LAURA ALFARO*
Harvard Business School and NBER

ANUSHA CHARI*
Department of Economics
University of North Carolina at Chapel Hill and NBER

India Transformed? Insights from the Firm Level 1988–2005

Using firm-level data, this paper analyzes the transformation of India's economic structure following the implementation of economic reforms. The focus of the study is on publicly-listed and unlisted firms from across a wide spectrum of manufacturing and services industries and ownership structures such as state-owned firms, business groups, private and foreign firms. Detailed balance sheet and ownership information permit an investigation of a range of variables such as sales, profitability, and assets. Here we analyze firm characteristics shown by industry before and after liberalization and investigate how industrial concentration, the number, and size of firms of the ownership type evolved between 1988 and 2005. We find great dynamism displayed by foreign and private firms as reflected in the growth in their numbers, assets, sales, and profits. Yet, closer scrutiny reveals no dramatic transformation in the wake of liberalization. The story rather is one of an economy still dominated by the incumbents (state-owned firms) and to a lesser extent, traditional private firms (firms incorporated before 1985). Sectors dominated by state-owned and traditional private firms before 1988–90, with assets, sales, and profits representing shares higher than 50 percent, generally remained so in 2005. The exception to this broad pattern is the growing importance of new and large private firms in the services sector. Rates of return also have remained stable over time and show low dispersion across sectors and across ownership groups within sectors.

Introduction

Is there some action a government of India could take that would lead the Indian economy to grow like Indonesia's or Egypt's? If so, what exactly? If not, what is it about the "nature of India" that makes it so?

—R. E. Lucas Jr. (1985)

According to World Bank estimates, between 1960 and 1980, India's growth rate remained at an unspectacular average of 3.5 percent per annum. It was in the mid-1980s that it began accelerating, culminating in a rate of over 9 percent per annum by 2005. In fact, India's average growth rate over the entire period between 1986 and 2005 surpassed those of both Indonesia and Egypt (see Appendix Table A-1).

Numerous views are put forth about the driving forces behind the transformation of India's growth landscape (Bosworth et at., 2007; Kochar et al., 2006; Panagariya, 2008; Rodrik and Subramanian, 2005). While Rodrik and Subramanian (2005) point out that growth initially accelerated during the 1980s, and attribute it to the role of "pro-business" reforms that began in the early 1980s, Bosworth et at. (2007) argue that the emphasis on the services sector as the driving force behind the expansion of the Indian economy is perhaps exaggerated as it represents only a small share of the country's overall employment level. Panagariya (2004) argues that piecemeal external liberalization, along with small spurts of domestic deregulation on a variety of margins and expansionary policies, combined to produce a small shift in the growth rate in the 1980s.[1] He also contends that the systemic reforms in the 1990s and 2000s were essential to both sustaining and accelerating the growth rate. Srinivasan and Tendulkar (2003), on the other hand, view fiscal expansion and excessive foreign borrowing that precipitated the balance of payments crisis in 1991 as the primary cause of the shift in the growth rate in the 1980s but also note that this growth rate would have been unsustainable without the subsequent reforms.

The debate is far from settled. Thus far the extensive empirical literature has focused on characterizing India's aggregate economic performance. However, aggregate data do not shed light on the channels through which

---

1. At 1999–2000 prices, the annual growth rate shifted from 3.2 percent between 1965–66 and 1980–81 to 4.6 percent between 1981–82 and 1987–88 with end-point years included in the calculations (Panagariya, 2004).

policy reform can transform the economy at the micro-level. Data at the firm or plant level would offer an opportunity to do so. This paper takes a step in this direction by documenting detailed stylized facts about the evolution of India's microeconomic industrial structure against the backdrop of the reforms that began in the mid-1980s.[2]

The end of the license raj and implementation of pro-market reforms had far-reaching implications for changes in India's industrial structure. Significant sectors of the economy were opened up for private participation. India began to integrate into the world economy: import licensing was abolished in many sectors, import duties were sharply reduced, and many restrictions on foreign direct investment (FDI) were lifted.[3] Investment increased from 23 percent of gross domestic product (GDP) in 1985 to 38 percent in 2005. During the 1980s, total FDI inflows barely reached one billion dollars. In contrast, India attracted more than $70 billion in FDI between 2000 and 2005, the bulk of which was concentrated in the services, computer software and hardware, construction, and telecommunications sectors. New firms emerged and many Indian firms established an international presence. The economy transitioned from being mainly dependent on agriculture and manufacturing to a services-oriented one over the 1990s.[4]

Liberalizations, broadly defined to include trade and entry liberalization, regulatory reform, and privatization, are believed to transform economies via more competition (domestic and foreign), the removal of distortions in relative prices and access to finance. The effects of liberalization processes, however, may not be uniform.[5] Some industries may be better equipped to

---

2. The reform process, albeit piecemeal in nature, began in the mid-1980s. Data limitations prevent us from describing changes in firm-activity for the period before 1988.

3. The third section describes the main industrial reforms which include privatization, trade, and FDI deregulation, and de-licensing or domestic deregulation; financial reforms include banking sector deregulation allowing foreign bank entry, stock market liberalization, exchange rate deregulation, and capital account liberalization; corporate governance reforms including setting up of a regulatory body (SEBI), regulations concerning listing requirements, insider trading laws, protection of minority shareholders, board membership rules, executive compensation rules, etc.

4. Manufacturing as a share of GDP had increased only marginally over the past three decades, from 22 percent in 1980 to 27 percent in 2006. Restrictive labor laws, and moderate corporate investment hampered this sector.

5. As Alesina et al. (2005) note, the theoretical effects of regulatory reform (entry liberalization and privatization) are ambiguous. Reforms that imply reduction in entry barriers and in the markup are likely to lead to an increase in investment; aspects of deregulation that remove binding constraints on rates of return may determine a reduction of investment. Similarly, the effects of privatization are also ambiguous.

change than others. Within industries, new entrants may gain market share, while incumbents go bankrupt. Restrictions may linger in some sectors, and for some firms.

Until recently, studies about firm-activity in the context of policy re-form have predominantly focused on developed rather than developing economies—data availability being an obvious constraint (see Tybout, 2000).[6] Firms in developing countries often face a variety of constraints such as over-regulation and the underdevelopment of financial markets. These are glaring constraints affecting the ease with which resources can be reallocated across sectors and within firms. Liberalization policies in many developing countries have relaxed some of these constraints and changed the environment in which firms operate. These reforms provide an ideal backdrop against which to investigate the firm-level response to a changing economic environment.

The aim of this paper is to describe the evolution of India's sectoral com-position by focusing on the micro-foundations of its productive structure. How has India's industrial structure evolved at the firm level as a result of the reforms? What was the industrial composition by ownership before and after reforms? Has the influence of traditional incumbents such as state-owned firms changed? If so, what is the emerging role of private, domestic, and foreign firms? What has happened to firm size and industry concentration following liberalization?

We present a series of detailed stylized facts about the characteristics of firms evidenced by industry before and after the reforms of 1991.[7] We use firm-level data from the Prowess database collected by the Centre for Monitoring the Indian Economy from company balance sheets and income statements. Prowess covers both publicly-listed and unlisted firms from a wide cross-section of manufacturing, services, utilities, and financial industries from 1988 until 2005. About one-third of the firms in Prowess are publicly-listed firms. The companies covered account for more than 70 percent of industrial output, 75 percent of corporate taxes, and more than 95 percent of excise taxes collected by the Government of India (Centre for Monitoring the Indian Economy). Prowess covers firms in the organized sector, which refers to registered companies that submit financial statements.[8]

---

6. Bertrand and Francis (2002), for example, study the expansion decisions of French retailers following new zoning regulations in France. Black and Strahan (2002) and Guiso et al. (2004) find that competition in the banking sector and financial development fosters firm-entry in the US and Italy.

7. Formal econometric analysis establishing causal linkages is left to future work.

8. The fourth section describes in detail the advantages and shortcomings of the dataset.

The main advantage of firm-level data is that detailed balance sheet and ownership information permit an investigation of a range of variables such as sales, profitability, and assets for an average of more than 15,500 firms across our sample period. Firms are classified across 109 3-digit industries covering agriculture, manufacturing, and services, which is an additional advantage of our data over existing work focusing only on the manufacturing sector.[9] The data are also classified by ownership categories such as state-owned, private business-group-affiliated firms, private stand-alone firms and foreign firms. Note that private refers to firms in the private as opposed to the public sector, and many firms in the private sector are publicly traded. We study five sub-periods 1988–90, 1991–94, 1995–98, 1999–2002, and 2003–05.[10] These periods broadly match the different liberalization waves explained in detail in the text.

We present, specifically, information in detail about the average number of firms, firm size (assets, sale), and profitability (profit before interest depreciation and taxes and return on assets) for all firms in our sample by sector as well as by category of firm: state-owned enterprises, private firms incorporated before 1985 (old private firms), private firms incorporated after 1985 (new private firms), and foreign firms for the five sub-periods. Sales, size, entry, profitability, and overall firm-activity are disaggregated measures of economic growth and proxies of efficiency, and thus provide an understanding of the effectiveness of reforms. We also look at market dynamics with regard to promotion of competition in order to understand the efficient allocation of resources. We measure the degree of competition (consolidation) as a measure of competitive efficiency to examine how industrial concentration has evolved over time.

The data show great dynamism on the part of foreign and new private firms (incorporated after 1985) as reflected in their growth, that is, in numbers, assets, sales, and profits. However, on closer examination, what emerges is not a story of dramatic transformation in India's microeconomic structure following liberalization. Rather, the data suggest an economy still dominated by the incumbents, state-owned firms, and to a lesser extent, the traditional

9. As Goldberg et al. (2009) note, unlike the Annual Survey of Industries (ASI), the Prowess data is a panel of firms, rather than a repeated cross-section, and therefore, particularly well suited for understanding how firms adjust over time and how their responses may be related to policy changes.

10. Although the liberalization process has been gradual, and the pattern of foreign-entry liberalizations (and more general reforms) driven by private interests (see Chari and Gupta, 2008), this does not preclude the analysis of the effects of reducing these constraints on the evolution of the firm-size distribution.

private firms, that is, those firms that existed before the first wave of reforms. We find evidence of continuing incumbent control in terms of shares of assets, sales, and profits accounted for by state-owned and traditional private firms. In sectors dominated by state-owned and traditional firms before liberalization (with shares higher than 50 percent), these incumbents remain the dominant ownership group following liberalization. Interestingly, rates of return remain remarkably stable over time and show low dispersion across sectors and across ownership groups within sectors.

The exception to the pattern of incumbent firm dominance is seen in the growth of private firms in the services industries. In particular, the assets and sales shares of private new firms in business and IT services, communications services and media, health, and other services show a substantial increase in growth and in shares over this period. This fact coincides with the reform measures that took place in the services sectors after the mid-1990s and is also consistent with the growth in services documented in the aggregate data.[11]

Schumpeter (1942) argued that creative destruction, the replacement of old firms by new firms, and of old capital by new capita, happens in waves. A system-wide reform or deregulation, such as the one implemented in India, may be the shock that prompts the creative destruction wave. Creation in India seems to have been driven by new entrants in the private sector and foreign firms. The sectoral transformation in India does not, however, seem to have gone through an industrial shake-out phase in which incumbent firms are replaced by new ones.[12] Sectors in which state-owned enterprises and older private firms dominated activity prior to liberalization continue to do so even twenty years after the reforms began.

Our findings are consistent with the observation in Topalova (2004), that there seems to be very little exit at the firm level in India's industry, with Goldberg et al.'s (2008) finding that net product creation following trade liberalization was almost exclusively driven by product addition as opposed to discontinuation of product lines, and with arguments in Panagariya (2008) about the slow transformation of the country following

11. In the case of information technology, pharmaceuticals, and telecom, some new and very large players have emerged. Khanna and Palepu (2005) document the dynamism in the software industry.

12. Interestingly, many of the older firms (pre-independence) have by and large remained untouched by the reforms (not considering sectoral composition effects); see Table 8.

reforms.[13] Different explanations may account for these findings such as lingering restrictions and regulation constraining firm flexibility to adjust and inefficiencies in the financial sector among others.[14] However, one additional explanation, perhaps not sufficiently stressed in the debate, may be the important remaining role of incumbent (such as state-owned firms and firms incorporated before the reforms began). As emphasized in the political economy literature, entrenched incumbents firms may have incentives to oppose the liberalization efforts (Rajan and Zingales, 2003a, 2003b). In fact, we find both industry concentration and state-ownership to be inversely correlated with the probability of liberalization. These results are consistent with the findings in Chari and Gupta (2008) focusing on FDI liberalization. Our conclusions suggest that trade liberalization in India was also inversely correlated with industry concentration.

Our work contributes to the literature that focuses on the study of different aspects of the recent evolution of the Indian economy, by analyzing in detail the evolution of firm activity by ownership, sector, and industry.[15] In addition, it relates, more generally, to literature that emphasizes the effects of policy in the allocation of resources across establishments, by studying the effects of liberalization, particularly those that use firm-level data.[16]

The paper is organized as follows. The second section presents a review of the related literature. The third section describes the liberalization process in India. The fourth section describes the data while the fifth section presents the main empirical results. The next, sixth section carries the conclusion.

---

13. Goldberg et al. (2008) find little evidence of "creative destruction" and no link between declines in tariffs on final goods induced by India's 1991 trade reform and product dropping.

14. Banerjee (2006) notes that the banking sector in India, dominated by public sector-managed banks, fails to pull the plug on firms that ought to have been long shut down, and refers to practices of "ever-greening" of loans in the Indian banking system. Bloom and Van Reenen (2007) and Bloom et al. (2007) find that decision-making in Indian firms is highly centralized and management practices do not provide strong incentives for good performance. See also Khanna and Palepu (1999) for explanations put forth for the lack of product dropping in case studies on the product scope of Indian conglomerates.

15. Other recent work examines the effects of India's 1990s liberalization with an emphasis on employment (see, for example, Aghion et al., 2008; Besley and Burgess, 2004), bank lending (Cole, 2009), product-mix and imported intermediate inputs (Goldberg et al., 2008, 2009). These papers shed light on some of the impediments to the transformation of the economy (labor regulation, bank regulation, tariffs, and so on).

16. See Goldberg and Pavcnik (2004), Alfaro and Rodríguez-Clare (2004), and Harrison and Rodríguez-Clare (2009) for recent overviews of the studies on the effects of trade and FDI and Kose et al. (2006) and Henry (2007) for the effects of liberalization on foreign capital.

The Lens of Firm-Level Data—Theory and Evidence from Related Literature

This study is related to different strands of research analyzing the recent performance of the Indian economy as well as the broad literature analyzing the impact of liberalization on investment, changes in the allocation of resources, and economic growth. A thorough review of these large and diverse studies is clearly beyond the scope of this paper. We limit our attention to a few examples that particularly motivate our work.

Reforms and Firm-Activity

Theories emphasizing the role of "creative destruction" emphasize rapid output and input reallocation, product obsolescence and changes in productivity levels as necessary ingredients for the pace of reallocation playing an important role in aggregate productivity growth. Schumpeter (1942: 83) describes "creative destruction" thus:

> The fundamental impulse that keeps the capital engine in motion comes from the new consumers' goods, the new methods of production and transportation, the new markets...[The process] incessantly revolutionizes from within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact of capitalism. It is what capitalism consists in and what every capitalist concern has got to live in…

In addition to technological change, a system-wide reform or deregulation may prompt the creative destruction wave. Industries then go through a shake-out phase during which the number of producers decline in the industry, as incumbents and new entrants replace the firms that exit (Caballero and Hammour, 1996). Restructuring is one manifestation of creative destruction, by which the production structure weeds out unproductive segments, upgrades its technology, processes and output mix, and adjusts to the evolving regulatory and global environment.

In the case of India, theory suggests that the number of firms operating within industries can change through entry and exit in the face of deregulation. Therefore we expect that the ownership composition between incumbents and new entrants may change especially if unproductive incumbents are weeded out during an industrial shake-out phase and efficient new players enter the market. Theory also suggests a greater variability in observed rates of return and a decline in importance of unproductive incumbents (for example, declining market shares, assets, sales, and profits).

Trade Liberalization and Firm-Activity

Recent work in trade using dynamic models with heterogeneous firms highlights the point that opening up trade leads to reallocations of resources across firms within an industry. Melitz (2003) provides a framework of monopolistic competition with heterogeneous firms that have become the cornerstone of a growing literature, as the model yields rich predictions that can be confronted with the data. With exogenously determined levels of firm-productivity, the model predicts that opening up trade leads to changes in firm-composition within industries along with improvements in aggregate industry productivity: that low-productivity firms exit; that intermediate productivity firms which survive contract; and that high productivity firms enter export markets and expand.[17]

Additionally, in a world of variable markets, import competition could have differential effects on firms of different productivities and procompetitive effects through endogenous changes in variable markups (Melitz and Ottaviano, 2008).[18] More generally, changes in tariff and non-tariff barriers may affect the availability of foreign products on domestic markets and, hence, the elasticity of demand for domestic goods. Therefore we expect that in sectors liberalized to trade, incumbent firms may contract or exit the market. Moreover, only those new firms that are able to withstand competition from imports will enter and/or remain in the market. Examining concentration ratios and coefficients of variation in firm-size in industries that were liberalized to trade will allow us to examine this hypothesis.

Several studies have also focused on the effects of trade liberalization on indigenous firms and have uncovered substantial heterogeneity in firm performance within narrowly defined industries in both developed and developing countries (see Goldberg and Pavcnik, 2004). Trade liberalization has been found to have a positive effect in terms of efficient allocation of resources, that is, higher output and productivity in manufacturing industries. In the case of India, Krishna and Mitra (1998) find that low-productivity plants contract and industry-level productivity increases following liberalization. Similar results are shown in Sivadasan (2006) and Topalova (2004)

---

17. In the standard version of the model, there is firm selection into export markets but no feedback from exporting to firm productivity. See Bustos (2009) and Lileeva and Trefler (2007) for work in this direction.

18. Trade liberalization is widely believed to have pro-competitive effects that are ruled out by assumption in most models (constant elasticity of substitution preferences implying constant markups). In contrast, in a world of variable markets, import competition could have differential effects on firms of different productivities through endogenous changes in markups.

following trade liberalization, while Arnold et al. (2008) find positive productivity effects from India's policy reform in services.

Industrial De-licensing, Domestic Deregulation, and Firm-Activity

Theoretical predictions about firm activity from macro models of entry liberalization and deregulation are ambiguous (see Alesina et al., 2009; Blanchard and Giavazzi, 2003).[19] Reducing entry barriers and reforms that imply a reduction in price markups in excess of marginal cost are likely to lead to an increase in the number of firms and investment. Regulatory reform can also influence the desired capital stock and number of firms via, for example, reduction in the red tape. On the other hand, for certain firms, removing constraints on rates of returns (especially removing ceilings restrictions) could lead to a reduction in investment.[20]

Most theoretical models, however, assume that firms are able to efficiently allocate resources within the firm and that factor markets are frictionless. Goldberg et al. (2009) argue that remnants of industrial regulation still affect the operation of Indian firms and may constrain their flexibility to adjust to new economic conditions.[21] In India, there is evidence to suggest this, despite the extensive industrial deregulation in the early 1990s. Along with lengthy, cumbersome liquidation procedures, this factor often hinders firms from eliminating unprofitable product lines.[22] As noted by Panagariya (2008), "India operates in a world with virtually no exit doors." India's bankruptcy rate was, according to the World Bank (2005), of 4 per 10,000 firms, compared with 15 in Thailand and 350 in the United States. If the pattern in firm-entry and exit is consistent with these observations, we expect industrial de-licensing to be accompanied by dynamism in firm-entry but little incumbent firm-exit.

