

The Unequal Effects of Liberalization: Evidence from Dismantling the License Raj in India

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We study whether the effects on registered manufacturing output of dismantling the License Raj – a system of central controls regulating entry and production activity in this sector – vary across Indian states with different labor market regulations. The effects are found to be unequal across Indian states with different labor market regulations. In particular, following delicensing, industries located in states with pro-employer labor market institutions grew more quickly than those in pro-worker environments. (JEL J52, L11, L52, O14, O24, O47, O53, P41)

In the post-war period, planned industrialization became a widespread development strategy for tackling economic backwardness. However, in the 1980's, amidst growing dissatisfaction about its results, many developing countries progressively liberalized their economies by dismantling government controls over industry and opening up to trade. Despite the pervasiveness of these reforms, there is little sound empirical evidence on whether and how they interact with local institutions. The same nationwide reform could lead to quite different outcomes depending on the local institutional environment in which it takes place.

The aim of this paper is to examine the interaction between product market deregula-

tion and the organization of labor markets in India. We focus on a little-studied internal liberalization episode, the dismantling during the 1980's and 1990's of the License Raj – a system of central controls introduced in 1951 regulating entry and production activity in the registered manufacturing sector. Delicensing reforms were staggered over a decade, but were nationwide in scope – when an industry was delicensed, the policy change affected all Indian firms in that industry, irrespective of location. The focus of our analysis is on whether institutional differences across Indian states, particularly in labor market regulations, led to a differential response in the industrial performance to the reform across states.

Our main finding is that, after delicensing, industries located in states with pro-employer labor market institutions grew more quickly than those in pro-worker environments. This result stands up to a wide variety of robustness checks. Since pro-worker regulations are, on average, associated with weaker industrial performance, our study shows that dropping barriers to investment and entry via delicensing magnified the disadvantage of states with pro-worker labor market institutions.

Our work relates to several strands of literature. First, several recent papers argue that the impact of pro-competitive reforms on economic performance will vary significantly depending on the technological and institutional environment in which they take place (Philippe Aghion et al. 2005; Daron Acemoglu, Aghion, and Fabrizio Zilibotti 2006).¹ Second, there is a literature which studies the effect of labor or entry regulation on economic performance (Thomas Holmes 1998; Marianne Bertrand and Francis Kramarz 2002; Simeon Djankov et al. 2002; Timothy Besley and Robin Burgess 2004; Ricardo J. Caballero et al. 2004; Chang-Tai Hsieh and Peter Klenow 2007). Finally, a recent literature analyzes the interaction between product market and labor market reg-

¹In a similar spirit the recent trade literature has studied how heterogeneous firms and industries react differently to trade liberalization (James Tybout, Jaime de Melo, and Vittorio Corbo 1991; Nina Pavcnik 2002; Marc Melitz 2003; Daniel Trefler 2004; Andrew Bernard, Stephen Redding, and Peter Schott 2007; Eric Verhoogen forthcoming).

ulations (Olivier Blanchard and Francesco Giavazzi 2003; Alejandro Cunat and Melitz 2007).

The paper is structured as follows. Section I provides the relevant historical background and describes how the different data series are constructed. Section II contains the empirical analysis of the links between delicensing, labor regulation environment and industrial performance. Section III concludes.

I. Background and Data

The centerpiece of centrally-planned industrialization in India was the Industries (Development and Regulation) Act of 1951 which brought all key industries in the registered manufacturing sector under central government control via industrial licensing. Under the Act an industrial license was required to establish a new factory, significantly expand capacity, start a new product line or change location (see Rabindra K. Hazari 1966; Jagdish Bhagwati and Padma Desai 1970; P.L. Malik, 1997). This allowed the government to allocate plan production targets to firms. We use statements on industrial policy, press notes and notifications issued by the federal government to code when different three-digit industries were exempted from industrial licensing.²

During the 1980s and the 1990s, there were two main waves of reforms. The first occurred in 1985 after Rajiv Gandhi's unexpected rise to power following the assassination of his mother Indira in 1984. He was an airline pilot with no political experience whose reformist attitude was largely unexpected (Dani Rodrik and Arvind Subramanian 2004). It was under his government that around one third of all three-digit industries were delicensed in 1985. The second wave of reform was launched in 1991 under the

²See Table 1 for summary statistics of the main variables and the Data Appendix for further information on variable definitions and data sources. Figure A1 of the Appendix, available at the American Economic Review's Web site (<http://www.aeaweb.org/aer/contents>), displays when each three-digit industry was delicensed. Table A1 provides the detail on how each three-digit industry was coded and Table A2 provides the concordance between the 1970 and 1987 industrial classification systems.

regime of Narasimha Rao, who came to power following Rajiv Gandhi's assassination in an election campaign which subsequently returned the Congress party to government. The 1991 liberalization was prompted by a balance of payment crisis and by the external pressure of the IMF that imposed a structural adjustment program. Industrial licensing was effectively abolished in 1991 except for a small number of industries where it was retained "for reasons related to security and strategic concerns, social reasons, problems related to safety and overriding environmental issues, manufacture of products of hazardous nature and articles of elitist consumption" (Government of India 1991). As with the case of Gandhi, the depth of the reformist tendencies of the Rao government was largely unanticipated. There are few instances of delicensing away from the leadership transitions in 1985 and 1991.³

From 1991 onwards tariff barriers were also progressively reduced and restrictions on foreign direct investment (FDI) relaxed (Pravin Krishna and Devashish Mitra 1998; Petia Topalova 2005). It is therefore important for us to separate the effects of delicensing from those of trade and FDI liberalization. To capture trade liberalization we construct a measure of the actual tariff rate applied by customs officials at the Indian border by combining basic, auxiliary and countervailing rates of duty for each three-digit industry between 1980 and 1997. These provide us with a direct measure of the evolving Indian trade policy regime and enable us to control for the effects of trade liberalization in our regressions. To capture FDI liberalization we record, from 1991 onwards, how many six-digit products within a three-digit industry were opened to automatic approval of FDI (up to 51 percent equity). Our measure takes a value of zero before 1991 when FDI was strictly controlled. In Table 1 we see that our applied tariff is high and relatively flat across the 1980-1990 period and then falls dramatically after 1990. The FDI reform measure increases after 1990 following the relaxation of controls on foreign investment.

³The 1985 and 1991 reforms covered, respectively around one third and one half of three-digit industries. About one tenth of three-digit industries had not been delicensed by 1997 (see Figure A1 of the Appendix).

We match our delicense, tariff and FDI reform measures with state-industry panel data on the registered manufacturing sector for the period 1980-1997 drawn from the Annual Survey of Industries.⁴ This is the most disaggregated level at which one can obtain representative data on industrial performance across the pre- and post-delicensing periods. The sampling unit is a state and three-digit industry pair, so that the data are representative at the state-three-digit industry level. To minimize the role played by industry entry and exit in explaining our results we restrict our attention to a balanced panel of state-industries on which data exist for all eighteen years of our data set. Moreover, since we are interested in comparing cross-state within-industry performance, we restrict attention to industries that exist in at least five states in each year of the sample. This gives us 18,324 observations on an average of 64 three-digit industries in each of the 16 main Indian states over an 18-year time period.⁵ These sixteen states account for over 95 percent of the Indian population.

As India is a federal democracy and industrial relations fall under the joint jurisdiction of central and state governments in the Indian constitution, labor market regulations differ across states. The key piece of central legislation is the Industrial Disputes Act of 1947 which sets out the conciliation, arbitration and adjudication procedures to be followed in the case of an industrial dispute. This Act has been extensively amended by state governments during the post-Independence period. Thus, although all states have the same starting point, they have diverged from one another over time. Following Besley and Burgess (2004) we code each state amendment as neutral (0), pro-worker (+1) or pro-employer (-1). Having obtained the net direction of amendments in any

⁴Under the Factories Act of 1948 enterprises are required to register if either they have more than ten employees and electric power or have more than twenty employees and no electric power. Smaller enterprises below these size thresholds are classified as part of unregistered manufacturing and are not covered by the Annual Survey of Industries. In our sample period, registered manufacturing makes up about 9 percent of total state output and unregistered manufacturing around 5 percent.

⁵We check that all our results are robust to running regressions on an unbalanced panel where industries are in the data for at least ten years and are active in at least five states. This raises our sample size to 24,374 observations.

given year, we cumulate the scores over time to give a quantitative picture of how the regulatory environment evolved over the 1947-1997 period.

There is heterogeneity in both the level and change of labor regulation across our 1980-1997 sample period. The most extreme pro-worker state, West Bengal, has labor regulation values which rise from +2 to +4 over the 1980-1997 period. Three other states (Gujarat, Maharashtra, Orissa) are also recorded as beginning the period as pro-worker or amending in this direction. The most extreme pro-employer state, Andhra Pradesh, has a score that varies from -2 to -3 across our period. Four other states (Kerala, Rajasthan, Tamil Nadu, Karnataka) begin the period as pro-employer or amend in that direction. There are six neutral states (Assam, Bihar, Haryana, Jammu and Kashmir, Punjab and Uttar Pradesh) that begin the period at 0 and do not amend in either direction. Finally, Madhya Pradesh is neutral in all years except for a pro-employer change in 1982 which is reversed by a 1983 pro-worker amendment.⁶

Labor regulations, industrial licensing and the Annual Survey of Industries only apply to registered manufacturing. Our data are therefore well-suited to examine how product market deregulation, in the form of delicensing, interacts with heterogeneous state-level labor institutions in shaping the pattern of industrial development across Indian states.

