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Entry Regulation and Persistence of Profits in Incumbent Firms

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Abstract
In line with the theory of creative destruction, industries where incumbent firms generate high profits will attract entry, which should drive down profits. This disciplinary effect of entry implies that profits above the norm should not exist in the long run. Factors that affect entry—such as entry regulations—could affect this profits convergence process. Using an unbalanced panel of firm- and country-level data for approximately 13,000 firms in 33 countries between 2005 and 2013, we examine the profit dynamics of incumbent firms in the context of entry and entry regulations.

Keywords Entry · Entrepreneurship · Entry regulation · Profit · Incumbent firm · Creative destruction

JEL Classification L00 · L22 · L25 · L4 · O32

1 Introduction

A central theme in the industrial organization research is on the determinants of the set of firms in an industry, including how barriers to entry shape the competitiveness of markets and their trajectories (see Einav and Levin 2010). Research within the industrial organization literature raises questions, such as how markets look different

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from theoretical endpoints such as perfect competition, and how conditions that are related to scale economies, transaction costs, and the strategic behavior of firms unfold (see Einav and Levin 2010). A stream of the literature examines how firms can maintain high profits: the *persistence of profits* (Geroski and Jacquemin 1988; Glen et al. 2001; Goddard and Wilson 1999; Mueller 1977, 2003; Pakes 1987; Waring 1996), in the context of entry and exit barriers (see Bain 1956).

The dynamic Schumpeterian view of entrepreneurship and competition advances the process of creative destruction, wherein incumbent firms and new entrants are theorized to seamlessly respond to market forces (Schumpeter 1942, 1934). In this view, entrepreneurship is considered crucial, and new firms are theorized to put pressure on incumbent firms to do things such as innovate, reduce prices, and provide greater value to consumers. This implies that new firms play a type of disciplining role and those firms that can compete will survive, whereas those that cannot, will eventually exit. The Schumpeterian "perennial gale of creative destruction" (Schumpeter 1942) in an environment without barriers to entry and exit would be theoretically costless.

The ability of incumbent firms to maintain high profits in this context of creative destruction would theoretically be as follows: Incumbent firms in promising industries that generate high profits could attract new firms. In turn, this would theoretically drive down profits, restoring them to "normal" levels. Incumbent firms would thus not be able to maintain high profits above normal for an extended duration, and entry would have served the Schumpeterian economic function of competition within the industry (for more on the economic value of entrepreneurship, see McMillan and Woodruff 2002). As Lahti (2006) notes, competition is self-destructive. This process is considered to be important for supporting productivity growth and market contestability (see Bartelsman et al. 2004).

Markets, in reality, depart from such a clean theoretical story (see Hill and Myatt 2007). Schumpeter noted that competition is never completely lacking but also hardly ever perfect (Schumpeter 1942). We study entry and incumbent firms in order to gain insight into this dynamic process: Our study addresses a gap by connecting research on the persistence of profits and entrepreneurship. They represent pieces of the creative destruction puzzle that—despite the widely held assumption that entry erodes the competitive advantage of incumbent firms (see Han et al. 2001)—would benefit from greater explicit connection in the entrepreneurship research.

The literature on profit persistence has been concerned mostly with firm and industry drivers of high profits and less with regulatory structure (e.g., Yurtoglu 2004; Schwalbach et al. 1989; Waring 1996). In addition, this research has often been marked largely by industry (e.g., Jenny and Weber 1990), single country (e.g., Yurtoglu 2004; Mueller 2003; Kambhampati 1995), or small-group country studies (e.g., Yamawaki 1989; Geroski and Jacquemin 1988). The broader research in industrial organization has yielded disaggregated insight into specific industries (Einav and Levin 2010) and could benefit from a big picture view.

Similarly, although the entrepreneurship research is often motivated by, and assumes, that entry will exert competitive pressures on incumbent firms, it has not adequately investigated the trends in those incumbent firms, focusing instead on the trends in entry. A large and growing literature has studied the role of entry (and

other) regulations in shaping entry, with fewer explicit linkages to incumbent firm performance (see Eklund and Lappi 2018). Stuetzer et al. (2016) studied the effect of large-scale firms on entrepreneurship in regions. Recent research has examined entry dynamics such as the rate, trend, and mode of entry (Audretsch et al. 2019; Stenholm et al. 2013) and the impact of entry regulation on various types of entry (Acs et al. 2008; Klapper et al. 2006), but needs more connection to incumbent firms.

We address this knowledge gap by testing and providing empirical evidence on the role of entry and entry regulation in explaining incumbent firm profits. We combine firm-level accounting data for stock-listed firms across 33 countries with country-level data on entry regulation, in order to study the effect of entry and entry regulation over the period of 2005 to 2013. We estimate a model where we utilize the within-variation of firms' long- and short-run profit persistence in relation to a general new business (entry) density measure and three different dimensions of entry regulation. Our results are robust across various specifications.

Our findings show that entry is positively associated with incumbent firm profits, which points to questions about the direct influence of entry and the role of the industry lifecycle. Our findings call for deeper investigation of the time structure and long-run equilibrium profits of incumbent firms. We find that entry regulation can encourage incumbent firm profit persistence under some conditions that are related specifically to procedures and financial costs, but that more time needed to comply with entry regulation is not significant.

The rest of the paper is as follows: Next, we discuss the relevant research, followed by our method. We report and discuss results in the fourth section and conclude in the fifth section.

