Regulating Away Competition

The Effect of Regulation on Entrepreneurship and Employment

James Bailey and
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Abstract

Many scholars have worried that regulation deters entrepreneurship because larger firms can overcome the costs of complying with regulations more easily than smaller firms. Using novel data on the extent of US federal regulations by industry at the four-digit NAICS (North American Industry Classification System) level, the RegData database of the Mercatus Center at George Mason University, and data on firm births and employment from the Statistics of US Businesses, we run fixed effects regressions to show that more-regulated industries experienced fewer new firm births and slower employment growth in the period 1998 to 2011. Large firms may even successfully lobby government officials to increase regulations to raise their smaller rivals' costs. We also find that regulations inhibit employment growth in small firms more than in large firms.

JEL codes: L26, L51, J68

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1. Introduction

The literature on the relationship between institutional quality and economic growth suggests that better institutions tend to be associated with better long-term growth and are an important indicator of overall economic well-being (Hall and Jones 1999; Acemoglu, Johnson, and Robinson 2001; Djankov, McLiesh, and Ramalho 2006). Countries that have better institutions (open access to political power, greater constraints on the executive, and greater political rights) tend to have less burdensome regulation and, as a result, tend to perform better in terms of economic growth (Djankov et al. 2002).

One important input into economic growth is new firm creation. The institution that theoretically matters most for the creation of new firms is regulation of entry. As the number of procedures required before starting a new business increases, fewer new businesses will enter the market (Djankov et al. 2002). More generally, however, a higher overall level of regulation in a country can benefit larger incumbent firms that have the resources to shoulder compliance costs while their smaller competitors falter in the face of an increasing regulatory burden.[1] Incumbents may even pursue such regulation of entry deliberately to protect themselves from competition by new entrants (Tullock 1967, Stigler 1971, Peltzman 1976).

Studies of institutional quality and its effect on entrepreneurship have so far focused on the quality of institutions by country (Djankov et al. 2002; Nyström 2008; Byørnskofv and Foss

[1] Maloney and McCormick (1982) show for an example of environmental quality regulation that such regulation benefits larger producers in an industry. Lacy Glenn Thomas (1990) estimates the effect of Food and Drug Administration regulation on research and development expenditures by pharmaceutical firms of different sizes and finds similar results.

2008). Such studies suffer from the problem that healthy economies usually score well on a number of different institutional variables, making it difficult to isolate the specific effect of a particular variable. Klapper, Laeven, and Rajan (2006) try to correct for this weakness by using an interaction between an industry's natural propensity for entry and a country's regulatory burden. This leaves them with a measure of the relative magnitude of the effect of regulation of entry on naturally high-entry industries only, however, rather than with an absolute measure of the effect of regulation on new firm creation. Using novel data on the changing intensity of regulation by industry for the United States from the RegData database of the Mercatus Center at George Mason University, we are able to provide a better estimate of the absolute effect of regulation on new firm creation and employment growth by industry.

The following section reviews the theoretical and empirical literature on the relationship between regulation and entrepreneurship. Section 3 describes the data we use in this study. Section 4 provides details of our empirical strategy. Section 5 summarizes our results, and section 6 concludes.

2. Literature Review

Regulation, although often intended to address some perceived market failure, may come at the cost of greater barriers to entry for new firms that seek to enter the market. Knowing the ins and outs of the regulatory framework that governs a particular industry represents a fixed cost of doing business that can be difficult for smaller entrants to an industry to overcome (Maloney and McCormick 1982).

The public choice literature on regulation, following Tullock (1967), suggests that regulation is promoted by the regulated industry itself and usually benefits existing producers

(Stigler 1971; Peltzman 1976). This view of regulation assumes that politicians cater to business interests to maximize their private reelection prospects. The public choice model is in conflict with the classic public interest model of regulation following Pigou (1938), which holds that regulation can counteract market failures and is instituted by government officials to maximize the general welfare.

Using data on entry regulation by country to test these two theories, Djankov et al. (2002) find that for a sample of 85 countries, countries with more open access to political power, greater constraints on the executive, and greater political rights tend to have less burdensome regulation. Stricter regulation of entry is not associated with higher-quality products, better pollution records or health outcomes, or livelier competition, as the public-interest model of regulation would predict. Instead, the authors find that countries with stricter regulation of entry are more likely to exhibit sharply higher levels of corruption and a larger unofficial economy. The authors conclude that their evidence supports the public choice model of regulation, which predicts that regulators are captured by industry and operate for its benefit.