II. Empirical Analysis

A. Method

Our interest centers on the delicense-labor regulation interaction coefficient which captures the role of state-specific labor regulation in mediating the impact of the delicensing reform on industrial performance. To examine this interaction we estimate a regression of the form:

⁶Figure A2 in the Appendix displays the variation in state labor regulation across the 1980-1997 sample period.

$$(1) \quad y_{i,s,t} = \alpha_{i,s} + \eta_{i,t} + \beta_{s,t} + \theta(d_{i,t})(r_{s,t}) + \varepsilon_{i,s,t},$$

where $y_{i,s,t}$ is the logarithm of three-digit state-industry real output, $d_{i,t}$ is a dummy variable which takes the value of unity in the year a three-digit industry is delicensed and then stays equal to one thereafter, $r_{s,t}$ is the labor regulation measure for state s at time t , $\alpha_{i,s}$ are state-industry interactions which control for any unobserved time-invariant determinants of state-industry performance (e.g. natural endowments, location), $\eta_{i,t}$ are industry-year interactions which control for differential industry-specific time effects (e.g. technological innovation), $\beta_{s,t}$ are state-year interactions which control for differential state-specific time effects (e.g. macro shocks), and $\varepsilon_{i,s,t}$ is a stochastic error. The coefficient of interest (θ) is identified by the mix of industry-year variation in delicensing interacted with state-year variation in labor regulation.

We cluster the standard errors by state and year of delicensing. This is not only to address serial correlation concerns (and to allow for heteroskedasticity) but also to take account of the fact that delicensing is highly clustered in time. Delicensing happened overwhelmingly in 1985 and 1991, implying that different industries within a state in these years cannot be treated as independent observations.

B. Results

If the licensing system was acting as a barrier to entry we would expect its removal to be associated with an increase in entry in delicensed relative to still-licensed industries. The inclusion of industry-year and state-year interactions in equation (1) precludes estimating the average effects of delicense and labor regulation as these vary at the industry-year and state-year level respectively. We therefore begin our analysis by presenting in Table 2 results for a specification where the industry-year and state-year interactions in

equation (1) have been replaced with year fixed effects and where the delicense-labor regulation interaction term has also been omitted. In column (1), we find that delicensing leads to a statistically significant increase in the number of factories within an industry of around 6 percent.⁷ The delicensing reform therefore does appear to have encouraged entry. In column (2) we include labor regulation as an additional regressor. The coefficient on labor regulation is negative and significant, indicating that states that have moved in a pro-worker direction experience less net entry relative to pro-employer states. The coefficient on delicense remains positive and significant, and of a similar magnitude. Delicensing and pro-worker labor regulation are thus pulling in opposite directions in determining the number of factories operating in state-industries.

Columns (3) and (4) use the same specification to examine the average effects of delicensing and labor regulation on output. In column (3), we find a positive, but not statistically significant effect of delicensing. The small average effect on output, however, may be masking substantial heterogeneity of delicensing effects depending on the institutional conditions in Indian states. Output may have risen in some states and fallen in other states in response to the same nationwide delicensing reform. To examine this possibility we added interactions between state fixed effects and delicense to the specification in column (3) of Table 2. We find that the coefficient on this interaction is positive in nine states and negative in seven states – delicensing led to a rise in output in some states and a fall in output in other states (relative to industries where licensing was retained).⁸ We also find a similar pattern of effects for employment and fixed capital – the average effect of delicensing is small and insignificant but hides considerable heterogeneity across states.

⁷Unfortunately, we do not observe separate entry and exit flows, but changes in the number of factories operating in a state-industry provide us with a measure of net entry.

⁸Eleven of the sixteen delicense-state interactions are statistically significantly different from zero at the 5 percent level. We can reject the null hypothesis that the coefficient on delicense is the same across states at the 1 percent level. In the interest of brevity we do not report the individual coefficients on the delicense-state interactions.

A key question concerns which characteristics of states affect how industries located within their borders respond to delicensing. Of particular interest, are policies and institutions over which state governments exercise some control. In column (4) of Table 2 we find that regulation in a pro-worker direction is associated with lowered output relative to regulating in a pro-employer direction. This lines up with a growing body of evidence which suggests that labor regulation affects industrial performance across Indian states.⁹

In this paper we examine whether state-specific labor institutions mediated the impact of the nationwide delicensing reform on industrial performance across Indian states. Column (1) of Table 3 presents results from estimating a regression of the form described in equation (1). The delicense-labor regulation interaction coefficient is negative and significant indicating that, when delicensing occurred, industries in states with pro-employer regulation experienced larger increases in output relative to those located in pro-worker states.¹⁰ This is the key result in the paper. Given the demanding nature of the specification this is compelling evidence that labor regulations passed over time at the state level affected how industries responded to a nationwide delicensing experiment.¹¹

We checked that our findings are not driven by individual states by sequentially excluding each state from the sample and reestimating the column (1) specification of

⁹Besley and Burgess (2004) show that states which amended in a pro-worker direction in the pre-1992 period experienced lowered output, employment, investment and productivity in registered manufacturing. In contrast, output in unregistered manufacturing increased. Labor regulation therefore seems to be capturing something specific to the institutional environment facing firms in registered manufacturing. Unfortunately data on unregistered manufacturing is not available at the state-industry level across our sample period.

¹⁰We find a similar result for a specification that includes state-industry interactions and year fixed effects (see column (1) of Table A3 in the Appendix). The delicense-labor regulation coefficient (standard error) is -0.070 (0.018).

¹¹A model developed in the working paper version of the paper helps us to understand this key result. Delicensing encourages firm entry and expansion but more so in pro-employer states. The falls in price that ensue lead to exit and contraction of less productive firms particularly in pro-worker states. The net effect is a reallocation of economic activity towards proemployer states (see Aghion, Burgess, Redding, and Zilibotti 2006).

Table 3. In each case the estimated coefficient on the interaction term between delicense and labor regulation remains significant at the 5 percent level and is not statistically significantly different from the estimate for the full sample. This suggests that our results capture a general relationship between industrial performance, delicensing and labor market institutions rather than the influence of individual states.

A potential concern is that state labor regulations are responding to changes in industrial development following delicensing. Therefore, column (2) considers a specification where we interact delicense with state labor regulations in 1980 before delicensing occurred. State-level amendments to the Industrial Disputes Act are coded and cumulated from 1947, so column (2) examines whether pre-delicensing cross-state variation in labor regulation affected how industries responded to delicensing in subsequent years. The interaction coefficient continues to be negative and significant and of similar magnitude to the column (1) result, indicating that industries located in states classified as pro-employer in 1980 tended to grow more quickly, relative to their counterparts in pro-worker states, after they were delicensed.

To provide further evidence against a feedback from industrial development to labor regulation, we exploit the instrumental variables estimation strategy of Besley and Burgess (2004). Following a Supreme Court ruling, which found Indira Gandhi's Congress party guilty of election fraud, she imposed martial law and suspended elections between 1975 and 1977. When state elections resumed she and her party were heavily punished – ten of the sixteen states in our data switched from Congress to non-Congress majorities. The new governments brought new ideas and we observe an increase in labor regulation activity following this political shock. We use interactions between a post-1977 dummy variable and pre-1977 mean unionization in a state and between the post-1977 dummy and patterns of land tenure in British India (from Abhijit Banerjee and Lakshmi Iyer 2005) as our two instruments for state labor regulation. Unionization and historical land tenure both affected how politics had evolved in each state and hence

the direction of labor regulation when political competition intensified post-1977.

Our IV strategy is to predict labor regulation using a first-stage regression, which includes our two instruments, state fixed effects and year fixed effects, for the period 1958-1997.¹² We then interact the predicted value of labor regulation with *delicense* and include it in our second-stage regression. The result is in column (3) of Table 3.¹³ The estimated coefficient on the *delicense*-labor regulation interaction is of a similar magnitude to that in column (1) and statistically significant at the 5 percent level, supporting our interpretation of the interaction term as capturing the role of state-specific labor regulation in determining the heterogeneous impact of delicensing.

In Column (4) we include a set of interactions between each state fixed effect and *delicense*. These interactions control for all fixed state characteristics which affect how industries respond to delicensing, including cross-state differences in labor regulation at the beginning of our sample period. The identification of the *delicense*-labor regulation interaction coefficient now solely comes from changes in labor regulation during the sample period. Even with this limited variation (see Figure A2 in the Appendix) the coefficient remains negative and significant indicating that, after being delicensed, industries located in states which moved in a pro-employer direction experienced greater output growth relative to those located in states which moved in a pro-worker direction.

