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Does Liberalization Promote Competition?

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Abstract

Using firm-level data from India, this paper investigates the distributional effects of deregulation on firm size and profitability. The data suggest that average firm size declines significantly in industries that deregulated entry. 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. Quantile regressions show that the shift in the distribution of firm size is non-linear with average firm size increasing till around the 15th percentile, and then getting significantly smaller till the 90th percentile while the largest percentile (95%) gets significantly bigger over the sample period. The marginal entry of small firms is consistent with an increase in competition following entry deregulation. 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 show significant non-linearity and a heterogeneous impact of deregulation on profitability.

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1. Introduction

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, 2003). The transition from a regulated to deregulated environment may imply the decline of incumbent firms as entry costs (regulatory) decline 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.

Recent research predicts that the deregulation of firm entry in 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).¹

In this paper we ask whether liberalization promotes competition. We employ firm-level financial statement information from the manufacturing sector to examine the question in the context of the massive deregulation that has taken place in India since 1991. The goal is to investigate the distributional effects of deregulation on firm size and profitability. We define deregulation broadly to include both domestic and foreign entry through FDI and trade.

A previous paper, Alfaro and Chari (2010a), examines the evolution of India's industrial composition between 1988-2005 by focusing on the micro-foundations of its productive structure across industrial sectors, by ownership within sectors, and across time. The evidence shows great dynamism by foreign and private firms in terms of growth in average numbers, assets, sales & profits. However, the data suggest an economy still dominated by the incumbents (state-owned firms and old private firms) in the form of continuing incumbent control in shares of assets, sales & profits accounted for by state-owned & old private firms. Sectors dominated by state-owned and old private firms before liberalization (with shares higher than 50%); incumbents remain the dominant ownership group following liberalization.

The major exception to the pattern of incumbent firm dominance is seen in the average growth of private firms in the services industries between 2001 and 2005. Asset, sales & profit

¹ A monopolistic competition assumption in the goods market determines the size of rents.

shares of private firms in business and IT services, communications services and media, health and other services show a substantial increase in growth and in shares over this period. In this paper we investigate the distributional impact of deregulation on firm size and profitability in greater detail.

Melitz and Ottaviano (2008) provide a useful benchmark to fix ideas and motivate the empirical analysis in the paper. In the Melitz-Ottaviano model, deregulation leads to bigger markets and more competition. Tougher selection in the competitive markets following deregulation implies higher average productivity and lower prices. In a key distinction from Melitz (2003), market size induces important changes in the equilibrium distribution of firms and their performance measures. The model's predictions for the effects of bilateral trade liberalization are very similar to those emphasized in Melitz (2003) in that trade forces the least productive firms to exit and reallocates market shares towards more productive exporting firms. Firms with lower productivity only serve their domestic markets. The parameterization on cost draws is such that average firm size (output, sales) and profits higher in larger markets. Profits increase because direct market size effect outweighs indirect effect through lower prices and markups.

In the context of India, we can think of deregulation as increasing market size through trade liberalization and FDI and domestic entry deregulation. 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. Similar measures can be applied to firm profitability.

A challenge we however face in this context is that in Melitz and Ottaviano (2008), 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. Furthermore, the period of deregulation in the early 1990s in India coincides with rapid economic growth. Therefore, a dynamic model is better suited to examining the effects of deregulation on competition against the backdrop of a 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.²

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.³ The data are also classified by incorporation year so that distinctions can be made across firms by age.⁴ 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.

Our main results are as follows. First, average firm size declines significantly in industries that deregulated 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 shift in the distribution of firm size is non-linear with average firm size increasing till around the 15th percentile, and then getting significantly smaller till the 90th 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. However, 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. 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,

² Section 3 describes in detail the advantages and shortcomings of the dataset.

³ 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.

⁴ 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.

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.

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 describes the data and Section 4 presents summary statistics about firm size distributions and profitability before and after deregulation, and by incumbent and new entrant status. Section 5 presents the empirical methodology and results. Section 6 concludes.

2. Predictions from Theory

Blanchard and Giavazzi (2003) and Alesina et al. (2005) are examples of models from the macroeconomic literature on 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, ε , varies inversely with the degree of product market regulation: tighter regulation is associated with a lower elasticity. One way to rationalize this is to assume that the elasticity of demand is an increasing function of the number of firms, m . Hence, $\varepsilon = g(m)$, where $g(\cdot) > 0$.