Following up on Djankov et al. (2002), Klapper, Laeven, and Rajan (2006) provide the microfoundation for the relationship between regulation and growth. The authors use European firm data and country-specific cost-of-entry data from Djankov et al. (2002) to study the effect of market entry regulations on the creation of new limited-liability firms, the average size of entrants, and the growth of incumbent firms. Their analysis suggests that new firm creation, especially in naturally high-entry industries, is limited when barriers to entry are high. They also find that new entrants tend to be larger when regulatory requirements for entry are more burdensome and that incumbent firms tend to grow more slowly when competition is reduced in that manner.

Sobel, Clark, and Lee (2007) use the total entrepreneurial activity index from the Kauffman Center's Global Entrepreneurship Monitor to represent a general measure of entrepreneurial activity. The authors find evidence that entrepreneurial activity is negatively affected by both domestic entry restrictions and barriers to international competition (trade barriers).

Nyström (2008) uses data on economic freedom by country from the Fraser Institute and self-employment as a measure of entrepreneurship and finds that a smaller government sector, better legal structure, and security of property rights, as well as less regulation of credit, labor, and business, tend to increase entrepreneurship. In the same issue of *Public Choice* and also using the economic freedom index to measure institutional quality, Bjørnskov and Foss (2008) find that the size of government is negatively correlated with entrepreneurial activity as measured by survey data from the Global Entrepreneurship Monitor Consortium. The authors similarly find that the sound money measure from the economic freedom index is positively correlated with entrepreneurial activity. None of the other measures of economic freedom, including regulation, are significantly correlated with entrepreneurship.

Sobel (2008) examines the relationship between institutional quality and different types of entrepreneurship for the 48 US states. More specifically, Sobel finds evidence that supports Baumol's (1990) theory of productive, unproductive, and destructive entrepreneurship, which suggests that institutions channel generally prevalent entrepreneurial tendencies into either productive economic or unproductive political opportunities.

All the existing studies suffer from the problem that regulation is usually industry specific but their measures of regulatory burden or institutional quality more generally are country or state specific. Klapper, Laeven, and Rajan (2006) try to compensate for that

shortcoming by creating an interaction between an industry's natural propensity for new entry and the country's regulatory burden. The interaction leaves the authors with a relative measure of the effect of regulation on new firm creation.

In this paper, we use a novel dataset on regulation by industry for the United States—RegData—to overcome that shortcoming and provide an absolute measure of the effect of regulation by industry on new firm creation. We describe the new dataset in more detail in the next section.

3. Data

To quantify the effect of regulation on firm size and employment growth, we use industry-level data on firms from the Statistics of US Businesses (SUSB), together with RegData's index of regulatory intensity and several control variables. Our sample contains data from 215 industries for 1997–2011.

The SUSB is compiled annually by the US Census Bureau using data on the full population of US firms—it is not simply a sample subject to sampling error. We use the dynamic version of the SUSB maintained by the Office of Advocacy of the US Small Business Administration. The dynamic SUSB provides information on the number of new firms in each industry (firm births), the number of firms exiting each industry (firm deaths), and the number of employees hired and fired for each industry. Key variables from the SUSB are summarized in table 1. The data identify industries down to four-digit North American Industry Classification System (NAICS) codes. The NAICS breaks down industries to progressively greater levels of detail, starting with the two-digit level, such as 31 (manufacturing). Three-digit codes dig deeper, with industry classifications such as 311 (food manufacturing). Four-digit codes provide still

greater detail, with industry classifications such as 3111 (animal food manufacturing) and 3112 (grain and oil seed milling). The SUSB describes 290 four-digit industries. Although the SUSB began in 1988, it first used the older Standard Industrial Classification system before transitioning to the NAICS in 1998. To ensure consistency in the industry classifications in the data, we use only the 1998–2011 SUSB information.

Table 1. Summary Statistics for Key Variables

Variable	Mean	Standard deviation	Minimum	Maximum	Observations
Firm births (all sizes)	2,543	4,608	0	38,092	2,494
Firm births (1–4 employees)	1,545	3,097	0	27,992	2,492
Firm births (500+ employees)	348	851	0	9,806	2,490
Firm deaths (all sizes)	2,474	4,349	0	40,944	2,494
Firm deaths (1–4 employees)	1,558	3,098	0	35,922	2,492
Firm deaths (500+ employees)	314	813	0	10,882	2,490
New hires (all sizes)	24,105	50,131	0	495,723	2,363
New hires (1–4 employees)	3,281	5,823	0	46,722	1,817
New hires (500+ employees)	12,798	27,691	0	330,961	1,802
Industry Regulation Index	21,602	79,127	0.022	734,866	2,494

Source: Data on firm births, firm deaths, and new hires are from the 1998–2011 Statistics of US Businesses; data on the Industry Regulation Index are from the 1998–2011 RegData database.

