Profit dynamics and product market regulations in the OECD

Growth Analysis has had an assignment to build up knowledge about the impact of regulation on business. This paper examines how swiftly profits that are greater or less than the norm are restored and what the determinants are. In particular, we examine how product market regulations influence profit persistence, which provide us with information about how competitive countries are.

growth analysis

Foreword

The Swedish Agency for Growth Policy Analysis (Growth Analysis) has had an assignment from the Swedish Government to build up knowledge about the impact of regulation on business. The overall aim is to ensure that the ongoing work for effective and more appropriate regulations will be taken primarily where it has the greatest impact on business growth.

Profits that persist above or below the norm for prolonged periods of time indicate a systematic misallocation of resources and dead-weight losses in the economy. They also indicate a lack of competition. In a competitive environment, monopoly rents will not persist and will be eroded by the entry of new firms and by entrepreneurs who imitate the incumbent firm. At the same time, profits are a vital force for economic development and offer incentives for entrepreneurs and thus enhance welfare.

This paper examines how swiftly profits that are greater or less than the norm are restored and what the determinants are. In particular, we are interested in examining how product market regulations influence profit persistence, which provide us with information about how competitive countries are. We use the OECD product market regulation (PMR) as a measure of regulations. The PMR-index includes three subcomponents: state control, barriers to entrepreneurship and barriers to trade and investment.

The study has been conducted by Professor Johan Eklund at Jönköping International Business School (JIBS) and managing director at Swedish Entrepreneurship Forum, and PhD student Emma Lappi at JIBS, on behalf of Growth Analysis.

Östersund, December 2015

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Förord

Myndigheten för tillväxtpolitiska utvärderingar och analyser (Tillväxtanalys) har sedan 2010 haft i uppdrag av regeringen att upparbeta kunskap inom området Reglers effekter på företagens tillväxt. Syftet är att säkerställa att insatser för effektivare och mer ändamålsenliga regler i första hand vidtas där de ger störst effekter på företagens tillväxt.

Vinster och vinstdynamik avslöjar mycket om hur väl en ekonomi fungerar. Vinster och det så kallade vinstmotivet betraktas allmänt som en av de centrala drivkrafterna i en marknadsekonomi. Tillsammans med konkurrens är vinstmotivet en central drivkraft för entreprenörskap och innovationer, som i sin tur driver ekonomisk utveckling och välfärd. Vinster som består över längre perioder kan antingen vara ett resultat av bristande konkurrens, eller ett resultat av entreprenörskap och företagens förmåga att generera innovationer, som gör att de kan motstå konkurrens i större utsträckning.

Denna rapport undersöker sambandet mellan vinster, vinstdynamik och produktmarknadsregleringar (PMR) inom OECD. PMR-indexet är sammansatt av de tre delindikatorerna statskontroll, barriärer för entreprenörskap samt barriärer för handel och investeringar. Indikatorerna är kvantitativa mått på lagar och regleringar som kan främja eller hämma konkurrens. I rapporten analyseras vinstdynamik och hur uthålliga eller persistenta vinster är, det vill säga hur snabbt vinster som avviker från normen återgår till en normal nivå i OECD-länderna.

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Östersund, december 2015

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Summary

Profits that persist above or below the norm for prolonged periods of time indicate a systematic misallocation of resources and dead-weight losses in the economy. They also indicate a lack of competition. In a competitive environment, monopoly rents will not persist and will be eroded by the entry of new firms and by entrepreneurs who imitate the incumbent firm. At the same time, profits are a vital force for economic development, and the mere observation of abnormal profits does not imply persistent misallocation of resources. Conventional partial equilibrium analysis teaches us that profits greater than the competitive return on capital are associated with welfare losses. However, from a dynamic perspective, profits offer incentives for entrepreneurs and thus enhance welfare.

We are interested in understanding how swiftly profits that are greater or less than the norm are restored and what the determinants are. In particular, we are interested in examining how product market regulations influence profit persistence.

We use a measure of the persistence of abnormal profits, which provides us with information about how competitive countries are. The report covers 33 OECD countries and close to 20 000 firms (164 000 firm-year observations). As measure of regulations we use OECD product market regulation (PMR) measures. The PMR includes three subcomponents: *state control*, *barriers to entrepreneurship* and *barriers to trade and investment*. We find that PMR, state control and barriers to entrepreneurship have negative impacts on competition, which lead to more persistent profits. Barriers to trade and investments have no significant effects.

The main findings are that Greece, Spain, the Czech Republic and Italy have the least competitive economies (i.e., most persistent profits) in the OECD, whereas Germany, Norway, Japan and Sweden are among the most competitive economies (i.e., least persistent profits). The findings have implications for regulatory economics and suggest that economies could improve their competitiveness through regulatory reform. Finally, we suggest areas for further research.

Sammanfattning

Vinster och vinstdynamik avslöjar mycket om hur väl en ekonomi fungerar. Vinster och det så kallade vinstmotivet betraktas allmänt som en av de centrala drivkrafterna i en marknadsekonomi. Tillsammans med konkurrens blir vinstmotivet en central drivkraft för entreprenörskap och innovationer som i sin tur driver ekonomisk utveckling och välfärd[1]. Att förstå vilka faktorer som bestämmer vinstdynamiken i ekonomin är därför viktigt för att förstå vilka faktorer som på sikt påverkar den ekonomiska utvecklingen och välståndet i en ekonomi. Denna rapport undersöker sambandet mellan vinster, vinstdynamik och produktmarknadsregleringar inom OECD. Syftet är att undersöka sambandet mellan produktmarknadsregleringar och konkurrenstrycket i ekonomi, vilket har betydelse för hur vi ser på regleringar och dess ekonomiska konsekvenser.

Vinster som består över längre perioder kan antingen vara ett resultat av bristande konkurrens och någon form av "monopolmakt", eller så kan det vara ett resultat av entreprenörskap och företagens förmåga att generera innovationer som gör att de kan motstå konkurrens.

Joseph Schumpeter (1934) betraktade vinsterna som en konsekvens av att en entreprenör genom nya kombinationer och idéer introducerade innovationer som gav utrymme för vinster. I sitt numera klassiska verk "Die Theorie der Wirtschaftslagen Entwicklung" beskriver Schumpeter ekonomisk utveckling som en dynamisk process karaktäriserad av "kreativ förstörelse". Schumpeter ger här en beskrivning av en dynamisk form av marknadsekonomi där jämvikten på produktmarknaden störs av innovationer. Dessa innovationer som entreprenören introducerar ger upphov till "temporära" monopol, vilket i sin tur skapar incitament för andra entreprenörer att imitera vilket på sikt urholkar monopolvinsten. Vinster som består över tiden är därför antigen ett resultat av entreprenörens (företagets) förmåga att generera innovationer och därmed stå emot konkurrensen eller så är det ett resultat av någon annan form av monopolmakt som upprätthålls av andra faktorer. Monopol kan till exempel vara en konsekvens av så kallade inträdesbarriärer som hindrar inträde av konkurrenter. En form av inträdesbarriärer är regleringar av olika slag vilka kan försvåra, eller till och med omöjliggöra, nyinträde på en marknad.