Blanchard and Giavazzi (2005) divide time in two periods, a short run, where the number of firms is given, and a long run, where the number of firms is endogenous, determined by an entry condition. They assume that firms face a cost of entry equal to c , which comes from product market regulation. In the model, c 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

c 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 can come from the government allowing more entry and therefore competition that reduces markups in the short run. As the profit rate decreases some firms exit the market and can to less competition in the long run. This 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 entry costs, in the long run it leads to entry of firms, thus to a higher elasticity of demand, and more competition in product markets. To the extent that deregulation leads to a larger number of firms, its effect in their model works only through the reduction in the monopoly power of firms.

In Alesina et al. (2005) this implies that if the markup of prices over marginal costs $(1 + \mu) = 1/(1 - (1/\varepsilon))$, then μ is a decreasing function of the number of firms, m ($\mu = \mu(g(m))$), with $\mu < 0$). The exposition begins by assuming that the regulatory authority (the government) administratively determines the 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. In this case, deregulation of product markets leads to a larger number of firms, hence, a decrease in μ .

Alesina et al.(2005) point out that other aspects of regulation may also affect the elasticity of demand, for any given number of firms, m . 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. A simple way to modify the model to account for such effects would be to write, as Blanchard and Giavazzi (2003) do, $\varepsilon = \varepsilon^*g(m)$, where $g(\cdot) > 0$ and ε^* captures the aspects of product market regulation. Finally, note also that an inverse relation between the markup 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).⁵

⁵ Without further assumptions, the sign of the change in the number of firms in response to a reduction in fixed costs ($\partial m / \partial c^*$) 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 α , it is possible to show that a sufficient condition for

The model also allows the number of firms to be endogenously determined by a standard entry condition, but entry is costly and regulation determines the size of such costs. Firms face adjustment costs that have the standard linear homogeneous quadratic form. They assume that product market regulation also affects the adjustment cost parameter and deregulation decreases it. With this they are 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 generates a reduction in the markup of prices over marginal costs (for instance through a reduction in entry barriers) or if it lowers costs of entry.

Hypothesis #1: Deregulation leads to entry, a larger number of firms in the long run, and the reduction in the monopoly power of firms, Blanchard and Giavazzi (2003) and Alesina (2005).

Tests of this hypothesis using firm-level data following deregulation include: (i) do the Herfindahl index decrease? (ii) Does average firm size decline? (ii) Does the average market share decrease? (iii) Do average profits decrease?

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

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.

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.

Hypothesis #2: In larger, more integrated markets, firms are bigger on average (in terms of both output and sales) and earn higher profits (although average mark-ups are lower) (Melitz, 2003 and Melitz and Ottaviano, 2008).

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.

Hypothesis #3: The dispersion of firm size (sales and assets) is larger in bigger markets (Melitz and Ottaviano, 2008). There is a positive relationship between larger markets and dispersion in sales, assets, profits (Campbell and Hopenhayn, 2005; Syverssen, 2004).

Tests of these two hypotheses using firm-level data following deregulation include: (i) do average firm size increase after deregulation? (ii) do average firm profits increase after deregulation? (iii) do small firms exit the market? (iv) does the size distribution of firms become positively skewed? (v) does dispersion in firm size increase?

Note that the macro and trade models yield different predictions regarding the competitive effects of deregulation. Blanchard and Giavazzi (2003) and Alesina et al. (2005) predict that deregulation 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.

3. The Data

We use firm-level data from the Prowess database. The sample period is from the year of inception of dataset, 1989 to 2005.⁶ The data are collected by the Centre for Monitoring the Indian Economy (CMIE) from company balance-sheets and income statements and covers both publicly-listed and unlisted firms from a wide cross-section of manufacturing, services, utilities, and financial industries. About one-third of the firms in Prowess are publicly listed firms. The companies covered account for more than 70% 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.⁷

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.⁸

⁶ 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).

⁷ Unlisted companies are not required to disclose its financials. CMIE asks their permission, but if they refuse, it cannot include these companies in Prowess.

⁸ 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

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 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 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 shutting down versus discontinued coverage. Therefore, when we no longer observe data for a firm, we assume firm-exit. But again, this may also reflect discontinued coverage by Prowess or the failure of unlisted firms to provide data about their operations. Therefore we construct a balanced panel of incumbent firms whom we follow over the sample period and 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.