Note: Observations are at the industry-year level, with industries measured using four-digit NAICS (North American Industry Classification System) codes.

Our data on regulation come from RegData. Compiled by the Mercatus Center, RegData tracks how much of each year's *Code of Federal Regulations* applies to each industry. The index of regulatory intensity is based on text analysis of the *Code of Federal Regulations*, which is published annually and contains all regulations issued at the federal level. More specifically, the index contains a search term count of the number of occurrences of a list of words that are likely to indicate binding constraints. The words are "shall," "must," "may not," "prohibited," and "required." In addition to that search term count, the RegData index, which measures the intensity of regulation of a particular industry, also contains a

measure of industry targeting. The industry targeting measure quantifies how frequently the regulations produced by a specific regulator target a specific industry. See Al-Ubaydli and McLaughlin (2014) for details.

Previous attempts to quantify the extent of regulation compared the overall level of regulation in different states or countries. RegData is the first dataset to quantify the level of regulation by industry, and it does so for 215 separate industries. A further advantage of RegData is that it measures the intensity of regulation by counting constraints. Previous work has tended to use cruder measures such as page counts (Coffey, McLaughlin, and Tollison 2012; Dawson and Seater 2013) or, in recent years, file-size data from state statutes (Mulligan and Shleifer 2005). Such attempts to measure the extent of regulation have obvious shortcomings. Not all the information contained in the *Federal Register*, for example, is dedicated to regulation. Furthermore, not all pages, even when they are dedicated to regulation, are equal. A particular page could be of enormous consequence in terms of its regulatory impact, or it might have little effect. To mitigate some of the shortfalls of existing measures of regulation by industry, RegData focuses on the number of binding constraints that apply to a particular industry.

RegData was recently expanded to classify industries down to the four-digit NAICS level. That level is consistent with our dynamic SUSB firm data, with the exception that RegData tracks only 215 four-digit industries compared with the SUSB's 290. RegData has available data for the period 1997 to 2012.

We use several indicators of the overall business and macroeconomic climate as control variables, presuming that firm births and deaths by industry are driven by general factors as well as by industry-specific ones. Our data on real gross domestic product growth, the Gross

Domestic Product Price Index, gross domestic private investment, and corporate profits come from the US Bureau of Economic Analysis. Our data on unemployment, real output per worker, industrial production, 10-year Treasury interest rates, and unit labor costs were obtained from the Federal Reserve Bank of Saint Louis's FRED (Federal Reserve Economic Data) database. All control variables are available from 1997 to 2012.

Our study focuses on the period 1998 to 2011. The limiting factor is the availability of the dynamic SUSB data; RegData also goes back only to 1997. As table 1 shows, these 14 years are enough to give us a reasonable number of observations because we observe so many industries in each year.

4. Empirical Strategy

Our main empirical strategy is to estimate the effect of regulatory burdens on firm births, firm deaths, and employment across industries using a 1998–2011 panel of data. Our main fixed effects regression is as follows:

$$\ln(FirmBirths)_{it} = b0 + b1 \times \ln(RegulationIndex)_{it} + b2 \times year_t + b3 \times industry_i + b4 \times controls_t + e_{it},$$

where firm births by industry are drawn from the SUSB; the index of regulatory intensity is drawn from RegData and is described earlier; $year_t$ represents year dummies; $industry_i$ is a dummy for each four-digit NAICS industry; $controls_t$ is a vector of economic control variables described below; and e is the error term. Industry fixed effects are the key to our identification strategy. They account for the fact that some industries may persistently have more firm births than other industries for reasons apart from regulation—for instance, they may be large or have naturally low barriers to entry.

Our control variables are real gross domestic product growth, the Gross Domestic Product Price Index, gross domestic private investment, corporate profits, unemployment, real output per worker, industrial production, 10-year Treasury interest rates, and unit labor costs.[2] In separate regressions, we use the natural log of firm deaths by industry and the change in employment by industry as dependent variables.

We use the natural log of our main variables of interest because they are highly right skewed, as is demonstrated by kernel density graphs in the appendix (see figures A1 and A2). The use of natural logs also makes interpreting the results easier—understanding the meaning of an increase of 1 in the regulatory index is difficult, but understanding the meaning of a 1 percent increase is easy.

5. Results

Firm Births

Table 2 summarizes the results of our analysis for the effect of regulation on firm births for firms of different sizes as well as for all firms in the sample.