When we reestimate the specification from column (1) of Table 3 for two alternative measures of industrial performance – total employment and fixed capital – we find similar magnitudes of interaction effects. The estimated *delicense*-labor regulation coefficients (standard errors) are -0.050 (0.019) and -0.054 (0.020) respectively. Therefore pro-worker states experience less employment growth and investment relative to pro-employer states following delicensing.

¹²The F statistic on the excluded instruments in the first-stage regression is 7.27 (this is a state-year regression, with standard errors clustered on state), indicating that the instruments have some power in explaining the direction of labor regulation.

¹³Standard errors in column (3) have been corrected to take account of the fact that predicted labor regulation is generated in a first-stage regression.

Our results demonstrate that liberalization had unequal effects across Indian states, and accentuated the importance of labor regulation in determining the trajectory of industrial activity in India. To gauge the economic significance of our findings we construct a counterfactual of what would have happened to the distribution of output across Indian states had delicensing had no heterogeneous effects in states with different labor regulations. To do this we first construct fitted values for log output using the specification in column (1) of Table 3. We next construct a counterfactual series for log output without heterogeneous effects of delicensing (by falsely assuming that $\theta = 0$ in column (1) of Table 3).¹⁴ Taking exponents and summing across industries within each state allows us to compare the evolution of state output with and without heterogeneous effects of delicensing (see Figure A3 in the Appendix).

The largest relative increases in output following delicensing are found in Andhra Pradesh and Tamil Nadu, the states with the most pro-employer labor regulations. Output in Andhra Pradesh and Tamil Nadu, is around 10 percent higher in 1997 relative to the counterfactual. In contrast, output in West Bengal and Maharashtra, the states with the most pro-worker regulations, is 18 percent and 9 percent lower. Similar results are found for employment and fixed capital.¹⁵

Collectively these results paint a consistent picture. State labor regulations affected in a sizeable fashion the relative development of registered manufacturing across Indian states following the delicensing episodes of the 1980's and 1990's.

¹⁴Since industry-year and state-year interaction effects absorb, respectively, the level effects of delicensing and labor regulation, the difference between the fitted and counterfactual series can only identify the heterogeneous effects of delicensing.

¹⁵Our estimates imply that, relative to the counterfactual, employment in 1997 is 5 and 10 percent higher in Andhra Pradesh and Tamil Nadu respectively, and 18 percent lower in West Bengal. Similarly fixed capital is around 10 percent higher in Andhra Pradesh and Tamil Nadu and 19 percent lower in West Bengal.

C. Robustness

Liberalization in 1991 in India came as a package. Trade tariffs were reduced and restrictions on foreign direct investment were relaxed at the same time that the second wave of delicensing was taking place. These reforms were enacted centrally and vary across industries and time (see Krishna and Mitra 1998; Topalova 2005). Table 4 checks whether our delicense-labor regulation result is robust to controlling for interactions between these other industry-year varying elements of the liberalization package and labor regulation.

We begin by examining the interaction between our tariff measure and labor regulation. In a specification with state-industry interactions and year dummies this interaction is positive and significant suggesting that tariff reductions led to output expansion in pro-employer states relative to pro-worker states.¹⁶ This result, however, is not robust to controlling for industry-year and state-year interactions as is shown in column (1) of Table 4. In column (2) we include the interaction of labor regulation with both tariff and delicense alongside one another. The delicense-labor regulation interaction remains negative and significant (and of the same magnitude as in column (1) of Table 3), indicating robustness to controlling for the interaction of trade liberalization with labor regulation. When we include both FDI reform-labor regulation and tariff-labor regulation interactions in column (3), we find that neither are significant. In column (4) we include our FDI reform measure interacted with labor regulation alongside the delicense-labor regulation and tariff-labor regulation interactions. We find that the delicense-labor regulation interaction remains significant (and of similar magnitude to our earlier result from column (1) in Table 3). Our central finding is therefore robust to controlling for the interaction of both trade liberalization and FDI reform with labor regulation.

¹⁶See column (3) of Table A3 in the Appendix. We also find a negative but statistically insignificant average effect of tariffs on output which lines up with the weak direct effects of delicensing on output that we observe in Table 2 (see column (2) of Table A3).

Table 5 checks whether our delicense-labor regulation result is robust to controlling for interactions between delicensing and other time-varying state policies and characteristics. In column (1) we include the interaction of delicense with state development expenditure and with a measure of state financial development. Development expenditure includes state spending on health, education and infrastructure and helps crudely to measure differences in state government investment in these activities across time. For financial development we use the instrumented state-level bank branch expansion measure from Burgess and Rohini Pande (2005). This captures the expansion of bank branch networks into locations with no banks across Indian states driven by the introduction (in 1977) and removal (in 1990) of a branch licensing rule.¹⁷ This mitigates concerns that financial development is endogenous to industrial development whilst controlling for this potentially important determinant of industrial performance (see Acemoglu and Zilibotti 1997; Aghion, Peter Howitt, and David Mayer-Foulkes 2005; Kalina Manova 2006).

The coefficient on the delicense-development expenditure interaction in column (1) of Table 5 is positive and significant suggesting that within each industry, states with larger development expenditures tend to gain more from the delicensing reform relative to those that spend less. The delicense-financial development coefficient is also positive and significant suggesting that states which expanded access to finance benefited from delicensing relative to those where bank branch expansion was less marked. The coefficient on the delicense-labor regulation interaction, however, remains negative and significant, and similar in magnitude to column (1) of Table 3, when we include these controls.

¹⁷Between 1977 and 1990 the Indian Central Bank imposed a licensing rule which required that for each branch opened in a banked location four had to be opened in unbanked locations. Burgess and Pande (2005) use the number of bank branches per capita in 1961 interacted with (i) a post-1976 time trend and (ii) a post-1989 time trend as instruments for state-level bank branch expansion. Standard errors in columns (1) to (3) of Table 5 have been adjusted to take account of the fact that predicted financial development is generated in a first-stage regression.

Labor market regulations may also be correlated with the technological level of industries in a given state. To address this concern we construct a dummy for whether a state-industry is in the top, middle or bottom tercile of the cross-state distribution of labor productivity for a given year. We then interact the top and bottom tercile dummies with our delicense measure omitting the middle tercile interaction which serves as a reference. In column (2) of Table 5 (which also contains the development expenditure and financial development controls from column (1)) we see that being in the top tercile is associated with a larger increase in output after delicensing relative to being in the middle tercile.¹⁸ Being in the bottom tercile is associated with smaller increases. Both effects are large in magnitude and highly statistically significant. Technological level clearly has a bearing on which state-industries in a three-digit sector benefit from delicensing. Controlling for technology, however, has little effect on the delicense-labor regulation interaction term which remains negative and significant and of similar magnitude to column (1) of Table 3. The direction of labor regulation in a state does not appear to be just proxying for how technologically advanced industries in a state are.

Many aspects of the policy environment are difficult to measure. In column (4) of Table 3 we have shown that our results are robust to including delicense-state interactions which control for the role that unobserved time-invariant state characteristics play in mediating the impact of delicensing. Omitted interactions between delicense and unobserved time-varying state policies, however, remain a concern. As a further robustness check, we therefore add in controls for the political complexion of states on the grounds that policies towards the registered manufacturing sector are likely to be correlated with political outcomes. We expect past political outcomes to matter as they determine the attitude towards business that prevails in the bureaucracy and polity. This attitude will

¹⁸This finding is consistent with the theory of Acemoglu, Aghion, and Zilibotti (2006) who argue that the removal of entry barriers favors the performance of firms and industries that are closer to the technological frontier, while it may harm less advanced ones. See also Aghion and Rachel Griffith (2005) for corresponding UK evidence.

affect a range of policy actions that we cannot observe in our data. We therefore assemble a picture of each state’s “political history” as measured by the number of years since 1957 that particular political groupings have held a majority of the seats in the state legislature. The relevant groupings for this exercise are: the Congress party, hard-left parties, regional parties, Janata parties and Hindu parties. The results are in column (3), which also contains the full set of controls for development expenditure, financial development and technology from columns (1) and (2). The coefficient on the interaction between delicense and labor regulation remains negative and significant and of similar magnitude to column (1) of Table 3 when we control for the interaction between delicense and state political histories. The same result holds if we use the contemporaneous share of seats held in state assemblies in these five groupings interacted with delicense.¹⁹

The timing of delicensing varies across industries. A natural question to ask is whether the actual year in which industries are delicensed matters. To investigate this we run a Monte Carlo simulation in which we draw a random year in which an industry is delicensed from the empirical distribution of delicensing years. We do this for each three-digit industry, thus creating a random or “placebo” delicense measure. We repeat this process to generate one hundred placebo delicense measures. For each of the placebo measures the probability of an industry being delicensed in a given year matches that in the actual data but we randomize over the identities of industries.

