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Johan E. Eklund and Sameeksha Desai

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Entry Regulation and Persistence of Profits in Incumbent Firms

Johan E. Eklund[1] and Sameeksha Desai[2]

Abstract

In a competitive milieu, profits above the norm will not persist for any length of time. Industries in which incumbent firms generate high profits will attract entry, which should subsequently drive down profits. A competitive market will allow this process to establish normal profit levels in the long run. However, entry barriers, including those originating in regulation, can play a role in slowing down or speeding up this convergence process. This paper examines profit dynamics in the context of entry regulation. We use an unbalanced panel of approximately 100,000 observations, compiled from micro-level firm accounting data merged with country-level entry regulation data. Our panel represents more than 20,000 firms in 59 countries across the years 1998-2011. We find evidence that difference dimensions of entry regulation play a crucial role in determining how competitive markets are and how quickly profits are restored to competitive levels.

JEL classification: L00 L22 L25 L4 O32

Keywords: entrepreneurship, cost of doing business, entry, regulation of entry, profit dynamics, persistence of profit

[1] Swedish Entrepreneurship Forum, Jönköping International Business School and CESIS the Royal Institute of Technology (johan.eklund@entreprenorskapsforum.se) or (johan.eklund@ihh.hj.se)
[2] School of Public and Environmental Affairs, Indiana University (desai@indiana.edu)

1. Introduction

The dynamic, Schumpeterian view of entrepreneurship and competition posits the process of creative destruction, wherein incumbent firms and new entrants easily and seamlessly respond to market forces. In such an environment – a perfectly competitive market – incumbent firms in promising industries will generate high profits. These high profits will attract entrepreneurs, who in the absence of entry barriers will quickly start new firms. This will, in turn, drive down profits, restoring them to "normal" levels. Incumbent firms will thus not be able to maintain high profits above normal, and entry has served a critical economic function of boosting competition within the industry[3].

The ability of incumbent firms to maintain high profits – *the persistence of profits* – is a valuable reflection of this process and overall competitiveness in an industry. The Schumpeterian process of creative destruction at its ideal represents an ideal and perfectly competitive market, without barriers to entry and exit. However, no perfectly competitive market exists, and in fact, entry barriers of varying magnitudes discourage entry across countries (Djankov et al., 2002). A key source of entry barriers comes from business regulation which can raise entry costs (Bain, 1956) and range from registration requirements to licensing, export/import and social security laws. *Entry regulation* is particularly important as this type of business regulation specifically governs the process of starting a business, such as the number of procedures to register a new business or the cost to file the registration paperwork (Djankov et al., 2002). More complex entry regulation should create greater barriers to entry and discourage the emergence of new firms; this could "have a chilling effect on incumbents and mute the disciplinary effects of competition" (Klapper et al., 2006), thereby allowing incumbent firms to maintain high profits.

We ask the question: *how does entry regulation affect profit persistence in incumbent firms across countries?* In doing so, we advance – and connect - two streams of literature. First, the literature on profit persistence has been concerned largely 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 literature has also focused largely on industry (Jenny and Weber, 1990), single country (Yurtoglu, 2004; Mueller, 2003; Khambampati, 1995) or small-group country studies (Yamawaki, 1989; Geroski and Jacquemin, 1988). We contribute to the profit persistence literature in two ways, by considering the role of regulation in driving incumbent firm profits, and by examining a large group of 59 countries over time. Second, the research on entry regulation has examined impacts on various types of entry (Acs et al., 2008; Klapper et al., 2006) but neglects incumbent firms. The lack of attention to incumbent firms and particularly to profit persistence is puzzling given the widely held assumption that entry erodes the competitive advantage of incumbent firms over time (see Porter, 1985; Dean et al., 2004) in the process of creative destruction - and by logical extension, the role of entry regulation. The few studies which have examined the impact of entry regulation on incumbent firm performance have looked at measures such as output productivity (Klapper et. al., 2006). We advance the literature on entry regulation by examining an understudied trend (profit persistence) of an understudied but key piece of the creative destruction process (the incumbent firm).

[3] This is one of the key economic functions played by entrepreneurs. The economic value of entrepreneurship (see McMillan and Woodruff, 2002) drives a great deal of the policy-oriented research on its allocation, regulation, measurement and enhancement.

To answer our research question, we compile an unbalanced panel comprising micro-level firm accounting data merged with country-level entry regulation data. Our final dataset represents more than 20,000 firms in 59 countries, comprising approximately 100,000 observations, over the years 1998-2011. Our primary interest is the relationship between entry regulation and profit persistence of incumbent firms; we also test for the impact of entry on profit persistence as secondary support for our analysis. We find that the administrative burden imposed by entry regulation (number of procedures and time required to start a business) are associated in some conditions with improved profit persistence in incumbent firms, but that the financial burden of entry (cost required to start a business) consistently improves profit persistence in incumbent firms. This implies significant misallocation of resources and welfare losses that can originate from regulation. Our findings have important policy implications and suggest that the social costs of some regulations are underestimated if the dynamics effects on profit persistence are ignored.

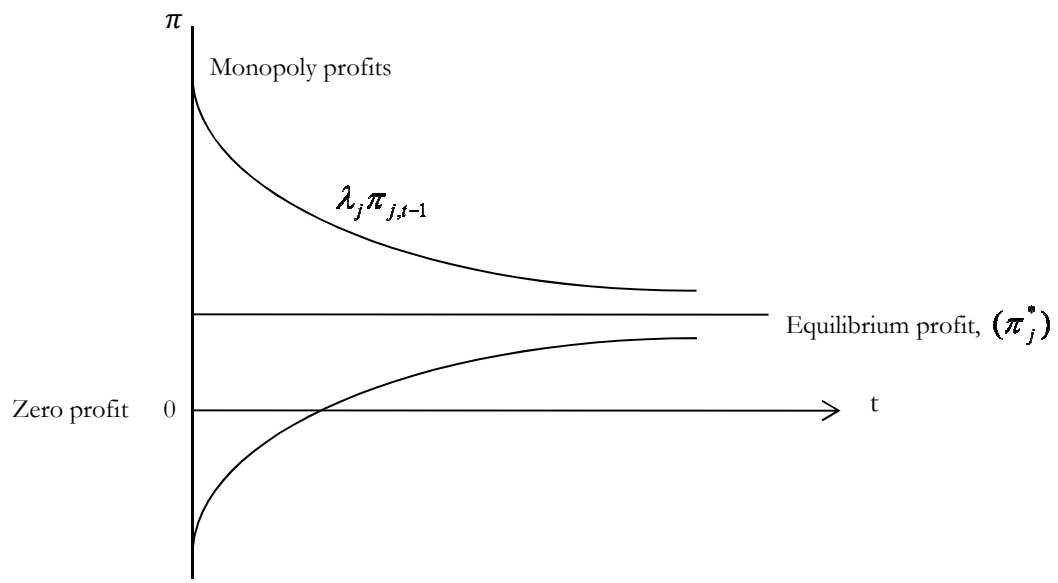
The remainder of the paper is organized as follows. We discuss the relevant literature in the next section, and our data and method in the third section. We present our results in the fourth section, followed by a discussion and conclusion.