The results suggest that a 10 percent increase in the intensity of regulation as measured by the RegData index leads to a statistically significant 0.5 percent decrease in overall firm births. Regulation is also associated with a similar statistically significant decrease among small firms, though it has no statistically significant effect on large firms. This finding supports the hypothesis that incumbents benefit from regulation because it deters new entrants. Our estimate

[2] Because these variables are observed at the national level each year, they are perfectly collinear with year dummies; including them in a regression together with year dummies causes some variables to be dropped. Thus, we use year dummies as our only national-level controls in the regressions reported in the body of the paper. In the appendix, we show the results from using the economic controls listed plus a linear time trend instead of year dummies. The results are nearly indistinguishable from those when we use only year dummies.

of the effect of regulation on firm births of large firms is not statistically significant, a fact that provides some support for the idea that larger firms are better able than smaller firms to deal with regulatory compliance costs.

Table 2. Effect of Regulatory Index on Firm Births

Variable	All firms	Small firms	Large firms
Regulatory index	−0.0499***	−0.0426**	−0.0639
	(0.0183)	(0.0172)	(0.0478)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
F-statistic	34.5***	16.8***	4.9***
R^2 (within)	0.16	0.11	0.03
Observations	2,493	2,486	2,380

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: Robust standard errors clustered by industry are given in parentheses. The number of observations is similar across firm types because the Statistics of US Businesses is a firm-level survey that is aggregated to the industry-year level for public use.

Firm Deaths

Table 3 summarizes our findings for the effect of regulation on firm deaths. The results suggest that regulation has no statistically significant effect on firm deaths. The finding supports the idea that incumbents usually benefit from regulation—regulation drives away new entrants (as seen in the reduced number of firm births) but it does not put existing firms out of business (there is no increase in firm deaths). In fact, there is some evidence that deaths among large firms actually decrease: a 10 percent increase in regulation is associated with a 0.9 percent decrease in the deaths of large firms (though this is statistically significant at only the 10 percent level of increased regulation).

Table 3. Effect of Regulatory Index on Firm Deaths

Variable	All firms	Small firms	Large firms
Regulatory index	−0.0141	0.0003	−0.0906*
	(0.0217)	(0.0216)	(0.0476)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
F-statistic	13.1***	10.5***	12.9***
R^2 (within)	0.07	0.04	0.06
Observations	2,492	2,475	2,449

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: Robust standard errors clustered by industry are given in parentheses. The number of observations is similar across firm types because the Statistics of US Businesses is a firm-level survey that is aggregated to the industry-year level for public use.

New Hires

Table 4 summarizes our results for the effect of regulation on employment growth. The results suggest that regulation deters hiring overall. A 10 percent increase in regulation is associated with a statistically significant 0.9 percent decrease in hiring. The effect for small firms is slightly smaller; a 10 percent increase in regulation is associated with a 0.5 percent decrease in hiring. The effect for large firms is not statistically significant.

Table 4. Effect of Regulatory Index on New Hires

Variable	All firms	Small firms	Large firms
Regulatory index	−0.0931***	−0.0535***	−0.0907
	(0.0320)	(0.0199)	(0.0566)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
F-statistic	27.8***	10.6***	8.8***
R^2 (within)	0.18	0.09	0.09
Observations	2,362	1,810	1,690

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: Robust standard errors clustered by industry are given in parentheses. The number of observations is similar across firm types because the Statistics of US Businesses is a firm-level survey that is aggregated to the industry-year level for public use.

Alternative Measures

Results not presented here show that an alternative measure of regulation, the total number of different regulators of an industry, has no effect on firm births, firm deaths, or hiring. We also find no statistically significant effect on firms of the level of regulation coming from specific large regulators such as the US Environmental Protection Agency or the US Department of Health and Human Services. The results suggest that, at least by using firm births, firm deaths, and hiring as measures of firm activity, we cannot support the theory of the anticommons.

So far we have investigated the effect of regulation in a year on firm behavior in the same year. But some regulation may not take effect immediately, especially if it is put in place near the end of the year. In table 5, we investigate the effect of this year's regulations on next year's firm births, firm deaths, and new hires. The results are similar to the main results that found the current-year effect of regulation. Regulation leads to a statistically significant reduction in hiring and firm births for firms overall and for small firms and a reduction in the deaths of large firms.

