In with the Big, Out with the Small:

Removing Small-Scale Reservations in India

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Abstract

An ongoing debate in employment policy is whether promoting small and medium enterprises creates more employment. Do small enterprises generate more employment growth than larger enterprises? We use the elimination of small-scale industry (SSI) promotion in India to address this question. For 60 years, SSI promotion in India focused on reserving certain products for manufacture by small and medium enterprises. We identify the consequences for employment growth, investment, output, productivity, and wages of dismantling India's SSI reservations. We exploit variation in the timing of de-reservation across products and also measure the long-run impact of national SSI policy changes using variation in pre-treatment exposure at the district level. Districts more exposed to de-reservation experienced higher employment and output growth. Growth was driven by entrants into de-reserved products and by incumbents previously constrained by size restrictions. The results suggest that promoting small and medium enterprises through India's SSI policies did not encourage overall employment growth.

Keywords: firm size and growth, small-scale firms, industrial policy, employment

JEL codes: L25, L53, J21

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1. Introduction

Most governments have policies to promote small and medium enterprises. Why? The U.S. Trade Representative's office makes the succinct claim that "America's small businesses are the backbone of the U.S. economy".[2] The Small Business Jobs Act, signed into law in 2010, provides a range of credit opportunities and tax cuts to promote small and medium enterprises ("SMEs") in the United States. The European Commission's 2008 Small Business Act for Europe seeks to reduce regulatory burdens for small businesses, provides tax incentives such as VAT reductions, and promotes access to financing. In 2002, China passed the SME Promotion law, which designated a central budget for promotion of small and medium enterprises across a variety of areas including credit provision, technological innovation, exporting, environmental protection, and worker training. India, the focus of our study, has had extensive regulations for decades to promote small and medium enterprises, based in part on its socialist legacy.

Much of the support for SMEs appears to stem from the assumption that SMEs promote more aggregate job creation. Yet the evidence to date on firm size and employment growth is contradictory. For developing countries, a number of studies document that small firms grow faster than large firms (Mead and Liedholm, 1998; Gunning and Mengistae, 2001 and Bigsten and Gebreeyesus, 2007; Sleuwaegen and Goedhuys, 2002). In contrast, Van Biesebroeck (2005) shows that after controlling for a number of other characteristics, medium and large firms in nine sub-Saharan African countries grow faster than small firms. Meanwhile, Teal (1998) and Harding, Soderbom and Teal (2004) find little relationship between firm size and growth in Ghana, Kenya and Tanzania.

The literature for industrial countries is also inconclusive, with early researchers finding that small firms grow more quickly and more recent research suggesting that the driver of growth is youth, not size (see, among others, Evans, 1987a, 1987b; Hall, 1987; and Sutton, 1997). Neumark, Wall, and Zhang

2 USTR website accessed August 7, 2015: https://ustr.gov/uscolombiatpa/small_business.

(2011) find evidence that small businesses create more jobs. However, they show that the negative relationship between establishment size and job creation is sensitive to whether firm size is measured using base period size or average size of the enterprise. Their estimates using average firm size show smaller but still significantly higher job creation rates for smaller firms.

Haltiwanger, Jarmin and Miranda (2013) argue that these earlier papers on U.S. firms are flawed due to measurement issues and omitted variable bias. They present evidence showing that the higher employment growth of smaller enterprises disappears once they control for age. Haltiwanger et al. conclude that public policy should promote young enterprises rather than small enterprises. For U.S. data, the evidence suggests both that younger firms grow faster than older firms, and that larger firms grow faster than smaller firms after conditioning on age.

One reason why it is so difficult to estimate both the effects of SME promotion as well as the job creation benefits of small firms is that firm size is not randomly assigned. In this paper, we take advantage of the elimination of a widespread policy to promote small scale enterprises to evaluate the effects of SME promotion on employment outcomes. India's widespread promotion of small and medium enterprises targeted products, not firms, and after decades of support was quickly eliminated starting in 1997. We use the rapid elimination of the program, which covered a quarter of all formal sector establishments prior to the reform, to measure the employment, productivity, and wage effects of a reversal of the SME promotion program.

India is an ideal country to study SME promotion. For the past 60 years, India has attempted to boost employment growth by shielding small manufacturing establishments from competition. Promotion measures have included the types of policies used all over the world to promote SMEs: subsidized credit, technical assistance, excise tax exemptions, preference in government procurement, and subsidies for power and capital. Until 1997, the "premier instrument" for protecting small establishments in India was its policy of reserving a number of products for exclusive production by small-scale industry. Proponents

of small establishment promotion argued that these policies encouraged labor-intensive growth, mitigated capital market imperfections, and shifted income towards lower wage earners (Hussain, 1997).

Critics of small and medium establishment promotion in India argued that these policies in fact discouraged their growth and slowed the overall expansion of the manufacturing sector. Mohan (2002) argued that small establishments making reserved products were prevented from growing or upgrading their technology, because they would have had to stop making those products if their investment grew above the allowed limits for small-scale industry (SSI). In a similar vein, Panagariya (2008) hypothesizes that the policy of reserving many labor-intensive products for SSIs limited Indian exports of these products.

In this paper, we address whether SME promotion through product reservation is an effective way of promoting job creation. India's dismantling of small scale reservations – which were specifically geared towards promoting small establishments – allows us to address the linkages between establishment size and job growth. We focus on the peak period of dismantling of the SSI reservation policy – 2000 to 2007 – to identify the impact of de-reservation on the growth of employment, output, investment, and wages. This period was characterized by few other reforms, as most of the trade liberalization and dismantling of the License Raj had been done in previous decades.

We use a newly available panel dataset from India's Annual Survey of Industries (ASI). While these data were previously available as a repeated cross-section, the new dataset provides unique establishment identifiers, allowing us to bypass the tricky business of trying to link establishments through beginning and end of year accounting information. We also explore the net impact of de-reservation at the district level. The panel dataset does not include district identifiers; however, we have created the first mapping of the panel dataset to district locations by merging these in from the annual cross-sections that we purchased separately.

We classify establishments based on characteristics prior to the reforms as incumbents (those already producing the reserved product) or entrants (those that moved into the product space after the product was de-reserved). We find that when products were removed from the reserved list, the average incumbent stagnated, while the average entrant grew. The net impact on employment growth of these two offsetting effects is positive. De-reservation increased the growth of larger establishments relative to smaller establishments, and reduced employment growth among smaller, older establishments. De-reservation also encouraged the growth of young entrants and incumbents that were previously constrained by the capital limits.

We are fortunate that most of India's other major reforms, including delicensing and major trade reform episodes, were completed before the period of our analysis. Of course, one important consideration is the potential endogeneity of the reforms. As an illustration, Chari and Gupta (2008), focusing on FDI liberalization, show that India's 1991 FDI liberalization was less likely in more concentrated sectors and sectors with a high share of state owned enterprises. We address potential endogeneity of the reforms by documenting that there are no pre-treatment trends before products were de-reserved. We also conduct placebo tests. Our results suggest that the effect of the true de-reservation remains robust, while the placebos show no effect.

To further address the possible endogeneity of the SSI reforms, we exploit the fact that SSI policies were set nationally but their effects are identified locally depending on prior exposure. At the district level, the elimination of SSI policies was an exogenous shock whose severity was greatest in regions whose pre-existing production structure included a large share of reserved products. We create a concordance that allows us to link our establishment -level panel to Indian districts. We then compare changes in employment, output, investment, and wage outcomes for districts that were more or less exposed to the de-reservation based on their pre-existing product mix. Estimating district-wide impacts also allows us to measure the net impact on employment outcomes across both shrinking (incumbent) establishments and expanding (new entrants into previously restricted products) establishments.

We find that districts that were more exposed to the de-reservation based on their pre-treatment product mix experienced higher employment and output growth over the period from 2000 to 2007. The results suggest that the average change in the fraction of de-reserved employment (0.076) is associated with a 6% increase in district-level employment.

The de-reservation may also have affected informal (unorganized) manufacturing employment.[3] If de-reservation simply pushed some workers into informality, then this would be a negative outcome that our ASI data would miss. To investigate this possibility, we conduct a similar, district-level analysis using unorganized manufacturing surveys from 2000 and 2005. We find no statistically significant association between the fraction of de-reservation and district-level employment in unorganized manufacturing. If anything, the evidence suggests that de-reservation may be associated with workers shifting from the unorganized to the organized sector.

For India, both Das (1995) and Shanmugam and Bhaduri (2002) document that small firms grow more quickly; however, these analyses are limited to small, specialized subsets of Indian manufacturing and do not shed light on why overall employment growth in labor-intensive industries has been slow. More recently, Garcia-Santana and Pijoan-Mas (2014) calibrate a span-of-control model that accounts for the reservation policy, using data from 2001, when most reservations were still in place. They simulate the effects of removing the reservation policy and predict that doing so would increase manufacturing output by nearly 7 percent. To our knowledge, ours is the first paper to empirically test the results of the actual dismantling of the SSI reservations policy at the establishment level, which makes it quite complementary to Garcia-Santana and Pijoan-Mas. Our finding that the average decline in reservations would increase employment by approximately 6 percent at the district-level is remarkably close to their simulation results. However, our primary focus is on generating employment, not output.

3 India uses the terms "unorganized" and "informal" to mean slightly different things. Our data cover the unorganized sector, although we use the two terms interchangeably.

While this paper focuses primarily on the linkages between establishment size and employment growth, there is also a related literature on policy distortions, productivity growth, and reallocation of production in developing countries. This includes Aghion, Burgess, Redding, and Zilibotti (2005), Alfaro and Chari (2009, forthcoming), Banerjee (2006), Besley and Burgess (2004), Goldberg, Khandelwal, Pavcnik and Topalova (2010a, 2010b), and Hsieh and Olken (2014). Aghion et al (2005) and Besley and Burgess (2004) are both important early papers on the costs of regulation in India that show how licensing and labor market regulations had significant but heterogeneous costs for both growth and productivity. Besley and Burgess (2004) emphasize the movement to informal sector enterprises as a result of regulation, an issue which we address at the end of this paper using data on unorganized manufacturing.

Alfaro and Chari (2009, forthcoming) examine more broadly changes in market structure and firm behavior over a longer time period spanning before and after the 1991 reforms. Alfaro and Chari (2009) find that firms that dominated in the early years continue to dominate in later decades, with the exception of the services sector where there is more significant dynamism. Despite significant entry by new firms, Alfaro and Chari show (using the Prowess data of all publicly listed firms) continued dominance of state-owned enterprises and older manufacturing enterprises.[4]

Goldberg, Khandelwal, Pavcnik and Topalova (2010a) are the first authors to use product-level data for India. They explore the determinants of new product introductions as a function of the earlier trade reforms, which were largely completed by the time the SSI liberalization occurred. Goldberg et al. find that falling input tariffs account for more than a 30 percent increase in new product introductions during their sample period. Goldberg, Khandelwal, Pavcnik and Topalova (2010b) examine whether the rationalization of product lines is linked to India's trade reforms, and find very weak links between the

4 Alfaro and Chari also examine the impact of the 1991 reforms on the overall size distribution of firms, finding that the reforms led to the entry of many small firms and reinforced the role of larger firms. Our paper is complementary to this paper, as we focus specifically on the removal of SSI policies, a reform which occurred after the major trade reforms and delicensing of earlier years.

two. Our paper has a different, but complementary focus: we are interested in how the elimination of product restrictions that favored small establishments—a change which occurred after the major trade reforms—affected employment growth.

Our findings are also consistent with a growing theoretical literature on heterogeneous firms and productivity (Melitz, 2003). Many of these papers show that reforms that allow the reallocation of production away from less efficient and towards more efficient firms are associated with significant productivity increases. Conversely, Garicano, Le Large, and Van Reenen (2013), show that countries like France that retain size-contingent labor regulations constrain firms from reaching optimal size (and consequently optimal productivity) levels. One important paper is Aghion, Burgess, Redding and Zilibotti (2008), which develops a model in the working paper version of their article where the dismantling of the License Raj encourages firm entry and expansion, but more so in pro-employer states. The fall in prices that ensues from delicensing leads to exit and contraction of less productive firms, but this is only possible in pro-worker states.

In our context, the de-reservation policy may be seen as lowering the fixed entry cost that establishments must pay in order to join a particular product market. The resulting increase in competition in the product market allows significant firm entry, which in turn lowers prices and raises the productivity level required for survival, as average productivity and wages rise. The smallest or least productive establishments are forced to exit the product space, and larger establishments increase their market shares. Alternatively, we can view the reservations policy as affecting the optimal behavior of multi-product establishments. Larger establishments that may have found it optimal to produce reserved products may not have been able to do so when the reservations policy was in place, and thus may have switched to a more optimal allocation after the reforms. In addition, by raising competition, de-reservation may have pushed establishments to specialize in products in their "core competencies" (Eckel and Neary, 2010).