In a first falsification exercise we then estimate our regression specification (1) using the placebo delicense measures in the place of our actual delicense measure. In ninety-three of the one hundred regressions, we find that the placebo delicense-labor regulation

¹⁹As part of a wider sensitivity analysis, not reported in the paper, we included all of the following additional variables interacted with delicense in columns (1) to (3) of Table 5: (i) the constituent health, education and other expenditure elements of development expenditure (to more finely control for state-government spending behavior), (ii) the proportion of people below the poverty line in a state (to capture overall backwardness), (iii) state-specific differences between industrial and agricultural electricity tariffs (to capture cross-subsidization of agriculture) and (iv) cumulative state land reform acts from Besley and Burgess (2000) (to capture how pro-rural a state was). In all these regressions the delicense-labor regulation interaction remains negative and highly significant.

interaction has a lower absolute t statistic than the actual delicense-labor regulation interaction (from column (1) of Table 3). In a second falsification exercise we include both the actual and placebo delicense measures interacted with labor regulation in our regression specification (1). The actual delicensing-labor regulation interaction is significant at the 5 percent level in ninety-eight of the one hundred regressions, whereas the placebo delicense-labor regulation interaction is significant at the 5 percent level in only seven of the regressions. The results of both falsification exercises serve as compelling evidence that the actual timing of when industries are delicensed is central to our main empirical result.

A final concern is that the sequencing of delicensing may be driven by the underlying performance of industries. The fact that delicensing was a centrally-managed technocratic reform which was, in part, triggered by largely unexpected shocks (Rajiv Gandhi's sudden rise to power and the IMF-imposed structural adjustment program under Narasimha Rao) helps to allay the concern that industries may have acted in anticipation of economic reforms. However, the industries that were delicensed in different waves may have been selected according to some characteristics related to performance potential. In particular, reformers in 1985 may have not chosen industries randomly. The concern is less severe for the 1991 wave as this covered most of the remaining industries, and the criterion for the exclusion of a few industries was their strategic, environmental and social importance. Endogenous sequencing would be a problem for analyzing the impact of delicensing if the selection criterion were correlated with the expected future performance of state-industries at the time of the reform.²⁰ As a crude check on this we ran a cross-section regression of the year in which a three-digit industry was delicensed on output growth in that industry during the 1980-84 period (prior to the first wave of

²⁰The fact that our interest centers on the delicense-labor regulation interaction helps somewhat in this regard. To explain our main result from column (1) of Table 3, endogenous selection would have to be based upon an industry's expected strong performance in pro-employer states and/or expected weak performance in pro-worker states.

delicensing). This is intended to detect whether politicians selected industries in 1985 according to their degree of economic success. We find no evidence of a relationship between when an industry is delicensed and pre-reform output growth (the estimated coefficient of interest is -0.383, and the standard error is 1.436). Similar results are found using other measures of pre-reform industrial performance such as employment or labor productivity growth during 1980-84.²¹ The absence of systematic differences in pre-reform economic performance between industries that are delicensed in each of the two waves is reassuring.

III. Conclusions

This paper has investigated the extent to which the effects on registered manufacturing output of dismantling the License Raj – a system of central controls governing entry and expansion in this sector – vary across Indian states with different labor market regulations. To do this we employ a difference-in-difference econometric specification that includes state-industry, industry-year and state-year interactions to control for a variety of unobserved effects. The main finding is that output rose more in pro-employer states than it did in pro-worker states in response to the same delicensing reform. This central result stands up to a wide variety of robustness checks and the delicense-labor regulation interaction coefficient is similar in size and significance across a range of specifications. Delicensing resulted in a sizeable reallocation of industrial production from states with pro-worker labor institutions to states with pro-employer labor institutions. A policy implication of our analysis is that liberalization tends to make the creation of a more favorable investment climate a more pressing concern. This may require complementary institutional reforms as well as redistributive policies that ease the costs of adjustment associated with liberalization.

²¹The regression coefficients (standard errors) are, respectively, 0.23 (1.25) and -0.74 (1.57).

A Data Appendix

Our dataset on output, number of factories, employment and fixed capital covers an average of 64 three-digit industries in the 16 main Indian states over an 18-year time period from 1980 to 1997 and comes from the Annual Survey of Industries (ASI).²² To this data set we add the following variables.

Delicense: Appendix II of The Industries Development and Regulation Act of 1951 reports a comprehensive list of the “Scheduled Industries” subject to industrial licensing (Malik 1997). All key manufacturing sectors are covered by the 1951 Act. We assigned three-digit codes to the scheduled industries listed in the Act and used Press Notices and Notifications issued by the Ministry of Commerce and Industry to track when three-digit industries were delicensed during the 1980s (see Shri Chaudhary 1987; Government of India’s Economic Surveys, and the Handbook of Industrial Policy and Statistics 1987). The Statement of Industrial Policy of 1991 disbanded industrial licensing except for a small number of specified industries. Subsequent revisions to the list of licensed industries from 1991 onwards were tracked from Press Notices and Notifications published in various issues of the Handbook of Industrial Policy and Statistics.

Labor regulation: This measure is based on state-specific text amendments to the Industrial Disputes Act 1947 reported in Malik (1997). Our coding of amendments follows Besley and Burgess (2004): 0 denotes a change judged not to affect the bargaining power of either workers or employers, 1 is a pro-worker change, and -1 denotes a pro-employer change. Where there was more than one amendment in a year we code the net direction of change thus restricting our measure to take a value of 0, 1, -1 in any given state and year. These measures are then cumulated over the 1947-1997 period.

Tariffs and FDI reform: Data on actual rates of duty are from the Customs Tariff

²²The Indian industrial classification changes in 1987. We establish a concordance from the 1970 classification to the 1987 classification to create a consistent state-industry panel across the 1980-1997 period (see Table A2 in the Appendix).

of India manuals published through the Central Board of Excise and Customs. Prior to 1988, the basic, auxiliary and countervailing duties are reported for approximately one thousand one hundred products of the Brussels Tariff Nomenclature (BTN). From 1988 onwards, even more finely-detailed data are available for approximately five thousand six-digit products of the Harmonized System (HS). We combine the three rates of duty according to the official formula²³ and then aggregate product rates to the three-digit industry average using the mapping of Bibek Debroy and A. T. Santhanam (1993). Data on when different HS six-digit products are opened to automatic FDI approval for up to 51 percent of equity is from the Handbook of Industrial Policy and Statistics.

Control variables: State development expenditure is from the Public Finance Statistics published by the Ministry of Finance. Our measure of state financial development is from Burgess and Pande (2005). The data on political histories come from state election data published by the Election Commission of India. State poverty headcounts are from the National Sample Survey. State cumulative land reforms are from Besley and Burgess (2000). Agricultural and industry electricity tariff data comes from Annual Reports on the Working of State Electricity Boards and Electricity Departments.

²³Applied tariff = basic + auxiliary + (100+ basic + auxiliary) × (countervailing)/100.

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Table 1: Sample Descriptive Statistics

	1980	1985	1990	1997	1980-1997
Delicensing					
Percentage of three-digit industries delicensed	0	36.61	39.29	91.07	73.48
Percentage of real output delicensed	0	47.68	56.94	92.57	74.53
Percentage of employment delicensed	0	43.05	47.81	88.15	68.31
Labor Regulation					
Labor Regulation	-0.16 (1.04)	-0.05 (1.42)	0.13 (1.65)	0.13 (1.65)	0.04 (1.52)
Trade Liberalization					
Tariff Rate	119.19 (44.74)	142.31 (47.69)	132.53 (38.94)	47.58 (21.34)	117.62 (49.22)
FDI Reform					
FDI Reform	0	0	0	0.35 (0.39)	0.14 (0.30)
Industrial performance					
Mean log real output	11.47 (1.96)	11.88 (1.93)	12.31 (1.96)	12.68 (2.20)	12.13 (2.02)
Mean log number of factories	3.30 (1.34)	3.42 (1.29)	3.50 (1.30)	3.58 (1.36)	3.46 (1.32)
Mean log employment	7.22 (1.70)	7.37 (1.57)	7.46 (1.58)	7.55 (1.69)	7.43 (1.61)

Mean log real fixed capital	9.78 (2.12)	10.39 (2.03)	10.74 (2.12)	11.27 (2.46)	10.61 (2.20)
Observations	1018	1018	1018	1018	18324

Notes to Table 1: The data set is a balanced panel of three-digit state-industries that are present in the data in all 18 years and includes an average of 64 three-digit industries in the 16 states over the period 1980 to 1997. Numbers in parentheses are standard deviations across state-industries. State amendments to the Industrial Disputes Act are coded 1=pro-worker, 0=neutral, -1=pro-employer and then cumulated over 1947-97 to generate the labor regulation measure. Tariff rate is the tariff rate applied to a three-digit registered manufacturing industry. FDI reform is a variable, which before 1991 is equal to zero and after 1991 is equal to the fraction of Harmonized System 6-digit products within a three-digit industry opened to automatic approval of foreign direct investment (FDI) for up to 51 percent equity. Real output is real registered manufacturing output in thousands of rupees (1981 prices). Number of factories is number of registered manufacturing factories. Employment is number of registered manufacturing employees. Real fixed capital is real registered manufacturing fixed capital stock in thousands of rupees (1981 prices). See the Data Appendix for further information on variable definitions and the data sources.