---

19. Blanchard and Giavazzi (2003) develop a model of both labor market and product market regulation and their interconnection. Alesina et al. (2009) analyze a monopolistic competition model and show that deregulation of product market has a positive effect on capital accumulation if it generates a reduction in the markup of prices over marginal costs (for instance, through a reduction in entry barriers) or if it lowers costs of adjusting the capital stock.

20. In some network industries, such as utilities and telecommunications, reforms entailing service liberalization and price rules for accessing networks can have conflicting influences on investment.

21. Some of their results also suggest that declines in tariffs are associated with somewhat bigger changes in the product scope of firms in industries, which are no longer subject to licenses at the onset of the 1991 reform as compared to regulated industries.

22. For example, an All-India Amendment to Industrial Disputes Act (1947) in 1982 required firms with more than 100 employees to seek government approval to dismiss workers (Kochhar et al., 2006).

Privatization and Firm-Activity

Similarly, the effects of privatization stemming from agency problems and political mandates are ambiguous. For example, deregulation, through a reduction in markups and in the availability of internal funds, may have a negative effect on investment if there is imperfect substitutability between internal and external sources of finance. This effect may be more relevant for firms severely affected by informational asymmetries and with limited collateral, such as small and young firms. On the other hand, if privatization reduces the influence of state-owned firms in the economy allowing new firms to enter, it can lead to an increase in investment.[23] While the theoretical predictions about the impact of privatization on firm-activity are ambiguous, we are particularly interested in examining the role of state-owned firms in the Indian economy—the most influential incumbents before the reforms began. The next sub-section elaborates on this subject.

Reforms and the Role of Incumbent Firms

Somewhat missing from, or perhaps not emphasized in, many papers in this literature, are political economy considerations and in particular the role of incumbent-firm ownership. As emphasized by Stigler (1971), incumbent firms in profitable, concentrated sectors have a greater incentive to prevent entry.[24] Theory predicts that successful reforms will lead to a decline in industry concentration in liberalized industries and greater competition as signaled by greater variation in rates of return and coefficients of variation in firm-size.

The widespread privatizations of the 1980s and 1990s around the world generated a large empirical literature focused on understanding the effects of ownership on firm performance.[25] As reported by Chong and Lopez-de-Silanes (2004), between 1984 and 1996, the participation of state-owned

23. Alesina et al. (2009) find that regulatory reforms in the OECD have been associated with increases in investment. The authors find both, entry into liberalization and privatization, to have had substantial effect on investment. There is also evidence to show that the marginal effect of deregulation on investment is greater when the policy reform is large and when changes occur, starting from already lower levels of regulation. In other words, small changes in a heavy regulated environment are not likely to produce any noteworthy effect.

24. Chari and Gupta (2008) find that reforms may be captured by powerful interests, particularly firms in profitable, concentrated industries and in industries with substantial state-owned firm presence. Given the deadweight loss associated with industry concentration, selective liberalization may inhibit economic growth.

25. Megginson and Netter (2001), surveying the literature, find that most studies reveal a positive impact of privatization on profitability and efficiency of firms.

enterprises in industrial countries declined from 8.5 percent of GDP to 5 percent (see Figure 1).[26] In middle-income countries it fell from 11 percent of GDP in 1980 to 5 percent in 1997 and from 15 percent to 3 percent in low-income economies. Employment dropped from 13 percent to 2 percent in middle income and 20 percent to 9 percent in low-income countries.[27] For India, our data suggest that between 2001 and 2005 state-owned firms accounted for 59 percent, 42 percent, and 50 percent of total assets, sales, and profits.

FIGURE 1. **Economic Activity of State-owned Enterprises, 1978–97 (Percentage of GDP)**
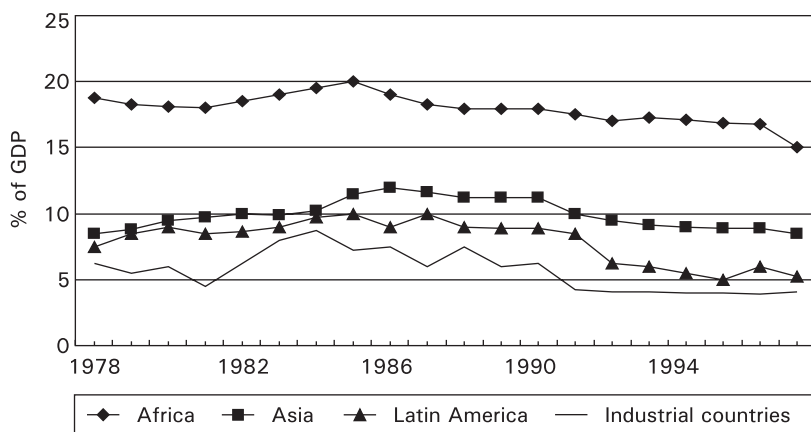
Source: World Bank (2001a) taken from Chong and Lopez-de-Silanes (2004).
Note: Weighted average.

Gupta (2005) studies the effects of partial privatization of state-owned enterprises in India and finds a positive impact on profitability, productivity, and investment. Her results also suggest that partial privatization does not cause the government to abandon the political objective of maintaining employment. This paper finds that the fractions of sales, assets, and profits

26. Reviewing the evidence in Latin America, Chong and Lopez-de-Silanes (2004) note that most privatization led to higher profitability, output and productivity growth, fiscal benefits, and quality improvements. The authors also highlight many instances of failure, which may be understood within the political framework (state participation in opaque processes, poor contract design, inadequate regulation or deregulation).

27. These averages, however, mask huge variations. In Africa, state ownership remains higher than 15 percent of the GDP; in China the government still has control over important sectors of the economy.

accounted for by state-owned firms have remained substantial in India for nearly two decades since liberalization and are substantially higher than in other countries, including the transition economies of Eastern Europe.

Liberalization in India: The Reforms

Liberalization in India encompassed a series of reforms including foreign entry and trade liberalization, industrial de-licensing and de-reservation measures, and services liberalization. In this section, we provide a broad overview of the reforms and refer the reader to studies that provide in-depth detail about specific reform measures.

Topalova (2004) provides a detailed overview of trade policy reform following the conditionalities imposed by the 1991 IMF Program. Benchmarks set forth under these conditions included a reduction in the level and dispersion of tariffs, a removal of quantitative restrictions on imported inputs and capital goods for export production, and elimination of public-sector monopoly on imports of almost all items.

It is important to note that the most significant initial trade reform was the removal of import licensing for capital and intermediate goods. However, tariff rates remained extremely high in the initial reform period. For example, the top tariff (while reduced) was brought down from 350 percent to 150 percent. Moreover, the 22 percent devaluation of the rupee further shielded the domestic industry from import competition, at least temporarily (Panagariya, 2008).

The government's export–import policy plan (1992–97), however, dramatically reduced the use of quantitative restrictions. The share of products subject to quantitative restrictions decreased from 87 percent in 1987–88 to 45 percent in 1994–95; all 26 import-licensing lists were eliminated and a "negative" list was established. Restrictions on exports were also relaxed, with the number of restricted items falling from 439 in 1990 to 210 in 1994 (Topalova, 2004).

Tariff reductions took place in 77 industrial categories and tariffs across a wide range of industries fell from a simple average of about 85 percent in 1990 to a value of approximately 12 percent in 2007 (Panagariya, 2008).[28]

28. The top tariff dropped from 50 percent in 1995–96 to 40 percent in 1997–98, 35 percent in 2000–01, 30 percent in 2002–03, 25 percent in 2003–04, 20 percent in 2004–05, 15 percent in 2005–06, 12.5 percent in 2006–07, and 10 percent in 2007–08. Some tariff peaks being outside the top rate, the simple average of tariffs on industrial goods in 2007 was approximately 12 percent. Custom duty collection in 2005–06 as a proportion of merchandise imports was just 4.9 percent (Panagariya, 2008).

Topalova (2004) also notes that the standard deviation of tariffs dropped by approximately 63 percent during the period between 1987 and 2001 (Figure 2, Panel A).[29] At the industry level, although there was variation across industries, the sharpest drop in tariffs took place between 1991 and 1992.

We note that the trend toward de-licensing and de-reservation began with the industrial policy statements in 1985 that outlined many liberalization measures including not restricting business houses to Appendix 1 industries as long as they moved to industrially backward regions and raised the minimum asset limit defining business houses. The pace of these policy trends accelerated with the New Industrial Policy outlined in the Industrial Policy Resolution of 1991.

F I G U R E 2 .   **Trade Reform in India, 1987–2001**

Panel A: Average Nominal Tariff

Panel B: Standard Deviation of Nominal Tariff
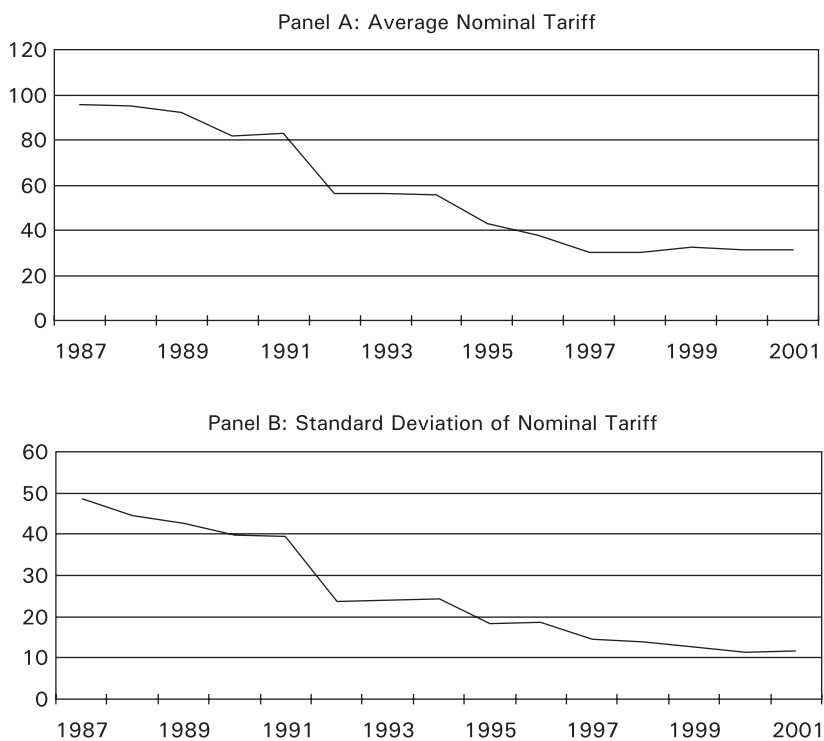
Source: Topalova (2004).

29. Data for Figure 2 were generously provided by Petia Topalova.

Compulsory industrial licensing was abolished for all except eighteen industries. Large companies no longer needed MRTP approval for capacity expansions. The number of industries reserved for the public sector in Schedule A (IPR 1951) were cut from seventeen to eight,[30] Schedule B, which listed industries open to the private sector but with increasing involvement from the state particularly for new establishments, was abolished altogether.[31] Importantly, limits on foreign equity holdings were raised from 40 to 51 percent (for industries listed in Annexure III of the Statement of Industrial Policy in 1991) under the "automatic approval route." The Industrial Policy Resolution of 1991 (Office of the Economic Advisor, 2001) provides information about the list of manufacturing industries in which the state liberalized foreign entry and also a list of industries where domestic entry restrictions continued to be in effect.

Services reforms while rapid in the 1990s, varied across sectors. Appendix A in Arnold et al. (2008) provides an excellent and detailed survey of the services liberalization reforms by sector between 1991 and 2005. Their paper carefully examines major policy changes enacted between 1991 and 2003. The first significant changes in financial services (banking and insurance), telecommunications, and transport are recorded as early as the 1993–94 fiscal year. The authors highlight some of the major policy changes they recorded for four services sectors, and then describe a strategy for quantifying this information into a services reform index. In order to make the services policy information amenable to quantitative analysis, we translated the policy changes into a sector-specific reform index, taking values from 0 to 5. We reproduce Figure 1 from their paper that provides a graphic illustration of the variation contained in the services reform index across four services sectors (see Figure 3).[32]

---

30. According to the Industrial Policy Resolution (1948), Schedule A comprised among others (*i*) industries exclusively reserved for the State (atomic energy, arms and ammunition, and railways), and (*ii*) basic industries where the State would have the exclusive right to undertake new investments (iron and steel, mineral oils, coal, shipbuilding, aircraft production, and telecommunications equipment). Other categories included eighteen industries of national importance regulated and licensed in cooperation with state governments and industries open to private sector participation. The Industrial Policy Resolution (1956) included the nine industries in categories (*i*) and (*ii*) of IPR 1948 and added eight additional industries including mining sectors, air transportation, and some heavy industries.

31. These industries included minerals, aluminum, and other non-ferrous metals not listed in Schedule A, machine tools, basic intermediate products required by the chemicals industries, antibiotics and other essential drugs, synthetic rubber, fertilizers, and road and sea transport.

32. We are grateful to the authors for permission to use their figures.

FIGURE 3. Service Liberalization, 1991–2005
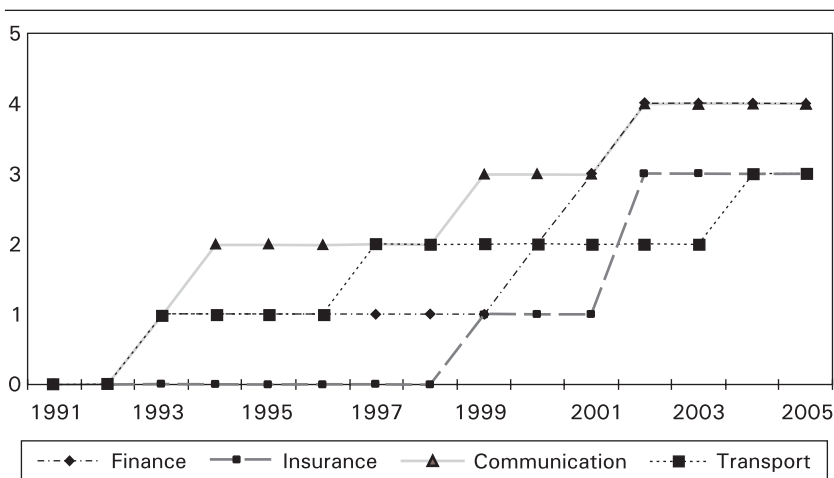
Notes: Taken from Arnold et al. (2008). Index values: 0: Almost no reform, the public sector is either the only relevant provider of services or has a strong grip on private providers. 1: some scope for private sector participation and some liberalization of operational decisions, combined with very limited scope for foreign participation (limited, for example, by low FDI ceilings or announced only as intentions). 2: limited degree of interference in operational decisions by public authorities, substantial price liberalization, and clear scope for foreign participation even if only in narrowly defined segments and as minority participations. However, the state remains a dominant actor in the sector. 3: significant scope for private providers, including foreign ones, a noticeable competitive pressure from new entrants on the public incumbents, and explicit possibilities for foreign equity participation. 4: little public intervention into the freedom of operation of private providers, the possibility of majority foreign ownership, and the dominance of private sector entities. 5: would be equal treatment of foreign and domestic providers, full convergence of regulation with international standards and unrestricted entry into the sector.

Following the description in the second section, we would expect a transformation of India's microeconomic structure following this broad and wide-ranging reform process: new firms entering and expanding production, increased competition from new entry as well as imports, and exit by unproductive incumbents that are unable to adapt to the changing economic environment. Most theoretical work on the effects of liberalization analyzes static effects. India experienced high growth during our period of analysis, in particular, toward the end, suggesting additional effects on entry, exit, and expansion in addition to those implied by the standard models (confounding further the overall effects at the macro level). Alternatively, as mentioned earlier, the reform process has been slow, and piecemeal in nature. Moreover, while we might expect to see dynamism in firm-entry, particularly by private and foreign firms following liberalization, lingering restrictions may imply little incumbent firm-exit.

The Prowess Data

We use firm-level data from the Prowess database. The sample period is from the year of inception of dataset, 1988–2005.[33] The data are collected by the Centre for Monitoring the Indian Economy (CMIE) from company balance sheets and income statements and covers both publicly-listed and unlisted firms from a wide cross-section of manufacturing, services, utilities, and financial industries. About one-third of the firms in Prowess are publicly listed firms. The companies covered account for more than 70 percent of industrial output, 75 percent of corporate taxes, and more than 95 percent of excise taxes collected by the Government of India (CMIE).

Prowess covers firms in the organized sector, which refers to registered companies that submit financial statements. According to the government, "The organized sector comprises enterprises for which the statistics are available from the budget documents or reports, etc. On the other hand the unorganized sector refers to those enterprises whose activities or collection of data is not regulated under any legal provision or do not maintain any regular accounts" (Government of India, 2000: 2). Indian firms are required by the 1956 Companies Act to disclose information on capacities, production, and sales in their annual reports. All listed companies are included in the database regardless of whether financials are available or not.[34]

The Indian National Industrial Classification (NIC) (1998) system is used to classify firms in the Prowess dataset into industries. The data include firms from a wide range of industries including mining, basic manufacturing, financial and real estate services, and energy distribution.

The main advantage of firm-level data is that detailed balance sheet and ownership information permit an investigation of whether the presence of certain types of incumbent firms in an industry affects the evolution of industry and firm characteristics, as also the responses to policy changes such as liberalization. In contrast, industry-level databases usually do not provide information about sales, assets, profits, and employment under

33. The Prowess database has now been used in several studies including Bertrand et al. (2002), Khanna and Palepu (1999), Fisman and Khanna (2004), Khanna and Palepu (2005), Topalova (2004), Dinç and Gupta (2009), Chari and Gupta (2008), and Goldberg et al. (2008, 2009).

34. Unlisted companies are not required to disclose its financials. CMIE asks their permission, but if they refuse, it cannot include these companies in Prowess.

different ownership categories.[35] The firms in the data belong to three main ownership categories: state-owned firms, private firms, and foreign firms. Private firms include family-owned business groups and unaffiliated private firms. Appendix Table A-2 provides a description of variables used in the data analysis.

One concern with the data may be related to new entrants versus improvements in the data coverage by CMIE. However, for all firms that Prowess decides to cover, regardless of when the decision is made, financial data from 1989 onwards, wherever available, is added to the database. That is, even if coverage for a firm begins only in 1995, CMIE goes back and gets data from at least 1989, if not earlier. Hence, for the sample that we consider, the entry numbers are not distorted by changing coverage (except, of course, from firms that are actually incorporated in that period). Nevertheless, we are cautious when interpreting the results.

A point regarding data coverage of foreign firms is worth highlighting. Firms are classified as domestic or foreign depending on the incorporation location. For example, in the case of Jet Airways, the holding company is incorporated overseas and therefore classified as a foreign firm. Also, as in the case of unlisted domestic firms, data on unlisted foreign firms is available only if the firm chooses to disclose its financial information. CMIE requests unlisted foreign firms for permission, but if they refuse (as for example, McDonald's and Coca Cola have done) then the firms are not included in Prowess.