2. Literature and Hypotheses

2.1. Persistence of Profits

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 nothing more than a transitory disequilibrium phenomenon, in the presence of low or no other barriers to entry. This process is illustrated in a stylized manner in Figure 1. High and low profits are defined relative to the industry average.

Figure 1: Dynamic view of profit convergence
Source: Schwalbach et al., 1989



Industries in which incumbent firms are achieving high profits will attract new entrants; competitive pressures created by entry will force incumbents to lower prices, reducing profits. Assume that an industry has the following simple cost function:

$$TC = FC + cq \qquad (1)$$

where *TC* is the total cost, *FC* is the fixed cost, *c* is the variable cost and *q* the production volume. It can be assumed that an industry is going to attract entry as long as expected profits are above the fixed costs. From this follows that entry in period *t*, $\mathcal{E}_t$, will be a function of the fixed costs and the profit level in the industry:

$$E_t = \alpha(\pi_{t-1} - FC) \qquad (2)$$

Entry will thus reduce profitability over time:

$$\pi_t = \pi_t - \beta E_t \qquad (3)$$

Substituting equation (2) into equation (3) and rearranging gives:

$$\pi_t = (1 - \alpha\beta)\pi_{t-1} + \alpha\beta FC \qquad (4)$$

This reduces to following equation, which can be estimated empirically:

$$\pi_{jt} = \alpha + \lambda\pi_{jt-1} + \varepsilon_{jt} \qquad (5)$$

where α represent a non-transitory permanent component to profits and λ represent the speed at which profits converge towards the norm (as shown in Figure 1). Naturally, this implies that further decomposition of profits are possible, an issue that we address later in section 3. Note that entry is not included in equation (5): Instead, how profits decay is determined by the level of fixed costs and the speed of profit decay.

2.2. Persistence of Profits and Entry Regulation

If markets were perfectly competitive, then the process of profit convergence would require little explanation. However, the ability of firms to maintain persistently high profits, particularly in oligarchic and monopolistic environments, has driven a robust body of comparative empirical research on the persistence of profits. This literature, taking cues from Mueller's foundational work (1986, 1990), addresses the central question: Will profits deviating from normal profit return to normal over time? Empirical studies across varied contexts (Geroski and Jacquemin, 1988; Schwalbach et al., 1989; Mueller, 1990; Cubbin and Gerosky, 1987, 1990; Yurtoglu, 2004) have produced inconsistent findings (see Lipcinzky and Wilson, 2001; Bentzen et al., 2005).

These inconsistencies could be attributed to industry structure as well as any of a wide variety of entry barriers across different contexts and regulatory regimes. Bain (1956) identified three sources of entry barriers which increase costs for new firms and favor incumbents: (1) absolute cost advantage of incumbent firms, who can find lower cost ways of production and capital accumulation (2) scale economies of incumbent firms (3) product differentiation advantages of incumbent firms, who have resources for activities such as research and development, or marketing and advertising to grow market share (Bain, 1956). Ultimately, some entry barriers may be more or less effective at preventing entry, thereby contributing to different profit trends in incumbent firms.

Regulation plays an important role for several reasons. Regulation can change the cost structure of a firm. Regulation can impact the speed of convergence by establishing the magnitude of some barriers to entry. Business regulation can impact all of these advantages because it governs firm activities, including for example, the requirements to create a new firm (e.g., incorporation regulation), treatment of labor (e.g., hiring and firing regulation), protection of investments in research and development (e.g, intellectual property protection), financing and the ability of firms to raise capital (e.g., banking regulation), security of property (land tenure and property rights regulation), and so on. Though many regulatory arrangements are important, we focus on entry regulation because they govern specifically the process of market entry.

Our aim is to hypothesize, and test empirically, how entry regulation affects profit persistence in incumbent firms. Two key streams of literature are relevant. The research on persistence of profits has examined the drivers of profit dynamics of incumbent firms, focusing largely on firm-level and industry-level 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 also been dominated by studies at the industry level (Jenny and Weber, 1990) or focused on one (Yurtoglu, 2004; Mueller, 2003; Mayurama and Odagiri, 2002; Khambampati, 1995) or a small group of countries (Yamawaki, 1989). We advance this literature by examining regulatory dimensions relevant to incumbent firms across a large number of countries.

A second relevant stream of research focuses on entry regulation specifically. As a narrow component of business regulation more broadly, entry regulation has been studied in single industries in one country (e.g., Schivardi and Viviano, 2011; Bertrand and Kramarz, 2002) as well as comparatively across countries (see Djankov et. al., 2002). Our interest here is in the comparative cross-country research[4]. The empirical cross-country research is largely concerned with how entry regulation affects various entrepreneurial outcomes and has generally found this to be negative for productive, opportunity-driven or formal entrepreneurial outcomes (Acs et al., 2008; Adargna and Lusardi, 2008; Ho and Wong, 2007; Klapper et al., 2006). It is likely that entry regulation, if it generally has a negative impact on entry, will favor incumbent firms. However, this has not been the subject of much study. This is surprising given the key role of entry in the creative destruction perspective (Dean et al., 2004). One of few cross-country studies linking entry regulation with incumbent firm outcomes was conducted by Klapper et al. (2006) and assessed the impact of entry regulation on the rate and average size of new firm entry and on productivity growth in incumbent firms (value-added per employee), concluding that "costly entry regulations are a form of protection that has the most deleterious effect on the performance of seasoned incumbents (2006: 594)." Though Klapper et al. (2006) looked at productivity growth of incumbent firms, the impact of entry regulation on profit persistence remains unclear.