Table 2: Average Effects of Delicensing on Industrial Performance in India: 1980-1997

	(1)	(2)	(3)	(4)
	Log No. Factories	Log No. Factories	Log Real Output	Log Real Output
Delicense	0.064*** (0.024)	0.064** (0.024)	0.032 (0.042)	0.031 (0.043)
Labor Regulation		-0.062** (0.027)		-0.137*** (0.044)
Observations	18324	18324	18324	18324
R-squared	0.92	0.92	0.89	0.89
State-industry interactions	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES

Notes to Table 2: The data set is a balanced panel of three-digit state-industries that are present in the data in all 18 years and includes an average of 64 three-digit industries in the 16 states over the period 1980 to 1997. Robust standard errors adjusted for clustering on state×year delicensed are reported in parentheses. Log no. factories is log number of registered manufacturing factories. Log real output is log real registered manufacturing output. Delicense is a dummy variable which is one if all or part of a three-digit industry is delicensed in a particular year and zero otherwise. State amendments to the Industrial Disputes Act are coded 1=pro-worker, 0=neutral, -1=pro-employer and then cumulated over 1947-97 to generate the labor regulation measure. See the Data Appendix for further information on variable definitions and the data sources. * denotes statistical significance at the 10% level; ** denotes statistical significance at the 5% level; *** denotes statistical significance at the 1% level.

Table 3: Delicensing, Labor Regulation and Industrial Performance in India: 1980-1997

	(1)	(2)	(3)	(4)
	Log Real Output	Log Real Output	Log Real Output	Log Real Output
Delicense \times Labor Regulation	-0.054** (0.024)			-0.202** (0.078)
Delicense \times 1980 Labor Regulation		-0.062* (0.035)		
Delicense \times Instrumented Labor Regulation			-0.068** (0.030)	
Observations	18324	18324	18054	18324
R-squared	0.92	0.92	0.92	0.92
State-industry interactions	YES	YES	YES	YES
State-year interactions	YES	YES	YES	YES
Industry-year interactions	YES	YES	YES	YES
Delicense-state interactions				YES

Notes to Table 3: The data set is a balanced panel of three-digit state-industries that are present in the data in all 18 years and includes an average of 64 three-digit industries in the 16 states over the period 1980 to 1997. The difference in the number of observations between column (3) and the other columns of the table is due to the absence of unionization data for Jammu and Kashmir, which implies that instrumented labor regulation is missing for Jammu and Kashmir. Robust standard errors adjusted for clustering by state×year delicensed are reported in parentheses. Log real output is log real registered manufacturing output. Delicense is a dummy variable which is one if all or part of a three-digit industry is delicensed in a particular year and zero otherwise. State amendments to the Industrial Disputes Act are coded 1=pro-worker, 0=neutral, -1=pro-employer and then cumulated over 1947-97 to generate the labor regulation measure. 1980 labor regulation is the labor regulation measure of states as of 1980. Instrumented labor regulation is predicted from a state-year regression for 1958-97 in which the instruments are interactions between a post-1977 dummy variable and pre-1977 mean unionization in a state and between the post-1977 dummy and patterns of land tenure in British India (from Banerjee and Iyer, 2005). The F-statistic for the significance of the excluded instruments in the first-stage state-year regression is 7.27. The Hansen-Sargan overidentification test regresses the residuals from the second-stage state-industry-time regression on interactions between the instruments and delicense. The instruments pass the overidentification test with a p-value of 0.255. Standard errors in column (3) are corrected for instrumented labor regulation being generated in a first-stage regression. See the Data Appendix for further information on variable definitions and the data sources. * denotes statistical significance at the 10% level; ** denotes statistical significance at the 5% level; *** denotes statistical significance at the 1% level.

Table 4: Trade Liberalization, FDI Reform, Labor Regulation and Industrial Performance in India: 1980-97

	(1)	(2)	(3)	(4)
	Log Real Output	Log Real Output	Log Real Output	Log Real Output
Delicense \times Labor Regulation		-0.059** (0.024)		-0.059** (0.024)
Log Tariff Rate \times Labor Regulation	0.009 (0.019)	0.008 (0.020)	0.009 (0.019)	0.008 (0.020)
FDI Reform \times Labor Regulation			-0.007 (0.038)	-0.010 (0.036)
Observations	17783	17783	17783	17783
R-squared	0.92	0.92	0.92	0.92
State-industry interactions	YES	YES	YES	YES
State-year interactions	YES	YES	YES	YES
Industry-year interactions	YES	YES	YES	YES

Notes to Table 4: The data set is a balanced panel of three-digit state-industries that are present in the data in all 18 years and includes an average of 64 three-digit industries in the 16 states over the period 1980 to 1997. The difference in the number of observations between Table 4 and Table 3 is due to the fact that there are a small number of three digit industries for which tariff data is unavailable. Robust standard errors adjusted for clustering on state×year delicensed are reported in parentheses. Log real output is log real registered manufacturing output. Delicense is a dummy variable which is one if all or part of a three-digit industry is delicensed in a particular year and zero otherwise. State amendments to the Industrial Disputes Act are coded 1=pro-worker, 0=neutral and -1=pro-employer and then cumulated over 1947-97 to generate the labor regulation measure. Log tariff rate is the log tariff rate applied to a three-digit industry. FDI reform is a variable which before 1991 is equal to zero and after 1991 is equal to the fraction of Harmonized System 6-digit products within a three-digit industry opened to automatic approval of foreign direct investment (FDI) for up to 51 percent equity. See the Data Appendix for further information on variable definitions and the data sources. * denotes statistical significance at the 10% level; ** denotes statistical significance at the 5% level; *** denotes statistical significance at the 1% level.

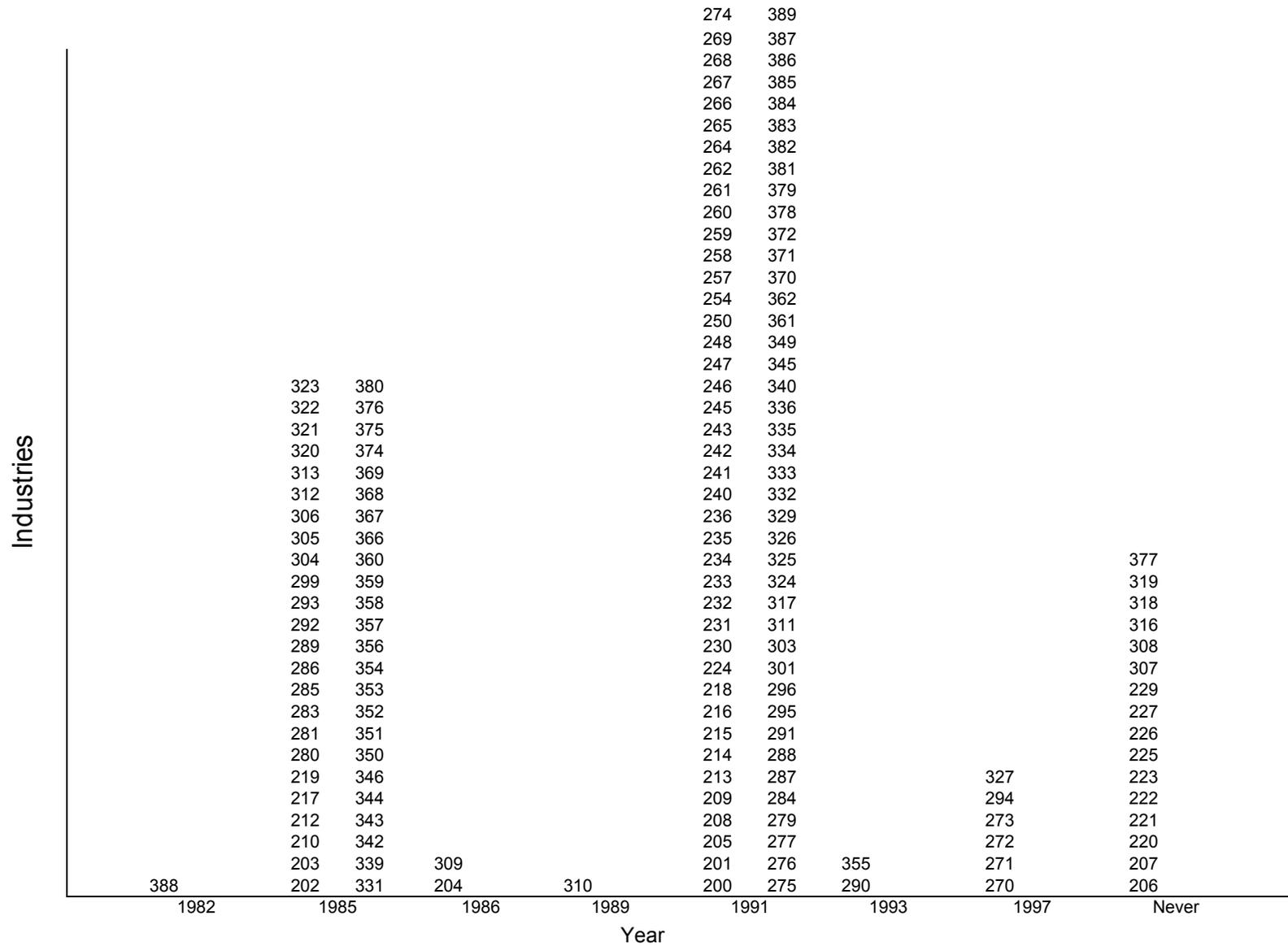
Table 5: Robustness to Interactions with State and State-Industry Characteristics

