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Entry regulation as a barrier to entrepreneurship ☆

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Abstract

Using a comprehensive database of European firms, we 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. We find that costly regulations hamper the creation of new firms, especially in industries that should naturally have high entry. These regulations also force new entrants to be

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larger and cause incumbent firms in naturally high-entry industries to grow more slowly. Our results hold even when we correct for the availability of financing, the degree of protection of intellectual property, and labor regulations.

JEL classification: G18; G38; L51; M13

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1. Introduction

Entrepreneurship is a critical part of the process of creative destruction that Joseph Schumpeter (1911) argued is so important for the continued dynamism of the modern economy. That it helps economic growth has been documented in previous work (e.g., Hause and Du Rietz, 1984; Black and Strahan, 2002). Yet a number of countries put in place regulations that make it more difficult to start a new firm. Our focus in this paper is on the cost of meeting the regulatory requirements for setting up a limited liability company (we will use "entry costs" or "entry regulation" interchangeably since our measure proxies for both). We study the effect of such entry regulations on (i) the creation of new firms, (ii) the average size of firms that finally are able to incorporate, and (iii) the dynamism of incumbent firms.

We start by investigating the cross-country picture of new firm incorporation. We use a comprehensive, recently released database of corporations across a number of developed and transition countries in Europe to assess this picture. Some facts are striking. For instance, one might believe that Italy, with its myriad small corporations, should have tremendous incorporation of new firms (we use "incorporation of new firms" and "entry" interchangeably). Actually, the share of new corporations in Italy (the fraction of corporations that are one or two years old) is only 3.8% compared to 13.5% on average for France, Germany, and the United Kingdom.

What might account for these differences? One potential explanation is the cost of meeting the regulatory requirements for setting up a limited liability company. Why might such regulations exist? The early debate on incorporation emphasized the risk that crooks might register new companies with little capital and dupe unsuspecting investors or consumers. For instance, *The Times* of London thundered against the principle of free incorporation through limited liability in 1824:

> Nothing can be so unjust as for a few persons abounding in wealth to offer a portion of their excess for the information of a company, to play with that excess for the information of a company—to lend the importance of their whole name and credit to the society, and then should the funds prove insufficient to answer all demands, to retire into the security of their unhazarded fortune, and leave the bait to be devoured by the poor deceived fish (Halpern et al., 1980, p. 117).

Thus one motivation for requiring a firm to go through a detailed (and hence costly) bureaucratic process to register as a limited liability company is to screen out potential frauds and cheats. But there could be other motivations. For example, to the extent that information is generated during the process, it could help the tax authorities improve

collections, or it could help improve the accuracy of various censuses and hence the public decision-making process.

More recently, however, there is a growing view that costly regulations impede the setting up of businesses and stand in the way of economic growth (see De Soto, 1990; Djankov et al., 2002; World Bank, 2004). Do higher regulatory costs really have adverse effects? While Djankov et al. (2002) find that countries with higher entry costs have more corruption and larger unofficial economies—suggesting that the motivation for these regulations is not entirely benign—they do not measure the direct impact or entry costs, which is our focus.

First, we study whether entry costs affect the extent of incorporation, a necessary first step in determining whether these regulations have any effect. We focus on cross-industry, cross-country interaction effects. That is, we ask whether the fraction of new corporations is lower in an industry with a higher "natural" propensity for entry when the country has higher costs of complying with bureaucratic requirements for incorporation. The methodology, following Rajan and Zingales (1998), enables us to finesse a number of problems associated with the more traditional cross-country regressions—such as the problem that a healthy economy scores well on a number of cross-country variables, which makes it hard to estimate the direct effect of each variable in a cross-country regression (and equally hard to correct for all possible country variables that might matter). By focusing on interactions, we can absorb country-level variables and instead examine the differential effects of country-level variables across industries that might be most responsive to them. The downside of this methodology, of course, is that while it can tell us whether entry regulation works in predicted economic ways, it cannot tell us the overall magnitude of the effect, only the relative magnitude on "naturally high-entry" industries. But since our primary interest is in examining whether bureaucratic regulations affect entrepreneurship, this is not a major concern.

We find that the rate of new corporation creation in "naturally high-entry" industries is relatively lower in countries with higher entry costs, suggesting that these costs matter. Interestingly, they matter most in richer countries, or countries that are not corrupt, where the regulations on the books are more likely to be enforced. Our findings suggest an explanation for the low level of incorporation in Italy: the average direct cost associated with fulfilling the bureaucratic regulations for registering a new corporation in Italy is 20% of per capita GNP compared to 10% of per capita GNP on average for other G-7 European countries.

Second, we study the effect of bureaucratic entry regulations on the average size of entrant firms. Given that the high entry costs are largely fixed, they should be reflected in an increased average size of entrants into high-entry industries in countries with high costs. We indeed find this to be the case. The average value added of new firms in high-entry industries is disproportionately higher in countries that have higher entry costs. This means that not only do such regulations discourage small firms from setting up, they also force others to grow without the protection of limited liability until they reach a scale that makes the cost of incorporation affordable.

If entry regulations indiscriminately screen out small young firms, which are the source of Schumpeterian waves of creative destruction, then constraints on their emergence should have a chilling effect on incumbents and mute the disciplinary effects of competition, with older firms more likely to be lazy and less capable of enhancing productivity. If, by contrast, entry regulations are effective at screening, older firms that

have come through the screening process could be better firms and more able to increase productivity. We therefore ask whether entry regulations affect the productivity growth of older incumbent firms. We find that the growth in value added per employee for firms older than two years is relatively lower in naturally high-entry industries when the industry is in a country with higher bureaucratic barriers to entry, consistent with the hypothesis that entry regulations indiscriminately screen out small young firms and inhibit the disciplinary effects of competition.

One might also expect the effects of the absence of competition to become more pronounced over time, with older incumbents in protected industries becoming far more reliant on the rents from incumbency than on efficiency gains. This is in fact the case. Value added per employee for older incumbents grows relatively more slowly in naturally high-entry industries in countries with costly bureaucratic barriers, although this effect is absent for young incumbents. Thus, costly entry regulations are a form of protection that has the most deleterious effect on the performance of seasoned incumbents.

In this regard, the comparison between high-entry-regulation Italy and the low-entry-regulation United Kingdom is particularly telling. Across all industries, firms start out larger when young in Italy, but grow more slowly so that firms in the United Kingdom are about twice as large by age ten (Fig. 1). This suggests that Italy has small firms not because there is too much entry but because there is too little!

Finally, to check whether entry regulations proxy for other aspects of the business environment that are likely to have an impact on entry, such as financial development, labor regulation, and protection of intellectual property, we include these environmental variables interacted with the characteristics of the industry they are most likely to influence. We find that these aspects of the business environment do matter, but primarily for the rate of incorporation, and not for the size of entrants or the productivity growth of incumbents. It is particularly noteworthy that the effect of entry regulations persists despite the inclusion of these other interactions.

In a related paper, Desai et al. (2003) use a cross-country approach and also find that entry regulations have a negative impact on firm entry. The cross-country approach has a number of limitations. In particular, variations in coverage in the database across

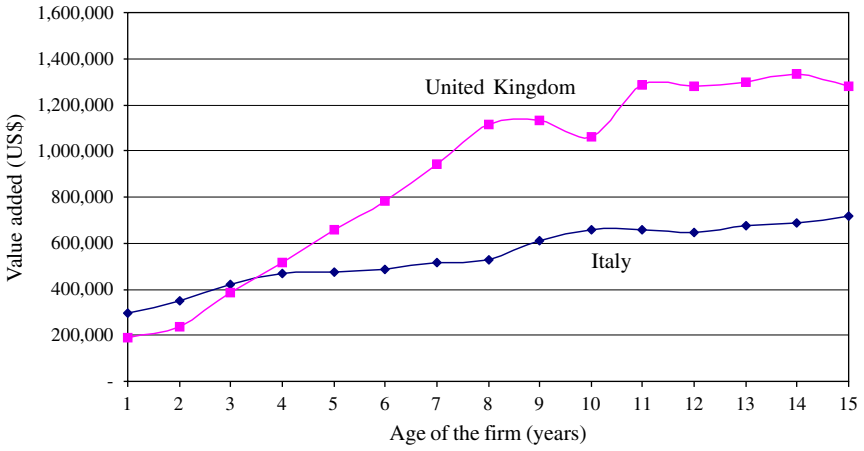

Fig. 1. Firm size and age.

countries could affect findings, a criticism that is less applicable to a within-country, cross-industry approach. Nevertheless, their findings are complementary to ours. Another related cross-country study is by Scarpetta et al. (2002), who use firm-level survey data from OECD countries to analyze firm entry and exit. They find that higher product market and labor regulations are negatively correlated with the entry of small and medium-sized firms SMEs) in OECD countries. Bertrand and Kramarz (2002) examine the expansion decisions of French retailers following new zoning regulations introduced in France and find a strong relation between increases in entry deterrence (such as rejection of expansion or entry decisions) and decreases in employment growth.

There is a substantial literature on entry into an industry (possibly by a firm from another industry) as distinguished from firm creation or entrepreneurship. It is the latter sense in which we use the term "entry." It would take us too much out of our way to describe the literature on industry entry, so we refer the reader to Gilbert (1989) for a comprehensive survey. Note that there are technological determinants of entry into an industry such as minimum scale, etc., that also affect firm creation. We assume these determinants carry over countries and are absorbed by industry indicators. Our focus is on environmental determinants of firm creation.

The paper proceeds as follows. In Section 2 we describe the data and in Section 3 we present the empirical methodology. We present the empirical results in Section 4. Section 5 concludes.

2. Data

2.1. Amadeus database

Central to our analysis is the firm-level Amadeus database. Amadeus is a commercial database provided by Bureau van Dijk. It contains financial information on over five million private and publicly owned firms across 34 Western and Eastern European countries. The database includes up to ten years of information per company, although coverage varies by country. Amadeus is especially useful because it covers a large fraction of new and SME companies across all industries. The Amadeus database is created by collecting standardized data received from 50 vendors across Europe. The local source for these data is generally the office of the Registrar of Companies.

The Amadeus database includes firm-level accounting data in standardized financial format for 22 balance sheet items, 22 income statement items, and 21 financial ratios. The accounts are transformed into a universal format to enhance comparison across countries, though coverage of these items varies across countries. We use period average exchange rates from the International Monetary Fund's International Financial Statistics to convert all accounting data into U.S. dollars.

In addition to financial information, Amadeus also provides other firm-level information. We use information on the year of incorporation to calculate the age of the firm. Amadeus also assigns companies a three-digit NACE code—the European standard of industry classification—which we use to classify firms and construct industry dummy variables. The NACE codes follow the NACE Revision 1 classification. In our analysis, we use NACE codes at a two-digit level so that we have a sufficient number of firms per industry.

2.2. Sample selection

We use the 2001 edition of Amadeus and limit our sample to the years 1998 and 1999.[1] There are two reasons to limit our analysis. First, there is the potential problem of survivorship: as companies exit or stop reporting their financial statements, Amadeus puts a "not available/missing" for four years following the last included filing. Firms are not removed from the database unless there is no reporting for at least five years (i.e., 1997 or earlier). So the data for firms from 1997 as reported in the 2001 database will not include firms that exited in 1997 or before. To avoid this potential survivorship bias, we restrict our attention to 1998 and 1999. A second reason is that efforts were made in 1998 to expand the coverage for Central and Eastern European countries allowing us to include more countries, but making the prior data less comparable. For example, the coverage of Central and Eastern European firms increased by 16% from 1997 to 1998, but less than 5%, on average, for the following two years.

As shown in Table 1, Column (i), we start with a sample in Amadeus of about 3.5 million annual observations over the years 1998–1999. We then impose a number of restrictions on the data. First, we require reporting firms to have some basic accounting information in their accounts over the years (i.e., data on total assets, sales, profit before tax, or employment). The reason for dropping those that do not report is that there could be country differences in the criteria for including firms with no information on their accounts. In addition, this criterion excludes any "phantom" firms established for tax or other purposes.

