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Deregulation and Firm Investment

Evidence from the Dismantling of the License System in India

Ivan T. Kandilov
Aslı Leblebicioğlu
Ruchita Manghnani

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Abstract

This paper analyzes the impact of deregulatory reforms in India during the 1990s, which eliminated compulsory industrial licensing, on manufacturing firms' investment decisions. The paper finds an economically and statistically significant positive effect of delicensing on investment. It also shows that firms in states with better credit conditions benefitted more from the removal of licenses. Moreover, the analysis demonstrates that the increase in investment was predominantly driven by smaller firms.

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Deregulation and Firm Investment: Evidence from the Dismantling of the License System in India*

Ivan T. Kandilov
North Carolina State University

Aslı Leblebicioğlu
University of Texas at Dallas

Ruchita Manghnani
World Bank

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* Ivan T. Kandilov: North Carolina State University, Department of Agricultural and Resource Economics, Box 8109, Raleigh, NC 27695 (E-mail: *ivan_kandilov@ncsu.edu*). Aslı Leblebicioğlu: University of Texas at Dallas, Department of Economics, 800 West Campbell Road, Richardson, TX 75080 (E-mail: *asli.leblebicioglu@utdallas.edu*). Ruchita Manghnani: The World Bank, 70 Lodhi Estate, New Delhi 110003 (E-mail*:* *rmanghnani@worldbank.org*)

1. INTRODUCTION

Historically, developing countries have adopted various industrial policies that regulate entry and output capacity of firms with the goal of addressing inadequacies across industries and regions. Regulations imposing artificial constraints on firm entry and capacity can distort efficiency by misallocating resources. In this paper, we focus on the effects of removing such regulations on investment. Specifically, we analyze the impact of deregulatory reforms in India during the 1990s, which eliminated compulsory industrial licensing (known as "license raj"), on the manufacturing firms' investment decisions. To the best of our knowledge, this is the first paper to study the impact of deregulation on firm-level investment in the context of a developing economy.

The dismantling of the license system in India provides a natural environment to study the effects of deregulation on firms' investment decisions. Under this system, a license was required to establish a plant, introduce a new product or expand capacity. Through allotments of input and import licenses, the government also controlled the flow of inputs and imported machinery.[1] Following the balance of payments crisis in 1991, the IMF agreed to provide financial assistance to India conditional upon economic reforms. These unanticipated reforms included delicensing, which eliminated the entry and capacity restrictions across industries.[2] We utilize this arguably exogenous shock (see Aghion et al., 2008) in order to identify the effects of deregulation on firm-level investment. To do so, we use data on Indian manufacturing firms for the 1989-2000 period and we estimate an investment equation to uncover a significant positive effect of delicensing on investment. We also show that the increase in investment was predominantly driven by smaller firms, and that firms in states with better credit conditions benefitted more from the deregulation.

Our paper contributes to the growing literature on deregulation and investment. Using industry-level data for 21 OECD countries, Alesina et al. (2005) show that regulatory reforms are associated with an

[1] The allotment of input and import licenses were based on the output limit specified in the licenses. See Chamarbagwala and Sharma (2011) for additional details on the industrial licensing system in India.
[2] While a major portion of delicensing was initiated following the 1991 crisis, some industries were delicensed in 1985 under Rajiv Gandhi, who unexpectedly became the Prime Minister upon the assassination of Prime Minister Indira Gandhi. Aghion et al. (2008) argue that both episodes of delicensing were exogenous shocks.

increase in investment. In our paper, we are able to study the impact of deregulation on investment at the firm level, which allows us to additionally control for time-invariant unobservables relevant to the firm's investment decisions. Further, it allows us to analyze the heterogeneity in the impact of delicensing across the firm size distribution.

This paper also contributes to the literature on the impact of delicensing reforms on industrial development in India. For example, Aghion et al. (2008) study the heterogeneous impact of delicensing on industry output across states with different labor regulations. Chamarbagwala and Sharma (2011), and Alfaro and Chari (2014) examine the impact of delicensing on skill upgrading and the firm size distribution, respectively. Our paper complements this literature by analyzing the impact of delicensing on investment, which is an important contributor of long-run economic growth.

2. EMPIRICAL INVESTMENT EQUATION AND ESTIMATION

The standard investment decision of a monopolistically competitive firm implies that the firm chooses to invest up to the level where the marginal cost of investing in a new unit of capital is equal to the present discounted value of the marginal return to capital. Higher marginal profitability of capital (MPK) provides an incentive for the firm to undertake investment. The MPK in turn depends on sales, inputs, and adjustment costs. Industrial delicensing, which eliminates output-capacity constraints and deregulates firm entry, can affect investment decisions in a number of important ways. On one hand, the elimination of capacity constraints increases the MPK by allowing firms to diversify into new product lines and by increasing sales. Moreover, by reducing regulatory burdens, delicensing can lower the adjustment costs, which would lead to greater investment for existing firms and would allow new firms to enter and undertake investment.[3] On the other hand, deregulation of firm entry may lead to a loss of market share for incumbent firms as a result

[3] See Alesina et al. (2005) for a model of investment where regulatory reforms that result in a reduction in entry barriers and adjustment costs lead to more capital accumulation.

of increased competition. This would lower the MPK, and thereby reduce investment. Hence, from a theoretical perspective, the net impact of deregulation on investment might be either positive or negative.