	(1)	(2)	(3)
	Log Real Output	Log Real Output	Log Real Output
Delicense × Labor Regulation	-0.051** (0.024)	-0.064** (0.028)	-0.064*** (0.022)
Delicense × Log Development Exp	0.188* (0.105)	-0.113 (0.101)	-0.118 (0.126)
Delicense × Financial Development	0.030** (0.014)	0.029* (0.017)	0.047** (0.023)
Delicense × Top Industry Productivity Tercile		0.472*** (0.032)	0.474*** (0.032)
Delicense × Bottom Industry Productivity Tercile		-0.521*** (0.033)	-0.523*** (0.033)
Delicense × Congress Majority			-0.006 (0.005)
Delicense × Hard-left Majority			0.005 (0.020)
Delicense × Regional Majority			0.003 (0.006)
Delicense × Janata Majority			0.006 (0.019)
Delicense × Hindu Majority			0.072 (0.081)
Observations	18324	18324	18324

R-squared	0.92	0.93	0.93
State-industry interactions	YES	YES	YES
State-year interactions	YES	YES	YES
Industry-year interactions	YES	YES	YES

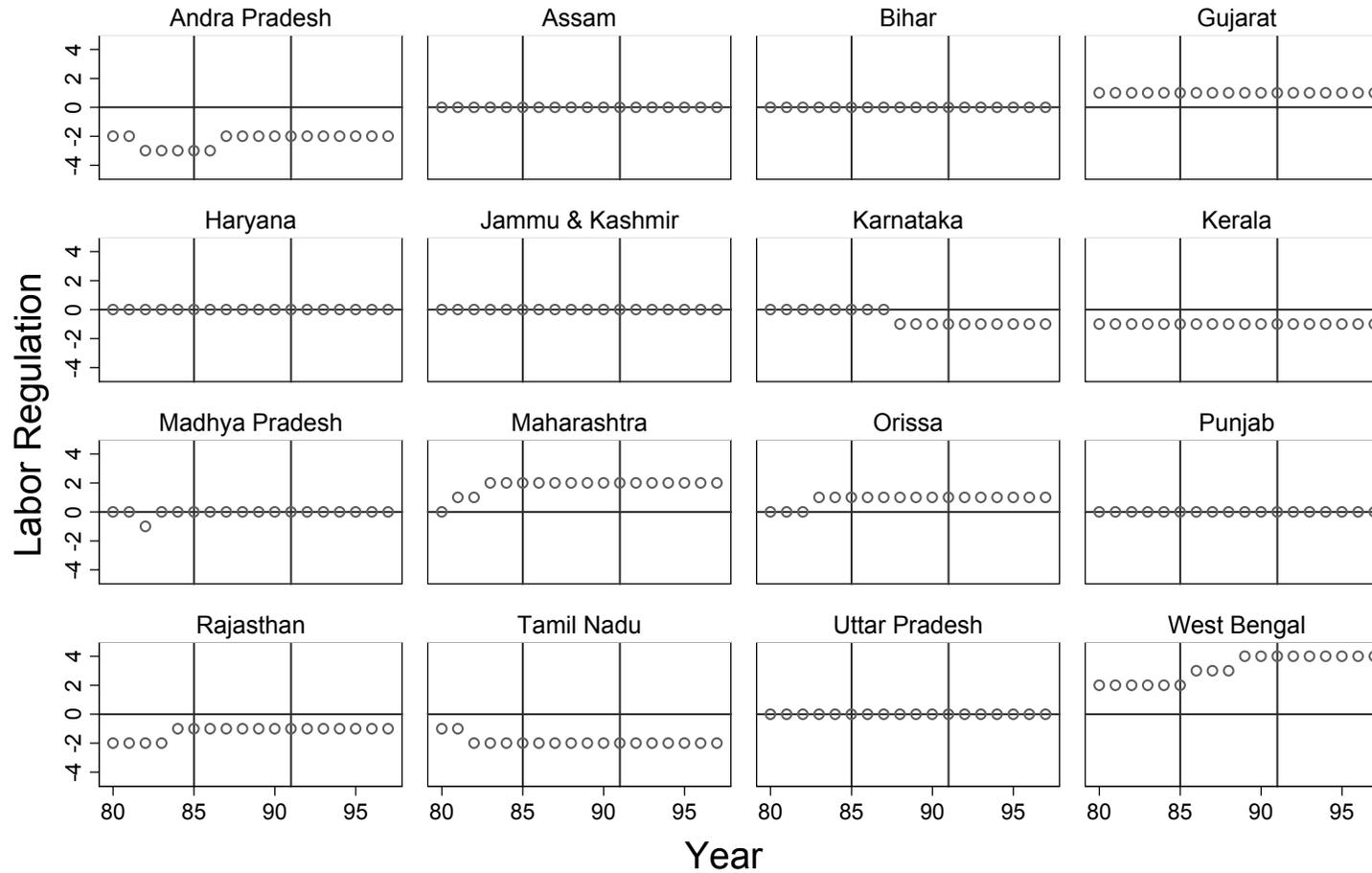
Notes to Table 5: The data set is a balanced panel of three-digit state-industries that are present in the data in all 18 years and includes an average of 64 three-digit industries in the 16 states over the period 1980 to 1997. Robust standard errors adjusted for clustering on state×year delicensed are reported in parentheses. Log real output is log real registered manufacturing output. Delicense is a dummy variable which is one if all or part of a three-digit industry is delicensed in a particular year and zero otherwise. State amendments to the Industrial Disputes Act are coded 1=pro-worker, 0=neutral and -1=pro-employer and then cumulated over 1947-97 to generate the labor regulation measure. Log development expenditure is real per capita state spending on social and economic services. Financial development is from Burgess and Pande (2005) who use the number of bank branches per capita in 1961 interacted with (i) a post-1976 time trend and (ii) a post-1989 time trend as instruments for state-level bank branch expansion for the 1961-2000 period. We use predicted financial development from this state-year regression interacted with delicense above. The F-statistic for the significance of the excluded instruments in the first-stage state-year regression is 16.87. Standard errors in columns (1) to (3) of Table 5 have been adjusted to take account of the fact that predicted financial development is generated in a first-stage regression. Top industry productivity tercile is a dummy which is one if a state-industry lies in the top third of the cross-state within-industry labor productivity distribution each year and zero otherwise. Bottom industry productivity tercile is a dummy which is one if a state-industry lies in the bottom third of the cross-state within-industry labor productivity distribution and zero otherwise. Congress, hard left, regional, Janata and Hindu majority are counts of the number of years for which these political groupings held a majority of the seats in the state legislatures since 1957. See the Data Appendix for further information on variable definitions and the data source. * denotes statistical significance at the 10% level; ** denotes statistical significance at the 5% level; *** denotes statistical significance at the 1% level.