Next we delete from our sample firms that report only consolidated statements, to avoid double-counting firms and subsidiaries or operations abroad. For most firms in Amadeus, unconsolidated statements are reported and consolidated statements are provided when available. We also exclude certain industries. First, we drop several primary industries where the activity is country-specific (e.g., not all countries have uranium mines). These industries include agriculture (NACE code 1), forestry (NACE code 2), fishing (NACE code 5), and mining (NACE codes 10-14). We also exclude utilities (NACE codes 40-41), which tend to be regulated and largely state-owned industries in Europe. We drop the recycling industry (NACE code 37), which is difficult to match with a comparable SIC code(s). We also drop the financial services industries (NACE codes 65 and 66) because financial ratios for financial companies are not comparable to those of nonfinancial companies. In addition, financial institutions tend to be subject to specific entry restrictions (e.g., initial capital requirements) that do not apply to nonfinancial firms. (Barth et al. (2004) discuss financial sector regulations across countries). Finally, we drop the government/public sector, education (mainly public sector in Europe), the health and social sector, activities of organizations, private households, extra-territorial organizations, and firms that cannot be classified (NACE codes 75, 80, 85, 91, 92, 95, and 99).[2] We also exclude, by country, any industries with less than three firms (although we check whether such exclusion affects our results qualitatively). We are left with 47 NACE industries, which is the maximum number of observations per country.

[1]Due to lags in data collection, the coverage for the year 2000 is incomplete.

[2]All results are robust to the inclusion of excluded industries.

Table 1
Number of firms, corporations and employment, by country and year

	(i)		(ii)		(iii)	
	Total Firms		Total Corporations		Total Employment	
Country	1998	1999	1998	1999	1998	1999
Austria	25,243	27,170	18,224	19,684	737,114	717,498
Belgium	229,171	244,361	215,709	230,352	1,459,269	1,501,236
Bulgaria	28,272	38,840	17,004	21,167	1,113,907	1,116,755
Czech Republic	7,153	7,613	7,153	7,613	1,424,975	1,472,515
Denmark	72,989	82,639	68,906	77,720	902,078	961,128
Estonia	10,438	27,407	10,243	26,737	269,042	321,308
Finland	47,646	57,781	46,286	55,765	789,208	867,984
France	652,376	676,781	584,274	604,155	7,640,624	7,724,623
Germany	468,865	519,759	334,305	372,167	10,266,932	10,005,253
Greece	17,617	18,604	17,297	18,280	708,412	710,973
Hungary	29,397	17,404	25,731	15,794	854,131	751,858
Ireland	15,184	10,587	13,835	9,759	104,543	78,324
Italy	117,670	126,514	111,736	120,393	4,598,602	4,808,664
Latvia	2,433	2,681	2,244	2,482	226,195	232,865
Lithuania	1,123	1,247	1,113	1,228	180,049	144,779
Netherlands	145,634	153,430	145,454	153,276	587,366	581,869
Norway	104,836	115,804	104,836	115,804	991,191	1,059,226
Poland	10,605	10,309	8,668	8,451	2,667,816	2,423,589
Portugal	21,351	23,798	20,734	23,096	396,088	195,393
Romania	302,705	318,020	287,657	303,374	4,027,310	3,506,044
Spain	166,688	180,621	164,879	178,662	4,849,609	4,894,020
Sweden	193,333	204,936	193,333	204,936	1,931,973	2,022,113
UK	506,610	863,498	491,891	833,033	10,712,104	10,545,236
Total	3,218,450	3,770,760	2,896,065	3,408,713	58,289,265	57,511,010

This table summarizes (i) the total number of firms, (ii) the total number of corporations (plc and ltd, or their equivalents) and (iii) employment from the Amadeus database. We exclude about 25,000 firms with no financial data (i.e., inactive firms). The total employment figures exclude firms with missing employment in all years. We use current employment figures to replace lagged employment figures if previous year(s) employment are missing and extrapolate forward employment figures if current year(s) employment is missing.

Finally, we exclude all legal forms other than the equivalent of public and private limited liability corporations.[3] In particular, we exclude proprietorships and partnerships. Two arguments prompt this. First, a big and common carrot behind registration as a corporation is limited liability, which allows entrepreneurs and investors to take risks. By contrast, the benefits of registration as other forms can vary considerably across countries, which will make the analysis harder to interpret. Second, the coverage of proprietorships and other unincorporated firms in Amadeus is poor and uneven: in most European countries, only limited liability companies are required to file statements. However, most European countries require all limited liability corporations to file financial statements,

[3]We include Plc and Ltd in the UK, AG and GmbH in Germany, and SA and SARL in France and exclude the GmbH & Co KG, which is a hybrid legal form (a combination of a partnership and a private limited company) used in Austria and Germany. The results do not alter when we include the latter.

which makes the coverage for corporations extensive and the best available. We use the information on legal form in Amadeus—which is country-specific—to identify public and private limited companies.

In Appendix A, we summarize the cross-country differences in the collection of company accounts in Amadeus. We exclude from our sample several European countries where the coverage is incomplete or the data quality is poor. First, we exclude Switzerland, since small firms are not required to file. Second, we exclude the countries of the former Republic of Yugoslavia (Bosnia-Herzegovina, Croatia, former Yugoslav Republic of Macedonia, and Federal Republic of Yugoslavia), which were at war during our sample period and where data coverage is limited. Third, we exclude Slovakia, Slovenia, Russia, and the Ukraine, which have only a very small number of total filings (i.e., less than 1,000 firms annually). These restrictions exclude 342,216 firms over the two years (9.8% of total firms).

As shown in Table 1, Column (ii), after applying these exclusion criteria, we have a smaller, comprehensive sample of incorporated firms in a large number of European countries, which enhances comparability across countries. These restrictions exclude 342,216 firms over two years (9.8% of total firms). Our sample now has over three million annual firms and 57 million employees.

We are not done yet. We have national statistics from Eurostat (European Commission, 2003) on numbers of, and employment in, firms of different sizes. In Table 2, we compare the ratio of firms and employment in Amadeus and in published national statistics in Eurostat (European Commission, 2003). Data, by firm size, are unavailable for non-EU countries. Columns (i) and (ii) show the coverage in Amadeus of large firms (the ratio of firms and employment at firms with more than 250 employees in Amadeus versus that in national statistics) and Columns (iii) and (iv) show the coverage of small firms (the ratio of firms and employment at firms with 10–50 employees in Amadeus versus that in national statistics). Column (v) shows the absolute value of the difference between the ratio of employment in small firms to the ratio of employment in large firms in Amadeus less the ratio of employment at small and large firms in national statistics. This ratio is used to test whether our Amadeus sample is biased towards larger firms. The discrepancy between Amadeus and national figures can also be explained by: (1) the lack of employment data for a significant number of firms in Amadeus, and (2) the fact that for the purpose of cross-country comparisons, our Amadeus dataset excludes proprietorships and partnerships.

We exclude a country from our dataset if two conditions are met: (1) the ratio of employment in firms with more than 250 employees in Amadeus to that in national statistics (Column (ii)) is less than 50%, and (2) the absolute difference between the ratio of the number of firms with 10–50 employees in Amadeus versus that in national statistics and the ratio of total employment at firms with 10–50 employees in Amadeus versus that in national statistics (Column (iv)) is more than 25%. Four countries do not meet the criteria: Iceland, Ireland, Luxembourg, and Portugal. Since these cutoffs could be considered somewhat arbitrary, we also test whether the qualitative results hold if we do not apply these criteria.

We believe that our inclusion criteria create the most comparable sample of firms across countries, but we should be cautious about deriving strong conclusions from direct cross-country comparisons. However, even if we have not eliminated all biases between countries, our basic test examines within-country differences across countries, and will not be affected unless there are systematic biases in reporting industries within a country.

Table 2
Comparison with National Statistics

	(i)	(ii)	(iii)	(iv)	(v)
	Coverage of large firms by number of		Coverage of small firms by number of		Relative coverage of small firms (%)
Country	Firms (%)	Employees (%)	Firms (%)	Employees (%)	
Austria	44.4	38.7	54.6	65.2	10.6
Belgium	70.0	57.4	65.9	50.6	15.3
Denmark	100.0	77.2	63.3	73.1	9.8
Finland	125.0	90.2	39.0	42.4	3.4
France	65.2	54.2	66.8	57.8	9.0
Germany	34.3	39.0	47.4	49.5	2.1
Greece	200.0	84.4	58.0	97.7	39.7
Iceland	30.0	39.3	6.2	37.9	31.7
Ireland	33.3	14.8	23.1	67.9	44.8
Italy	57.9	78.5	45.3	100.0	54.7
Luxembourg	40.0	38.3	2.9	82.2	79.3
Netherlands	14.3	11.9	31.5	46.4	14.9
Portugal	33.3	20.5	12.8	117.5	104.7
Spain	83.3	98.6	53.2	99.0	45.8
Sweden	114.3	105.6	43.7	47.8	4.1
UK	85.1	79.4	8.6	31.0	22.4

This table compares the number of corporations in Amadeus in 1999 with the total number of firms according to 1996 data from *Enterprises in Europe*: 6th report (European Commission, 2003). The Amadeus ratios are calculated using our extrapolated employment data. The national statistics (Eurostat) refer to all enterprises, including proprietorships. Enterprises with zero employees are excluded from both samples. *Enterprises in Europe* does not cover Eastern European countries, Norway, and Switzerland. In Column (i), we report the ratio of the number of firms with more than 250 employees in Amadeus to the number of firms with more than 250 employees in national statistics. In Column (ii), we report the ratio of total employment at firms with more than 250 employees in Amadeus to total employment at firms with more than 250 employees in national statistics. In Column (iii), we report the ratio of the number of firms with 10–50 employees in Amadeus to the number of firms with 10–50 employees in national statistics. In Column (iv), we report the ratio of total employment at firms with 10–50 employees in Amadeus to total employment at firms with 10–50 employees in national statistics. Column (v) indicates whether there is a bias in the relative coverage of large (versus small) firms in Amadeus and is equal to the absolute value of the difference between the ratio of employment in firms with 10–50 employees to employment in firms with more than 250 employees in Amadeus and the ratio of employment in firms with 10–50 employees to employment in firms with more than 250 employees in national statistics. All data are shown as percentages. Due to data unavailability, large firms in Iceland refer to firms with more than 100 (rather than 250) employees.

Our final sample includes 3,371,073 firms in 21 countries: Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, the Netherlands, Norway, Poland, Romania, Spain, Sweden, and the United Kingdom.

2.3. Industry-level entry variables

We measure entry as the fraction of new firms to the total number of firms in an industry, where a new firm is defined as a firm that is one or two years old. We calculate

entry at the two-digit NACE industry level averaged over the years 1998 and 1999. We refer to this variable as Entry. For a complete list of variable names and definitions, see Appendix B. Our empirical results are qualitatively robust to defining new firms as age equal to one or to using entry rates calculated for one year (1998 or 1999) only.

We require firms to survive at least one year and exclude firms in year 0. We exclude firms less than one year old to avoid frivolous filings and because of the difference in initial filing requirements across countries. In particular, in some countries firms in their first year do not have to file accounting information until after the end of their first year of operation, while in others they have up to one year to file. We check that the results are not qualitatively affected by including firms under one year old as new firms. The median share of firms of age zero over the period 1998–1999 is 2.5%.

Table 3
Entry rates and main explanatory variables by country, average 1998–1999

	(i)	(ii)	(iii)
Country	% of new firms (1 and 2 years old)	Number of entry procedures	Entry cost (% of per capita GNP)
Austria	13.00	9	27.28
Belgium	11.58	8	9.98
Bulgaria	8.60	10	14.41
Czech Republic	11.55	10	8.22
Denmark	13.66	3	10.00
Estonia	20.41	n.a.	n.a.
Finland	11.13	5	1.16
France	14.68	15	14.30
Germany	12.34	10	15.69
Greece	15.44	15	58.60
Hungary	17.38	8	85.87
Italy	3.46	16	20.02
Latvia	18.16	7	42.34
Lithuania	19.23	10	5.46
Netherlands	8.48	8	18.41
Norway	16.87	4	4.72
Poland	12.04	11	25.46
Romania	17.97	16	15.31
Spain	11.41	11	17.30
Sweden	7.90	6	2.56
UK	15.01	5	1.43
Averages			
Western Europe	11.92	8.85	15.50
Transition countries	15.67	10.29	28.15
All countries	13.35	9.35	19.93

Column (i) shows entry rates of new firms in Amadeus, averaged by country for the period 1998–1999. We exclude the agricultural, mining, utility, finance, and public sectors. We exclude country–industry observations based on fewer than three firm observations. New firms are defined as corporations one and two years old. Columns (ii–iii) show the number of entry procedures and entry costs as a percentage of per capita GNP, respectively (Djankov et al., 2002). All data are shown as percentages.