The remainder of the paper is organized as follows. Section 2 explains the rationale behind SSI reservation in India, describes the trends in reservation and de-reservation, and reviews the data sets used

in estimation. Section 3 identifies the impact of SSI reservation policies on employment, investment, output, and wages over the 2000 through 2007 period. Section 4 presents additional robustness checks and Section 5 concludes.

2. Promoting Small and Medium Enterprises (SMEs) in India

India has historically supported its small-scale sector. According to Mohan (2002), one major reason was the government's belief that employment generation is critical in a labor surplus economy. Many believed that SSIs, particularly labor-intensive manufacturing enterprises, would be able to absorb surplus labor. One important pillar of SSI promotion was the reservation policy, initiated in 1967. Under this policy, which applies exclusively to manufacturing, certain products were reserved for production by SSIs. Initially, only 47 items were reserved (see Figure 1), but by 1996 that number had grown to more than 1,000 products. Mohan points out that the only selection criterion mentioned in official documents was the ability of SSIs to manufacture such items. He also notes – as does an official report of an expert committee on small enterprises, of which he was a member – that the choice of products was "arbitrary" (Hussain, 1997; Mohan, 2002).

SSIs were originally defined as "industrial undertakings" with up to Rs. 500,000 in fixed assets and fewer than 50 employees.[5] Over time, the employment condition was dropped and the investment ceiling raised, so that by 1999, industrial undertakings with up to Rs. 10 million in plant and machinery (at historical cost) were considered SSIs.[6] Large industrial undertakings that already made the reserved

5 An "industrial undertaking" may include more than one establishment. As we discuss below, almost all observations in our data include only one establishment, and we conduct our analysis at the establishment level.

6 The table below shows the SSI ceilings over time. The restriction on employment was dropped in 1960. The ceiling has been defined in terms of the original value of plant and machinery since 1975. The ceiling on investment in plant and machinery was raised from Rs. 6.5 million to Rs. 30 million in 1997, but was subsequently reduced to Rs. 10 million in 1999. Banerjee and Duflo (2012) use these changes to examine the impact of directed credit on firm performance. In 2006, the Micro, Small and Medium Enterprise Act raised the limit on plant and machinery for small enterprises to Rs. 50 million. We would therefore expect the constraint of the SSI reservation policy to be less binding for the last year of our sample.

products were allowed to continue manufacturing them, but their output was capped at current levels. Any further expansion or entry required a commitment to export at least 75% of output (Mohan, 2002).

Despite India's liberalization of a variety of industrial and trade policies in 1991, the reservation of products for SSIs remained in force until the late 1990s. Following the 1991 trade reform, the Advisory Committee on Reservation recognized growing concerns about SSI policies. SSIs had to compete with imported goods, and large undertakings (which had been grandfathered in) might be able to exercise monopoly power in the market for reserved goods as most other producers would be small. Moreover, growing consumer demand for high-quality goods, and ongoing technological progress, made it more difficult to produce many items in small undertakings. The Advisory Committee therefore appointed a special committee to reconsider the list of reserved items in 1995 (Office of Development Commissioner, Ministry of Micro, Small, & Medium Enterprises, Government of India, 2007). Based on recommendations from this committee, product de-reservation began in 1997 (Figure 1). While there were a few items removed from the list in earlier years, large-scale de-reservation started in 1997 (15 products) and picked up in 2002 (51 products). From 2003 to 2008, approximately 100 to 250 products were de-reserved each year, with only 22 products remaining reserved at the end of that period. While the de-reservation started slowly (Appendix Table A.3) with only 15 items de-reserved in 1997, the process

Year	SSI Definition
1955	Upto Rs. 5 lakhs in fixed assets and employment less than 50/100 workers with/without power
1960	Upto Rs. 5 lakhs in fixed assets
1966	Upto Rs. 5 lakhs in fixed assets
1975	Upto Rs. 7.5 lakhs in plant and machinery
1980	Rs. 20 lakhs
1985	Rs. 35 lakhs
1991	Rs. 60 lakhs
1997	Rs. 300 lakhs
1999	Rs. 100 lakhs
2006	Rs. 500 lakhs

Sources: Government of India, Ministry of Micro, Small & Medium Enterprises, Circular entitled "Investment Ceilings Over The Years"; Micro, Small and Medium Enteprises Act (2006). 1 lakh=100,000 (100 lakhs = Rs. 10 million).

accelerated over time, with the most number of products (253) deserved at the end of our sample period, in 2007. The coverage also accelerated in 2007 as each of the individual items de-reserved at the end of the reform period covered many more establishments.[7] After 2008, few products remained reserved, and in 2015, the last products were removed from the reservation list.

We mapped the list of SSI products to a panel of manufacturing establishments from the Annual Survey of Industries (ASI) from 2000-01 to 2007-08.[8] The ASI provides a representative sample of all registered manufacturing establishments in India, with large establishments covered every year, and smaller establishments covered on a sampling basis.[9] While previously the ASI did not release identifiers that would allow researchers to follow the same unit across years, the Central Statistical Office recently reversed this policy and released a panel going back to 1998. However, due to incomplete product coverage in 1998 and 1999 we are forced to begin our analysis in 2000. We drop 1998 and 1999 because without detailed product coverage we cannot identify which establishments were affected by SSI reservations and which were not.

The basic unit of observation in the ASI is an establishment (called a factory in the ASI data). The ASI allows owners who have more than one establishment in the same state and industry to provide a joint return, but very few (less than 5% of our sample) do so. In discussing the literature on firm size and

7 There were many establishments making several products that were de-reserved in 2007, the most common of which was "Fire clay, bricks and blocks containing less than 40% alumina". Nearly 3,500 incumbent establishments were making these bricks. Other items made by 300-500 incumbents each, included sawn timber, bolts and nuts, reinforced cement concrete pipes, and shopping bags.

8 The ASI uses the accounting year, which runs from 1 April to 31 March. We refer to each accounting year based on the start of the period; for example, the year we call "2000" runs from 1 April 2000 to 31 March 2001. Note that the product de-reservation in 2008 took place at the tail end of the 2007-08 accounting year; therefore we do not count these products as being de-reserved during 2007-08.

9 For the ASI, establishments with 100 or more employees are considered "large" and covered under the Census sector. In addition, establishments in "industrially backwards" states are covered under the Census sector, as are certain units deemed to have contributed substantially to output during previous surveys.

growth, we occasionally refer to "firms" but our analysis is conducted at the level of the establishment. Establishments report products in the ASI survey using ASI Commodity Classification, or ASICC, codes. We created a concordance between the SSI product codes—which indicate which products were reserved for small and medium enterprises—and the ASICC codes. We describe our procedure in Appendix A.

Table 1 provides further details on the establishments in the ASI. Our dataset contains approximately 30,000 establishments in any given year, 26% of which made at least one reserved product in 2000. Table 1 documents that SSI reservation policies were pervasive at the beginning of the sample period and affected one out of four establishments in our sample. By 2007, however, less than 10% of establishments were making reserved products. Table 1 also shows that establishments making de-reserved products were, on average, slightly younger than establishments making reserved products.

One question that frequently arises in research on Indian establishments is the quality of the Annual Survey of Industries. A number of researchers have used an alternative data source, the Prowess database, created and maintained by the CMIE. Why use the ASI? Mohanan and Chopra (2012) raise the concern that there are only 4,018 establishments that appear in all 10 years of the ASI panel that they consider (1998 through 2007). To address concerns about the potential quality of the data, we have now included a discussion of the nature and quality of the ASI panel in the data appendix.

For research on manufacturing employment growth, the ASI data are by far the most comprehensive panel available. In 2000, for example, the Prowess database only listed employment data for 90 enterprises, while the ASI had data on 30,851. A year-by-year comparison of the ASI coverage and Prowess for our key variables is reported in Appendix Table A.4. By the end of our sample period, in 2007, the Prowess database had significantly improved its coverage, but it still lagged behind the ASI. In 2007, 35,962 ASI establishments reported wage data versus 10,673 firms in Prowess. However 36,144 ASI establishments also reported employment counts whereas only 774 firms in Prowess did.

The Prowess database, which has been used in a variety of other papers, is useful for studying the behavior of large firms. However, since Prowess focuses on large firms, it would not be appropriate for our examination of a small-scale reservation policy. Another advantage of the ASI over Prowess is that the ASI always reports the locations where establishments operate, whereas Prowess typically only reports the location of the firm's headquarters. For the purposes of our analyses, the ASI data are the most comprehensive and appropriate panel available.

3. Removal of Small-scale Reservation Policies

In this section, we use the rapid and complete dismantling of the SSI reservation policy documented in Figure 1 to measure its impact on establishments of different sizes and ages. While we are particularly interested in the impact on employment, we also report outcomes for investment, output, wages, and labor productivity. Legally, small-scale reservation policies applied primarily to establishments with a historical cost of plant and machinery below Rs. 10 million during our sample years. Consequently we would expect a heterogeneous response to the removal of reservation policies across establishments depending on whether or not they were constrained by the Rs. 10 million ceiling. [10]

Our level of analysis is primarily at the establishment level. However, we also present results at the product, industry, and district levels. Robustness tests presented later will show that our results are consistent across different levels of analysis. We have chosen not to focus on industry level results because reservation policies were implemented at the sub-industry level. Within any single industry, only a handful of products were typically reserved. The advantage of an analysis conducted using establishments is that we know exactly which products within these units were reserved, allowing us to identify the coverage of reservation policies much more accurately. In addition, assigning a date for de-

10 As noted above, in 2006, the Micro, Small and Medium Enterprise Act raised the limit on plant and machinery for small enterprises to Rs. 50 million. However, since this change was only made official in September 2006, and our sample period only extends to 2007, we focus on the Rs. 10 million threshold.

reservation at the industry level is problematic because most industries have multiple de-reserved products, many of which have different dates of de-reservation.

Our results at the district level allow us to aggregate results on the net impact of de-reservation across entrants and incumbents in the product space as well as across different industries. The identification strategy at the district level is different than at the establishment and product levels, so we present these various results separately.

3.1 Establishment-Level Effects of De-reservation

For the establishment-level analysis, treatment is defined as the elimination of small-scale reservation on the establishment's primary SSI product. The "primary SSI product" is defined as the first SSI product to be de-reserved that we ever observe the establishment making, regardless of whether that SSI product is reserved or de-reserved at the time.11We start with a difference-in-differences (DID) equation of the following form for establishment *i* in year *t*:

$$y_{it} = \beta Deres_{it} + \alpha_i + \alpha_t + \omega_{it} \qquad (1)$$

The dependent variable y_{it} is alternatively defined as the (log of) employment, output, capital, the average per-employee wage, or labor productivity of establishment *i* at time *t.* Employment is defined as the total number of employees. Throughout the paper, output and capital are defined in real terms, where output is deflated by the wholesale price index (WPI) for the appropriate product category, and capital is deflated by the WPI for plant and machinery. Wages are measured by dividing the total annual wage bill, deflated by the consumer price index, by the number of employees. We also measure labor productivity as real output divided by the number of employees.

11 Over 95% of establishments observed making a SSI product make no other SSI products. Forty percent of the establishments that make more than one SSI product exclusively make similar products that were de-reserved in the same year. In the few cases where an establishment makes multiple SSI products that are de-reserved in different years, we define the establishment as treated when the first product to get de-reserved is de-reserved.

$Deres_{it}$ is a dummy variable that is equal to 1 if the establishment's main SSI product has been de-reserved. Where possible, we include all establishments – even those that do not help to identify β because they are not affected by the reservation policy – because these establishments help to identify the secular year trends in establishment performance.

Because we are controlling for both year (α_t) and establishment (α_i) fixed effects, β is identified from a combination of (1) products becoming de-reserved and (2) establishments switching into or out of making (de)reserved products. To distinguish between these channels, we interact the de-reservation dummy with indicators identifying incumbents and entrants into the product market. We create a dummy variable *Incumbent* that equals 1 if an establishment ever made an SSI product before it was de-reserved. Similarly, we create a dummy variable *Entrant* that equals 1 if an establishment ever made an SSI product *after* it was de-reserved, but not before. Note that our establishment fixed effects absorb the direct impacts of being an incumbent or entrant, so we include only the interactions with our *Deres* variable:

$$y_{it} = \gamma Deres_{it} * Incumbent_i + \rho Deres_{it} * Entrant_i + \alpha_t + EntryYear_i * \alpha_t + \alpha_i + \varepsilon_{it} \quad (2)$$

In all of our establishment-level regressions, we recognize that establishments that enter into a new product space may be fundamentally different from those that do not. We address this selection in two main ways. First, we identify the first year in which we see an establishment switching the main product that it makes (regardless of whether it is an SSI product or not)[12]. We assign the establishment this "year of entry" into a new product space. When we separate results by incumbents and entrants, we control for an interaction between this year of entry and year fixed effects. This creates a non-parametric control for unobserved, time-varying characteristics for establishments that switched into new product spaces in each

12 We do not count this as a switch if the establishment immediately switches back to making the original product.

year.[13] In an alternate specification, discussed in Section 4 and shown in Table 9, we control for whether an establishment changes the main product it makes in any given year. With these two sets of controls, we interpret the coefficients for entrants as the effect of de-reservation conditional on the decision to enter a new product space. In other words, we investigate the mechanism by which de-reservation changes the outcomes of interest by looking for a disproportionate response to entry in the product space of de-reserved products relative to entry into the space of other products.