A key component of a Schumpeterian approach to competitive disciplining is that entry will create competitive pressures on incumbent firms. Extending this, we argue that the quality of entry regulation, which impacts the rate of entry, will affect the persistence of profits of incumbent firms. Several dimensions of entry regulation could induce transaction costs which affect new firms. The subsequent entry decision (or not) undertaken by these potential new firms could, in turn, affect profits in incumbent firms. Entry regulation can vary

[4] There is a stream of research that examines entry barriers and impacts on non-firm measures of economic development such as growth (e.g, Herrendorf and Teixeira, 2011; Pistor, 2009; Barseghyan, 2008; Djankov et al., 2006). Our main concern is with firms.

significantly by industry and by country and lead to different outcomes depending on the context (e.g, Schivardi and Viviano, 2001; Bertrand and Kramarz, 2002). Assessing systematic differences in entry regulation across countries and their impact on firms is a difficult task, due partly to the variance in regulatory structures across countries as well as the difficulty in capturing comparable measures. We focus on three dimensions measuring entry regulation collected by the Doing Business Report[5]. We focus on these for three reasons. First, the report provides arguably the most popular globally relevant but nationally-utilized measures of business regulation. This increases the relevance of our findings to policy. Second, these measures allow us to maximize our period of study and the number of countries included in the analysis, whereas many other cross-country data sources on entry regulation simply do not offer the same coverage. Third, these measures capture key nuances in entry regulation, allowing for a more refined analysis.

We classify two types of burden reflected in the "starting a business" category of the Doing Business project: Administrative (procedures, time) and financial burden (cost). With few exceptions (Klapper and Love, 2010; van Stel et al., 2007), cross-country studies tend to examine only one component of entry regulation. The administrative burden of starting a business reflects the extent to which entry into an industry is regulated by procedural and bureaucratic arrangements. This includes two dimensions - the number of procedures to start a business and the time required to complete the process to start a business. If the administrative burden to register a new company is tedious, or takes too long, potential new entrants could switch to other industries or to other economic activities. Entry regulation has been found to negatively impact entrepreneurship across countries (see Acs et al., 2008 and Klapper et al., 2006). Klapper et al. (2006) find that relative entry into industries with "naturally" high entry is disproportionately higher in the presence of low national regulatory barriers (2006: 605). While entry regulation is in principle non-negotiable, the time burdens facing potential entrants could be less consistent. Ciccone and Papaioannou (2007) studied entry procedures in 45 countries and found that less time to register a business was associated with greater entry on an industry-level. However, dynamics such as corruption or informality complicate this kind of result. For example, corruption could allow potential new entrants to reduce the time burden of registering a new business, but still meet the procedural burden on paper. For example, Klapper et al. (2006) found that high entry costs matter more in richer countries – in other words, in countries with more effective enforcement of regulations. In addition, some procedures may rely on other procedures, leading to different completion times for firms in the same industry. The impact of time on different types of entrepreneurial outcomes is inconsistent (Belitski and Desai, 2013). Therefore, while we expect the volume (procedures) of entry regulation to discourage new entrants, we do not expect the time required to significantly impact new firms. The financial burden related to entry regulation is the cost imposed on potential entrants to start a business. This cost is likely to increase under a more complex regulatory system with greater bureaucratic involvement. Entrepreneurs can face excessively high costs to start a business in some countries (Djankov et al., 2002), exceeding annual per capita income in many developing countries, which also tend to have less developed financial systems (see Morck et al., 2000) and levels of financial development. We expect that higher cost of entry will deter new firms and this, in turn, will allow incumbent firms to maintain high profits. We thus present three hypotheses:

H1: The number of procedures to start a business will be positively associated with profit persistence in incumbent firms.

[5] See www.doingbusiness.org for more.

H2: The time required to start a business will not be associated with profit persistence in incumbent firms.

H3: Financial entry burden will be positively associated with profit persistence in incumbent firms.

Following a dynamic Schumpeterian view, entry – which is affected by regulatory conditions (see Acs et al., 2013) – should create competitive pressures on incumbent firms. Entry competitively disciplines markets (Dean et al., 2004) when new firms directly compete with incumbent firms for resources, suppliers, intermediaries, and buyers, as well as market share and gains from innovation. Though our primary interest is in entry regulation, we test a related hypotheses on entry itself:

H4: Entry will be negatively associated with profit persistence in incumbent firms.

3. Method

3.1. Measuring Persistent Profitability

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[6]:

$$\pi_{j,t} = c + r_j + s_{j,t} \qquad (6)$$

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:

$$s_{j,t} = \lambda_j s_{j,t-1} \qquad (7)$$

The λ-parameter shows the speed of the profit decay. Assuming that $-1 \le \lambda \le 1$ then profits will converge to the equilibrium rate of return as time passes.[7] By substitution, this gives the following first-order autoregressive function:

$$\pi_{j,t} = (c + r_j)(1 - \lambda_j) + \lambda_j \pi_{j,t-1} \qquad (8)$$

This reduces to the following empirically testable model:

$$\pi_{j,t} = \alpha_j + \lambda_j \pi_{j,t-1} + \varepsilon_{j,t} \qquad (5')$$

Where $\alpha_j \equiv c + r_j \equiv \pi^*$, 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[8]:

[6] Another formulations is to decompose transitory rent into industry and firm-specific rent (Waring, 1996).
[7] Most studies on the persistence of profit find that the λ-parameter is in the region of 0.5 (Mueller (2003)).

$$\hat{\pi}_j = \frac{\hat{\alpha}_i}{1-\hat{\lambda}_j}. \qquad (9)$$

3.2. Sample

We use an unbalanced panel comprising micro-level accounting data merged with country-level business regulation data. Our firm data cover 30,000 firms in 59 countries across the years 1998-2011, and comes from standard accounting data provided in the Compustat Global database. Data on business regulations is available starting in 2004, limiting our use of this data to 7 years. We utilize lags and still make use of the full data testing for appropriate lag structures.

