

## Does Liberalization Promote Competition?

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### Abstract

Theory predicts that deregulation can affect the degree of competition between firms by reducing and redistributing rents, leading to new distributions of firms within industries over time. Using firm-level data from India, this paper investigates the competitive effects of liberalization on firm size and profitability in the manufacturing sector. The data suggest that average firm size declines significantly in industries that liberalized entry: firm entry occurs from the left hand tail of the size distribution with more small firms entering the market while the largest incumbent firms get significantly bigger following deregulation. The marginal entry of small firms is consistent with an increase in competition following entry liberalization. Consistent with a decline in monopoly power, the Herfindahl index of firm sales also shows a significant decline. Further, quantile regressions show significant non-linearity and a heterogeneous impact of deregulation on size: average firm size increases till around the 15<sup>th</sup> percentile, then gets smaller till the 90<sup>th</sup> percentile while firms in the largest percentile (95%) get significantly bigger over the sample period. Policy concerns that small firms would be driven out following deregulation and that foreign firms would displace domestic incumbents do not appear to be borne out by the data.

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## 1. Introduction

Given its large population and historic poverty levels, the rapid transformation of India's economy presents a unique and important opportunity for economists to examine the causes and consequences of the accelerated development and to derive policy lessons from them. Pro-market reforms in the 1990s rapidly removed restrictions on both domestic and foreign entry in significant sectors of the economy previously off-limits to private participation. Importantly, the end of compulsory industrial licensing (also known as the license Raj) in all but a small subset of industries in India and the deregulation of both domestic and foreign entry had far-reaching implications for competition in India's manufacturing. As the economy opened up, data from the Centre for Monitoring the Indian Economy show that thousands of new, private firms were incorporated while many Indian firms established an international presence. Within industries, the shift in policy from autarky to openness has had the capacity to transform the competitive environment in which firms operate.

Theory suggests that the regulation of entry in an industry determines both the entry costs faced by firms, and the degree of competition between firms (Blanchard and Giavazzi, 2005). The transition from a regulated to deregulated environment may imply the decline of incumbent firms as entry costs (regulatory) fall and new firms enter the market. Alternatively, while new firms enter the market, large incumbents may be in a position to consolidate their positions further if the size of the market expands. The deregulation of entry can therefore reduce and redistribute rents leading to new distributions of firms within industries over time.

Briefly, recent research from the macro and trade literature predicts that the deregulation of firm entry will lead to (i) more firms and less incumbent power (Blanchard and Giavazzi, 2003, Alesina et al., 2005); (ii) increases in average firm size and profits through trade liberalization (Melitz and Ottaviano, 2008); (iii) increasing dispersion in sales, assets, profits, (Campbell and Hopenhayn, 2005; Syverssen, 2004), and (iv) increasing turnover and firm age distributions tilting towards younger firms (Asplund and Nocke, 2003).

In this paper we ask whether liberalization promotes competition in the context of the massive reforms implemented in India since 1991 by examining the distributional impact of deregulation on firm size and profitability. We employ firm-level financial statement information from the manufacturing sector to examine the question. We examine deregulation of both domestic entry and foreign entry through foreign direct investment and trade. We also suggest

that small scale reservations which restricted industrial production in several industries to small firms, the licensing of capacity and other constraints such as extensive state-ownership led to a distribution of firm size that was not natural. De-licensing or deregulating entry therefore provides an interesting experiment to examine the impact of removing these restrictions on competition and the distribution of firms.

Note also that the policy concerns with the broad based deregulation measures were two-fold. First, policy-makers were concerned that removing entry restrictions by de-licensing and removing small scale industry reservations would drive out small firms unable to compete with large firms. Second, there was a concern that removing restrictions on foreign entry by either FDI liberalization or relaxing import restrictions via trade liberalization would erode the market power of domestic firms.

In the context of India, we can think of liberalization as increasing market size through trade liberalization and FDI and domestic entry deregulation. A challenge we face in this context, however, is that the period of deregulation in the early 1990s in India coincides with rapid economic growth. In static trade models,<sup>1</sup> on the other hand, average profits and sales increase by the same proportion when market size increases through trade. Thus, average industry profitability does not vary with market size and makes measuring redistribution effects tricky. Therefore, a dynamic model is preferable to examine the effects of deregulation on competition against the backdrop of a growing economy. Our empirical methodology incorporates a time trend to address the concern that the redistributive effects of liberalizing entry occurred in a rapidly growing economy.

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 1989 until 2005. About one-third of the firms in Prowess are publicly-listed firms. The companies covered account for more than 70% of industrial output, 75% of corporate taxes, and more than 95% 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.<sup>2</sup>

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<sup>1</sup> Such as for example, Melitz and Ottaviano (2008).

<sup>2</sup> Section 3 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 10,800 firms across our sample period (1989-2005). We focus on firms are classified across 62 3-digit industries in the manufacturing sector.<sup>3</sup> The data are also classified by incorporation year so that distinctions can be made across firms by age.<sup>4</sup> As a result, the data contain rich detail to characterize changes in firm size distributions, as well as differentiate across types of firms such as incumbents and new entrants. The data also allow us to measure increases in competition may be in several ways—an increase in dispersion in firm size distributions, a reduction in concentration ratios or a decline in average firm size. Similar measures can be applied to firm profitability.

The main results are as follows. First, average firm size declines significantly in industries that liberalized entry (domestic, foreign) consistent with small firm entry combined with import competition. Second, firm entry leads occurs from the left hand tail of the size distribution with more small firms entering the market while the largest incumbent firms get significantly bigger following deregulation. Third, quantile regressions show that the U-shaped shift in the distribution of firm size is non-linear with average firm size increasing till around the 15<sup>th</sup> percentile, and then getting significantly smaller till the 90<sup>th</sup> percentile while the largest percentile (95%) gets significantly bigger over the same time period.

The marginal entry of small firms is consistent with an increase in competition following entry deregulation. The finding is consistent with Blanchard and Giavazzi (2003) as is the reduction in average firm size implying less monopoly power. The increase in the size of the very largest firms is consistent with the prediction from Melitz (2003) as large firms are more likely to be exporters. Policy concerns that small firms would be driven out following entry deregulation and that foreign firms would displace domestic incumbents do not appear to be borne out by the data.

Further, the finding that large incumbent firms grew larger is consistent with licensing regime restrictions. Prior to de-licensing firms could enter freely till a minimum size threshold, however once this threshold was crossed, a license determined how much these firms could

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<sup>3</sup> 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.

<sup>4</sup> Although the liberalization process has been gradual, this does not preclude the analysis of the effects of reducing these constraints on the evolution of the firm-size distributions and profitability.

produce and invest effectively curtailing their size. The capacity caps were therefore likely to have kept down the most successful firms by restricting from expanding. Removing these restrictions through de-licensing could have allowed the most dynamic and efficient incumbent firms to overcome these problems and expand in an unrestricted way. Imported inputs through trade liberalization may also have allowed the large incumbents to become more efficient and grow.

A further comment on the U-shaped pattern observed in the post-liberalization firm size distribution is that de-licensing may well have created a winner takes all competitive environment with the largest firms growing. So while entry is possible and small firms enter, the hollowing out of middle of the size distribution may be the result of this type of dynamic. The distribution with a large number of small firms and a small number of large firms can be characterized as the “missing middle” in Indian manufacturing.

Dispersion in firm size also increases consistent with Melitz and Ottaviano (2008). Consistent with a decline in monopoly power, the Herfindahl index of firm sales also shows a significant decline. While summary statistics suggest a decline in average firm profits, quantile regressions once again show significant non-linearity and a heterogeneous impact of deregulation on profitability.

We estimate a number of specifications to ensure the robustness of the findings. The firm size regressions are estimated for both assets and sales. We use a balanced panel of incumbent firms with and without fixed effects. The fixed effects specification controls for unobserved heterogeneity at the firm-level. We use an unbalanced panel of firms to allow for entry and to examine the distributional impact of deregulation. The specifications include a year trend variable to control for the overall growth in the economy. Finally, standard errors are clustered at the 3-digit NIC3 level to allow for correlations in residuals across firms within an industry.

In previous research (Alfaro and Chari, 2010), using a firm-level dataset, we document detailed stylized facts about the evolution of India’s micro-economic industrial structure against the backdrop of the reforms that began in the mid-1980s. We present information about the average number of firms and firm size (assets, sales) for the firms in our sample by sector as well as by owner-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.

The data in Alfaro and Chari (2010) portray a dynamic economy driven by the growth of private and foreign firms. Consistent with the rapid growth observed after the mid-1980s, overall firm activity measured by the number of firms grew substantially relative to the beginning of the sample period. While one cannot infer causality from summary statistics, the increasing number of private and 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 suggests substantial foreign entry, albeit from very low levels in the pre-reform period. This pattern is broadly mimicked for average assets and sales, by ownership type and sector. The emphasis in Alfaro and Chari (2010) was on firm ownership and also on entrenched incumbents such as state-owned firms and firms incorporated before the reforms began.<sup>5</sup>

The paper has links to several strands of the literature on the Indian economy. Research has focused on different aspects of the recent acceleration in growth shedding light on the transformation of the economy (see for example Bosworth, Collins and Virmani, 2007; Rodrik and Subramanian, 2005; Kochhar et al., 2006; Panagariya, 2008). Other recent work examines the effects of India's nineties liberalization with an emphasis on employment (Aghion, Burgess, Redding, Zilibotti, 2007), bank lending (Cole 2008), productivity (Krishna and Mitra, 1998; Chari, 2010; Khandelwal and Topolova, 2011), product mix and imported intermediate inputs (Goldberg et al. 2008, 2009), and services liberalization (Arnold et al., 2008). In addition, the paper relates to the cross-country literature that emphasizes the effects of policy on the allocation of resources across establishments, by studying the effects of liberalization, particularly to studies that use firm-level data.<sup>6</sup>

The paper is organized as follows. Section 2 provides a brief survey of recent theoretical models of deregulation that provide testable implications for our study. Section 3 provides a brief survey of the reforms, Section 4 describes the data and Section 5 presents summary statistics about firm size distributions and profitability before and after deregulation, and by incumbent

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<sup>5</sup> Bollard, Klenow and Sharma (2011) similarly document the dominance of old large firms in the output and employment growth of sectors in India.

<sup>6</sup> See Goldberg and Pavcnik (2004), Alfaro and Rodríguez-Clare, Harrison and Rodríguez-Clare (2010) for recent overviews of the studies on the effects of trade and FDI and Kose, Prasad, Rogoff, and Wei (2006) and Henry (2007) for the effects of liberalization on foreign capital.

and new entrant status. Section 6 presents the empirical methodology and results. Section 7 concludes.

## **2. The Related Literature**

This study relates to the literature on the recent performance of the Indian economy as well as research that examines the impact of liberalization on firm entry and number of firms and more generally to work analyzing the effects of the reallocation of resources on economic growth. We overview a few examples most closely related to our work.