2 Literature Review

2.1 Incumbent Firm Profits

An important stream of industrial organization research relates to the determinants of market structure and the set of firms that are present in an industry (see Einav and Levin 2010). Market power is tied to profitability and market structure, and entry or exit barriers are important because of their effects on (potential) entrants and exits (see Lahti 2006). Bain (1956) identified barriers to entry that can shape the costs for firms. These can relate to the absolute cost advantage of incumbent firms, which can find lower-cost ways of production and capital accumulation; scale economies of incumbent firms; and product differentiation advantages of incumbent firms, which have the resources for activities such as research and development, or marketing and advertising to grow market share. Ultimately, some entry barriers may be more or less effective at preventing entry, which thereby can contribute to different profit trends in incumbent firms.

In addition to the entry decision, the performance of both new and incumbent firms can be useful to understand how markets and competition may evolve. One way to examine this is through profit dynamics over time. Greiner (1972) suggested a model of

firm growth that occurs in phases, with each next growth phase being tied to a "crisis" of some kind, that provides context on how the persistence of profits could matter. The ability of a firm to navigate and emerge successfully from a crisis in this Greiner framework can be related to how it mobilizes resources that are internal and external to the firm (see Belitski and Desai 2019).

The first phase reflects growth through creativity and is marked by a crisis of leadership. The firm experiences growth through direction, lining up to crisis of autonomy in the second phase. The third phase is marked by growth through delegation, which can result in a crisis of control in the firm. Next, as the firm is maturing and experiences growth through coordination, it can face a crisis of red tape. For example, a firm may be moving into new activities that expand oversight of its activities. And, a mature firm grows through collaboration, which can lead to crisis related to growth and other crises.

This sequence implies that each crisis can represent an opportunity that could deepen the advantage or disadvantage of a firm: for example, in strengthening or creating relationships; leveraging new capital; accessing new knowledge; or gaining other types of resources. As a firm grows, it may require different or greater resources to overcome the next crisis, which places a greater value on the track record of the firm (see Belitski and Desai 2019).

Greiner's growth and crisis implications may be relevant to the context of firm profits in several ways: Firms with high profits should have more financial resources to withstand a crisis if capital is one of the resources that is necessary to do so. This implies that the firm may be able to respond by making investments (e.g., a crisis related to direction could mean that a firm considers if investment in new production capacity or new product development is needed) or to absorb a period of losses (e.g., if a crisis requires short-term losses during product development or investment). Also, firms with persistent profits may be better able to finance both scenarios than are firms with limited resources: a period of proactive investment and a period of absorbing losses.

Profit persistence is the subject of comparative empirical research, with cues from Mueller's foundational work (1986, 1990). A core question in this line of work has been: Will deviating profits return to the normal level over time? Empirical studies across varied contexts (Geroski and Jacquemin 1988; Schwalbach et al. 1989; Cubbin and Gerosky 1990; Yurtoglu 2004) have offered insight as well as some inconsistent findings (see Bentzen et al. 2005). Research on profit persistence has asked about the drivers of profits in incumbent firms; this research focuses often on the firm and industry conditions (Yurtoglu 2004; Schwalbach et al. 1989; Waring 1996) such as firm size, market share, and firm growth (see Gschwandtner 2012). This line of inquiry has been marked by studies at the industry level (Jenny and Weber 1990), or at a country-level (Yurtoglu 2004; Mueller 2003; Maruyama and Odagiri 2002; Kambhampati 1995), or including a small set of countries (Yamawaki 1989).

2.2 Incumbent Firm Profits, Entry, and Entry Regulation

The relationship between entry and the profit persistence of incumbent firms warrants greater attention in the empirical research (see Porter 1981; Dean et al. 2006)

and is a meaningful question for study. Following a dynamic Schumpeterian view, entry or even the threat of entry could create competitive pressures on incumbent firms. Entry is theorized to discipline markets competitively (see Dean et al. 2006; Eklund and Lappi 2018), when new firms compete with incumbent firms for resources, suppliers, intermediaries, and buyers, as well as for market share and gains from innovation.

The role of entry itself in the process of creative destruction is often explicitly linked in contemporary research, but the role of the factors that can shape entry in this process is less clear. The importance of regulations—i.e., that institutional conditions matter—emerges as a point of convergence in a large body of research on economic outcomes broadly (Ketteni and Kottaridi 2019; Cette et al. 2016; Aghion et al. 2009; Williamson 2000) and entrepreneurship specifically (Stenholm et al. 2013; Djankov et al. 2002). Entry has been shown to be shaped by the institutional environment, in which regulations play a large role. Regulations have been linked not only to the rate of entry but also to the type, nature, and outcomes of entrepreneurial activities (Audretsch et al. 2019; Estrin et al. 2016; Klapper et al. 2006). A wide variety of settings across regulatory regimes can play a role in deterring or encouraging entry.

The origins and benefits or costs of regulation are theorized in contrasting ways among public interest and public choice perspectives (see Pigou 1938; Buchanan 1986; Stigler 1971). Regulation can play an important role by changing the cost structure that faces a firm and, in this way, setting out terms for the firm. When firms face crises that lead to growth, as theorized by Greiner (1972), their ability and even mechanisms to respond could be affected by regulation.