Goldberg et al. (2009) argue that the Prowess dataset is not a manufacturing census, and therefore may not be ideal for studying firm-entry and exit, given that it includes only larger firms for which entry and exit are not important margins of adjustment. However, it is pertinent to note that unlike the Annual Survey of Industries (ASI) which is a survey of manufacturing, the

employment information. Since the sample of firms that report employment is small, we do not focus on these numbers.

Prowess data is a panel of firms, rather than a repeated cross-section. Prowess is therefore particularly well suited to examining how firm- characteristics including entry and exit evolve over time and may respond to policy changes. (For instance, Goldberg et al. (2009) use the Prowess dataset to examine how firms adjust their product-mix over time). Firms that no longer report sales or assets are assumed to have exited. We also classify firms that do not report data because of mergers and acquisitions as firms that exit the data due to consolidation.

4. Summary Statistics

4.1 The Evolution of Firm Size and Firm Profits

Table 1 includes information on industry concentration (the Herfindahl index⁹), 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.

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, 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

⁹ 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.

profitable and somewhat more dissimilar.¹⁰ 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.¹¹

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.

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.¹²

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

¹⁰ 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.

¹¹ 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.

¹² Variations in the number of industries in Tables 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.

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.

Table 3a shows measures of measures of market share, firm size, profits and dispersion averaged across sectors that were for the period before FDI liberalization in the first column and after FDI liberalization in the second one. The FDI reforms in 1991 reduced barriers to foreign entry in a subset of industries. 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. 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, 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, 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 decline in industries that experienced either de-licensing or FDI and/or trade liberalization. The coefficient of variation in average firm sales and assets increased suggesting that there is greater dispersion in firm size within liberalized industries.

4.2 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 suggests 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 99th 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.

Note that these preliminary findings from the size distribution data are not entirely consistent with the predictions from Melitz (2003) and Melitz and Ottaviano (2008) which expect that average firm size should rise. 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 not rise as predicted in these models. The findings are however consistent with Blanchard and Giavazzi (2003) and Alesina et al. (2005) where, on average, incumbent firms are predicted to lose monopoly power following deregulation. The marginal entry of small firms is consistent with an increase in competition following entry deregulation.

The final column of Table 4 shows that the size distribution becomes negatively skewed over time. The pattern is more clearly seen in Charts 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. The shift in the pattern of skewness holds for both log assets and log sales as well as for the incumbent firms.

5. 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. We then 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, 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.

5.1 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.

As we argue earlier, 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 against the backdrop of a 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.

5.2 Unbalanced Panel

As stated earlier, with unbalanced panels we allow for compositional effects to occur with entry. We turn to quantile regressions 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 5th percentile to the 95th 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:

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

where y is the dependent variable, x is the k by 1 vector of explanatory variables, b is the coefficient vector and τ is the quantile to be estimated. The coefficient vector b 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 5th through the 15th 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 95th 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.

Chart 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.

5.3 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. Chart 4 displays these results graphically.

6. Conclusion

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 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 15th percentile, and then getting significantly smaller till the 90th 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 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

Industry	3 digit NIC code	# Firms	Industry	3 digit NIC code	# Firms
Manufacturing			Manufacturing		
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

Industry	3 digit NIC code	# Firms	Industry	3 digit NIC code	# Firms
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 & 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

	I	II	III	IV	V
Incorporation/Period	1988-1990	1991-1995	1996-1998	1999-2002	2003-2005
<u>Pre-independence</u>					
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					
<u>c1947-1985</u>					
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					
<u>c1985-2005</u>					
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)

	Panel 3a: FDI Deregulation		Panel 3b: Trade Liberalization		
	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

	Panel 3c: Domestic Delicensing	
	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

Log Sales									
N	p10	mean	p50	p99	max	sd	cv	skewness	
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

Log Sales									
N	p10	mean	p50	p99	max	sd	cv	skewness	
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

Log Sales									
N	p10	mean	p50	p99	max	sd	cv	skewness	
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

Log Assets									
N	p10	mean	p50	p99	max	sd	cv	skewness	
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

Log Assets									
N	p10	mean	p50	p99	max	sd	cv	skewness	
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

Log Assets									
N	p10	mean	p50	p99	max	sd	cv	skewness	
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 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

(1)					(2)							
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)