In Table 3, we describe the country averages of the entry variables that we use in our analysis. We calculate entry and new firm employment rates for all firms. As shown in Column (i), the average entry rate across industries and countries is about 13.3%. Since we define new firms as firms that are one or two years old, this is calculated over two years, on average, and corresponds to an average annual entry rate of about 6.6% (or 4.6% when excluding small firms). The entry rate varies from a high of 19.2% in Lithuania to a low of 3.5% in Italy. Overall, we find an average of about 15.7% of new firms in Eastern European countries, as compared to 11.9% for Western European countries. This difference reflects the recent emergence of a large number of private firms in the transition economies.

Djankov et al. (2002) have data on the procedures that are officially required for an entrepreneur to obtain all necessary permits, and to notify and file with all requisite authorities, in order to legally operate a business. These data refer to 1999 and are shown in Column (ii). These procedures include (i) obtaining all the necessary permits and licenses, and (ii) completing all the required inscriptions, verifications, and notifications to enable the company to start operation. To make the procedures and companies comparable across countries, the survey assumes that the intent is to open a limited liability company and that the founders complete all procedures themselves (without intermediaries). This means the entry barriers are likely to be more onerous for small firms where this latter assumption is likely to be true. We report in Table 3, Column (iii), the direct costs of setting up a new business expressed as a percentage of per capita GNP in U.S. dollars. The cost of entry varies from a high of 86% of GNP per capita in Hungary to a low of 1% of GNP per capita in Finland and the U.K.

In Table 4, Column (i), we present entry rates for a selection of industries based on (groupings of) two-digit NACE codes. The highest entry rates are in communications (telephone, wireless, etc.), computer services, and services, with the lowest entry into chemical manufacturing, construction, and transportation. The industries with high entry rates are generally those related to the high-tech sector, which experienced global growth over the late 1990s. Industries with lower entry rates are those that similarly faced a global decline in the late 1990s (construction) as well as traditionally more concentrated industries (such as chemicals).

As a comparison, we calculate one-year entry rates in the United States from the Dun & Bradstreet (D&B) database of over seven million U.S. corporations over the period 1998–1999. We refer to this variable as Entry_{US}. In Table 4, Column (iii), we present U.S. entry rates (Entry_{US}) for the same NACE codes. Complete two-digit NACE U.S. entry and exit rates are shown in Appendix C. We use the International Concordance between the U.S. 1987 SIC and the NACE Revision 1 industrial classifications to match the four-digit level SIC codes used by D&B with the two-digit level NACE codes used in Amadeus. As in Europe, we find similar high entry rates in the computer and communications industries in the United States and low entry rates in industries such as manufacturing of basic metals and machinery, suggesting common investment opportunity shocks in these industries. One way of conceptualizing our methodology (though not the only way) is that it essentially examines how different countries respond to these shocks.

In Table 5, we examine the size (measured by number of employees in Amadeus) distribution of entering firms, averaged over 1998 and 1999. An important caveat is that these data are less comprehensive since employment (which we need to classify firms) is missing for about 38% of observations in our sample. The data confirm that most of the

Table 4
Entry rates across Europe and the United States by two-digit NACE code

		(i)	(ii)	(iii)
		Europe		U.S.
Industry	NACE code	Age 1 & 2	Age 1	Age 1
Manufacturing	15–36	11.07	6.00	6.31
Food products and beverages	15	9.78	4.63	5.24
Tobacco products	16	16.12	15.23	7.45
Textiles	17	9.37	4.82	6.92
Wearing apparel; dressing and dyeing of fur	18	9.56	4.83	6.44
Luggage, handbags, saddlery and footwear	19	8.48	6.12	9.06
Wood and of products of wood and cork, except furniture	20	11.09	5.62	5.98
Pulp, paper and paper products	21	9.32	5.74	5.26
Publishing, printing and reproduction of recorded media	22	11.15	5.71	5.49
Coke, refined petroleum products and nuclear fuel	23	10.78	7.11	5.80
Chemicals, and chemical products	24	9.53	4.64	6.08
Rubber and plastic products	25	11.15	5.17	4.46
Other non-metallic mineral products	26	9.33	4.90	5.79
Basic metals	27	12.54	7.33	4.90
Fabricated metal products, except machinery and equipment	28	11.58	5.99	5.71
Machinery and equipment not elsewhere classified	29	10.46	4.86	4.30
Office machinery and computers	30	15.53	9.33	8.67
Electrical machinery and apparatus not elsewhere classified	31	11.06	5.82	5.92
Radio, television and communication equipment and apparatus	32	14.35	7.14	8.45
Medical, precision and optical instruments, watches and clocks	33	9.97	5.62	5.72
Motor vehicles, trailers and semi-trailers	34	10.78	5.47	5.20
Other transport equipment	35	12.90	6.94	7.96
Furniture; manufacturing not elsewhere classified	36	11.73	5.90	7.92
Construction	45	13.56	6.51	8.14
Trade	50–52	14.27	6.92	5.86
Sale, maintenance and repair of motor vehicles and motorcycles	50	13.15	6.21	5.05
Wholesale trade and commission trade, except of motor vehicles	51	14.65	7.00	5.35
Retail trade, except of motor vehicles and motorcycles	52	15.01	7.55	7.19
Hotels and Restaurants	55	14.73	7.42	5.95
Transportation	60–63	13.90	7.58	6.74
Land transport; transport via pipelines	60	15.56	7.82	8.41
Water transport	61	11.67	7.12	5.61
Air transport	62	13.53	8.62	6.19
Supporting and auxiliary transport activities, and travel agencies	63	14.20	6.95	6.77
Post and telecommunications	64	26.71	14.00	10.09
Services	70–74, 93	18.01	9.77	7.51
Real estate activities	70	15.76	8.20	5.33
Leasing of equipment and machinery	71	17.66	9.18	6.34
Computer services	72	22.19	12.49	10.73
Research and development	73	16.76	10.29	6.53
Other business activities	74	16.98	8.76	6.46
Other services activities	93	16.76	10.29	6.53
Total	15–93	13.27	7.09	6.65

This table shows entry rates of new firms across Europe and the U.S. by two-digit NACE industry codes. Column (i) shows European data from Amadeus, averaged across countries, and averaged for the years 1998–1999. Column (ii) defines new firms as corporations one year old, to compare to the U.S. data. In Column (iii), data on U.S. entry rates are from Dun & Bradstreet, averaged for the years 1998–99, and new firms are defined as corporations of age 1. Data are shown as percentages. We exclude the agricultural, mining, utility, finance, and public sectors (NACE codes 5–7, 10–14, 50–51, 65–67, 85, and 91–92). We also exclude country-industry observations based on less than three firm observations. "Total" is the average of all non-excluded two-digit NACE codes.

Table 5
Size distribution of new firms in Europe, by country and firm size, average of 1998 and 1999

	(i)	(ii)	(iii)	(iv)
	Percentage of new corporations with employment:			
Country	<10	10–50	50–250	> 250
Austria	61.32	29.89	7.04	1.76
Belgium	91.18	7.44	1.17	0.20
Bulgaria	54.51	24.10	16.64	4.75
Czech Republic	28.18	34.83	29.39	7.60
Denmark	82.57	15.42	1.74	0.27
Estonia	77.39	19.36	2.72	0.53
Finland	87.37	9.70	2.30	0.63
France	90.91	8.00	0.93	0.16
Germany	80.50	16.05	2.71	0.74
Greece	54.54	40.42	4.49	0.54
Hungary	43.03	38.90	14.83	3.24
Ireland	7.89	34.54	52.30	0.00
Italy	66.18	23.21	8.35	2.25
Latvia	50.02	31.37	14.80	3.81
Lithuania	36.38	47.04	12.79	3.78
Netherlands	57.67	23.15	16.33	2.85
Norway	86.42	11.68	1.55	0.36
Poland	19.50	28.42	41.87	10.20
Portugal	50.87	28.35	16.50	4.28
Romania	92.07	6.02	1.44	0.46
Spain	68.06	27.54	3.82	0.58
Sweden	91.32	7.54	0.98	0.17
United Kingdom	70.14	17.18	9.83	2.85
Averages				
Western Europe	69.80	20.01	8.67	1.18
Transition countries	50.14	28.76	16.81	4.30
All countries	62.96	23.05	11.50	2.26

This table shows the size distribution of new firms in Amadeus by country, averaged over the period 1998–99. New firms are defined as corporations that are one or two years old. Columns indicate percentages of total new corporations in a particular size category.

entry occurs in small firms. Interestingly, we find a greater fraction of new, larger firms in the Eastern European transition countries. This might suggest that new, private firms are emerging across all size groups, rather than only among small firms. It could also reflect a number of larger, state-owned firms that continue to be privatized and reincorporated following the transition. An exception to the transition countries is Romania, which includes over 200,000 firms with less than 10 employees. On average, about 63% of new firms have fewer than ten employees, 23% have 10–50 employees, 12% have 50–250 employees, and 2% have more than 250 employees. Since new firms in this largest category are likely to be existing firms that reincorporate following a merger or acquisition, we check that our qualitative results hold when we exclude new firms with more than 250 employees.

3. Methodology

We explore the differential effects of certain country characteristics on entry across industries with different natural demands for that characteristic. In other words, we are interested in the interaction between country and industry-specific variables. We use industry indicators to control for level differences across industries and country indicators to control for level differences across countries. The model is as follows:

$$\begin{aligned} Entry_{j,k} = {} & Constant + \Phi_1 \cdot Industry\ \ dummies_j \\ & + \Phi_2 \cdot Country\ \ dummies_k \\ & + \phi_3 \cdot Industry\ \ share_{j,k} \\ & + \phi_4 \cdot (Industry\ \ characteristic_j \cdot Country\ \ characteristic_k) \\ & + e_{j,k}, \end{aligned} \tag{1}$$

where a subscript j indicates industry j, a subscript k indicates country k, and uppercase coefficients indicate vectors. The dependent variable is the ratio of new firms to total firms of industry j in country k. The industry indicators correct for industry-specific effects. Similarly, the country indicators correct for country-specific variables.[4] The industry j share of total sales in country k captures an industry-specific convergence effect: we correct for the possibility that sectors that are large relative to the rest of the economy experience lower entry rates. We get similar results when we use value added rather than sales as a measure of relative industry size, but prefer to use sales as a measure of size because value added figures are missing for several industries in a number of countries. Finally, $\varepsilon_{j,k}$ is an error term with the usual distributional assumptions. The focus is on the interaction term and its coefficient ϕ_4.

The critical aspect, of course, is the country characteristic and the industry characteristic. The first country characteristic we focus on is the cost of fulfilling the bureaucratic requirements to register a company. Costly entry regulations will make it more difficult for new firms to enter. Djankov et al. (2002) calculate the direct costs associated with starting up a business as a percentage of per capita GNP in 1999. Following their work, we term the log of this variable EntCost. We use the log of the entry cost variable (which takes values of between zero and one because it is expressed in fractions of per capita GNP) so that in absolute terms higher costs are associated with lower values.

We would expect industries that naturally have low entry barriers to be most affected by regulations on entry. We therefore need to know what entry would look like if there were few artificial or infrastructural barriers to entry—not just bureaucratic barriers but also other potential barriers like rigid labor regulation or poor access to financing. Under the assumption that these barriers are low in the United States (for instance, entry costs in the U.S. are 0.5% of per capita GNP compared to an average of 20% of per capita GNP in our sample of European countries), we would expect the rate of entry in an industry in the United States to be a good proxy for the "natural" propensity for entry in that industry – reflecting technological barriers in that industry like economies of scale or incumbent

[4]One of the omitted variables that could explain cross-country variation in incorporation rates is differences in the tax regimes and tax treatments of corporations. In many countries, limited companies are set up for tax purposes rather than entrepreneurial activities. If this taxation difference varies across countries, this would create a hard to quantify bias. The country indicators, however, control for such differences across countries.

organizational efficiencies obtained from experience. Of course, there is a degree of heroism in assuming that entry in the United States does not suffer from artificial barriers (or even in assuming that there is a clear distinction between natural and artificial barriers). Nevertheless, all that is important for us is that the rank ordering of entry in the United States correspond to the rank ordering of natural barriers across industries, and that this rank ordering carry over to other countries. We do, however, check the robustness of the results to measures based on entry in other regions.

As a measure of industry share, we use the Amadeus database to construct the ratio of the industry's sales to total sales of firms in the country. We refer to this variable as Industry Share. We use the average of this variable for the years 1998–1999. We calculate this country-industry level variable for two-digit NACE industries using data in Amadeus. These industry shares of total sales are expected to capture a potential convergence effect.