Konkurrens, och hur effektivt konkurrensen i en ekonomi verkar, har studerats flitigt av ekonomer och renderat mycket uppmärksamhet från beslutsfattare. Det finns till exempel välkända och starka ekonomiska argument som ligger till grund för konkurrenslagstiftning: brist på konkurrens resulterar i alltför höga priser och att för lite av varan eller tjänsten produceras vilket leder till en lägre välfärd än vad som hade varit fallet om konkurrensen fungerat. Förbises dynamiken i vinster och dess bakomliggande bestämningsfaktorer finns det emellertid en risk att felaktiga ekonomisk-politiska slutsatser dras. Denna rapport syftar till att empiriskt undersöka sambandet mellan regleringar som barriärer för entreprenörskap och konkurrens och dess effekter på vinstdynamik inom OECD.

I rapporten används en modell för att modellera vinstdynamik och mäta hur uthålliga eller persistenta vinster är, det vill säga om vinster avviker från det normala, hur snabbt återgår dessa till en normal nivå? Figur 1 nedan illustrerar hur vinster som avviker från normen

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[1] Se Eklund (red.) m.fl. (2015) för diskussion om vinstmotivet och i synnerhet vinsternas betydelse inom de så kallade välfärdssektorerna.

kan förväntas konvergera; ju långsammare konvergens desto mer persistenta vinster. Notera att långsiktig jämviktsvinst inte är detsamma som nollvinst.
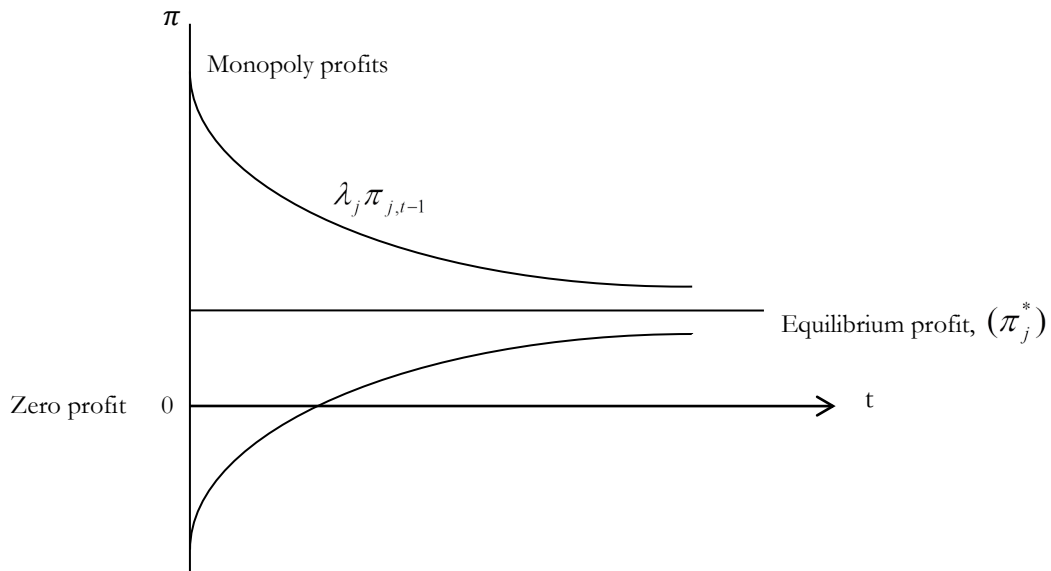
Figur 1 Vinstpersistens

Källa: Schwalbach m.fl. (1989)

I analysen används företagsdata från 33 OECD-länder som omfattar cirka 20 000 företag (164 000 observationer). Till detta har ett index över produktmarknadsregleringar (PMR) från OECD adderats. PMR-indexet är sammansatt av tre olika delindikatorer: Statskontroll, barriärer för entreprenörskap samt barriärer för handel och investeringar. OECD:s uttalade syfte med dessa indikatorer är att tillhandahålla kvantitativa mått på lagar och regleringar som kan främja eller hämma konkurrensen samt mäta policyrelevanta variabler.

Resultaten visar att det finns betydande skillnader i vinstpersistens inom OECD. I synnerhet visar resultaten att statskontroll och barriärer för entreprenörskap är förknippade med ökad vinstpersistens. Nedan, i Figur 2, återges vinstpersistensen i Grekland, Sverige och Tyskland. Figuren baserar sig på ett antagande om ett företag som uppvisar en vinst som ligger 100 procent över genomsnittet. Konvergensen är sedan beräknad baserad på de skattade vinstpersistens-parametrarna för respektive land. Efter fem år är "över-vinster" i stort sett utraderade i Sverige och Tyskland medan närmare 50 procent finns kvar i Grekland.
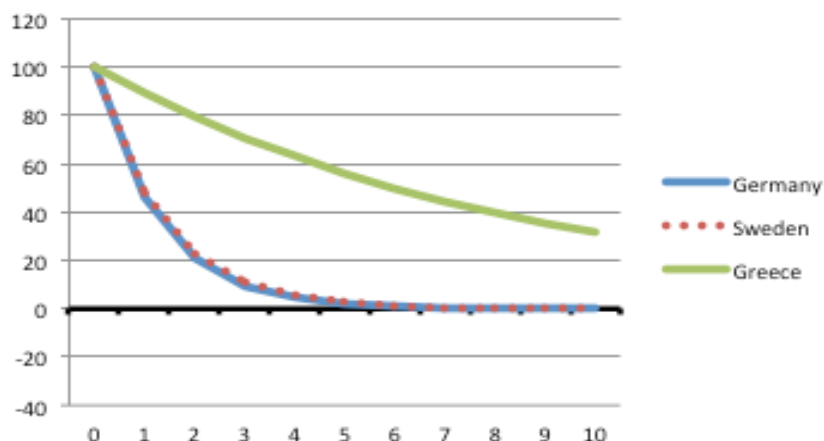
Figur 2 Vinstpersistens i Grekland, Tyskland och Sverige

Resultaten visar att Grekland, Spanien och Tjeckien tillhör de minst konkurrensutsatta (mest persistenta vinster) ekonomierna inom OECD. Tyskland, Norge, Japan och Sverige tillhör gruppen av de mest konkurrensutsatta länderna inom OECD (minst persistenta vinster). Det finns med andra ord betydande skillnader i konkurrenstryck inom OECD. Delar av de skillnader som kan observeras i figuren ovan kan förklaras med hjälp av skillnader i PMR. Analysen visar att länder med högre värde på PMR även har mer persistenta vinster. Av delkomponenterna i PMR-indexet vidare det sig att både graden av statskontroll och barriärer för entreprenörskap ökar vinstpersistensen. En annan intressant observation är att graden av vinstpersistens uppvisar en negativ korrelation med graden av möjlighetsbaserat entreprenörskap.

Av dessa resultat följer ett antal policyslutsatser. Reformer av produktmarknadsregleringar kan ha betydelse för konkurrenstrycket i ekonomin, vilket i sin tur påverkar entreprenörskap och därmed även den långsiktiga ekonomiska utvecklingen i ett land. En annan ekonomisk-politisk slutsats som kan dras är att de dynamiska effekter som uppstår i samband med regleringar inte fångas av konventionella, statiska konsekvensanalyser, vilket även innebär en risk för att de samhällsekonomiska kostnaderna av regleringar systematiskt underskattas.