Chari and Gupta (2008) compare the Prowess data with the ASI conducted by the Government of India. The ASI is a survey collected on a sampling basis of factories employing 100 or more workers.[36] Although the overlap in the list of industries covered by the two datasets is not perfect, the ASI data nevertheless provide a useful cross-industry benchmark for the coverage in Prowess. For instance, the ASI data focus exclusively on the manufacturing sector, whereas Prowess covers several additional service sectors including defense, restaurants, hotels, and IT services. The authors find that in forty-one of the fifty-one 3-digit industries covered by both

---

35. Since firms are not required to report employment in their annual reports, we observe employment data for only a more restricted sample of firms. Financial services are the only industry that is mandated by law to disclose employment information. Since the sample of firms that report employment is small, we do not focus on these numbers.

36. The sampling design is outlined in detail in items number 9–11 at http://www.mospi. nic.in/stat_act_t3.htm (accessed on May 14, 2010).

databases, total industry sales in Prowess is an average of 77 percent of the value of total sales for the same industry in the ASI.

Goldberg et al. (2009) argue that the Prowess dataset is not a manufacturing census, and therefore may not be ideal for studying firm-entry and exit, given that it includes only larger firms for which entry and exit are not important margins of adjustment. However, it is pertinent to note that unlike the ASI, which is a survey of manufacturing, the Prowess data is a panel of firms, rather than a repeated cross-section. Prowess is therefore particularly well suited to examining how firm-characteristics including entry and exit evolve over time and may respond to policy changes. (For instance, Goldberg et al. [2009] use the Prowess dataset to examine how firms adjust their product-mix over time.) Firms that no longer report sales or assets are assumed to have exited. We also classify firms that do not report data because of mergers and acquisitions as firms that exit the data due to consolidation.

Finally, the predominant emphasis of the extant literature using firm-level data on India has been on the manufacturing sector. An important advantage of Prowess is its coverage of firms in the services sector widely credited for India's growth miracle. The next section documents stylized facts about the evolution of India's industrial composition and firm activity against the backdrop of these broad-sweeping reforms.

The Evidence

We study five sub-periods: 1988–90, 1991–94, 1994–98, 1999–2002, and 2003–05. These periods broadly match the different waves of liberalization. Our objective is to provide the reader with an overview of the evolution of India's industrial composition in the last 20 years. We present deflated data using the GDP deflator from World Bank, World Development Indicators. For expositional purposes, the tables collapse the sectors in ten: agricultural, mining, and extraction; food, textile, and paper manufacturing; chemical and plastics manufacturing; metals and industrial manufacturing; utilities, construction, and retail; transport; hospitality, tourism, media, health, and other services; financial services and real estate; business, computer, and communication services; and miscellaneous diversified. Appendix Table A-3 presents detailed information on the industries included in each sector and the number of firms by sector.

Tables 1 to 5 present detailed information on the number of firms, firm size (assets, sale), and profitability (profit before interest depreciation and taxes and return on assets) for all firms in our sample by sector as well as by category of firm: state-owned enterprises, foreign firms, private firms incorporated before 1985 (also referred to as traditional firms), and private firms incorporated after 1985 (also referred to as new private firms). Table 6 presents information on the dispersion of returns. Table 7 describes the composition of number of firms, firm size, and profitability as a percentage of the total (by ownership group and sector). Table 8 presents additional information by year of incorporation, and Tables 9 and 10 describe the evolution of firm size and concentration.

Reforms and Dynamism?

The columns in Table 1 present data on the average number of firms by type of ownership and sector. The table shows information for the full sample across all sectors by type of ownership, followed by information for each of the different sectors by type of ownership and finally, data consolidated by sector.

Consistent with the rapid growth observed in India after the mid-1980s (as documented in Table A-1) overall firm activity as proxied by the number of firms grew substantially relative to the beginning of the sample period. There is, however, heterogeneity in ownership type. The average number of state-owned firms increased from 645 in the 1988–90 to 693 in 1995–98 ending in 617 by 2003–05. The number of firms incorporated before 1985 decreased in this period from 7,551 in 1988–90 to 5,685 in 2003–05. These numbers are in contrast to the growth rates in the average number of new private firms: up from 3,031 in 1988–90 to close to 8,864 at the end of the period. The number of foreign firms increased from an average of 533 in 1988–90 to 748 by 2003–05.

While one cannot infer causality from our results, following the different wave of reforms in the mid-1980s and early 1990s, the increasing number not just of private but also of foreign firms suggests that the liberalization measures enacted to allow domestic entry through de-licensing and de-reservation, combined with the liberalization of FDI, promoted greater dynamism in new entry by firms other than the incumbents of the pre-reform period (state-owned and traditional private firms incorporated before 1985). Indeed, the doubling of the average number of foreign firms in this period is suggestive of substantial foreign entry albeit from very low levels in the pre-reform period.

TABLE 1. Industrial Composition—Average Number of Firms, 1988–2005

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Full sample					
State	645	665	693	684	617
Private (Inc. pre-1985)	7,551	7,413	6,903	6,317	5,685
Private (Inc. post-1985)	3,031	6,381	9,233	9,616	8,864
Foreign	533	678	856	850	748
Agriculture, mining, extraction					
State	42	44	43	41	39
Private (Inc. pre-1985)	145	143	134	126	112
Private (Inc. post-1985)	99	221	289	279	255
Foreign	6	8	13	14	13
Food, textile, and paper mfg.					
State	83	77	73	66	56
Private (Inc. pre-1985)	1,328	1,284	1,171	1,049	907
Private (Inc. post-1985)	504	1,048	1,293	1,269	1,109
Foreign	68	85	101	89	73
Chemicals and plastics mfg.					
State	56	57	56	49	46
Private (Inc. pre-1985)	1,150	1,121	1,025	910	816
Private (Inc. post-1985)	527	929	1,081	1,030	916
Foreign	120	135	147	139	123

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Hospitality, tourism, media, health, and other services					
State	16	17	17	17	16
Private (Inc. pre-1985)	198	198	194	186	173
Private (Inc. post-1985)	104	206	341	411	404
Foreign	18	20	25	28	26
Financial services, real estate					
State	185	202	220	212	197
Private (Inc. pre-1985)	1,861	1,858	1,779	1,669	1,538
Private (Inc. post-1985)	656	1,652	2,566	2,561	2,404
Foreign	80	117	157	148	129
Business, computer, and communication services					
State	24	28	30	32	28
Private (Inc. pre-1985)	266	265	260	248	225
Private (Inc. post-1985)	133	360	711	923	875
Foreign	34	56	93	117	98
Misc. diversified					
State	5	4	4	6	6
Private (Inc. pre-1985)	156	153	150	145	134
Private (Inc. post-1985)	78	173	338	391	392
Foreign	7	9	15	17	16

(Table 1 continued)

(*Table 1 continued*)

Owner/Period	I	II	III	IV	V
	1988–90	1991–94	1995–98	1999–2002	2003–05
Metals and industrial mfg.					
State	97	97	94	83	73
Private (Inc. pre-1985)	1,450	1,406	1,264	1,115	995
Private (Inc. post-1985)	521	916	1,198	1,166	1,045
Foreign	135	159	191	181	160
Utilities, construction, retail					
State	103	105	116	135	124
Private (Inc. pre-1985)	892	882	828	775	702
Private (Inc. post-1985)	370	796	1,279	1,415	1,293
Foreign	55	75	92	97	89
Transport					
State	33	36	40	42	34
Private (Inc. pre-1985)	104	104	99	95	87
Private (Inc. post-1985)	40	80	138	171	174
Foreign	9	16	21	21	22

Owner/Period	I	II	III	IV	V
	1988–90	1991–94	1995–98	1999–2002	2003–05
Industry/Period	Full sample				
Agri., mining, extrac.	292	416	479	460	419
Food, text., pap. mfg	1,983	2,494	2,637	2,473	2,144
Chem., plastics mfg.	1,853	2,242	2,309	2,128	1,901
Metals, ind. mfg	2,204	2,578	2,747	2,545	2,272
Utilities, construction, retail	1,421	1,857	2,315	2,422	2,207
Transport	186	236	298	329	316
Hospitality, tourism, and other	336	441	578	642	618
Finance, real estate	2,782	3,828	4,722	4,590	4,267
Business, computers, and communication services	456	709	1,094	1,321	1,225
Miscellaneous diversified	246	338	506	559	547

Source: Prowess dataset.
Note: See Appendix Tables A-1 and A-2 for detailed explanation of variables.

These patterns are broadly mimicked within sectors. Agriculture, for example, is characterized by a relatively stable average number of state-owned firms and increasing activity by private and foreign firms (again the former from a relatively low base). The average number of traditional private firms in this sector decreased from 145 in 1988–90 to 112 by 2003–05.

In food, textiles and paper manufacturing, chemicals and plastic manufacturing, and metals and industrial manufacturing, the average number of state-owned firms decreased from 83, 56, and 97 respectively in 1988–90 to a corresponding 56, 46, and 73 in 2003–05. The number of traditional private firms shows somewhat similar patterns: the average numbers went from 1,328, 1,150, and 1,450 respectively in 1988–90 to a corresponding 907, 816, and 995 by 2003–05. In contrast, the number of private and foreign firms has increased substantially between 1988 and 2005.

Similarly, we observe high growth in the number of private and foreign firms in sectors such as utilities, construction, and retail; hospitality, tourism, and media; financial services and real estate; and business, computer and computer communications, and others. In these same sectors, there was an increase in the number of state-owned firms while there were slight reductions in the number of traditional private firms.

Business, computer and communication services, and financial service and real state by far show the highest growth rates for all type of firms, but again, private and foreign firms show substantial activity in terms of number of firms. Panagariya (2008) hails the success story in the telecommunication sector as the triumph of reforms. As the last panel in Table 1 shows, there was an overwhelming increase in the number of firms in this sector.[37]

Overall, Table 1 presents a picture of a dynamic economy driven by private and foreign firms and the transformation of the Indian economy. In fact the data suggests that 1988–90 was already a period of great activity in terms of the number of firms. We examined within-period growth in the number of firms for this period and found it to be substantial ranging from 35 percent for foreign firms and 115 percent for new private firms. As mentioned, while our data precludes comparisons with the pre-1985 period, the evidence is consistent with arguments in Panagariya (2008: 18–19) that the reforms of the 1980s opened the door to wider entry by new firms. Consistent with previous evidence, the data also suggest that the regime shift in India's growth path began in the mid-1980s.

---

37. See Appendix Table A-2 for activities included in each classification.

We note that there was acceleration in entry in the period following 1991 that continued through the rest of the decade. Further, our findings corroborate observation of lingering exit restrictions. While the data presents clear evidence on dynamism in firm-entry particularly by private and foreign firms, we observe little incumbent firm-exit (notwithstanding methodological issues in the collection of the data).

Table 2 presents information on average assets of ownership type and sector (in constant rupees crore). Average assets have also grown in the last two decades particularly for new private firms and firms in the foreign sector, although the initial values of assets under foreign ownership and private firms incorporated after 1985 were very low (the latter by construction). The table shows high accumulation of assets in private and foreign firms in all sectors of the economy but particularly in agriculture, mining and extraction, food, textile and paper manufacturing, transports, utilities, construction and retail, business and IT services, financial services, and other services (hospitality, tourism, media, health, and others). Foreign firms also show increased participation in recent periods and particularly in sectors such as transportation, media, health, and other services. While one cannot infer causality, greater foreign firm access did not seem to come at the expense of the overall significance of private domestic firms (see Alfaro et al. [2009] for similar results for a broad sample of countries).

The lower panel in Table 2 shows asset accumulation across sectors suggesting an increasing role in service-related activities. The growth of assets is far more dramatic in financial services and real estate, business, computer and communication services, utilities, construction and retail, transport, construction, and media.

Table 3 presents similar detailed information on sales (in constant rupees crore), where much the same pattern emerges. Although there is substantial growth across all forms of ownerships and sectors, the data suggest higher activity in terms of sales growth by foreign and new private firms and in growth in the services sectors. In sales by new private firms, growth was particularly strong in transport, hospitality, tourism media and health, while foreign firm growth was high in transport, business, computer, and communication services. As in previous patterns, there was noticeably high growth in sales of new private firms in agriculture in the period 1991–94 versus 1988–90.

Table 4 shows profits (profits before depreciation, interest payments, and rents of firms in constant terms) by ownership and sector. New private firms stand out in terms of the growth rate in their average profits. However, all

TABLE 2. Industrial Composition—Average Total Assets, 1988–2005 (Constant Rs Crore)

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Full sample					
State	198,288	384,355	551,184	808,408	969,039
Private (Inc. pre-1985)	73,013	134,655	224,185	246,071	269,427
Private (Inc. post-1985)	3,079	24,090	82,517	167,759	244,100
Foreign	14,547	36,319	68,390	99,833	117,171
Agriculture, mining, extraction					
State	8,523	24,821	29,117	36,988	49,479
Private (Inc. pre-1985)	297	644	1,053	1,176	1,571
Private (Inc. post-1985)	36	600	1,567	2,684	2,874
Foreign	46	231	288	352	452
Food, textile, and paper mfg.					
State	15,080	17,540	30,602	43,080	47,737
Private (Inc. pre-1985)	12,512	21,842	34,255	43,580	50,666
Private (Inc. post-1985)	372	4,444	15,980	18,749	20,381
Foreign	2,259	3,816	5,203	6,258	7,644
Chemicals and plastics mfg.					
State	7,119	7,197	8,166	7,310	6,479
Private (Inc. pre-1985)	20,127	30,528	43,591	44,016	45,664
Private (Inc. post-1985)	806	4,832	11,033	14,251	18,938
Foreign	4,336	5,473	9,357	12,733	13,795

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Hospitality, tourism, media, health, and other services					
State	40	153	246	257	341
Private (Inc. pre-1985)	730	1,258	3,133	6,129	5,672
Private (Inc. post-1985)	18	250	1,084	2,878	4,526
Foreign	32	120	305	527	510
Financial services, real estate					
State	115,481	239,529	376,073	535,430	633,167
Private (Inc. pre-1985)	5,963	25,834	59,802	66,747	70,690
Private (Inc. post-1985)	380	5,295	23,429	69,535	110,035
Foreign	2,546	18,287	34,660	51,801	63,953
Business, computer, and communication services					
State	3,329	5,717	6,847	38,517	43,438
Private (Inc. pre-1985)	460	796	1,866	4,490	6,555
Private (Inc. post-1985)	333	1,308	7,204	19,674	28,885
Foreign	53	197	1,285	4,337	5,987
Misc. diversified					
State	532	348	404	386	382
Private (Inc. pre-1985)	3,392	4,588	5,212	4,491	4,608
Private (Inc. post-1985)	152	638	1,242	1,436	1,842
Foreign	189	165	154	167	235

(Table 2 continued)

Metals and industrial mfg.

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
State	27,872	32,737	31,148	27,140	32,028
Private (Inc. pre-1985)	21,130	33,715	51,047	50,570	56,805
Private (Inc. post-1985)	692	4,747	12,556	20,358	23,987
Foreign	4,770	7,490	14,461	17,893	19,694

Utilities, construction, retail

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
State	19,047	48,894	59,622	107,182	143,278
Private (Inc. pre-1985)	7,256	13,227	21,425	21,926	23,496
Private (Inc. post-1985)	241	1,704	7,560	14,900	28,475
Foreign	305	454	1,980	3,574	2,331

Transport

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
State	1,265	7,420	8,960	12,118	12,710
Private (Inc. pre-1985)	1,146	2,224	2,800	2,946	3,702
Private (Inc. post-1985)	48	273	863	3,296	4,156
Foreign	10	86	698	2,190	2,570

Full sample

Owner/Period — Industry/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Agri., mining, extrac.	8,903	26,296	32,025	41,200	54,375
Food, text., pap. mfg	30,223	47,641	86,040	111,666	126,429
Chem., plastics mfg.	32,388	48,031	72,148	78,310	84,876
Metals, ind. mfg	54,464	78,688	109,212	115,961	132,514
Util., construct., retail	26,849	64,279	90,586	147,582	197,580
Transport	2,469	10,003	13,320	20,550	23,138
Hosp., tour., and other	820	1,781	4,768	9,791	11,049
Financ., real estate	124,370	288,944	493,963	723,513	877,845
Bus., comp., and comm.	4,176	8,017	17,202	67,018	84,865
Misc. diversified	4,264	5,739	7,012	6,480	7,067

TABLE 3. Industrial Composition—Average Gross Sales, 1988–2005 (Constant Rs Crore)

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Full sample					
State	67,121	90,617	129,745	203,605	256,972
Private (Inc. pre-1985)	72,047	96,737	128,494	150,568	187,815
Private (Inc. post-1985)	2,566	13,094	38,155	72,986	103,229
Foreign	17,748	22,774	35,473	47,240	59,091
Agriculture, mining, extraction					
State	5,486	10,462	16,098	20,974	26,712
Private (Inc. pre-1985)	253	477	830	857	1,307
Private (Inc. post-1985)	22	276	955	1,869	2,470
Foreign	81	173	181	209	465
Food, textile, and paper mfg.					
State	29,059	31,898	52,401	88,011	103,620
Private (Inc. pre-1985)	14,795	20,236	26,214	39,253	46,606
Private (Inc. post-1985)	483	3,182	9,124	18,631	18,808
Foreign	4,086	5,669	7,149	8,518	9,003
Chemicals and plastics mfg.					
State	4,729	5,104	5,405	6,056	6,208
Private (Inc. pre-1985)	19,989	26,667	34,097	35,660	41,531
Private (Inc. post-1985)	629	2,815	7,041	11,082	15,295
Foreign	6,647	7,834	11,753	14,474	14,804

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Hospitality, tourism, media, health, and other services					
State	29	123	226	181	185
Private (Inc. pre-1985)	367	616	1,175	1,405	1,678
Private (Inc. post-1985)	3	64	280	941	1,495
Foreign	17	58	147	205	297
Financial services, real estate					
State	195	364	538	407	414
Private (Inc. pre-1985)	2,280	2,568	3,597	4,797	4,429
Private (Inc. post-1985)	42	179	390	466	898
Foreign	40	44	56	22	76
Business, computer, and communication services					
State	996	1,526	2,180	9,987	12,739
Private (Inc. pre-1985)	565	813	1,683	3,639	5,576
Private (Inc. post-1985)	185	1,287	4,046	7,822	12,958
Foreign	29	140	566	2,405	4,029
Misc. diversified					
State	680	341	372	343	381
Private (Inc. pre-1985)	3,253	3,902	3,936	3,454	4,176
Private (Inc. post-1985)	288	619	1,031	1,058	1,401
Foreign	582	427	291	394	486

(Table 3 continued)

(*Table 3 continued*)

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05	Owner/Period	Full sample				
						Industry/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Metals and industrial mfg.						Agri., mining, extrac.	5,842	11,387	18,064	23,908	30,954
State	14,492	15,981	16,046	16,407	21,394	Food, text., pap. mfg	48,423	60,984	94,887	154,413	178,038
Private (Inc. pre-1985)	23,583	30,563	41,587	43,286	59,202	Chem., plastics mfg.	31,994	42,419	58,296	67,272	77,837
Private (Inc. post-1985)	639	3,230	9,172	17,908	26,992	Metals, ind. mfg	44,212	57,181	79,932	94,491	132,813
Foreign	5,499	7,406	13,128	16,890	25,225	Util., construct., retail	17,942	34,095	52,904	85,562	122,535
Utilities, construction, retail						Transport	1,518	4,082	7,273	11,226	13,713
State	10,615	21,984	31,645	54,346	77,522	Hosp., tour., and other	416	862	1,829	2,732	3,656
Private (Inc. pre-1985)	6,313	9,846	13,980	16,243	20,770	Financ., real estate	2,558	3,155	4,580	5,693	5,817
Private (Inc. post-1985)	262	1,281	5,637	12,080	21,236	Bus., comp., and comm.	1,774	3,767	8,474	23,852	35,302
Foreign	751	984	1,642	2,893	3,006	Misc. diversified	4,803	5,289	5,630	5,250	6,444
cont.											
Transport											
State	840	2,834	4,835	6,892	7,798						
Private (Inc. pre-1985)	649	1,049	1,397	1,974	2,540						
Private (Inc. post-1985)	13	159	480	1,130	1,675						
Foreign	15	39	561	1,230	1,699						

Source: Prowess dataset.
Note: See Appendix Tables A-2 and A-3 for detailed explanation of variables.