While we do not control for other confounding policy changes, other major reforms with heterogeneous effects across manufacturing products were limited during this time period. By 1998, 93% of industries were no longer subject to licensing requirements. Major changes in policies vis-à-vis foreign investment occurred in the early 1990s, and then stalled during the period of SSI reform. Nataraj (2011) shows that tariffs were largely harmonized across industries by the late 1990s. Although there were some tariff reductions during the 2000s the variation in tariff rates across product types had fallen dramatically by the start of our sample period.

Our establishment-level results from estimating equations (1) and (2) are reported in Table 2. The point estimates in panel (a) of Table 2 indicate that when we do not distinguish between incumbents and entrants, de-reservation across the entire sample of establishments had no statistically significant impact on employment or capital. However, removal of small-scale reservation was associated with a significant increase in per-employee wage and a marginally significant increase in output. The coefficients on output and wages indicate that on average across all establishments, the removal of small-scale reservation was associated with a 2.4% increase in output and a 1.4% increase in the average (real) wage. [14]

13 Our results are robust to using a separate linear time trend for each year of entry into a new product space.

14 Changes are estimated as [exp(b)-1] for each coefficient b.

These averages mask considerable heterogeneity among incumbents and entrants. Panel (b) of Table 2 shows that for entrants into a previously reserved product space, employment, output, capital investment, wages, and labor productivity increased significantly. Employment increased on average by 7%, output by 26%, and capital investment by nearly 9%. Average real wages increased by approximately 7%. In keeping with the large increase in output relative to employment, labor productivity also increased by over 19%.

For incumbents that previously produced reserved products and remained in the sample, the coefficients on all outcome variables are smaller in magnitude and, with the exception of the employment results, statistically indistinguishable from zero. The coefficient on employment is significant and suggests that de-reservation is associated with a 2% decrease in employment among incumbents. These findings suggest that with de-reservation, the average incumbent shrank, while the average entrant grew. In the following section, we examine the extent to which these effects varied by establishment size and age.

3.2 Effects of De-reservation by Establishment Size and Age

To identify how the impact of de-reservation differed by establishment size, we use two alternative measures. The first measure is based on the historical value of fixed assets, which was used as a threshold to determine eligibility for the manufacture of reserved products. The second measure of size is an average of current and lagged total number of employees.

Reserved products could typically be produced only by "industrial undertakings" with historical values of plant and machinery below a certain value. However, undertakings with historical capital investment above the threshold could produce reserved products if they committed to exporting a certain share (usually 75%) of production. Moreover, large incumbent undertakings (those that were already producing the product before it was reserved, or small incumbent undertakings that grew above the

threshold) could obtain a "Carry On Business" license to continue production. However, these undertakings were constrained to produce no more than they had previously produced.

Table 3 shows how the effect of de-reservation varied for establishments that reported average book values of plant and machinery above versus below the Rs. 10 million threshold prior to de-reservation. In this table, we limit the sample to establishments for which we observe plant and machinery in at least one year prior to de-reservation.[15] In panel (a), we find that de-reservation reduced employment among establishments that were previously below the threshold. The point estimate is significant, and indicates that on average these establishments reduced employment by 4%. However, the reforms increased employment, output, capital, and wages among constrained establishments, defined as those that had exceeded the 10 million Rs. threshold. For these establishments, the increase in employment averaged 5%, while output increased by 6%.

In panel (b), we split the results by incumbents versus entrants. As expected, incumbents with pre-de-reservation levels of plant and machinery within the SSI cap reduced employment, output, and capital stock, with a concurrent decline in labor productivity. In contrast, the largest increases in employment and capital are found among new entrants that would have been actively constrained by the SSI cap. The effect on employment is statistically significant as well as economically large; the average previously constrained entrant exhibits an increase of 13% in employment after de-reservation. Output and capital also increased by 16% and 9%, respectively. Larger incumbents that were presumably grandfathered, and constrained by historical output levels, also exhibited significant increases in employment and wages. These positive results for larger incumbents are particularly interesting because they indicate that the driving mechanism for employment generation was not the distinction between entrants and incumbents, but the size constraints imposed on larger establishments.

15 This restriction does not exclude entrants, because we do not require that the establishment be observed *making the reserved product* prior to de-reservation. For example, if an entrant started to make tapioca flour after it was de-reserved in 2004, and we observed that entrant's plant and machinery prior to 2004 (when it was making other products), then we include it.

We also find a large increase in output among entrants who would have been within the threshold (and thus allowed to enter the product space) even before de-reservation. One likely reason is that the product reservations discouraged even small establishments from entering the product space, since they would have known that they could not grow beyond a certain limit. Another possibility is that there may have been monopolistic conditions created by large, grandfathered incumbents. Once reservations were lifted and de-reserved product markets became more competitive, smaller establishments entered and grew. Unlike larger incumbents and entrants, small entrants increased output by over 25% but capital stock only by 8%, with small and insignificant increases in employment. Thus labor productivity and wages among these small entrants also increased substantially.

We would expect that if the SSI threshold were a binding constraint prior to the reforms, the most productive incumbent establishments would have grown until they reached the threshold. Incumbent establishments just below the threshold, and those that reached the threshold and were granted "Carry on Business" licenses should benefit most from de-reservation. Figure 2 shows the effects of de-reservation across size categories for plant and machinery for incumbent establishments, with the largest positive effects for those near the threshold. The establishments are classified based on their average, pre- de-reservation values of plant and machinery. This figure suggests that incumbents just below the threshold were in fact constrained by the reservation policy, and increased their capital investment the most after de-reservation. Investment by incumbents above the threshold also increased.

To what extent do these differences by capital investment size hold if instead we measure size in terms of employment? To examine this issue, we interact the de-reservation variable in Equation 2 with a dummy for each establishment size and age category. Size is measured as average employment size

between the previous period in which the establishment was observed, and the current period.[16] Figure 3, panel (a) plots the coefficients on de-reservation for each size and age class, and shows that larger establishments grew faster with de-reservation, while smaller establishments shrank. This pattern holds across all age classes. Figure 3 shows that the critical cutoff for establishments that benefited from the reforms was 50 employees. On average, establishments with at least 50 employees showed employment growth with de-reservation. Within each of these larger size classes, the fastest growing establishments were the younger ones. This figure makes clear that the fastest growing establishments as a result of de-reservation were the largest (at least 500 employees) and youngest (1 to 2 years old). Conversely, the establishments most negatively affected in terms of employment contraction were those with zero to four workers.

In panel (b) of Figure 3, we break down the effect of size for incumbents versus entrants. For ease of interpretation, we interact de-reservation with each size category, controlling for age, rather than showing results for each size-age cell independently. The results are similar to panel (a): for both incumbents and entrants, larger (smaller) establishments grew faster (slower) with de-reservation. The relationship is strong and monotonic, and the standard errors are small. This evidence suggests that the de-reservation encouraged both large incumbents as well as large entrants. The results for incumbents also confirm the hypothesis that the smallest establishments shrank the most.

Taken together, these findings suggest that de-reservation increased the tendency of larger, younger establishments to grow relative to smaller, older establishments. The growth in employment was driven both by entrants that moved into the previously reserved product space, as well as by large incumbents that were previously constrained by the reservation ceiling.

3.3 Potential Endogeneity of Product Choice for De-Reservation

16 As discussed in Davis et al. (1996) and Haltiwanger et al. (2013), using an average of the previous period's size and this period's size mitigates the effect of regression to the mean in establishment size.

One possible concern is that products were strategically chosen for de-reservation, suggesting potential endogeneity of the reforms. Documents from the Ministry of Micro, Small & Medium Enterprises indicate that products were de-reserved based on the recommendations of a special committee. Committee members were asked to consider a variety of factors when determining which products to de-reserve, including the labor intensity of production, the minimum economic scale of production, the export orientation of small establishments manufacturing those items, and consumer interests.[17]

Our baseline specifications include establishment fixed effects, which control for any time-invariant, establishment-level characteristics that are correlated with de-reservation. However, the committee indicated that some products were selected for de-reservation based on recent changes in product innovation. Therefore, it is possible that the product markets for de-reserved items were changing in a systematically different way than the markets for non-de-reserved items. We might also be concerned that our differential results for entrants and incumbents are driven not by entrants growing due to de-reservation, but because the de-reservation policy simply attracted entrants that were already growing quickly. In this section we perform a number of exercises to investigate whether these issues affect our analysis.

To address the possible endogeneity of product choice, we first revisit our previous analysis at the product level. We begin by showing that our results at the product level are consistent with the

17 The special committee produced a report identifying products for de-reservation. This report indicated a number of reasons for selecting the first set of products recommended for de-reservation, namely: feasibility of producing quality products given the threshold on investment; need for higher investment due to product innovation; safety and hygiene issues associated with certain products; export potential; resource utilization; and the creation of a "monopoly like situation" in certain product markets due to the Carry On Business licenses granted to large establishments (Office of Development Commissioner, Ministry of Micro, Small, & Medium Enterprises, Government of India, 2007).

establishment level results. We conduct the following regression of outcome *y* on a dummy variable for de-reservation at the product level *p*:

$$y_{pt} = \beta Deres_{pt} + \alpha_p + \alpha_t + \mu_{pt} \quad (3)$$

We allocate output using reported product-level revenues. To construct product-level labor, capital, wage, and number of establishments, we allocate each of these variables based on the share of revenues associated with that product. We weight the product level regressions using initial employment.

Table 4 shows that de-reservation is associated with an increase in the number of establishments making a product, and with increases in labor, output, capital, and wages. The estimates suggest that product de-reservation was associated with an average increase in the number of establishments producing a product of nearly 15%. For products that were de-reserved, employment increased by about 50%, output by nearly 35%, capital by 45% and wages by 6%. These large effects are all significant at the 5% level, and most are significant at the 1% level. At the product level, the increase in employment is greater than the increase in output, leading to a fall in labor productivity.

Pre-De-reservation Trends in Outcomes. We next explore the possibility of endogenous product choice by testing for significant trends at the product level in outcomes prior to the reform. To test for the existence of pre-treatment trends, we run a product-level regression of de-reservation (equal to one in the year of de-reservation) on lagged, first difference changes in the product-level outcomes of interest (employment, output, capital, and wages). If government officials took a product off the reservation list in response to increasing employment or output growth, then the coefficients in our regressions should be statistically significant.

Since some products were not observed in every year, we calculate the lagged first difference at time *t* by taking the outcome in the previous period observed (*t_lag*), minus the outcome in the prior

period observed (*t_lag2*), and dividing by the gap between *t_lag* and *t_lag2*. We then estimate the following:

$$Deres_{pt} = \beta\{[Outcome(t\_lag)_{p,} - Outcome(t\_lag2)_p]/[t\_lag - t\_lag2]\} + \alpha_p + \alpha_t + \omega_{pt} \quad (4)$$

We include all products for which we observe lagged, first-differenced outcomes, even those that were never reserved or de-reserved. For products that were de-reserved, we limit the sample to years up to the year of de-reservation, so as not to include the effects of de-reservation. Table 5 shows the results. We find no evidence that pre-de-reservation trends in the outcomes differed systematically prior to the year of de-reservation. The point estimates are insignificant and close to zero.

Placebo Test As an additional test, we also conduct placebo tests by randomizing de-reservation across remaining products. To do so, we randomly select ASI products and attribute a year of de-reservation to them, mirroring the frequency and distribution of years of de-reservation for the true de-reserved products. We perform this exercise 100 times. For each iteration, we run the following regression for each outcome of interest:

$$y_{pt} = \beta Deres_{pt} + \delta PlaceboDeres_{pt} + \alpha_p + \alpha_t + \mu_{pt} \quad (5)$$

Since products that were actually de-reserved could be selected for the placebo treatment, we control for true de-reservation in order to avoid confounding the placebo effect with the true treatment effect.