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1   Introduction[2]

Profits that persist above or below the norm for prolonged periods of time indicate a systematic misallocation of resources and dead-weight losses in the economy. They also indicate a lack of competition. In a competitive environment, monopoly rents will not persist and will be eroded by the entry of new firms and by entrepreneurs who imitate the incumbent firm. At the same time, profits are a vital force for economic development, and the mere observation of abnormal profits does not imply the persistent misallocation of resources. Conventional partial equilibrium analysis teaches us that profits greater than the competitive return on capital are associated with welfare losses. However, from a dynamic perspective, profits offer incentives for entrepreneurs and thus enhance welfare.

Under Schumpeterian competition, an entrepreneur introduces an innovation, which creates a temporal monopoly. These monopoly profits provide incentives to other entrepreneurs to imitate and enter the market. Profits that persist can be the result either of the ability of firms to innovate persistently or of monopoly power. Competition can also be impeded by regulations, which create barriers to both entry and trade. From a policy perspective, it is therefore important to understand how regulations affect the competitive process and the extent to which profit persistence and non-competitive market outcomes are due to regulations. From the literature, we know that regulations influence productivity (Nicoletti et al. 2010 and Nicoletti and Scarpetta, 2005) and economic growth (Aghion and Griffith, 2005).

In this context, one can distinguish between monopoly-based profits and innovation-based/Schumpeterian profits. The former type of profits will decay slowly, if at all, whereas innovation-based profits will decay rapidly. In this report, we are interested in understanding how swiftly profits that are greater or less than the norm are restored and what the determinants are. In particular, we are interested in examining how product market regulations influence profit persistence.

We use a measure of the persistence of abnormal profits, which provides us with information about how competitive countries are. The report covers 33 OECD countries and close to 20 000 firms (164 000 firm-year observations).

Further, we examine the relationships among product market regulations, entrepreneurship and profit persistence. We use the OECD product market regulation (PMR) indicators as measures of regulations that can impede competition. According to the OECD, the: *"(...) the basic idea of the PMR indicators is to turn qualitative information concerns laws and regulations that may affect competition into quantitative indicators. They aim at measuring regulations that are potentially anti-competitive in areas where competition is viable, and focus on policy settings instead of market outcomes."* (OECD, 2010).

The PMR includes three subcomponents: *state control*, *barriers to entrepreneurship* and *barriers to trade and investment*. We find that PMR, state control and barriers to entrepreneurship have negative impacts on competition, which lead to more persistent profits. Barriers to trade and investments have no significant effects.

The main findings are that Greece, Spain, the Czech Republic and Italy have the least competitive economies (i.e., most persistent profits) in the OECD, whereas Germany, Norway, Japan and Sweden are among the most competitive economies (i.e., least persistent profits). The findings have implications for regulatory economics and suggest that economies could improve their competitiveness through regulatory reform. Finally, we suggest areas for further research.

2 Profits, competition and product market regulation

Profits and the profit motive are perhaps the strongest forces in an economy. Firms and entrepreneurs are profit seeking, and the prospect of making profits arguably provides powerful incentives for economic agents to innovate, for entrepreneurship as well as rent seeking (see i.e., Mueller, 2003). See Mueller (1976 and 2003) for a discussion of the nature and definition of profits.

Profits greater than the norm that persist over prolonged periods of time suggest the systematic misallocation of resources and deadweight losses. Economic theory suggests that competition through imitation (e.g., entry) should drive profits that are greater or less than normal toward the normal profit levels (see e.g., Mueller, 1977 and 1986). According to economic theory, persistent profits greater than the norm are a sign of either a lack of competition and some degree of monopoly power or an ability to innovate rapidly. How swiftly abnormally high and low profits converge toward more normal levels can thus reveal a great deal about how well imitative competition works in a sector or a country. Different forms of entry barriers – such as regulations – can cause firms to maintain abnormal profits indefinitely.

In *Die Theorie der Wirtschaftlichen Entwicklung* (1911), Joseph Schumpeter described economic development as a dynamic process in which equilibrium in product markets is disturbed by innovations caused by the actions of entrepreneurs once entrepreneurs introduce an innovation that results in a monopoly. Subsequently, this profit opportunity provides other entrepreneurs with incentives to imitate the innovation. Imitation and entry will then drive down monopoly rents until a new equilibrium is established (see Mueller, 2015).

Firms that are successful innovators might be able to withstand imitative competition, entry and Schumpeterian creative destruction (see Dean et al., 2004; for an analysis of how entry affects the productivity of incumbents, see Aghion et al., 2009). If this is the case, abnormal profits are not the result of entry barriers but are instead the result of innovations. In this case, persistent abnormal profits are not associated with the same misallocation of resources. This association has not been as well recognized, most likely because this insight is, by necessity, based on a dynamic disequilibrium analysis rather than a comparative static equilibrium analysis. Thus, the policy conclusions can fundamentally differ depending on the explanation for profit persistence.

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 (1997, 1986, 1990), has addressed the central question of whether profits that deviate from the norm return to normal levels 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).

Competition and how well the competitive forces of an economy work have received much attention from economists and policymakers for a long time. We are all familiar with the arguments against monopoly power and the economic reasoning underlying anti-trust

policies. However, many industrial organizational studies of market structure and profit might have captured transitory disequilibria phenomena (Mueller, 2003). Failure to consider the temporal structure of profits and the underlying dynamics will result in incorrect inferences and, subsequently, incorrect policy conclusions. Neither partial nor general equilibrium analysis will capture the dynamic effects of regulations.

There are two alternative ways of viewing the competition process. Under the first view, competition is seen as a process for determining prices and quantities, and the monopoly problem consists of too few sellers that produce too little output at too high prices. Following this view, competition policies are established based on the inference that the divergence between price and costs is greater in concentrated industries and, thus, that welfare losses must be greater in more concentrated industries. According to the second, more dynamic view of the competition process, in some markets, products are heterogeneous, and non-price, investment modes of competition prevail. These markets are better characterized by a competition process, in which the entry and exit of firms are important components. This view of the competition process can be associated with a Schumpeterian-like model of dynamic competition.

Figure 1 provides an illustration of how competitive forces over time restore profits to normal levels. If markets are unimpeded and no innovations are introduced, imitative competition and entry will cause profits to converge toward the normal levels.