There is an extensive empirical literature analyzing different aspects of India's economic growth. Work in this literature has focused on characterizing India's economic performance at the aggregate level to examine the relative contributions of factor accumulation and total factor productivity. Bosworth, Collins and Virmani (2007), for example, use growth accounting techniques to analyze of India's economic growth experience during 1960-2004, focusing on the post 1973 acceleration.

Aggregate data, however, cannot be used to examine the micro-channels which can impact economic growth. Firm-level data, on the other hand, offer a lens through which to examine transmission mechanisms that impact growth at the micro-level.<sup>7</sup> More importantly, firms in developed economies operate in relatively unconstrained environments while in contrast firms in developing countries often face constraints including regulatory ones that become particularly important when it comes to the ease with which resources can be reallocated across sectors and within firms and more broadly the level of competition in industries. Liberalization policies in many emerging and developing nations have relaxed some of these constraints and provide an ideal setting to investigate the firm-level response to changes in the competitive environment.

Blanchard and Giavazzi (2003) and Alesina et al. (2005) are examples of models from the macroeconomic literature on entry deregulation in product markets. Both models assume a monopolistic competitive environment in which each firm produces a differentiated product with capital and labor. In this setting, the elasticity of demand varies inversely with the degree of product market regulation: tighter regulation is associated with a lower elasticity. One way to

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<sup>7</sup> Until recently, the literature focusing on firm-activity using micro data, has however, predominantly focused on developed economies, data availability being an obvious constraint (see Tybout, 2000).

rationalize this is to assume that the elasticity of demand is an increasing function of the number of firms.

In Blanchard and Giavazzi (2005), in the long run, the number of firms is endogenous, determined by an entry condition. They assume that firms face a cost of entry which comes from product market regulation. In the model, this cost is a shadow cost designed to motivate the focus on regulation such that many regulatory barriers to entry take the form of legal and administrative restrictions on entry, rather than direct costs. They argue that it is reasonable to think that, in many markets, regulation allows firms to make positive pure profits for a long time. Decreases in the shadow cost may come, for example, from the elimination of state monopolies, or the reduction of red tape associated with the creation of new firms. Product market deregulation arises when the government allows more entry and therefore competition which in turn reduces markups in the short run. As the profit rate decreases, some firms exit the market and can lead to less competition in the long run.<sup>8</sup>

In Alesina et al. (2005), the model assumes that the regulatory authority (the government) administratively determines the number of firms and deregulation of product markets leads to a larger number of firms. This assumption is consistent with the restrictions on entry in India through industrial licensing and reservation policies for state-owned firms prior to 1991 and is also consistent with restrictions on FDI and trade. Alesina et al.(2005) point out that other aspects of regulation may also affect the elasticity of demand, for any given number of firms. For instance, changes in tariff and non tariff barriers may affect the availability of foreign products on domestic markets and, hence, the elasticity of demand. Finally, note also that an inverse relation between markups and the number of firms can be obtained in a variety of models and does not require a model with product differentiation. For instance, it holds in a model with Cournot competition and homogeneous products (See Berry and Reiss, 2007 for a survey).<sup>9</sup>

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<sup>8</sup> This long-run feature of the model is similar to that in recent trade models such as Melitz (2003) where average firm size increases in the long run as less productive firms exit the market and larger and productive incumbents remain. However, to the extent that deregulation is accompanied by a reduction in direct entry costs, in the long run it leads to firm entry, a higher elasticity of demand, and more competition in product markets. If deregulation leads to a larger number of firms, its effect in their model works through the reduction in the monopoly power of firms.

<sup>9</sup> Without further assumptions, the sign of the change in the number of firms in response to a reduction in fixed costs is ambiguous. Regulatory barriers to entry take the form of legal and administrative restrictions on entry, rather than direct costs. Alesina et al (2005) assume that the production function,  $F(K_i, L_i)$  is Cobb–Douglas with an elasticity of output with respect to capital equal to  $\alpha$ , it is possible to show that a sufficient condition for

Alesina et. al (2005) assume that firms face adjustment costs and that product market regulation affects the adjustment cost parameter and deregulation decreases it. With this the model is able to capture the reduction in the shadow and actual costs of doing business associated with red tape and other administrative impediments that constrain firms' choices. The general conclusion that can be derived from the models in Blanchard and Giavazzi (2003) or Alesina et al (2005) is that deregulation of product markets has a positive effect on the number of firms if it reduces mark-ups through a reduction in entry barriers or if it lowers entry costs.

Recent work in trade using dynamic models with heterogeneous firms provides another strand of literature that 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.

Additionally, in a world of variable markets, import competition could have differential effects on firms of different productivities and pro-competitive effects through endogenous changes in mark-ups (Melitz and Ottaviano, 2003). 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. The technology parameterization in the Melitz and Ottaviano (2008) model also unambiguously signs the effects of market size on the dispersion of the firm performance measures. First, the variance of cost, prices, and mark-ups are lower in bigger markets (the selection effect decreases the support of these distributions for any distribution of cost draws). Second, the variance of firm size (in terms of either output or revenue) is larger in bigger markets due to the direct magnifying effect of market size on these variables.

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deregulation to lead to an increase in the number of firms depends on the capital share, the interest rate, a quadratic adjustment cost parameter and the depreciation rate.

Note that macro and trade models both yield predictions regarding the competitive effects of deregulation. Macro models may be more suited to studying domestic entry and trade models to foreign entry. In the macro literature for example, Blanchard and Giavazzi (2003) and Alesina et al. (2005) predict that deregulating domestic entry will lead to more firms, greater competition and declining monopoly power. Whereas in trade models with heterogeneous firms average firm size and profits are expected to rise as the productivity distribution of firms that survive is truncated from the left when liberalization occurs and foreign competition is allowed. The challenge for testing these predictions in the Indian context is that deregulation along both the domestic and foreign entry dimensions commenced at the same time.

For the Indian case, theory suggests that the number of firms operating within industries can change through entry and exit in the face of deregulation. Most models, however, assume that firms are able to efficiently allocate resources within the firm and that factor markets are frictionless. Goldberg et al. argue that remnants of industrial regulation still affect the operation of Indian firms may constrain their flexibility to adjust to new economic conditions. Evidence also suggests that despite the extensive industrial deregulation in the early 1990's, rigid labor market regulations may continue to affect the daily operations of Indian firms, potentially precluding them from eliminating unprofitable product lines. For example, an all India amendment to Industrial Disputes Act (1947) in 1982 required firms with more than 100 to seek government approval to dismiss workers (Kochhar et al, 2006).

In addition, liquidation procedures are cumbersome and long. 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. Our findings corroborate this observation. While there was dynamism in firm entry particularly by private and foreign firms following liberalization, we observe little incumbent firm exit.

Our work contributes to the literature by analyzing in detail the evolution of firm entry and measures of competitiveness as proxy for efficiency enhancing role of reforms and thus provide an understanding of the effectiveness of reforms. In addition to the literature studying the evolution of India's economy and the effects of current reforms, our work more generally relates to literature studying effects of liberalization (in particular and those exploiting firm level

data)<sup>10</sup>. Political economy considerations suggest that reforms may be captured by powerful interests (Kroszner and Strahan, 1999; Chari and Gupta, 2008), so that new firms may not benefit from liberalization. The next section provides a brief overview of the reforms that impacted new firm entry in India.

### **3. Reforms in India**

Liberalization in India encompassed a series of reforms including foreign entry and trade liberalization, industrial de-licensing and de-reservation measures. 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% in 1990 to a value of approximately 12% in 2007 (Panagariya, 2008). The top tariff dropped from 50% in 1995-96 to 40% in 1997-98, 35% in 2000-01, 30% in 2002-03, 25% in 2003-04, 20% in 2004-05, 15% in 2005-06, 12.5% in 2006-

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<sup>10</sup> Galindo, Schiantarelli, and Weiss (2007) and Chari and Henry (2008) study whether capital account liberalization has increased the efficiency of the allocation of investment in publicly traded firms in the liberalizing economies.

07 and 10% in 2007-08. Some tariff peaks being outside the top rate, the simple average of tariffs on industrial goods in 2007 was approximately 12%. Custom duty collection in 2005-06 as a proportion of merchandise imports was just 4.9 % (Panagariya, 2008). Topalova (2004) also notes that the standard deviation of tariffs dropped by approximately 63 percent during the period between 1987-2001. 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 towards 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.

Compulsory industrial licensing was abolished for all except 18 industries. Large companies no longer needed MRTP approval for capacity expansions. The number of industries reserved for the public sector in Schedule A (IPR1951) was cut from 17 to 8, Schedule B, which listed industries open to the private sector but with increasing involvement from the state particularly for new establishments, was abolished altogether. 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. Importantly, limits on foreign equity holdings were raised from 40 to 51% (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.

#### **4. The Data**

We use firm-level data from the Prowess database. The sample period is from the year of inception of dataset, 1989 to 2005.<sup>11</sup> The data are collected by the Centre for Monitoring the

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<sup>11</sup> 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 (2007), Chari and Gupta (2007), and Goldberg et al. (2008, 2009).

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% of industrial output, 75% of corporate taxes, and more than 95% 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. 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” (Informal Sector in India: Approaches for Social Security, Government of India, page 2, 2000). 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.<sup>12</sup>

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 incorporation information allow us to analyze how incumbent firms are impacted by policy changes such as liberalization that allow new firm entry. In contrast, industry-level databases usually do not provide information about sales, assets, and profits by incorporation year and hence firm-age.<sup>13</sup>

The data allow us to examine whether the ownership composition of firms changed by the number and size of firms, the fraction of sales, assets and profits by age (incumbent status) and by industry. We can also examine changes in firm activity and market dynamics in industries

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<sup>12</sup> Unlisted companies are not required to disclose its financials. CMIE asks their permission, but if they refuse, it cannot include these companies in Prowess.

<sup>13</sup> 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.

where entry restrictions, both foreign and domestic, were lifted. Appendix 1 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.

We address the issue of improved coverage in the data versus new entry by making use of information about incorporation dates. We begin with a sample of firms in 1989 and allow firms to enter sample only if the new firms enter with data coinciding with their incorporation date. Therefore, incumbent firms are identified as those firms which had data in 1989 and with incorporation dates prior to 1989. Following 1991, a firm is identified as a new entrant only if its data coverage coincides with its incorporation date (also later than 1991). For example, a firm with data coverage beginning in 1992 is deemed to be a new entrant only if its incorporation date is also 1992.

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 that are shut 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. To address this issue, we construct (i) a balanced panel of incumbent firms whom we follow over the sample period and (ii) an unbalanced panel of incumbent and new entrant firms where we only allow a new firm to enter the sample if data availability coincides with the year of incorporation after 1991.

It is pertinent to note that unlike the Annual Survey of Industries (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. New products that are introduced into the market by firms not covered by Prowess are also excluded from their study. In our analysis, 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.

## 5. Summary Statistics

### 5.1 Reforms and the Birth of New Firms

We study five sub-periods: 1988-1990; 1991-1994; 1994-1998; 1999-2002 and 2003-2005. These periods broadly match the different waves of liberalization. Our objective is to provide the reader with an overview of new firm entry in the manufacturing sector in the last twenty years. We present deflated data using the GDP deflator from World Bank, World Development Indicators. Appendix Table 2 presents detailed information on the industries included in each sector and the number of firms by sector.