In the basic regression then, EntCost is our country characteristic and Entry_{US} is the industry characteristic indicating whether the industry has "naturally high entry." If, as hypothesized, bureaucratic entry requirements do have an effect, they should particularly impede entry in industries that are naturally prone to entry (or seen another way, entry into an industry that is a natural monopoly should be little affected by the existence of bureaucratic entry barriers). We thus expect coefficient ϕ_4 to be negative.

4. Results

4.1. Entry barriers and permutations

We report summary statistics for the country and industry level variables in Table 6. In Table 7, Column (i), we present the basic regression, estimated using a Tobit regression with censoring at zero and one. The coefficient of the interaction term is negative and significant at the 1% level. Since we use the log of entry cost, which takes values between zero and one, lower entry costs result in a more negative value for our entry cost variable. Together with the negative coefficient on the interaction term, this means that relative entry into industries with naturally high entry is disproportionately higher in countries with low regulatory barriers to entry.

Since this is a difference-in-difference estimate, it is worth pointing out what the coefficient means. Take an industry like retail trade (NACE code 52) that is at the 75th percentile of Entry_{US} and an industry like manufacturing of pulp, paper, and paper products (NACE code 21) that is at the 25th percentile of Entry_{US}. The coefficient estimate suggests that the difference in entry rates between retail and pulp in the Czech Republic (which is at the 25th percentile in terms of EntCost with entry costs equal to 8% of per capita GNP) is 0.5 percentage points higher than the difference in entry rates between the same industries in Italy (which is at the 75th percentile in terms of EntCost with entry costs equal to 20% of per capita GNP). In other words, moving from Italy to the Czech Republic benefits the high entry retail sector relatively more. As a comparison, the mean difference in entry rates between the retail and pulp industries across countries is 5%. This suggests that the effect of regulatory entry barriers accounts for about 10% of the mean difference.

Since this basic result is critical to any further analysis, we attempt to rule out other explanations of this result by conducting a variety of robustness checks. In Column (ii) we use as an alternative measure of entry regulation the logarithm of the number of

Table 6
Summary statistics of country-level variables

Panel A: Summary statistics of country-level variables

Variable	(i) Number of countries	(ii) Mean	(iii) Median	(iv) Std. dev.	(v) Min	(vi) Max
Entry costs (EntCost)	20	0.20	0.15	0.21	0.01	0.86
Entry procedures (EntProc)	20	9.35	9.50	3.90	3.00	16.00
Bankrupty costs (bankcost)	20	0.13	0.08	0.11	0.01	0.38
Private credit (Priv)	21	0.58	0.58	0.38	0.10	1.20
Employment laws (EmpLaw)	20	1.55	1.68	0.36	0.80	2.18
Property rights (Prop)	21	4.14	4.00	0.85	2.00	5.00
Tax disadvantage (Tax)	21	−0.11	−0.10	0.09	−0.28	0.00

Panel B: Summary statistics of U.S. and Amadeus industry-level variables, by industry

Industry	(i) Sector code	(ii) NACE Industry Code	(iii) Entry rate ($Entry_{US}$)	(iv) Exit rate ($Exit_{US}$)	(v) Total Assets (Scale)	(vi) Total Revenues (Size)	(vii) External Finance (ExtFin)	(viii) Labor Intensity (LabInt)	(ix) R&D (R&D)
Manufacturing	1	15–36	6.31	21.71	318.44	385.41	26.60	23.94	3.15
Manufacture of chemicals		24	6.08	22.43	31.04	17.22	79.05	11.12	12.68
Manufacture of office machinery and computers		30	8.67	34.23	34.65	40.23	50.15	54.31	10.35
Manufacture of radio, television, and Communication equipment		32	8.45	27.43	42.95	51.69	32.76	19.61	10.62
Construction	2	45	8.14	19.89	97.24	127.54	46.98	22.27	0.50
Trade	3	50–52	5.86	20.30	104.70	209.29	54.79	43.56	0.00
Hotels and restaurants	4	55	5.95	15.88	52.82	62.65	42.51	95.70	0.00
Transportation	5	60–63	6.74	24.63	218.34	204.39	13.01	20.13	7.50
Communications	6	64	10.09	31.36	270.85	108.67	85.58	9.63	2.23
Services	7	70–74, 93	7.51	20.30	47.76	46.17	96.87	28.68	10.21
Computer services		72	10.73	25.61	17.85	20.95	123.86	22.81	17.57
Average	1–7	15–93	6.65	21.74	234.23	276.32	41.00	2.80	4.12
Median			6.14	20.66	94.36	126.06	28.05	1.96	1.31
Standard deviation			1.59	4.76	643.11	733.22	50.20	2.16	7.52

Panel A shows summary statistics of country-level variables. In the regressions, we use the logarithm of the entry costs, entry procedures, and bankruptcy costs as reported in Panel A. Panel B shows summary statistics of U.S. industry-level characteristics. Averages are reported across sector groups based on two-digit NACE industry codes. Entry rates, exit rates, external financial dependence, labor intensity, and R&D intensity are reported in percentages. See Appendix C for complete two-digit NACE U.S. entry and exit rates. We exclude the agricultural, mining, utility, finance, and public sectors and two-digit industries with fewer than 3 observations. See Appendix B for complete variable definitions and sources.

procedures required to set up a business from Djankov et al. (2002). The maximum value of number of entry procedures in the sample is 16, for Italy and Romania. We indeed find higher entry rates into industries with high entry in the U.S. in countries with fewer entry procedures. The coefficient estimate suggests that the difference in entry rates between retail and pulp in Sweden (which is at the 25th percentile in terms of the number of entry procedures) is 0.8 percentage points higher than the difference in entry rates between the same industries in Spain (which is at the 75th percentile in terms of the number of entry

Table 7
Determinants of entry rates

	(i)	(ii)	(iii)	(iv)	(v)
	Fraction of new firms				
	Entry costs	Entry procedures	EntCost & time	Excl. transition	EuroStat data
Industry Share	−0.092	−0.093	−0.095	0.157	
	(0.108)	(0.109)	(0.108)	(0.123)	
$Entry_{US}$ * EntCost	−0.175***			−0.110***	−0.198***
	(0.047)			(0.041)	(0.043)
$Entry_{US}$ * EntProc		−0.656***			
		(0.177)			
$Entry_{US}$ * EntCost&Time			−0.211***		
			(0.055)		
Observations	708	708	708	484	259

The reported estimates are from Tobit regressions. The dependent variable in columns (I–iv) is the ratio of new firms to total firms, averaged over the period 1998–1999, by two-digit NACE industry code and country (Amadeus). Industry Share is the industry share in sales (Amadeus). $Entry_{US}$ is the ratio of new firms to total firms in the U.S., by two-digit NACE industry code (Dun & Bradstreet). In Column (iv), we exclude transition countries. The dependent variable in Column (v) is the ratio of new firms to total firms for the year 1999 by Eurostat industry code and country, calculated using data from Eurostat. All regressions include a constant, country dummies and two-digit industry dummies, not shown. White (1980) standard errors are reported in parentheses. *** denotes significance at 1%. See Appendix B for complete variable definitions and sources.

procedures). In Column (iii) we include the monetized value of the entrepreneur's time to set up a business in the cost of entry and find similar results.

Next, we estimate using different samples. In Column (iv), we exclude transition countries. Privatization has resulted in the emergence of a large number of private firms in these economies, and we want to make sure our results are not driven by this. Our results are robust to the exclusion of these countries. Our results are also robust to adding back those countries that fail to meet our inclusion criteria (i.e., Iceland, Ireland, Luxembourg, and Portugal), and to dropping one country at a time (not reported in tables).

We also analyze "official" data from Eurostat, which is calculated by the European Union (EU) using confidential census data for a sample of nine EU countries, by "EU-industries," which are broader than two-digit NACE codes. We do not have data from this sample for non-EU transition countries or for certain industries. For example, whereas we have about 600 observations by country and two-digit NACE industry codes using the Amadeus database, Eurostat only includes about 250 observations. Eurostat provides entry rates, calculated as the one-year change in the number of firms, and exit rates, calculated as the number of firms exiting the industry, excluding mergers and acquisitions. Entry rates across countries and industries using the Amadeus database and Eurostat data are significantly correlated at about 67%. As shown in Column (v), our main regression results are robust to the substitution of entry rates from Eurostat. This suggests that our calculations using the Amadeus data are in line with official figures.

4.2. Robustness to outliers

Our estimation strategy can be thought of as a difference-in-difference estimation, where we divide the countries into two groups: high entry regulation (HR) and low entry regulation (LR) groups, and the industries into high entry (HE) and low entry (LE) groups. If we abstract away from any control variables, our estimate is: [HE(HR) – LE(HR)] – [HE(LR) – LE(LR)]. This estimate captures the average effect only. For robustness, we employ a similar non-parametric difference-in-difference estimation strategy to investigate whether the effect is generally present in all countries and industries.[5] We report the results of this procedure but do not include a separate table.

We first divide the countries into HR and LR, and then rank the industries from the lowest natural entry to the highest. Next, we pick the lowest natural entry industry (LWE) as our reference industry, and repeat the difference-in-difference estimation above for each remaining industry J, i.e., we compute: [J(HR) – LWE(HR)] – [(J(LR) – LWE(LR)], for each industry J. The effect is strongest for the computer and related activities (NACE 72) and post and telecommunications (NACE 64) industries. We also find that the effect tends to be larger for industries with higher natural entry.

Next, we repeat the exercise for countries, i.e., we divide industries into low entry (LE) and high entry (HE), and order countries from lowest to highest entry regulation. Again, we find that the average effect is consistent with our main results. The effect is strongest for Norway and the United Kingdom. What is reassuring is that no single industry or country appears to be driving the results. In particular, the results in Table 7 are also robust to (i) the exclusion of Italy, a developed country with relatively high entry barriers, and (ii) the exclusion of the following information technology-intensive industries: manufacture of communication equipment (NACE 32) and computer and related activities (NACE 72).

4.3. Alternative measures

In Table 8 we examine alternatives to U.S. entry rates as measures of the natural propensity to enter. Prior literature (Dunne et al., 1988) finds that exit rates and entry rates are strongly correlated—the more there is creation through young firms, the more destruction there also is. In Column (i) we calculate Exit_{US}, which is the share of firms that exit in the U.S. D&B data measured by the number of firms that exit in year t (because of closure or acquisition) as a percentage of all firms in year t-1. This measure is averaged for the industry over the period 1998–1999. Exit_{US} should serve as a proxy for "natural entry" and when we replace Entry_{US} with it in the regression, the interaction has the expected negative sign and is significant (this also suggests that our industry characteristics are not just picking up growth opportunities in the industry but some measure of the industry's natural dynamism).

One might think it obvious that bureaucratic costs would deter entry. What about other costs that weigh on entrants? For example, we expect that firms are more likely to enter and receive start-up financing if bankruptcy proceedings are less costly in the case of default. As a measure of bankruptcy costs, we use the actual cost of bankruptcy proceedings as the percentage of the estate that is consumed in bankruptcy proceedings

[5]We thank Atif Mian for this suggestion.

Table 8
Alternative proxies for natural propensity to enter

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)
	Exit	Bankruptcy	Taxes	SME	Scale	Size		UK	Europe
Industry Share	−0.081	−0.083	−0.108	−0.083	−0.087	−0.088	−0.074	−0.143	−0.105
	(0.109)	(0.108)	(0.109)	(0.109)	(0.109)	(0.109)	(0.109)	(0.111)	(0.107)
Exit * EntCost	−0.032**								
	(0.015)								
$Entry_{US}$ * BankCost		−3.491***							
		(0.863)							
$Entry_{US}$ * EntCost			−0.207***						
			(0.050)						
$Entry_{US}$ * Tax			−2.429**						
			(1.228)						
SME * EntCost				−0.007*					
				(0.004)					
Scale * EntCost					0.002***				
					(0.001)				
Size * EntCost						0.002***			
						(0.001)			
$Entry_{US,\ 1990-2000}$ * EntCost							−0.142**		
							(0.064)		
$Entry_{UK}$ * EntCost								−0.095***	
								(0.022)	
$Entry_{Europe}$ * EntCost									−0.094***
									(0.015)
Observations	708	708	708	708	708	708	708	670	708

The reported estimates are from Tobit regressions. The dependent variable is the ratio of new firms to total firms, averaged over the period 1998–1999, by two-digit NACE industry and country (Amadeus). Industry Share is the industry share in sales (Amadeus). Exit is exit rates of U.S. firms, averaged over the period 1998–1999, by NACE industry (Dun & Bradstreet). EntCost is country-level entry cost (Djankov et al., 2002). $Entry_{US}$ is the ratio of new firms to total firms in the U.S., by NACE industry (Dun & Bradstreet) BankCost is the country-level bankruptcy cost (Djankov et al., 2003). Tax is the difference between the top corporate income and personal income tax rates in the country (PricewaterhouseCoopers). SME is the percentage of U.S. firms with fewer than 250 employees, averaged over the period 1998–1999, by NACE industry (D & B). Scale is the median assets of U.S. firms, averaged over the period 1998–1999, by NACE industry (Compustat). Size is the median sales of U.S. firms, averaged over the period 1998–1999, by NACE industry (Compustat). $Entry_{US,\ 1990-2000}$ is the entry rate of U.S. firms, averaged over the period 1990–2000, by NACE industry (D & B). $Entry_{UK}$ is the entry rate of U.K. firms, averaged over the period 1998–1999, by NACE industry (Amadeus). $Entry_{Europe}$ is the entry rate of firms in Europe, averaged over the period 1998–1999, by NACE industry (Amadeus). All regressions include a constant, and country and industry dummies, not shown. See Appendix B for complete variable definitions and sources. White (1980) standard errors are reported in parentheses. *, **, and *** denote significant at 10%, 5%, and 1%, respectively.