Table 6, panel (a) shows the results from one of our 100 placebo runs, while panel (b) summarizes the number of runs that were significantly above or below zero at the 5 percent level, for each outcome of interest. Panel (c) illustrates both the true and the placebo results for employment and output. For most outcomes, 10 or fewer runs were significant at the 5 percent level, and those that were significant were fairly evenly split between positive and negative results. One outcome of interest – labor productivity – did exhibit 11 runs that were significantly different from zero, and 10 of these were

positive, which is the opposite direction from our true results (see Table 4 above). Overall, 4.6 percent of the results were positive while 2.7 percent were negative, which suggests an absence of a placebo effect.

3.4 Net Impact of SSI Reservation Policies on District Outcomes

We examine the effects of the de-reservation policy at the district level using the pre-treatment allocation of reserved and non-reserved products. Our district level analysis is our best estimate of the aggregate impact of the reservation policy because it captures the effect on all establishments, including informal sector units and formal sector establishments that are sampled infrequently.

Our measure of exposure to de-reservation is similar to that used by Topalova (2010) to study the impact of tariff liberalization on Indian districts. It exploits the fact that the de-reservation policy was implemented at a national level and varied across products, but calculates each district's exposure based on beginning-of-period product mix. Therefore, it avoids any changes in a district's product mix that may have been induced by the de-reservation policy. At the same time, it uses geographic variation in exposure to de-reservation, which is less likely to have influenced the special committee's decisions than product-level characteristics. Figure 4, panel (a) shows the fraction of employment in each district that was associated with reserved products in 2000. Panel (b) shows the extent to which products were subsequently de-reserved by 2007, weighting each de-reserved product by its labor share in 2000.

For each of the 339 districts in India that have at least 10 establishments reported in the ASI for each year in our sample, we construct a measure of exposure to de-reservation as follows:

$$FrDeres_{dt} = \frac{\sum_p (Employment2000_{dp} X Deres_{pt})}{TotalEmployment2000_d}$$

$FrDeres_{dt}$, the fraction of employment exposed to de-reservation, is calculated as the sum over all products p of employment associated with that product in district d in 2000, multiplied by a dummy

variable indicating whether the product was de-reserved, and divided by total district-level employment in 2000. We allocate each establishment's employment to its various products based on output shares.

We estimate the following long-difference DID model at the district level:

$$\Delta y_d = \beta \Delta FrDeres_d + \mu_d \quad (6)$$

The left hand side variable, Δy_d is alternatively the change in log of employment, output, capital, wages, or labor productivity between 2000 and 2007. The right hand side variable is the change in the fraction of employment exposed to de-reservation between 2000 and 2007, where the fraction is calculated as described above. We calculate these variables at the district level by aggregating the establishment-level variables, inflated by their sampling weights. One potential concern is that the de-reservation may have resulted in inter-district migration, thus affecting district-level results. To address this issue, we control for the average change in de-reservation among *neighboring* districts. We also control for whether the district is located in a state with employer-friendly regulations (as classified by Besley and Burgess (2004)), and for a variety of pre-existing, district-level characteristics based on the 2001 Census.

Table 7 shows the district-level DID results. The point estimates show a positive relationship between de-reservation and employment, output, capital and wages, and a negative relationship between de-reservation and labor productivity. The results are statistically significant for both employment and output. In the data, the average change in the fraction of de-reserved employment at the district level was 0.076. Thus, the point estimate from panel (a), at 0.786, suggests a 6% increase in district-level employment.

We note that the coefficient on neighboring-district de-reservation is negative for all variables and significant for both output and productivity. These results are consistent with the migration of workers and economic activity towards neighboring districts that experienced higher levels of de-reservation.

These results suggest that the removal of SSI reservations increased formal sector employment, which is captured by the ASI. At the same time, it is possible that the SSI policy reforms affected unorganized, or informal, manufacturing as well. One possibility is that the reforms drove formal sector workers into informal sector jobs, which typically pay lower wages and provide fewer benefits. While panel data do not exist for the unorganized sector, we used two rounds of the National Sample Survey Organisation's Unorganized Manufacturing Enterprises Survey – from 2000 and 2005 – to conduct a district-level analysis. Table 8 shows the results of regressing the change in unorganized sector employment, output, capital, and labor productivity, at the district level, on the change in the fraction of de-reserved output in the formal sector. We do not include wages as an outcome variable, as many unorganized establishments rely on unpaid household employees.

There is no statistically significant association between the fraction of de-reservation and district-level employment in unorganized manufacturing. If anything, the negative coefficient on unorganized employment in Table 8 and the positive coefficients in Table 7 suggest that de-reservation may have been associated with a shift away from the unorganized sector towards organized sector employment.

4. Extensions and Robustness Checks

Product Switching The positive coefficients on entrants may reflect the fact that establishments moving into these products are a selected sample. Entrants focusing on core competencies may have been expected to grow even in the absence of the de-reservation. To investigate this possibility, we include a dummy variable that equals one when an establishment changes its main product, regardless of whether the product is reserved, is de-reserved, or was never reserved. Table 9 shows that establishments that switch do, in fact, appear to grow, suggesting selection into switching. Nonetheless, the effects of the de-reservation remain robust in magnitude and significance.

Industry Level Results This paper emphasizes establishment level and product level measures to evaluate the impact of de-reservation. Conducting the analysis at the industry level is likely to be less

accurate since policies were not applied at the industry level. For any four-digit industry, there could be a number of products that were reserved as well as many that were not. Nevertheless, the ASI is likely to be more representative of the population of establishments at the industry level. For example, ASI provides sampling weights for smaller and larger establishments so that at industry level one can achieve representation that is accurate by using those weights to scale up the data. At the establishment or product level there could also be truncation or selection issues which the use of the multipliers to scale up to the industry level addresses. Consequently, we also created an aggregate industry level measure of exposure to SSI at time *t*. Use of the sampling multipliers means that smaller establishments, which are more likely to make SSI products, are given greater weight than they are in the establishment-level results.

We use the sampling weights provided by the ASI to create a representative sample of establishments at the industry level. We measure industries at the four-digit level; in the ASI there are 124 such industries. To do so, we follow a similar logic as we used in the district-level regressions, following Topalova (2010). We calculate the exposure of each industry *j* to de-reservation at time *t* as the sum over all products of revenue associated with each product *p* in industry *j* in 2000, multiplied by a dummy variable indicating whether the product was de-reserved, and divided by total industry-level product revenues in 2000.

$$FrDeres_{jt} = \frac{\sum_p (Revenue2000_{jp} XDeres_{pt})}{TotalProductRevenue2000_j}$$

Our left-hand side variables are contemporaneous measures of aggregate labor, output, capital, average wage (calculated as aggregate wage payments divided by aggregate labor), and aggregate number of establishments at the industry level. We then estimate the effects of exposure to de-reservation on each outcome of interest y as follows:

$$y_{jt} = \beta FrDeres_{jt} + \alpha_j + \alpha_t + \mu_{jt} \qquad (7)$$

We also include a long-difference specification, which uses the change in the fraction de-reserved, and the changes in the outcomes of interest, between 2000 and 2007:

$$\Delta y_j = \beta \Delta FrDeres_j + \mu_j \quad (8)$$

The results, reported in Appendix B, demonstrate that de-reservation is associated with a significant increase in total employment. For the annual fixed effects regressions the results indicate that if an industry were to go from fully reserved to fully de-reserved, employment would increase by 28%. For the long differences, which measure the impact between 2000 and 2007, the results indicate a 75% increase in employment for an industry that would have moved from fully covered by small-scale reservation to fully de-reserved. As noted above, these coefficients should be cautiously interpreted as only a handful of products were typically reserved in any given industry. Although the coefficient on output is also positive, it is not statistically significant from zero, and the percentage increase is less than the percentage increase in employment. These findings are consistent with our district-level results, which also show that de-reservation is associated with increases in employment and output.

Other robustness tests We saw above that product de-reservation does not appear to be associated with pre-de-reservation trends at the product level. However, we may also be concerned that industries with certain characteristics were selected into de-reservation at earlier dates. We checked for this possibility by re-running our baseline specification at the establishment level (results reported in Appendix B) including a number of different controls such as industry-by-year dummies (industry dummies at the 3-digit level); initial location dummies interacted with year dummies; initial age (dummies for 5 age groups) interacted with year dummies; the initial ratio of production to total workers (dummies for 10 deciles) interacted with year dummies; and the initial ratio of capital to number of workers (dummies for 10 deciles) interacted with year dummies.

We also conducted a robustness check to control for establishment-specific time trends. Given the large number of individual establishments, including a separate variable with a time trend for each establishment was infeasible. Therefore, for each outcome of interest, we first conducted a separate regression, for each establishment, of the outcome on a time trend. We used the coefficient on the time trend to generate predicted values for that outcome of interest and for that establishment. We then combined all of the establishment-specific predicted values for a particular outcome of interest into one variable (for example, log(labor)_hat) and included this variable as a control in the relevant regression (i.e. the regression for that outcome of interest; for example we included log(labor)_hat in the labor regressions, log(output)_hat in the output regressions, and so forth). Results, available in Appendix B, are very close to the baseline results.[18]

Employment growth for non-SSI sectors We find that eliminating incentives via product reservation for small establishments in India boosted aggregate employment growth. An alternative approach would have been to adopt a more direct strategy to understanding the relationship between size, age, and growth for Indian manufacturing.

As a further check on our results, we performed a quasi out of sample exercise. We began by excluding all establishments that were affected by the SSI policies, either as incumbents or as entrants into the reserved product space. We then traced—using approaches adopted previously in the literature for the United States—the reduced form relationship between establishment size, age, and employment growth. In addition to providing a robustness check on the previous section, we can also think of this exercise as casting light on the long run relationship between employment growth and establishment size and age.

The results are summarized in Figure 5. The figure shows projected establishment employment growth rates for each size and age class across Indian establishments that were never affected by small

18 However, the number of observations is lower than in the baseline results as we can only include an establishment-specific trend for establishments observed at least twice with non-missing values of the dependent variable in question.

scale reservation.[19] Each bar represents the results of a regression of employment growth on a specific establishment size and age class, controlling for a number of other determinants.

The results are remarkably consistent with the previous tables. Once one takes into account the high failure rate of smaller establishments, the fastest growing establishments in terms of employment are either young or big. Average employment growth was positive and high for all establishments with at least 500 employees. Employment growth was also positive for nearly all size classes of establishments between 1 and 2 years of age. Controlling for age, the largest establishments experienced the largest employment growth. Controlling for size, the youngest establishments also experienced the highest employment growth.

5. Concluding Comments

In this paper, we use the elimination of a policy that promoted small and medium establishments in India to answer the following question: which kinds of establishments create more employment? For the past 60 years, India has promoted small-scale industry (SSI) by reserving production of some goods for smaller establishments. During the sample period, one in four establishments in the Annual Survey of Industries was covered by this policy.[20] The stated goal of small-scale reservation was to promote employment growth and income redistribution, but some commentators have argued that the policy constrained growth. We use the elimination of the SSI reservation policy between 1998 and 2007 as an exogenous shock to understand size and employment linkages over time.

19 Following Davis et al. (1996) and Haltiwanger et al. (2013), size is measured as average size in period t, given by average employment between the previous period observed and the current period, $S_{avg}= 0.5[S(t) + S(t')]$. Employment growth is measured as size in period t minus size in the previous period observed, divided by average size and by the gap between current period and prior period observed: $[S(t')-S(t)]/\{ S_{avg}[t' -t]\}$. We also follow Haltiwanger et al.'s approach of accounting for both entry and exit.

20 Since large establishments are over-represented in the sample, and the reservation policy was targeted at small establishments, it is likely that an even greater share of the overall population of formal establishments was covered by the policy.

Our results suggest that eliminating incentives for small establishments boosted aggregate employment growth. India eliminated all but a handful of product restrictions protecting small and medium establishments from competition over a short horizon between 1997 and 2007. This period was characterized by few other reforms, as most of the trade liberalization and dismantling of the License Raj had been done in previous decades. The elimination of small-scale reservation over a short horizon allows us to measure the importance of size in employment promotion.

We also conduct the analysis at the district level. We find that districts that were more exposed to the de-reservation policy experienced higher employment growth between 2000 and 2007. The magnitude of the effect is large: between 2000 and 2007 a district facing the average amount of de-reservation would have experienced a 6% increase in overall employment.

To explore the mechanisms through which these changes might have occurred, we examine the effects of the de-reservation policy on incumbents versus entrants. Consistent with the reservation policy's stated goal of protecting employment in small establishments, we find that the de-reservation decreased employment among smaller, older establishments. Also consistent with the claim that reservation was holding back the growth of larger establishments, we find that the entry and expansion of output, employment, and investment was driven by new entrants to the previously reserved product space as well as establishments that were previously constrained from expanding their existing stock of fixed assets. We also document increased investment in plant and machinery among these previously constrained incumbents. Our findings can be interpreted through the lens of the heterogeneous firms literature (Melitz, 2003); as de-reservation increases competition in a product market, large establishments increase their market shares at the expense of small establishments.

