980s. This disembodiment of manufacturing, which is what is probably happening now in India, implies a structural break in the data over time and makes it difficult to estimate trends in manufacturing sector's share in GDP. One example would suffice. Tata Motors, until the beginning of 2000 or late 1990s, would have had under its corporate umbrella, and hence as part of the manufacturing sector, the entire range of activities ranging from their designing center, the production of special machine tools to the service station managed by the company itself. But lo and behold, of course, in the last 5–10 years, a number of these activities have been outsourced and, therefore, just the core activity of Tata Motor's production plants in Jamshedpur and Pune are the only output and employment that are now included under Tata Motors, and as part of the manufacturing sector. The sector's share shrinks without a shrinkage in the level of activity. Therefore, all time series data is open to scrutiny and this is why I think TN's advice on not depending

on industry-level aggregate data and going to the firm level is important in this situation.

I think probably the paper's data ends at 2003–04 financial year. However, there has been a manufacturing sector take-off after that, which has been quite amazing. The sector's growth has, in fact, in a couple of years, surpassed that of services. I think that would be much better to capture that change in the authors' empirical exercise. This is important because until this recent spurt in growth, there was not much differential in manufacturing sector growth rates either across industries or across states. So it is difficult to see what the empirical exercise will capture. We need to update the exercise for the period after 2003–04 to be able to identify the drivers of growth because by updating the data set there will be rich information from the thirty-four or thirty-six quarters of rapid growth in industrial output. That is the period that the authors would want to capture to do an empirical exercise of that level.

Given that results obtained are not very different from those obtained in previous studies, a natural question will be on the usefulness of yet another quantitative exercise. However, in my view there is no harm in reiterating what we may know already, especially when policy action is still missing. But I think given existing work on labor market regulations and their impact on firm behavior, which covers a large range of issues such as judicial oversight, implementation problems, large firms being able to handle these regulations much better than smaller ones, it may be more useful to take the discussion to a more detailed level. I think we need to perhaps shift the debate and discussion in India away from simply talking of Section 5 of Act 35 of the Industrial Disputes Act to something deeper and more detailed in the context of the labor market. I do not know whether exercise like the one undertaken in this paper is able to do this.

I am a little bit surprised at the recommendation that the choice is between having a policy/reform package or nothing at all. That is very dismaying because that really would not be possible. Therefore, to that extent, I would have preferred that the authors would have been able to rank their recommendations in some order of priority because to make policy recommendations that are well beyond the political or administrative capacity of the state governments simply results in no action at all. We have to follow an incremental approach even if it is clearly second best because making some advance is certainly better than no policy movement at all.

It is not clear why we would suddenly combine export intensity as one of the industry characteristics while all other industry indicators that have been selected such infrastructure dependence, labor intensity, and so on,

relate to the supply side. I do not know what it does to the econometrics but it does make your industry-set somewhat incomparable by expanding the range of industries that you are including in your exercise. This could affect the results.

Let me then come to the assumption about technology being fixed, which implies that relative labor intensities do not change either across industries or over time. I shall give you an example—let us say, of the plastics and chemicals industries. De-reservation and de-licensing have made a big impact on the downstream segment of this industry. Nearly all the units were earlier in the small-scale industry segment and therefore, hugely labor-intensive. But with the entry of larger firms in this downstream segment as a result of the de-reservation policy in sectors such as plastics and textiles and garments, technology has changed significantly and consequently, labor intensities would also have changed. Given such industry-specific policy changes, which are rather the norm in India, technological progress can be significantly varied across industries and thus affect relative factor intensities very differently. So this assumption does need to be examined, and if possible, should be dropped. Apart from the issue of different rates of technological progress across industries, as Professor Srinivasan has said, assuming that technology remains unchanged also implies that incentives do not really matter.

The other thing is, why is infrastructure a policy variable? In the time frame that the authors are considering, there has not been much policy change here. It is just the supply of infrastructure. So, either we bring in something of an argument that advent of public–private partnership has improved the availability of infrastructure in the current years compared to the past or that the supply of private infrastructure is different from the past. Unless this is the case and the rate of growth of infrastructure capacity has been changing over the years, the empirical exercise does not really reveal very much. The only conclusion can be that the infrastructure constraint on manufacturing sector growth is a binding one and this is, of course, incontestable.