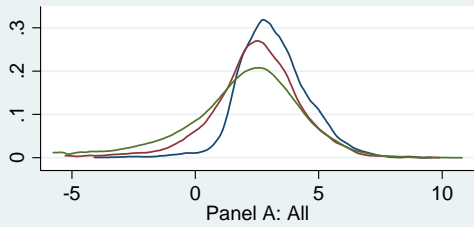
No. of observations=72,015

No. of observations=72,015

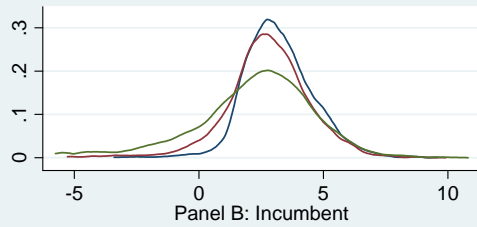
Panel C: Trade				
Quantile	Trade_Lib	(s.e.)	Constant	(s.e.)
q5	-3.4314***	(0.328)	-8.3333***	(0.342)
q10	-1.6250***	(0.196)	-2.1118***	(0.133)
q15	-0.3008***	(0.069)	-0.0000***	-
q20	0.4942***	(0.086)	0.0000*	-
q25	1.7462***	(0.112)	0.9009***	(0.087)
q30	1.7806***	(0.119)	2.7420***	(0.081)
q35	1.5882***	(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

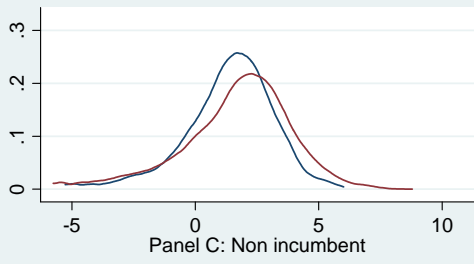
Chart 1: Log Sales by Incumbent and Period (Manufacturing)



— 1988-1990 — 1991-1994
— 2003-2005

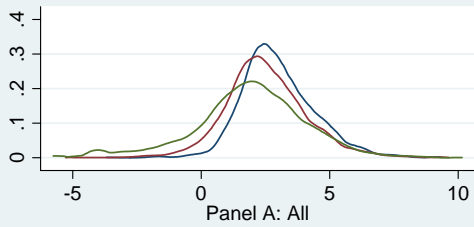


— 1988-1990 — 2003-2005
— kdensity logsales

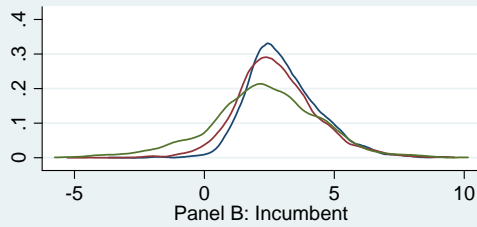


— 1991-1994 — 2003-2005

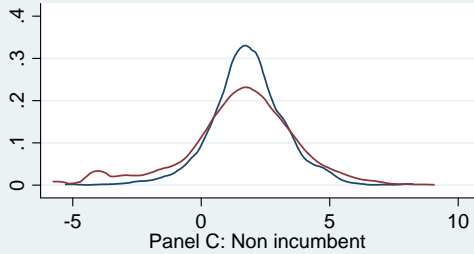
Chart 2: Log Assets by Incumbent and Period (Manufacturing)