Figure 1 Persistence of profits above or below the norm
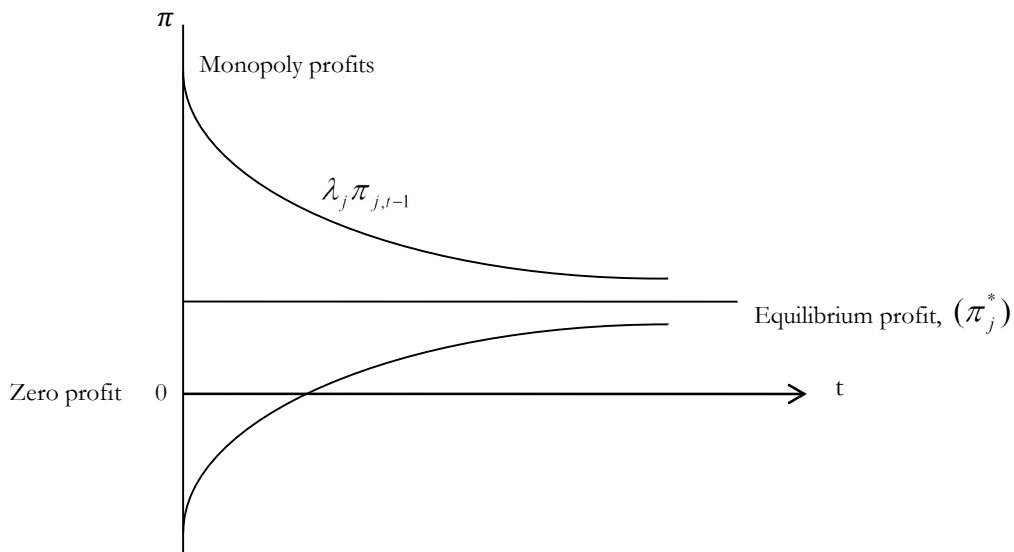
Source: Adjusted from Schwalbach et al. (1989)

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To summarize, there are, in principle, three possible explanations for persistence in profits (Roberts, 2001): a monopoly-based explanation, an innovation-based explanation, and a hybrid of the two. The different explanations are associated with different patterns of imitative competition and innovations (see Roberts, 2001, for details).
Table 1 summarizes the discussion from above.

Table 1 Explanations of firm-level persistent profitability

Explanation	Above-normal profits	Innovations generated	Competitor imitation
Base case	Transitory	Single	Rapid
Monopoly-based	Persistent	Single	Slow
Schumpeterian/innovation-based	Persistent	Many	Rapid
Hybrid	Persistent	Few	Moderate

Source: Roberts (2001)

From a public policy and economic welfare perspective, it is desirable to promote Schumpeterian/innovation-based profits, whereas monopoly-based profits should be discouraged.

3   Methods

To study whether the process of dynamic competition leads to the convergence of firm profits to a normal level, we examine firm *i*'s return on capital as a component of three parts: i) the competitive return on capital *c*; ii) a firm-specific permanent rent r_i; and iii) a firm specific short-run rent s_{it}

$$\pi_{it} = c + r_i + s_{it}. \tag{2}$$

The short-run rent s_{it} is defined as [3]

$$s_{it} = \lambda s_{it-1} + \mu_{it}. \tag{3}$$

Substituting equation 3 into equation 2 and rearranging, we obtain

$$\pi_{it} = (c + r_i)(1 - \lambda) + \lambda \pi_{it-1} - \mu_{it}, \tag{4}$$

where π_{it} equals the profit at time *t,* which is usually calculated as deviation from the profit norm, $(c + r_i)(1 - \lambda) = \alpha$ represents a non-transitory permanent component to the profits, π_{it-1} is the lagged value of profit, and μ_{it} is the error term. The coefficient λ represents the speed at which profits converge toward the norm. Profit therefore depends on its past values, typically with a mean reverting process.[4] Equation 4 can thus be reduced to the following model, which can be empirically estimated:

$$\pi_{it} = \alpha + \pi_{i,t-1} + \varepsilon_{it} \tag{5}$$

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[3] The model has been adopted from Mueller (2003). See Mueller (1976 and 2003) for a discussion of the nature and definition of profits.

[4] As mentioned, there are several different models of profit dynamics in the literature (see Mueller, 1986 and 1990). One possibility is to incorporate entry/exit into the model. To add the dynamics of entry and exit to explain profits, we consider an industry in which a firm's total cost function (TC) to be explained as
$TC = S + cx,$
where x equals the output of a firm. Entry of firms into the industry will prevail until *n* firms have entered, and the condition $\pi_n \geq S > \pi_{n+1}$ is fulfilled. We define entry as
$E_t = \alpha(\pi_{t-1} - S),$
where π_{t-1} is the profit in an industry at time t-1. Entry lowers profits, and thus,
$\pi_t = \pi_{t-1} - \beta E_t.$
Substituting equation 6 into equation 7 and rearranging, we obtain
$\pi_t = (1 - \alpha\beta)\pi_{t-1} + \alpha\beta S$
In equation 8, we can substitute S with different entry barrier measurements, in our case, product market regulation estimates.

4 The OECD product market regulation (PMR) indicator

The idea underlying the economy-wide indicator of product market regulation (PMR) is to turn qualitative data on the laws, regulations and formal rules that can affect competition into a quantitative indicator. The aim is to measure regulations that are potentially anti-competitive in areas where competition is viable and to focus on policy settings rather than market outcomes. Furthermore, the data on which the indicator is based are mainly derived from a survey of member countries, with only a small fraction based on external data sets, thus guaranteeing a high level of comparability across countries (Wölfl, et al., 2009). The PMR indicator is built using a bottom-up approach, which makes it possible to trace the indicator's scores back to the individual policies. The indicator and its sub-level components represent the stringency of regulatory policy on a scale from 0 to 6, where a higher number is associated with policies that are more restrictive to competition; thus, the value of the indicator increases when the degree of restrictions, imposed by regulations on competition or private governance, is higher (see Wölfl, et al. (2009) for an in-depth discussion of the construction of the indicator).

The aggregate economy-wide PMR indicator summarizes a broad range of different regulatory provisions across countries. The indicator covers both general and sectorial regulatory issues in three domains: state control, barriers to entrepreneurship and barriers to trade and investment. State control includes provisions that aim to establish partial or full control over resources or economic activities that could, in principle, be managed by private agents. Both of the domains' barriers to entrepreneurship and barriers to trade and investment reflect provisions that create entry barriers in domestic markets, in which fixed costs, technology and demand conditions make competition viable.

The OECD's product market regulation indicator arguably has many advantages, such as objectivity, transparency and quantifiability (see Pelkmans (2005) for a more in-depth discussion). It measures both economic regulations and administrative regulations and provides an overview of the regulatory environment of a country in a given year. According to Conway, Janod and Nicoletti (2005), the PMR indicator differs from other available indicators, with the PMR indicators being policy focused and objective and therefore not based on opinion surveys or conveying information about market outcomes, whereas the indicators cover regulations that affect the economy at large rather than particular sectors or areas. In addition, the PMR indicators' scores can be traced back to the specific policies due to the bottom-up approach used. Nevertheless, there are drawbacks to using PMR indicators. Pelkmans (2005) suggested that the PMR indicators portray the EU countries as more restrictive in goods and services than what they really are; thus, the indicator has a negative bias toward countries located in Europe. An additional drawback of the indicators is that the data are updated every fifth year (see appendix 1 for a description of the structure of the OECD product market regulation index and appendix 2 for OECD product market regulation indicators).

5   Data

The firm-level data cover close to 20 000 firms in 33 countries across the time period of 1996 to 2013 (unbalanced panel), and they come from standard accounting data available through the Compustat Global Database. Data on product market regulations are available from 1998 onward and are updated every fifth year, i.e., 1998, 2003, 2008 and 2013, and they are provided by the OECD Product Market Regulation Database. We use several different datasets in which the numbers of observations vary depending on data availability. Our main results cover data from 1998-2012 or 2013, depending on the country, covering approximately 20 000 firms and 164 000 observations. We also conduct a number of robustness checks, in which we add control variables that significantly reduce the number of observations. After merging the data with the control variables and accounting for the remaining outliers, the sample contains firm-year observations for the time period of 2007 to 2013. These results are reported in the appendix.