After merging our data and accounting for the remaining outliers, our sample contains approximately 100,000 observations.

3.3. Variables

Our dependent variable is adjusted profits ($profit_{j,t}$). This is calculated by subtracting the mean RoA in a given year from each firm's return on assets (RoA). This adjustment means our dependent variable measures the deviation from the profit norm. Note that we exclude observations of RoAs which are below -25 percent, on the basis that these presumably do not reflect a regular profit motive[9].

In order to remove business cycle effects, the profit measure is defined as:

$$\bar{\pi}_{j,t} = \pi_{j,t} - \frac{\sum_{j=1}^{n} \pi_{j,t}}{n} \qquad (10)$$

Where $\pi_{j,t}$ profit for firm *j* at time *t* and *n* is the number of firms. In other words the term $\bar{\pi}_{j,t}$ measures firm *j*'s profit deviation from the sample mean. This means that profit is measured as the deviation from the overall sample mean[10]. Adjusted profit rates should consequently be nearly free of cyclical influences. 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 very large and influential outliers (a few of the data points amount to multiple million percent). To achieve a normal distribution, we cap RoA in both ends of the distribution by removing the 1st and 99th percentile. After this we also exclude observations for RoA < - 25%. Excluding firm with significant losses can be justified on theoretical grounds. Unless these firms receive loss coverage and additional capital, they will not survive for any length of time. This adjustment was necessary because the analysis in this paper relies on the adjustment of each observation

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

[9] For example, some firms might be set up by parent corporations for the purpose of absorbing losses.

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

by subtracting the mean (i.e, a centered dependent variable)[11]. After adjusting RoA, we test for normal distribution of adjusted RoA using D'Agostino et al. (1990) and Royston (1991) (this is a Stats-command and is standard; we cannot use *Swilk* since the no. of observations > 5000). See appendix 1 for more details on the data.

We include several firm variables from the Compustat data to account for firm characteristics that could impact profit dynamics (see Gschwandtner, 2012). We include three lagged measures for adjusted profits to account for the historic performance of a firm. We account for the size of a firm by using the log of its sales in a given year. We account for domestic competition by measuring a firm's market share of industry sales at the SIC 2-digit code. We account for a firm's tangible assets using the value of its physical assets as percent of total assets.

Our measures of regulatory environment are taken from the Doing Business project and are available beginning in 2004. To reflect administrative burden, we measure procedural entry burden as the number of procedures required to start a business, and we measure time entry burden as the time in days to start a business. To reflect financial entry burden we use the cost of starting a business, as percent of GDP per capita. To account for overall regulatory arrangements which could reasonably impact incumbent firms and new firms, we also use the corporate tax rate.

We measure entrepreneurship as entry density, defined as the ratio of newly registered limited liability firms in a country per 1,000 working age population (aged 15-64) (Klapper and Love, 2010). This measure is taken from the World Bank.

We also include four interaction terms with the first lag of profit: Cost of starting a business, procedures to start a business, time to start a business and entry density.

Our variables and sources are listed in Table 1 and correlations are shown in Table 2.

3.4. Empirical Strategy

As profit convergence is an autoregressive process, we test for up to AR(3) and adopt a best lag structure based on Akaike Information Criteria and Schwarz Bayesian Information Criteria. Results support the higher order of AR process. We estimate the following equation:

$$\bar{\pi}_{j,t} = \alpha + \beta_1 \bar{\pi}_{j,t-1} + \beta_2 (\bar{\pi}_{j,t-1} \times BR_{j,t-1}) + \beta_3 BR_{i,t-1} + \beta_4 \boldsymbol{X}_{k,t-1} + \varepsilon_{j,t} \quad (11)$$

where *BR* is the our regulatory measures; $\mathbf{X}_k$ is a vector of control variables including firm-level variables and ε_j is a conventional error term. We used a heteroskedasticity-robust estimator to ensure that the conditional expectation of squared errors is equaled to zero. The persistence parameter λ corresponds the marginal effect: $\beta_1 + \beta_2 BR_i$.

Following Wooldridge (2002) and Drukker (2003), we test for panel autocorrelation and find no evidence for first order autocorrelation. There could be a concern about heteroskedasticity across countries; we use Breusch-Pagan / Cook-Weisberg test and find no evidence of heteroskedasticity. A final and serious concern is multicollinearity, particularly in the presence of multiple interaction terms. We estimate Variance Inflation Factor (VIF) for all our specifications and cannot include country or industry dummies in our analysis because

[11] Note that is it not possible to use robust estimation techniques because of the way we adjust our profit variable.

this generates VIF factors greater than 10 (200 ≤ VIF ≥ 1500), indicating severe multicollinearity. Hausman Test confirms that random effects is appropriate for our models. We generate standard errors for coefficients estimated by pooled OLS/WLS or fixed-effects regression (Driscoll and Kraay, 1998).

The regulatory variables 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 (4) entry. We run all four models first for our base (Table 3) and then with standard errors clustered by country (Table 4).

We also run our models with adjustment for industry profits (Table 5). We do this because of a possible concern that controls for industry effects could be insufficient. We are unable to include industry effects due to multicollinearity issues. Controlling for industry effects is important considering that variation in both competition and profits[12] could be due to industry factors (Gschwandtner, 2012; Goddard and Wilson, 1999; Waring, 1996; Shchol, 1990). One way of resolving this issue is to remove the industry effects for the data. This can be achieved by adjusting profits by industry mean, rather than by the global mean. We therefore adjust our profit measure according to equation (10), but we modify by using industry means, at the two-digit industry level. This means that firm profit is measured as 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. The results are robust and do not change in any significant way.

4. Results

Our findings are reported in Table 3 (base models), Table 4 (with standard errors clustered by country) and Table 5 (with industry profit adjustment).

Our first measure of administrative burden is the number of procedures required to start a business (Model 1). This is positively and significantly associated with adjusted profits in our base model. However, it is not significant in the model with standard errors clustered by country and in the model with the industry profit adjustment. H1 is partially supported.