To evaluate the net impact of delicensing on investment empirically, we estimate the following standard investment equation:

$$\frac{I_{ijst}}{K_{ijst-1}} = \alpha_1 \frac{I_{ijst-1}}{K_{ijst-2}} + \alpha_2 \frac{S_{ijst}}{K_{ijst-1}} + \alpha_3 \frac{C_{ijst}}{K_{ijst-1}} + \alpha_4 L_{jt} + \upsilon_i + \eta_t + \mu_j * \tau + \phi_s * \tau + \varepsilon_{ijt}, \qquad (1)$$

where $\frac{I_{ijst}}{K_{ijst-1}}$ is the investment rate for firm *i* in industry *j*, located in Indian state *s* during year *t*; $\frac{S_{ijst}}{K_{ijst-1}}$ and $\frac{C_{ijst}}{K_{ijst-1}}$ are the firm's total sales and cash flow, respectively, normalized by its capital stock.[4] The main variable of interest L_{jt} represents the share of products in industry *j* subject to licensing requirements. Hence, a reduction in L_{jt} captures the industrial delicensing in that particular industry.

As firm-level determinants of investment, we include sales-to-capital ratio in order to control for MPK, and cash flow as a proxy for financing constraints (see, for example, Fazzari et al., 1988). As customary, we also include the lagged investment rate to control for the autocorrelation that may arise due to investment adjustment costs. The specification in equation (1) also includes firm fixed effects, υ_i, that capture time-invariant, firm-specific determinants of investment, as well as year effects, η_t, that capture economy-wide fluctuations, such as changes in the interest rates. Moreover, to control for economic trends that differ across industries and geographic regions, we include two sets of interaction terms – (1) between a linear time-trend and two-digit industry dummies ($\mu_j * \tau$) and (2) between a linear time-trend and a full set of state dummies ($\phi_s * \tau$).

[4] The normalization by capital stock naturally arises in a model with quadratic adjustment costs, and it allows us to control for the size of the firm. One can obtain a linearized Euler equation similar to the one presented in equation (1) by adopting a functional form for the adjustment costs, and taking a first-order Taylor approximation of the resulting Euler equation (see Love (2003) or Kandilov et al. (2016) for derivation of such a model).

We estimate equation (1) using the *system-GMM estimator* of Arellano and Bover (1995) and Blundell and Bond (1998), which addresses the potential biases that arise from the correlation between the firm fixed effects and the lagged dependent variable, as well as the endogeneity of sales, and cash flow in short panels. We treat all of the firm specific variables as endogenous, and use lagged values dated *t*-2 and *t*-3 as GMM-type instruments.[5] Reported standard errors are robust and they are clustered at the five-digit industry level.

3. DATA

The firm level variables are from Prowess, a panel data set of Indian firms, collected by the Centre for Monitoring of the Indian Economy. The data account for about 70% of the organized industrial activity. Firms are classified into industries based on the 2008 National Industrial Classification (NIC).[6] We use data on manufacturing firms for the 1989-2000 period. We drop the observations in the top and bottom 1% of the sample based on investment rate, sales and cash-flow in order to eliminate outliers. To construct firm-level investment expenditures, we take the annual difference in the gross fixed assets, which measures the value of the firm's capital.

The data on licenses, which represent the fraction of products in an industry subject to licensing requirements, are from Topalova and Khandelwal (2010). The data vary across four- or five-digit industries and over time. Delicensing in India during the 1990s was accompanied by other industrial reforms that included trade liberalization (reductions in tariffs), and lowering of entry barriers to foreign investment. In order to identify the distinct effects of delicensing, we also control for these concurrent reforms. The data on tariffs and the share of products which have approval for foreign investment (FDI) are also from Topalova and Khandelwal (2010). Additionally, we control for the logarithm of real net state product (source: Reserve Bank of India) to account for income differences across states that might affect firm

[5] We report the Sargan-Hansen tests of overidentification to verify the validity of our instruments.
[6] The 2008 National Industrial Classification is based on the International Standard Industrial Classification (ISIC) Rev.4.

profitability and investment. Table 1 provides the descriptive statistics for the variables we use in the empirical analysis.

4. RESULTS AND DISCUSSION

Column (1) of Table 2 presents the results from our baseline specification (1), and column (2) presents the results from a specification that also includes measures of trade and FDI liberalization. The estimates in both columns show a negative and statistically significant effect of licenses on firm-level investment. The coefficient of -0.072 on Licenses (L_{jt}) presented in column (2) suggests that a one standard deviation reduction in the share of products in an industry subject to licensing requirements (which is 0.22, see Table 1) increases the investment rate by 1.58 percentage points. Given that the average investment rate in our sample is 19%, this increase implies an 8.3% increase in the investment rate.