T A B L E 4 . Industrial Composition—Average Profits (PBDIT), 1988–2005 (Constant Rs Crore)

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Full sample					
State	15,421	32,029	50,140	72,050	82,753
Private (Inc. pre-1985)	10,032	17,326	25,484	25,893	33,252
Private (Inc. post-1985)	402	2,552	6,693	13,213	19,562
Foreign	2,130	4,196	7,783	10,371	12,886
Agriculture, mining, extraction					
State	767	3,731	4,905	7,031	10,571
Private (Inc. pre-1985)	38	88	110	111	369
Private (Inc. post-1985)	7	67	143	254	356
Foreign	9	33	30	26	143
Food, textile, and paper mfg.					
State	2,089	2,123	3,406	5,376	7,395
Private (Inc. pre-1985)	1,847	2,959	3,841	5,341	6,848
Private (Inc. post-1985)	49	401	948	1,666	1,557
Foreign	442	720	923	1,195	1,504
Chemicals and plastics mfg.					
State	608	824	707	390	580
Private (Inc. pre-1985)	2,909	4,343	5,269	5,090	6,120
Private (Inc. post-1985)	76	472	934	1,441	1,968
Foreign	754	1,029	1,573	2,313	2,584

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Hospitality, tourism, media, health, and other services					
State	3	21	36	11	12
Private (Inc. pre-1985)	95	197	459	448	506
Private (Inc. post-1985)	1	23	72	178	283
Foreign	6	23	42	45	62
Financial services, real estate					
State	7,709	16,874	29,855	40,125	37,802
Private (Inc. pre-1985)	714	2,935	6,724	5,909	5,791
Private (Inc. post-1985)	49	565	2,026	4,295	6,480
Foreign	210	1,338	3,224	4,059	3,669
Business, computer, and communication services					
State	436	819	1,347	5,160	6,876
Private (Inc. pre-1985)	67	127	332	1,022	1,559
Private (Inc. post-1985)	81	276	914	2,113	3,228
Foreign	3	34	115	594	1,202
Misc. diversified					
State	57	34	33	11	8
Private (Inc. pre-1985)	365	555	521	350	569
Private (Inc. post-1985)	23	84	112	114	161
Foreign	40	41	28	51	58

(Table 4 continued)

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Metals and industrial mfg.					
State	2,204	2,508	2,598	1,944	5,118
Private (Inc. pre-1985)	2,955	4,277	5,847	5,265	8,535
Private (Inc. post-1985)	77	480	981	1,707	2,771
Foreign	640	914	1,570	1,576	3,005
Utilities, construction, retail					
State	1,374	4,446	6,440	10,661	12,796
Private (Inc. pre-1985)	812	1,462	2,037	1,944	2,271
Private (Inc. post-1985)	35	156	482	1,061	2,297
Foreign	26	54	204	332	216
Transport					
State	172	649	814	1,341	1,596
Private (Inc. pre-1985)	231	382	344	412	684
Private (Inc. post-1985)	5	27	80	384	461
Foreign	0	9	73	180	442

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
			Full sample		
Industry/Period	I	II	III	IV	V
Agri., mining, extrac.	820	3,920	5,188	7,422	11,440
Food, text., pap. mfg	4,428	6,204	9,118	13,578	17,304
Chem., plastics mfg.	4,347	6,668	8,484	9,235	11,252
Metals, ind. mfg	5,876	8,179	10,996	10,493	19,430
Util., construct., retail	2,247	6,118	9,162	13,998	17,580
Transport	408	1,067	1,311	2,318	3,184
Hosp., tour., and other	105	264	609	682	862
Financ., real estate	8,682	21,712	41,829	54,388	53,741
Bus., comp., and comm.	587	1,256	2,708	8,888	12,865
Misc. diversified	485	713	695	526	796

Source: Prowess dataset.
Note: See Appendix Tables A-2 and A-3 for detailed explanation of variables.

type of firms, state-owned, traditional and new private firms and foreign firms also show high rates of growth in the average level of their profits. For foreign firms, financial services and business and computer-related activities witnessed the highest rates of growth in average profits. It is also worth noting that across economic activities, sectors in the services (such as utilities, construction and retail, hospitality, tourism, media, health, and financial services) dominated those activities in the manufacturing sector (such as food, textile and paper manufacturing, and chemicals and plastics) for profit growth. It is also worth highlighting the high growth in profits in agriculture and mining by traditional private firms in the period 1991–94 versus 1988–90.

Table 5 shows a more subtle picture emerging, which reflects the return on assets. In the early period of 1988–90, for the full sample, traditional private businesses display the highest average rate of return (13.53 percent) followed by new private firms (12.93 percent) and then foreign firms (12.36 percent). State-owned firms come last with an average rate of return of 8.90 percent during this period. After 1991, the picture changes. Traditional private firms and new private firms experience a decline in the return of assets reaching 10.66 percent and 8.11 percent, respectively, in 1999–2002 to increase to 12.39 percent and 8.54 percent, respectively, during 2003–05. State-owned firms, in contrast, experienced an increase in the return on assets with a figure of 10.61 percent in 2003–05 from 8.90 percent in 1988–90.[38] Foreign firms also experience an increase in the return on assets with a 14.94 percent return for the 2003–05 period compared to 12.36 percent in 1988–90. It is interesting to note that the dispersion in rates of return remained almost the same from 1988–90 (at 4.63 percent) until 1999–2002 (at 4.38 percent) to increase to 6.39 percent in 2003–05 across ownership group. The coefficient of variation in returns across ownership increased from 0.17 in 1988–90 to 0.23 in 2003–05.

For state-owned firms, the highest rate of return was in agriculture, mining and extraction (21.27 percent) followed by business, computer, and communication services (15.85 percent); metals and industrial manufacturing (15.74 percent); and food, textile, and paper management (15.63 percent) in 2003–05. The sectors with the highest rates of return for traditional private firms were business, computer, and communication services (23.65 percent) and agriculture, mining and extraction (22.91 percent). For new private firms, the highest rate of return was agriculture, mining

38. Bai et al. (2006) estimate the aggregate marginal product of capital in China to be around 20 percent, down from 25 percent in the pre-reform period.

TABLE 5. Industrial Composition—Average Return on Assets, 1988–2005

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Full sample					
State	8.90	9.54	10.26	9.21	10.61
Private (Inc. pre-1985)	13.53	12.78	11.54	10.66	12.39
Private (Inc. post-1985)	12.93	11.81	8.35	8.11	8.54
Foreign	12.36	14.18	12.44	12.50	14.94
Agriculture, mining, extraction					
State	8.81	15.29	16.82	18.75	21.27
Private (Inc. pre-1985)	13.39	13.48	10.51	9.40	22.91
Private (Inc. post-1985)	19.77	11.02	9.27	9.48	12.38
Foreign	18.93	15.21	10.39	7.60	30.04
Food, textile, and paper mfg.					
State	13.97	12.14	11.16	12.41	15.63
Private (Inc. pre-1985)	14.68	13.58	11.23	12.28	13.50
Private (Inc. post-1985)	12.62	9.69	6.23	8.67	7.64
Foreign	19.41	19.06	17.70	19.11	19.69
Chemicals and plastics mfg.					
State	8.54	11.46	8.67	5.47	8.96
Private (Inc. pre-1985)	14.44	14.19	12.15	11.57	13.40
Private (Inc. post-1985)	9.39	9.98	8.49	10.05	10.40
Foreign	17.36	18.95	16.88	18.14	18.73

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Hospitality, tourism, media, health, and other services					
State	2.82	13.32	14.29	0.70	3.42
Private (Inc. pre-1985)	13.16	15.59	16.06	7.33	8.90
Private (Inc. post-1985)	2.06	8.51	6.65	6.22	6.23
Foreign	17.95	19.45	14.22	8.50	12.09
Financial services, real estate					
State	6.55	7.08	7.93	7.50	6.00
Private (Inc. pre-1985)	12.77	11.30	11.30	8.88	8.19
Private (Inc. post-1985)	12.77	12.04	9.00	6.30	5.92
Foreign	8.37	7.60	9.37	7.84	5.76
Business, computer, and communication services					
State	13.27	14.18	19.67	13.23	15.85
Private (Inc. pre-1985)	14.59	16.00	17.33	23.01	23.65
Private (Inc. post-1985)	16.29	22.13	13.15	11.42	11.07
Foreign	5.28	16.42	9.74	13.79	20.09
Misc. diversified					
State	11.02	9.83	8.19	2.83	2.03
Private (Inc. pre-1985)	10.69	12.05	9.82	7.76	12.33
Private (Inc. post-1985)	14.34	13.70	9.30	7.89	8.73
Foreign	22.48	25.16	18.18	30.67	24.79

Metals and industrial mfg.

State	7.99	7.66	8.36	7.10	15.74
Private (Inc. pre-1985)	13.97	12.73	11.51	10.39	14.97
Private (Inc. post-1985)	11.14	10.41	7.87	8.37	11.48
Foreign	13.40	12.24	11.24	8.81	15.22

Utilities, construction, retail

State	6.97	9.05	10.77	10.07	8.95
Private (Inc. pre-1985)	11.21	11.11	9.54	8.88	9.66
Private (Inc. post-1985)	14.92	10.34	6.36	7.05	8.11
Foreign	8.35	11.73	9.38	9.51	9.24

Transport

State	15.20	8.94	9.08	11.07	12.56
Private (Inc. pre-1985)	19.79	17.14	12.38	14.00	18.30
Private (Inc. post-1985)	11.19	10.44	9.14	11.60	11.09
Foreign	−0.70	7.96	11.53	8.56	17.04

Industry/Period	I	II	III	IV	V
Agri., mining, extrac.	17.31	12.07	10.20	10.14	16.14
Food, text., pap. mfg	13.78	11.75	8.92	10.69	10.80
Chem., plastics mfg.	12.02	12.37	10.58	11.10	12.16
Metals, ind. mfg	12.45	11.48	9.73	9.26	13.42
Util., construct., retail	13.07	10.56	7.71	7.88	8.68
Transport	13.16	11.82	10.13	11.96	13.54
Hosp., tour., and other	5.69	10.93	9.64	6.43	7.07
Financ., real estate	12.35	11.42	9.78	7.32	6.73
Bus., comp., and comm.	16.39	20.36	13.80	13.71	14.15
Misc. diversified	13.70	13.58	9.64	8.39	9.81

Source: Prowess dataset.
Note: See Appendix Tables A-2 and A-3 for detailed explanation of variables.

and extraction (12.38 percent), transport (11.09 percent), and business, computer, and communication services (11.09 percent). It is important to highlight that in agriculture, mining and extraction, food, textile, and paper manufacturing, chemicals and plastics manufacturing, transport, hospitality, tourism, media, health, and other service and miscellaneous diversified activities, foreign firms earned the highest rates of return across ownership groups. For the full sample, the highest rate of return was in agriculture, mining and extraction (17.31 percent) and the lowest in hospitality, tourism, media, and health (8.15 percent) in 1988–1990. In 2003–05, the highest rate of return was in transport (13.54 percent) and the lowest in financial services (6.73 percent).

Table 6 presents data on the sectoral variance of return on assets measured by dispersion in the top panel and by the coefficient of variation[39] in the second one. As seen in Table 6, in 1988–90, the dispersion in returns across ownership groups within a sector was the highest in transport (20.49 percent) and the lowest in metals and industrial manufacturing (5.97 percent) and financial services (7.22 percent). In the period 2003–05, the dispersion in returns ranged from 22.76 percent in miscellaneous to 1.55 percent in utilities, construction, and retail. Interestingly, the dispersion in returns across sectors fell from 11.62 percent in the early period to 9.41 percent in the most recent period.

The coefficient of variation within sectors across ownership groups was 0.19 in food, textile, and paper manufacturing and 0.77 in transport in 1988–90 and ranged from 0.07 in utilities, construction, and retail to 0.80 in miscellaneous diversified production in 2003–05. The coefficient of variation in returns across sectors went from 0.24 in 1988–90 to 0.28 in 2003–05.

In sum, the panels in Tables 5 and 6 tell an analogous story. The rate of return is remarkably stable for the full sample across time with an average return on assets of 11.93 percent in 1988–90 to 11.62 percent in 2003–05. While there is cross-sectional variation in rates of return across ownership groups and sectors, there is relatively little dispersion in the rates of return as seen in the tight range of returns and the low coefficient of variation within sectors by ownership groups and across sectors (see Figure 4). The patterns in the return on assets are striking when compared to the large variations

---

39. The coefficient of variation is a normalized measure of the dispersion of a probability distribution. It is defined as the ratio of the standard deviation to the mean. For examples, distributions with coefficient of variation less than one are considered low variance and higher than one high variance.
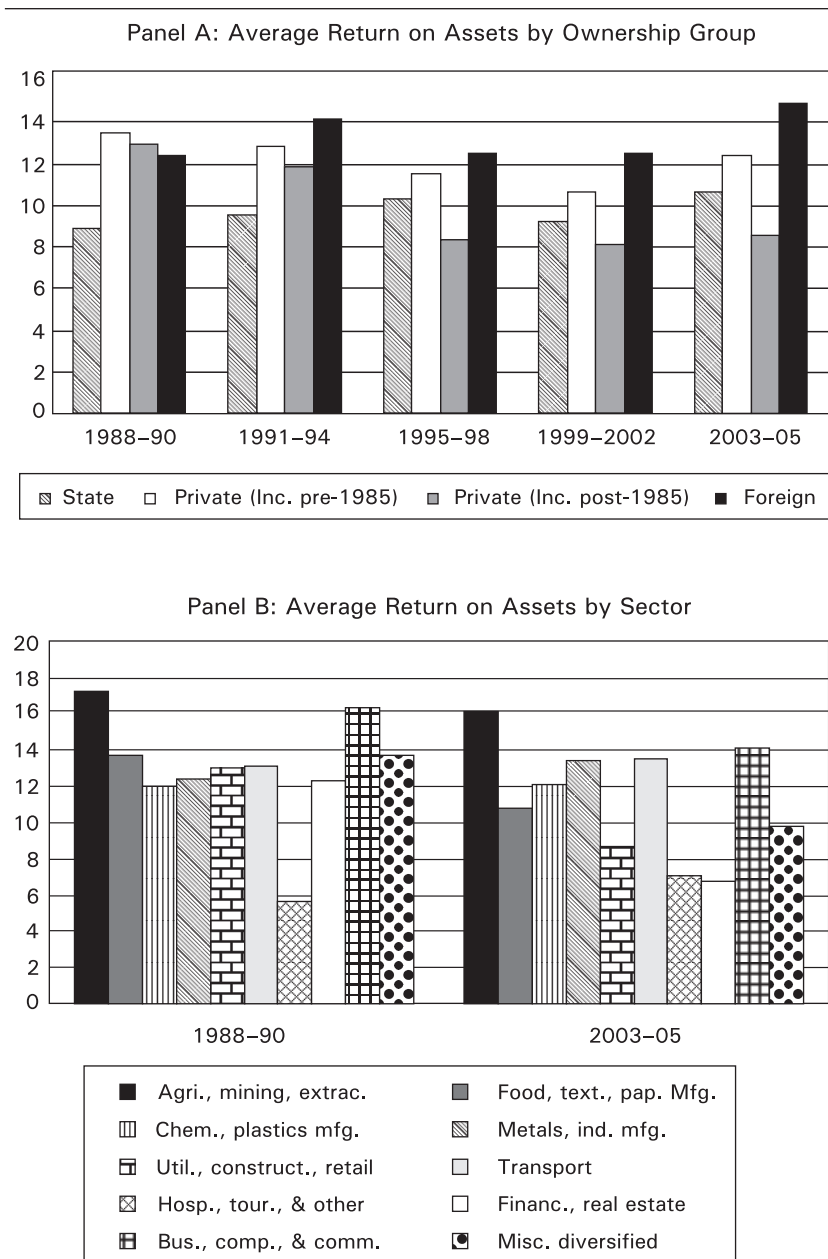
TABLE 6. Return on Assets—Cross-Sectional Variance, 1988–2005

Industry/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Return on assets (%): Dispersion					
Full sample (across owners)	4.63	4.64	4.09	4.38	6.39
Agriculture, mining, extraction	10.96	4.27	7.55	11.15	17.66
Food, textile, and paper mfg.	6.79	9.37	11.46	10.44	12.05
Chemicals and plastics mfg.	8.83	8.97	8.38	12.67	9.78
Metals and industrial mfg.	5.97	5.06	3.64	3.28	4.26
Utilities, construction, retail	7.95	2.68	4.41	3.02	1.55
Transport	20.49	9.18	3.30	5.44	7.21
Hospitality, tourism, media, health, and other services	15.89	10.94	9.41	7.80	8.66
Financial services, real estate	6.22	4.96	3.37	2.58	2.44
Business, computer, and communication services	11.01	7.95	9.92	11.59	12.58
Misc. diversified	11.79	15.32	9.99	27.84	22.76
Full sample (across industries)	11.62	9.80	6.09	7.27	9.41
Return on asset: Coefficient of variation					
Full sample (across owners)	0.17	0.16	0.17	0.19	0.23
Agriculture, mining, extraction	0.34	0.15	0.29	0.45	0.34
Food, textile, and paper mfg.	0.19	0.29	0.41	0.33	0.36
Chemicals and plastics mfg.	0.34	0.29	0.34	0.46	0.34
Metals and industrial mfg.	0.23	0.21	0.19	0.16	0.14
Utilities, construction, retail	0.34	0.11	0.21	0.15	0.07
Transport	0.77	0.37	0.16	0.20	0.24
Hospitality, tourism, media, health, and other services	0.87	0.32	0.33	0.61	0.48
Financial services, real estate	0.31	0.27	0.15	0.14	0.18
Business, computer, and communication services	0.39	0.20	0.29	0.34	0.31
Misc. diversified	0.37	0.45	0.40	1.02	0.80
Full sample (across industries)	0.24	0.22	0.15	0.23	0.28

Source: Prowess dataset.
Note: See Appendix Tables A-2 and A-3 for detailed explanation of variables.

FIGURE 4.   **Average Return on Assets**

Panel A: Average Return on Assets by Ownership Group

Legend: ▨ State   ☐ Private (Inc. pre-1985)   ▦ Private (Inc. post-1985)   ■ Foreign

Panel B: Average Return on Assets by Sector

Legend:
- ■ Agri., mining, extrac.
- ▦ Food, text., pap. Mfg.
- ▥ Chem., plastics mfg.
- ▨ Metals, ind. mfg.
- ⊟ Util., construct., retail
- ☐ Transport
- ⊠ Hosp., tour., & other
- ☐ Financ., real estate
- ⊞ Bus., comp., & comm.
- ◖ Misc. diversified

Source: Prowess dataset.

we see in terms of new firm—entry by foreign and private firms and in the growth of their assets, sales, and profits in comparison to the lower rates of entry by state-owned and business group-affiliated firms.