The second dimension of administrative burden is the cost required to start a business (Model 2). This is positively and significantly associated with adjusted profits in our base model. It is not significant in the model with standard errors clustered by country, but it is again positive and significant in the model with the industry profit adjustment. H2 is partially supported.

Our measure of financial burden is the cost to start a business (Model 3). This is positively associated with adjusted profits in all three sets of models – the base model, when standard errors are clustered by country, and with the industry profit adjustment. This implies that a greater financial entry burden could, indeed be preventing new entrants, thereby allowing incumbent firms to maintain abnormally high profits. Therefore, H3 is supported.

[12] For example, Aghion et al. (2009) examined the effect of entry on two other trends in 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.

When examining entry and profit persistence (Model 4), we find a negative and significant relationship in our base model, no relationship in the model with standard errors adjusted by country, and a positive and significant relationship for the industry profit adjustment.

Do you want to discussion interaction terms here?

Across our models, we find that the lagged profit measures have a positive impact on adjusted profits. This is intuitive and expected based on the existing comparative empirical literature (Gschwandtner, 2012 and Mueller, 1986). Share of industry sales is positive and significant for all three base models (procedures, time and cost), positive and significant for procedures and time when standard errors are clustered by country, and positive and significant for procedures, time, cost and entry in the models with the industry profit adjustment. Openness is positively and significantly associated with adjusted profits in all four models but is not significant in all four models when standard errors are clustered by country. It is positive and significant for the procedures, time and entry models with industry profit adjustments. Intuitively, tangibility is found consistently across all models to have a negative and significant relationship with profit persistence. Corporate tax rate is positive and significant for all four base models and all four models with the industry profit adjustment; it when standard errors are clustered by country, it is negative and significant only for the entry model.

Our findings point to the importance of examining regulations individually and to consider that various dimensions of the same process, such as starting a business, could impact competitive dynamics differently. The cost to start a business is the key regulatory dimension that matters according to our findings. This complements findings that start-up costs are an important driver of entrepreneurial activity (see Fonseca et al., 2001; Ho and Wong, 2007). Greater financial entry burden facing new firms will discourage entry, thereby allowing profits to persist in incumbent firms. The number of procedures and the time to start a business are not consistently significant; this further supports the need to treat business environment as heterogeneous (see Aidis et al., 2008; Stenholm et al., 2013). For example, Van Stel et al. (2007) found that the minimum capital requirement for new business matters for entrepreneurship, but that procedures, cost and time to start a business do not. Klapper and Love (2010) find that all three measures of entry regulation matter for new businesses.

Three interesting directions could guide further research. A first question is to identify and understand other specific regulatory arrangements which could play a role. For example, do administrative and financial burdens related to obtaining export licenses or specialized permits matter? A second direction could extend this research to examine how enforcement of regulations matter. Systematic differences in enforcement across countries could impact the extent to which some entry regulations (particularly procedures to start a business) matter. A third question could address heterogeneity in entry and examine if different types of entry impact incumbent firms differently. For example, informal firms could have a different impact than registered businesses, or firm size and industry selection could matter.

5. Conclusion

We advance the literature on the persistence of profits, entry regulation and on more broadly, on the competitive dynamics of markets, by examining how three dimensions of entry regulation impact profit persistence in incumbent firms. We studied profit dynamics in

more than 20,000 firms across 59 countries from 1998-2010 and found that entry regulation is positively associated with persistent profits in incumbent firms whereas entry is negatively associated with persistent profits. Our findings are supportive of a dynamic, Schumpeterian view of the role of entrepreneurship in the economy. Our study explicitly provides evidence of this phenomenon across countries, a relationship often assumed but not often empirically tested. In addition, our findings on entry regulation yield useful guidance for policymakers interested in supporting more competitive industries by targeting regulatory arrangements.

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Table 1: Variable definitions and sources

$\bar{\pi}_{j,t}$ ($\text{profit}_{j,t}$)	Profits are measured as return on assets (RoA) (Profit over total assets). RoA has been adjusted for sample mean in RoA. See text for details.	Source: Compustat
Firm size	Log variable of firm sales	Source: Compustat
Market share	Firm *j* market share of industry sales, computed at the SIC 2-digit level	Source: Compustat
Tangibility	Tangible assets as share of total assets	Source: Compustat

Openness	Total value of import and export as share of GDP	Source: World Bank
Regulatory cost to start a business	The cost as percent of GDP per capita to start a business	Source: Doing Business Database
Procedures to start a business	The number of procedures to register a business	Source: Doing Business Database
Time to start a business	The number of days to start a business	Source: Doing Business Database
Corporate tax rate	Total tax rate	Source: Doing Business Database
Entry density	Ratio of newly registered limited liability firms in a country per 1,000 working age population (aged 15-64)	Source: World Bank Group Entrepreneurship Snapshot

Table 2: Correlation Matrix

Note: * indicates significant correlation at 5%

	$\bar{\pi}_{j,t-1}$ (profit$_{j,t-1}$)	Starting cost	Starting procedures	Staring time	Entry	Size	Tangibility	Share of sales	Openness
$\bar{\pi}_{j,t-1}$ (profit$_{j,t-1}$)	1								
Starting cost	0.06*	1							
Starting procedures	0.10*	0.52*	1						
Staring time	0.07*	0.50*	0.64*	1					
Entry	-0.05*	-0.52*	-0.62*	-0.41*	1				
Size	0.16*	-0.43*	-0.08*	-0.04*	0.16*	1			
Tangibility	-0.04*	0.11*	0.07*	0.09*	-0.08*	0.04*	1		
Share of sales	0.06*	0.01*	-0.04*	0.04*	0.02*	0.23*	0.07*	1	
Openness	0.04*	-0.09*	-0.14*	-0.10*	0.26*	0.08*	0.02*	0.08*	1
Corporate taxes	0.05*	0.32*	0.46*	0.31*	-0.41*	-0.13*	0.02*	-0.10*	-0.51*