Table 5. One-Year Lagged Effect of Regulatory Index on Firm Births, Firm Deaths, and New Hires

Firm Births

Variable	All firms	Small firms	Large firms
Regulatory index	−0.0470**	−0.0359**	−0.0567
	(0.0182)	(0.0179)	(0.0530)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
F-statistic	36.0***	17.5***	5.5***
R^2 (within)	0.17	0.12	0.04
Observations	2,287	2,281	2,180

continued on next page

Firm Deaths

Variable	All firms	Small firms	Large firms
Regulatory index	−0.0215	−0.0212	−0.0911**
	(0.0211)	(0.0199)	(0.0451)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
F-statistic	12.5***	11.4***	10.6***
R^2 (within)	0.07	0.04	0.06
Observations	2,287	2,271	2,246

New Hires

Variable	All firms	Small firms	Large firms
Regulatory index	−0.0629***	−0.0482**	−0.0860*
	(0.0242)	(0.0194)	(0.0467)
Year dummies	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes
F-statistic	28.5***	11.3***	8.7***
R^2 (within)	0.18	0.09	0.10
Observations	2,168	1,652	1,538

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: Robust standard errors clustered by industry are given in parentheses. The number of observations is similar across firm types because the Statistics of US Businesses is a firm-level survey that is aggregated to the industry-year level for public use.

Robustness

One possible concern with a long-run panel study like ours is that we find spurious correlations, driven by the fact that our dependent variables and our measure of regulation both increase over time even though they may not be causally related to each other. We believe our study deals with this situation by using year fixed effects and by using what are essentially first-differenced variables—we measure flows (firm births, firm deaths, and new hires) rather than stocks (current number of existing firms and current number of employees). Formal tests for a unit root in our dependent variables confirm this intuition. A Fisher unit-root test using augmented Dickey-Fuller tests rejects the null hypothesis of a unit root for all our dependent variables (with $p < 0.01$ for all variables).

Another way to address concerns about causality in a panel setting is to investigate Granger causality: to see whether changes in one variable occur before changes in another. Granger causality tests with one lag show that regulation Granger-causes firm births, but firm births do not Granger-cause regulation. Similarly, regulation Granger-causes new hires, but new hires do not Granger-cause regulation. Neither firm deaths nor regulation Granger-cause each other; that finding matches up with our insignificant results for overall firm deaths.

6. Conclusion

Using novel data on the intensity of regulation by industry, we provide evidence that supports the idea that regulation has a negative effect on new firm creation and employment growth. Small firms are affected more dramatically than are large firms in our sample, but neither small nor large firms seem to exit an industry when the intensity of regulation increases. In fact, we find that large incumbents are actually less likely to die when their industry becomes more regulated. That finding suggests that incumbents, in particular, benefit from increasing levels of regulation and provides support for the idea that incumbents might actively seek increasing regulation to deter entry and limit competition (consistent with capture theory).

We find that a 10 percent increase in regulation leads to a 0.5 percent reduction in new firm births and a 0.9 percent reduction in hiring. Over the period 1998 to 2011 that we study, RegData shows that the overall level of federal regulation increased by 24 percent. Thus, our results suggest that from 1998 to 2011, increased federal regulation reduced the entry of new firms by 1.2 percent and reduced hiring by 2.2 percent. That result implies that returning to the level of regulation in effect in 1998 would lead to the creation of 30 new firms and the hiring of 530 new employees every year for an average industry.

Overall, our results confirm that regulators should be more aware of the important tradeoff between regulation and firm creation—and, by extension, economic growth. Regulators should consider more carefully the potential economic effects of their decisions regarding new and expanding levels of regulation.

Bibliography

Acemoglu, D., Johnson, S., & Robinson, J. (2001). The Colonial Origins of Comparative Development: An Empirical Investigation. *American Economic Review*, 91(5), 1369–401.

Al-Ubaydli, O., & McLaughlin, P. A. (2014). RegData: A Numerical Database on Industry-Specific Regulations for All US Industries and Federal Regulations, 1997–2012. Mercatus Working Paper, Mercatus Center at George Mason University, Arlington, VA.

Baumol, W. (1990). Entrepreneurship: Productive, Unproductive, and Destructive. *Journal of Political Economy*, 98(5), 893–921.

Bjørnskov, C., & Foss, N. J. (2008). Economic Freedom and Entrepreneurial Activity: Some Cross-Country Evidence. *Public Choice*, 134(3/4), 307–28.

Calcagno, P. T., & Sobel, R. S. (2014). Regulatory Costs on Entrepreneurship and Establishment Employment Size. *Small Business Economics*, 42(3), 541–59.

Coffey, B., McLaughlin, P. A., & Tollison, R. (2012). Regulators and Redskins. *Public Choice*, 153(1/2), 191–204.

Dawson, J., & Seater, J. (2013). Federal Regulation and Aggregate Economic Growth. *Journal of Economic Growth*, 18(2), 137–77.

Djankov, S., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2002). The Regulation of Entry. *Quarterly Journal of Economics*, 117(1), 1–37.