Consistent with the rapid growth observed in India after the mid-eighties overall firm activity as proxied by the number of firms grew substantially relative to the beginning of the sample period. In Alfaro and Chari (2010), we show that growth rates in the average number of new private firms across sectors (agriculture, manufacturing, and services): up from 3,031 in 1988-1990 to close to 8,864 by 2005. The number of foreign firms increased from an average of 533 in 1988-1990 to 748 by 2005. While one cannot infer causality from this pattern, 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 foreign direct investment, 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.

In this previous work, we also show that these patterns are broadly mimicked within sectors. In food, textiles and paper manufacturing, chemicals and plastic manufacturing, and metals and industrial manufacturing, for instance, the number of private and foreign firms has increased substantially between 1988 and 2005. Overall, the data presents a picture of a dynamic economy with the birth of large numbers of new firms following reforms. In fact the data suggests that 1988-1990 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% for foreign firms and 115% for new private firms. As mentioned, while the firm-level data precludes comparisons with the pre-1985 period, the evidence is

consistent with arguments in Panagariya (2008, pp. 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. 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).

## 5.2 The Evolution of Firm Size and Firm Profits

Table 1 includes information on industry concentration (the Herfindahl index<sup>14</sup>), firm size, profitability 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 three-digit level, industry concentration accordingly is computed at the three-digit level. We present data for the full sample first and then by incumbents and new entrants.

For the overall economy, Table 1 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 (Alfaro and Chari, 2010).<sup>15</sup>

The coefficient of variation (for both sales and assets) also indicates increased dispersion. Overall, what emerges is a picture of the average manufacturing firm in India growing smaller,

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<sup>14</sup> 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.

<sup>15</sup> Alfaro and Chari (2010) also present 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 evidence shows high accumulation of assets in private and foreign firms in all manufacturing sectors of the economy but particularly in food, textile and paper manufacturing. For similar detailed information on sales (in constant rupees crore), much the same pattern emerges where new private firms also stand out in terms of the growth rate in their average profits.

in terms of assets, sales and profits, along with a substantial increase in heterogeneity increased over the period.

In terms of the differences in incumbent status, for the average incumbent firm, dispersion has also increased. Overall, the average incumbent firm has grown bigger, more profitable and somewhat more dissimilar.<sup>16</sup> While new entrants have also grown significantly in terms of sales, assets and profits, it is striking to note that the incumbent firms are considerably bigger than the new entrants. This suggests, consistent with international evidence, that young firms tend to be small in size and entry takes place from the left hand tail of the size distribution. For new entrants, dispersion also increases during the sample period.

The total market share variable here refers to the fraction of sales accounted by incumbent and new entrant firms relative to the total sales in a particular industry. It is interesting to note that the average market share of incumbent firms in total sales declines from 99% to 79% between 1989 and 2005. Mirroring this decline in average incumbent shares is the increase in the average market share of new entrants incorporated after 1991 from 1% to 24% over the same period.<sup>17</sup>

Table 2 presents information by year of incorporation (between pre-1947, 1947-1985, 1985-2005) for number of firms, firm size, assets, sales, employment, profitability, and rate of return and their evolution in the different periods of study. The oldest firm in the sample (Howrah Mills Company Ltd.) was incorporated in 1825, and the sample begins with over 390 manufacturing firms that were incorporated before independence. From this group some firms exit the sample through mergers. Many of these older firms (pre-independence), however, remain in operation following the reforms.

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<sup>16</sup> Note that the average firm profit, sales and assets measures were constructed by taking firm averages by year and industry and then averaging these measures across industries and years with a given time period. For example the average firm asset size of Rs. (crore) 69.15 was constructed by taking the average of average firm assets by industry across industries and over the two year period 1989-1990.

<sup>17</sup> Note that the market shares of incumbents and new entrants do not sum to exactly 100% for the following reason. The total market share measure for incumbents was constructed by taking the ratio of total incumbent sales to total industry sales by NIC3 industry and taking an average of this ratio across industries. Similarly, the total market share of new entrants was constructed by taking the ratio of total new entrant sales to total industry sales by NIC3 industry and then averaging this ratio across industries.

Tables 3a-c describe how firms evolved before and after in industries that enacted specific reforms: liberalization of foreign direct investment, trade liberalization and domestic market deregulation.<sup>18</sup>

One interesting pattern that emerges from all three panels is that market concentration seems to have diminished for the liberalizing industries dramatically, following domestic market regulation, FDI deregulation and trade liberalization (perhaps not very surprising, given the extent of regulation and lingering restrictions) and consistent with declining incumbent monopoly power following liberalization. The value of the Herfindahl index declines from 0.43 to 0.27 for industries that liberalized FDI, from 0.48 to 0.27 and 0.26 for industries that liberalized trade and deregulated domestic entry, respectively.

The FDI reforms in 1991 reduced barriers to foreign entry in a subset of industries. According to the Industrial Policy Resolution of 1991, automatic approval was granted for foreign direct investment of up to 51% in 46 of 96 three-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.

Table 3a shows measures of market share, firm size, profits and dispersion averaged across sectors that were liberalized for the period before FDI liberalization in the first column and after FDI liberalization in the second one. The top panel of the table shows the results for the whole sample and the lower ones by incumbent. The sample is restricted to industries that deregulated foreign investment, to two years before (1989-1990) and to five years after (1991-1995) the policy was implemented in 1991.

For the average firm, market shares declined significantly following the policy change in liberalized industries as did average firm profits, sales and assets. Dispersion (both in terms of assets and sales) increased following the reforms. The average incumbent firm in the liberalized industries also experienced a decline in market shares, and firm size. However, average incumbent firm profits in liberalized industries appear to have remained stable. The coefficient of variation for incumbent firms increased somewhat.

Table 3b presents similar results for trade liberalization. First, it is important to note that trade liberalization in 1991 was inversely related to industry concentration before 1991. Second,

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<sup>18</sup> 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.

following trade liberalization, the market share, size and profitability of the average firm in industries that liberalized trade declined significantly five years following the policy change. Third, dispersion also increased following trade liberalization. Looking at incumbent firms a similar pattern obtains except for incumbent firm profits that appear remarkably stable even after liberalization. Finally, Table 3c shows similar summary statistics for pre- and post-domestic market deregulation which shows a similar pattern of declining market shares, size and average firm profits and increased dispersion.

Strictly speaking, a firm's market share is equal to firm sales relative to total domestic industry sales plus imports in that industry. If time-series data were available for imports by 3-digit NIC code, we would be in a position to adjust our market share calculations for imports. A caveat to our analysis is therefore that we do not take import figures into account.

Overall, summary statistics suggest that industry concentration, average market shares, firm size and profits all declined 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.

### **5.3 The Evolution of Firm Size-Distributional Statistics**

Table 4 presents detailed distributional statistics for firm size in terms of log sales and log assets before and after liberalization. For both assets and sales, the mean and median numbers suggest that firm size declined over the sample period and the pattern holds for incumbent firms as well. New entrants on the other hand experience an increase in firm size, perhaps not surprisingly.

Examining the tails of the size distribution reveals two interesting patterns. First, we see that the smallest firms in the left hand tail of the size distribution have become smaller over time. The firms in the tenth percentile have grown considerably smaller over the post liberalization period. The data suggest also that firm entry has taken place in the form of small firms especially since the new entrants are much smaller than the incumbent firms in the lowest percentiles of size for both assets and sales.

Second, the largest firms have grown bigger. For all three samples, the full sample, incumbents and new entrants the largest firms in the 99<sup>th</sup> percentile have grown larger over time. It is particularly interesting to note the increase in the size of the largest new entrants.

These two patterns from the distributional data (small firms getting smaller and big firms bigger) are consistent with an increase in the standard deviation in the size distribution. Also given the increase in the standard deviation of firm size and the fall in the average firm size, it is perhaps not surprising that dispersion measured by the coefficient of variation in firm size rises.

The final column of Table 4 shows that the size distribution becomes negatively skewed over time. The pattern is more clearly seen in Figures 1-6. The size distribution flattens and shifts in the direction of negative skewness following liberalization with the magnitude of skewness increasing over time. The size distribution in the early years following liberalization (1991-1995) is more skewed in comparison to the pre-liberalization period (1989-1990), and the size distribution in the later years following liberalization (2003-2005) is more skewed in comparison to the early years (1991-1995). The shift in the pattern of skewness holds for both log assets and log sales as well as for the incumbent firms. We do not conduct the analysis for the new entrants because by definition they did not exist before liberalization.

In summary preliminary findings from the size distribution data suggest that while the largest firms increase in size, there also appears to be considerable entry from the left hand tail of the distribution and the average size for the smallest incumbent firms also appears to get smaller. In addition, average firm size and average firm profits fall. The findings consistent with predictions that incumbent firms lose monopoly power following deregulation (Blanchard and Giavazzi,2003; Alesina et al.,2005) The marginal entry of small firms is consistent with an increase in competition following entry deregulation.

## **6. Empirical Methodology and Results**

We now turn to the formal estimations of the impact of deregulation on firm size and profitability. We begin by considering a balanced panel of incumbent firms that existed before liberalization. To examine the impact of deregulation and entry, a restricted sample panel of incumbent firms is better suited to analyzing pre- and post- effects on these firms. By restricting the sample to incumbent firms, we are able to parse out compositional effects that occur with entry. We first look at the impact of deregulation on incumbent firms without firm-fixed effects to examine more cleanly what happens to incumbent firms. Second, we introduce compositional controls in the form of firm-fixed effects to control for unobserved heterogeneity at the firm-

level. However, a specification with firm-fixed effects cannot use this to examine distributional effects which occur with entry. To do so, third, we examine an unbalanced panel that allows for compositional effects to occur with entry.

We begin with the following benchmark regression specification, for firm  $i$  in sector  $j$  and year  $t$ ,

$$Y_{ijt} = a_i + Year_t + d Lib_{jt} + e_{ijt} \quad (1)$$

where  $Y_{ijt}$ : different outcome variables, we control for firm fixed effects and a year trend.

Standard errors are robust and clustered at the 3-digit industry level.

Since the sample period in this paper coincides with a period of rapid growth in the Indian economy, incorporate a linear year trend in our estimations to more precisely isolate the impact of the liberalization policy measures. We report estimates with and without the year trend to highlight the impact on the coefficient estimates and their interpretation.

## 6.1 Balanced Panel

Table 5 presents regression estimates for a balanced panel of firms from 1989-1995. The dependent variable is the logarithm of annual firm sales. *Delicense* is a dummy variable that takes a value of 1 if a firm is an industry that delicensed entry in 1991. *FDI\_Lib* and *Trade\_Lib* are dummy variables that take a value of 1 if a firm is in an industry the liberalized to FDI or Trade in 1991. Standard errors are clustered at the NIC3-digit level.