How well did the reservation policy achieve its goals? While small-scale reservation may have protected employment in certain small establishments, it did so at the expense of employment elsewhere. With respect to the goal of income enhancement, our results show that eliminating reservation policies for smaller establishments increased average wages. However, it is not clear whether this effect is due to entrants paying higher wages to existing workers, or to a shift towards a higher-skilled workforce. Our

analysis suggests that the removal of small-scale reservations *increased* overall employment by encouraging the growth of younger, larger establishments – those that are most likely to pay higher wages, create more investment, be more productive, and generate growth in employment.

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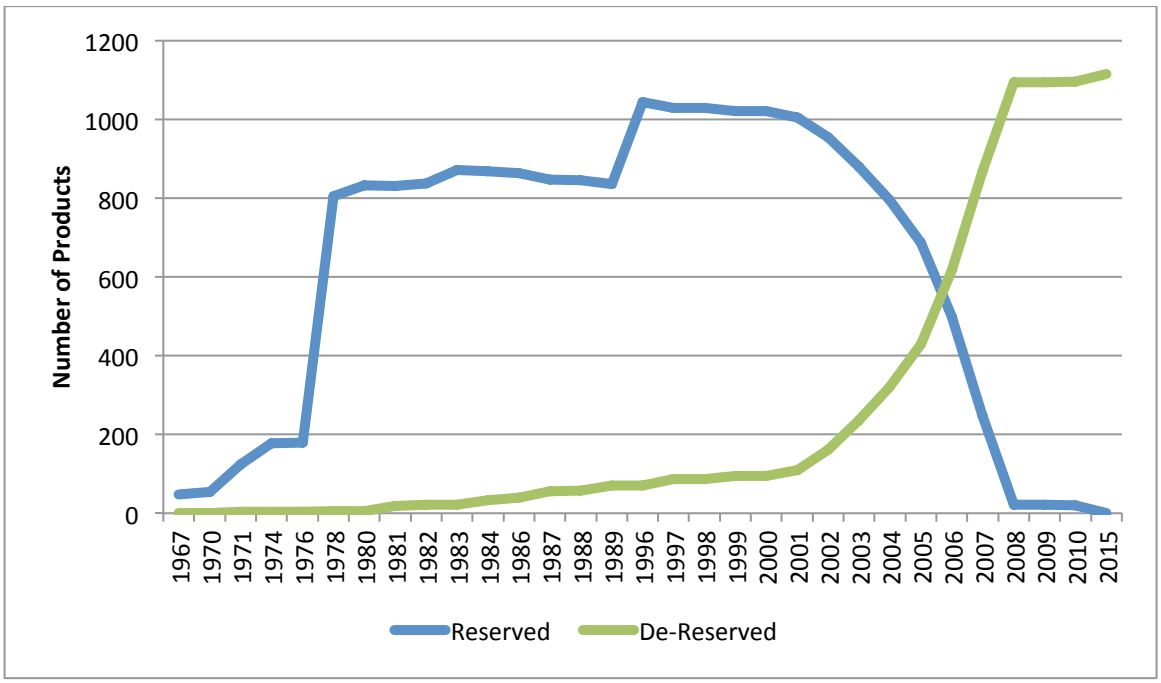
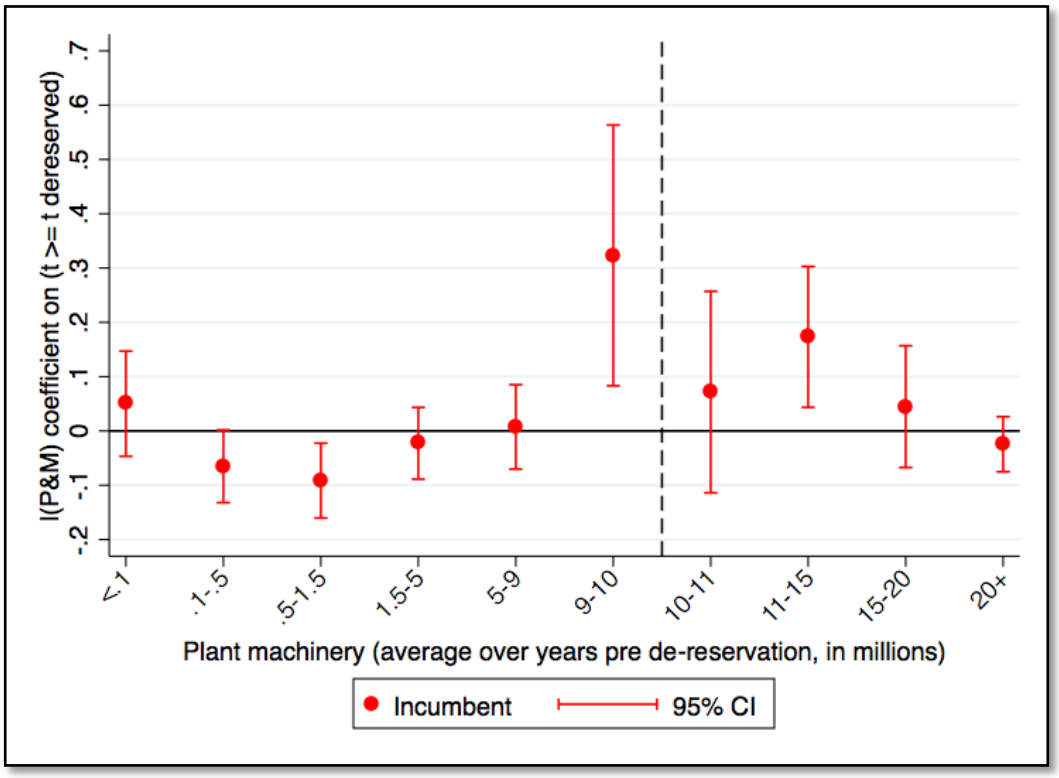
Van Biesebroeck, Johannes, "Firm Size Matters: Growth and Productivity Growth in African Manufacturing," Economic Development and Cultural Change, March 2005, 53 (3), 545-584.

Figure 1: De-Reservation Policy



Notes: Data for 1967 through 1989 taken from Table 6.3 in Mohan (2002). Data for 1996 onwards taken from various publications of the Government of India, Ministry of Micro, Small, & Medium Enterprises.

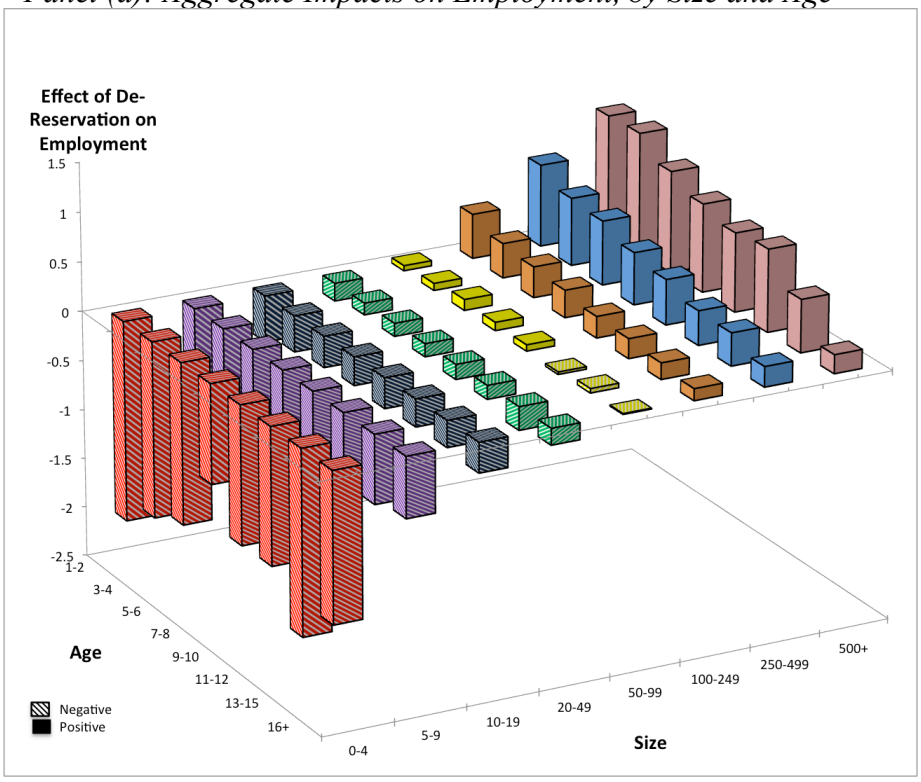
Figure 2: Impact of De-reservation Among Incumbent Establishments Near the Investment Threshold



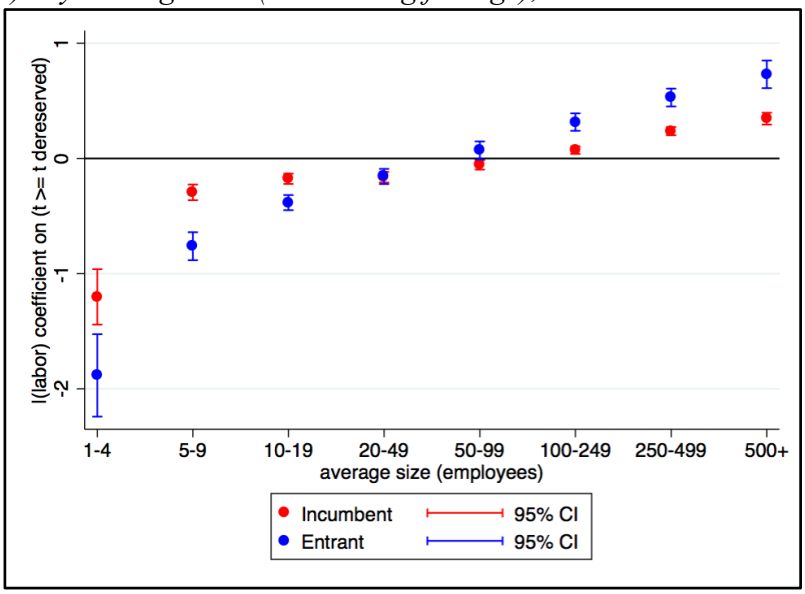
Notes: Coefficients from a regression of log of nominal plant and machinery value on de-reservation, for incumbents in the product space. Establishments with historical investment in plant and machinery up to Rs. 10 million (illustrated by the dashed line) could be considered small-scale industries.

Figure 3: Impact of De-reservation on Employment – By Employment Size and Age

Panel (a): Aggregate Impacts on Employment, by Size and Age



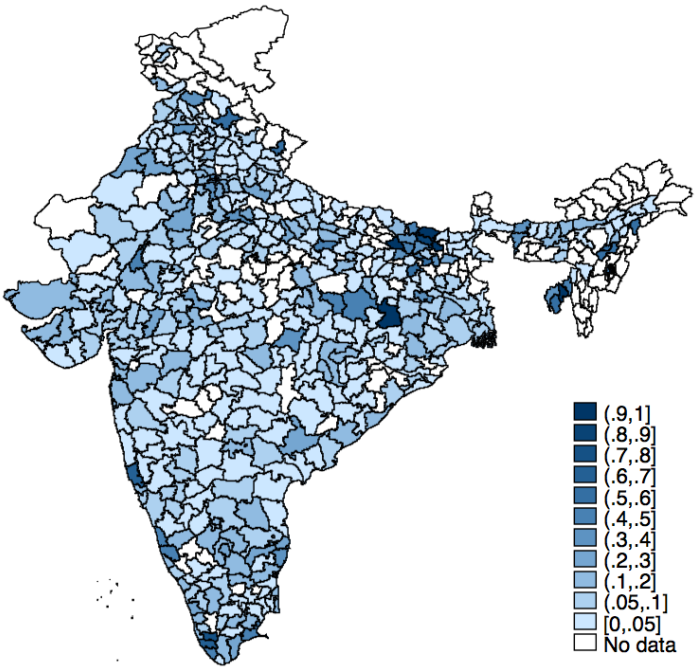
Panel (b): By Average Size (Controlling for Age), Incumbents versus Entrants



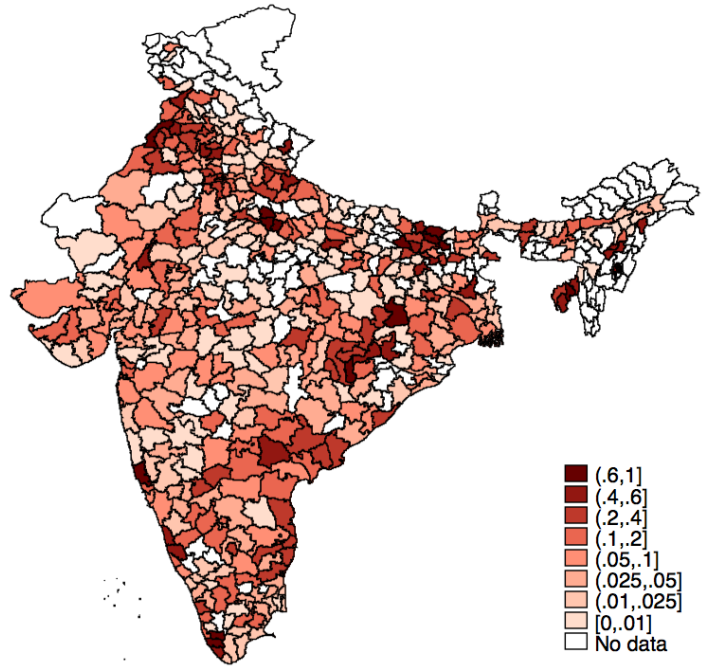
Notes: Panel (a) shows the coefficients from a regression of log of employment on de-reservation, interacted with a dummy variable for each employment size and age class. Panel (b) shows the coefficients from a regression of the log of employment on de-reservation, interacted with dummy variables for employment size and for whether the establishment is an incumbent or an entrant into the product space, controlling for age.