We use return on assets (RoA) as our measure of profits. Profits vary greatly over time, particularly over the business cycle. To remove this cyclical component, we subtract the mean profit level from each firm observation.

Our profit measure is thus defined as[5]

$$\bar{\pi}_{j,\,t} = \ \pi_{j,t} - \frac{\sum_{j=1}^{n} \pi_{j,t}}{n}, \tag{6}$$

where $\pi_{j,t}$ denotes profits for firm j at time t, and n is the number of firms. This adjustment is made with the sample mean of profits; therefore, the term $\bar{\pi}_{j,t}$ measures firm j's profit deviation from the sample mean. As a robustness check, we also use the 2-digit industry mean to adjust the profits (not reported)[6,7].

The economy-wide indicators of policy regimes in OECD countries have been estimated for 1998, 2003, 2008 and 2013. The values between the reported years have been extrapolated.[8] The aggregate economy-wide PMR indicator is added as one of the main variables of interest to capture the overall product market regulations in an economy. To study further the relationship between regulations and profit, the indicator is divided into three sub-indicators: *state control*, *barriers to entrepreneurship* and *barriers to trade and investment*. The lower-level indicators make more of a distinction between which part of the regulation of the economy affects the profits. Additionally, interaction terms are added to the model, in which the first lag of profit is interacted with the regulatory variable. See appendices 1 and 2 for a description of structure and the components of PMR.

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[5] In the previous literature, several different definitions of profit measurements have been used. For a discussion, see Mueller (1986 and 1990).

[6] The data are trimmed to exclude the 1st and 99th percentiles, and the observations for RoA that are less than -25 percent are deleted on the basis that, presumably, they do not reflect a regular profit motive. These data can, for example, be subsidiaries that are receiving regular loss-coverage from parent companies or owners. See appendix 3 for details.

[7] The sample comprises approximately 44.4% manufacturing sector, 20% service sector, 9.4% mining, 9.1% transport, 6.6% retail, 4.5% wholesale, and 3.1% construction; the remaining sectors have relatively low representation.

[8] The values between the reported ones have also been tested such that they are weighted equally between the years. The results are robust, and they do not seem to differ whether they are extrapolated or equally weighted.

Several control variables that account for the firm characteristics that could impact profit dynamics are added, and they are taken from the Compustat Global Database. Three lagged measures of adjusted profits are included to account for the historic performance of a firm. These lags convey information about how the profits persist. Using the log of firm sales in a given year controls for the firm size. Domestic competition is accounted for by measuring a firm's market share of industry sales at the 2-digit SIC level[9]. Additionally, using the value of its physical assets as a share of total assets controls for a firm's tangible assets.

Table 2 Variable definitions and sources

	Definition	Source	Time Period
Profit	Profits are measured as return on assets (RoA) (profit over total assets). RoA has been adjusted for the sample mean in RoA at the 2-digit industry code. See text for details	Compustat Global Database	1996-2013
Product Market Regulation	Economy-wide indicator that measures the degree to which policies promote or inhibit competition in areas of the product market in which competition is viable	OECD (2013), Product Market Regulation Database	1998, 2003, 2008, 2013
State Control	A subset indicator of the Product Market Regulation indicator, it reflects the extent to which governments influence firm decisions through public ownership, price controls or other forms of coercive – rather than incentive-based – regulation.	OECD (2013), Product Market Regulation Database	1998, 2003, 2008, 2013
Barriers to Entrepreneur-ship	A subset indicator of the Product Market Regulation indicator, it reflects obstacles to easy access of information about existing regulations, general or sector-specific administrative burdens for business start-ups or other general or sector-specific regulations that hinder the entry of firms.	OECD (2013), Product Market Regulation Database	1998, 2003, 2008, 2013
Barriers to Trade and Investment	A subset indicator of the Product Market Regulation indicator, it reflects barriers to foreign ownership of firms, tariffs and other non-tariff barriers to trade.	OECD (2013), Product Market Regulation Database	1998, 2003, 2008, 2013
Control Variables Tax Rate	Total tax rate, which measures the amount of taxes and mandatory contributions paid by businesses after accounting for allowable deductions and exemptions as a share of commercial profits	World Bank, Doing Business project	2005-2013
Firm Size	Log of firm sales in a given year	Compustat Global Database	1996-2013
Domestic Competition	A firm's market share of industry sales	Compustat Global Database	1996-2013
Tangibles	Tangible assets as share of total assets	Compustat Global Database	1996-2013
Openness	Total value of imports and exports as a share of GDP	World Bank	1996-2012
New Business Density	Ratio of newly registered limited liability firms in a country per 1,000 people in the working age population (aged 15-64)	World Bank's Entrepreneurship Survey and Database	2004-2012
TFP-Growth	Total Factor Productivity Growth	The Conference Board Total Economy Database	1996-2013

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[9] It would be desirable to use a measure of industry competition at the four-digit level; however, this is not possible in our case due to an insufficient number of observations.

Table 3 Descriptive statistics

	Obs.	Mean	Std. Dev.	Min.	Max.
Profit	164 183	0.367	6.23	-30.6	32.8
Product Market Regulation	164 183	1.63	0.379	0.910	2.71
State Control	164 183	1.98	0.522	1.16	4.20
Barriers to Entrepreneurship	164 183	1.98	0.544	1.08	3.22
Barriers to Trade and Investment	164 183	0.939	0.447	0.120	2.44
Tax Rate	62 373	0.459	0.111	0.243	0.768
Firm Size	62 373	4.80	2.29	-5.81	15.5
Domestic Competition	62 373	0.099	0.225	6.20e-08	1.03
Tangibles	62 373	0.688	0.262	-21.5	1.00
Openness	62 373	0.579	0.297	0.256	2.01
New Business Density	62 373	3.27	3.52	0.188	25.1
TFP Growth	62 373	0.088	2.19	-7.95	5.81

Further control variables are added that could possibly affect the profit dynamics at the country level. These results are reported in the appendix. Corporate tax rates are included as a control variable. Openness to trade will presumably influence the competitive pressure in an economy. To capture this influence, we include a measure of openness to trade as the combined value of imports and exports as a share of GDP. A variable of New Business Density is added that measures the ratio of newly registered liability firms in a country per thousand working age population aged 15-64 years. The above variables are taken from the World Bank database. Finally, a variable that measures the Total Factor Productivity growth of a country, i.e., the productivity growth that comes from technological changes, is added, which is taken from the Conference Board Total Economy Database.

Between 1998 and 2013, the aggregate PMR indicator varies, with values ranging from 0.96 to 2.71. The strictest regulations seem to originate from the domain State Control, whereas the least strict scores seem to come from barriers to trade and investment. See appendix 2 for details.