(Djankov et al., 2003). We find that entry is higher in high-entry industries in countries with lower cost of bankruptcy (Column (ii) in Table 8).

Another form of entry barrier is the differential income taxes for corporations compared to individuals, which can cause a tax penalty and make incorporation unattractive. In Column (iii) we include the interaction between $Entry_{US}$ and Tax Disadvantage, which is defined as the difference between the top corporate income tax and the top personal income tax rates in the country (obtained from PricewaterhouseCoopers

Worldwide Taxes 1999–2000).[6] We find that entry is significantly higher in high-entry industries in countries where tax rates on corporate income are much lower than those on personal income.

In Column (iv) we use the D& B data to calculate SME, which is the ratio of the number of Small and Medium Enterprises (SMEs), defined as businesses with less than 250 employees, to the total number of firms. Since new firms are generally also small, we expect greater entry into industries with larger shares of smaller firms. Indeed, we find a significantly negative coefficient, suggesting that higher entry costs discourage entry into industries with larger shares of SMEs. In Columns (v–vi), we use firm size as the industry characteristic. We use Compustat data of U.S. listed firms to calculate SCALE as the log of median assets of firms in an industry and SIZE as the log of median total sales. Assets and sales take values less than one (they are divided by 10 billion US dollars) so that the log is a negative number, and more negative values denote industries with firms of smaller size. Since entry costs are more negative when low, the positive coefficient estimate indicates that smaller scale/average size industries have relatively more entry in low entry cost countries.

Next, we examine the persistence of U.S. entry rates. Dunne and Roberts (1991) and Cable and Schwalbach (1991) study U.S. and international data, respectively, and find that the relation between industry characteristics and industry turnover patterns is stable over time. These results suggest stability of industry structures over time and countries. However, for robustness we compute the average of annual D & B entry rates of U.S. corporations from 1990–2000 ($\text{Entry}_{\text{US, 1990–2000}}$). The raw correlation between U.S. entry rates in 1998–1999 – the variable in the baseline regression—and U.S. entry rates over the 1990s is 0.32 and significant at the 5% level. When we replace the Entry_{US} variables with $\text{Entry}_{\text{US, 1990–2000}}$, we find that the coefficient on the interaction term remains highly significant and of similar magnitude (Column (vii) in Table 8).

Finally, it could be that our results are driven by the peculiarities of industry structure in the U.S. Our method should work so long as we measure entry rates in a country where barriers to entry are thought to be small. In Column (viii), we use entry rates calculated for firms in the United Kingdom (Entry_{UK}). There are important differences between the United Kingdom and the U.S. For instance, the United Kingdom's bankruptcy system is more creditor-friendly and the composition of its industries is different. Nevertheless, the correlation between entry rates in the U.S. and in the United Kingdom is 0.60 and significant at the 1% level. The regression results (excluding industries of the United Kingdom) show that the coefficient on the interaction term remains highly significant. Column (ix) shows that our results are also robust to using entry rates calculated using firms across all European countries in our sample ($\text{Entry}_{\text{Europe}}$). The correlation between entry rates in the U.S. and the average entry rate across Europe is 0.60 and significant at the 1% level.

4.4. Causality

We have not fully addressed the issue of causality. We know the findings do not arise because there are fewer high natural entry industries in countries with high bureaucratic entry barriers—this is the virtue of correcting for industry effects. But there could be omitted variables that jointly drive the propensity to enter and the degree of bureaucratic

[6]Our measure of tax disadvantage differs from the measure used in Gordon and MacKie-Mason (1997) which takes taxation of corporate dividends into account.

entry barriers. One way to test the direction of causality is to use instruments. It has been generally found that the origin of a country's legal system seems to be strongly associated with the regulatory system in place today (see, for example, La Porta et al., 1999). While there has been some debate about the precise mechanism by which this association exists, a country's legal origin offers a proxy for predetermined components of regulation. When we instrument entry regulation with legal origin, we find that the coefficient estimate for the interaction term is highly significant, the same sign and approximately the same magnitude as shown earlier in Table 7 (Column (i) in Table 9). The legal origin variables explain 59% of the variation in the entry cost variable. Entry costs tend to be lowest in countries with Anglo-Saxon and Scandinavian legal origin and highest in countries with French legal origin.

The instrumental variable approach might still not fully address the causality problem: it could be that countries with large "high natural entry" industries have a strong entrepreneurial culture and select low entry regulation. (If legal origin also drives entrepreneurial culture, the instrument could be pre-determined, but might not satisfy the exclusion restriction—it might be correlated with other omitted variables that determine entry.) A crude way to correct for this is to include the interaction between Entry_{US} and the aggregate rate of entry in the country (the fraction of new firms to total firms). If the aggregate rate of entry proxies for entrepreneurial culture, and so do entry costs, the inclusion of this new interaction variable should reduce the magnitude of the estimated coefficient on the basic interaction significantly. It does not (see Table 9, Column (ii)).

Another approach is to check whether the result holds when we restrict the sample to industries that are relatively small. These industries are unlikely to be responsible for the entry barriers since they have limited political clout. For each country, industries are defined to be small if their Industry Share is in the country's bottom textile in Industry Share. When we restrict our sample to small industries, we still find a strongly significant interaction coefficient of approximately the same magnitude as shown earlier in Table 7 (Column (iii) in Table 9). This suggests that industries that are unlikely to be responsible for the entry regulations are equally affected by it.

While entry regulation is not strongly correlated with economic development (as measured by per capita GDP) in our sample, we also confirm that our results are robust to the inclusion of the interaction of Entry_{US} and the logarithm of per capita GDP (Column (iv) in Table 9). We have also checked whether the results are robust to controlling for growth opportunities. Following Fisman and Love (2003b), we use industry-level U.S. sales growth over the period 1990–2000 as proxy for industry growth opportunities. Our entry interaction variable still enters significantly at the 1% level when we add the interaction between U.S. sales growth and entry costs (not shown). We get similar results when we calculate average U.S. sales growth for the period 1980–1990.

Another concern is that countries with more untrustworthy populations erect higher bureaucratic barriers so as to screen would-be entrepreneurs more carefully. If this were true, bureaucratic barriers might affect entry, and might cause incumbents to become fat and lazy, but this is necessary because the alternative of unrestricted entry by charlatans would be much worse. One way to address this concern is to check whether the underlying population results in differential selection. More developed countries have better-developed information systems, better product inspections and quality control, better contract and law enforcement, and consequently, an entrepreneurial population less inclined to misbehavior. (The underlying population in wealthier countries might also be

Table 9
Causality and selection issues

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)
	IV:Legal origin	Country-average entry	Small industries	Development	GDP	Corruption	Informal sector
Industry Share	−0.092	−0.089	−3.704*	−0.128	−0.110	−0.117	−0.143
	(0.090)	(0.108)	(2.085)	(0.107)	(0.108)	(0.108)	(0.108)
$Entry_{US}$ * EntCost	−0.175***	−0.164***	−0.191**	−0.186***			−0.173***
	(0.055)	(0.048)	(0.093)	(0.046)			(0.046)
$Entry_{US}$ * Country-average Entry		2.730					
		(2.672)					
$Entry_{US}$ * GDP per capita				0.419***			
				(0.092)			
Low GDP per capita * $Entry_{US}$ * EntCost					0.087		
					(0.127)		
High GDP per capita * $Entry_{US}$ * EntCost					−0.170***		
					(0.047)		
High Corruption * $Entry_{US}$ * EntCost						0.186	
						(0.128)	
Low Corruption * $Entry_{US}$ * EntCost						−0.168***	
						(0.047)	
$Entry_{US}$ * Informal							−0.057***
							(0.013)
Observations	708	708	214	708	708	708	708

This table shows an instrumental variable regression with robust errors (Column (i)) and Tobit regressions with censoring at 0 and 1 (Columns (ii–viii)). The dependent variable is the ratio of new firms to total firms, averaged over the period 1998–1999, by two-digit NACE industry code and country. In column (i), we use the legal origin variable in La Porta et al. (1998) as instrument for entry regulations. The standard errors are corrected for clustering at the country level. Column (ii) includes an interaction of industry-level U.S. entry and the average entry rate for the country as a whole. Column (iii) shows Tobit regressions with the sample restricted to industries that are in the country's bottom tertile in industry share. Column (iv) includes an interaction of industry-level entry and the logarithm of per capita GDP in the country. Columns (v-vi) show Tobit results when we estimate different slopes for the interaction variables for whether the industry is in a country below or above the sample median per capita income (low GDP per capita and high GDP per capita), or above or below the sample median level of corruption (high corruption and low corruption). Column (vii) includes an interaction of industry-level entry and the share of the informal economy in the country (Informal) from Schneider (2002). All regressions include a constant and country and industry dummies, not shown. See Appendix B for complete variable definitions and sources. White (1980) standard errors are reported in parentheses. *, **, and *** denote significant at 10%, 5%, and 1%, respectively.

socialized to be more honest (less adverse selection) but for our purposes it is only necessary that the richer infrastructure gives them more incentive to behave, so there is less need for screening.) If bureaucratic rules are meant to screen entry efficiently, we should expect them to be particularly effective in low-income countries relative to high-income countries. In Column (v) of Table 9 we estimate different slopes for the interaction variable for whether the industry is in a country that is above or below the sample median per capita income. If, in fact, entry regulations screen more effectively in low-income countries where there is less alternative infrastructure to assure compliance, we should find the coefficient estimate for the interaction in below-sample-median income countries to be significantly more negative. It is not.[7] Similarly, we find that entry barriers work most effectively in preventing entry in low-corruption countries rather than in high-corruption countries (Column (vi) in Table 9), suggesting that they do not help select more carefully amongst an untrustworthy population.

Taken together, these results suggest that the regulation of entry seems to have causal effects, more so in wealthy countries or countries that are not corrupt than in poor or corrupt countries. Thus, it is unlikely that these regulations are particularly effective in screening populations in countries where other formal screening mechanisms do not exist or where the population is more likely to be untrustworthy.

Finally, we are concerned that there could be a high degree of underreporting of new firms, since we measure entry only into the formal sector. In countries where for tax avoidance and other reasons it is attractive to remain informal, we expect to see less entry into the formal sector and fewer firms choosing the legal form of a limited liability company. The correlation between our measure of the informal sector (Informal) calculated as the size of the informal economy as a percentage of official GNI averaged over the period 1999–2000 and the cost of entry regulations (EntCost) is 0.37 although not statistically significant at the 10 percent level. In column (vii), we include an interaction of Entry_{US} and a measure of the share of the informal economy (Informal).

The coefficient estimate for the interaction between Entry_{US} and Informal is negative and statistically significant, suggesting that underreporting of new firms is more likely in high-entry industries in countries with an inhospitable business environment. However, our main interaction variable between Entry_{US} and EntCost remains highly significant and virtually unchanged in magnitude, suggesting that bureaucratic regulations have an independent effect over and above the effects of the inhospitable environment. This is not particularly surprising in light of our finding that bureaucratic regulations have the most impact in developed and less corrupt countries, which are unlikely to have an inhospitable business environment.