Figure A1 : The Timing of Delicensing in India 1980-97



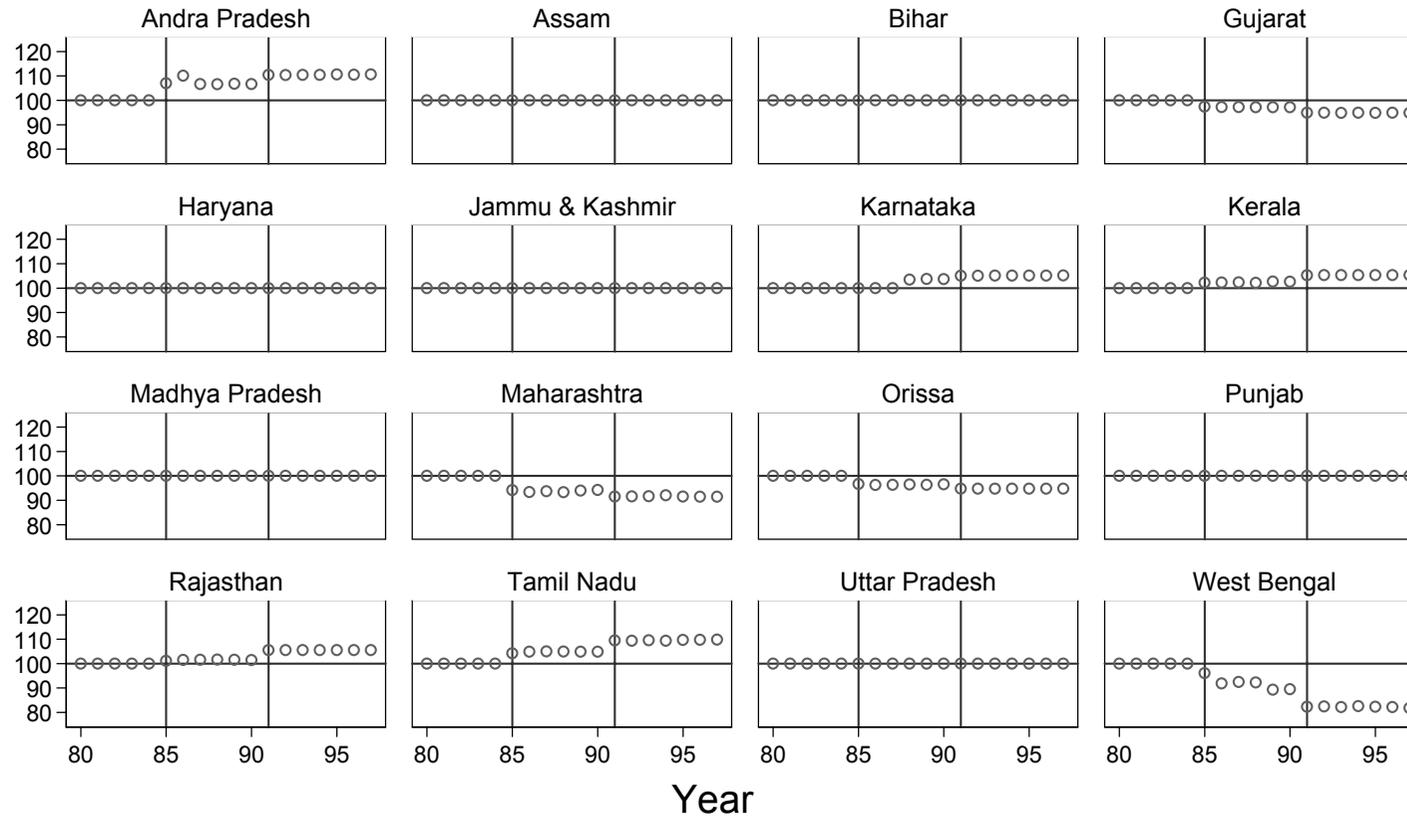
Notes: The figure displays the years in which different three-digit registered manufacturing industries in India were delicensed over the 1980-97 period. The industries shown in the Never column had not been delicensed as of 1997. Numbers refer to three-digit codes in the concordance of the 1970 and 1987 industrial classifications in Table A2. See Table A1 for the detail on how each three-digit industry was coded. See the Data Appendix for further information on variable definitions and the data sources.

Figure A2: Labor Regulation in India 1980-97



Notes: State amendments to the Industrial Disputes Act are coded: 1=pro-worker, 0=neutral, -1=pro-employer and cumulated from 1947-97. Vertical lines denote the two waves of delicensing in 1985 and 1991. See the data appendix for further details on the variables and data sources.

Figure A3: The Unequal Effects of Delicensing in India 1980-97



Notes: For each Indian state we display the ratio of fitted state output (from column (1) of Table 3) to counterfactual state output obtained by setting the delicense-labor regulation interaction to zero in this specification. The fitted-counterfactual ratio has been multiplied by one hundred to be expressed as a percentage. Deviations from a value of one hundred are attributable to the heterogeneous effects of delicensing across states due to their different labor market regulations. Since industry-year and state-year effects absorb, respectively, the level effects of delicensing and labor regulation, the difference between the fitted and counterfactual series can only identify the heterogeneous effects of delicensing. Vertical lines denote the two waves of delicensing in 1985 and 1991.

Table A1: Coding for Delicense Variable

Nic 3	Year delicensed	IDRA Industry	Reason Delicensed
200	1991	Food-processing industries (other)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
201	1991	Food-processing industries (milk products)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
202	1985	Food-processing industries (canned fruits)	"Canned fruits" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
203	1985	Food-processing industries (other)	"Marine products" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
204	1986	Food-processing industries (flour)	"Roller flour milling industry" mentioned in Press Note No. 21 issued 9 July 1986 (Chaudhary 1987)
205	1991	Food-processing industries (other)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
206	0	Sugar	"Sugar" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
207	0	Sugar	"Sugar" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
208	1991	Salt (under processed food)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
209	1991	Food-processing industries (other)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
210	1985	Vegetable oils and vanaspati	"Vegetable oils" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
212	1985	Vegetable oils and vanaspati	"Vegetable oils" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
213	1991	Food-processing industries (other)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
214	1991	Food-processing industries (other)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
215	1991	Food-processing industries (other)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
216	1991	Food-processing industries (other)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
217	1985	Food-processing industries (other)	"Cattle feed" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
218	1991	Food-processing industries (other)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
219	1985	Food-processing industries (malted food, other)	"Protein foods" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
220	0	Fermentation industries	"Distillation and Brewing of alcoholic drinks" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
221	0	Fermentation industries	"Distillation and Brewing of alcoholic drinks" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
222	0	Fermentation industries	"Distillation and Brewing of alcoholic drinks" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
223	0	Fermentation industries	"Distillation and Brewing of alcoholic drinks" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
224	1991	Food-processing industries (other)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
225	0	Miscellaneous industries (tobacco)	"Tobacco and Substitutes" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
226	0	Miscellaneous industries (tobacco)	"Tobacco and Substitutes" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
227	0	Miscellaneous industries (tobacco)	"Tobacco and Substitutes" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
229	0	Miscellaneous industries (tobacco)	"Tobacco and Substitutes" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
230	1991	Textiles (cotton)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
231	1991	Textiles (cotton)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
232	1991	Textiles (cotton)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
233	1991	Textiles (cotton)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
234	1991	Textiles (cotton)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
235	1991	Textiles (cotton)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
236	1991	Textiles (cotton-dyeing/printing)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
240	1991	Textiles (silk, synthetic, artificial)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)

241	1991	Textiles (wool)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
242	1991	Textiles (wool)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
243	1991	Textiles (wool-dying)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
245	1991	Textiles (silk)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
246	1991	Textiles (silk)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
247	1991	Textiles (artificial)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
248	1991	Textiles (artificial-dying/printing)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
250	1991	Textiles (jute)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
254	1991	Textiles (jute)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
257	1991	Textiles (fibre)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
258	1991	Textiles (fibre)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
259	1991	Textiles (fibre)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
260	1991	Textiles (various)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
261	1991	Textiles (ropes)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
262	1991	Textiles (various)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
264	1991	Textiles (various)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
265	1991	Textiles (various)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
266	1991	Textiles (various)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
267	1991	Textiles (various)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
268	1991	Textiles (various)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
269	1991	Textiles (various)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
270	1997	Timber products (miscellaneous)	"Wood-based products" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992) and delicensed in Press Note No. 11 issued 17 July 1997 (Handbook of Industrial Policy and Statistics 1999)
271	1997	Timber products (plywood)	"Plywood" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992) and delicensed in Press Note No. 11 issued 17 July 1997 (Handbook of Industrial Policy and Statistics 1999)
272	1997	Timber products (miscellaneous)	"Wood-based products" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992) and delicensed in Press Note No. 11 issued 17 July 1997 (Handbook of Industrial Policy and Statistics 1999)
273	1997	Timber products (miscellaneous)	"Wood based products" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992) and delicensed in Press Note No. 11 issued 17 July 1997 (Handbook of Industrial Policy and Statistics 1999)
274	1991	Timber products (miscellaneous)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
275	1991	Timber products (miscellaneous)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
276	1991	Timber products (miscellaneous)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
277	1991	Timber products (miscellaneous)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
279	1991	Timber products (miscellaneous)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
280	1985	Paper and pulp	"Paper and pulp" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
281	1985	Paper and pulp	"Paper and pulp" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
283	1985	Paper and pulp	"Paper and pulp" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
284	1991	Printing and publishing of newspapers	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
285	1985	Printing	"Printing" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)