Business regulation governs firm activities, including the requirements to create a new firm (e.g., entry regulation), treatment of labor (e.g., labor regulation), research and development (e.g., intellectual property protections), financing and access to capital (e.g., bank regulation), security of property (e.g., land tenure and property rights regulation), and so on. Though many regulatory arrangements are important, we focus on entry regulation because it is in principle relevant to all new business activity as it governs the process of market entry. We therefore examine how entry regulation affects profit persistence.

Klapper et al. (2006) note that more complex entry regulation could create greater entry barriers and discourage the emergence of new firms, which could have a "chilling" effect on incumbent firms and mute the potential disciplining effect of competition. This could allow incumbent firms to maintain high profits. Yet at the same time, how various institutional and regulatory conditions might create or alleviate barriers to entry is not straightforward. In fact, recent research on the effect of regulations on entry demonstrates the non-monolithic nature of regulation (Audretsch et al. 2019; Charron et al. 2014) and that different types of regulations can matter (Eklund and Lappi 2018) at different times.

Entry regulation has been studied in single industries in a country (see Schivardi and Viviano 2011; Bertrand and Kramarz 2002) as well as comparatively across countries (see Djankov et al. 2002). Our interest is in the comparative cross-country

research,[1] which is concerned with empirical effects on various entrepreneurial outcomes and points to mixed findings, often negative, for a range of outcome measures (Audretsch et al. 2019; Acs et al. 2008; Ardagna and Lusardi 2010; Ho and Wong 2007; Klapper et al. 2006).

In a cross-country study that linked entry regulation with incumbent firm outcomes and new firms, Klapper et al. (2006) assessed the impact of entry regulation on the rate and average size of new firm entry and on productivity growth in incumbent firms; the authors consider that "costly entry regulations are a form of protection that has the most deleterious effect on the performance of seasoned incumbents" (2006: 594). Bartelsman et al. (2004) studied the process of creative destruction in driving productivity effects across 24 countries. They found important differences across industrialized countries, transition economies of Central and Eastern Europe, and the emerging economies of Latin America and East Asia. In addition, the nature of a particular industry is important: Klapper et al. (2006) find that the role of relative entry into industries with "naturally" high entry is disproportionately higher in the presence of low national regulatory barriers (2006: 605). They also found that high entry costs matter more in richer countries, which are also likely to be the countries that can more effectively enforce regulations.

Two recent studies point to heterogeneity of regulation as an important consideration. Audretsch et al. (2019) studied multiple types of regulation, including entry, across implementation arrangements, such as paperwork, time needed to comply, and financial cost. They find heterogeneous influence of entry regulation on entrepreneurship. Eklund and Lappi (2018) analysed the effect of product market regulation on profit persistence, including: components that are related to state control; barriers to entrepreneurship; and barriers to trade and investment. Their approach—which uses clusters representing policy regimes—finds that barriers to entrepreneurship are not significant for profit persistence but that barriers to trade and investment are positive and significant. Both Eklund and Lappi (2018) and Audretsch et al. (2019) point to the need to consider the multidimensionality of regulation. We therefore empirically investigate the role of entry and dimensions of entry regulation in explaining the profit persistence of incumbent firms.

3 Methodology

3.1 Data

Our two main data sources—Compustat and the World Bank's Doing Business Database—provide an opportunity to merge micro-level accounting data with country-level entry regulation data. Compustat provides accounting data for key firm-level information (see Table 1 for variables and definitions). The data covers firms

[1] A robust stream of research examines impact of entry regulation on non-firm measures, such as economic growth (e.g., Herrendorf and Teixeira 2011; Pistor 2009; Barseghyan 2008; Djankov et al. 2006).

Table 1 Variables, definitions, sources and descriptive statistics

Variable	Definition	Mean	SD	Min	Max
Profit ($\overline{\pi}_{j,t}$)	Return on assets (RoA) (Profit over total assets). RoA has been adjusted for the sample mean in RoA. See the text for details. Source: Compustat	0.5662	7.911	− 28.128	26.987
Procedures to start a business ($DB_{pro,\,j,t}$)	The number of procedures that are required to start up and formally operate a limited liability company (LLC) Source: Doing Business	6.402	2.789	1	15
Time to start a business ($DB_{time,\,j,t}$)	The number of days that are required to start up and formally operate a LLC Source: Doing Business	14.663	12.871	0.500	137
Cost to start a business ($DB_{cost,\,j,t}$)	The cost of to start up and formally operate a LLC, as % income per capita Source Doing Business	6.369	6.782	0	32.5
New Business (entry) Density (E_{jt})	The ratio of newly registered LLCs (or equivalent) per 1000 working-age people (aged 15–64) Source: World Bank Entrepreneurship Project	5.339	4.074	0.3107	21.310
Firm size	Firm sales, taken in logarithms Source: Compustat	5.099	2.470	− 6.908	15.524
Market share	Firm *j* market share of industry sales, computed at the SIC 2-digit level Source: Compustat	0.1357	0.264	0	1
Tangibles	Tangible assets as a share of total assets Source: Compustat	0.6502	0.286	− 21.466	1
Openness	Total value of imports and exports as share of GDP Source: World Bank	70.921	26.508	30.226	196.609
Corporate tax rate	Total tax rate Source: Doing Business	42.855	12.349	19.900	76.700
Observations		58,745			
Firms		13,135			
Countries		33			

from all industries in an economy (codes 1 to 99 at the 2-digit Standard Industrial Classification level). Accounting data are an appropriate source for incumbent firm performance because it captures firms that have reached a level of survival and performance to make filings.[2] Doing Business data provides comparable information on business regulation across countries from 2004 onwards, and it allows us to maximize our period of study and the number of countries that are included in the analysis (other data sources on entry regulation do not offer the same coverage either in the number of countries or length of time of data availability). In addition, the Doing Business data allows us to study nuances in entry regulation because it provides information on several dimensions of entry regulation, which supports a more refined analysis.