4.5. *The consequences of preventing free entry*

Entry regulations, at least in the way we measure them, could be thought of as a fixed cost. They should be reflected in an increased average size of entrants into high-entry industries in countries with high entry costs. In Table 10, Panel A, Column (i), the dependent variable is the average size of entrants (measured as the logarithm of average

[7]When allowing for different slopes for transition versus non-transition countries, we find a stronger effect for non-transition countries, i.e., for countries where we expect a stronger legal system etc. (not shown).

value added in millions of Euros in industry i in country j over the period 1998–1999, where value added is computed as earnings before interest, taxes, depreciation, and amortization, plus labor costs). The explanatory variables are the standard ones. We find that the average size of entering firms is indeed significantly higher in high-entry industries in countries with high entry costs. A one standard deviation increase in entry costs raises the average size of entrants by 0.78 million euros in an industry that is one standard deviation higher in natural entry rate, a substantial magnitude when compared to the median size of entrants across industries of 0.87 million euros.

While some of the lower entry we have found earlier could simply be because a number of small firms will be discouraged from setting up, others might have to grow without the protection of limited liability until they reach the scale to afford the cost of incorporation. In either case, entry costs could have a dampening effect on innovation and risk-taking.

An immediate question is whether entry regulation affects the ability or incentive of incumbents to enhance productivity. If entry regulations only serve to protect incumbents and prevent the disciplinary effects of competition, incumbent firms are less likely to be able, or forced, to enhance productivity. If, by contrast, regulations are effective at screening, incumbent firms that have come through the screening process could be better firms, more able to enhance productivity.

In Table 10, Panel A, Columns (ii-viii), we examine the effect of entry regulation on the relative performance of incumbent or established firms, defined as all firms more than two years old. We use the growth in value added per employee as a measure of firm performance. To reduce the influence of outliers, the dependent variable in the regressions in this table is censored.

In Panel A, Columns (ii–v), we present Tobit estimations where the dependent variable is the real growth in value added per employee over the period 1998–1999 averaged over all incumbent firms in the industry in a country. In Column (ii), the negative significant coefficient on the interaction variable indicates that incumbent firms in naturally high-entry industries have relatively less growth in value added when they are in a country with high entry regulations. We verify that this result is not simply because incumbents in countries with high entry costs are larger—the result survives when we include the average value added for incumbents in the industry in that country (not reported in the table).

Again, it is worth pointing out what the coefficient means by comparing the retail trade industry, which is at the 75th percentile of Entry_{US}, and the pulp and paper manufacturing industry, which is at the 25th percentile of Entry_{US}. The coefficient estimate suggests that the difference in real growth rates of value added per worker between retail and pulp in the Czech Republic (which is at the 25th percentile in terms of EntCost) is 0.7 percentage points higher than the difference in real growth rates between the same industries in Italy (which is at the 75th percentile in terms of EntCost). In other words, moving from Italy to the Czech Republic benefits the growth rate of the high-entry retail sector relatively more. Since the average real growth rate in value added per worker is 1%, this is a sizeable magnitude.

We also include other measures of firm entry. Column (iii) shows that our results are robust to the substitution of entry rates with the percentage of SMEs, defined as firms with less than 250 employees. The estimates in Columns (iv–v) indicate that incumbent firms in industries with smaller scale tend to increase productivity more slowly in countries with high regulatory entry barriers. Next, we test the direction of causality using legal origin as

Table 10
The consequences of preventing free entry

Panel A: Size of entrants and performance of incumbent firms

	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
	Size of entrants	Growth	SME	Scale	Size	Legal origin	GDP	Corruption
Industry Share	2.334	−0.050	−0.030	−0.048	−0.040	−0.178	−0.038	0.012
	(3.890)	(0.530)	(0.529)	(0.530)	(0.530)	(0.378)	(0.531)	(0.530)
$Entry_{US}$ * EntCost	9.936***	−0.426**				−0.211*		
	(1.861)	(0.202)				(0.113)		
SME * EntCost			−0.039**					
			(0.015)					
Scale * EntCost				0.006**				
				(0.003)				
Size * EntCost					0.007**			
					(0.003)			
Low GDP per capita * $Entry_{US}$ * EntCost							−0.607	
							(0.607)	
High GDP per capita * $Entry_{US}$ * EntCost							−0.431**	
							(0.203)	
High Corruption * $Entry_{US}$ * EntCost								−0.456**
								(0.202)
Low Corruption * $Entry_{US}$ * EntCost								−1.394**
								(0.614)
Observations	484	572	572	572	572	572	572	572

Table 10 (*continued*)

Panel B: Performance of Young and Old Incumbent Firms

	(i)	(ii)
	Age 3–5	Age > 5
$Entry_{US}$ * EntCost	−0.038 (0.281)	−0.396** (0.199)
Wald test of equality of slope coefficients (*p*-value)	0.300	
Likelihood ratio test of equality of all regression coefficients (*p*-value)	0.001***	
Observations	472	615

Column (i) of Panel A reports OLS estimates. The dependent variable is the logarithm of the average value added (in millions of Euros) of entrants for each industry and country, averaged over the years 1998−1999. Entrants are defined as firms that are one or two years old. Columns (ii) to (v) of Panel A show Tobit regressions with alternative proxies for the propensity to enter. Column (vi) shows an instrumental variable regression. We use legal origin of the country as instrument for entry cost. Columns (vii–viii) show Tobit results when we estimate different slopes for the interaction variables for whether the industry is in a country below or above the sample median of per capita income, or above or below the sample median of corruption. The dependent variable in Columns (ii–viii) is the industry-level real growth in value added per employee of incumbent firms, defined as firms with age > 2. Panel B reports results from Tobit estimations. The dependent variable is the industry-level real growth in value added per employee of incumbent firms calculated for two age groups: age 3–5 and age > 5. Growth rates are averages for the period 1998–1999, by two-digit NACE industry and country, and excluding observations based on fewer than three firms. Growth observations are censored at −50% and + 100%. Industry Share is the industry share in sales. $Entry_{US}$ is the ratio of new firms to total firms in the United States. EntCost is country-level entry costs. SME is the percentage of U.S. firms with fewer than 250 employees. Scale is the median assets of U.S. firms in an industry. Size is the median sales of U.S. firms in an industry. $Entry_{US}$, SME, Scale, and Size are averages for the period 1998–1999 and calculated at the two-digit NACE industry level. See Appendix B for complete variable definitions and sources. All regressions include a constant, country dummies, and two-digit industry dummies, not shown. White (1980) standard errors are reported in parentheses. In Panel B we report the *p*-value of a Wald test for whether the coefficients of the interaction term are equal across the two regressions and the *p*-value of a likelihood ratio test of equality of all regression coefficients across the two regressions. *, **, and *** denote significant at 10%, 5%, and 1%, respectively.

an instrument for entry regulation. Column (vi) shows that the results are robust to using instrumental variables, although the magnitude of the coefficient estimate for the interaction term is somewhat reduced. Finally, in Columns (vii) and (viii), we verify that the adverse effect on productivity growth is more pronounced in high GDP and low corruption countries, consistent with our earlier finding that these are the countries where entry barriers have an impact.

If the lower regulatory barriers indeed allow for more disciplining of entry, older incumbents should be particularly affected since they have survived much harsher competition. The effects should be far less pronounced for young incumbent firms because competition has not had time to work its selection effects. Put another way, older incumbents in protected industries should have become far more reliant on the rents from incumbency than on efficiency gains.

We split each industry in each country into incumbent young firms (firms between three and five years of age) and incumbent old firms (firms over five years of age) and compute value-added growth rates for each age segment. We then estimate the regression in Table 10, Panel A, Column (ii) for each segment. The regression estimates are in Table 10, Panel B. They suggest that the adverse interaction effects on growth are present primarily for the older firms, and a likelihood ratio test confirms the difference in coefficients across the two samples.

In sum, value added per worker grows relatively more slowly for older incumbents in naturally high-entry industries in countries with high bureaucratic barriers but not for young incumbents. This is consistent with older firms, who have had to survive greater competition in countries with low entry barriers, becoming relatively more efficient.

This has effects on overall growth rates. As a suggestive comparison, Fig. 1 plots average value added for firms in different age groups for two countries, high-barrier Italy and the low-barrier United Kingdom. Across all industries, firms start out larger when young in Italy, but grow more slowly so that firms in the United Kingdom are about twice as large by age ten.

Taken together, these results suggest that entry regulations adversely affect the growth of those industries that might be presumed to benefit most by the added selectivity that such regulation might bring. This strongly suggests that there are costs to such regulations that should be taken into account in evaluating any potential benefits.

4.6. Other regulations and the business environment

Thus far, the focus has been on entry regulations and their effect on firm entry, size, and growth. But there are other regulations and aspects of the business environment that might affect entry and firm growth, such as financial development, labor regulation, and protection of intellectual property. We want to make sure that the effect we have focused on thus far is not driven by these other aspects of the business environment. To the extent that onerous entry regulations go together with lower financial development, more stringent employee protection, and lower property rights protection, they could all capture similar aspects of an unfavorable business environment. We therefore consider the effects of the availability of financing, labor regulations, and the protection of intellectual property on firm entry and growth.

We focus on these three dimensions of the business environment because they have been found to explain variation in firm entry, size, and growth in previous literature. Black and

Strahan (2002) find that financial development following bank deregulation fostered firm entry in the United States. Di Patti and Dell'Ariccia (2004) find that entry is higher in informationally opaque industries in Italian regions that have a more concentrated banking sector. Fisman and Love (2003a) focus on access to trade credit rather than bank credit and find that industries with higher dependence on trade credit financing exhibit higher growth rates in countries with relatively weak financial institutions.

Stricter labor regulations, such as the ability to hire and fire workers, have also been found to correlate with firm entry. Scarpetta et al. (2002) use firm-level survey data from OECD countries and find that firm entry is lower in countries with stricter labor regulations.

There is also work related to the importance of property rights for firm size and firm growth. Kumar et al. (2002) find that the average size of firms in human capital and in R&D intensive industries is larger in countries that protect property rights and patents. Using survey data from five transition countries on the reinvestment of profits by entrepreneurs, Johnson et al. (2002) find lower investment by entrepreneurs in countries with weak property rights. Claessens and Laeven (2003) find that growth of industries that rely on intangible assets is disproportionately lower in countries with weak intellectual property rights. Except for the work by Scarpetta et al. (2002), none of these other papers also examine entry regulations.

We find that these aspects of the business environment have a significant impact, but primarily on the rate of incorporation and not on the productivity growth of incumbents. Importantly, when we control for these other aspects of the business environment, entry regulations remain an important determinant of new firm entry and the growth of incumbent firms.

4.6.1. Access to finance

First, we consider access to finance as an alternative determinant of firm entry and growth. Liquidity constraints can hinder people from starting businesses (see, e.g., Evans and Jovanovic, 1989). This suggests that entry rates should be lower in countries with less developed financial systems.[8] In fact, Rajan and Zingales (2003) suggest that the absence of regulations protecting investors could be a very effective barrier to new firm creation.

We use ExtFin, a measure of dependence on external finance (the industry-level median of the ratio of capital expenditures minus cash flow over capital expenditures – see Rajan and Zingales (1998) for details) as the industry characteristic. We also calculate an industry-level measure of reliance on supplier trade financing as the average ratio of accounts payable to total assets across all firms in the industry. Both measures are calculated for the period 1990–1999 for all U.S. listed firms in Compustat.

We also use alternative measures of access to financing. As a measure of banking development, we include the ratio of domestic credit to the private sector to GDP from the International Monetary Fund's International Financial Statistics. As a proxy for capital market development, we use the ratio of stock market capitalization to GDP from the World Bank Development Indicators. To measure country-level provisioning of supplier

[8]Rajan and Zingales (1998) find that there are more new establishments in industrial sectors with greater external financing needs in more developed financial systems. This is not exactly the same as our findings, since new establishments need not be new entry but could simply be new plants set up by existing firms.

trade credit, we use firm-level financial data in Amadeus to calculate the unweighted ratio of the sum of total accounts receivables to total assets for all firms.

In Table 11A, Column (i), we find as predicted that entry is higher in more financially dependent industries in countries that have higher financial development. We find similar results when substituting the stock market capitalization variable for the private credit variable. These results suggest that new firm creation depends on access to start-up capital.

Next, we use industry-level trade credit dependence. Industries with higher dependence on trade credit financing exhibit higher entry rates in countries with greater availability of trade credit (not shown). We find that supplier financing matters even after controlling for the effect of financial development and entry costs (not shown). In sum, these results suggest that the availability of both private (bank) credit and trade credit aids entry in financially dependent industries.