Columns 1, 4 and 7 show the impact of deregulation on log sales for incumbent firms without fixed effects. While the impact of delicensing appears to have an insignificant effect on firm sales, both trade and FDI liberalization leading to a decline in average incumbent firm sales. Controlling for firm-fixed effects in Columns 2, 5 and 8 shows that while the impact of delicensing continues to be insignificant, average incumbent firm size increases significantly with trade and FDI liberalization. Note that the sign on the coefficient for both the trade and FDI liberalization dummies flips when we introduce firm-fixed effects suggesting that the average incumbent firm grew over this time period.

To account for the rapid growth in the economy over this time period, we incorporate a year trend variable into the specifications in columns 3, 6 and 9. The coefficient on the delicensing dummy is now negative and significant. Interestingly, the coefficients on the trade

and FDI dummies are negative and significant once again while the coefficient on the year trend is positive and significant.

The results from the specification suggest that the impact of deregulation on firm size in the context of a growing economy can be decomposed into two effects: a competitive effect through firm entry and a growth effect. Competition through entry appears to reduce average firm size while the growing economy lifts all boats increasing average firm size. Incorporating the year trend variable is important therefore not only because it allows us to isolate the impact of deregulation on firm size but also because it suggests that a dynamic model is better suited to examining the effects of deregulation on competition in a rapidly growing economy.

Table 6 repeats the analysis for log assets and a similar pattern obtains. It is important to note that the negative and significant coefficient on the deregulation dummies (delicense, trade and FDI) are consistent with two alternative interpretations. The negative coefficient on the liberalization dummies with positive year trend coefficient could be interpreted as (i) average firm size goes down in liberalized industries but also (ii) controlling for the overall growth of the economy, liberalized industries are growing slower.

## **6.2 Unbalanced Panel**

As stated earlier, with unbalanced panels we allow for compositional effects to occur with entry. We turn to quantile regressions which are important for looking at distribution effects on firm size. Quantile (including median) regression models, also known as least-absolute value (LAV) models or minimum absolute deviation (MAD) models. In the median regression estimates version of the quantile regression model, the median of the dependent variable is analyzed conditional on the values of the independent variable. This is similar to least-squares regression, which estimates the mean of the dependent variable. Put differently, quantile regressions find the regression plane that minimizes the sum of the absolute residuals rather than the sum of the squared residuals.

Since we are interested in characterizing the entire distribution of firm size before and after deregulation, we specify a regression specification that estimates the regression plane for quantiles ranging from the 5<sup>th</sup> percentile to the 95<sup>th</sup> percentile of the distribution of the outcome variable of interest (size, profits) at intervals of 5%. Standard errors are bootstrapped.

As described by Koenker and Bassett (1978), the estimation is done by minimizing the following specification:

$$\begin{aligned} & \text{Min} \\ & \beta \in R^K \sum_{t \in \{t: y_t \geq x_t \beta\}} \theta |y_t - x_t \beta| + \sum_{t \in \{t: y_t < x_t \beta\}} (1 - \theta) |y_t - x_t \beta| \\ & (2) \end{aligned}$$

where  $y$  is the dependent variable,  $x$  is the  $k$  by  $1$  vector of explanatory variables,  $\beta$  is the coefficient vector and  $1$  is the quantile to be estimated. The coefficient vector  $\beta$  will differ depending on the particular quantile being estimated.

Table 7 estimates the quantile regression specification with log sales as the dependent variable and with the deregulation dummies (delicense, trade and FDI) and the independent variables. A second specification includes the year trend variable. The coefficients on the deregulation dummies display considerable non-linearity and highlight the heterogeneous effects of deregulation on firms of different sizes.

Table 7 shows that the impact of delicensing on log sales for firms across quantiles of differing firm sizes is non-linear. There is an increase in the average firm size for firms in the 5<sup>th</sup> through the 15<sup>th</sup> percentile consistent with entry by small firms from the left hand tail. There is however, a significant decline for all quantiles from the 20th to the 90th percentile. Finally, the coefficient for the 95<sup>th</sup> percentile is positive and significant consistent with large incumbents growing bigger and perhaps being exporters as in the Melitz and Ottaviano (2008) model.

Adding a year trend shifts quantile regression coefficients curve up. These results should be interpreted with caution as we do not include fixed effects. Also, the significance of coefficient estimates varies once the year trend is included. Here, the negative coefficient on the year trend indicates that the average firm size declines as the market size grows. The non-linear effects on firm size are also seen when the regressions include the trade and FDI dummies. The pattern of the firms in the 95th percentile getting bigger is only seen with FDI liberalization when the year trend is included but not with trade liberalization reducing tariffs on imports.

Figure 3 depicts these findings graphically to highlight the non-linear impact of delicensing, FDI and trade liberalization on firm size across quantiles. It also serves to highlight the varying magnitude of the coefficient estimates across quantiles. The three panels show the impact of adding a year trend shifts the magnitude of the coefficient estimates on the deregulation measures on firm size.

The marginal entry of small firms is consistent with an increase in competition following entry deregulation. The finding is consistent with Blanchard and Giavazzi (2003) as is the reduction in average firm size implying less monopoly power. The increase in the size of the very largest firms is consistent with the prediction from Melitz (2003) as large firms are more likely to be exporters. Policy concerns that small firms would be driven out following entry deregulation and that foreign firms would displace domestic incumbents do not appear to be borne out by the data.

The finding that large incumbent firms grew larger is consistent with licensing regime restrictions. Prior to de-licensing firms could enter freely till a minimum size threshold, however once this threshold was crossed, a license determined how much these firms could produce and invest effectively curtailing their size. The capacity caps were therefore likely to have kept down the most successful firms by restricting from expanding. Removing these restrictions through de-licensing could have allowed the most dynamic and efficient incumbent firms to overcome these problems and expand in an unrestricted way. Imported inputs through trade liberalization may also have allowed the large incumbents to become more efficient and grow.

With regard to the U-shaped pattern observed in the post-liberalization firm size distribution is that de-licensing may well have created a winner takes all competitive environment with the largest firms growing. So while entry is possible and small firms enter, the hollowing out of middle of the size distribution may be the result of this type of dynamic. The distribution with a large number of small firms and a small number of large firms can be characterized as the “missing middle” in Indian manufacturing.

### **6.3 Deregulation, Market Concentration and Profitability**

Table 8 presents regression estimates for an unbalanced panel of firms from 1989-1995. The dependent variable is the Herfindahl index of firm sales. The independent variables are the deregulation dummies. Standard errors are clustered at the 3-digit NIC industry level. Consistent with an increase in competitiveness and with the summary statistics in Table 3, the Herfindahl index declines significantly in industries that were deregulated. The pattern of declining Herfindahl indices is also seen when we estimate a specification with a balanced panel of incumbent firms although with a slightly smaller magnitude of coefficient estimates suggesting a decline in the monopoly power of incumbent firms with deregulation consistent with the

predictions from Blanchard and Giavazzi (2003). The Herfindahl index also shows a significant decline if we restrict the sample period to the immediate aftermath of the deregulation in 1991-1995. The magnitudes are smaller but significant with the exception of the coefficient on the delicensing dummy.

Table 9 estimates the quantile regression specification with the return on assets as the dependent variable and with the deregulation dummies (delicense, trade and FDI) and the independent variables. A second specification includes the year trend variable. The coefficients on the deregulation dummies display considerable non-linearity and highlight the heterogeneous effects of deregulation on firms of differing profitability. A note of caution is that the return on asset series is very noisy with extreme outliers both negative and positive. Therefore, it is not clear the weight we can place on the patterns observed. Once again, the specifications do not include firm fixed effects.

The coefficient estimates indicate that while the return on assets declined significantly in industries that were delicensed consistent with greater competition via entry, the return on assets actually increased significantly for the specifications that include FDI and trade liberalization. Figure 4 displays these results graphically.

## **7. Conclusion**

Theories emphasizing the role of “creative destruction” suggest that in addition to technological change, system wide reforms or deregulation may prompt a creative destruction wave. Industries then go through a shakeout phase during which the number of producers decline in the industry, as incumbents and new entrants replace the firms that exit (see Caballero and Hammour, 1996).

India has engaged in a massive deregulation effort since 1991. The end of the license Raj and implementation of pro-market reforms have far-reaching implications for competitive environment in the Indian economy. Significant sectors of the economy were opened up for private participation through de-licensing and allowing entry in industries previously reserved exclusively for the state-owned sector. Trade liberalization allowing for more import competition by reducing tariff and other trade barriers has also been considerable. At the same time, many sectors of the economy have been opened to foreign entry via direct investment.

Nearly twenty years after the reforms began we ask whether liberalization in the manufacturing sector has led to more competition. We argue that an increase in competition may be measured in several ways. Deregulating entry may imply an increase in dispersion in firm size distributions, a reduction in concentration ratios or a decline in average firm size and profits. To examine the competitive effects of deregulating entry, we use firm-level data from CMIE's Prowess database to examine the changes in firm size and profitability distributions.

The evidence suggests several interesting patterns. Average firm size declines significantly in industries that deregulated entry. Small firms enter the market from the left hand tail of the size distribution while the incumbent firms get significantly bigger following deregulation. Quantile regressions to examine the distributional impact of deregulation show that the shift in the distribution of firm size is non-linear with average firm size increasing till around the 15<sup>th</sup> percentile, and then getting significantly smaller till the 90<sup>th</sup> percentile while the largest percentile (95%) gets significantly bigger over the same time period.

Consistent with a decline in monopoly power, the Herfindahl index of firm sales also shows a significant decline. While summary statistics suggest a decline in average firm profits, quantile regressions once again show significant non-linearity and a heterogeneous impact of deregulation on profitability. The dispersion of firm size (sales and assets) also rises following deregulation consistent with Melitz and Ottaviano (2008), Campbell and Hopenhayen (2005), and Asplund and Nocke (2003).

On balance, the evidence suggests that examining the distributional changes in firm size and profitability reveal the more nuanced effects of deregulation. The marginal entry of small firms and the decline in the average size of firms in the middle percentiles appears consistent with the hypothesis that deregulation leads to entry, a larger number of firms in the long run, and the reduction in the monopoly power of incumbent firms. However, the increase in the size of the largest firms suggests that it is important to take into account the possible non-linear effects of deregulation on competition.