We also use two other sources of data from the World Bank: The Entrepreneurship Project provides data on new limited liability companies or equivalent across countries, sourced from official records in the country. And we use World Bank data for our openness control variable. Estimating the profit persistence at a firm-level while combining the country level measures achieves a comprehensive picture over the period of our study. This is a value-added to the industrial organization research—which has been able to go deep into many specific industries but not always provided a more holistic view.

Our final merged dataset is an unbalanced panel of 13,135 firms in 33 countries for the years 2005 to 2013. The sample is composed of firms in Australia, Austria, Belgium, Bulgaria, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Ireland, Israel, Italy, Japan, Korea, the Netherlands, New Zealand, Norway, Portugal, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, United Kingdom, and United States, reflecting 30 OECD and 3 non-OECD countries.

3.2 Dependent Variable: Profits

Our dependent variable is calculated as mean-centered profit at the global-scale for each year. This means, we subtract the mean return on assets (RoA) in a given year from each firm's RoA.[3] This adjustment means that our dependent variable ($\overline{\pi}_{j,t}$) measures the deviation from the profit norm for firm j at time t.[4]

The dynamic view of industry competition posits that "normal" profits will emerge in the long-run in a competitive market, as the result of a responsive process of entry and exit among new and incumbent firms. In this view, the opportunity cost of capital is a transitory disequilibrium phenomenon, in the presence of low or no other barriers to entry. High and low profits are defined relative to the industry

[2] Industrial organization research has moved towards within industry studies and away from comparative industry studies (for review e.g. Einav and Levin, 2010). We consider that there can be benefits in a broad view from comparative studies making use of longer time series. To this end it is useful to rely on accounting data despite its drawbacks..

[3] Defined formally as $\overline{\pi}_{j,t} = \pi_{j,t} - \frac{\sum_{j=1}^{n} \pi_{j,t}}{n}$. The results are robust to alternative de-meaning variations.

[4] To see why profit persistence is a relative term, see, e.g., Jacobsen (1988).

average. Industries in which incumbent firms are achieving high profits will attract new entrants; competitive pressures that are created by entry will force incumbents to reduce prices, which there by reduces profits. It can be assumed that an industry will attract entry as long as $\pi_n \geq$ fixed cost.

Under this assumption it is straightforward to derive the following equation, which can be estimated empirically:

$$\overline{\pi}_{j,t} = \alpha + \lambda \overline{\pi}_{j,t-1} + \varepsilon_{j,t} \tag{1}$$

where α represents a non-transitory permanent component to profits; λ represents the speed at which profits converge towards the norm; and ε is a conventional error term. If we assume that $-1 \leq \lambda \leq 1$, then profits will converge to the equilibrium rate of return as time passes.[5] Naturally, this implies that further decomposition of profits is possible. See Mueller (2003 and 1986) for more details, and the "Appendix" for details on the profit decomposition. Our approach to calculating adjusted profit rates should consequently be nearly free of cyclical influences. We use the sample mean; if industry-specific effects are important, they are most likely to be observed in explaining differences in permanent rents.

Measurement and reporting errors were problematic: Shapiro-Wilks test and simple histogram show that RoA is not normally distributed, due to a few but very large and influential outliers. To achieve a normal distribution, we cap RoA at both ends of the distribution by removing the 1st and 99th percentile. We then also exclude observations for RoA $< -$ 25%[6] on theoretical grounds because unless these firms receive loss coverage and additional capital, they will not survive for any length of time. This adjustment was appropriate because the analysis in this paper relies on the adjustment of each observation by subtracting the mean: a centered dependent variable.

Table 1 contains our list of variables, definitions, sources, and descriptive statistics. Correlations for our variables are reported in Table 3 ("Appendix").

3.3 Explanatory and Control Variables

We measure entry with the use of *new business (entry) density*: the ratio of new limited liability firms or equivalent in a country per 1000 working-age population (aged 15–64) (Klapper and Love 2010), from the World Bank Group Entrepreneurship Project. It provides a comparable measure across countries and captures existing entrepreneurial activity and can represent the pressure of competition for incumbent firms. The entry rate includes new private sector limited liability firms in a country not limited to a single industry as it tries to capture the overall entrepreneurial

[5] Most studies on the persistence of profit find that the λ-parameter is in the region of 0.5 (Mueller 2003).

[6] Presumably this does not reflect a regular profit motive. For example, some firms might be set up by parent corporations for the purpose of absorbing losses.

activity.[7] We recognize that LLCs included in this measure are not the only form of entry that entrepreneurial activity can take, but we feel it is an appropriate tradeoff of cross-country comparability and representation of entry.[8]

We use three variables to reflect three dimensions that are related specifically to entry regulation in a country. First, we use *procedures to start a business*: the number of procedures, applicable to all businesses, that are required to start up and formally operate a limited liability company in a country. Second, we use *time to start a business*: the number of days that are needed to complete the LLC processes. Third, we use *cost to start a business*: the cost to start up and formally operate a LLC as a percentage of income per capita in the economy. All three variables for entry regulation come from the Doing Business data.