4.6.2. Labor regulation

We next turn to labor market regulation, specifically laws that prevent a firm from firing employees. This could cut both ways. One could argue that strict labor regulations protect

Table 11A
Other Regulations and the business environment

	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	Entry rates				Size of entrants	Growth of incumbents
	Finance	Labor	Innovation	Horse race	Horse race	Horse race
Industry Share	−0.118	−0.108	−0.135	−0.157	2.690	−0.029
	(0.108)	(0.108)	(0.108)	(0.108)	(3.891)	(0.534)
$Entry_{US}$ * EntCost	−0.155***	−0.195***	−0.166***	−0.177***	9.506***	−0.420**
	(0.047)	(0.048)	(0.047)	(0.048)	(1.862)	(0.210)
$ExtFin_{US}$ * Priv	0.034***			0.016	0.344	0.005
	(0.010)			(0.012)	(0.619)	(0.052)
$LabInt_{US}$ * EmplLaw		−2.580**		−2.447**	−25.704	2.451
		(1.014)		(1.007)	(27.180)	(4.432)
$R\&D_{US}$ * Prop			0.117***	0.093***	−2.330	0.045
			(0.030)	(0.034)	(1.881)	(0.148)
Observations	708	708	679	679	468	548

This table shows Tobit regressions with censoring at zero and one (Columns (i–iv and vi) and an OLS regression (Column (v)). The dependent variable in regressions (i–iv) is the ratio of new firms (defined as age 1–2) to total firms, averaged over the period 1998–1999, by two-digit NACE industry code and country. The dependent variable in regression (v) is the logarithm of the average value added (in millions of Euros) of entrants, defined as firms with age 1–2, for each industry and country. The dependent variable in regression (vi) is the industry-level real growth in value added per employee for firms with age42. Industry Share is the industry share in sales. $Entry_{US}$ * EntCost is the interaction of industry-level new entry ratios and country-level entry costs. $ExtFin_{US}$ * Priv is the interaction of industry-level external financial dependence for the period 1990–1999 (from Compustat) and country-level private credit-to-GDP. $LabInt_{US}$ * EmplLaw is the interaction of industry-level labor intensity and country-level employment laws index. $R\&D_{US}$ * Prop is the interaction of industry-level R&D intensity and country-level Property rights. See Appendix B for complete variable definitions and sources. All regressions include a constant, country dummies, and industry dummies, not shown. White (1980) standard errors are reported in parentheses. *, **, and *** denote significant at 10%, 5%, and 1%, respectively.

employees and give them the confidence to join small, untested firms (much the way that good corporate governance offers investors confidence), thus reducing start up-costs. Regulations could also hamper the growth of large incumbent firms, whose adherence to regulations is more easily monitored, thus creating the space for new firms to enter. However, one could argue for the opposite effect of labor regulations on entry: the cost of compliance with regulations has fixed components that make them particularly costly for small businesses to meet, and could inhibit entry. Small firms might not be able to afford to keep their employees through downturns, and thus might underhire in the face of strict labor regulations.

We use the employment laws index of worker protection developed by Botero et al. (2004), which indicates the strictness of labor regulations in the country in 1997. This index was constructed by examining detailed provisions in the labor laws regarding alternative employment contracts, conditions of employment, and job security. The index takes values between zero and three, with higher values implying that regulation is more protective of a worker. We refer to this index as EmpLaw.

Following our methodology, we need to find an industry characteristic that would make an industry most susceptible to labor regulation. We would expect labor regulations to impinge the most on industries that are the most labor intensive. We calculate labor intensity, LabInt, from U.S. data as the industry median over all Compustat firms in that industry of the number of employees divided by the amount of fixed assets (in millions of dollars), and is calculated over all firm-years over the period 1998–1999. A higher score indicates higher labor intensity. We have explored the use of other measures of labor intensity such as employees over total assets and get similar results. In Table 11A, Column (ii), we find that labor regulations have a dampening effect on entry in labor-intensive industries.

4.6.3. Regulations protecting property

Now consider regulations protecting intellectual property. Strong patent protection could dissuade entry because it protects incumbents and forces new entrants to carve a wide path around existing intellectual property. On the other hand, new entrants do not have the organizational structure, finance, or intellectual capital to create a significant first-mover advantage and thus dissuade potential imitators. As a result, they might have a greater incentive to do research if they know their research will be protected legally.

Following the now familiar method, our country-level variable is Property Rights, which is an index of the protection of property in a country from the Economic Freedom Index constructed by the Heritage Foundation. This variable is estimated for the year 1997 and has been used previously by Claessens and Laeven (2003).

The industry variable measured from U.S. data, R&D, is a measure of dependence on research and development and equals the industry-level median of the ratio of research and development expenses to sales for Compustat firms in the same industry over the period 1990–1999. The numerator and denominator are summed over all years for each firm before dividing.

In Table 11A, Column (iii), the interaction variable is positive and significant, suggesting that there is more entry in R&D intensive industries in countries that protect property better. This echoes the findings of Claessens and Laeven (2003). We find similar results when using a more specific index of intellectual property rights from the World Economic Forum (2002) (not shown).

Table 11B
Correlations between regulatory variables

	EntCost	Priv	EmplLaw	Prop
EntCost	1.00			
Priv	−0.38	1.00		
	(0.10)			
EmplLaw	0.37	−0.44	1.00	
	(0.11)	(0.05)		
Prop	−0.29	0.70	−0.44	1.00
	(0.22)	(0.00)	(0.05)	

This table shows the correlations between the different country-level regulatory variables considered in the regressions reported in Table 11A. EntCost is country-level costs associated with entry regulation. Priv is the country-level ratio of private credit to GDP. EmplLaw is a country-level index of employment regulations. Prop is a country-level measure of protection of property rights. See Appendix B for complete variable definitions and sources. *P*-values are reported between brackets.

4.6.4. *Business environment*

Do higher entry costs reflect a generally hostile business environment? Because the correlations in Table 11B suggest that higher entry costs accompany lower private credit to GDP, more stringent employee protection, and lower property rights protection, these could all be aspects of an unfavorable business environment (or, put another way, good institutions tend to go together). But only the correlation with private credit is significant at the 10% level, suggesting there is some variation.

When we estimate a regression with all the interactions included in Table 11A, Column (iv), we find that all variables retain their predicted effect and statistical significance except the financial development interaction (not surprising since private credit is more strongly statistically correlated with entry costs and the other regulatory variables considered). The coefficient estimate of the entry costs interaction remains statistically significant and of similar magnitude in Table 11 A Column (iv) as in the baseline regression in Table 7, Column (i).

4.6.5. *Performance of incumbents and other regulations*

Do these other impediments to entry affect the average size of entrants? While low credit, high labor regulation, or low protection of property rights could particularly affect young firms, they are not just an up-front fixed cost that can be overcome by reaching the right size. For example, profitable firms can overcome constraints on external credit, firms that utilize labor very effectively can overcome high labor regulatory costs, and low protection of property rights can be overcome by being more secretive or more efficient at commercialization than the competition. Indeed, when we regress the average value added by entrants (our measure of size) against the various interactions, only the entry cost interaction is significant (Table 11A, Column (v)). This suggests that the other constraints on entry must be overcome by factors other than sheer size.

If the other constraints have to be overcome by being more efficient, then one might expect ambiguous effects of a hostile business environment (apart from entry costs) on the productivity growth of incumbents. On the one hand, the absence of the disciplinary effect of competition from new young entrants gives incumbents less incentive to be efficient. On the other hand, the hostile environment forces them to be more efficient in order to survive (and to have entered in the first place).

If we estimate the regression with the real growth in value added per employee of incumbent firms as a dependent variable, and include all the interactions in Table 11A, Column (vi), we find that none of the interaction terms with the other regulatory variables enters significantly. Importantly, the entry regulation interaction continues to enter negatively and is statistically significant and with a similar order of magnitude as the regressions reported in Table 10. In sum, there could well be offsetting effects of other constraints to entry as hypothesized above; or, put another way, firms need not be particularly clever or efficient to pay high bureaucratic costs of entry, they only need to be large enough to afford it.

5. Conclusion

This paper uses cross-country data to identify the impact of the business environment on entrepreneurship. We use the Amadeus database, which includes financial data on over three million firms in Western and Eastern Europe. These data improve upon previously used datasets in that they include (1) a large number of private, unlisted, and publicly traded corporations and (2) all sectors (i.e., not limited to manufacturing). This database offers a unique opportunity for us to construct entry rates across sectors and test the effect of diverse industry- and country-level characteristics on new firm creation.

To summarize our results, we find that entry regulations hamper entry, especially in industries that naturally should have high entry. Entrants are larger—suggesting that small firms are dissuaded from entering or have to grow without the protection of limited liability until they can afford the costs of incorporation. Also, the value added per employee in naturally "high-entry" industries grows more slowly in countries with high entry barriers. The effect is primarily seen in older firms, suggesting that entry barriers mute the disciplining effect of competition. Taken together, our findings suggest that entry regulations have significant adverse effects. Since we have not measured the value of all potential benefits, we cannot make a categorical statement about the net welfare effects of these regulations.

However, the effect of these entry regulations is seen primarily in developed countries or countries where there is little corruption. To the extent that the benefits of screening are small, and other benefits—such as the provision of greater information to the authorities—can be captured even with reduced costs (for example, by automating the process), a reduction in the cost of complying with regulations governing incorporation will have the most pronounced effect in developed countries such as those in Continental Europe, where existing entry regulations are most effectively enforced.

In developing countries or countries where corruption is a serious problem, entry regulations are unlikely to help screen out cheats. To the extent that such regulations increase the cost of entry (if nothing else, through the additional bribes that have to be paid), without any benefits in screening or information gathering, there could be merit to reducing the regulatory requirements substantially.

The broader point made is that entry regulation has costs over and above the direct costs of compliance and enforcement. While there could indeed be deeper politico-economic interests underpinning such regulation that negate any attempt at deregulation, authorities should weigh these "excess costs" of entry regulation carefully in deciding policy.

Appendix A

Details about collection of company accounts in Amadeus are given in Table 12.

Table 12

Country	Which companies have to file accounts?	Are all public and private limited companies required to file accounts?	Maximum period a company can take to file accounts after its year end	Maximum period between filing of accounts and records appearing in database
Austria	Public limited companies (AG) and private limited companies (GmbH).	Yes	12 months	3 months
Belgium	All public limited companies (SA/NV) companies, private limited companies (SPRL/BV/BVBA), partnerships, cooperatives, and European Economic Interest Groupings.	Yes	7 months	3 months
Bulgaria	Joint Stock companies (EAD).	No, only public limited companies.	n.a.	n.a.
Czech Republic	Joint stock companies, limited liability companies and cooperatives. Limited liability companies and cooperatives only if they meet at least one of the following two conditions in the previous year: equity > CZK 20 million and turnover > CZK 40 million.	No, only if they meet certain size criteria.	6 months	4–5 weeks
Denmark	Public limited companies (A/S), private limited companies (ApS), limited partnerships by shares (P/S), and some limited and general partnerships.	Yes	5–6 months	Less than 20 days
Estonia	Public limited companies, private limited companies, and cooperatives.	Yes	6 months	12 months
Finland	All joint-stock companies and all cooperatives that meet two of the following three conditions: turnover > FIM 20 million, total assets > FIM 10 million, number of employees > 50.	No, only if they meet certain size criteria.	8 months	n.a.
France	Public limited companies (SA), private limited companies (SARL), limited partnerships (SCS), general partnerships (SNC), and sole proprietorships with limited liability (EURL).	Yes	4–6 months	4 months
Germany	Public limited companies (AG), private limited companies (GmbH), and cooperatives (eG).	Yes	12 months	4–6 weeks
Greece	Public and private limited companies (SA).	Yes	6 months	20–40 days
Hungary	All companies, except proprietorships.	Yes	5 months	n.a.
Iceland	All public limited companies (HF), private limited companies (EHF), general cooperatives (SVF), and some partnerships and agricultural cooperatives.	Yes	8 months	6 weeks
Ireland	Public limited companies (plc) and private limited companies (ltd).	Yes	46 days	n.a.