Figure 4: Product Reservation and De-reservation by District

Panel (a): Fraction of Employment in 2000 Associated with Products Ever Reserved

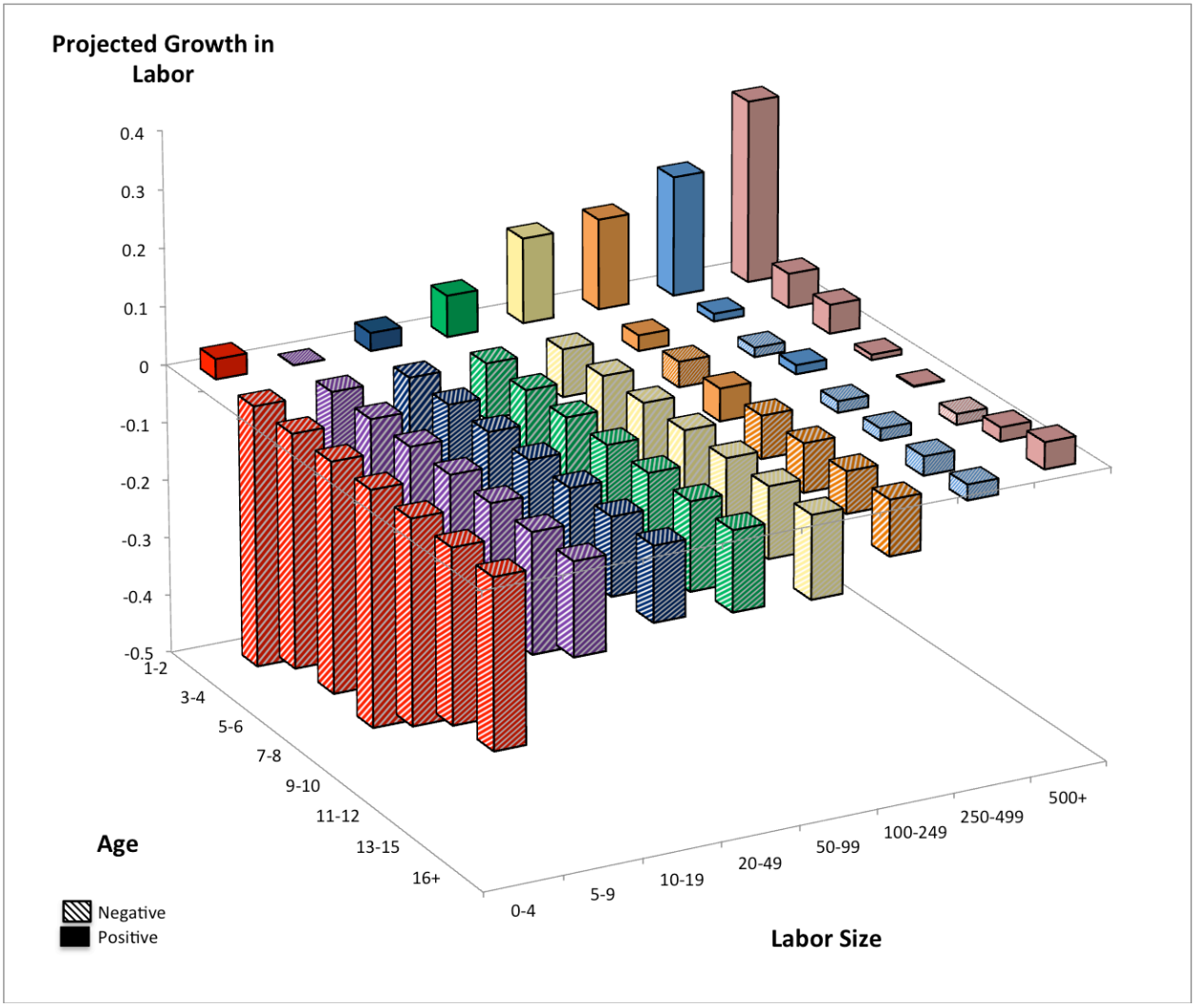


Panel (b): Fraction of Employment in 2000 Associated with Products De-reserved 1997-2007



Notes: Panel (a) shows the fraction of employment in 2000 that was associated with producing a product that was ever reserved, by district. Panel (b) shows the fraction of employment in 2000 that was associated with producing a product that was eventually de-reserved, by district.

Figure 5: Projected Employment Growth by Average Size and Age Class



Notes: Projected establishment employment growth rates for each size and age class. Size is measured as average employment between the previous period observed and the current period. Employment growth is measured as size in the current period minus size in the previous period, divided by size as defined above. Growth measure accounts for both entry and exit.

Table 1: Summary Statistics for ASI Manufacturing Establishments by Participation in Reserved Product Market

	Manufacturing Reserved Product				Manufacturing De-reserved Product				Not manufacturing Ever-reserved products			
Year	Labor (000s)	Age (mean)	Establishments		Labor (000s)	Age (mean)	Establishments		Labor (000s)	Age (mean)	Establishments	
2000	1,515	16.4	8,040	26%	72	17.3	1,329	4%	3,596	19.2	21,482	70%
2001	1,355	16.8	7,995	24%	306	13.7	2,433	7%	3,616	19	22,505	68%
2002	1,384	16.9	8,293	25%	353	14.6	2,820	9%	3,626	19.4	21,966	66%
2003	1,311	16.7	10,194	23%	601	15.7	4,247	10%	3,863	18.5	30,006	68%
2004	1,085	17.1	8,153	21%	857	15.8	4,685	12%	3,711	18.8	25,606	67%
2005	936	16.9	7,797	19%	1,177	15.6	6,106	15%	3,990	17.7	27,976	67%
2006	752	16.2	6,981	17%	1,471	15.6	6,782	16%	4,190	17	27,444	67%
2007	452	17.4	3,229	9%	1,908	16.3	8,768	24%	4,407	17.1	24,147	67%

Notes: Summary statistics for all establishments are authors' calculations based on ASI data. No sampling multipliers applied. Labor is total for each group-year, in thousands. Age represents mean value for each group-year.

Table 2: Impact of De-reservation on Establishment-Level Outcomes

Panel (a): Aggregate Results

	log(Labor)	log(Output)	log(Capital)	log(Wage)	log(Q/L)
t ≥ year de-reserved	-0.00399	0.0233*	0.00656	0.0137***	0.0157
	(0.00863)	(0.0120)	(0.00994)	(0.00486)	(0.00975)
No. Obs.	298,984	294,157	292,998	296,575	294,157
No. Establishments	130,397	128,033	127,822	128,986	128,033
R^2	0.006	0.011	0.003	0.026	0.007
Year FE	Yes	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes	Yes

Panel (b): Incumbents versus Entrants

	log(Labor)	log(Output)	log(Capital)	log(Wage)	log(Q/L)
Incumbent X	-0.0211**	-0.0186	-0.0105	0.00177	-0.0153
t ≥ year de-reserved	(0.00949)	(0.0128)	(0.0106)	(0.00509)	(0.0102)
Entrant X	0.0739***	0.230***	0.0847***	0.0705***	0.178***
t ≥ year de-reserved	(0.0194)	(0.0327)	(0.0255)	(0.0139)	(0.0276)
No. Obs.	298,984	294,157	292,998	296,575	294,157
No. Establishments	130,397	128,033	127,822	128,986	128,033
R^2	0.008	0.014	0.004	0.027	0.009
Year FE	Yes	Yes	Yes	Yes	Yes
Year of Entry X Year FE	Yes	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes	Yes

Notes: Results from establishment-level regressions. Dependent variables are shown in column headings. "t ≥ year deserved" is a dummy variable that takes the value of 1 if the product associated with the establishment is removed from the list of reserved products. "Incumbent" indicates that the establishment previously made the product when it had reserved status. "Entrant" indicates that the establishment only made the product after it had been de-reserved. "Q/L" indicates labor productivity (real output divided by number of employees). Errors are clustered at the establishment level. *, ** and *** represent significant at the 10%, 5% and 1% levels respectively.

Table 3: Impact of De-reservation on Establishment-Level Outcomes – By Value of Plant and Machinery

Panel (a): Aggregate Results

	log(Labor)	log(Output)	log(Capital)	log(Wage)	log(Q/L)
Within SSI cap in 2000 X	-0.0415***	-0.0110	-0.00615	0.00682	-0.0143
t ≥ year de-reserved	(0.0104)	(0.0145)	(0.0123)	(0.00599)	(0.0119)
Over SSI cap in 2000 X	0.0505***	0.0591***	0.0359**	0.0275***	0.0862
t ≥ year de-reserved	(0.0145)	(0.0202)	(0.0155)	(0.00762)	(0.0161)
No. Obs.	268,160	263,874	266,284	266,193	263,874
No. Establishments	112,864	110,772	112,647	111,697	110,772
R^2	0.021	0.032	0.004	0.047	0.017
Year FE	Yes	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes	Yes
Current Age Group FE	Yes	Yes	Yes	Yes	Yes

Panel (b): Incumbents versus Entrants

	log(Labor)	log(Output)	log(Capital)	log(Wage)	log(Q/L)
Incumbent X Within SSI cap X	-0.0565***	-0.0597***	-0.0246*	-0.00850	-0.0262***
t ≥ year de-reserved	(0.0113)	(0.0149)	(0.0130)	(0.00621)	(0.0121)
Entrant X Within SSI cap X	0.0168	0.237***	0.0760**	0.0894***	0.243***
t ≥ year de-reserved	(0.0245)	(0.0445)	(0.0341)	(0.0183)	(0.0377)
Incumbent X Over SSI cap X	0.0381**	0.0440*	0.0230	0.0260***	0.00282
t ≥ year de-reserved	(0.0163)	(0.0229)	(0.0171)	(0.00838)	(0.0180)
Entrant X Over SSI cap X	0.128***	0.151***	0.0904**	0.0320*	0.0408
t ≥ year de-reserved	(0.0288)	(0.0390)	(0.0354)	(0.0179)	(0.0335)
No. Obs.	268,161	263,874	266,284	266,193	263,874
No. Establishments	112,864	110,772	112,647	111,697	110,772
R^2	0.023	0.033	0.005	0.047	0.018
Year FE	Yes	Yes	Yes	Yes	Yes
Year of Entry X Year FE	Yes	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes	Yes
Current Age Group FE	Yes	Yes	Yes	Yes	Yes

Notes: Results from establishment-level regressions. Dependent variables are shown in column headings. "Within/over SSI cap" refers to whether an establishment's average estimated value of plant and machinery in years pre- de-reservation exceeded 10 million rupees. "Incumbent" indicates that the establishment previously made the product when it had reserved status. "Entrant" indicates that the establishment only made the product after it had been de-reserved. The label "t ≥ year deserved" is a dummy variable that takes the value of 1 when the product is removed from the list of reserved products. "Q/L" indicates labor productivity (real output divided by number of employees). Errors are clustered at the establishment level. *, ** and *** represent significant at the 10%, 5% and 1% levels respectively.