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**Appendix 1: Industry Classifications**

<b>Industry</b>	<b>3 digit NIC code</b>	<b># Firms</b>	<b>Industry</b>	<b>3 digit NIC code</b>	<b># Firms</b>
<b>Manufacturing</b>			<b>Manufacturing</b>		
Abrasives	269	13	Dyes & pigments	241, 242	99
Air-cond. & refrigerators	291, 293	23	Dyes & pigments	242	13
Alkalies	241	17	Fertilisers	241	77
Alum. & alum. products	272	76	Footwear	192	73
Automobile ancillaries	343	424	Gems & jewellery	369	121
Bakery products	154	29	General purpose machinery	291	109
				289, 291, 311, 312,	
Beer & alcohol	155	137	Generators & switchgears	319	143
	210, 221,				
Books & cards	222	80	Glass & glassware	261	68
				291, 292,	
Castings & forgings	273, 289	173	Industrial machinery	300	185
Cement	269	159	Inorganic chemicals	241,242	115
Ceramic tiles	269	72	Inorganic chemicals	242	1
Cloth	171	218	Lubricants, etc.	232	66
Coal & lignite	231	16	Machine tools	292	75
Cocoa products	154	12	Marine foods	151	101
Coffee	154	21	Media-print	221	46
				271, 281,	
Commercial vehicles	341	8	Metal products	289, 361	283
	319,				
Communication equipment	322,331	71	Milling products	153, 155	76
				269, 291,	
	221, 252,			292, 312,	
Comp., perip. & storage dev.	300	79	Misc. electrical machinery	319	64
				232, 331,	
				332, 333,	
Construction equipment	291, 292	53	Misc. manufactured articles	361,369	99
	300,				
Consumer electronics	321,323	43	Organic chemicals	241	176
Copper & copper products	272	45	Other agricultural products	155	4
				241-242,	
				293, 300,	
				311-312,	
				314, 319,	
Cosmetics, toiletries, soaps & detergents	242	118	Other chemicals	321-323, 331	441
Cotton & blended yarn	171	453	Other industrial machinery	172,291-292	30
Dairy products	152, 154	69	Other leather products	191	62
	289,				
Domestic elec. appliances	292,293,315	76	Other non-ferrous metals	272	43
Drugs & pharmaceuticals	242	626	Other non-metallic mineral prod.	269	37
Dry cells	314	7	Other recreational services	223,253	3
Processed/package foods	151-155	55	Other storage & distribution	232	7
				171-	
Prod., distrib. & exh. films	242	1	Other textiles	173,181,252	261

**Manufacturing (cont.)**

**Appendix Table 1 (cont.): Industry Classifications**

<b>Industry</b>	<b>3 digit NIC code</b>	<b># Firms</b>	<b>Industry</b>	<b>3 digit NIC code</b>	<b># Firms</b>
Readymade garments	181	199	Other transports equipment	351-353,359	48
Polymers	241	83	Paints & varnishes	242	44
Poultry & meat products	151, 154	18	Paper	210	205
Prime movers	281, 291	37	Paper products	210	66
Prime movers	291	26	Pass. cars & multi utility vehicle:	341	12
Processed/packaged foods	151-155	55	Pesticides	241-242	115
Prod., distrib. & exh. films	242	1	Pig iron	271	13
Readymade garments	181	199	Plastic films	252	56
Refinery	232	15	Plastic packaging goods	252	137
Refractories	269	43	Plastic tubes & sheets, others	252	219
Rubber & rubber products	241,251	105	Polymers	241	83
Sponge iron	271	32	Poultry & meat products	151, 154	18
Starches	153	13	Prime movers	281, 291	37
Steel	271	488	Prime movers	291	26
Steel tubes & pipes	271	111	Storage batteries	314	12
Sugar	154	147	Trading	293	1
Synthetic textiles	171-172,243	158	Two & three wheelers	359	22
Tea	154	214	Tyres & tubes	251	42
Textile processing	171,243 155, 160,	176	Vegetable oils & products	151-153	307
Tobacco products	369	30	Wires & cables	313	110
Tractors	292	14	Wood	201-202	53
Housing construction	452	177		261	1
Industrial construction	452	156		343	1
Infrastructural construction	452	91	Diversified	970	63
Other constr. & allied act.	452-453	159	Misc. manufactured articles	970	695
			Misc. manufactured articles	970	695

## Appendix 2 - Description of Variables

Variables	Definition
<i>Sales</i>	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.
<i>Assets</i>	Gross fixed assets of a firm, which includes movable and immovable assets as well as assets which are in the process of being installed.
<i>Firm Size (Assets &amp; Sales)</i>	Average firm assets and sales in an industry. For the full sample, the industry-level averages are averaged across industries.
<i>Market Share</i>	Ratio of Sales to Industry Sales for a firm. Also, ratio of Assets to Industry Assets for a firm.
<i>Herfindahl Index</i>	Sum of the squares of the <i>Market Share</i> of all firms in an industry in each 3-digit industrial category.
<i>Incumbent Share</i>	The ratio of total sales, assets, profits produced by incumbent firms (incorporated before 1990) in an industry to <i>Industry Sales</i> , <i>Industry Assets</i> , <i>Industry Profits</i> in that industry.
<i>New Entrant Share</i>	The ratio of total sales, assets, profits produced by new entrant firms (incorporated after 1991) in an industry to <i>Industry Sales</i> , <i>Industry Assets</i> , <i>Industry Profits</i> in that industry.
<i>Industry Sales</i>	Sum of <i>Sales</i> across all firms in an industry.
<i>Industry Assets</i>	Sum of <i>Assets</i> across all firms in an industry.
<i>PBITDA</i>	Excess of income over all expenditures except tax, depreciation, interest payments, and rents in a firm.
<i>Return on Assets</i>	Ratio of <i>PBITDA</i> to <i>Assets</i> in a firm, averaged across firms in that industry.
<i>Sales Growth</i>	$(\text{Industry Sales} - \text{Lagged Industry Sales}) / \text{Lagged Industry Sales}$ in that industry.
<i>Coefficient of Variation</i>	Ratio of standard deviation to mean of assets, sales, return on assets at the industry level
<i>Tade liberalization measure</i>	Percentage decrease in tariffs at the three-digit industry level between 1986-1990 and 1991-1995.
<i>NIC Code</i>	Three-digit industry code includes manufacturing, financial, and service sectors.

**Table 1: The Evolution of Firm Size and Firm Profits (Constant Rs. Crore)**

	1989-1990	1991-1995	1996-1998	1999-2002	2003-2005
	Full Sample				
<i>NIC3 Herfindahl Index (sales)</i>	0.33	0.28	0.25	0.25	0.24
Average Firm Profits (Rs. Crore)	8.43	6.93	7.17	6.16	7.36
Average Firm Size (Assets Rs. Crore)	69.15	58.11	64.77	62.70	57.56
Average Firm Size (Sales Rs. Crore)	73.63	62.11	61.46	58.11	60.96
Coefficient of Variation of Firm Size (Assets)	5.39	5.39	7.11	8.89	10.11
Coefficient of Variation of Firm Size (Sales)	5.49	5.49	6.32	6.77	7.88
	Incumbents				
<i>Total Market Share (sales)</i>	0.99	0.97	0.92	0.87	0.79
Average Firm Profits (Rs. Crore)	8.33	7.14	8.21	7.46	9.86
Average Firm Size (Assets Rs. Crore)	67.64	59.35	71.86	73.46	73.73
Average Firm Size (Sales Rs. Crore)	70.75	54.61	65.15	69.07	80.14
Coefficient of Variation of Firm Size (Assets)	5.32	6.11	5.63	6.18	7.27
Coefficient of Variation of Firm Size (Sales)	5.404	5.979	7.04	9.38	9.95
	New Entrants				
<i>Total Market Share (sales)</i>	0.01	0.04	0.10	0.16	0.24
Average Firm Profits (Rs. Crore)	2.71	1.82	1.21	1.90	2.53
Average Firm Size (Assets Rs. Crore)	22.71	14.76	21.26	42.72	25.77
Average Firm Size (Sales Rs. Crore)	27.90	12.24	10.85	19.08	22.64
Coefficient of Variation of Firm Size (Assets)	5.92	6.52	6.04	6.55	6.66
Coefficient of Variation of Firm Size (Sales)	1.88	2.55	2.64	5.91	4.59

Appendix 2 provides variable definitions.

**Table 2: Year of Incorporation**

	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
<b>Incorporation/Period</b>	<b>1988-1990</b>	<b>1991-1995</b>	<b>1996-1998</b>	<b>1999-2002</b>	<b>2003-2005</b>
<b><u>Pre-independence</u></b>					
Assets (Rs. Crore)	87	97	130	129	134
Sales (Rs. Crore)	103	98	116	109	113
PBDIT (Rs. Crore)	11	13	16	15	17
ROA (%)	12	12	10	5	6
No. of firms=390					
<b><u>c1947-1985</u></b>					
Assets (Rs. Crore)	87	85	98	103	109
Sales (Rs. Crore)	83	67	79	93	107
PBDITA (Rs. Crore)	10	10	12	11	15
ROA (%)	14	13	9	6	8
No. of firms=1,486					
<b><u>c1985-2005</u></b>					
Assets (Rs. Crore)	32	25	31	43	44
Sales (Rs. Crore)	19	11	15	25	30
PBDIT (Rs. Crore)	2	2	2	3	4
ROA (%)	10	9	6	6	1
No. of firms=3,303					

Source: Prowess Data Set. See Appendix Tables A1 and A2 for detailed explanation of variables.

**Table 3: The Evolution of Firm Size & Market Concentration in Manufacturing (Liberalized Industries)**

<b>Panel 3a: FDI Deregulation</b>			<b>Panel 3b: Trade Liberalization</b>		
	1989-1990	1991-1995		1989-1990	1991-1995
	Full Sample			Full Sample	
<i>Herfindahl Index</i>	0.43	0.27	<i>Herfindahl Index</i>	0.48	0.27
<i>Market Share (sales)</i>	3.31	1.69	<i>Market Share (sales)</i>	2.69	1.36
Firm Profits	8.18	6.53	Firm Profits	10.91	7.71
Firm Size (Assets Rs.)	65.47	49.87	Firm Size (Assets Rs.)	86.19	65.79
Firm Size (Sales Rs.)	64.50	42.30	Firm Size (Sales Rs.)	101.33	62.46
CV Firm Size (Assets)	2.58	3.02	CV Firm Size (Assets)	5.59	6.63
CV Firm Size (Sales)	2.24	3.03	CV Firm Size (Sales)	5.99	7.59
	Incumbents			Incumbents	
<i>Market Share (sales)</i>	3.32	2.003	<i>Market Share (sales)</i>	2.74	1.68
Firm Profits	8.4	8.26	Firm Profits	11.38	10.14
Firm Size (Assets Rs.)	67.1	61.58	Firm Size (Assets Rs.)	89.75	84.9
Firm Size (Sales Rs.)	65.9	53.68	Firm Size (Sales Rs.)	105.74	83.55
CV Firm Size (Assets)	2.56	2.79	CV Firm Size (Assets)	5.51	6.06
CV Firm Size (Sales)	2.22	2.72	CV Firm Size (Sales)	5.89	6.7

<b>Panel 3c: Domestic Delicensing</b>		
	1989-1990	1991-1995
	Full Sample	
<i>Herfindahl Index</i>	0.48	0.26
<i>Market Share (sales)</i>	3.32	1.64
Firm Profits	8.63	6.22
Firm Size (Assets Rs.)	68.96	52.59
Firm Size (Sales Rs.)	65.47	43.22
CV Firm Size (Assets)	4.91	5.81
CV Firm Size (Sales)	3.50	4.09
	Incumbents	
<i>Market Share (sales)</i>	3.31	2.01
Firm Profits	9.02	8.00
Firm Size (Assets Rs.)	71.8	66.3
Firm Size (Sales Rs.)	68.18	55.42
CV Firm Size (Assets)	4.84	5.38
CV Firm Size (Sales)	3.45	3.71