The other puzzling feature about the data is to assume that both Gujarat and Uttar Pradesh are at the same level of product market reform. This is simply not true. And it is akin to the conclusions of Besley and Burgess study on labor market reforms, which concludes that Gujarat public policy was negatively inclined toward investment and has been pro-labor, ahead of a state like Uttar Pradesh. To me this suggests the need for a more detailed and nuanced study of product and labor markets across states that will help us understand the true picture. The majority rule that the authors follow is I think very safe, but at some stage, as authors, they will have to take a view of their own on what they think are the major constraints or determinants

of manufacturing activity in the country. Therefore, we would require them to look at these state-level reforms more deeply rather than just depend on others' findings.

I am quite surprised at the authors' omission of foreign direct investment (FDI) as one of the determining variables especially when they consider the performance across industry segments. One of the key weaknesses of the Indian manufacturing sector is its inability to get into mass labor-intensive export-oriented manufacturing. The principal reason for this in my view has been the relative absence of FDI in industries unlike China and unlike all Asian Tigers in the past. I would, therefore, urge to examine the reasons for which FDI is relatively weak in India as this may well turn out to be one of the key determinants of manufacturing sector performance.

This brings me to my last point, which is that having been in the Confederation of Indian Industry and seen it a little bit from the inside, I think we have to address the broader issue of defining the objectives of industrial policy in the country. Could it be that the implicit objective of public policy is to develop indigenous industry along with its own branding and brand equity? There can be a trade-off between developing the indigenous industry capacity and brand equity on the one hand and the larger objective of pushing growth and employment generation in industry. Given the implicit policy objective, there seems to be a clear bias in favor of the former. Some experts like Alice Amsden of MIT may perhaps endorse this policy of developing national champions even at the cost of lower rates of growth and employment. I am firmly on the other side because for me, achieving full employment in a poor country like India must be the key policy objective as it is not only an issue of reducing poverty and improving material conditions but also of assuring self-esteem that comes with being productively employed. So, following are the two issues that I leave for the authors' consideration. Please do include FDI as an important determining variable when looking across industries and, secondly, do think about what you want in this issue of the trade-off between generating mass employment versus developing indigenous firms and brand equity.

My last point is about employment generation in the manufacturing sector. We know that National Sample Survey Organisation's latest data shows that between 1999 and 2004, all increase in employment in manufacturing has occurred in the unorganized sector. Therefore, any discussion on employment generation in industry that only looks at registered and organized industry would perhaps not clearly capture this positive development and in fact could be misleading. Therefore, we have got to look at the unorganized sector if we want to get the true picture of manufacturing sector employment.

This will perhaps help us to answer the important question as to why the dualism persists and 94 percent of our labor force still remains in the unorganized sector. We need to identify the policies at the state and the Central Government level that are responsible for the persistence of this dualism. Addressing this issue is perhaps crucial in order to understand why Indian manufacturing is not growing as fast as it can and as rapidly as it should to be able to absorb the increasing workforce and draw out labor from the agriculture sector.

General Discussion

Sisira Jayasuriya noted that the growth of manufacturing in China had a number of special features: the role of foreign direct investment, the importance of transnational companies, and the fragmentation of production throughout East Asia. These reflected a series of policy reforms affecting the international sourcing of factor and product inputs whereas the present study seemed to assume that all such inputs would be domestically sourced.

Esther Duflo raised two points, subsequently pursued by other participants. These were, whether the sector or the firm was the most appropriate level of analysis and how to judge the importance of labor legislation in retarding growth of organized-sector manufacturing.

Since the empirical results suggested that markets were not successful at allocating inputs efficiently across firms within sectors, she felt that individual firms might be the better unit of analysis. And the fact that the labor regulations variable had differential effects as between labor-intensive and non-labor-intensive industries in equations with other interactive variables was not conclusive to her about the strength of the effect of this variable on industrial growth. She also expressed surprise that not much attention had been paid in the paper to the role played by credit markets.