286	1985	Printing	"Printing" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
287	1991	Engraving, etching, and block-making	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
288	1991	Book binding on account of others	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
289	1985	Printing	"Printing" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
290	1993	Leather, leather goods and pickers	"Raw hides " mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992) and delicensed in Press Note No. 4 issued 23 April 1993 (Handbook of Industrial Policy and Statistics 1999)
291	1991	Manufacture of footwear	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
292	1985	Leather, leather goods and pickers	"Leather goods" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
293	1985	Leather, leather goods and pickers	"Leather goods" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
294	1997	Leather, leather goods and pickers	"Tanned or dressed furskins" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992) and delicensed in Press Note No. 11 issued 17 July 1997 (Handbook of Industrial Policy and Statistics 1999)
295	1991	Leather, leather goods and pickers	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
296	1991	Leather, leather goods and pickers	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
299	1985	Leather, leather goods and pickers	"Leather goods" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
301	1991	Fertilisers	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
303	1991	Chemicals (Paints, varnishes)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
304	1985	Drugs and pharmaceuticals	List of drugs mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
305	1985	Soaps, cosmetics and toilet preparations	"Soap and cosmetics" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
306	1985	Chemicals (industrial gases, man-made fibres)	"Industrial gases" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
307	0	Timber products (matches)	"Matches" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
308	0	Chemicals (explosives)	"Explosives" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
309	1986	Chemicals (fine)	"Fine chemicals" mentioned in Press Note No. 32 issued 26 September 1986 (Chaudhary 1987)
310	1989	Rubber goods (tyres and tubes)	"Tyres and tubes" mentioned in Paragraph 4.14, Economic Survey, 1989-90.
311	1991	Rubber goods (footwear)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
312	1985	Rubber goods (surgical)	"Surgical instruments" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
313	1985	Miscellaneous mechanical and engineering industries (plastic moulded goods)	"Plastic moulded goods" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
316	0	Fuels	"Petroleum and its distillation products" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
317	1991	Fuels	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
318	0	Fuels (coke and derivatives)	"Coal and lignite" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
319	0	Fuels (coal and lignite)	"Coal and lignite" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
320	1985	Ceramics (refractories)	"Refractories" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
321	1985	Glass	"Glassware" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
322	1985	Ceramics (pottery)	"Pottery" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
323	1985	Ceramics (sanitary ware, insulators)	"Sanitaryware, insulators" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
324	1991	Cement and gypsum products	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
325	1991	Cement and gypsum products	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
326	1991	Cement and gypsum products	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
327	1997	Cement (asbestos)	"Asbestos" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992) and delicensed in Press Note No. 2 issued 31 July 1997 (Handbook of Industrial Policy and Statistics 1999)

329	1991	Miscellaneous non-metallic mineral products	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
331	1985	Metallurgical industries (ferrous-iron and steel)	"Sponge Iron" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987), "Pig Iron" mentioned in list of industries delicensed for MRTP and FERA companies in December 1985 in Table 4.1, Economic Survey, 1985-86. See also Press Note No. 6 issued 30 January 1986 (Chaudhary 1987).
332	1991	Metallurgical industries (ferro-alloys)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
333	1991	Metallurgical industries (non ferrous)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
334	1991	Metallurgical industries (non ferrous)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
335	1991	Metallurgical industries (non ferrous)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
336	1991	Metallurgical industries (non ferrous)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
339	1985	Metallurgical industries (castings and forgings)	"Iron castings" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987), "Castings and forgings" mentioned in list of industries delicensed for MRTP and FERA companies in December 1985 in Table 4.1, Economic Survey, 1985-86. See also Press Note No. 6 issued 30 January 1986 (Chaudhary 1987).
340	1991	Fabricated structural metal products	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
342	1985	Metallurgical industries (ferrous-iron and steel products)	"Steel furniture" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
343	1985	Miscellaneous mechanical and engineering industries (hand tools)	"Hand tools" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
344	1985	Metallurgical industries (castings and forgings)	"Castings and forgings" mentioned in list of industries delicensed for MRTP and FERA companies in December 1985 in Table 4.1, Economic Survey, 1985-86. See also Press Note No. 6 issued 30 January 1986 (Chaudhary 1987).
345	1991	Metallurgical industries (semi-manufactures and manufactures)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
346	1985	Commercial,office and household equipment (cutlery, pressure cookers)	"Pressure cooker, cutlery" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987).
349	1991	Metallurgical industries (semi-manufactures and manufactures)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
350	1985	Agricultural machinery	"Agricultural Implements" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
351	1985	Industrial machinery-Earth moving machinery	"Industrial machinery" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987).
352	1985	Primer movers	"Steam turbines" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987).
353	1985	Industrial machinery	"Industrial machinery" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987).
354	1985	Industrial machinery	"Industrial machinery" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987).
355	1993	Commercial,office and household equipment (Air-conditioners and refrigerators)	"White goods" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992) and delicensed in Press Note No. 4 issued 23 April 1993 (Handbook of Industrial Policy and Statistics 1999)
356	1985	Industrial machinery (general items)	"Water pumps" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987).
357	1985	Industrial machinery (general items)	"Industrial machinery" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987).
358	1985	Commercial,office and household equipment (typewriter, calculating machines)	"Office equipment" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
359	1985	Industrial machinery (general items)	"Industrial sewing machines-office equipment" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
360	1985	Electrical equipment	"Electrical equipment" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
361	1991	Electrical equipment (cables and wires)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
362	1991	Electrical equipment (storage batteries, dry cells)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
366	1985	Telecommunications (+ some household/office equipment)	"Magnetic tapes" and "broadcasting equipment" mentioned in list of industries delicensed for MRTP and FERA companies in December 1985 in Table 4.1, Economic Survey, 1985-86. See also Press Note No. 6 issued 30 January 1986 (Chaudhary 1987).
367	1985	Electrical equipment (household appliances)	"Computer peripherals" mentioned in list of industries delicensed for MRTP and FERA companies in December 1985 in Table 4.1, Economic Survey, 1985-86. See also Press Note No. 6 issued 30 January 1986 (Chaudhary 1987).
368	1985	Electrical equipment (household appliances)	"Electronic components" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
369	1985	Electrical equipment (lamps, x-ray equipment)	"Electronic components" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)

370	1991	Transportation(ships)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
371	1991	Transportation(railway locomotives)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
372	1991	Transportation(railway rolling-stock)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
374	1985	Transportation(automobiles)	"Automotive ancillaries" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
375	1985	Transportation (motorized cycles)	"Cycles" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
376	1985	Transportation (bicycles)	"Cycles" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
377	0	Transportation(aircraft)	"Electronic aerospace equipment" mentioned in Compulsory Licensing list 1991 (Handbook of Industrial Statistics 1992 and subsequent issues)
378	1991	Transportation(others)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
379	1991	Transportation(others)	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
380	1985	Medical and surgical appliances, Industrial, mathematical instruments	"Industrial and Scientific instruments" mentioned in Press Note No. 7 issued 16 March 1985 (Chaudhary 1987)
381	1991	Photographic, cinematographic and optical goods	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
382	1991	Manufacture of watches and clocks	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
383	1991	Manufacture of jewellery and related articles	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
384	1991	Minting of currency coins	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
385	1991	Manufacture of sports and athletic goods	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
386	1991	Manufacture of musical instruments	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
387	1991	Manufacture of stationery articles	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)
388	1982	Electrical equipment	"Equipment for exploitation of alternate sources of energy" mentioned in Press Note issued 21 January 1982 (Chaudhary 1987)
389	1991	Manufacture of miscellaneous products	Delicensed in the Statement on Industrial Policy 24 July 1991 (Handbook of Industrial Statistics 1992)

Notes: a year delicensed of "0" indicates that an industry had not been delicensed by 1997. Nic 3 codes are based on the concordance between the 1970 and 1987 industrial classifications in Table A2.

Table A3: Delicensing, Labor Regulation, Trade Liberalization, FDI Reform and Industrial Performance in India: Alternative Specification

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Log Real Output	Log Real Output	Log Real Output	Log Real Output	Log Real Output	Log Real Output	Log Real Output
Delicense	0.038 (0.044)			0.049 (0.044)			0.064 (0.044)
Labor Regulation	-0.074* (0.040)	-0.132*** (0.044)	-0.360*** (0.084)	-0.191* (0.098)		-0.306*** (0.100)	-0.184* (0.106)
Delicense × Labor Regulation	-0.070*** (0.018)			-0.061*** (0.020)			-0.060*** (0.018)
Log Tariff Rate		-0.003 (0.049)	-0.006 (0.051)	-0.008 (0.050)	-0.015 (0.049)	-0.015 (0.050)	-0.020 (0.050)
Log Tariff Rate × Labor Regulation			0.051*** (0.015)	0.026 (0.016)		0.041** (0.018)	0.025 (0.018)
FDI Reform					0.226*** (0.084)	0.237*** (0.079)	0.242*** (0.078)
FDI Reform × Labor Regulation						-0.038 (0.030)	-0.010 (0.028)
Observations	18324	17783	17783	17783	17783	17783	17783
R-squared	0.89	0.89	0.89	0.89	0.89	0.89	0.89
State-industry interactions	YES	YES	YES	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES	YES	YES	YES

Notes: The data set is a balanced panel of three-digit state-industries that are present in the data in all 18 years and includes an average of 64 three-digit industries in the 16 states over the period 1980 to 1997. The difference in the number of observations between column (1) and columns (2)-(7) is due to the fact that there are a small number of three digit industries for which tariff data is unavailable. Robust standard errors adjusted for clustering by state×year delicensed are reported in parentheses. *** denotes statistical significance at the 1% level; ** denotes statistical significance at the 5% level; * denotes statistical significance at the 10% level. Log real output is log real registered manufacturing output. Delicense is a dummy variable which is one if all or part of a three-digit industry is delicensed in a particular year and zero otherwise. Log tariff rate is the log tariff rate applied to a three digit industry. FDI reform is a variable which before 1991 is equal to zero and after 1991 is equal to the fraction of Harmonized System 6-digit products within a three-digit industry opened to automatic approval of foreign direct investment (FDI) for up to 51 percent equity. State amendments to the Industrial Disputes Act are coded 1=pro-worker, 0=neutral, -1=pro-employer and then cumulated over 1947-97 to generate the labor regulation measure. See the Data Appendix for further information on variable definitions and the data sources.