In column (3), we show that the increase in investment following delicensing occurred mainly in financially more developed states. To that end, we construct a dummy variable that equals one if the average ratio of private bank credit to state net product (source: Reserve Bank of India) is above the sample mean. We interact this dummy variable indicating better credit conditions with the license measure. While the coefficient on the main effect of licenses becomes insignificant, the interaction term is negative and significant, suggesting that mainly firms in states with better credit conditions could benefit from delicensing.

In Table 3, we investigate the heterogeneity in the impact of delicensing on firms' investment by dividing the firms into four quartiles of the initial firm size distribution, measured by the initial real sales or wage bill of the firm, and construct indicator variables equal to one when the firm belongs to a particular quartile. We include interaction terms between the license measure and three quartile dummies in equation (1). The main coefficient on the license term shows the effect of delicensing on investment for the smallest firms. The negative and significant coefficient suggests that the firms in the first quartile benefitted most from delicensing, and that they increased their investment by 3.76 percentage points given a one standard

deviation reduction in licensing requirements.[7] All three interaction terms are positive and significant, suggesting that larger firms did not increase their investment as much as the smallest firms when licenses were removed. The largest firms (in the fourth quartile based on sales), which were possibly operating at maximum capacity, experienced the next largest impact.

[7] This increase implies a 34.2% increase in the investment rate, given that the average investment rate for the firms in the first quartile is 11%.

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Table 1: Summary Statistics

Variable	Mean	St. Dev.	Min	Max
Investment Rate ($\frac{I_{ijst}}{K_{ijst-1}}$)	0.190	0.321	-0.135	2.824
Sales ($\frac{S_{ijst}}{K_{ijst-1}}$)	2.711	2.346	0.0374	18.19
Cash Flow ($\frac{C_{ijst}}{K_{ijst-1}}$)	0.0458	0.215	-0.976	1.009
Licenses (L_{jt})	0.0783	0.221	0	1
Log real state net product	6.934	0.484	5.400	7.674
FDI	0.620	0.403	0	1
Tariffs	0.547	0.232	0.0476	3.281
Credit to state net product dummy	0.476	0.499	0	1

Note: The total number of observations is 7,266.

Table 2: The Effects of Delicensing on Investment

Dependent variable: $\frac{I_{ijst}}{K_{ijst-1}}$	(1)	(2)	(3)
Lagged investment rate ($\frac{I_{ijst-1}}{K_{ijst-2}}$)	0.040***	0.038***	0.037***
	(0.013)	(0.013)	(0.013)
Sales ($\frac{S_{ijst}}{K_{ijst-1}}$)	0.019*	0.017*	0.017
	(0.010)	(0.010)	(0.010)
Cash Flow ($\frac{C_{ijst}}{K_{ijst-1}}$)	0.233	0.247	0.254*
	(0.150)	(0.152)	(0.154)
Licenses (L_{jt})	-0.077**	-0.072**	0.007
	(0.030)	(0.029)	(0.031)
Log real state net product	0.184***	0.206***	0.221***
	(0.061)	(0.065)	(0.070)
FDI		-0.050*	-0.052*
		(0.028)	(0.029)
Tariffs		-0.137	-0.138
		(0.088)	(0.091)
Licenses*Credit dummy			-0.140***
			(0.051)
Number of observations	7,266	7,266	7,266
Number of firms	2,037	2,037	2,037
Hansen test (p - value)	0.785	0.790	0.783
1st order serial correlation (p - value)	0	0	0
2nd order serial correlation (p - value)	0.928	0.999	0.960

Notes: The p-values for the Hansen over-identification test and the second order serial correlation tests are reported. ***, **, * denote significance at the 1, 5, and 10% level, respectively.

Table 3: Heterogeneity in the Impact of Delicensing across Firm Size Groups

Dependent variable: $\frac{I_{ijst}}{K_{ijst-1}}$	(1) Wage bill quartiles	(2) Sales quartiles
Lagged investment rate ($\frac{I_{ijst-1}}{K_{ijst-2}}$)	0.038***	0.038***
	(0.013)	(0.013)
Sales ($\frac{S_{ijst}}{K_{ijst-1}}$)	0.017	0.017*
	(0.010)	(0.010)
Cash Flow ($\frac{C_{ijst}}{K_{ijst-1}}$)	0.250	0.244
	(0.154)	(0.152)
Licenses (L_{jt})	-0.171***	-0.192***
	(0.042)	(0.060)
Licences*Second quartile dummy	0.138***	0.154**
	(0.047)	(0.061)
Licences*Third quartile dummy	0.091**	0.125**
	(0.040)	(0.063)
Licences*Fourth quartile dummy	0.092*	0.113*
	(0.048)	(0.062)
Log real state net product	0.209***	0.207***
	(0.067)	(0.066)
FDI	-0.051*	-0.050*
	(0.028)	(0.028)
Tariffs	-0.141	-0.135
	(0.090)	(0.089)
Number of observations	7,266	7,266
Number of firms	2,037	2,037
Hansen test (p - value)	0.795	0.785
1st order serial correlation (p - value)	0	0
2nd order serial correlation (p - value)	0.996	0.997

Notes: In the first column firms are classified into four quartiles based on initial (real) wage bill, and in the second column they are classified based on initial (real) sales. See Table 2 for additional notes.