Based on her own experience, Anne Krueger was more skeptical as to the value of firm-level analysis. Individual firms were subject to numerous idiosyncratic shocks (such as strikes) and had their own growth patterns, which made it difficult to draw meaningful generalizations on the impact of policy. On outsourcing, she thought it made sense not only to look at value added, as had been done by the present paper, but also gross value of output. She also believed that the impact both of small-scale reservations policy and of labor market regulations, particularly the disruptive power of trade unions, were more powerful in shaping industrial structure than the paper's methodology allowed.

The authors responded that they had put in a great deal of thought and effort in reviewing and assessing alternative industrial datasets. The available firm-level data (Prowess) was limited to a fixed sample of firms. Nonetheless, it had useful information on such issues as the growing importance of outsourcing of production. However, what would seriously affect their empirical results was whether the importance of outsourcing differed systematically by industry; on this there was little evidence. It was not certain that increased outsourcing necessarily would result in slower industry growth; increased productivity could compensate for greater specialization.

Surjit Bhalla believed that a critical assessment needed to be made of the Annual Survey of Industries (ASI) data on manufacturing employment, which the paper had used, by comparing it to the data from other official sources such as the National Sample Survey (NSS). For example, one of the figures suggested that employment in registered employment had only grown by 10 percent in the period 1977–2004. Such an assessment would in turn impact on measures of labor productivity growth in manufacturing, which at an average of 7 percent per year over a span of thirty years, did not strike him as plausible. The authors responded that they intended to look at NSSO's data on the unorganized sector to establish whether large firms (that should have been part of the ASI frame) were being excluded in a systematic way. A generalized worsening of the ASI frame would not affect their qualitative results.

Devesh Kapur, returning to the impact of labor legislation, noted that there were multiple senses in which the term "labor legislation" was employed and measured. There was the law as passed by the state legislature, its enforcement by the state Labor Tribunal, and the interpretation of the legislation and its implementation by the Supreme Court.

The most widely used state-level measures (such as those of Besley and Burgess) focused on the first whereas what mattered were business expectations of the actual likelihood of implementation. Judgments of the Supreme Court since the late 1990s marked a sea change in stance, and were influencing the appeals to state tribunals and the decisions of those tribunals. He also pointed out that labor laws needed to be assessed both in their effects on incumbents and on new entrants, which were likely to differ. With regard to recent data, he drew the attention of the authors to recent firm-level data collected by the Indian Institute of Management Ahmedabad for the National Manufacturing Competitiveness Commission. He also noted that in recent years, firm responses to the ASI had deteriorated as compliance was now voluntary.

Arvind Panagariya noted that, for reasons that were not completely established, India (unlike China) had few large-scale firms in labor-intensive industries. The usual assumption was that the development of such firms had been inhibited by small-scale reservations, which primarily applied to the labor-intensive sectors. The results for labor-intensive industries could, in part, be picking up this scale effect. He also noted that small-scale reservations had in practice largely been eliminated since 2000 for firms primarily producing for export.

Dilip Mookherjee returned to the issue of the appropriate level of analysis. He noted that an important response mechanism to policy reform was the reallocation of production within a sector from less efficient to more efficient firms. Such "cross-firm effects" could only be captured by examining trends at the industry level. Noting that the paper's main result was what he called the "triple interaction" effect (among labor market flexibility, labor-intensive industries, and response to delicensing), he believed that it was exactly this set of industries that would respond by resorting to outsourcing. In this context he believed that it was important to study the interactions between the formal and informal sectors, and the efficiency costs of substitution away from the formal sector to the informal sector. These important issues could not be addressed by the present data. While the focus of the paper was on the impact of delicensing, in reality, delicensing was captured by a time (and industry) dummy which also would pick up other reforms that took place concurrently, such as reduction of import tariffs.

Kaushik Basu noted that while the authors' focus was on liberalization of entry, an equally important determinant of private investment was the ease of exit. This was only partly a matter of labor laws; it was equally influenced by the general bankruptcy regime, where India lagged well behind other emerging markets, as indicated, for example, by the World Bank's surveys. This determinant of industrial performance could be explored by the paper. He also noted that a relatively low share of manufacturing in GDP was not specific just to India; it was also true of other countries in South Asia, notably Pakistan, which were characterized by fewer restrictions on labor laws than India.

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