Table 3: Profits, Regulatory Environment and Entry, base models

Dependent variable: $\bar{\pi}_{j,t}$ (Profit $_{j,t}$)				
	(1)	(2)	(3)	(4)
Constant	-2.279*** (0.131)	-2.114*** (0.129)	-2.395*** (0.128)	-3.173*** (0.188)
$\bar{\pi}_{j,t-1}$ (Profit $_{j,t-1}$)	0.367*** (0.006)	0.374*** (0.004)	0.368*** (0.003)	0.409*** (0.005)
$\bar{\pi}_{j,t-2}$ (Profit $_{j,\ t-2}$)	0.081*** (0.003)	0.081*** (0.003)	0.078*** (0.003)	0.081*** (0.004)
$\bar{\pi}_{j,t-3}$ (Profit $_{j,\ t-3}$)	0.068*** (0.003)	0.068*** (0.003)	0.066*** (0.003)	0.060*** (0.004)
Procedures to start a business	0.042*** (0.008)			
Time to start a business		0.009*** (0.001)		
Regulatory costs to start a business			0.036*** (0.001)	
Entry density				-0.016* (0.008)
Share of industry sales	0.645*** (0.113)	0.599*** (0.113)	0.340*** (0.113)	0.137 (0.141)
Openness	0.001*** (0.000)	0.001*** (0.000)	0.001* (0.000)	0.002*** (0.000)
Tangibility	-1.782*** (0.106)	-1.799*** (0.107)	-2.076*** (0.106)	-1.676*** (0.137)
Size (ln Sales)	0.234**** (0.009)	0.228*** (0.009)	0.360*** (0.010)	0.299*** (0.013)
Corporate tax rate	0.017*** (0.002)	0.017*** (0.002)	0.006*** (0.002)	0.041*** (0.003)
Interaction terms with profit $_{t-1}$				
Procedures to start a business	0.003*** (0.008)			
Time to start a business		0.001*** (0.000)		
Regulatory costs to start a business			0.001*** (0.000)	
Entry density				-0.006*** (0.001)
No. observations	102 092	102 092	102 092	64 669
No. firms	22 302	22 302	22 302	14 992
R^2	0.38	0.38	0.39	0.38
Firm effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Country clusters	No	No	No	No

Industry effects	No	No	No	No
VIF	2.27	1.54	1.52	1.59

Table 4: Profits, Regulatory Environment and Entry, standard errors clustered by country

Dependent variable: $\bar{\pi}_{j,t}$ (Profit$_{j,t}$)				
	(1)	(2)	(3)	(4)
Constant	-2.279*** (0.831)	-2.114*** (0.757)	-2.395*** (0.751)	-3.173** (1.245)
$\bar{\pi}_{j,t-1}$ (Profit $_{j,t-1}$)	0.367*** (0.033)	0.374*** (0.015)	0.368*** (0.016)	0.409*** (0.020)
$\bar{\pi}_{j,t-2}$ (Profit $_{j,t-2}$)	0.081*** (0.007)	0.081*** (0.007)	0.078*** (0.007)	0.081*** (0.007)
$\bar{\pi}_{j,t-3}$ (Profit $_{j,t-3}$)	0.068*** (0.006)	0.068*** (0.006)	0.066*** (0.007)	0.060*** (0.007)
Procedures to start a business	0.042 (0.041)			
Time to start a business		0.009 (0.006)		
Regulatory cost to start a business			0.036*** (0.008)	
Entry density				-0.016 (0.032)
Share of industry sales	0.645** (0.264)	0.590** (0.269)	0.340 (0.257)	0.137 (0.254)
Openness	0.001 (0.001)	0.001 (0.001)	0.001 (0.002)	0.002 (0.002)
Tangibility	-1.782*** (0.288)	-1.799*** (0.278)	-2.08*** (0.268)	-1.676*** (0.401)
Size (ln Sales)	0.234 (0.101)	0.228** (0.113)	0.360*** (0.057)	0.299** (0.106)
Corporate tax rate	0.017 (0.015)	0.017 (0.015)	0.006 (0.010)	0.041* (0.023)
Interaction terms with profit $_{t-1}$				
Procedures to start a business	0.003 (0.005)			
Time to start a business		0.001 (0.001)		
Regulatory costs of starting business			0.002*** (0.4e-3)	
Entry density				-0.006** (0.003)
No. observations	102 092	102 092	102 092	64 669
No. firms	22 302	22 302	22 302	14 992
R^2	0.38	0.38	0.38	0.38
Firm effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Country clusters	Yes	Yes	Yes	Yes
Industry effects	No	No	No	No
VIF	2.27	1.54	1.52	1.59

Note: Statistical significance is reported at 1, 5 and 10 % (***, ** and * respectively). Random effects models with firm and time effects. Standard errors are reported in brackets. Standard errors have been clustered by country. Industry effects and country effects are excluded due to multicollinearity concerns.

Table 5: Profits, Regulatory Environment and Entry (profits adjusted by industry)

Dependent variable: $\bar{\pi}_{j,t}$ (Profit $_{j,t}$)				
	(1)	(2)	(3)	(4)
Constant	-2.025*** (0.131)	-2.011*** (0.129)	-2.246*** (0.129)	-3.131*** (0.188)
$\bar{\pi}_{j,t-1}$ (Profit $_{j,t-1}$)	0.363*** (0.006)	0.371*** (0.004)	0.380*** (0.003)	0.409*** (0.005)
$\bar{\pi}_{j,t-2}$ (Profit $_{j,\ t-2}$)	0.082*** (0.003)	0.082*** (0.003)	0.081*** (0.003)	0.083*** (0.004)
$\bar{\pi}_{j,t-3}$ (Profit $_{j,\ t-3}$)	0.069*** (0.003)	0.068*** (0.003)	0.067*** (0.003)	0.059*** (0.004)
Procedures to start a business	0.002 (0.008)			
Time to start a business		0.006*** (0.001)		
Regulatory costs to start a business			0.030*** (0.001)	
Entry density				0.014* (0.008)
Share of industry sales	0.685*** (0.113)	0.658*** (0.113)	0.449*** (0.113)	0.255*** (0.013)
Openness	0.001** (0.3e-3)	0.008** (0.004)	0.000(0.000)	0.001*** (0.5e-3)
Tangibility	-1.084*** (0.106)	-1.125*** (0.106)	-1.361***(0.107)	-0.920*** (0.137)
Size (ln Sales)	0.198*** (0.009)	0.196*** (0.009)	0.302*** (0.010)	0.255*** (0.013)
Corporate tax rate	0.018*** (0.002)	0.015*** (0.002)	0.006*** (0.002)	0.038*** (0.003)
Interaction terms with profit $_{t-1}$				
Procedures to start a business	0.004*** (0.001)			
Time to start a business		0.001*** (0.1e-3)		
Regulatory costs to start a business			0.7e-4*** (0.2e-4)	
Entry density				-0.006*** (0.001)
No. observations	102 092	102 092	102 092	64 669
No. firms	22 302	22 302	22 302	14 992
R^2	0.38	0.38	0.38	0.38
Firm effects	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes

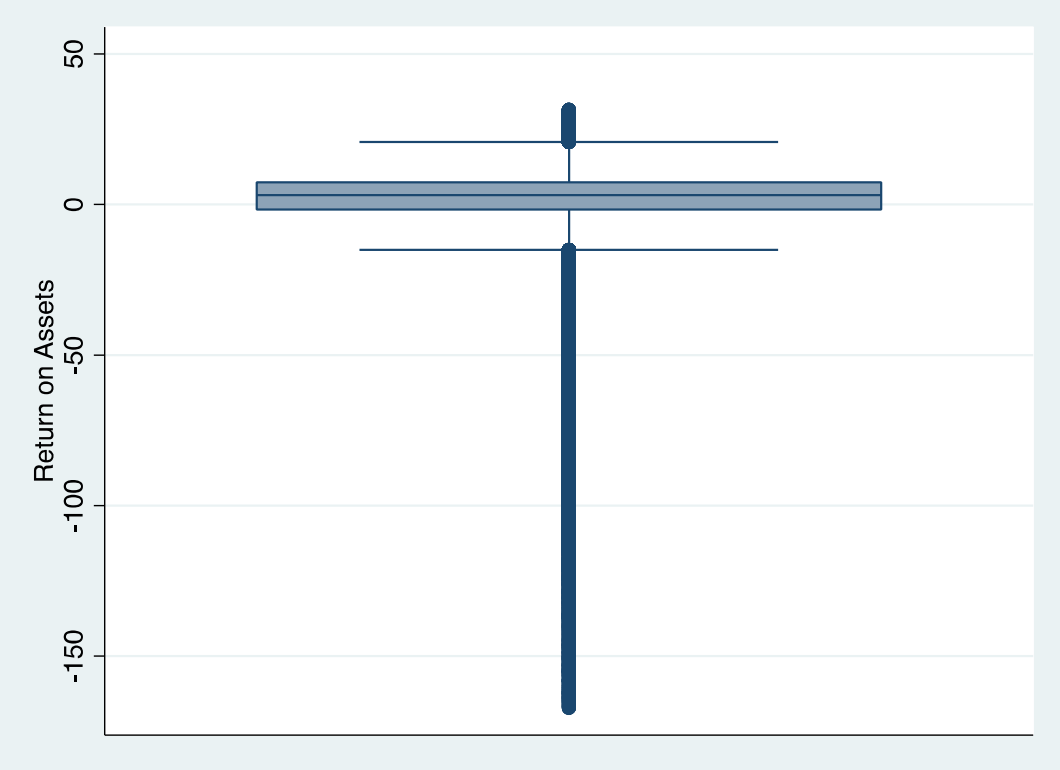
Country clusters	No	No	No	No
Industry adjustment	Yes	Yes	Yes	Yes
VIF	2.28	1.53	1.48	1.58

Note: Statistical significance is reported at 1, 5 and 10 % (***, ** and * respectively). Random effects models with firm and time effects. Standard errors are reported in brackets. Firm Profits have be adjusted by industry mean at two digit level.

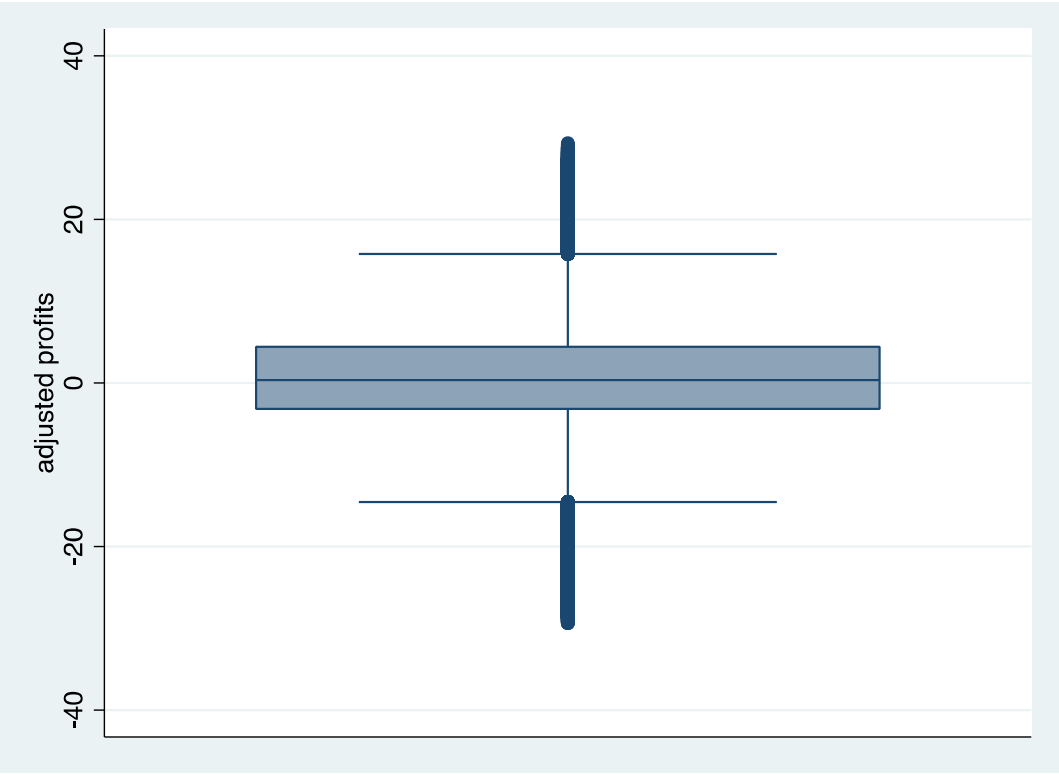
Appendix 1

As can be seen from the Box-plots and histograms below the

Box-plot of untrimmed and unadjusted profit (RoA)