Table 4: Impact of De-reservation on Product-Level Outcomes

	log(Labor)	log(Output)	log(Capital)	log(Wage)	log(Q/L)	log(Estab)
t ≥ year	0.423***	0.295***	0.378***	0.0584***	-0.128**	0.138**
de-reserved	(0.0786)	(0.0650)	(0.0965)	(0.0218)	(0.0587)	(0.0550)
No. Obs.	29,494	29,494	29,474	29,493	29,494	29,543
No. Products	4,126	4,126	4,126	4,126	4,126	4,126
R^2	0.018	0.018	0.011	0.009	0.080	0.009
Product FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Results from product-level regressions. Dependent variables are shown in column headings. "t ≥ year deserved" is a dummy variable that takes the value of 1 when the product is removed from the list of reserved products. "Q/L" indicates labor productivity (real output divided by number of employees). Regressions are weighted by initial labor shares. Standard errors are clustered at the product level. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Pre-De-Reservation Trends at the Product Level

	Deres	Deres	Deres	Deres
Lag Δ Labor	0.001			
	(0.001)			
Lag Δ Output		-0.000		
		(0.001)		
Lag Δ Capital			0.000	
			(0.001)	
Lag Δ Wage				0.001
				(0.002)
No. Obs.	20,870	20,870	20,851	20,869
No. Products	4,010	4,010	4,010	4,010
R^2	0.02	0.02	0.02	0.02

Notes: Results from a product-level regression of de-reservation (equal to one in the year of de-reservation) on lagged, first difference changes in .labor, output, capital, and wage. The number of products and observations is fewer than in Table 4 because (1) we only observe lagged first-differences in outcomes for 2002-2007 and (2) for de-reserved products we only include years until de-reservation in order to avoid picking up the effects of de-reservation. Regressions are weighted by initial labor shares. Standard errors are clustered at the product level. *, ** and *** represent significant at the 10%, 5% and 1% levels respectively.

Table 6: Placebo Tests at the Product Level

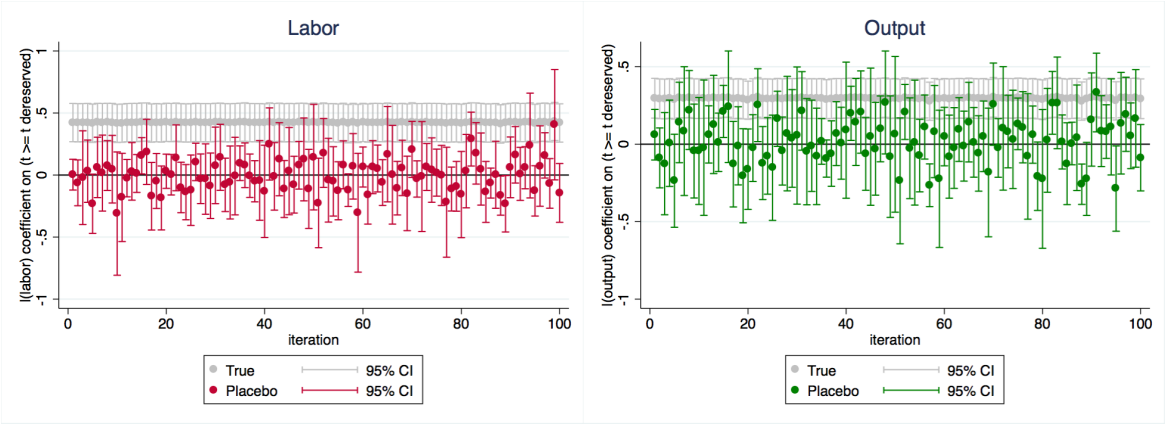
Panel (a): Product-level placebo test

	log(Labor)	log(Output)	log(Capital)	log(Wage)	log(Q/L)	Log(Estab)
t > year dereserved	0.399	0.275	0.361	0.058	-0.124	0.132
	(0.082)***	(0.066)***	(0.098)***	(0.022)***	(0.061)**	(0.055)**
Placebo t >	-0.065	-0.087	-0.094	-0.052	-0.021	0.065
year dereserved	(0.095)	(0.096)	(0.114)	(0.031)*	(0.048)	(0.070)
R^2	0.02	0.02	0.01	0.01	0.08	0.01
N	29,262	29,262	29,243	29,261	29,262	29,305
Product FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel (b): Results of 100 iterations of placebo sampling, number of estimates landing above, below and within 95% confidence interval around zero

	Above 0	Below 0	Insignificant
Labor	1	1	98
Output	6	2	92
Capital	2	4	94
Wage	4	3	93
Q/L	10	1	89
Establishments	3	4	93

Panel (c): Results of 100 iterations of placebo sampling for labor and output



Notes: Results from a product-level placebo in which de-reservation is randomly assigned across all potential products. Placebos were assigned 100 times. Panel (a) shows an example of one placebo run. Panel (b) shows the number of runs in which each outcome of interest was above or below zero and significant at the 5 percent level, versus not significant at the 5 percent level. Panel (c) illustrates the true and placebo effects for labor and output in each of the 100 runs. Standard errors are clustered at the product level. *, ** and *** represent significant at the 10%, 5% and 1% levels respectively.

Table 7: Impact of De-reservation on District-Level Outcomes – Long Differences from 2000-2007

	Δ log(Labor)	Δ log(Output)	Δ log(Capital)	Δ log(Wage)	Δ log(Q/L)
Δ Fraction de-reserved	0.786***	0.770**	0.644	0.173	-0.153
	(0.262)	(0.332)	(0.450)	(0.133)	(0.245)
Δ Fraction de-reserved of neighboring districts	-0.484	-1.083**	-0.805	-0.152	-0.599**
	(0.396)	(0.429)	(0.579)	(0.169)	(0.294)
Pro-employer state	-0.0384	-0.0894	0.219**	0.0231	-0.0510
	(0.0721)	(0.0707)	(0.0969)	(0.0313)	(0.0567)
% Literacy	-0.00552	-0.0029	-0.0116*	0.000229	0.00229
	(0.00358)	(0.00341)	(0.00595)	(0.00173)	(0.00286)
% Scheduled caste/tribes	0.00116	-0.000737	-0.00233	0.00143	-0.00190
	(0.00241)	(0.00250)	(0.00316)	(0.00127)	(0.00216)
Control for labor force composition	Yes	Yes	Yes	Yes	Yes
R^2	0.190	0.071	0.128	0.045	0.114
No. Observations	339	339	339	339	339

Notes: Results from district-level regressions of changes in dependent variables (shown in column headings) from 2000-2007 on change in fraction of district employment in 2000 that was subsequently associated with product de-reservation. "Fraction de-reserved" is the fraction of a district's output in 2000 that is subsequently de-reserved. "Fraction de-reserved of neighboring districts" is the fraction of output in contiguous districts in 2000 that is subsequently de-reserved. "Q/L" indicates labor productivity (real output divided by number of employees). All specifications include a dummy equal to one if the state was classified as pro-employer at the end of the period studied by Besley and Burgess (2004). Specifications also control for the following charactersitics from the 2001 Census: the share of district's population that is scheduled caste/tribe, the percentage of literate population, and the percentage of workers in a district employed in agriculture, mining, manufacturing, trade, transport, and services (construction is the omitted category). Regressions are weighted by initial labor shares, and use all districts that, after applying weights, have at least 10 establishments in each ASI year. Errors are heteroskedasticity-robust. *, ** and *** represent significant at the 10%, 5% and 1% levels respectively.

Table 8: Checking for Spillovers into Unorganized Manufacturing – Long Differences, 2000-2005

	Δ log(Labor)	Δ log(Output)	Δ log(Capital)	Δ log(Q/L)
Δ Fraction Organized Sector	-0.608	0.505	-0.183	1.113
Manufacturing De-reserved	(0.451)	(0.668)	(0.697)	(0.613)*
R^2	0.01	0.00	0.00	0.01
No. Observations	401	401	401	401

Results from district-level regressions of changes in dependent variables (shown in column headings) for the unorganized manufacturing sector from 2000-2005 on change in fraction of organized (ASI) sector district employment in 2000 that was subsequently associated with product de-reservation. "Fraction organized sector manufacturing de-reserved" is the fraction of a district's organized (ASI) output in 2000 that is subsequently de-reserved. "Q/L" indicates labor productivity (real output divided by number of employees). Regressions are weighted by initial labor shares and use all districts that, after applying weights, have at least 10 establishments in each year. Errors are heteroskedasticity-robust. *, ** and *** represent significant at the 10%, 5% and 1% levels respectively.

Table 9: Impact of De-reservation on Establishment-Level Outcomes, Controlling for Product Switching

Panel (a): Aggregate Results

	log(Labor)	log(Output)	log(Capital)	log(Wage)	log(Q/L)
t ≥ year de-reserved	-0.005	0.021	0.006	0.013	0.015
	(0.009)	(0.012)*	(0.010)	(0.005)***	(0.010)
Switch	0.061	0.086	0.025	0.019	0.042
	(0.003)***	(0.005)***	(0.004)***	(0.002)***	(0.004)***
No. Observations	298,984	294,157	292,998	296,575	294,157
No. Establishments	130,397	128,033	127,822	128,986	128,033
R^2	0.01	0.01	0.00	0.03	0.01
Year FE	Yes	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes	Yes

Panel (b): Incumbents versus Entrants

	log(Labor)	log(Output)	log(Capital)	log(Wage)	log(Q/L)
Incumbent X	-0.020	-0.018	-0.009	0.002	-0.016
t ≥ year de-reserved	(0.009)**	(0.013)	(0.011)	(0.005)	(0.010)
Entrant X	0.075	0.231	0.088	0.071	0.177
t ≥ year de-reserved	(0.019)***	(0.033)***	(0.026)***	(0.014)***	(0.028)***
Switch	0.060	0.085	0.025	0.018	0.042
	(0.003)***	(0.005)***	(0.004)***	(0.002)***	(0.004)***
No. Observations	298,984	294,157	292,998	296,575	294,157
No. Establishments	130,397	128,033	127,822	128,986	128,033
R^2	0.01	0.01	0.00	0.03	0.01
Year FE	Yes	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes	Yes

Notes: Results from establishment-level regressions. Dependent variables are shown in column headings. "t ≥ year deserved" is a dummy variable that takes the value of 1 when the product is removed from the list of reserved products. "Incumbent" indicates that the establishment previously made the product when it had reserved status. "Entrant" indicates that the establishment only made the product after it had been de-reserved. "Switch" is a dummy that takes a value of 1 when a establishment changes the main product it makes. "Q/L" indicates labor productivity (real output divided by number of employees). Errors are clustered at the establishment level. *, ** and *** represent significant at the 10%, 5% and 1% levels respectively.

Appendix A: Data Cleaning Details

Annual Survey of Industries Data

We use an establishment-level panel from the Annual Survey of Industries (ASI) covering 2000 to 2007. The ASI sampling frame covers all registered (formal) manufacturing firms. Large firms are considered part of the "Census" sector, and are surveyed every year. Smaller firms are considered part of the "Sample" sector, and are sampled every few years. The survey provides sampling weights that allow the construction of representative samples at the state-by-industry level. We excluded services and mining establishments from our analysis, as the growth patterns in these sectors may be different from those in manufacturing. We also exclude a few establishments due to missing data or likely data entry errors, such as establishments for which we cannot identify age, and those that report positive amounts of employment when closed. The main regressions exclude observations in which establishments are flagged as closed, although the analysis that explores the relationship between size, age and growth does include those observations in order to account for entry and exit.

We also used the panel nature of the data to check if year-to-year observations are consistent. Specifically, establishments report opening and closing values of six variables: stock of raw materials, fuels, and stores; stock of semi-finished goods; stock of finished goods; inventory; loans; and fixed capital. We tested the extent to which the closing value in a particular year matches the opening value in the following year, for establishments observed to be open in adjacent years, and that report non-missing, non-zero values of each variable. Table A.1 shows that for each variable, between 77 and 90 percent of opening values were within one percent of closing values from the previous year. Thus, it appears that the panel correctly identifies annual observations belonging to each establishment.

District Codes

This analysis uses the ASI panel identifiers supplied by Ministry of Statistics and Programme Implementation. The panel dataset does not include district identifiers; we merge these in from the annual cross-sections that we purchased separately.

Matching Establishment-Level Data with Product Reservation Status

During the years we study (2000-2007), product codes in the ASI were classified under the ASI Commodity Classification (ASICC). During this period, there were 4,805 ASICC product codes in manufacturing that respondents could choose from when answering the survey. Although respondents could in theory list up to 10 output products on their form, over 90% of respondents listed 4 or fewer products. For most years of the panel, 50-60% of respondents listed only one product. While it is possible that some establishments underreport the number of products they make, our finding that 50-60% of establishments report only one product is consistent with evidence from the US, where only 39% of manufacturing firms product multiple products (Bernard, Redding, and Schott (2010), Table 1).

If establishments in our dataset do underreport products, it is possible that we fail to identify some establishments that should be flagged as producing SSI products (either reserved or de-reserved). The direction of any potential bias would depend on how these establishments compare with establishments that do report SSI products. However, given the similarity between our findings and those of Bernard et al. (2010) we do not believe that there is substantial underreporting of products.