**Table 4: Distributional Statistics of Firm Size**

<b>Log Sales</b>									
<b>N</b>	<b>p10</b>	<b>mean</b>	<b>p50</b>	<b>p99</b>	<b>max</b>	<b>sd</b>	<b>cv</b>	<b>skewness</b>	
Full Sample									
1989-1990	3,084	1.63	3.14	3.03	6.83	9.59	1.42	0.45	0.02
1991-1995	14,675	0.23	2.41	2.51	6.37	9.91	1.83	0.76	-0.62
1991-2005	62,776	-0.49	2.12	2.33	6.42	10.81	2.10	0.99	-0.70

<b>Log Sales</b>									
<b>N</b>	<b>p10</b>	<b>mean</b>	<b>p50</b>	<b>p99</b>	<b>max</b>	<b>sd</b>	<b>cv</b>	<b>skewness</b>	
Incumbents									
1989-1990	3,045	1.63	3.14	3.03	6.83	9.59	1.43	0.45	0.03
1991-1995	13,463	0.52	2.54	2.61	6.47	9.91	1.74	0.69	-0.55
1991-2005	48,454	-0.14	2.34	2.51	6.58	10.81	2.05	0.88	-0.73

<b>Log Sales</b>									
<b>N</b>	<b>p10</b>	<b>mean</b>	<b>p50</b>	<b>p99</b>	<b>max</b>	<b>sd</b>	<b>cv</b>	<b>skewness</b>	
New Entrants									
1991-1995	1212	-1.86	0.93	1.17	4.72	5.86	2.04	2.19	-0.62
1991-2005	14,322	-1.39	1.40	1.68	5.53	9.33	2.10	1.50	-0.70

<b>Log Assets</b>									
<b>N</b>	<b>p10</b>	<b>mean</b>	<b>p50</b>	<b>p99</b>	<b>max</b>	<b>sd</b>	<b>cv</b>	<b>skewness</b>	
Full Sample									
1989-1990	3,120	1.41	2.97	2.82	6.97	9.20	1.41	0.48	0.42
1991-1995	15,597	0.67	2.48	2.39	6.65	9.45	1.58	0.64	0.13
1991-2005	70,902	0.27	2.29	2.25	6.73	10.15	1.83	0.80	-0.30

<b>Log Assets</b>									
<b>N</b>	<b>p10</b>	<b>mean</b>	<b>p50</b>	<b>p99</b>	<b>max</b>	<b>sd</b>	<b>cv</b>	<b>skewness</b>	
Incumbents									
1989-1990	3081	1.42	2.98	2.82	6.99	9.20	1.42	0.48	0.43
1991-1995	11,779	0.82	2.59	2.46	6.72	9.45	1.54	0.59	0.27
1991-2005	53,948	0.53	2.51	2.44	6.91	10.15	1.76	0.70	-0.09

<b>Log Assets</b>									
<b>N</b>	<b>p10</b>	<b>mean</b>	<b>p50</b>	<b>p99</b>	<b>max</b>	<b>sd</b>	<b>cv</b>	<b>skewness</b>	
New Entrants									
1991-1995	1718	-0.40	1.44	1.47	4.90	7.00	1.52	1.06	-0.37
1991-2005	16,954	-0.45	1.58	1.67	5.65	8.93	1.87	1.18	-0.76

**Table 5: Deregulation and Firm Size (Log Sales)**

This table presents regression estimates for a balanced panel of firms from 1989-1995. The dependent variable is the logarithm of annual firm sales. Delicense is a dummy variable that takes a value of 1 if a firm is in an industry that delicensed entry in 1991. FDI\_Lib and Trade\_Lib are dummy variables that take a value of 1 if a firm is in an industry the liberalized to FDI or Trade in 1991. Clustered standard errors in parentheses. \*, \*\* and \*\*\* denote significance levels at 10%, 5% and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variable	Sales	Sales	Sales	Sales	Sales	Sales	Sales	Sales	Sales
Delicense	-0.0848 (0.137)	0.0578 (0.137)	-0.1640*** (0.044)						
FDI_Lib				-0.4157*** (0.132)	0.1484*** (0.025)	-0.0910*** (0.033)			
Trade_Lib							-0.2087* (0.106)	0.1301*** (0.03)	-0.1109*** (0.032)
Year Trend			0.0666*** (0.007)			0.0707*** (0.009)			0.0716*** (0.008)
Constant	2.6920*** (0.077)	2.6593*** (0.008)	2.4053*** (0.027)	2.9433*** (0.13)	2.5759*** (0.016)	2.4083*** (0.031)	2.7919*** (0.097)	2.5981*** (0.017)	2.4083*** (0.032)
Fixed Effects	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Observations	16,648	16,648	16,648	16,648	16,648	16,648	16,648	16,648	16,648
R-squared	0	0.922	0.925	0.013	0.923	0.925	0.004	0.922	0.925

**Table 6: Deregulation and Firm Size (Log Assets)**

This table presents regression estimates for a balanced panel of firms from 1989-1995. The dependent variable is the logarithm of annual firm assets. Delicence is a dummy variable that takes a value of 1 if a firm is in an industry that delicensed entry in 1991. FDI\_LIB and Trade\_Lib are dummy variables that take a value of 1 if a firm is in an industry the liberalized to FDI or Trade in 1991. Robust standard errors in parentheses. \*, \*\* and \*\*\* denote significance levels at 10%, 5% and 1%, respectively.

	(1a)	(2a)	(3a)	(4a)	(5a)	(6a)	(7a)	(8a)	(9a)
Rhs	Assets	Assets	Assets	Assets	Assets	Assets	Assets	Assets	Assets
Delicence	-0.0174 (0.135)	0.1825*** (0.031)	-0.1398*** (0.033)						
FDI_LIB				-0.3087** (0.137)	0.2233*** (0.018)	-0.1422*** (0.025)			
Trade_Lib							-0.1781 (0.113)	0.2182*** (0.015)	-0.1367*** (0.028)
Year Trend			0.0965*** (0.006)			0.1078*** (0.007)			0.1052*** (0.008)
Constant	2.7071*** (0.075)	2.6613*** (0.007)	2.2924*** (0.028)	2.9047*** (0.136)	2.5573*** (0.012)	2.3012*** (0.024)	2.8053*** (0.104)	2.5779*** (0.009)	2.2986*** (0.026)
Fixed Effect	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Observation	17,115	17,115	17,115	17,115	17,115	17,115	17,115	17,115	17,115
R-squared	0	0.938	0.947	0.009	0.94	0.948	0.003	0.94	0.947

**Table 7: Quantile Regressions of Firm Size (Log Sales), 1989-2005**

This table presents quantile regressions for firm size for an unbalanced panel of firms. The dependent variable is the logarithm of annual firm sales. Delicense is a dummy variable that takes a value of 1 if a firm is an industry that delicensed entry in 1991. FDI\_Lib and Trade\_Lib are dummy variables that take a value of 1 if a firm is in an industry the liberalized to FDI or Trade in 1991. Yeartrend is a trend variable. \*, \*\* and \*\*\* denote significance levels at 10%, 5% and 1%, respectively. Bootstrapped standard errors in parentheses.

**Panel A: Delicense**

(1)					(2)						
Quantile	Delicense	(s.e.)	Constant	(s.e.)	Quantile	Delicense	(s.e.)	Yeartrend	(s.e.)	Constant	(s.e.)
q5	0.1752***	(0.062)	-1.7117***	(0.047)	q5	0.2123***	(0.077)	-0.2188***	(0.009)	0.7077***	(0.076)
q10	0.0850**	(0.041)	-0.4359***	(0.021)	q10	0.0898**	(0.039)	-0.1639***	(0.005)	1.3393***	(0.049)
q15	0.0305	(0.032)	0.2675***	(0.017)	q15	0.0710**	(0.028)	-0.1305***	(0.004)	1.6406***	(0.034)
q20	-0.0697***	(0.023)	0.7922***	(0.013)	q20	0.0271	(0.025)	-0.1051***	(0.003)	1.8565***	(0.027)
q25	-0.1123***	(0.024)	1.1691***	(0.009)	q25	-0.0235	(0.026)	-0.0863***	(0.003)	2.0339***	(0.025)
q30	-0.1226***	(0.019)	1.4856***	(0.009)	q30	-0.0540**	(0.023)	-0.0732***	(0.002)	2.2076***	(0.021)
q35	-0.1057***	(0.024)	1.7456***	(0.009)	q35	-0.0589***	(0.022)	-0.0626***	(0.002)	2.3633***	(0.019)
q40	-0.0824***	(0.018)	1.9703***	(0.008)	q40	-0.0611***	(0.021)	-0.0539***	(0.002)	2.5150***	(0.019)
q45	-0.0890***	(0.017)	2.1959***	(0.008)	q45	-0.0607***	(0.021)	-0.0476***	(0.002)	2.6687***	(0.018)
q50	-0.0855***	(0.02)	2.4024***	(0.008)	q50	-0.0625***	(0.017)	-0.0412***	(0.002)	2.8129***	(0.019)
q55	-0.0729***	(0.019)	2.6097***	(0.008)	q55	-0.0467***	(0.018)	-0.0354***	(0.001)	2.9574***	(0.020)
q60	-0.0542***	(0.014)	2.8096***	(0.007)	q60	-0.0298	(0.019)	-0.0309***	(0.002)	3.1228***	(0.022)
q65	-0.0343**	(0.017)	3.0274***	(0.010)	q65	-0.0196	(0.017)	-0.0274***	(0.002)	3.3021***	(0.022)
q70	-0.0410**	(0.017)	3.2607***	(0.010)	q70	-0.0303*	(0.018)	-0.0234***	(0.001)	3.4975***	(0.019)
q75	-0.0539***	(0.021)	3.5259***	(0.012)	q75	-0.0419**	(0.017)	-0.0193***	(0.001)	3.7190***	(0.019)
q80	-0.0706***	(0.019)	3.8154***	(0.011)	q80	-0.0544**	(0.022)	-0.0134***	(0.002)	3.9488***	(0.021)
q85	-0.0745***	(0.021)	4.1520***	(0.013)	q85	-0.0666*	(0.036)	-0.0101***	(0.002)	4.2537***	(0.027)
q90	-0.0608*	(0.034)	4.5857***	(0.016)	q90	-0.062	(0.041)	-0.0084***	(0.003)	4.6727***	(0.028)
q95	0.1567***	(0.048)	5.2373***	(0.017)	q95	0.1596***	(0.059)	-0.0012	(0.004)	5.2491***	(0.042)