We use three measures because entry regulation itself is not one-dimensional and different measures of entry regulation could impact new firms in different ways (Audretsch et al. 2019). They can reflect different components of the regulatory environment, which may not always be obvious. For example, a country may have what appears to be a low procedural requirement: very few procedures for starting a business. However, it could be that each procedure takes a significant amount of time to complete or requires coordination with other people, like the spouse of the owner. Or, it could be that the cost of starting a business is low but that procedures are complicated and new owners need expert legal guidance. Nuances such as these cannot be captured by a single dimension of regulation. This heterogeneity in the regulatory environment—even within one type of regulation (entry)—can be relevant across contexts and to different outcomes (e.g., Schivardi and Viviano 2001; Bertrand and Kramarz 2002), which are not straightforward, given also that different distortions could actually be occurring at the same time (Bartelsman et al. 2004).For example, Ciccone and Papaioannou (2007) studied entry procedures in 45 countries and found that less time to register a business was associated with greater entry at an industry level; but Audretsch et al. (2019) found the impact of time that was spent meeting regulatory requirements on different types of entrepreneurial outcomes to be inconsistent.

We include several control variables from the Compustat data to account for firm characteristics that could affect profit dynamics (see Gschwandtner 2012). We account for *firm size*: the logarithm of firm sales. We control for *market share*: a firm's market share of industry sales at the SIC 2-digit code. We also include *tangibles*: the value of a firm's physical assets to total assets. *Openness* is included because of the importance of export markets in growth opportunities for new and incumbent firms (see Edwards 1998). We measure openness as the total value of

[7] The World Bank makes several assumptions about the business and owners for the sake of comparability, including assumptions related to domestic ownership; general industrial or commercial activities and exclusions for specific activities; qualification for investment incentives; startup capital; number and structure of owners; employee size; office space; company deed (see doingbusiness.org/en/methodology/start-a-business),.

[8] The entry rate is endogenous as firms adjust their profit levels possibly in expectations of new entrants or try to lobby for more regulations. But if firms do not have full monopoly power, they cannot influence the number of entrants. This is especially true as our measure of entry is not at the industry level.

imports and exports as a share of GDP in a country, taken from the World Bank. Finally, we include the *corporate tax rate* to account for the institutional context more broadly It can be relevant to firm activities as well as entrepreneurial behaviors (Djankov et al. 2010). This is measured as the total tax rate and taken from Doing Business database.

3.4 Method

As profit convergence is an autoregressive process, we include one lag of the profit to estimate the short-run profit persistence.[9] We estimate the following equation:

$$\overline{\pi}_{j,t} = \alpha + \beta_1 \overline{\pi}_{j,t-1} + \beta_2 \left(\overline{\pi}_{j,t-1} \times DB_{j,t}\right) + \beta_3 DB_{j,t} + \beta_4 \boldsymbol{X}_{j,t} + e_j + e_t + \varepsilon_{j,t} \quad (2)$$

where $DB_{j,t}$ is the regulatory measure; $\mathbf{X}_{\mathrm{j,t}}$ is a vector of control variables that include the firm- and country-level variables that were specified above; e_j is firm and e_t time fixed effects, respectively; and $\varepsilon_{j,t}$ is a conventional error term. The persistence parameter λ corresponds to the marginal effect: $\beta_1 + \beta_2 DB_{j,t}$. The regulatory variables (denoted as $DB_{j,t}$) are included in separate models: (1) number of procedures to start a business; (2) time required to start a business; (3) cost to start a business; and (4) new business entry density.

With estimating Eq. 2 including firm fixed effects, we control for the time-invariant country and industry-specific shocks and idiosyncratic differences. Controlling for industry effects is important since variation in both competition and profits[10] could be due to industry factors (see Gschwandtner 2012; Goddard and Wilson 1999; Waring 1996; Shchol 1990). An alternative way of resolving this is to remove industry effects from the data. This can be achieved by adjusting profits by industry mean, rather than by global mean. We therefore also have adjusted the profit measure using industry means at the two-digit industry level in additional estimations. This means that firm profit is measured as the deviation from industry mean. This adjustment allows for significant industry variation in profits, and we observe how firm profits converge towards industry profits. Apart from the adjustment, the models are specified in the same manner with the results being robust. The results of de-meaning with industries are available from the authors upon request. The main results in Sect. 4 use the pre-specified global de-meaning.

[9] The results are robust when we include a lag structure of higher orders.

[10] For example, Aghion et al. (2009) examined the effect of entry on two other trends for incumbent firms: innovation incentives; and productivity growth. They found that entry matters -- depending on the level of technological advancement of the industry. Though they did not examine profits, the concern about industry effects is relevant to our study.