A growing literature argues that the differential effects of policies and institutions on the investment climate broadly defined might significantly influence the allocation of resources across establishments. The working hypothesis in this literature is that not only the level of factor accumulation, but also how these factors are allocated across heterogeneous production units, matters in trying to understand income differences (see Alfaro et al., 2009; Hsieh and Klenow, 2009; Restuccia and Rogerson, 2008). That is, the great divide between rich and poor countries may not just be explained by lack of capital and skilled labor but also by the consequence of the misallocation or misuse of available resources.

For India, Hsieh and Klenow (2009) use plant-level information from the Indian manufacturing census data to measure dispersion in the marginal products of capital and labor within 4-digit manufacturing sectors. When capital and labor are hypothetically reallocated to equalize marginal products to the extent observed in the United States, the authors find efficiency gains of 50–60 percent in India.[40] As noted by Klenow (2008), the importance of allocative efficiency has been motivated by the fact that the growth took off in India in the wake of a series of policy reforms. In this paper, we show that the coefficient of variation in the rate of return on assets is relatively low across both industries and owners. A further point to observe is that state-owned firms earn substantial profits. It is not clear whether these returns stem from monopoly power in concentrated industries or because they are efficient. If it is the former, further privatization may serve to raise returns even higher, notwithstanding the caveat that private monopolies do not replace state-owned monopolies.

Or, Is It Continuing Incumbent Control?

Table 7 presents information about the shares of the number of firms, assets, sales, and profits by ownership groups and sectors. Although the table carries substantial information, some clear, interesting but conflicting, patterns emerge. Overall, what appears is not a story of dramatic transformation in India's microeconomic structure following liberalization. Rather, it is one

---

40. Hsieh and Klenow (2009) use manufacturing data from India's Annual Survey of Industries (ASI) from 1987–88 through 1994–95.

T A B L E 7 . Industrial Composition—Fraction of Average Number of Firms, Assets, Sales, and Profits, 1998–2005

Owner/Period	Number of firm					Total assets					Total sales					Profits (PBDIT)				
	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Full sample																				
State	5%	4%	4%	4%	4%	69%	66%	60%	61%	61%	42%	41%	39%	43%	42%	55%	57%	56%	59%	56%
Pr. Pre-85	64%	49%	39%	36%	36%	25%	23%	24%	19%	17%	45%	43%	39%	32%	31%	36%	31%	28%	21%	22%
Pr. Post-85	26%	42%	52%	55%	56%	1%	4%	9%	13%	15%	2%	6%	11%	15%	17%	1%	5%	7%	11%	13%
Foreign	5%	4%	5%	5%	5%	5%	6%	7%	8%	7%	11%	10%	11%	10%	10%	8%	7%	9%	9%	9%
Agric., mining, extraction																				
State	14%	10%	9%	9%	9%	96%	94%	91%	90%	91%	94%	92%	89%	88%	86%	94%	95%	95%	95%	92%
Pr. Pre-85	50%	34%	28%	27%	27%	3%	2%	3%	3%	3%	4%	4%	5%	4%	4%	5%	2%	2%	2%	3%
Pr. Post-85	34%	53%	60%	61%	61%	0%	2%	5%	7%	5%	0%	2%	5%	8%	8%	1%	2%	3%	3%	3%
Foreign	2%	2%	3%	3%	3%	2%	1%	1%	1%	1%	1%	2%	1%	1%	2%	1%	1%	1%	0%	1%
Food, textile, and paper mfg.																				
State	4%	3%	3%	3%	3%	50%	37%	36%	39%	38%	60%	52%	55%	57%	58%	47%	34%	37%	40%	43%
Pr. Pre-85	67%	51%	44%	42%	42%	41%	46%	40%	39%	40%	31%	33%	28%	25%	26%	42%	48%	42%	39%	40%
Pr. Post-85	25%	42%	49%	51%	52%	1%	9%	19%	17%	16%	1%	5%	10%	12%	11%	1%	6%	10%	12%	9%
Foreign	3%	3%	4%	4%	3%	7%	8%	6%	6%	6%	8%	9%	8%	6%	5%	10%	12%	10%	9%	9%
Chemicals and plastics mfg.																				
State	3%	3%	2%	2%	2%	22%	15%	11%	9%	8%	15%	12%	9%	9%	8%	14%	12%	8%	4%	5%
Pr. Pre-85	62%	50%	44%	43%	43%	62%	64%	60%	56%	54%	62%	63%	58%	53%	53%	67%	65%	62%	55%	54%
Pr. Post-85	28%	41%	47%	48%	48%	2%	10%	15%	18%	22%	2%	7%	12%	16%	20%	2%	7%	11%	16%	17%
Foreign	6%	6%	6%	7%	6%	13%	11%	13%	16%	16%	21%	18%	20%	22%	19%	17%	15%	19%	25%	23%
Metals and industrial mfg.																				
State	4%	4%	3%	3%	3%	51%	42%	29%	23%	24%	33%	28%	20%	17%	16%	38%	31%	24%	19%	26%
Pr. Pre-85	66%	55%	46%	44%	44%	39%	43%	47%	44%	43%	53%	53%	52%	46%	45%	50%	52%	53%	50%	44%
Pr. Post-85	24%	36%	44%	46%	46%	1%	6%	11%	18%	18%	1%	6%	11%	19%	20%	1%	6%	9%	16%	14%
Foreign	6%	6%	7%	7%	7%	9%	10%	13%	15%	15%	12%	13%	16%	18%	19%	11%	11%	14%	15%	15%

Utilities, construc., retail

State	7%	6%	5%	6%	6%
Pr. Pre-85	63%	47%	36%	32%	32%
Pr. Post-85	26%	43%	55%	58%	59%
Foreign	4%	4%	4%	4%	4%

Transport

State	18%	15%	14%	13%	11%
Pr. Pre-85	56%	44%	33%	29%	27%
Pr. Post-85	21%	34%	46%	52%	55%
Foreign	5%	7%	7%	6%	7%

Hospitality, tour., media, health, and other

State	5%	4%	3%	3%	3%
Pr. Pre-85	59%	45%	34%	29%	28%
Pr. Post-85	31%	47%	59%	64%	65%
Foreign	5%	4%	4%	4%	4%

Financial services, real estate

State	7%	5%	5%	5%	5%
Pr. Pre-85	67%	49%	38%	36%	36%
Pr. Post-85	24%	43%	54%	56%	56%
Foreign	3%	3%	3%	3%	3%

Business, comp., and comm. services

State	5%	4%	3%	2%	2%
Pr. Pre-85	58%	37%	24%	19%	18%
Pr. Post-85	29%	51%	65%	70%	71%
Foreign	7%	8%	9%	9%	8%

Utilities, construc., retail

State	71%	76%	66%	73%	73%
Pr. Pre-85	27%	21%	24%	15%	12%
Pr. Post-85	1%	3%	8%	10%	14%
Foreign	1%	1%	2%	2%	1%

Transport

State	51%	74%	67%	59%	55%
Bus. G.	46%	22%	21%	14%	16%
Private	2%	3%	6%	16%	18%
Foreign	0%	1%	5%	11%	11%

Hospitality, tour., media, health, and other

State	5%	9%	5%	3%	3%
Bus. G.	89%	71%	66%	63%	51%
Private	2%	14%	23%	29%	41%
Foreign	4%	7%	6%	5%	5%

Financial services, real estate

State	93%	83%	76%	74%	72%
Bus. G.	5%	9%	12%	9%	8%
Private	0%	2%	5%	10%	13%
Foreign	2%	6%	7%	7%	7%

Business, comp., and comm. services

State	80%	71%	40%	57%	51%
Bus. G.	11%	10%	11%	7%	8%
Private	8%	16%	42%	29%	34%
Foreign	1%	2%	7%	6%	7%

Utilities, construc., retail

State	59%	64%	60%	64%	63%
Pr. Pre-85	35%	29%	26%	19%	17%
Pr. Post-85	1%	4%	11%	14%	17%
Foreign	4%	3%	3%	3%	2%

Transport

State	55%	69%	66%	61%	57%
Bus. G.	43%	26%	19%	18%	19%
Private	1%	4%	7%	10%	12%
Foreign	1%	1%	8%	11%	12%

Hospitality, tour., media, health, and other

State	7%	14%	12%	7%	5%
Bus. G.	88%	71%	64%	51%	46%
Private	1%	7%	15%	34%	41%
Foreign	4%	7%	8%	7%	8%

Financial services, real estate

State	8%	12%	12%	7%	7%
Bus. G.	89%	81%	79%	84%	76%
Private	2%	6%	9%	8%	15%
Foreign	2%	1%	1%	0%	1%

Business, comp., and comm. services

State	56%	41%	26%	42%	36%
Bus. G.	32%	22%	20%	15%	16%
Private	10%	34%	48%	33%	37%
Foreign	2%	4%	7%	10%	11%

Utilities, construc., retail

State	61%	73%	70%	76%	73%
Pr. Pre-85	36%	24%	22%	14%	13%
Pr. Post-85	2%	3%	5%	8%	13%
Foreign	1%	1%	2%	2%	1%

Transport

State	42%	61%	62%	58%	50%
Bus. G.	57%	36%	26%	18%	21%
Private	1%	3%	6%	17%	14%
Foreign	0%	1%	6%	8%	14%

Hospitality, tour., media, health, and other

State	3%	8%	6%	2%	1%
Bus. G.	90%	75%	75%	66%	59%
Private	1%	9%	12%	26%	33%
Foreign	6%	9%	7%	7%	7%

Financial services, real estate

State	89%	78%	71%	74%	70%
Bus. G.	8%	14%	16%	11%	11%
Private	1%	3%	5%	8%	12%
Foreign	2%	6%	8%	7%	7%

Business, comp., and comm. services

State	74%	65%	50%	58%	53%
Bus. G.	11%	10%	12%	11%	12%
Private	14%	22%	34%	24%	25%
Foreign	0%	3%	4%	7%	9%

(*Table 7 continued*)

Number of firm

Owner/Period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Misc. diversified					
State	2%	1%	1%	1%	1%
Pr. Pre-85	63%	45%	30%	26%	24%
Pr. Post-85	32%	51%	67%	70%	72%
Foreign	3%	3%	3%	3%	3%
Full sample: All industries					
Agri., min.	2%	3%	3%	3%	3%
Food, text.	17%	16%	15%	14%	13%
Chem.R	16%	15%	13%	12%	12%
Metals	19%	17%	16%	15%	14%
Util., cons.	12%	12%	13%	14%	14%
Trans.	2%	2%	2%	2%	2%
Hosp.	3%	3%	3%	4%	4%
Finan.	24%	25%	27%	26%	27%
Bus. comp.	4%	5%	6%	8%	8%
Misc.	2%	2%	3%	3%	3%

Total assets

Owner/period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Misc. diversified					
State		6%	6%	6%	5%
Bus. G.	80%	80%	74%	69%	65%
Private	4%	11%	18%	22%	26%
Foreign	4%	3%	2%	3%	3%
Full sample: All industries					
Agri., min.	3%	5%	3%	3%	3%
Food, text.	10%	8%	9%	8%	8%
Chem.R	11%	8%	8%	6%	5%
Metals	19%	14%	12%	9%	8%
Util., cons.	9%	11%	10%	11%	12%
Trans.	1%	2%	1%	2%	1%
Hosp.	0%	0%	1%	1%	1%
Finan.	43%	50%	53%	55%	55%
Bus. comp.	1%	1%	2%	5%	5%
Misc.	1%	1%	1%	0.5%	0.4%

Total sales

Owner/period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Misc. diversified					
State		6%	7%	7%	6%
Bus. G.	68%	74%	70%	66%	65%
Private	6%	12%	18%	20%	22%
Foreign	12%	8%	5%	8%	8%
Full sample: All industries					
Agri., min.	4%	5%	5%	5%	5%
Food, text.	30%	27%	29%	33%	29%
Chem.R	20%	19%	18%	14%	13%
Metals	28%	26%	24%	20%	22%
Util., cons.	11%	15%	16%	18%	20%
Trans.	1%	2%	2%	2%	2%
Hosp.	0%	0%	1%	1%	1%
Finan.	2%	1%	1%	1%	1%
Bus. comp.	1%	2%	3%	5%	6%
Misc.	3%	2%	2%	1%	1%

Profits (PBDIT)

Owner/period	I 1988–90	II 1991–94	III 1995–98	IV 1999–2002	V 2003–05
Misc. diversified					
State	12%	5%	5%	2%	1%
Bus. G.	75%	78%	75%	67%	71%
Private	5%	12%	16%	22%	20%
Foreign	8%	6%	4%	10%	7%
Full sample: All industries					
Agri., min.	3%	7%	6%	6%	8%
Food, text.	16%	11%	10%	11%	12%
Chem.R	16%	12%	9%	8%	8%
Metals	21%	15%	12%	9%	13%
Util., cons.	8%	11%	10%	12%	12%
Trans.	1%	2%	1%	2%	2%
Hosp.	0%	0%	1%	1%	1%
Finan.	31%	39%	46%	45%	36%
Bus. comp.	2%	2%	3%	7%	9%
Misc.	2%	1%	1%	0%	1%

Source: Prowess dataset.

Note: See Appendix Tables A-2 and A-3 for detailed explanation of variables.

of an economy still dominated by the incumbents (state-owned firms and traditional private firms) and the sectors of the pre-reform period (see Figure 5). The evidence corroborates the arguments in Panagariya (2008).[41]

F I G U R E 5 .   Number of Firms, Assets, Sales, and Profits by Ownership Group (Share of Total)
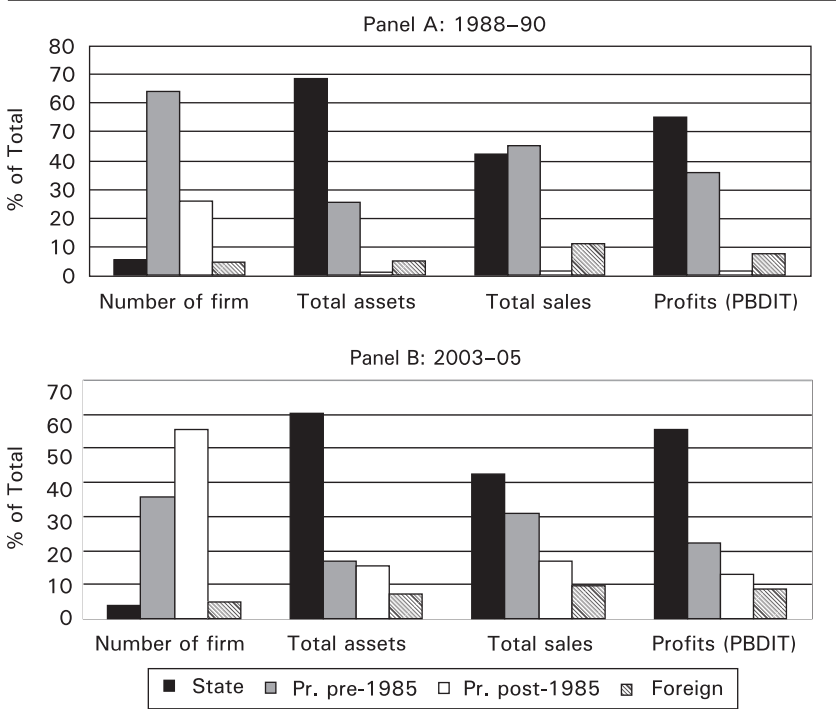
Source: Prowees dataset.

Despite low shares in the number of firms, India's formal sector continues to be dominated by state-owned enterprises and to a lesser extent by traditional private firms in terms of shares of assets, sales, and profits. Between 1988 and 1990, on an average, new private and foreign firms accounted for 26 percent and 5 percent of the total number of firms, respectively, while state-owned firms and traditional private firms accounted for 5 percent and 64 percent of the total number of firms, respectively. Between 2003 and 2005, on an average, the number of new private firms accounted for 56 percent of all firms, while the number of traditional private firms was 36 percent of the total number of firms. The share of the number of state-owned firms

41. The evidence is consistent with a slow and gradual reform process.

and foreign firms remained virtually unchanged at 4 percent and 5 percent respectively. The 60–40 split in the number of firms between the shares of private and foreign firms and the shares of state-owned and traditional private firms is replicated across sectors. The exceptions are business, computer, and communication, where the split is 80–20, which reflects the even higher number of new private firms.

In striking contrast, state-owned and traditional private firms overshadow the shares of assets, sales, and profits. Between 1988 and 1990, state-owned and traditional firms accounted for 94 percent, 87 percent, and 91 percent of total assets, sales, and profits. Between 2003 and 2005, these fractions stood at 77 percent, 73 percent, and 78 percent, respectively. While the rising importance of foreign and private firm activity is evident from the data, it appears that the incumbents from the pre-reform period control nearly three-quarters of the economy in broad terms: state-owned firms and traditional private firms. It is worth pointing out, however, that although the shares of assets, sales, and profits appear largely under the control of incumbent firms, given that the number of private and foreign firms has been increasing across sectors, competition at the margins is probably intensifying alongside of competition from imports in sectors that were liberalized to trade.

The importance of the state-owned firms has remained extraordinarily high suggesting perhaps insufficient reform. Privatization efforts were abandoned after a short spell in the early 2000s and sectors such as manufacturing and financial services remain largely under state control. For example, average total assets of state-owned firms represented close to 70 percent of total assets in 1988–90, and stood at over 60 percent by 2005. Given virtually no privatization, however, we note that while this is not an inconsequential shift, the extent of state control makes India an outlier in the world economy (with the exception of China, of course) (Chong and Lopez-de-Silanes, 2004). Average share of total assets owned by traditional private firms remained relatively constant at 25 percent between 1988 and 1998 while falling to 17 percent by 2005. New private firms' average share of assets in contrast rose from of 1 percent in 1988–90 reaching 15 percent at the end of the period. The share of assets under foreign firms has remained relatively constant throughout the period moving from 5 percent in 1988–90 to a mere 7 percent in 2003–05.

Average sales by state-owned firms remained at close to 40 percent of total sales throughout the sample period, while the average share of traditional firms dipped from 45 percent to 31 percent and that of new private firms rose from 2 percent to 17 percent. Foreign firms represent close to 10 percent of total sales on average remaining relatively stable throughout the period.

Profit shares also remained relatively stable throughout the period for state-owned firms, representing close to 55 percent, and for foreign firms at 9 percent. Traditional private firms and new private firms marked a shift from 36 percent and 1 percent respectively at the beginning of the sample period to 22 percent and 13 percent respectively in 2003–05.

Although there is considerable variation in assets, sales, and profit shares across sectors, an interesting pattern emerges. Sectors dominated by state-owned firms before liberalization (with fractions higher than 50 percent to 60 percent) remain the dominant ownership groups following liberalization. For example, in agriculture, state-owned firms represented close to 95 percent of all assets, sales, and profits in the period 1988–90. By 2003–05, state-owned firms still represented close to 90 percent of assets, sales, and profits. Similarly, in utilities, construction and retail and transport state-owned firms accounted for more than 70 percent and 50 percent of assets respectively in the period 1988–90 and in 2003–05, with similar shares for sales and profits. Traditional private firms led chemicals and plastic manufacturing, metals and industrial manufacturing, and activities in the miscellaneous diversified groups.

Interestingly, while in all sectors the share of new private and foreign firms has remained low, they have gained importance in recent years. In particular, an important exception to state and traditional private-firm dominance is seen in business and business, computer, and communication where new private firms accounted for close to 40 percent of asset shares in 2003–05. Shares of total sales and profits display a similar pattern. These activities therefore represent not only growth in terms of numbers of firms but also in terms of importance in assets, sales, and profit shares. The firm-level evidence in these industries mirrors the services growth in the aggregate data, especially after 2000.