Djankov, S., McLiesh, C., & Ramalho, R. M. (2006). Regulation and Growth. *Economics Letters*, 92(3), 395–401.

Hall, R., & Jones, C. (1999). Why Do Some Countries Produce So Much More Output per Worker than Others? *Quarterly Journal of Economics*, 114 (1), 83–116.

Klapper, L., Laeven, L., & Rajan, R. (2006). Entry Regulation as a Barrier to Entrepreneurship. *Journal of Financial Economics*, 82(3), 591–629.

Maloney, M. T., & McCormick, R. E. (1982). A Positive Theory of Environmental Quality Regulation. *Journal of Law and Economics*, 25(1), 99–123.

Mulligan, C., & Shleifer, A. (2005). The Extent of the Market and the Supply of Regulation. *Quarterly Journal of Economics*, 120(4), 1445–73.

Nyström, K. (2008). The Institutions of Economic Freedom and Entrepreneurship: Evidence from Panel Data. *Public Choice*, 136(3/4), 269–82.

Peltzman, S. (1976). Toward a More General Theory of Regulation. *Journal of Law and Economics*, 19(2), 211–40. Conference on the Economics of Politics and Regulation.

Peltzman, S. (1989). The Economic Theory of Regulation after a Decade of Deregulation. *Brookings Papers on Economic Activity. Microeconomics, 1989* (special issue), 1–59.

Pigou, A. (1938). *The Economics of Welfare*, 4th edition. London: MacMillan.

RegData database, version 2.0. Developed by Patrick A. McLaughlin, Omar Al-Ubaydli, and the Mercatus Center at George Mason University. http://regdata.org/?type=regulatory_restrictions&regulator[]=0.

Sobel, R. S. (2008). Testing Baumol: Institutional Quality and the Productivity of Entrepreneurship. *Journal of Business Venturing*, 23(6), 641–55.

Sobel, R. S., Clark, J., & Lee, D. R. (2007). Freedom, Barriers to Entry, Entrepreneurship, and Economic Progress. *Review of Austrian Economics*, 20, 221–36.

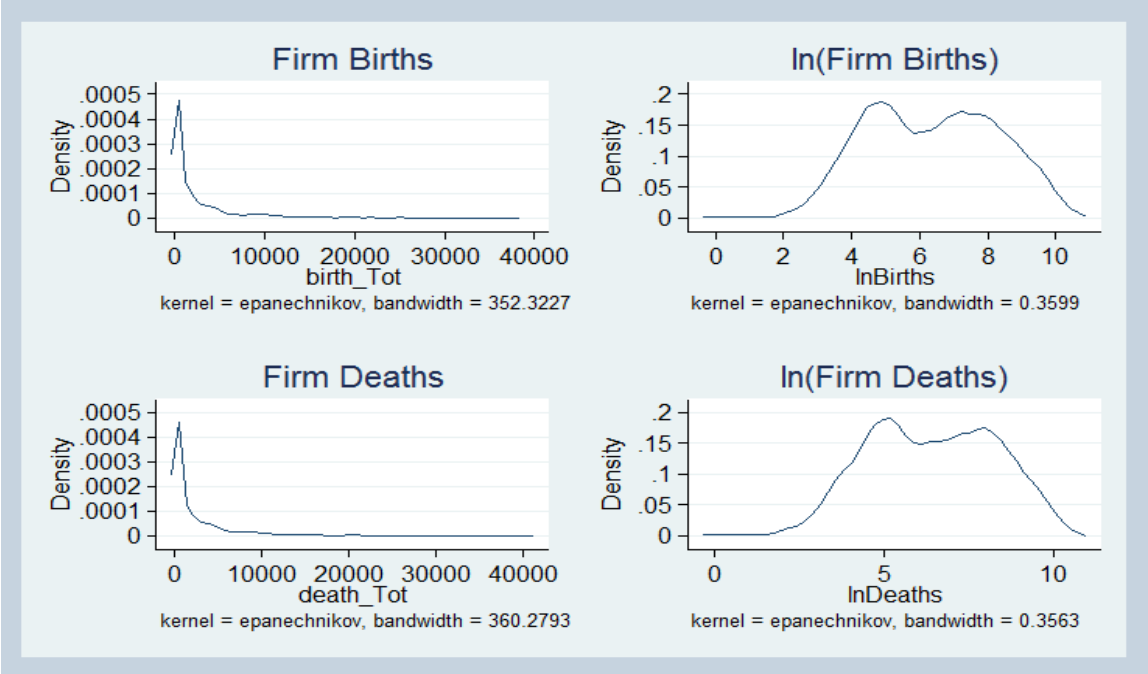
Stigler, G. J. (1971). The Theory of Economic Regulation. *Bell Journal of Economics and Managment Science*, 2(1), 3–21.