Table 2 Fixed effects model

Dependent variable: $\overline{\pi}_{j,t}$	(1)	(2)	(3)	(4)
$\overline{\pi}_{j,t-1}$	0.068***	0.089***	0.123***	0.120***
	(0.017)	(0.012)	(0.011)	(0.015)
$DB_{pro,\,j,t}$	0.134***			
	(0.037)			
$DB_{time,\,j,t}$		0.005		
		(0.005)		
$DB_{cost,\,j,t}$			0.039**	
			(0.019)	
$E_{j,t}$				0.106***
				(0.035)
Interaction terms with $\overline{\pi}_{j,t-1}$				
$DB_{pro,\,j,t}{}^{*}\,\overline{\pi}_{j,t-1}$	0.012***			
	(0.002)			
$DB_{time,\,j,t}{}^{*}\,\overline{\pi}_{j,t-1}$		0.004***		
		(0.001)		
$DB_{cost,\,j,t}{}^{*}\,\overline{\pi}_{j,t-1}$			0.004***	
			(0.001)	
$E_{j,t}{}^{*}\,\overline{\pi}_{j,t-1}$				− 0.001
				(0.002)
Firm and country level control variables				
Firm size	1.868***	1.874***	1.850***	2.041***
	(0.106)	(0.107)	(0.107)	(0.131)
Market share	− 0.533	− 0.475	− 0.490	− 0.363
	(0.459)	(0.453)	(0.457)	(0.511)
Tangibles	9.263***	9.292***	9.291***	9.153***
	(1.794)	(1.801)	(1.802)	(2.308)
Openness	0.014***	0.005	0.008	0.012**
	(0.005)	(0.005)	(0.005)	(0.006)
Corporate tax rate	0.005	0.011	0.010	0.029
	(0.010)	(0.010)	(0.010)	(0.018)
Constant	− 16.317***	− 15.279***	− 15.408***	− 17.579***
	(1.573)	(1.635)	(1.628)	(2.002)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
No. of observations	58,745	58,745	58,745	45,832
No. of firms	13,135	13,135	13,135	9106
No. of countries	33	33	33	30
R^2	0.108	0.109	0.107	0.096
VIF	2.07	1.66	1.56	1.77

Robust standard errors in parentheses. ***,** and * indicates significance at 1%, 5% and 10% respectively. The firm and year fixed effects are significantly different from zero collectively and thus should be added in the estimations

4 Results and Discussion

4.1 Main Results

The results for our fixed-effects model with dependent variable adjusted profits are reported in Table 2. Specifications 1, 2, and 3 correspond to estimations for procedures to start a business, time to start a business, and cost to start a business, respectively. Specification 4 corresponds to entry density.

The results for our firm and country-level control variables are largely consistent with previous research. Firm size is always positively associated with incumbent firm profits, and it is highly significant across all four estimations. This is consistent with a large literature on the role of established large firms as having greater power and resources, as compared to new firms that have access to relatively fewer resources (Tonoyan et al. 2010). Similarly, the result for tangibles is always positively associated with incumbent firm profits (Eklund and Lappi 2018). This can be interpreted similarly to the role of firm size. Openness is positive and significant in specifications 1 (0.014) and 4 (0.012). We find that market share and the corporate tax rate are not significant. This could be because they matter little or this could be related to not having enough variation in a fixed-effects estimation setting.

We turn to our key explanatory variables of interest: Our results for entry show a highly significant and positive association with incumbent firm profits (0.106). This is not consistent with a theoretical disciplining effect, even within the relatively short period that our study captures. Our results for three measures of entry regulation show a mixed influence on incumbent firm profits. We find that two of our three entry regulation measures have a positive and significant influence on incumbent firm profits, and the third variable is not significant though still positive. The significant results are for the number of procedures to start a business (0.134) and the cost to start a business (0.039). This demonstrates that entry regulation can have a direct relationship to incumbent firm profits—depending on the type of regulation—and adds insight to an emerging line of research on entrepreneurship that considers regulatory heterogeneity (Audretsch et al. 2019; Eklund and Lappi 2018; Stenholm et al. 2013).

We find that our interaction terms that involve regulatory measures are positive and significant: procedures*profits (0.012); time*profits (0.004); and cost*profits (0.004). This implies that firms that had high profits in the previous year are better able to manage regulatory requirements, and actually have an advantage in environments where regulations are more extensive, more time-intensive, and more costly. Time to start a business was not significant, but the interaction of time*profits was significant. Our interaction term for entry*profits is not significant. Using interaction terms may cause a multicollinearity issue; this is not the case in our estimation. The variance inflation factor (VIF) is well below the commonly used critical thresholds of either 4 or 10 (see for example O'Brien 2007 for a discussion). However, including further interactions would result in collinearity to cause a problem in the estimations.

There may be several possible interpretations for the finding that entry is positively associated with incumbent firm profits. One interpretation could be that for promising industries that are expanding, there may be economic opportunities for many firms as those industries are growing. Strong profit opportunities in a growing industry may allow incumbents to achieve high profits and attract high rates of entry at the same time in the short term. Another interpretation could be that new entrants may not realize profits immediately. Our analysis includes a lag of 1 year, which may not allow for enough time to capture profit dynamics in industries that require longer cycles to achieve profits. For example, R&D in pharmaceutical industries may take many years, and the success of the drug experimentation phase may be still unknown in the first few years in the life of a new firm (see Zachary et al. 2015).

Incumbent firms could feel and respond to competitive pressures because they expect competition in the near future. This could push them to innovate, which could bring about high profits. Eklund and Wiberg (2008) find that firms with sustained R&D investments show higher profit levels and argue that investing in R&D may allow firms to maintain high profits even in the absence of significant entry barriers. In more mature industries where technology has matured, large incumbent firms may be more important innovative players (Block et al. 2016) and already have resources to innovate, and this may mean that it is more difficult for new firms to make profits quickly. If this were the case, the positive finding for entry could also be tied to delays in profits for entrepreneurial firms. It could be that incumbent firms may be maintaining high profits because of innovation in anticipation of future competition from those firms. Or it could also reflect that the time lags in our analysis do not capture a long enough period in an industry to accommodate that entry is a process that may take time (Zachary et al. 2015). An evolutionary view of industries (Nelson and Winter 1982) that takes into account different growth phases (Greiner 1972) could also be useful.