Activities in manufacturing such as food and textile and paper manufacturing, chemical and plastics manufacturing, and metals and industrial manufacturing still dominate sales. While these sectors still represent a high share of assets, it is the financial service and real estate activities that dominate assets. In food and textile and paper manufacturing, and metals and industrial manufacturing, state-owned firms account for 38 percent and 24 percent of assets; 58 percent and 16 percent of sales and 43 percent and 25 percent of profits in the current period down from 50 percent and 51 percent of assets; 60 percent and 33 percent of sales and 47 percent and 38 percent of profits. Chemicals and plastics manufacturing, however, remains dominated by traditional private firms which still account for more than 50 percent of assets, sales, and profits. The combined role of private and

foreign firms in assets, sales, and even profits peaked at close to 40 percent in recent years in chemicals and metals and close to 20 percent in food and textile. Overall, for activities in the manufacturing sector, the picture remains one of a sector dominated by incumbents (state-owned firms and traditional private firms).

In the financial services sector, state-owned and traditional private firms accounted for 97 percent of total assets, sales, and profits in 1988–90. These shares stood at 80 percent, 83 percent, and 81 percent, respectively, in 2001–05.

Table 8 presents information by year of incorporation (between 1947–77, 1977–90, and 1991–05) for number of firms, firm size, assets, sales, employment, profitability, and rate of return and their evolution in the different periods of study.[42] The oldest firm in the sample (Howrah Mills Company Ltd) was incorporated in 1825, and the sample begins with over 1,200 firms

T A B L E   8 .   Year of Incorporation

	I	*II*	*III*	*IV*	*V*
Incorporation/Period	*1988–90*	*1991–95*	*1996–98*	*1999–2002*	*2003–07*
Pre-independence					
Number of firms	1,018	1,002	950	883	785
Assets (Rs crore)	162	285	367	436	445
Sales (Rs crore)	91	67	79	73	67
PBDIT (Rs crore)	15	23	32	36	33
ROA	11	11	10	5	−1
c1947–85					
Number of firms	1,177	1,159	1,098	1,022	912
Assets (Rs crore)	135	102	120	126	122
Sales (Rs crore)	80	48	58	61	65
PBDITA (Rs crore)	13	10	13	12	13
ROA	13	12	9	5	6
c1985–2007					
Number of firms	365	827	1,293	1,357	1,268
Assets (Rs crore)	101	27	34	52	48
Sales (Rs crore)	25	7	11	19	18
PBDIT (Rs crore)	10	3	3	5	4
ROA	10	8	6	2	−1

Source: Prowess dataset.
Note: See Appendix Tables A-1 and A-2 for detailed explanation of variables.

42. A point about firm-exit is worth noting. The dataset contains a code for firms that exited the data via mergers and acquisitions. However, the data do not contain a flag for firms shutting down versus discontinued coverage. Therefore, when we no longer observe data for a firm, we assume firm-exit. But again, this may also reflect discontinued coverage by Prowess or the failure of unlisted firms to provide data about their operations. Results should, hence, be interpreted with caution.

that were incorporated before independence. From this group 91 firms exit the sample through mergers. Many of these older firms (pre-independence), however, remain in operation following the reforms.[43] An industrial shake-out perhaps characteristic of a creative destructive wave following widespread reform is not manifest in the data.

Overall, the facts presented in the section "Evidence," the low number of state-owned and business group-affiliated firms combined with their dominant shares of assets, sales, and profits, is suggestive of high industry concentration by incumbents.

Using data on product lines, Goldberg et al. (2009) find the contribution of the net product margin to total output growth, following liberalization in India, to be driven almost exclusively by product additions, and not by discontinuation of product lines that have become obsolete.[44] The authors argue that product churning or "creative destruction" along the product dimension did not happen in India in the 1990s, despite the fact that firms were undergoing major trade and other structural reforms during this period.[45] In relation to these findings, our results suggest that creative destruction in firm-entry and exit, where new entrants replace incumbent firms, does not appear to characterize firm-activity in the Indian context following liberalization. Consistent with the addition of product lines in Goldberg et al. (2009), there was substantial firm-entry across all sectors and in particular in the services sectors. However, it does not appear that firm-entry was also accompanied by a decline in the importance of incumbent firms. This may simply be because the incumbent firms restructured and became competitive. In industries such as airlines, banking, and telecommunications, incumbent firms have restructured with a significant rise in their productivity.

43. The data also suggest that the profitability of older firms (incorporated before 1985) surpasses that of newer firms (incorporated after 1985). This finding may in part reflect survivorship bias (surviving older firms) and the fact that young firms may have lower returns in their early years.

44. For recent theoretical models that focus on the relationship between trade costs and product-mix predict that firms adjust to a decline in trade costs through product dropping, see Bernard et al. (2006, 2010).

45. Goldberg et al. (2008, 2009) examine whether Indian firms change their extensive product margin in response to India's large-scale tariff liberalization during the 1990s. Their analysis suggests that despite the regulatory constraints, changes in firms' product-mix made a noticeable contribution to growth; on net, they account for approximately 25 percent of the increase in Indian manufacturing output during our sample period. However, in contrast to the US, only 30 percent of Indian firms show a change in their product-mix over a 5-year period. Firms in India infrequently drop a product or simultaneously add and drop a product. See Bernard et al. (2006, 2010) for evidence in US.

Alternatively, incumbent firms, especially state-owned firms, may continue to operate because they remain heavily subsidized by the state.

The next section examines the evolution of industry concentration and firm size across industries and ownership shares and the impact of various liberalization measures enacted in 1991.

Maintaining Control: Market Share and Concentration

In order to understand the efficient allocation of resources, we look at market dynamics with regard to promotion of competition. We measure the degree of competition (consolidation) as a measure of competitive efficiency to examine how industrial concentration has evolved over time.

Table 9 includes information on industry concentration (the Herfindahl index)[46] and dispersion measures (coefficient of variation calculated by assets and sales). Underlying average market share values are calculated for a given firm across the years in a sub-period and then the Herfindahl index is calculated by industry for a given sub-period. It may be noted that the Prowess database provides four-and-five-digit industry classifications for most firms. However, because the liberalization policies were enacted at the 3-digit level, industry concentration accordingly is computed at the 3-digit level. We present data for the full sample first and then by the different forms of ownership.

For the overall economy, Table 9 shows a reduction in market concentration for the average firm throughout the sample period. The Herfindahl indices suggest an increased degree of competition among firms in India. This finding is consistent with the earlier evidence on increased firm-activity and overall higher dynamism in the economy. However, despite the evidence about increased levels of competition, even for 2001–05, the concentration measures remain high. Chari and Gupta (2008) compare the industrial structure in India with that of the United States (taken as a benchmark of a country with fewer regulations and more developed financial markets). They find that in 1990, a year before the reforms, the average Herfindahl index in India was significantly higher (40 percent) than in the United States (24 percent) for the same 3-digit SIC industries, while concentration in industries that remained protected was significantly higher than their US counterparts (54 percent versus 22 percent).

---

46. The Herfindahl index is an indicator of the degree of competition among firms in an industry. It is defined as the square of the market shares of each firm in an industry. The value of the Herfindahl index can range from zero in perfectly competitive industries to one in single-producer monopolies). All data are first expressed in constant rupees crore.

T A B L E 9 .   **The Evolution of Firm Size and Market Concentration (Constant Rs Crore)**

	1989–90	1991–95	1996–98	1999–2002	2003–07
			Full sample		
Herfindahl index	0.43	0.38	0.33	0.32	0.31
Firm profits	13.39	12.21	11.88	12.21	10.85
Firm size (assets Rs crore)	137.66	126.20	118.23	132.55	116.65
Firm size (sales Rs crore)	85.62	49.79	43.41	47.10	43.34
Coefficient of variation of firm size (assets)	2.09	2.77	3.71	4.17	4.78
Coefficient of variation of firm size (sales)	1.99	3.55	5.51	6.24	9.83
Number of firms	11,394	14,608	17,544	17,767	16,318
Number of industries	115	116	119	122	121
			State-owned firms		
Coefficient of variation of firm size (assets)	2.02	2.63	3.39	3.78	4.21
Coefficient of variation of firm size (sales)	1.89	3.55	5.67	5.97	8.59
Number of firms	645	661	691	692	636
Number of industries	81	82	85	85	84
			Private firms (before 1985)		
Coefficient of variation of firm size (assets)	2.19	2.88	3.83	4.28	4.82
Coefficient of variation of firm size (sales)	2.08	3.67	5.61	6.38	10.12
Number of firms	7,564	7,436	7,035	6,552	5,843
Number of industries	111	111	111	111	111
			Private firms (after 1985)		
Coefficient of variation of firm size (assets)	2.04	2.73	3.71	4.18	4.86
Coefficient of variation of firm size (sales)	1.94	3.52	5.51	6.27	9.97
Number of firms	2,664	5,858	8,983	9,646	9,069
Number of industries	103	110	115	118	118
			Foreign firms		
Coefficient of variation of firm size (assets)	1.91	2.45	3.13	3.44	3.96
Coefficient of variation of firm size (sales)	1.85	3.06	4.65	5.01	7.00
Number of firms	521	654	835	877	771
Number of industries	76	81	89	90	88

Source: Prowess dataset.
Note: See Appendix Tables A-1 and A-2 for detailed explanation of variables.

The coefficient of variation (for both sales and assets) indicates increased dispersion. Overall, consistent with theory, what emerges is a picture of the average firm in India growing bigger, in terms of assets, sales, and profits, perhaps with some gaining more than others as heterogeneity increased substantially in the period. The finding also suggests a decline in the traditional dominance of small firms in India.

In terms of the different ownership groups, for the average state-owned firm, dispersion has also increased. Overall, the average state-owned firm has grown bigger, more profitable and somewhat more dissimilar. This may largely reflect greater involvement of the state in the commanding heights of the industry and its monopoly in certain sectors. The share here refers to the fraction of assets (sales) owned by state-owned firms relative to the total assets (sales) in a particular industry. For traditional private firms, dispersion also increased during the period. In sum, the average traditional private firm has become more profitable, bigger, and more disperse (particularly during the last sub-periods of the data). For new private firms, there is a substantial increase in heterogeneity in this group, which characterizes a great many firms. As for foreign firms, they too show increased dispersion.

The previous discussion portrays the evolution of firms in India from 1988–2005, a period characterized by substantial reforms. These reforms took many forms (liberalization of FDI, trade, domestic markets, etc.) at different times as different sectors were liberalized each at a difference pace. Although a formal causal analysis of the effect of these policies is beyond the scope of this paper, Tables 10a–10c describe how firms evolved before and after in industries that enacted specific reforms: liberalization of foreign direct investment, trade liberalization, and domestic market deregulation.[47]

Table 10a shows measures of industry concentration, and dispersion averaged across sectors that were for the period before FDI liberalization in the first column and after FDI liberalization in the second one. The FDI reforms in 1991 reduced barriers to foreign entry in a subset of industries. Specifically, according to the Industrial Policy Resolution of 1991, automatic approval was granted for foreign direct investment of up to 51 percent in 46 of 96 3-digit industrial categories (Office of the Economic Advisor, 2001). In the remaining 50 industries, the state continued to require that foreign investors obtain approval for entry. The top panel of the table shows the results for the whole sample and the lower ones by ownership group.

47. Variations in the number of industries in Table 10a before and after liberalization reflect entry or exit by different owner categories into industries that were liberalized. The number of industries in the results for the full sample gives the maximum number of liberalized industries.

T A B L E 1 0 a.   The Evolution of Firm Size and Market Concentration—FDI Deregulation (Constant Rs Crore)

	Before FDI deregulation	After FDI deregulation
	Full sample	
Herfindahl index	0.26	0.20
Coefficient of variation of firm size (assets)	1.95	2.32
Coefficient of variation of firm size (sales)	1.86	2.36
Number of firms	5,241	6,434
Number of industries	43	43
	State-owned firms	
Coefficient of variation of firm size (assets)	2.02	2.36
Coefficient of variation of firm size (sales)	1.91	2.35
Number of firms	198	193
Number of industries	33	33
	Private (Inc. pre-1985)	
Coefficient of variation of firm size (assets)	2.05	2.39
Coefficient of variation of firm size (sales)	1.94	2.38
Number of firms	3,495	3,402
Number of industries	43	43
	Private (Inc. post-1985)	
Coefficient of variation of firm size (assets)	1.88	2.27
Coefficient of variation of firm size (sales)	1.80	2.35
Number of firms	1,228	2,458
Number of industries	40	42
	Foreign firms	
Coefficient of variation of firm size (assets)	1.84	2.23
Coefficient of variation of firm size (sales)	1.83	2.32
Number of firms	321	381
Number of industries	35	37

Source: Prowess dataset.

Note: See Appendix Tables A-1 and A-2 for detailed explanation of variables. This table provides descriptive statistics of the "before–after" effect of foreign direct investment liberalization on the market share and profitability of firms and concentration ratios in liberalized industries. The sample is restricted to industries that deregulated foreign investment and to two years before (1989–90) and two years after (1992–93) the policy was implemented in 1991.

The sample is restricted to industries that deregulated foreign investment, to 2 years before (1989–90) and to 5 years after (1991–95) the policy was implemented in 1991.

For the average firm, industry concentration declined significantly following the policy change from 0.26 to 0.20 in liberalized industries. Dispersion (both in terms of assets and sales) also increased following the reforms. Industries that were liberalized had lower concentration ratios before liberalization than non-liberalized economies. Concentration falls below the Herfindahl index for the full sample after liberalization suggesting that non-liberalizing industries had and continue to have substantially higher levels of concentration. These results are consistent with findings in Chari and Gupta (2008).

Closer examination reveals substantial heterogeneity across groups. The data shows a significant increase in dispersion across state-owned firms. In the case of traditional private firms as well, dispersion seems to have increased considerably. FDI liberalization (of up to 51 percent ownership stake) in many instances necessitated a local partner. As such, many local business groups stood to gain by the liberalization process (as they were the obvious partner to take in many instances). Similarly, the results show that for new private firms and foreign firms, increase in dispersion was substantial.

Table 10b presents similar results for trade liberalization. First, it is important to note that trade liberalization in 1991 was inversely related to

T A B L E 1 0 b.   The Evolution of Firm Size and Market Concentration—Trade Liberalization (Constant Rs Crore)

	Before trade liberalization	After trade liberalization
	Full sample	
Herfindahl index	0.32	0.28
Coefficient of variation of firm size (assets)	2.27	2.57
Coefficient of variation of firm size (sales)	2.09	2.48
Number of firms	4,255	5,110
Number of industries	35	35
	State-owned firms	
Coefficient of variation of firm size (assets)	2.23	2.55
Coefficient of variation of firm size (sales)	2.06	2.44
Number of firms	182	181
Number of industries	28	28
	Private (Inc. pre-1985)	
Coefficient of variation of firm size (assets)	2.32	2.61
Coefficient of variation of firm size (sales)	2.13	2.50
Number of firms	2,784	2,701
Number of industries	34	34
	Private (Inc. post-1985)	
Coefficient of variation of firm size (assets)	2.24	2.54
Coefficient of variation of firm size (sales)	2.05	2.47
Number of firms	1,055	1,959
Number of industries	32	34
	Foreign firms	
Coefficient of variation of firm size (assets)	2.18	2.48
Coefficient of variation of firm size (sales)	2.10	2.49
Number of firms	234	270
Number of industries	28	29

Source: Prowess dataset.

Note: See Appendix Tables A-1 and A-2 for detailed explanation of variables. This table provides descriptive statistics of the "before–after" effect of foreign direct investment liberalization on the market share and profitability of firms and concentration ratios in liberalized industries. The sample is restricted to industries that deregulated foreign investment and to two years before (1989–90) and two years after (1992–93) the policy was implemented in 1991.

industry concentration before 1991. Second, following trade liberalization, the industry concentration of the average firm in the economy declined significantly five years following the policy change. Third, dispersion also increased following trade liberalization. Looking across ownership types, we find substantial heterogeneity.

Finally, Table 10c shows similar summary statistics for pre- and post-domestic market deregulation. The trends also display substantial heterogeneity across groups. One interesting pattern is that market concentration seems to have diminished for the liberalizing industries more dramatically, following domestic market regulation, than FDI deregulation and in

TABLE 10c.   The Evolution of Firm Size and Market Concentration— Domestic Delicensing (Constant Rs Crore)

	Before domestic delicensing	After domestic delicensing
	Full sample	
Herfindahl index	0.35	0.24
Coefficient of variation of firm size (assets)	1.57	2.03
Coefficient of variation of firm size (sales)	1.54	1.93
Number of firms	3,158	3,789
Number of industries	24	24
	State-owned firms	
Coefficient of variation of firm size (assets)	1.73	2.11
Coefficient of variation of firm size (sales)	1.63	1.94
Number of firms	131	124
Number of industries	16	16
	Private (Inc. pre-1985)	
Coefficient of variation of firm size (assets)	1.60	2.03
Coefficient of variation of firm size (sales)	1.59	1.94
Number of firms	2,139	2,083
Number of industries	24	24
	Private (Inc. post-1985)	
Coefficient of variation of firm size (assets)	1.54	2.03
Coefficient of variation of firm size (sales)	1.48	1.90
Number of firms	705	1,374
Number of industries	32	34
	Foreign firms	
Coefficient of variation of firm size (assets)	1.49	1.89
Coefficient of variation of firm size (sales)	1.58	2.07
Number of firms	181	204
Number of industries	17	18

Source: Prowess dataset.

Note: See Appendix Tables A-1 and A-2 for detailed explanation of variables. This table provides descriptive statistics of the "before–after" effect of foreign direct investment liberalization on the market share and profitability of firms and concentration ratios in liberalized industries. The sample is restricted to industries that deregulated foreign investment and to two years before (1989–90) and two years after (1992–93) the policy was implemented in 1991.

particular trade liberalization (perhaps not very surprising, given the extent of regulation and lingering restrictions).

Overall, preliminary findings suggest that industry concentration and average market shares decline in industries that experienced either de-licensing or FDI and/or trade liberalization. The coefficient of variation in average firm sales and assets increased suggesting that there is greater dispersion in firm size within liberalized industries. Our future endeavor will be to disentangle the precise mechanisms through which specific reforms affect firm activity in liberalized industries.

Conclusion

Between 1986 and 2005, Indian growth put to rest the concern that there was something about the "nature of India" that made rapid growth difficult. Following broad-ranging reforms in the mid-1980s and early 1990s, the state deregulated entry, both domestic and foreign, in many industries and also hugely reduced barriers to trade. While liberalizations are believed to transform economies through competition and the removal of distortions, the effects of liberalization may not be uniform. Some industries may be better equipped for change while others are not. Within industries, new entrants may gain market share, while incumbents go bankrupt. Restrictions may linger in some sectors, and for some firms.

In this paper we analyze the evolution of India's industrial composition by focusing on the micro-foundations of its productive structure: we examine the evolution of India's industrial structure at the firm level following reforms. In addition to changes in the industrial composition, we examine whether entry took place and if so, whether at the expense of traditional incumbents such as state-owned and traditional private firms. Finally, we examine the evolution of firm size, market share, and industry concentration over time and in industries that were liberalized to either domestic or foreign entry or trade.