Table 12 (*continued*)

Country	Which companies have to file accounts?	Are all public and private limited companies required to file accounts?	Maximum period a company can take to file accounts after its year end	Maximum period between filing of accounts and records appearing in database
Italy	Public limited companies (S.p.A.) and private limited companies (S.r.l.).	Yes	6 months	5 months
Latvia	All companies, except sole proprietorships and farms with annual turnover < LVL 45,000.	Yes	4–10 months	9 months
Lithuania	All companies.	Yes	5 months	n.a.
Luxembourg	Public limited companies (S.A.), private limited companies (S.A.R.L.) and cooperatives (S.C.).	Yes	6 months	2 months
Netherlands	Public limited companies (NV) and private limited companies (BV).	Yes	15 months	
Norway	All limited liability companies. Unlimited liability entities only if turnover > NOK 2 million.	Yes	6 months	2 months
Poland	All joint stock companies, limited liability companies, and partnerships that meet the following criteria: employees > 50, total assets > Euro 1 million, and net profits > Euro 3 million.	No, only if they meet certain size criteria.	9 months	n.a.
Portugal	All joint-stock companies and private limited companies.	Yes	6 months	2 months
Romania	Joint stock companies, limited liability companies, and partnerships limited by shares.	Yes	2.5 months	4 months
Slovak Republic	Joint stock companies (a.s.), limited liability companies (s.r.o.), and cooperatives if they meet two of three conditions: Assets > SKK 20 mln, turnover > SKK 40 mln, and number of employees > 20.	No, only if they meet certain size criteria.	12 months	4–5 weeks
Slovenia	All companies.	Yes	3 months	2–4 months
Spain	All public limited companies (S.A.), private limited companies (S.L.) and limited partnerships.	Yes	7 months	n.a.
Sweden	All public and private limited companies (AB).	Yes	6 months	n.a.
Switzerland	There are no legal requirements to file accounts. Listed public limited corporations (AG/SA) must file accounts to the stock exchange and publish audited statements in the official gazette.	No	n.a.	3 months
United Kingdom	Public limited companies (plc) and private limited companies (ltd).	Yes	7–10 months	10 weeks

Source: Amadeus, Bureau Van Dijk, Dun & Bradstreet Country Report Guides, and Primark Capital Markets Guide 1999. Note: Data excludes proprietorships in all countries.

Appendix B

Definition of Variables are given in Table 13.

Table 13

Variable	Description
Amadeus industry-level variables	
Entry	Share of new firms in the total number of firms. New firms are firms that are one or two years old. Average for the years 1998–1999. We calculate this country-industry level variable for two-digit NACE industries. Source: Amadeus.
Industry share	Ratio of the industry's sales to total sales. Average for the years 1998–1999. We calculate this country-industry level variable for two-digit NACE industries. Source: Amadeus.
Growth in value added per employee	Growth in value added per employee over the period 1998–99 averaged over all incumbent firms in the industry in a country. Incumbent firms are defined as firms that are more than two years old. Value added is computed as earnings before interest, taxes, depreciation and amortization, plus labor costs. We calculate this country-industry level variable for two-digit NACE industries. Source: Amadeus.
Size of entrants	Logarithm of average value added (in millions of Euros) of entrants, defined as firms that are one or two years old, over the period 1998–99. We calculate this country-industry level variable for two-digit NACE industries. Source: Amadeus.
Eurostat industry-level variables	
Eurostat entry	Entry rate for the year 1999 by Eurostat industry (based on two-digit NACE industries). Source: Eurostat.
Eurostat exit	Exit rate for the year 1999 by Eurostat industry (based on two-digit NACE industries). Source: Eurostat.
U.S. Benchmark variables	
Entry U.S. ($Entry_{US}$)	Entry rates for U.S. corporations. Calculated for two-digit NACE industries (original data on a four-digit SIC level). Average for the years 1998–1999. Source: Dun & Bradstreet.
Exit U.S. ($Exit_{US}$)	Exit rates for U.S. corporations. Calculated for two-digit NACE industries (original data on a four-digit SIC level). Average for the years 1998–1999. Source: Dun & Bradstreet.
Entry U.S. 1990s ($Entry_{US,\ 1990-2000}$)	Entry rates for U.S. corporations. Calculated for two-digit NACE industries (original data on a four-digit SIC level). Average for the years 1990–2000. Source: Dun & Bradstreet.
Entry U.K. ($Entry_{UK}$)	Entry rates for U.K. corporations. Calculated for two-digit NACE industries. Average for the years 1998–1999. Source: Amadeus.
Entry Europe ($Entry_{Europe}$)	Entry rates averaged across all corporations in the sampled European countries. Calculated for two-digit NACE industries. Average for the years 1998–1999. Source: Amadeus.
Total assets (Scale)	Industry-level median of total assets. We compute this measure for all U.S. firms for the year 1995. Calculated for two-digit NACE industries (original data on a four-digit SIC level). Source: Compustat.
Total revenues (Size)	Industry-level median of total revenues. We compute this measure for all U.S. firms for the year 1995. Calculated for two-digit NACE

Table 13 (*continued*)

Variable	Description
	industries (original data on a four-digit SIC level). Source: Compustat.
External financial dependence (ExtFin)	Industry-level median of the ratio of capital expenditures minus cash flow over capital expenditures. The numerator and denominator are summed over all years for each firm before dividing. Cash flow is defined as the sum of funds from operations, decreases in inventories, decreases in receivables, and increases in payables. Capital expenditures include net acquisitions of fixed assets. This definition follows Rajan and Zingales (1998). We compute this measure for all U.S. firms for the period 1990–1999. Calculated for two-digit NACE industries (original data on a four-digit SIC level). Source: Compustat.
R & D intensity (R&D)	Measure of dependence on research and development, equal to the industry-level median of the ratio of research and development expenses to sales. The numerator and denominator are summed over all years for each firm before dividing. We compute this measure for all U.S. firms for the period 1990–99. Calculated for two-digit NACE industries (original data on a four-digit SIC level). Source: Compustat.
Labor intensity (LabInt)	Measure of labor intensity, equal to the amount of employees per value added, industry medians of ratios over all firm-years in the relevant time period. We compute this measure for all U.S. firms for the period 1990–99. A higher score indicates higher labor intensity. Calculated for two-digit NACE industries (original data on a four-digit SIC level). Source: Compustat.
Country-Level Variables	
Entry cost (EntCost)	Cost of business registration, expressed as a percentage of per capita GNP. Data for the year 1999. Source: Djankov et al. (2002).
Entry cost and time (EntTime)	Cost of business registration, including the monetized value of the entrepreneur's time. Source: Djankov et al. (2002).
Entry procedures (EntProc)	Number of procedures to register a business. Data for the year 1999. Source: Djankov et al. (2002).
Bankruptcy cost (BankCost)	Actual cost of bankruptcy proceedings as a percentage of the estate. Data for the year 2003. Source: Djankov et al. (2003).
Informal sector (Informal)	Share of the informal economy, calculated as the size of the informal economy as a percentage of official GNI. Average over the period 1999–2000. Source: Schneider (2002).
Tax disadvantage (Tax)	Tax disadvantage is the difference between the top corporate income tax and the top personal income tax rates in the country (PricewaterhouseCoopers Worldwide Taxes 1999–2000).
Private credit to GDP (Priv)	Ratio of domestic credit to the private sector scaled by GDP, average over the period 1995–99. Source: International Monetary Fund's International Financial Statistics (IMF-IFS).
Stock market capitalization (MCap)	Ratio of stock market capitalization to GDP, average over the period 1995–99. Source: World Bank World Development Indicators (WDI).
Employment laws (EmpLaw)	Index of labor regulations from Botero et al. (2004). Ranges from zero to three. A higher score indicates that regulation is more protective of a worker. Data refer to 1997.
Property rights (Prop)	Index of property rights for the year 1997. Source: Index of Economic Freedom, Heritage Foundation. Ranges from one to five with higher score indicating greater protection of property rights (we reversed the original scale).

Appendix C

U.S. entry and exit rates, by two-digit NACE Revision 1 or two-digit 1987 U.S. SIC code are given in Table 14.

Table 14

NACE	Industry	Entry	Exit	SIC	Industry	Entry	Exit
10	Coal mining	3.05	4.08	10	Metal mining	3.42	2.72
11	Oil and gas extraction	4.45	1.35	12	Coal mining	3.05	4.08
13	Mining of metal ores	3.41	2.86	13	Oil and gas extraction	4.32	1.33
14	Other mining and quarrying	3.73	1.39	14	Nonmetallic minerals, except fuels	3.73	1.39
15	Food products and beverages	5.24	1.91	15	General building contractors	9.27	4.58
16	Tobacco products	7.45	1.40	16	Heavy construction contractors	4.98	2.00
17	Textiles	6.92	2.46	17	Special trade contractors	7.81	4.10
18	Wearing apparel; fur	6.44	3.03	20	Food and kindred products	5.24	1.91
19	Luggage, handbags, footwear	9.06	2.51	21	Tobacco manufactures	7.45	1.40
20	Wood, except furniture	5.98	3.29	22	Textile mill products	6.14	2.65
21	Pulp and paper	5.26	1.87	23	Apparel and other textile products	7.02	2.68
22	Publishing; printing	5.49	2.14	24	Lumber and wood products	6.39	3.17
23	Coke and petroleum products	5.80	0.81	25	Furniture and fixtures	5.03	2.59
24	Chemicals	6.08	1.45	26	Paper and allied products	5.26	1.87
25	Rubber and plastic products	4.46	1.79	27	Printing and publishing	5.49	2.14
26	Non-metallic mineral products	5.79	1.74	28	Chemicals and allied products	6.02	1.44
27	Basic metals	4.90	2.13	29	Petroleum and coal products	4.89	0.95
28	Fabricated metal products	5.71	1.98	30	Rubber and plastics	4.29	1.52
29	Machinery and equipment n.e.c.	4.30	1.74	31	Leather and leather products	9.00	2.37
30	Office machinery and computers	8.67	2.20	32	Stone, clay, and glass products	5.93	1.79
31	Electrical machinery	5.92	1.52	33	Primary metal industries	4.90	2.13
32	Communication equipment	8.45	2.27	34	Fabricated metal products	4.31	1.83
33	Instruments, watches and clocks	5.72	1.45	35	Machinery and equipment	4.52	1.75
34	Motor vehicles and trailers	5.20	2.42	36	Electrical and electronic equipment	7.07	1.89
35	Other transport equipment	7.96	2.18	37	Transportation equipment	6.77	2.27
36	Furniture; manufacturing n.e.c.	7.92	2.33	38	Instruments and related products	6.02	1.05
40	Electricity, gas, hot water	5.56	0.88	39	Miscellaneous manufacturing	8.62	2.25
41	Distribution of water	1.74	0.28	40	Railroads and rail transportation	4.87	2.48
45	Construction	8.14	4.14	41	Local passenger transit	5.90	3.98
50	Sale and repair of motor vehicles	5.05	2.74	42	Motor freight transportation	8.45	7.33
51	Wholesale trade	5.35	1.54	44	Water transportation	4.22	1.56
52	Retail trade	7.19	2.81	45	Transportation by air	4.65	1.55
55	Hotels and restaurants	5.95	2.54	46	Pipelines, except natural gas	2.22	0.44
60	Land transport	8.41	7.68	47	Transportation services	8.24	2.14
61	Water transport	5.61	1.95	48	Communications	8.80	1.77
62	Air transport	6.19	1.75	49	Electric, gas, and sanitary services	4.68	1.51
63	Supporting transport activities	6.77	1.67	50	Wholesale trade–durable goods	4.94	1.50
64	Post and telecommunications	10.09	2.14	51	Wholesale trade–nondurable goods	5.68	1.68
70	Real estate activities	5.33	1.56	52	Building materials	4.93	1.81
71	Renting of machinery, equipment	6.34	1.93	53	General merchandise stores	6.44	2.21
72	Computer and related activities	10.73	1.91	54	Food stores	5.72	2.28
73	Research and development	6.53	0.93	55	Automotive dealers; gas stations	4.68	2.02
74	Other business activities	9.65	4.60	56	Apparel and accessory stores	8.61	2.42
85	Health and social work	2.83	1.51	57	Furniture stores	7.56	2.61
90	Sewage; disposal; sanitation	5.43	2.22	58	Eating and drinking places	6.29	2.77
92	Recreation, culture and sports	6.46	2.35	59	Miscellaneous retail	7.55	2.97
93	Other services activities	6.46	3.67	65	Real estate	5.22	1.52

Table 14 (*continued*)

NACE	Industry	Entry	Exit	SIC	Industry	Entry	Exit
				70	Hotels and other lodging places	3.83	1.13
				72	Personal services	6.56	3.73
				73	Business services	11.49	5.68
				75	Automotive repair and services	5.47	3.31
				76	Miscellaneous repair services	8.09	4.14
				78	Motion pictures	9.58	3.47
				79	Amusement and recreation	6.20	2.43
				80	Health services	2.19	1.04
				83	Social services	4.52	2.70

Sample of all U.S. corporations from Dun & Bradstreet. Averages for the years 1998–1999. *Entry* is the percentage of new corporations (firms that are one year old). *Exit* is the percentage of firms that exited following formal bankruptcy proceedings.

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