Table 4 The most regulatory-restrictive countries

Product Market Regulation		State Control		Barriers to Entrepreneurship		Barriers to Trade and Investment	
Country	2013	Country	2013	Country	2013	Country	2013
Israel	2.16	South Africa	3.10	Israel	2.50	South Korea	1.30
South Africa	2.05	Israel	2.92	South Africa	2.17	Slovenia	1.09
South Korea	1.88	Bulgaria	2.80	Iceland	2.04	Israel	1.06
Slovenia	1.80	Switzerland	2.68	Spain	2.10	Japan	1.03
Greece	1.68	Greece	2.61	Chile	2.02	South Africa	0.88
Average	1.44	Average	2.15	Average	1.66	Average	0.50
Sweden	1.55	Sweden	2.32	Sweden	1.71	Sweden	0.62

Table 5 The least regulatory-restrictive countries

Product Market Regulation		State Control		Barriers to Entrepreneurship		Barriers to Trade and Investment	
Country	2013	Country	2013	Country	2013	Country	2013
Netherlands	0.91	Netherlands	1.41	Slovak Republic	1.15	Netherlands	0.12
United Kingdom	1.09	United Kingdom	1.59	New Zealand	1.18	Belgium	0.18
Austria	1.17	Austria	1.63	Netherlands	1.19	Australia	0.19
Germany	1.21	Estonia	1.70	Italy	1.22	Finland	0.20
Denmark	1.22	Germany	1.75	Denmark	1.26	United Kingdom	0.20
Average	1.44	Average	2.15	Average	1.66	Average	0.50
Sweden	1.55	Sweden	2.32	Sweden	1.71	Sweden	0.62

The Netherlands seems to be the country with the overall least regulatory-restricted market of the 33 countries included in the analysis. Of the Scandinavian countries, Denmark seems to have the least regulations in the overall regulation of the product market and the fewest barriers to entrepreneurship domains, whereas Finland has the least regulation with regard to barriers to trade and investment. Sweden seems to have regulations that are more restrictive than average across countries in all domains. Correlations for the variables described are reported in Table 6 below.

Table 6 Correlation matrix

	Profit	Product Market Regulation	State Control	Barrier to Entrepre-neurship	Barriers to Invest-ment	Tax Rate	Firm Size	Domestic Competition	Tang-ibles	Open-ness	New Business Density	TFP Growth
Profit	1.00											
Product Market Regulation	0.02*	1.00										
State Control	0.04*	0.77*	1.00									
Barrier to Entrepreneurship	-0.01*	0.83*	0.48*	1.00								
Barriers to Trade and Investment	0.01*	0.68*	0.22*	0.42*	1.00							
Tax Rate	-0.05*	-0.12*	-0.01*	-0.22*	-0.09*	1.00						
Firm Size	0.19*	-0.02*	0.08*	-0.05*	-0.07*	-0.11*	1.00					
Domestic Competition	0.07*	-0.10*	0.26*	0.06*	-0.13*	-0.06*	0.34*	1.00				
Tangibles	0.15*	0.01*	0.00	0.01*	0.02*	-0.01	-0.01*	-0.00	1.00			
Openness	0.04*	0.12*	0.39*	0.06*	-0.23*	-0.34*	0.12*	0.31*	-0.01*	1.00		
New Business Density	-0.01*	-0.51*	-0.36*	-0.15*	-0.58*	-0.21*	-0.18*	0.02*	-0.01*	-0.06*	1.00	
TFP Growth	0.03*	0.11*	-0.04*	0.06*	0.24*	0.08*	0.03*	-0.06*	0.01*	-0.00	-0.24*	1.00

Note: *indicates 5% significance

6   Empirical results

Based on equation 5 above, we estimate following empirical equation:

$$\bar{\pi}_{j,t} = \alpha + \beta_1\bar{\pi}_{j,t-v} + \beta_2 R_k + \beta_3\left[\bar{\pi}_{j,t-1}R_k\right] + \beta_4\mathbf{X}_{j,t} + \beta_5\mathbf{X}_{k,t} + \varepsilon_{j,t}, \qquad (7)$$

where $\bar{\pi}_{j,t}$ equals the profit at time t for firm j. Three lagged values of the profits are added as explanatory variables to measure the profit persistence; $\bar{\pi}_{j,t-v}$, where $v = 1, 2$ and 3. $R_{k,t}$ is the regulatory indicator for country k at time t. $\mathbf{X}_{j,t}$ **and** $\mathbf{X}_{k,t}$ denotes vectors of control variables at firm and country, respectively. $\varepsilon_{j,t}$ is a conventional error term. Estimations with control variables are reported in the appendix.

A random effect with firm effects – in agreement with the previous literature – is used, and each regulatory variable is included in separate specifications, with the results shown in Table 6.[10] An appropriate lag structure has been determined using information criteria.

For our purposes, we are interested in the interaction terms, which provide us with information about how persistent profits are influenced by regulations. The overall measures of product market regulations significantly increase profit persistence. Of our sub-components, state control and barriers to entrepreneurship are significant, whereas barriers to trade and investments are insignificant.

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[10] Further empirical specifications, including dynamic panel models, can be found in Eklund and Lappi (2015).

Table 7 Regression results (adjustment toward sample mean)

Dependent variable: $\bar{n}_{j,t}$ (profit$_{j,t}$)	(1)	(2)	(3)	(4)
Constant	-0.087 (0.070)	-0.278*** (0.075)	0.004 (0.051)	-0.119*** (0.044)
$\bar{n}_{j,t-1}$ (Profit$_{j,t-1}$)	0.367*** (0.015)	0.365*** (0.014)	0.356*** (0.013)	0.405*** (0.008)
$\bar{n}_{j,t-2}$ (Profit$_{j,t-2}$)	0.059*** (0.004)	0.058*** (0.004)	0.059*** (0.004)	0.058*** (0.004)
$\bar{n}_{j,t-3}$ (Profit$_{j,t-3}$)	0.046*** (0.004)	0.046*** (0.004)	0.047*** (0.004)	0.046*** (0.004)
Product Market Regulation	-0.012 (0.039)			
State Control		0.084** (0.036)		
Barriers to Entrepreneurship			-0.055** (0.022)	
Barriers to Trade and Investment				0.012 (0.040)
Interaction terms with profit$_{j,t-1}$				
Product Market Regulation	0.018* (0.009)			
State Control		0.015** (0.007)		
Barriers to Entrepreneurship			0.021*** (0.007)	
Barriers to Investment				-0.010 (0.008)
No. of Observation	164 183	164 183	164 183	164 183
No. of Firms	19 708	19 689	19 689	19 689
R^2	0.36	0.36	0.36	0.36
VIF	8.72	6.95	8.13	2.95

*Note: Statistical significance is reported at 1, 5 and 10% (***, ** and *, respectively). Random effects model with firm effects. Robust standard errors are reported in brackets.*

To gain a better understanding of the country differences in persistence of profits, we estimate equation 6 for each country in our sample separately. As above, the lag structure must be determined with information criteria. As above, random estimation with firm effects is used. In each case, up to three lags are used, and the appropriate lag structure has been determined with the help of information criteria and significance (if it is insignificant, we have not included the lag). The persistence of profit parameter is simply the sum of the lags[11].