Number of Observations= 66,634

**Panel B: FDI**

<b>(1)</b>					<b>(2)</b>							
Quantile	FDI	(s.e.)	Constant	(s.e.)	Quantile	Yeartrend	(s.e.)	FDI	(s.e.)	Constant	(s.e.)	
q5	0.3980***	(0.072)	-1.9626***	(0.063)	q5	-0.2131***	(0.006)	0.2807***	-0.076	0.5033***	(0.088)	
q10	0.1539***	(0.058)	-0.5245***	(0.053)	q10	-0.1637***	(0.004)	0.1304***	-0.049	1.2636***	(0.046)	
q15	0.0623	(0.043)	0.2313***	(0.036)	q15	-0.1305***	(0.003)	0.0509	-0.032	1.6239***	(0.028)	
q20	-0.0451	(0.042)	0.8058***	(0.035)	q20	-0.1054***	(0.002)	0.0237	-0.023	1.8482***	(0.019)	
q25	-0.0884***	(0.032)	1.2058***	(0.026)	q25	-0.0870***	(0.002)	0.0276	-0.025	2.0145***	(0.018)	
q30	-0.1278***	(0.024)	1.5435***	(0.019)	q30	-0.0742***	(0.002)	0.0207	-0.024	2.1889***	(0.015)	
q35	-0.1212***	(0.017)	1.8054***	(0.015)	q35	-0.0632***	(0.002)	-0.0109	-0.021	2.3618***	(0.019)	
q40	-0.1297***	(0.016)	2.0476***	(0.014)	q40	-0.0539***	(0.002)	-0.0237	-0.023	2.5132***	(0.019)	
q45	-0.1242***	(0.019)	2.2622***	(0.017)	q45	-0.0475***	(0.002)	-0.0283	-0.018	2.6719***	(0.017)	
q50	-0.1424***	(0.018)	2.4904***	(0.015)	q50	-0.0407***	(0.002)	-0.0422**	-0.021	2.8216***	(0.022)	
q55	-0.1561***	(0.020)	2.7083***	(0.018)	q55	-0.0341***	(0.002)	-0.0794***	-0.022	2.9925***	(0.025)	
q60	-0.1622***	(0.019)	2.9209***	(0.016)	q60	-0.0289***	(0.002)	-0.0870***	-0.021	3.1587***	(0.025)	
q65	-0.1563***	(0.017)	3.1306***	(0.013)	q65	-0.0253***	(0.002)	-0.0961***	-0.022	3.3467***	(0.027)	
q70	-0.1459***	(0.017)	3.3584***	(0.013)	q70	-0.0213***	(0.002)	-0.0930***	-0.02	3.5363***	(0.029)	
q75	-0.1357***	(0.021)	3.6099***	(0.014)	q75	-0.0170***	(0.002)	-0.0929***	-0.02	3.7526***	(0.025)	
q80	-0.1043***	(0.021)	3.8718***	(0.013)	q80	-0.0131***	(0.002)	-0.0868***	-0.024	3.9937***	(0.034)	
q85	-0.1414***	(0.032)	4.2398***	(0.025)	q85	-0.0085***	(0.002)	-0.1277***	-0.024	4.3182***	(0.035)	
q90	-0.2382***	(0.030)	4.7545***	(0.023)	q90	-0.0049**	(0.002)	-0.2312***	-0.026	4.8019***	(0.041)	
q95	-0.4015***	(0.037)	5.5745***	(0.035)	q95	0.0077**	(0.004)	-0.4149***	-0.032	5.5049***	(0.048)	

Number of Observations= 66,634

Panel C: Trade

(1)					(2)							
Quantile	Trade	(s.e.)	Constant	(s.e.)	Quantile	Yeartrend	(s.e.)	Trade	(s.e.)	Constant	(s.e.)	
q5	0.5655***	(0.058)	-2.0453***	(0.050)	q5	-0.2144***	(0.007)	0.5354***	(0.067)	0.3680***	(0.103)	
q10	0.2989***	(0.048)	-0.6053***	(0.040)	q10	-0.1640***	(0.004)	0.3097***	(0.027)	1.1612***	(0.050)	
q15	0.2127***	(0.036)	0.1364***	(0.032)	q15	-0.1316***	(0.003)	0.1980***	(0.020)	1.5431***	(0.041)	
q20	0.1427***	(0.023)	0.6751***	(0.019)	q20	-0.1072***	(0.003)	0.1696***	(0.021)	1.7747***	(0.034)	
q25	0.0954***	(0.025)	1.0704***	(0.020)	q25	-0.0901***	(0.002)	0.1710***	(0.019)	1.9519***	(0.029)	
q30	0.031	(0.025)	1.4297***	(0.019)	q30	-0.0758***	(0.002)	0.1403***	(0.018)	2.1253***	(0.027)	
q35	-0.0121	(0.023)	1.7257***	(0.018)	q35	-0.0645***	(0.002)	0.0961***	(0.017)	2.3000***	(0.025)	
q40	-0.0507**	(0.021)	1.9841***	(0.017)	q40	-0.0553***	(0.002)	0.0419**	(0.019)	2.4814***	(0.024)	
q45	-0.0688***	(0.017)	2.2165***	(0.014)	q45	-0.0483***	(0.002)	0.0063	(0.015)	2.6547***	(0.020)	
q50	-0.0781***	(0.017)	2.4326***	(0.014)	q50	-0.0413***	(0.002)	-0.0134	(0.016)	2.8061***	(0.018)	
q55	-0.1017***	(0.016)	2.6581***	(0.013)	q55	-0.0348***	(0.002)	-0.0468***	(0.018)	2.9704***	(0.022)	
q60	-0.1299***	(0.016)	2.8868***	(0.012)	q60	-0.0298***	(0.002)	-0.0846***	(0.017)	3.1603***	(0.024)	
q65	-0.1511***	(0.017)	3.1168***	(0.014)	q65	-0.0259***	(0.002)	-0.1109***	(0.018)	3.3550***	(0.026)	
q70	-0.1768***	(0.019)	3.3699***	(0.014)	q70	-0.0219***	(0.002)	-0.1418***	(0.017)	3.5683***	(0.025)	
q75	-0.2057***	(0.022)	3.6465***	(0.017)	q75	-0.0154***	(0.002)	-0.1784***	(0.017)	3.7841***	(0.024)	
q80	-0.2156***	(0.020)	3.9341***	(0.016)	q80	-0.0111***	(0.002)	-0.1959***	(0.020)	4.0357***	(0.018)	
q85	-0.1935***	(0.025)	4.2533***	(0.018)	q85	-0.0085***	(0.002)	-0.1828***	(0.027)	4.3325***	(0.023)	
q90	-0.2034***	(0.027)	4.7003***	(0.020)	q90	-0.0054**	(0.002)	-0.1964***	(0.027)	4.7539***	(0.024)	
q95	-0.2055***	(0.040)	5.3936***	(0.033)	q95	0.0015	(0.003)	-0.2060***	(0.037)	5.3779***	(0.030)	

Number of Observations= 66,634

**Table 8: Deregulation and Industry Concentration**

This table presents regression estimates for an unbalanced panel of firms from 1989-1995. The dependent variable is the *Herfindahl index* of firm sales. *Delicense* is a dummy variable that takes a value of 1 if a firm is an industry that delicensed entry in 1991. *FDI\_Lib* and *Trade\_Lib* are dummy variables that take a value of 1 if a firm is in an industry the liberalized to FDI or Trade in 1991. Clustered standard errors at the NIC3-digit industry-level in parentheses. \*, \*\* and \*\*\* denote significance levels at 10%, 5% and 1%, respectively.

	(1b)	(2b)	(3b)	(4b)	(5b)	(6b)
	Herfindahl (Sales)	Herfindahl (Sales)	Herfindahl (Sales)	Herfindahl (Sales)	Herfindahl (Sales)	Herfindahl (Sales)
<i>Delicense</i>	-0.0236** (0.01)			-0.0214** (0.008)		
<i>FDI_LIB</i>		-0.0656*** (0.02)			-0.0510*** (0.013)	
<i>Trade_Lib</i>			-0.0739*** (0.025)			-0.0578*** (0.017)
<i>Constant</i>	0.1000*** (0.002)	0.1356*** (0.012)	0.1346*** (0.013)	0.0946*** (0.002)	0.1216*** (0.008)	0.1210*** (0.009)
Observatio	189,039	189,039	189,039	189,227	189,227	189,227
R-squared	0.726	0.749	0.751	0.732	0.747	0.749

**Table 9: Quantile Regressions of Firm Size (ROA), 1989-2005**

This table presents quantile regressions for firm size for an unbalanced panel of firms. The dependent variable is the logarithm of annual firm sales. Delicense is a dummy variable that takes a value of 1 if a firm is an industry that delicensed entry in 1991. FDI\_Lib and Trade\_Lib are dummy variables that take a value of 1 if a firm is in an industry the liberalized to FDI or Trade in 1991. Yeaftrend is a trend variable. \*, \*\* and \*\*\* denote significance levels at 10%, 5% and 1%, respectively. Bootstrapped standard errors in parentheses.

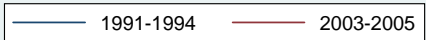
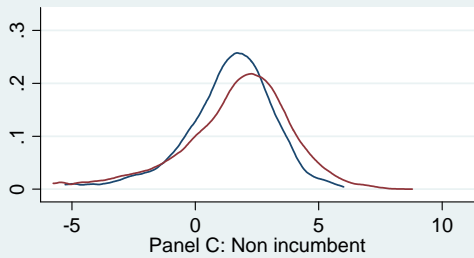
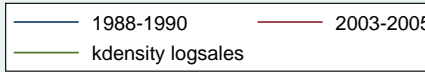
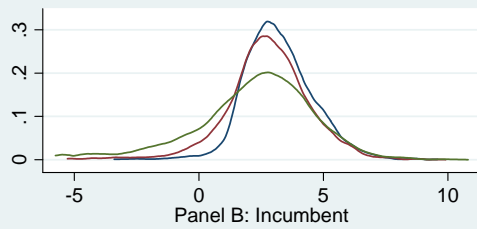
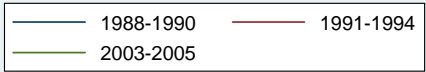
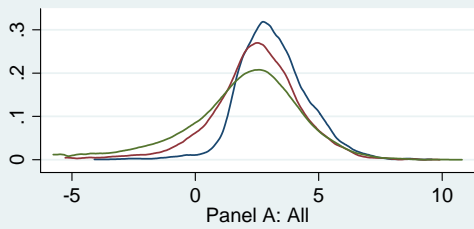
Panel A: Delicense					Panel B: FDI				
Quantile	Delicense	(s.e.)	Constant	(s.e.)	Quantile	FDI_Lib	(s.e.)	Constant	(s.e.)
q5	-3.0519***	(0.554)	-9.7113***	(0.245)	q5	1.0246**	(0.494)	-11.4005***	(0.421)
q10	-1.8887***	(0.205)	-2.5932***	(0.112)	q10	-0.6576***	(0.240)	-2.5544***	(0.203)
q15	-0.9336***	(0.123)	0.0000***	-	q15	-0.2424***	(0.062)	-0.0000***	-
q20	-0.0951	(0.063)	0.0951	(0.063)	q20	0.4095***	(0.065)	0.0000***	-
q25	-0.5054***	(0.131)	2.0856***	(0.065)	q25	1.9117***	(0.148)	0.5952***	(0.100)
q30	-0.5301***	(0.121)	4.0000***	(0.072)	q30	1.8347***	(0.160)	2.5132***	(0.122)
q35	-0.5553***	(0.118)	5.6551***	(0.063)	q35	1.4901***	(0.148)	4.3764***	(0.130)
q40	-0.4325***	(0.115)	7.0524***	(0.062)	q40	1.1078***	(0.139)	6.1008***	(0.122)
q45	-0.2847***	(0.110)	8.2847***	(0.056)	q45	0.8503***	(0.119)	7.5708***	(0.100)
q50	-0.2707**	(0.112)	9.4522***	(0.058)	q50	0.7652***	(0.143)	8.8042***	(0.125)
q55	-0.2378**	(0.100)	10.5575***	(0.048)	q55	0.6680***	(0.121)	10.0000***	(0.104)
q60	-0.2215**	(0.089)	11.6731***	(0.048)	q60	0.6041***	(0.113)	11.1642***	(0.096)
q65	-0.2147**	(0.086)	12.8000***	(0.046)	q65	0.5549***	(0.120)	12.3377***	(0.098)
q70	-0.2043**	(0.088)	13.9928***	(0.054)	q70	0.5124***	(0.121)	13.5582***	(0.105)
q75	-0.2688**	(0.113)	15.3365***	(0.056)	q75	0.5412***	(0.116)	14.8559***	(0.107)
q80	-0.4312***	(0.110)	16.9432***	(0.057)	q80	0.6215***	(0.118)	16.3696***	(0.107)
q85	-0.5600***	(0.141)	18.9560***	(0.077)	q85	0.6056***	(0.157)	18.3636***	(0.132)
q90	-0.7654***	(0.194)	21.8362***	(0.092)	q90	0.8279***	(0.178)	21.0400***	(0.152)
q95	-0.5784	(0.393)	26.8781***	(0.171)	q95	1.1616***	(0.260)	25.9352***	(0.192)