Thomas, L. G. (1990). Regulation and Firm Size: FDA Impacts on Innovation. *The RAND Journal of Economics*, 21(4), 497–517.

Tullock, G. (1967). The Welfare Costs of Tariffs, Monopolies, and Theft. *Western Economic Journal*, 5(3), 224–32.

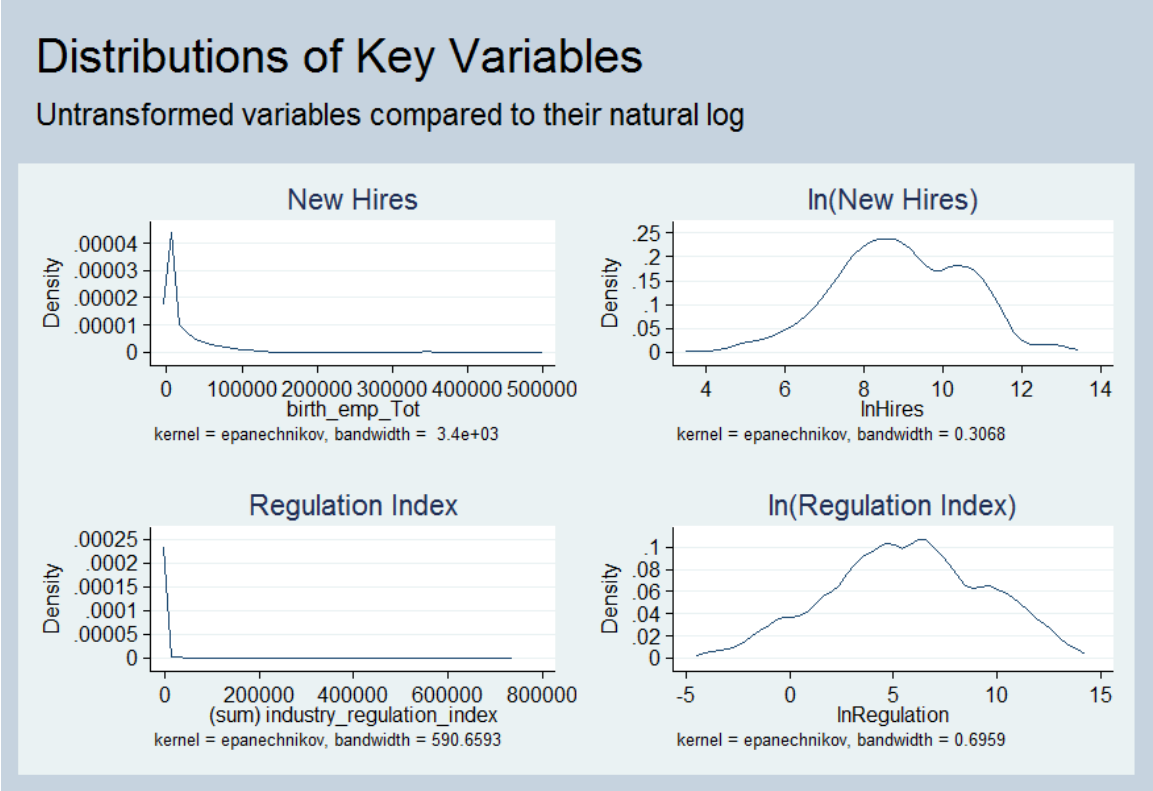
Appendix: Data Distribution and Robustness Checks

Figure A1. Distributions of Key Variables: Untransformed Variables Compared for Their Natural Log



Source: Data are from the 1998–2011 Statistics of US Businesses.

Figure A2. Distributions of Key Variables:
Untransformed Variables Compared for Their Natural Log



Source: Data on new hires are from the 1998–2011 Statistics of US Businesses. Data on regulation are from the 1998–2011 RegData database.