We created a concordance between the ASICC product codes and the list of reserved and de-reserved products. Because some of the ASICC codes are very broad, we matched products reserved to each establishment based on both ASICC and 5-digit industry. In some cases, the match between ASICC codes and SSI codes was so exact that we were able to create the match based solely on the product descriptions. In other cases, we used the lengthy descriptions associated with the industry codes to help resolve many questionable concordances. We assumed that a product was matched to an ASICC code if it was at least a partial match.

Table A.2 shows a subset of illustrative industries with ASICC codes and reserved products matched to those codes. Table A.3 shows the number of products that were de-reserved in each year starting in 1997. Table A.4 contains a comparison of the ASI and Prowess datasets.

Table A.1: Consistency in Opening/Closing Stock Variables

Variable	Number of Adjacent, Non-Zero Observations	Percent of Opening Values within 1% of Previous Year's Closing Value
Fixed capital	124,765	78%
Stock of raw materials, fuels, and stores	114,478	84%
Stock of semi-finished goods	60,908	90%
Stock of finished goods	92,661	86%
Inventory	117,319	89%
Loans	91,296	77%

Notes: Authors' calculations based on comparing closing values in one year against opening values in the following year, for observations identified as belonging to the same establishment in the ASI panel.

Table A.2 Sample of Exact Product Matches, Including Partial Matches

SSI product	SSI product description	ASI product	ASI product description
202501	Pickles & chutneys	13532	Chutneys
20530101	Biscuits	13401	Biscuit, cookies
271001	Sawn timber	51105 51107	Timber/wooden planks, sawn/resawn Sawn timber posts / squares
292001	Leather garments	44202	Garments, leather
30350101	Polyethylene films with thickness less than 0.10 mm except co-extruded film cross linked polymer films and high density molecular films	42405	Film, polythene
315102	Cashew shell oil	12114	Cashewnut shell liquid
31922030	Sodium nitrate-lab.	31331	Sodium nitrate
340101	Steel almirah	71501	Almirah, steel
340403	Cocks and valves--water pipe fittings	71362	Sanitary fittings, iron/steel
353134	Rice and dal mill machinery	76235	Rice mill machinery
36420101	Radio/car radio-low cost up to Rs. 250 each	78237	Radio

Table A.2 Sample of Industry-Product Matches

SSI product	SSI product description	Industry	Industry description	ASI product	ASI product description
204200	Rice milling	15312	Rice milling	12311 12312 12315 12317 15312	Rice, par-boiled Rice raw excl. basmati Rice, basmati Rice, broken Bran, rice
224302	Synthetic syrups	15542	Manufacture of synthetic flavored concentrates and syrups	13971 13977	Essence/flavour used in food products Concentrates/emulsion used in food products
260101 260102 260103 260104 260106 260199	Cotton cloth knitted Cotton vests knitted Cotton socks knitted Cotton undergarments knitted Cotton shawls knitted Other cotton knitted wears	17301	Manufacture of knitted and crocheted cotton textile products	63323 63348 63437	Knitted fabrics, cloth, cotton Hosiery knitted cloth, cotton Garments, knitted- cotton
290201	Sole leather	19112	Tanning and finishing of sole leather	43302 43304 43301	Leather, semi-tanned Leather, semi-processed Leather, tanned
27210301	Wooden crates	20231	Manufacture of wooden boxes, barrels etc. (except plywood)	51102	Wooden crates
281904	Corrugated fiber board containers	21023	Manufacture of corrugated fibre board containers	57104	Boxes, corrugated sheet
312203xx 312207xx 312210xx 312211xx	Basic dyes Azo dyes (direct) Acid dyes Reactive dyes Fast colour bases	24114	Manufacture of dyes	35115 35126 35152 35166 35199	Chrome, dye Dye, intermediates, others Dye, synthetic, others Direct dye excl. congo red Dyeing/tanning materials, n.e.c (+ 13 color-specific)
34359901 350102 350104 350105 350106 350108 35080101 343507 343510 343511	Other agricultural implements Winnowers--up to 5 h.p. motive power Seed cleaners--up to 5 h.p. motive power Grain Driers--up to 5 h.p. motive power Sheel Huskers--up to 5 h.p. motive power Cotton Deliniting machine--up to 5 h.p. motive power Harvester grader, baler & other earth moving blades used in agricultural machines Plough shears/iron ploughs Insecticide dusters--manual Insecticide sprayers--manual	29219	Manufacture of other machinery and equipment for use in agriculture, horticulture or forestry, bee-keeping and fodder preparation n.e.c.	76189	Agricultural & forestry machinery/parts, n.e.c
3768xx	(39 bicycle component products: tube valves, fork handles, pedal assemblies, chains, etc.)	35923	Manufacture of parts and accessories for bicycles, cycle - rickshaws and invalid carriages	82489 82414	Cycles-others and parts, n.e.c Parts for motor cycle/moped/ cycle, n.e.c.

Notes: Sample of matches between SSI product codes and ASICC codes.

Table A.3: Dates of Reservation and De-reservation

Year	Number Products Reserved At Beginning of Year	Number Products De-Reserved During the Year	Number of Products Still Reserved at End of Year
1997	1045	15	1030
1998	1030	0	1030
1999	1030	9	1021
2000	1021	0	1021
2001	1021	15	1006
2002	1006	51	955
2003	955	75	880
2004	880	85	795
2005	795	108	687
2006	687	187	500
2007	500	253	247
2008	247	225	22
2009	22	0	22
2010	22	2	20
2015	20	20	0

Notes: Authors' compilations based on various publications of the Government of India, Ministry of Micro, Small, & Medium Enterprises.

Table A.4: Comparing ASI and Prowess Datasets

	Number of Establishments (ASI) or Firms (Prowess) that List: (No sampling multipliers are applied)							
Year	Labor		Wages		Capital		Output	
	ASI	Prowess	ASI	Prowess	ASI	Prowess	ASI	Prowess
2000	30,851	90	30,604	7,240	30,269	7,557	30,275	7,143
2001	32,933	173	32,670	7,549	32,316	7,951	32,322	7,463
2002	33,079	538	32,891	8,951	32,472	9,531	32,594	8,900
2003	44,447	741	44,058	9,833	43,554	10,550	43,663	9,793
2004	38,444	744	38,036	10,464	37,614	11,350	37,771	10,403
2005	41,879	696	41,464	10,682	40,955	11,702	41,164	10,658
2006	41,207	768	40,890	10,550	40,325	11,683	40,651	10,561
2007	36,144	774	35,962	10,675	35,493	11,901	35,717	10,727

Notes: Authors' calculations of number of establishments in the ASI dataset and firms in the Prowess dataset that report each of the variables of interest. No sampling multipliers applied.

Appendix B: Additional Robustness Tests (FOR ONLINE APPENDIX)

This appendix shows results from several robustness tests discussed in the main text.

Industry-Level Regressions

In addition to the product and establishment-level results, we also test whether our results are robust to using an aggregate industry-level measure of exposure to the SSI policy. We use the sampling weights provided by the ASI to create a representative sample of establishments at the industry level. To do so, we follow a similar logic as we used in the district-level regressions, following Topalova (2010). We calculate the exposure of each industry *j* to de-reservation at time *t* as the sum over all products of revenue associated with each product *p* in industry *j* in 2000, multiplied by a dummy variable indicating whether the product was de-reserved, and divided by total industry-level product revenues in 2000.

$$FrDeres_{jt} = \frac{\sum_p (Revenue2000_{jp} XDeres_{pt})}{TotalProductRevenue2000_j}$$

Our left-hand side variables are contemporaneous measures of aggregate labor, output, capital, average wage (calculated as aggregate wage payments divided by aggregate labor), and aggregate number of establishments at the industry level. We then estimate the effects of exposure to de-reservation on each outcome of interest y as follows:

$$y_{jt} = \beta FrDeres_{jt} + \mu_{jt}$$

We also include a long-difference specification, which uses the change in the fraction de-reserved, and the changes in the outcomes of interest, between 2000 and 2007:

$$\Delta y_j = \beta \Delta FrDeres_j + \mu_j$$

The results shown in Table B.1 demonstrate that de-reservation is associated with an increase in total employment. Although the coefficient on output is also positive, it is not statistically significant from zero, and the percentage increase is less than the percentage increase in employment. These findings are

consistent with our district-level results, which also show that de-reservation is associated with increases in employment and output.

Industry Characteristics

The main text shows that product de-reservation does not appear to be associated with pre-de-reservation trends at the product level. However, we may also be concerned that industries with certain characteristics were selected into de-reservation at earlier dates. We check for this possibility by re-running our baseline specification including a number of different controls:

- Industry-by-year dummies (industry dummies at the 3-digit level)
- Initial location dummies interacted with year dummies
- Initial age (dummies for 5 age groups) interacted with year dummies
- Initial ratio of production to total workers (dummies for 10 deciles) interacted with year dummies
- Initial ratio of capital to number of workers (dummies for 10 deciles) interacted with year dummies

Table B.2 shows the results from these regressions. The additional controls are not shown because of space considerations, but are included in all specifications.

Table B.1: Impact of De-reservation on Industry-Level Outcomes

Panel (a): Within-industry

	log(Labor)	log(Output)	log(Capital)	log(Wage)	log(Q/L)	log(Estab)
Fraction de-reserved	0.252***	0.151	0.0594	-0.00858	-0.101	-0.00427
	(0.0877)	(0.132)	(0.138)	(0.0430)	(0.0844)	(0.0543)
No. Obs.	992	992	992	992	992	992
No. Industries	124	124	124	124	124	124
R^2	0.301	0.503	0.251	0.061	0.354	0.036
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel (b): Long differences 2000-2007

	Δlog(Labor)	Δlog(Output)	Δlog(Capital)	Δlog(Wage)	Δlog(Q/L)	Δlog(Estab)
Δ Fraction de-reserved	0.562***	0.282	0.127	0.0670	-0.280	0.0509
	(0.119)	(0.208)	(0.143)	(0.0724)	(0.172)	(0.120)
No. Obs.	124	124	124	124	124	124
R^2	0.163	0.023	0.005	0.009	0.047	0.002

Notes: Dependent variables are shown in column headings. "Fraction de-reserved" is the fraction of an industry's output that is de-reserved. Industry classification based on NIC 1998 at 4-digit level. "Q/L" indicates labor productivity (real output divided by number of employees). Regressions are weighted by initial labor shares. In panel (a) standard errors are clustered at the industry level. In panel (b) standard errors are heteroskedasticity-robust. *** p<0.01, ** p<0.05, * p<0.1

Table B.2: Impact of De-reservation on Establishment-Level Outcomes, With Industry Fixed Effects and Characteristics

Panel (a): Aggregate Results

	log(Labor)	log(Output)	log(Capital)	log(Wage)	log(Q/L)
t >= year dereserved	-0.00889	0.0102	0.0217*	0.0162***	0.0128
	(0.00967)	(0.0141)	(0.0115)	(0.00583)	(0.0113)
Year FE	Yes	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Firm and Industry Characteristics X Year FE	Yes	Yes	Yes	Yes	Yes
R^2	0.058	0.059	0.036	0.058	0.039
No. Obs.	298,883	294,059	292,897	296,474	294,059

Panel (b): Incumbents versus Entrants

	log(Labor)	log(Output)	log(Capital)	log(Wage)	log(Q/L)
Incumbent X	-0.0196*	-0.0272*	0.00500	0.00549	-0.0197*
t ≥ year de-reserved	(0.0106)	(0.0148)	(0.0123)	(0.00608)	(0.0118)
Entrant X	0.0466	0.187***	0.0869***	0.0650***	0.162***
t ≥ year de-reserved	(0.0192)**	(0.0329)	(0.0253)	(0.0138)	(0.0269)
Year FE	Yes	Yes	Yes	Yes	Yes
Year of Entry X Year FE	Yes	Yes	Yes	Yes	Yes
Establishment FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Firm and Industry Characteristics X Year FE	Yes	Yes	Yes	Yes	Yes
R^2	0.061	0.061	0.037	0.058	0.040
No. Obs.	298,883	294,059	292,897	296,474	294,059

Notes: Dependent variables are shown in column headings. "t ≥ year deserved" is a dummy variable that takes the value of 1 when the product is removed from the list of reserved products. "Incumbent" indicates that the establishment previously made the product when it had reserved status. "Entrant" indicates that the establishment only made the product after it had been de-reserved. All specifications include industry fixed effects at the 3-digit NIC level and firm and industry characteristics interacted with year fixed effects. Interacted firm characteristics include location and initial age (5 groups). Interacted industry characteristics include the initial ratio of production to total workers (10 deciles) and the initial ratio of capital to number of workers (10 deciles). Errors are clustered at the establishment level. *, ** and *** represent significant at the 10%, 5% and 1% levels respectively.