No. of observations=72,015

Panel C: Trade				
Quantile	Trade_Lib	(s.e.)	Constant	(s.e.)
q5	-3.4314***	(0.328)	-8.3333***	(0.342)
q10	-1.6250***	(0.196)	-2.1118***	(0.133)
q15	-0.3008***	(0.069)	-0.0000***	-
q20	0.4942***	(0.086)	0.0000*	-
q25	1.7462***	(0.112)	0.9009***	(0.087)
q30	1.7806***	(0.119)	2.7420***	(0.081)
q35	1.5882***	(0.117)	4.5007***	(0.088)
q40	1.4516***	(0.118)	6.0032***	(0.093)
q45	1.3076***	(0.102)	7.3770***	(0.082)
q50	1.3234***	(0.067)	8.5418***	(0.059)
q55	1.2982***	(0.076)	9.6578***	(0.067)
q60	1.2213***	(0.080)	10.8179***	(0.068)
q65	1.1810***	(0.081)	11.9725***	(0.080)
q70	1.1362***	(0.090)	13.2093***	(0.075)
q75	1.1628***	(0.088)	14.5009***	(0.068)
q80	1.1087***	(0.124)	16.0782***	(0.096)
q85	0.8734***	(0.126)	18.2217***	(0.107)
q90	0.8249***	(0.130)	21.0943***	(0.124)
q95	0.9023***	(0.166)	26.2219***	(0.187)

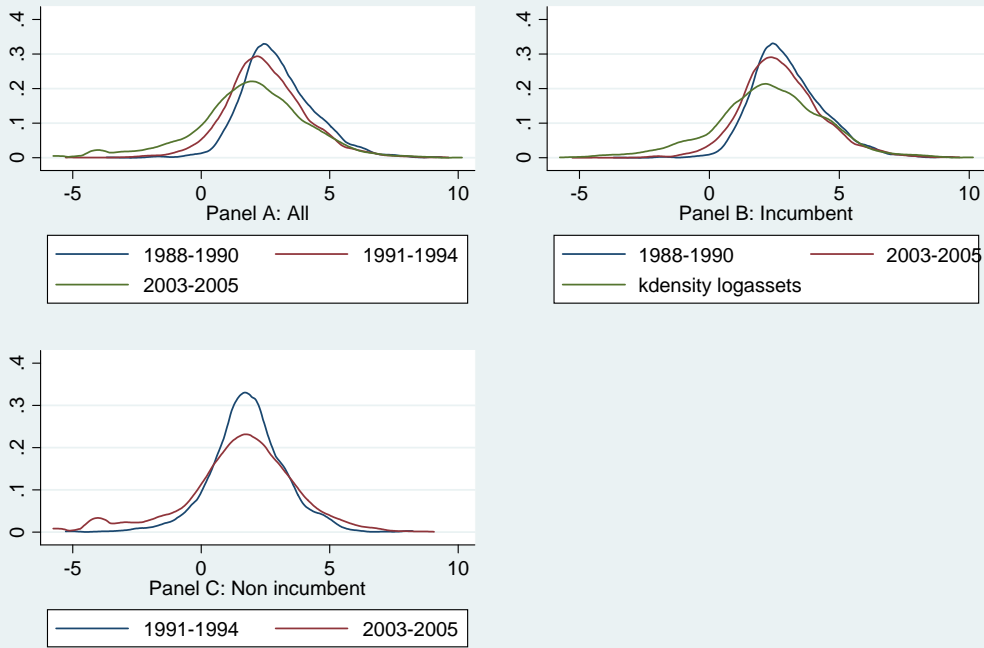
No. of observations=72,015

# Chart 1: Log Sales by Incumbent and Period (Manufacturing)



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Chart 2: Log Assets by Incumbent and Period (Manufacturing)



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Chart 3

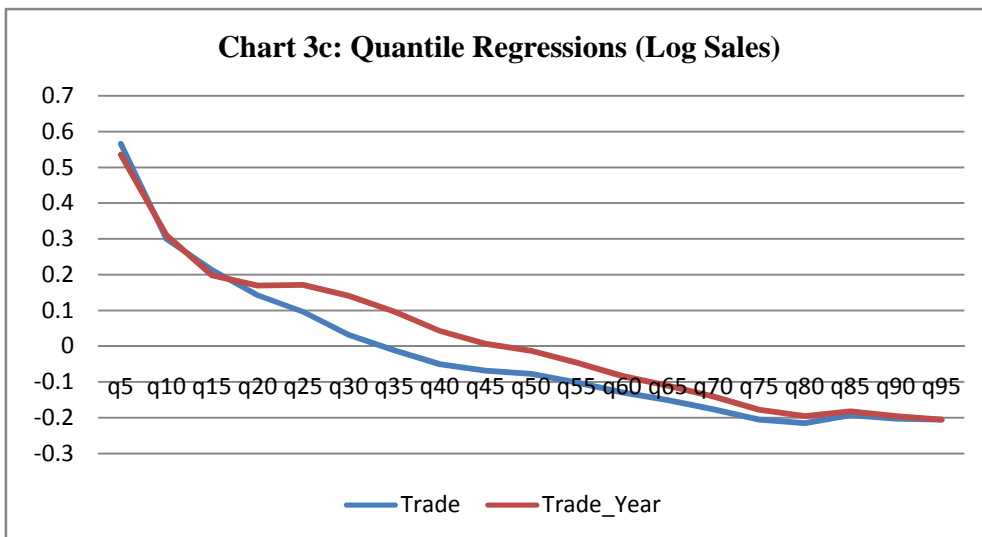
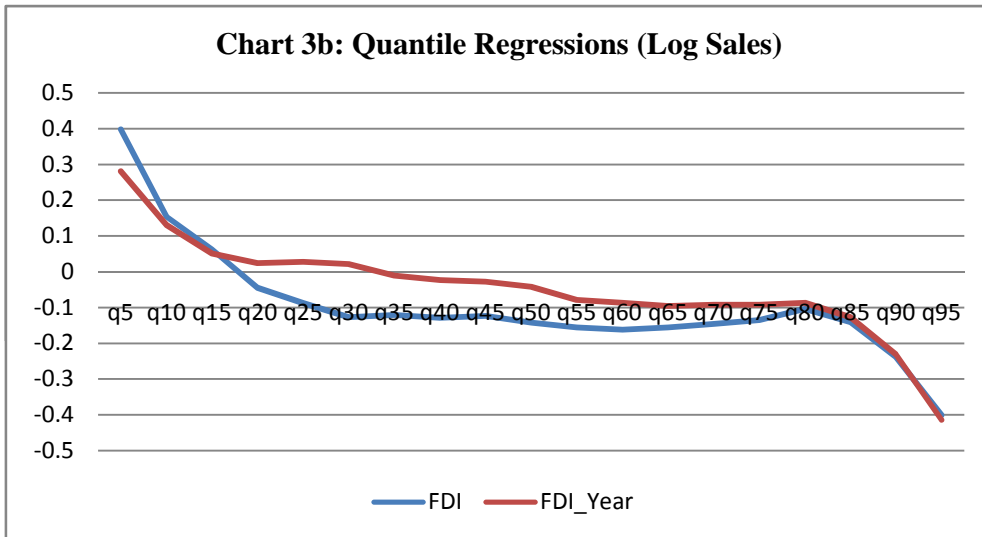
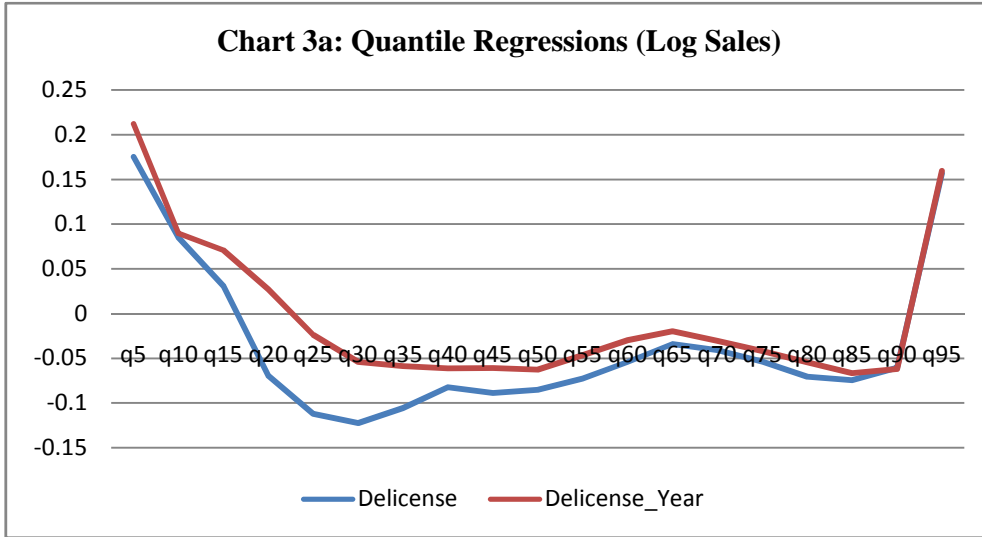


Chart 4