Another interpretation could be that the relationship is driven by specific industries; we do not identify if these results hold across all industries or some key industries dominate even if we control for the industries empirically. This may be related to the measure of entry density used in our analysis, which could be affected by industry and country-specific characteristics. It could be that some combination of time and industry factors are creating different outcomes, and further research connecting to the body of research on entry timing specifically (see Zachary et al. 2015) could provide insight on the time dimensions related to profit persistence. Waring (1996) found evidence that industry characteristics, including R&D, have an impact on the speed of the profit convergence process, and Karakaya and Kerin (2007) found that the importance of barriers can vary at different industry and product life stages. Zachary et al. (2015) note that while some firms attempt to displace early movers (Markman et al. 2009), other firms wait and use speed capabilities to catch up or surpass first movers (Hawk et al. 2013) in product markets. Future research could examine longer time frames and decompose incumbent firm profits based on industry, to understand how profit cycles and investment in R&D can affect competitive dynamics. Finally, it could simply be that profit performance is a net outcome of many factors (Lieberman and Montgomery 2013).

Our findings that procedures to start a business and the cost of starting a business are positively related to incumbent firm profit persistence could be interpreted in several ways. If more procedures also raise difficulty or complexity of compliance, for example by requiring more documentation or special information, potential entrants may need to hire lawyers or devote a lot of time to navigating the procedures. It is also possible however that more procedures may not substantially raise difficulty: for example, if the procedures are straightforward and easy to achieve. When the financial cost to start a business is higher, this could mean new entrants may not be able to invest as heavily in growth-oriented activities. Potential entrants could react in several ways. One reaction could be that it may simply be too complicated or too expensive to enter the market, and some potential entrants may decide against it. Another reaction could be still to enter the market but not achieve high profits as quickly because the entrants have diverted resources to comply with regulations. Potential entrants might not be able to invest fully in production capacity or might not have funds to hire employees to ramp up growth activities. Some potential entrants may establish new firms but operate them part-time or in conjunction with other labor market participation, or others may enter the market but operate informally.

Our finding that the time needed to comply with the regulation is not significant shows that the role of regulations is not homogeneous. A question for future research is to gain a better understanding of the long-run equilibrium nature of profit persistence, which we are unable to do given that our panel is 9 years. Another question for future research is to consider how the strategic choices of firms within an industry (see Porter 1981) respond to the regulations that we study. An interesting question in this regard is on potential nonlinearities in the relationships.

It would also be productive for future research to go beyond the type of entrepreneurship and the dimensions of regulation we examined. Our measure of entry is based on limited liability companies or equivalent, which offers comparability but would not capture other types of new formal business activity. In addition, some new businesses may not have formal operating status but could still be observable or relevant to incumbent firms. The extent to which formal and informal entrepreneurial activities are shaped by entry regulations is a productive question for future research. This type of heterogeneity of entry—and entrepreneurs—could be affected in different ways by entry regulation (Bruhn 2013). Examining other types of incorporation status would make it possible to understand how they may play a role in affecting incumbent firm profits.

4.2 Robustness Check

As a robustness check, we run our models again using OLS. As we have a lagged dependent variable, we should use a difference- or system-GMM estimator as proposed by Arellano and Bond (1991) and Blundell and Bond (1998). Since we can theoretically expect the GMM results to be between OLS and FE estimation and we find that the estimators produce coefficients that are close to each other, we do not

produce the GMM estimates which also simplifies the interpretation of the estimated coefficients.

Our robustness check (see Table 4) finds that all measures of entry regulation are significant and positive: procedures to start a business (0.155); time to start a business (0.014); and cost to start a business (0.088). This is largely consistent with our main effects model, where the only difference is that time to start a business was not significant. As with our main fixed effects model, we find that entry density is positive and significant (0.071). We find that the interaction terms for regulations and previous year profit are consistent with our main model: procedures to start a business interacted with profits is positive (0.003); time*profits is positive (0.001); and cost*profits is positive (0.002). The interaction entry*profits is not significant, as with our main model. The findings for most control variables are also similar: Firm size, tangibles, and openness are positive and consistent for all specifications. Market share, which was not significant in our main model, is negative and significant in our OLS model. The corporate tax rate, as with the main model, remains insignificant.

5 Conclusion

In this paper we studied profit dynamics in more than 13,000 firms across 33 countries and find that some dimensions of entry regulation are often positively associated with persistent profits in incumbent firms. We find that two types of entry regulation (procedures and financial costs) can favor profits persistence of incumbent firms but this cannot be generalized to all dimensions of entry regulation (time). Second, we find entry itself does not have an immediate depressive effect on incumbent firms' profits within the first lag.