Table A1. Effect of Regulatory Index on Firm Births when Macroeconomic Controls Are Included

Variables	(1) All firms	(2) Small firms	(3) Large firms
lnRegulation	−0.0502***	−0.0425**	−0.0642
	(0.0182)	(0.0172)	(0.0478)
Time	−0.265***	−0.147**	0.139
	(0.0585)	(0.0662)	(0.182)
GDP growth	−0.0597***	−0.00659	−0.0757***
	(0.00961)	(0.00832)	(0.0270)
Productivity	0.0621***	0.0630***	0.0140
	(0.00940)	(0.00908)	(0.0309)
Interest rates 10-year treasuries	−0.0865**	−0.0859**	0.243**
	(0.0337)	(0.0417)	(0.107)
Unit labor costs	0.0331*	0.0260	−0.102*
	(0.0196)	(0.0229)	(0.0594)
GDP price index	−0.0345*	0.00119	−0.0262
	(0.0193)	(0.0202)	(0.0505)
Gross private domestic investment	−0.00126***	−0.00125***	−2.13e-05
	(0.000177)	(0.000171)	(0.000660)
Corporate profits	0.000999***	0.000600***	−0.000354
	(0.000163)	(0.000208)	(0.000525)
Unemployment	−0.0614	−0.179***	−0.0804
	(0.0376)	(0.0423)	(0.138)
Industrial production	0.0713***	0.0287***	0.0139
	(0.00833)	(0.00785)	(0.0254)
Constant	525.5***	293.6**	−267.3
	(114.6)	(129.7)	(356.4)
Observations	2,493	2,486	2,380
R^2	0.151	0.104	0.033
F-stat	34.99***	19.86***	5.539***

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: Robust standard errors are in parentheses.

Table A2. Effect of Regulatory Index on Firm Deaths when Macroeconomic Controls Are Included

Variables	(1) All firms	(2) Small firms	(3) Large firms
lnRegulation	−0.0144	−0.000433	−0.0905*
	(0.0217)	(0.0216)	(0.0476)
Time	−0.0749	0.00702	−0.521***
	(0.0765)	(0.0699)	(0.162)
GDP growth	−0.0649***	−0.0421***	−0.0814***
	(0.00860)	(0.00928)	(0.0206)
Productivity	0.0302***	−0.0184**	0.157***
	(0.00968)	(0.00813)	(0.0246)
Interest rates 10-year treasuries	0.0439	0.0471	−0.0462
	(0.0423)	(0.0398)	(0.0957)
Unit labor costs	−0.0283	−0.0286	0.0696
	(0.0273)	(0.0219)	(0.0535)
GDP price index	−0.0653***	−0.0424**	−0.187***
	(0.0137)	(0.0171)	(0.0446)
Gross private domestic investment	−0.000243	0.000981***	−0.00131***
	(0.000188)	(0.000202)	(0.000494)
Corporate profits	6.81e-05	−0.000384**	0.000861*
	(0.000204)	(0.000175)	(0.000454)
Unemployment	0.0242	0.164***	0.0234
	(0.0509)	(0.0605)	(0.118)
Industrial production	0.0433***	0.00776	0.101***
	(0.00761)	(0.0104)	(0.0199)
Constant	152.9	−7.355	1,020***
	(149.8)	(136.8)	(316.8)
Observations	2,492	2,475	2,449
R^2	0.065	0.033	0.061
F-stat	14.74	10.97	14.16

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Note: Robust standard errors are in parentheses.

Table A3. Effect of Regulatory Index on New Hires when Macroeconomic Controls Are Included

Variables	(1) All firms	(2) Small firms	(3) Large firms
lnRegulation	−0.0934***	−0.0534***	−0.0906
	(0.0319)	(0.0199)	(0.0566)
Time	−0.144	−0.0531	0.104
	(0.108)	(0.0966)	(0.253)
GDP growth	−0.0585***	−0.00558	−0.0315
	(0.0170)	(0.0117)	(0.0337)
Productivity	0.0855***	0.0301**	0.0439
	(0.0191)	(0.0126)	(0.0397)
Interest rates 10-year treasuries	0.0550	−0.0523	0.128
	(0.0605)	(0.0602)	(0.157)
Unit labor costs	−0.0260	0.000973	−0.0759
	(0.0350)	(0.0324)	(0.0855)
GDP price index	−0.0648**	0.0371	−0.0481
	(0.0291)	(0.0280)	(0.0652)
Gross private domestic investment	0.00138***	0.000720***	−0.000328
	(0.000359)	(0.000220)	(0.000800)
Corporate profits	0.000433	0.000252	−0.000439
	(0.000324)	(0.000286)	(0.000712)
Unemployment	−0.178**	−0.108**	−0.255
	(0.0842)	(0.0540)	(0.173)
Industrial production	0.0619***	0.0178	−0.00522
	(0.0150)	(0.0110)	(0.0307)
Constant	290.3	111.0	−192.6
	(210.7)	(189.2)	(495.8)
Observations	2,362	1,810	1,690
R^2	0.170	0.085	0.095
F-stat	29.10	12.47	10.31

* p < 0.1, ** p < 0.05, *** p < 0.01.

Note: Robust standard errors are in parentheses.