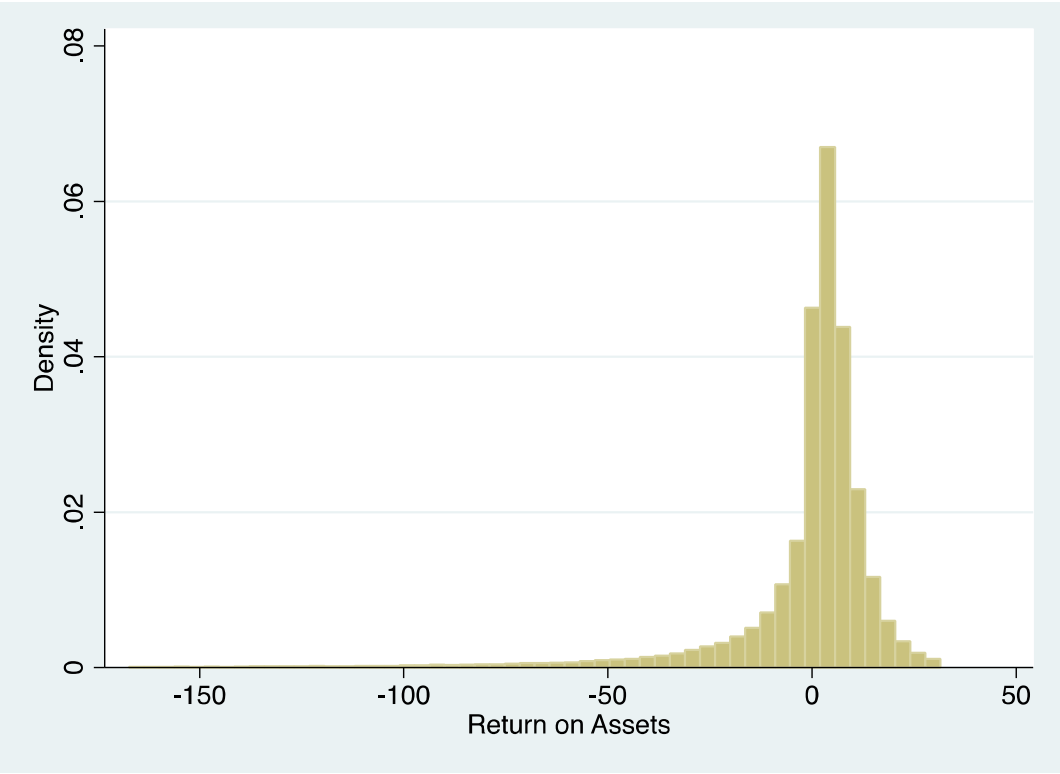
Box-plot of trimmed and adjusted profit

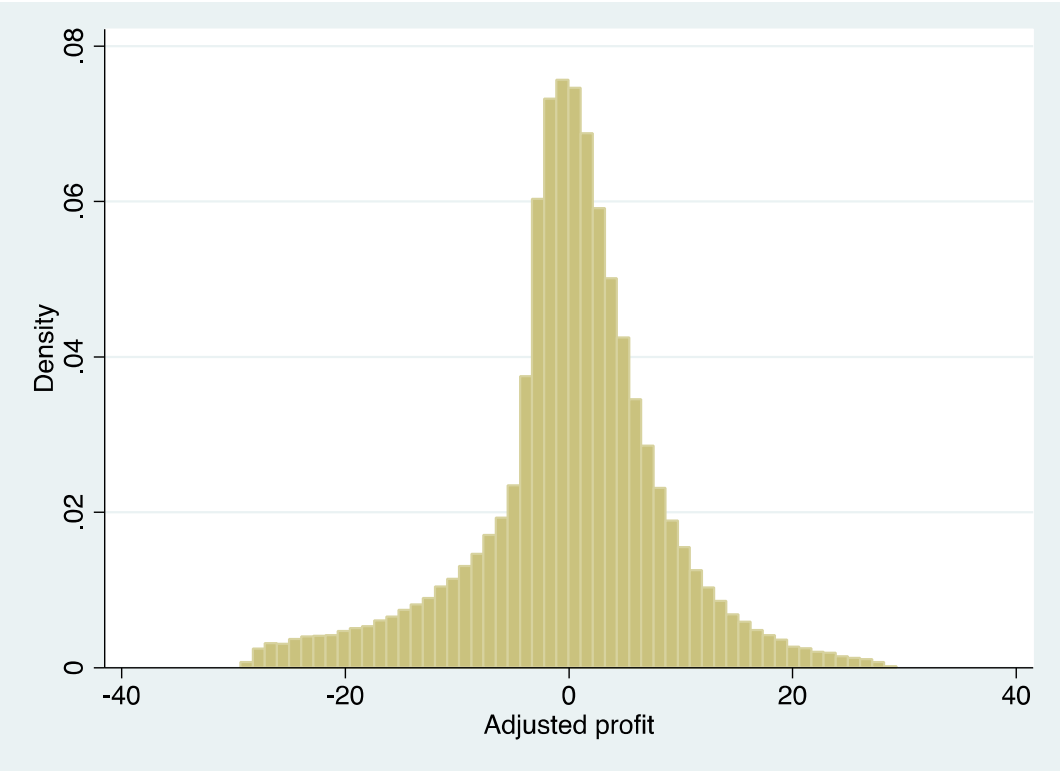


This data has been trimmed at 1 and 99 percentile and profit rates that were below -25% have been excluded. Excluding profit rates that are below -25% can be justified in theoretical terms.

The untrimmed data displayed serious non-normality problems. Which was confirmed with both box-plot and statistical test for normal distribution (sktest).

These adjustments are necessary since the methodology in this paper relies on an adjustment of each observation by subtracting the mean. In statistical terms this means that we have centred our key-variable.


Density
0
.02
.04
.06
.08
-150
-100
-50
0
50
Return on Assets


Density
0
.02
.04
.06
.08
-40
-20
0
20
40
Adjusted profit

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