Using firm-level data, we document dynamism and change in the productive structure following the implementation of economic reforms. Substantial new entry by foreign and private firms went along with high growth in their assets, sales, and profits. In recent years, for example, some new and important private players have emerged in sectors such as information technology services (IT), pharmaceuticals, and telecom. However, despite the substantial increase in the number of private and foreign firms, the overall

pattern that emerges after close to two decades of reforms is one of continued incumbent dominance in terms of assets, sales, and profits: state-owned firms and traditional private firms. In sectors dominated by state-owned and traditional private firms before liberalization (with assets, sales, and profits representing 50 percent or higher shares), these firms remain the dominant ownership group following liberalization. Further, rates of return remain stable over time and show low dispersion across sectors and across ownership groups within sectors.

Certainly, the welfare implications of our findings are not clear-cut, especially in the light of the current international financial crisis and the increased role of the state in private enterprise in the US and other developed countries. It may, however, be hard to justify the extent of state-owned presence that we continue to see in India. Of course it is not clear whether ownership per se matters or whether exposure to competition through liberalization is a sufficient condition for improvements in efficiency.[48]

Recent literature highlights the idea that economic growth may be impeded not simply because of a lack of resources such as capital, skilled labor, and entrepreneurship but also because available resources are misallocated. The high levels of state ownership and ownership by traditional private firms in India raise the question of whether existing resources could be allocated more efficiently and whether remaining barriers to competition jeopardize the effectiveness of reform measures that have been put in place. While rates of return across ownership groups do not display significant dispersion, it is not clear whether the rates of return for the incumbent groups are being driven by monopoly power that comes with high industry concentration, or through inherent efficiency. A related issue that also arises is whether privatization in the context of high industry concentration may simply replace state-owned monopolies with private ones as it has done in the case of many countries in Latin America.

---

48. One might well argue that the slow/uneven reform process and the small private sector could still be setting "marginal incentives." As Schumpeter (1942) notes,

> [Monopolistic] competition of the kind we now have in mind acts not only when in being but also when it is merely an ever-present threat. It disciplines before it attacks. The businessman feels himself to be in a competitive situation even if he is alone in his field or if, though not alone, he holds a position such that investigating government experts fail to see any effective competition between him and any other firms in the same or a neighboring field and in consequence conclude that his talk, under examination, about his competitive sorrows is all make-believe.

As discussed in the paper, the macroeconomic effects of deregulation are theoretically ambiguous. Further empirical work is needed before we can reach definitive conclusions on the impact of deregulation on the overall dynamic efficiency of the economy.[49] An assessment of the optimality of market reforms requires a full welfare analysis that goes beyond the scope of this paper and will be the subject of our future research.

APPENDIX

T A B L E A - 1 . Egypt, India, and Indonesia—Economic Growth (1975–2005)

	1975–85	*1986–95*	*1996–2005*
Real GDP growth rates*			
India	4.1%	6.0%	6.3%
Egypt	8.3%	4.2%	4.3%
Indonesia	6.8%	4.9%	2.8%
Real per capita GDP growth rates*			
India	1.9%	4.3%	4.6%
Egypt	5.8%	2.3%	2.4%
Indonesia	4.6%	3.4%	0.8%

Source: *World Development Indicators*, World Bank.
Note: *Average growth rate of GDP and GDP per capita (constant 2000 US$).

T A B L E A - 2 . Description of Variables

Variables	Definition
State-Owned (SOE)	Firms majority-owned by the federal and state governments.
Traditional Private Firms	Includes firms majority-owned by a business group and private firms not affiliated to a group incorporated before 1985. Indian business groups or family-owned firms are groups of companies that are controlled by the same shareholders, usually all members of a family.
New Private Firms	Includes firms majority-owned by a business group and private firms not affiliated to a group incorporated after 1985.
Foreign Firms	Firms incorporated overseas.
Sales	Sales generated by a firm from its main business activity measured by charges to customers for goods supplied and services rendered. Excludes income from activities not related to main business, such as dividends, interest, and rents in the case of industrial firms, as well as non-recurring income. Data in constant Rs crore (deflated by GDP deflator from World Bank, WDI).

(*Table A-2 continued*)

49. It is also worth emphasizing that this work does not speak to other welfare and efficiency-improving effects of liberalization linked to improved quality and variety of products, or international risk-sharing.

(*Table A-2 continued*)

Variables	Definition
Assets	Gross fixed assets of a firm, which includes movable and immovable assets as well as assets which are in the process of being installed. Data in constant Rs crore (deflated by GDP deflator from World Bank, WDI).
PBITDA	Excess of income over all expenditures except tax, depreciation, interest payments, and rents in a firm. Data in constant Rs crore (deflated by GDP deflator from World Bank, WDI).
Return on Assets	Ratio of *PBITDA* to *Assets* in a firm, averaged across firms in that industry.
Firm Size (Assets and Sales) and Profits	Average firm assets, sales, and profits in an industry. For the full sample, the industry-level averages are averaged across industries. Data in constant Rs crore (deflated by GDP deflator from World Bank, WDI).
SOE Share	The ratio of total sales, assets, profits produced by state-owned firms in an industry to *Industry Sales*, *Industry Assets, Industry Profits* in that industry.
Traditional Firms Share	The ratio of total sales, assets, profits produced by private firms incorporated before 1985 in an industry to *Industry Sales, Industry Assets, Industry Profits* in that industry.
New Private Firms Share	The ratio of total sales, assets, profits produced by private firms incorporated after 1985 in an industry to *Industry Sales, Industry Assets, Industry Profits* in that industry.
Foreign Share	The ratio of total sales, assets, profits produced by foreign firms in an industry to *Industry Sales*, *Industry Assets, Industry Profits* in that industry.
Herfindahl Index	Sum of the squares of the *Market Share* of all firms in an industry in each 3-digit industrial category.
Coefficient of Variation	Ratio of standard deviation to mean of assets, sales, return on assets at the industry level.
Trade Liberalization Measure	Percentage decrease in tariffs at the three-digit industry level between 1986–90 and 1991–95.
NIC Code	3-digit industry code includes manufacturing, financial, and service sectors.

Source: Authors' definitions.

T A B L E   A - 3 .   Industry Classifications

Industry name	3-digit NIC code	No. of firms
1. Agriculture, mining, extraction		
Coal and lignite	101, 102	16
Cotton and blended yarn	11, 14	6
Crude oil and natural gas	111	9
Floriculture	11	27
Granite	141	46
Minerals	101, 103, 120, 131, 132, 141, 142	81
Other agricultural products	11, 12, 14, 20, 142	149
Other construction and allied activities	112	12
Other textiles	11	2
Poultry and meat products	11, 12	16
Processed/packaged foods	11	22
Rubber and rubber products	11	11
Tobacco products	11	5
Vegetable oils and products	11	0
Wood	20	6
2. Food, textile, and paper manufacturing		
Bakery products	154	21
Beer and alcohol	155	95
Books and cards	210, 221, 222	60
Cloth	171	148
Coal and lignite	231	11
Cocoa products and confectionery	154	9
Coffee	154	19
Comp., and storage devices	221	1
Cotton and blended yarn	171	336
Dairy products	152, 154	46
Footwear	192	47
Lubricants, etc.	232	46
Marine foods	151	71
Media-print	221	35
Milling products	153, 155	59
Misc. manufactured articles	232	1
Other agricultural products	155	2
Other industrial machinery	172	1
Other leather products	191	36
Other recreational services	223	2
Other storage and distribution	232	5
Other textiles	171, 172, 173, 181	189
Paper	210	154
Paper products	210	46
Poultry and meat products	151, 154	14
Processed/packaged foods	151, 153, 154, 155	81
Readymade garments	181	120
Refinery	232	12
Starches	153	9
Sugar	154	99

(*Table A-3 continued*)

(*Table A-3 continued*)

Industry name	3-digit NIC code	No. of firms
Synthetic textiles	171, 172	19
Tea	154	173
Textile processing	171	68
Tobacco products	155, 160	20
Vegetable oils and products	151, 152, 153	224
Wood	201, 202	41
3. Chemicals and plastics manufacturing		
Abrasives	269	11
Alkalies	241	13
Cement	269	113
Ceramic tiles	269	44
Comp., and storage devices	252	2
Cosm., toiletries, soaps, and detergents	242	86
Drugs and pharmaceuticals	242	442
Dyes and pigments	241, 242	73
Fertilizers	241	60
Glass and glassware	261	48
Inorganic chemicals	241, 242	86
Misc. electrical machinery	269	3
Organic chemicals	241	134
Other chemicals	241, 242	124
Other non-metallic mineral products	269	29
Other recreational services	252	4
Other textiles	252	1
Paints and varnishes	242	34
Pesticides	241, 242	86
Plastic films	252	40
Plastic packaging goods	252	105
Plastic tubes and sheets, other	252	162
Polymers	241	55
Prod., distribution and exhib. of films	242	0
Refractories	269	32
Rubber and rubber products	241, 251	82
Synthetic textiles	243	100
Textile processing	243	57
Tyres and tubes	251	34
4. Metals and industrial manufacturing		
Air-conditioners and refrigerators	291, 293	16
Aluminum and aluminum products	272	53
Automobile ancillaries	343	307
Castings and forgings	273, 289	123
Commercial vehicles	341	5
Communication equipment	319, 322, 331	45
Computers and peripherals	300	46
Construction equipment	291, 292	39
Consumer electronics	300, 321, 323	34
Copper and copper products	272	30

(*Table A-3 continued*)

Industry name	3-digit NIC code	No. of firms
Domestic electrical appliances	289, 292, 293, 315	52
Dry cells	314	5
Gems and jewelry	369	84
General purpose machinery	291	84
Generators, transf. and switchgears	319	111
Industrial machinery	291, 292, 300	137
Machine tools	292	60
Metal products	271, 281, 289, 361	218
Misc. electrical machinery	291, 292, 312, 319	44
Misc. manufactured articles	369	68
Other electronics	314, 319, 321, 322	194
Other industrial machinery	291, 292	24
Other non-ferrous metals	272	30
Other transports equipment	351, 352, 353, 359	38
Passenger cars and multi-utility vehicles	341	8
Pig iron	271	10
Prime movers	281, 291	24
Sponge iron	271	21
Steel	271	327
Steel tubes and pipes	271	85
Storage batteries	314	8
Tobacco products	369	4
Tractors	292	9
Trading	293	1
Two and three wheelers	359	16
Wires and cables	313	80
5. Utilities, construction, retail		
Copper and copper products	511	1
Electricity distribution	401	21
Electricity generation	401	116
Housing construction	452	118
Industrial construction	452	105
Infrastructural construction	452	56
Irrigation	410	3
LNG storage and distribution	402	4
Other construction and allied activities	452, 453	83
Other misc. services	502, 519, 521, 526	180
Other storage and distribution	402	7
Retail trading	521, 523	15
Trading	514, 515, 519	1,293
6. Transport		
Air transport infrastructure services	630	3
Air transport services	621	19
Other storage and distribution	603, 630	30
Railway transport services	601	4

(*Table A-3 continued*)

(*Table A-3 continued*)

Industry name	3-digit NIC code	No. of firms
Road transport infrastructure services	630	10
Road transport services	602	48
Shipping transport infrastructure services	611, 612, 630	10
Shipping transport services	611, 612	63
Tourism	630	19
Transport logistics services	602, 630	63
7. Hospitality, tourism, media, health, and other services		
Animation content provider	924	4
Exhibition of films	924	12
Health services	851	74
Hotels and restaurants	551, 552	203
Media-broadcasting	922	28
Media-content	924	23
Other financial services	753	1
Other misc. services	809, 851, 911, 919	91
Other recreational services	921, 924	46
Production, distribution, and exhibition of films	921	22
Tourism	552	9
8. Financial services, real estate		
Banking services	651	164
Brokers	659, 671	72
Business consultancy	671	21
Commercial complexes	701, 702	167
Computer software	701	5
Drugs and pharmaceuticals	701	0
Financial institutions	659	44
Housing finance services	659	49
Non-banking financial cos. (NBFCs)	659	374
Other financial services	659, 660	1,697
Readymade garments	701	1
Securities and stock traders	659	1,395
9. Business, computer, and communication services		
Business consultancy	743, 749	342
Computer software	722	451
Courier services	641	10
ITES	722	50
Other const. and allied activities	742	5
Other misc. services	731, 741	9
Telecommunication services	642	74
10. Misc. diversified		
Diversified	970	52
Misc. manufactured articles	970	382

Comments and Discussion

Robert Z. Lawrence: This paper gives us an interesting description of a large firm database that reports on the performance of Indian firms along a number of dimensions during a period in which there was both economic reform and considerable economic growth. The aim is obtain deeper insights into how the reform process affects firm behavior to generate that growth.

What the paper actually shows is that the Indian growth acceleration has been associated with less "creative destruction" than one might have imagined and perhaps some might have hoped for. It reveals an Indian economy that is dynamic at the margin, but also, particularly with respect to key corporate players, is rather stable at its core. There is, to be sure, some evidence that accords with expectations about a dynamic transformation: There has been considerable new entry of both domestic and foreign firms and over time markets have become less concentrated. And about a quarter of the firms that were incorporated prior to 1985 and appeared in the data for 1988–90 were not present in the data for 2003–05, presumably because they either merged or went out of business.

Nonetheless, the traditional asset-intensive incumbents remain dominant in the economy. This is true both of those that are state owned and those that were already around in 1985. In addition, "rates of returns are stable over time and show low dispersion across sectors and across ownership groups within sectors." Given their high profits, one is led to speculate that without policy changes, the dominant role of both state-owned firms and those that existed in 1985 is likely to persist. On the other hand, while new foreign investors have done particularly well, domestic private newcomers are by and large a group whose average returns have been low and declining.

The strength of the paper is that the authors are modest about what they have found and do not make exaggerated claims for what they have accomplished, but the weakness is that as a reader one still remains uncertain about what exactly to make of the findings. Indeed, for the paper to be useful for policy we need lots more work. In particular, what strikes me about the findings is that in their current state they could be used to support some very different viewpoints.

For example, take the finding that Indian growth has been associated with a dominant role played by incumbents. One interpretation is that since

India was able to grow so fast with relatively little creative destruction, perhaps the merits of creative destruction have been oversold. Maybe the Indian model with large incumbents and state-owned firms at its core is actually a good one. Maybe the high and steady profits of the state-owned enterprises indicates they are efficient and have successfully engaged in activities the private sector might not have been able to undertake. Maybe the similar rates of profits across sectors and firms within sectors indicate that resource allocation is actually quite efficient. Maybe the regime, prior to reform, actually constrained large and more efficient firms, and the success of the reforms was not in destroying the large firms but allowing them to realize their potential. Similarly, perhaps creative destruction, particularly if it involved exit and entry could be oversold and the very stability of Indian firms has allowed them to invest and innovate.

On the other hand, you could say that if India has been able to grow that fast without serious structural changes, with state-owned and other large firms exercising monopoly control and reform only tinkering at the edges, imagine how much faster it might grow with more extensive reforms and even more intense competition. The extent and pervasiveness of state-owned firms in India certainly is surprising. If the high profits earned by state enterprises reflect monopoly power that also limits growth, accelerating privatization might be the answer. Similarly, a much higher dispersion in profit rates should be expected if resources are transferred to uses with larger payoffs. Certainly India's most dynamic sector, that of business, computer, and communications services has been associated with minimal state ownership, major shifts in market shares from old to new firms, and very volatile rates of return. Perhaps it is the exception that proves the rule.

My hunch though is that before we get close to drawing broad conclusions, this data should be exploited to investigate some narrow questions that can be answered with greater confidence. For example, the paper takes a very tentative first step at trying to explore the effects of specific reforms such as liberalizing FDI, reducing tariffs and eliminating licensing on corporate behavior. But they have only scratched the surface by reporting on how affected industries behaved before and after these reforms were implemented. Obviously, a regression analysis is really required to provide better controls in order to isolate the marginal impact of these policies. It would also be interesting to match these data with measures of firm productivity. That might allow us to determine, for example, if the relatively high profitability of state-owned and foreign owned firms reflects market power or greater efficiency.

As told therefore, the authors have done us a service by highlighting the existence of this valuable Dataset, but they have only scratched the surface of what they and others could do in helping us understand the sources of Indian growth, and its policy implications.

Shashanka Bhide: I would like to thank the organizers of IPF for giving me this opportunity to comment on the very interesting paper by L. Alfaro and A. Chari. The paper has two parts, one on the nature of India and then on the transitions in the industrial sector. The paper points to much less churn in the industry on a variety of indicators in a period of economic reforms than what is usually assumed.

The paper looks at the period from 1988 onwards and if one were to think of changes in the economy leading up to the large-scale reforms of the 1990s, we may have to look at the period covering a few more years before 1988. Although the choice of the period of analysis is limited by the available data, there is a need to examine the previous few years even if based on other studies. Mookherjee (1995) provides a good summary of industrial policy and trends leading up to the economic and industrial reforms. One important reason for looking at a year before 1988 to place the significant changes in the economy is to mark the changes marked by the noticeable rise in the manufactured consumer products produced by the industry.

There have been changes in the economy that may have significance to the changes in the industrial structure. I would like to point to some of these transformations.

The percentage share of agriculture in gross fixed capital formation dropped from about 45 percent in 1951 to 25 percent in 1981. It dropped to 20 percent in 1991 and 15 percent in 1999. There has been a drop of 5 percentage points in each decade in the 1980s and 1990s but actually a faster drop in the previous three decades. The pace of industrialization, therefore, was not slower in the early years.

The share of industry has been a mirror image of agriculture, its rise actually a little more spectacular than agriculture's decline.

One may argues that at the aggregate level, the reforms of the 1980s and 1990s have essentially taken the transformation forward. The sources of overall growth remain the same: services and industry rather than agriculture.

However, there are important differences at the disaggregate level.

One difference is in the case of the role of public sector. The share of public sector (including government) in gross fixed capital formation

(nominal) first rose from about 27 percent in 1951 to 50 percent in 1965 reaching the commanding heights, dropped, and rose again steadily back to 50 percent in 1981. It then dropped to 46 percent by 1987–88, 40 percent in 1990, and to 25 percent in 2001–02. The decline in the share of public sector had begun in the early 1980s. What is of interest is that the GCF in private sector was rising steadily throughout this period.

The public sector could not keep up its role in the transformation of the economy from an essentially agrarian structure to industrial, once the policy regime began to turn more liberal. The private sector was able to play the role as much under the restricted regime of planning as under the reforms.

It is, therefore, not surprising that with the delicensing and liberalization of other economic policies, the firms in the private sector became more dynamic and private sector became more dynamic. The much lamented "industrial sickness" sort of dropped off the radar of research starting from the late 1990s. Mookherji volume has the influential piece by Anant and Goswami (1995) pointing to the reasons for stagnation in markets.

If the result of the reforms of the 1990s—more dynamic markets—was any different, it would have been quite startling. But I would like to note that the reasons for outcome are not limited to industrial policy. The liberalization of capital markets, credit market, and better fiscal policies were equally important.

The paper provides an interesting description of changes in the organized sector of the economy, the sector which has delivered high growth in the recent two decades.

The paper has examined the evolution of India's industrial structure with respect to composition (ownership), entry of firms, and whether the entry of new firms is at the expense of the incumbents: state or business groups. It examines the evolution of firm size, market share, and industry concentration.

It finds substantial new entry by foreign and private firms; high growth of assets, sales, and profits. However, even after two decades of reforms, there is continued dominance of traditional incumbents. In each of the sectors, there are state enterprises and in each case, their number has increased. The "transformation" has indeed been by stealth and appears to have been designed to be non-destabilizing.