We advance the literature—rooted in industrial organization and entrepreneurship—by connecting persistence of profits, entry, and entry regulation. Our study provides evidence of this phenomenon across countries: This is a relationship that is often assumed but not often empirically tested. In addition, our findings on entry regulation provide useful considerations for decision-makers who are interested in understanding how regulatory arrangements can affect the competitiveness of industries; and our findings point to the importance of considering the long-run behavior of profits in the research that is at the intersection of entrepreneurship and regulation.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Appendix: Profit Decomposition

In order to capture the long-run dynamics of a firm's profitability, a decomposition of the firm's profits is necessary. Mueller (1986, 1990) has suggested that profits (π) can be decomposed in the following way[11]:

$$\pi_{j,t} = c + r_j + s_{j,t} \tag{3}$$

where $_{j,t}$ is the profit for firm j at time t; c is the normal competitive return; r_j is a firm-specific permanent rent for firm j, e.g., a premium for risk; and $s_{j,t}$ is a transitory rent. In the long-run, the equilibrium profit will be equal to the competitive return $\left(\pi_{j,t} = c\right)$ for a firm working in a competitive market. Hereafter this long-run equilibrium return, of any firm j, is referred to as Π_j^*. The transitory component $s_{j,t}$, is assumed to decline in the following way:

$$s_{j,t} = \lambda_j s_{j,t-1} \tag{4}$$

The λ-parameter shows the speed of the profit decay. By substitution, this gives the following first-order autoregressive function:

$$\pi_{j,t} = (c + r_j)(1 - \lambda_j) + \lambda_j \pi_{j,t-1} \tag{5}$$

This reduces to the following empirically testable model:

$$\pi_{j,t} = \alpha_j + \lambda_j \pi_{j,t-1} + \varepsilon_{j,t} \tag{6}$$

where $\alpha_j \equiv c + r_j \equiv \pi^*$ (long-run equilibrium profit), and $\varepsilon_{j,t}$ is an error term. Note that this is the same equation as above. The long-run projected profits of firm j—$\hat{\pi}_j$—can then be derived and estimated as[12]:

$$\hat{\pi}_j^* = \frac{\hat{\alpha}_j}{1 - \hat{\lambda}_j} \tag{7}$$

(Tables 3, 4).

[11] Another formulation is to decompose transitory rent into industry and firm-specific rent (Waring, 1996).

[12] If more than one lag is used, the long-run profit is estimated as: $\hat{\pi}_j = \frac{\hat{\alpha}_i}{1-\left(\sum_{i=1}^{lag} \hat{\lambda}_{ij}\right)}$.

Table 3 Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) $\overline{\pi}_{j,t-1}$	1.000									
(2) $DB_{pro,\,j,t}$	0.019	1.000								
(3) $DB_{time,\,j,t}$	0.098	0.542	1.000							
(4) $DB_{cost,\,j,t}$	− 0.006	0.744	0.339	1.000						
(5) $E_{j,t}$	− 0.020	− 0.600	− 0.275	− 0.645	1.000					
(6) Firm size	0.280	0.060	0.203	0.050	− 0.169	1.000				
(7) Market share	0.078	− 0.042	0.146	− 0.053	0.002	0.403	1.000			
(8) Tangibles	0.113	0.077	0.038	0.127	− 0.076	− 0.195	− 0.099	1.000		
(9) Openness	− 0.057	− 0.198	− 0.207	− 0.137	− 0.105	− 0.015	0.030	− 0.087	1.000	
(1) Corporate tax rate	0.057	0.163	0.115	0.284	− 0.482	0.214	0.164	0.058	− 0.308	1.000

Correlations based on 58,745 observation for 13,135 firms

Table 4 OLS model (without firm FE)

Dependent variable: $\overline{\pi}_{j,t}$	(1)	(2)	(3)	(4)
$\overline{\pi}_{j,t-1}$	0.507***	0.509***	0.515***	0.538***
	(0.012)	(0.008)	(0.007)	(0.011)
$DB_{pro,\,j,t}$	0.155***			
	(0.034)			
$DB_{time,\,j,t}$		0.014***		
		(0.004)		
$DB_{cost,\,j,t}$			0.088***	
			(0.018)	
$E_{j,t}$				0.071**
				(0.032)
Interaction terms with $\overline{\pi}_{j,t-1}$				
$DB_{pro,\,j,t}{}^{*}\,\overline{\pi}_{j,t-1}$	0.003*			
	(0.002)			
$DB_{time,\,j,t}{}^{*}\,\overline{\pi}_{j,t-1}$		0.001***		
		(0.000)		
$DB_{cost,\,j,t}{}^{*}\,\overline{\pi}_{j,t-1}$			0.002**	
			(0.001)	
$E_{j,t}{}^{*}\,\overline{\pi}_{j,t-1}$				− 0.002
				(0.001)
Firm and country level control variables				
Firm size	0.601***	0.602***	0.602***	0.617***
	(0.022)	(0.022)	(0.022)	(0.026)
Market share	− 0.675***	− 0.681***	− 0.672***	− 0.756***
	(0.122)	(0.122)	(0.122)	(0.138)
Tangibles	3.761***	3.761***	3.756***	3.717***
	(0.470)	(0.470)	(0.470)	(0.558)
Openness	0.023***	0.015***	0.017***	0.014**
	(0.005)	(0.005)	(0.005)	(0.005)
Corporate tax rate	− 0.008	− 0.001	− 0.006	0.030*
	(0.009)	(0.009)	(0.009)	(0.015)
Constant	− 4.447***	− 4.079***	− 3.999***	− 5.799***
	(0.699)	(0.692)	(0.692)	(0.933)
Firm FE	No	No	No	No
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
No. of observations	58,745	58,745	58,745	45,832
No. of firms	13,135	13,135	13,135	9106
No. of countries	33	33	33	30
R^2	0.406	0.406	0.406	0.411

Robust standard errors in parentheses. ***,** and * indicates significance at 1%, 5%, and 10% respectively

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