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[11] $\sum_k^n \hat{\lambda}_{t-k}$

Table 8 Country estimates of profit persistence

	Constant	Profit $_{t-1}$	Profit $_{t-2}$	Profit $_{t-3}$	Obs	Firms	R^2
Australia	0.157 (0.133)	0.351*** (0.012)	0.107*** (0.013)	0.052*** (0.012)	7 043	1 319	0.35
Austria	-0.132 (0.158)	0.472*** (0.037)	0.099** (0.039)	0.088** (0.036)	901	112	0.31
Belgium	0.185 (0.203)	0.425*** (0.031)	0.124*** (0.033)	0.096*** (0.029)	1 113	145	0.41
Bulgaria	-0.257 (0.416)	0.453*** (0.087)	0.275*** (0.080)	-	138	21	0.43
Canada	0.673*** (0.126)	0.371*** (0.014)	0.088*** (0.015)	0.072*** (0.014)	5 143	723	0.31
Chile	0.757*** (0.243)	0.431*** (0.026)	0.071** (0.029)	0.053** (0.026)	1 594	160	0.49
Czech Republic	0.780*** (0.293)	0.545*** (0.065)	0.246*** (0.067)	-	235	35	0.51
Denmark	-0.150 (0.197)	0.514*** (0.027)	0.057** (0.027)	-	1 496	187	0.37
Estonia	2.07*** (0.653)	0.787*** (0.080)	-0.164** (0.082)	-	152	18	0.35
Finland	0.085 (0.159)	0.521*** (0.028)	0.112*** (0.031)	0.081*** (0.027)	1 306	145	0.39
France	-0.210** (0.103)	0.418*** (0.012)	0.057*** (0.013)	0.029** (0.012)	6 627	853	0.38
Germany	-0.309*** (0.118)	0.361*** (0.013)	0.053*** (0.014)	0.043*** (0.013)	6 420	856	0.30
Greece	-1.31*** (0.115)	0.627*** (0.025)	0.133*** (0.031)	0.131*** (0.028)	1 639	229	0.55
Hungary	0.033 (0.411)	0.376*** (0.067)	0.205*** (0.074)	0.142** (0.067)	218	28	0.43
Iceland	-0.726 (0.655)	0.422*** (0.101)	-	-	82	11	0.18
Indonesia	0.466*** (0.141)	0.518*** (0.019)	0.043** (0.021)	0.157*** (0.018)	2 469	341	0.44
Ireland	0.435 (0.267)	0.396*** (0.037)	0.121*** (0.042)	0.079** (0.037)	724	94	0.35
Israel	0.333* (0.182)	0.481*** (0.018)	-	-	2 061	315	0.33
Italy	-0.550*** (0.086)	0.549*** (0.021)	0.126*** (0.024)	0.116*** (0.021)	2 521	328	0.46
Japan	-0.508*** (0.030)	0.374*** (0.005)	0.060*** (0.005)	0.037*** (0.005)	51 031	4 346	0.31
South Korea	-0.277*** (0.071)	0.409*** (0.008)	0.063*** (0.009)	0.020** (0.008)	15 891	1 681	0.30
Netherlands	0.294 (0.220)	0.436*** (0.026)	0.070** (0.028)	0.061*** (0.025)	1 656	218	0.37
New Zealand	0.676** (0.255)	0.393*** (0.032)	0.092*** (0.031)	-	1 121	145	0.35

	Constant	Profit $_{t-1}$	Profit $_{t-2}$	Profit $_{t-3}$	Obs	Firms	R^2
Norway	-0.444 (0.258)	0.314*** (0.026)	0.054*** (0.027)	0.098*** (0.025)	1 494	245	0.28
Portugal	-0.249 (0.171)	0.469*** (0.037)	0.145*** (0.037)	-	646	77	0.33
Slovak Republic	-0.297 (0.692)	0.549*** (0.090)	-	-	97	12	0.28
Slovenia	-0.384 (0.265)	0.546*** (0.068)	0.180*** (0.066)	-	241	24	0.38
South Africa	1.98*** (0.212)	0.429*** (0.019)	0.050*** (0.019)	-	2 661	345	0.33
Spain	0.025 (0.107)	0.626*** (0.025)	0.111*** (0.025)	-	1 689	183	0.46
Sweden	0.166 (0.196)	0.383*** (0.017)	0.095*** (0.017)	-	3 319	473	0.34
Switzerland	0.418*** (0.107)	0.547*** (0.021)	0.077*** (0.024)	0.102*** (0.021)	2 466	256	0.39
United Kingdom	-0.002 (0.085)	0.396*** (0.009)	0.063 *** (0.010)	0.071*** (0.071)	12 218	1 929	0.34
United States	0.097* (0.050)	0.445*** (0.005)	0.039*** (0.006)	0.061*** (0.005)	35 121	4 235	0.37

Note: Statistical significance is reported at 1, 5 and 10% (***, ** and *, respectively). Random effects model with firm effects. Standard errors are reported in brackets.

1996-2012: Israel, Portugal

1996-2013: Denmark, South Africa

1997-2012: Finland, Estonia, Iceland, Slovak Republic

1997-2013: Austria, Hungary, Indonesia, Ireland, South Korea, New Zealand, Spain, Sweden

1998-2012: Chile, Czech Republic, Slovenia

1998-2013: Australia, Belgium, Canada, France, Germany, Greece, Italy, Japan, Netherlands, Norway, Switzerland, United Kingdom and United States

2000-2012: Bulgaria

In Table 9, the persistence of profit parameter is reported for the OECD countries and Key Partners. One immediate observation is a significant cross-country variation. Several Northern European countries, including Sweden and Germany, are found among the countries with relatively low persistence in profits, whereas all of the Southern European countries, including Spain, Italy and Greece, have relatively high levels of profit persistence.

Table 9 Profit persistence in OECD countries and Indonesia and South Africa

Country	
Iceland	0.422
Germany	0.457
Norway	0.466
Japan	0.471
Sweden	0.478
South Africa	0.479
Israel	0.481
New Zealand	0.485
South Korea	0.492
France	0.504
Australia	0.510
United Kingdom	0.530
Canada	0.531
United States	0.545
Slovak Republic	0.549
Chile	0.555
Netherlands	0.567
Denmark	0.571
Ireland	0.596
Portugal	0.614
Estonia	0.623
Belgium	0.645
Austria	0.659
Finland	0.714
Indonesia	0.718
Hungary	0.723
Slovenia	0.726
Switzerland	0.726
Bulgaria	0.728
Spain	0.737
Czech Republic	0.791
Italy	0.791
Greece	0.891

Note: The persistence parameters have been calculated by summarizing the coefficient estimates of the lagged profit variables in table 9. E.g., Sweden: 0.383 + 0.095 = 0.478.