— 1988-1990 — 1991-1994
— 2003-2005



— 1988-1990 — 2003-2005
— kdensity logassets



— 1991-1994 — 2003-2005

Chart 3

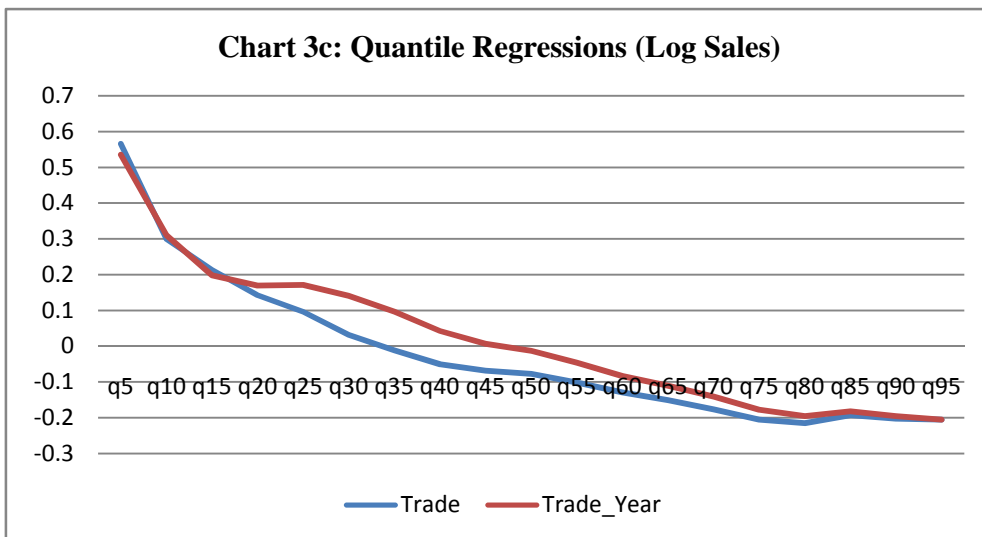
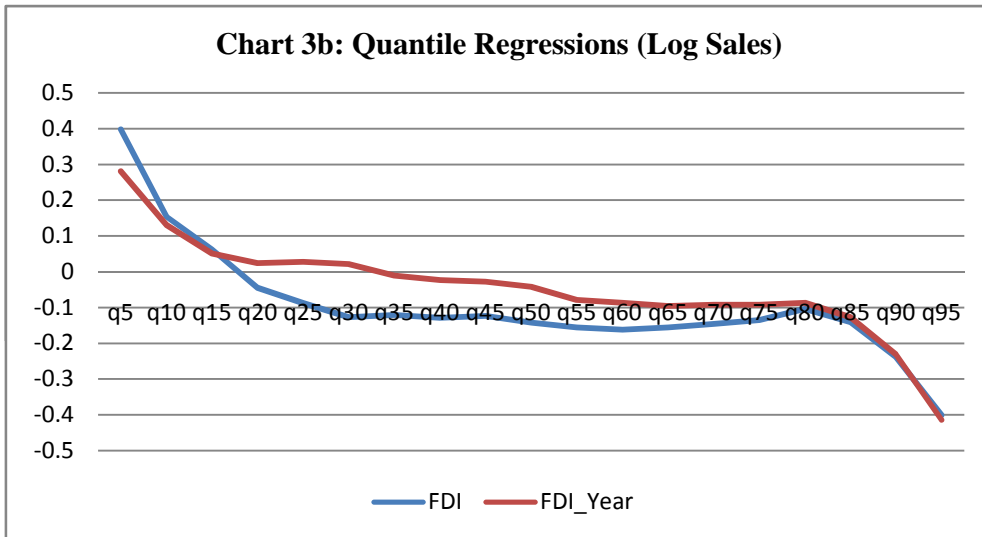
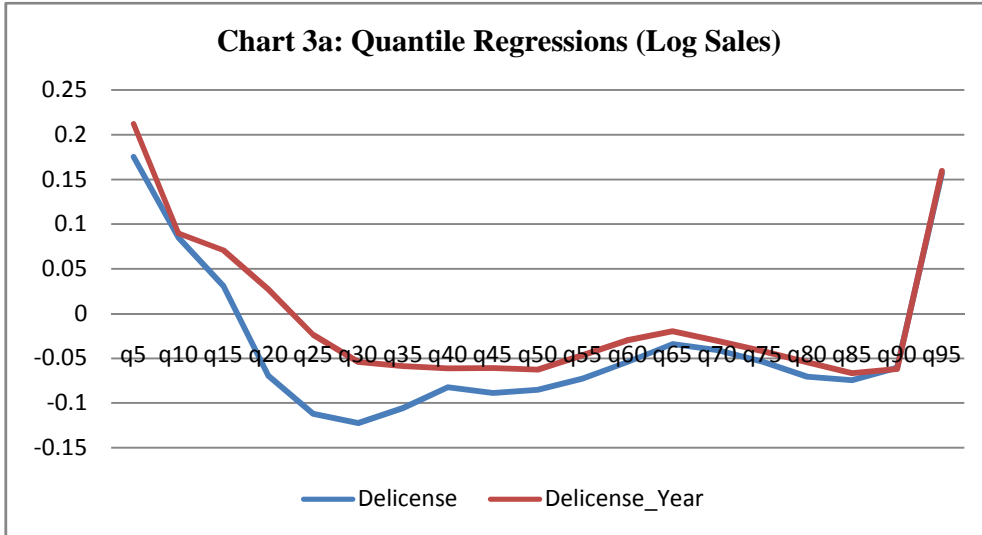


Chart 4