The share of private sector in terms of numbers has generally been about 70 percent throughout the period of analysis and their share of assets is about 8 percent. This raises the question, how different are the results across ownership groups of firms? Only in the case of Business services and IT, the share of private sector in assets is touching 30 percent.

There is an interesting table on the characteristics of firms by year of incorporation. Are the reform era firms any different from their immediately earlier generation? They appear to be of about the same size in terms of assets and sales. The distinct thing seems to be that they employ less labor and they earn negative returns on assets.

I would like to point out some results of analysis based on one of my analysis of the ASI data (Bhide and Kalirajan, 2004).

1. Decomposition of growth in employment in organized manufacturing: Average annual growth rates (percent):

Period	No. of factories	Output per factory
1973–80	2.20	6.77
1980–90	5.86	1.23
1990–98	5.18	2.50
1993–98	6.95	2.06
1973–98	4.72	3.04

- The growth in the number of factories was very high in the decade of 1970s. The post-reform period did see a faster growth in the number of factories as compared to the period of 1980s.
- The output per factory was very rapid in the period after the 1970s, both pre-reform and post-reform. It may have accelerated slightly in the period after the 1993–94.
- Both the scale (output per factory) and spread (number of factories) effects of the reforms appear to be significant. But the scale effect is stronger.

2. Determinants of output per factory and number of factories: A regression analysis suggests that

- The output per factory is more sensitive to overall growth (GDP) (positive) and (trade/GDP) ratio (negative).
- The number of factories is not statistically significantly affected by overall growth and (trade/GDP) ratio. The dynamics is really in the size of factory rather than entry and exit.

I will point to another strand of analysis which provides a decomposition of output growth in terms of number of firms, input growth per firm, and improvements in technical efficiency and technical progress. Perhaps growth is needed in all three components to sustain the growth momentum. The

mere growth in the size of firms may only tell us that there are constraints to the entry and exit.

One final point. Actually for quite some time after the industrial reforms, there was a great concern that the industrial sector actually did not respond to any of these reforms, especially in terms of pace of growth of industrial output. The performance was pretty much "in the nature of India." The immediate post-1991 period, the years in which the reforms were launched, was also a period of weak performance particularly for the manufacturing sector. Some of this is attributed to the impact of competition arising from trade reforms. India saw very small improvement in the UNIDO Industrial Competitiveness Index between 1985 and 2002 while China's numbers surged.

The paper makes a very important contribution to our understanding of the behavior of the firms during the period of reforms.

General Discussion

Pranab Bardhan raised three issues. First, the decline in the value of the Herfindahl index observed by the authors is surprising since a study by the OECD a couple of years back using the ASI data found no change in the value of the index. Second, there is some doubt about the claim in the paper that the firms in the Dataset represented 70 percent of the industrial output. Even the ASI data, which include all firms in the organized sector, do not represent 70 percent of industrial output. Finally, the authors refer to a political-economy factor whereby incumbent firms oppose liberalization. But surely, incumbent firms also want access to foreign inputs and capital goods at cheaper prices. This factor would work in favor of liberalization unless the incumbent firms are fully vertically integrated. It is doubtful that business groups like Tata and Reliance are against liberalization.

Arvind Panagariya followed Bardhan with three points of his own. For Panagariya, the broad message of the paper seemed to be that little transformation has happened in terms of industry structure. However, in his opinion, this conclusion did not meet the "smell" test. He stated that even a casual look at some of the industries that were subject to clear and systematic liberalization, would provide evidence of major transformation. One of the examples he highlighted was that of the airline industry. Panagariya described how the entry of private airlines (upon receiving the go-ahead from the government) significantly transformed the airline industry, into one with a multitude of players and options for flyers. Telecommunications

was another area subject to a similar transformation. Panagariya noted how, following the entry of private operators, there had been a surge in the number of phones, from a lowly three per hundred in 1999–2000, to the current figure, which exceeds forty. A similar change was seen in the auto industry, abetted mainly by the dismantling of the license raj and the entry of foreign firms. Information technology, banking, construction, and pharmaceuticals likewise, experienced major transformation. Panagariya's second point expressed the importance in distinguishing between reformed and unreformed sectors. He stated that a contrast had to be made between products subject to small-scale industries (SSI) reservation and others. Panagariya stated that the dismantling of the SSI reservation did not begin until 1998, and that even after this dismantling, labor laws probably remained a barrier to the entry of new large firms. Finally, Panagariya referred on trade data disaggregated down to six-digits within the harmonized system, which showed a vast number of new products appearing on both the export and import side. This to him suggested a major transformation of the economy and he concluded his comments by expressing the view that the idea that there was little industrial transformation in an economy growing at 8–9 percent a year went against basic intuition.

Kaushik Basu urged the authors to look into breaking up time periods differently. He noted that period 1991–95 could not be viewed as representing the post-reform period since the reforms were largely implemented in 1992 and in the immediately following years the economy was still recovering from the crisis that had hit. The impact of reforms was more likely to be captured in the data during 1994–97 when economic growth did accelerate.

Picking on Basu's point, Isher Ahluwalia stated that the use of terms pre-liberalization and post-liberalization is a tricky affair. Recall that licensing on consumer goods did not go away until as late as 2001. Even though many policy changes had been made during the 1990s, investors perhaps remained unconvinced that the changes will stick until almost the turn of the century. They perhaps also held out for strategic reasons, seeking more concessions from the government in terms of devaluation, building of infrastructure, and the like. It was only around 2001 that reforms became credible and real action on investment began. Even so, different states have played their complementary roles differently so that Punjab is not the same as Karnataka, Andhra Pradesh, Maharashtra, and Gujarat.

Surjit S. Bhalla stated that the turn around in India at the turn of the century was rooted in a major reduction in the real interest rates that began in 1999. By 2004, this reduction had cumulated to 6 percentage points. Bhalla also

noted that if one went by the turnover in the ownership of top twenty firms, India ranks second only to the United States. By this measure, suggested by Tarun Khanna who studied ownership of top twenty firms in years 1939, 1969, and 1999, there is great dynamism in the Indian economy.

Sugata Marjit suggested that it might be worthwhile to relate the entry and exit to trade orientation of industries. One would not expect much exit in exportable sectors while importable sectors would have both entry and exit. These asymmetries may be reflected in the movements in the concentration ratios as well.

Poonam Gupta noted that the CMIE data has the major limitation that firm coverage in the earlier years is poor relative to later years. Madhav Raghavan replied that when new firms are added, CMIE does go back up to 1988 or 1989 to fill whatever information gaps can be filed based on the available balance sheets for prior years. Rohini Somanathan echoed Poonam Gupta, however, saying that when she used the CMIE data, she found lots of gaps in information for many firms. On a different subject, Somanathan noted that she was struck by the variance in the performance of public sector firms: while the public sector player in steel has done phenomenally well, one in the airline industry has done very poorly.

Suman Bery made three points. First, he drew a contrast between lobbying power of public sector units (PSUs) in India and China. According to the OECD, PSUs in China have suffered the brunt of the adjustment policies through privatization or liquidation. In contrast, in India, as in the recent case of Air India, PSUs are successfully able to lobby for themselves. It needs to be investigated why PSUs in India are so successful at lobbying. Second, how do we think about continued dominance of Chaebols (conglomerates) in South Korea? There is a lot of dynamism in terms of product innovation and growth but it is always within that the sources remain the same Chaebols. Under such circumstances, what kind of smell test does one employ to find out whether true competition has set in or monopoly is reappearing under a different guise each time. Finally, India is placing a lot of faith in public–private partnerships. But given the chilling portrait of what went on in the United States that Robert Z. Lawrence has painted, is this the right way to go?

Robert Z. Lawrence responded that what turned absolutely toxic in the United States was the combination of public ownership and no regulation of publicly owned entities such as the Fannie Mae and Freddie Mac. This combination allowed the firms to engage in all kinds of uncontrolled "innovation" with implicit government guarantee against losses and eventual bankruptcy. Because they had this guarantee, their cost of capital was lower than their

private sector counterparts. They used the advantage to maximize profits by investing into riskier and riskier assets. In retrospect, such a guarantee must come with regulation against moving into riskier and riskier ventures. I think this is the broader lesson of the 1930s and how the United States got deposit insurance for banks on the one hand, which gave banks certain advantages in raising capital, and bank regulation on the other. So, when we talk about private–public partnership, the real challenge is how the government structures them and what incentive systems it sets up. As economists, we know if you do not allow the incentives appropriately and you provide the private players an opportunity to take advantage of the public guarantee, you are going to get into deep trouble. There is a lot of advantage in private participation but it is very important to be very careful about the incentive system under which they operate.

In her response, Anusha Chari selectively answered a few of the questions raised by formal discussants and during the general discussion. She began by stating that this was the first stab at the data by her and her co-authors and that they tried to put together a set of stylized facts that can provide a basis for informed discussion. How we divide data into different time periods and how data are average of all issues open to discussion and debate. Chari appreciated Robert Z. Lawrence's suggestion regarding an analytical framework as also conducting comparison over time in terms of real rather than nominal magnitudes. She also noted that the paper emphasizes variation across industries. In particular, it finds considerable dynamism in many services sectors. In these sectors, we do observe greater fractions of sales and assets being accounted for by private and foreign firms. Finally, responding to a point made by Shashank Bhide, Chari noted that consistent with what he said, Tables 9 and 10 of the paper showed an increase in the average size of the firms.

References

Aghion, P., R. Burgess, S. Redding, and F. Zilibotti. 2008. "The Unequal Effects of Liberalization: Evidence from Dismantling the License Raj in India." *American Economic Review* 94 (4): 1397–412.

Alesina, A., S. Ardagna, G. Nicoletti, and F. Schiantarelli. 2005. "Regulation and Investment." *Journal of the European Economic Association* 3 (4): 791–825.

Alfaro, L., A. Charlton, and F. Kanczuk. 2009. "Plant-Size Distribution and Cross-Country Income Differences." *NBER International Seminar on Macroeconomics* 5 (1): 243–72.

Alfaro, L. and A. Rodríguez-Clare. 2004. "Multinationals and Linkages: Evidence from Latin America." *Economia* 4 (2): 113–70.

Anant, T. C. A. and Omkar Goswami. 1995. "Getting Everything Wrong: India's Policies Regarding Sick Firms." In *Indian Insutry, Policies and Performance*, edited by Dilip Mookherjee. New Delhi: Oxford University Press.

Arnold, J., B. Javorcik, M. Lipscomb, and A. Mattoo. 2008. "Services Reform and Manufacturing Performance: Evidence from India." Mimeo, Oxford University, Oxford.

Bai, C., C.-T. Hsieh, and Y. Qin. 2006. "The Return to Capital in China." *Brookings Papers in Economic Activity* 37 (2): 61–102.

Banerjee, A. 2006. "The Paradox of Indian Growth: A Comment on Kochar et al." *Journal of Monetary Economics* 53 (5): 1021–26.

Bernard, A., S. Redding, and P. Schott. 2006. "Multi-product Firms and Trade Liberalization." Working Paper No. 12782, NBER, Cambridge, MA.

———. 2010. "Multi-product Firms and Product Switching." *American Economic Review* 100 (1): 70–97.

Bertrand, M., P. Mehta, and S. Mullainathan. 2002. "Ferreting out Tunneling: An Application to Indian Business groups." *Quarterly Journal of Economics* 117 (1): 121–48.

Bertrand, M. and K. Francis. 2002. "Does Entry Regulation Hinder Job Creation? Evidence from the French Retail Industry." *Quarterly Journal of Economics* 117 (4): 1369–413.

Besley, Timothy and Robin Burgess. 2004. "Can Labor Regulation Hinder Economic Performance? Evidence from India." *Quarterly Journal of Economics* 19 (1): 91–134.

Bhide, Shashanka and K. P. Kalirajan. 2004. "Impact of Trade Liberalisation on Employment in Indian Manufacturing: Evidence from the Organised Sector." *Journal of Social and Economic Development* VI (1) 1–19.

Black, S. E. and P. E. Strahan. 2002. "Entrepreneurship and Bank Credit Availability." *Journal of Finance* 57 (5): 2807–833.

Blanchard, Olivier J. and Francesco Giavazzi. 2003. "Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Market." *Quarterly Journal of Economics* 118 (3): 879–908.

Bloom, N. and J. Van Reenen. 2007. "Measuring and Explaining Management Practices across Firms and Countries." *Quarterly Journal of Economics* 122 (4): 1341–408.

Bloom, N., R. Sadun, and J. Van Reenen. 2007. "The Organization of Firms across Countries." Mimeo, Stanford University.

Bosworth, B., S. Collins, and A. Virmani. 2007. "Sources of Growth in the Indian Economy." *India Policy Forum 2006/07*, Vol. 3, pp. 1–50. New Delhi: Sage Publications.

Bustos, P. 2009. "Trade Liberalization, Exports and Technology Upgrading: Evidence on the Impact of MERCOSUR on Argentinean Firms." Mimeo.

Caballero, R. and M. Hammour. 1996. "On the Timing and Efficiency of Creative Destruction." *Quarterly Journal of Economics* 111 (3): 805–52.

Chari, A. and N. Gupta. 2008. "Incumbents and Protectionism: The Political Economy of Foreign Entry Liberalization." *Journal of Financial Economics* 88 (3): 633–56.

Chong, S. and L. Lopez-de-Silanes. 2004. "Privatization in Latin America: What Does the Evidence Say?" *Economia* 4 (2): 37–111.

Cole, S. A. 2009. "Financial Development, Bank Ownership, and Growth. Or, Does Quantity Imply Quality?" *The Review of Economics and Statistics* 91 (1): 33–51.

Dinç, I. S. and N. Gupta. 2009. "The Decision to Privatize: Finance, Politics and Patronage." Available online at http://www.bus.indiana.edu/nagupta/decisiontoprivatize.pdf (accessed on May 25, 2010).

Fisman, R. and T. Khanna. 2004. "Facilitating Development: The Role of Business Groups." *World Development* 32 (4): 609–28.

Goldberg, P., A. Khandelwal, N. Pavcnik, and P. Topalova. 2008. "Imported Intermediate Inputs and Domestic Product Growth: Evidence from India." Working Paper No. 14416, NBER, Cambridge, MA.

———. 2009. "Trade Liberalization and New Imported Inputs." *American Economic Review* 99 (2): 494–500.

Goldberg, P. and N. Pavcnik. 2004. "Trade, Inequality, and Poverty: What Do We Know? Evidence from Recent Trade Liberalization Episodes in Developing Countries." *Brookings Trade Forum*, Washington, DC.

Government of India. 2000. *Informal Sector in India: Approaches for Social Security.* New Delhi: Government of India.

Guiso, L., P. Sapienza, and L. Zingales. 2004. "Does Local Financial Development Matter?" *Quarterly Journal of Economics* 119 (3): 929–69.

Gupta, N. 2005. "Partial Privatization and Firm Performance." *The Journal of Finance* LX (2): 987–1015.

Harrison, A. and A. Rodríguez-Clare. 2009. "Trade, Foreign Investment, and Industrial Policy." In *Handbook of Development Economics,* Vol. 5, edited by D. Rodrick and M. R. Rosenzweig. Amsterdam: Elsevier.

Henry, P. 2007. "Capital Account Liberalization: Theory, Evidence, and Speculation." *Journal of Economic Literature* 45 (4): 887–935.

Hsieh, C.-T. and P. J. Klenow. 2009. "Misallocation and Manufacturing TFP in China and India." *Quarterly Journal of Economics* 124 (4): 1403–48.

Khanna, T. and K. Palepu. 1999. "Policy Shocks, Market Intermediaries and Corporate Strategy: The Evolution of Business Groups in Chile and India." *Journal of Economics & Management Strategy* 8 (2): 271–310.

———. 2005. "The Evolution of Concentrated Ownership in India: Broad Patterns and a History of the Indian Software Industry." In *A History of Corporate Governance around the World: Family Business Groups to Professional Managers*, edited by Randall Morck. Chicago: University of Chicago Press.

Klenow, P. 2008. "Discussion on Big Answers for Big Questions: The Presumption of Macro." The Brookings Institution Conference on What Works in Development? Thinking Big and Thinking Small, May.

Kochhar, K., U. Kumar, R. Rajan, A. Subramanian, and I. Tokatlidis. 2006. "India's Pattern of Development: What Happened, What Follows." *Journal of Monetary Economics* 53 (5): 981–1019.

Kose, A. M., E. Prasad, K. Rogoff, and S.-J. Wei. 2006. "Financial Globalization: A Reappraisal." Working Paper No. 12484, NBER, Cambridge, MA.

Krishna, P. and D. Mitra. 1998. "Trade Liberalization, Market Discipline and Productivity Growth: New Evidence from India." *Journal of Development Economics* 56: 447–62.

Lileeva, A. and D. Trefler. 2007. "Improved Access to Foreign Markets Raises Plant-Level Productivity… for Some Plants." Mimeo.

Lucas, R. E., Jr. 1985. "On the Mechanics of Economic Development." Marshall Lecture, delivered at Cambridge University, Cambridge, UK.

Megginson, W. L. and J. M. Netter. 2001. "From State to Market: A Survey of Empirical Studies on Privatization." *Journal of Economic Literature* 39 (2): 321–89.

Melitz, M. J. 2003. "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity." *Econometrica* 71 (6): 1695–725.

Melitz, M. and G. Ottaviano. 2008. "Market Size, Trade, and Productivity." *Review of Economic Studies* 75 (1): 295–316.

Mookherjee, Dilip. 1995. *Indian Industry, Policies and Performance*. New Delhi: Oxford University Press.

Office of the Economic Advisor. 2001. *Handbook of Industrial Policy and Statistics.* New Delhi: Government of India.

Panagariya, A. 2004. "India in the 1980s and 1990s: A Triumph of Reforms." IMF Staff Country Reports, pp. 1–37.

———. 2008. *India, the Emerging Giant*. New York: Oxford University Press.

Rajan, R., Zingales, L. 2003a. "The Great Reversals: The Politics of Financial Development in the Twentieth Century." *Journal of Financial Economics* 69 (1): 5–50.

Rajan, R., Zingales, L. 2003b. *Saving Capitalism from Capitalists*. New York: Random House.

Restuccia, Diego and Richard Rogerson. 2008. "Policy Distortions and Aggregate Productivity with Heterogeneous Plants." *Review of Economic Dynamics* 11 (4): 707–20.

Rodrik, D. and A. Subramanian. 2005. "From Hindu Growth to Productivity Surge: The Mystery of the Indian Growth Transition." *IMF Staff Papers* 52 (2): 193–228.

Schumpeter, J. A. 1942. *Capitalism, Socialism and Democracy*. London: Unwin University Books.

Sivadasan, J. 2009. "Barriers to Competition and Productivity: Evidence from India." *The B.E. Journal of Economic Analysis and Policy* 9 (1) (Advances), Article 42.

Srinivasan, T. N. and S. D. Tendulkar. 2003. *Reintegrating India with the World Economy.* Peterson Institute of International Economics.

Stigler, G. J. 1971. "The Theory of Economy Regulation." *Bell Journal of Economics* 2 (1): 3–21.

Topalova, P. 2004. "Trade Liberalization and Firm Productivity: The Case of India." IMF Working Paper, WP/04/28.

Tybout, J. 2000. "Manufacturing Firms in Developing Countries: How Well Do They Do and Why?" *Journal of Economic Literature* 38 (1): 11–44.

World Bank. 2005. *Improving the Investment Climate in India.* Washington, D.C.: South Asia Region and Investment Climate Unit, World Bank.