The profit persistence estimates can be used to predict how swiftly abnormal profits are restored to normal levels, thus providing information about how competitive an economy is. Theoretically, we expect a pattern similar to that in
Figure 1above. In Figure 2 below, the convergence process has been plotted for three countries: Germany, Sweden and Greece. We only include three countries to avoid clutter. It should be noted that the value 0 is the level of the normal profits and does not indicate zero actual profits.
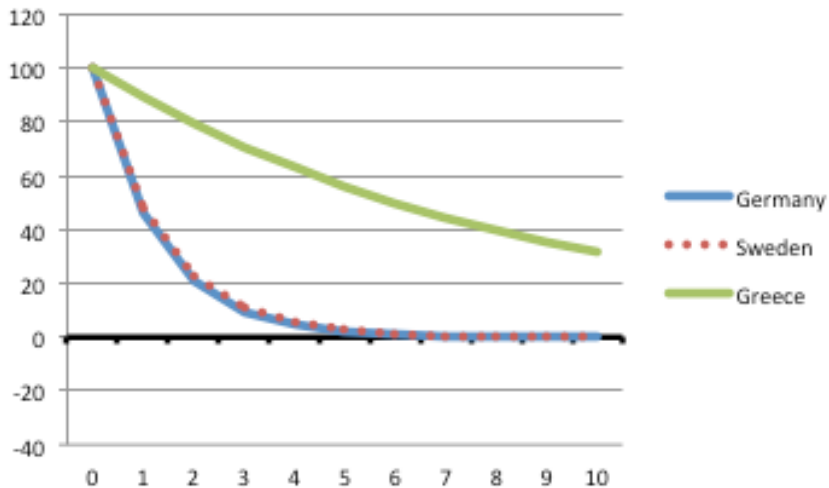

Figure 2 Persistence of profits above or below the norm in Germany, Sweden and Greece

The graph illustrates the predicted convergence process over a period of ten years. This graph provides a clear illustration of how different the competitiveness of the OECD counties is. Sweden and Germany belong to the more competitive group of counties, whereas Greece clearly is among the least competitive countries in the OECD, together with Spain, the Czech Republic and Bulgaria. These results are consistent with the view that profits in Sweden and Germany are entrepreneurially and innovation-driven, whereas those in, for example, Greece are more monopoly-based. However, to verify this finding, further micro-data would be necessary.[12]

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[12] We also conduct additional robustness and empirical tests. First, to check the robustness of our results, we included additional control variables (tax rate, openness, tangibility, firm size, new business density and domestic competition). These results are similar to the results above. However, one important caveat to bear in mind when interpreting these results is that the number of observations is significantly reduced, which is mainly caused by a lack of data prior to 2007. This lack is problematic given that we are focusing on the dynamics of profits. We find that four of the control variables are robustly significant: firm size, tangibility, openness, total factor productivity growth and new business density. Firm size has a positive relationship with profits, whereas openness has a negative relationship. These results can be obtained from the authors upon request.

As discussed above, the convergence process can be indicative not only of how strong imitative competition is but also of the degree of Schumpeterian competition and innovation. To illustrate this competitive process we use data from the Global Entrepreneurship Monitor (GEM, 2015) which measure different dimensions of entrepreneurship and entrepreneurial activity. We use a specific measure of entrepreneurial opportunity, which captures perceived entrepreneurial opportunities. In Figure 3 below, the persistence of profit estimates from Table 10 is plotted against opportunity-driven entrepreneurship. The correlation is negative, which indicates that a higher degree of opportunity-based entrepreneurship is associated with lower profit persistence.
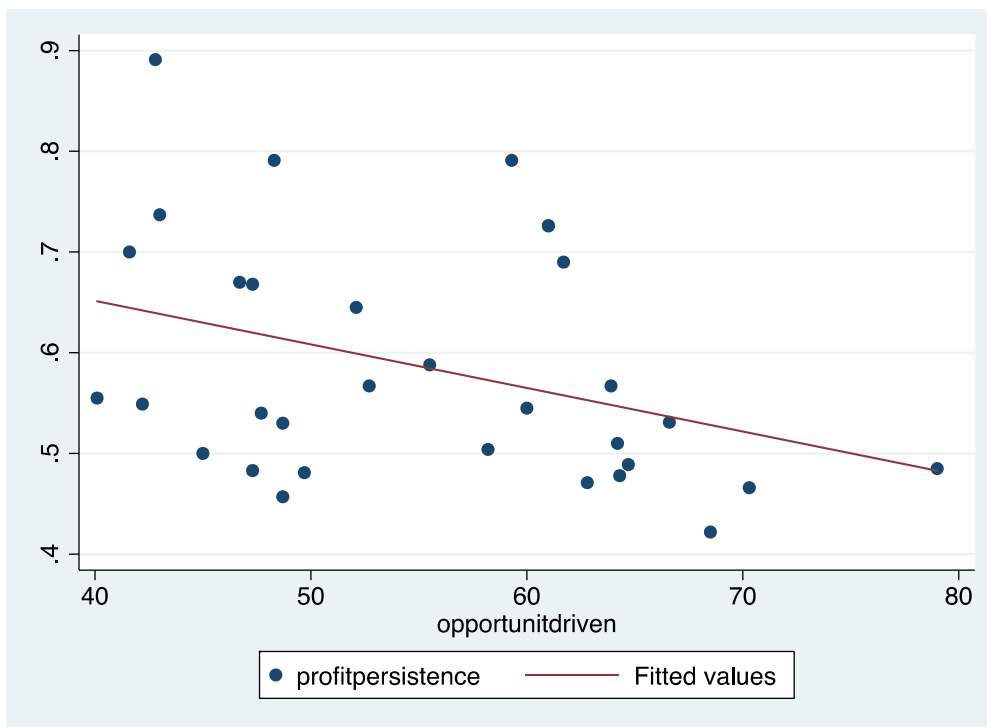

Figure 3 Profit persistence and opportunity-driven entrepreneurship

Source: Data on opportunity-driven entrepreneurship were collected from Global Entrepreneurship Monitor and cover 2004-2014 (GEM, 2015). The fitted line is significant at 5%.

For entrepreneurship data, see Appendix 5 Persistence of profits and entrepreneurship.

7   Conclusions and policy implications

Profits and the profit motive are arguably among the most important forces driving an economy, and they provide entrepreneurs with powerful incentives to innovate. At the same time, it is well known that monopoly profits result in too low output and welfare losses. To understand the dynamics of profits, it thus becomes important to understand whether they are welfare enhancing or welfare decreeing. From a dynamic perspective, profits are an important factor for enhancing welfare through entrepreneurship and innovations. If profits, in contrast, persist for prolonged periods of time, it could be a sign of monopoly power maintained through entry barriers that prevent imitation (competition). These types of monopoly profits are welfare reducing.

Schumpeter argued, in his seminal book *Die Theorie der Wirtschaftligen Entwicklung* (1911), that economic development is a dynamic process in which an entrepreneur introduces an innovation, which disrupts product market equilibrium. These innovations give rise to temporal monopolies and monopoly rents. These monopoly rents will attract the entry of imitating firms. Imitation and entry will drive down monopoly rents and restore the equilibrium. Firms and entrepreneurs that are able to innovate persistently might be able to withstand imitative competition. Profits greater than the norm, however, might also come about due to various forms of entry barriers.

We study how product market regulations (PMR) across the OECD influence profit dynamics. To this end, we use a model of profit dynamics pioneered by Mueller (1977). We use an unbalanced panel with close to 20 000 firms and approximately 164 000 firm year observations[13]. We find that profit persistence varies significantly across OECD countries. In Germany, Norway, Japan and Sweden, profits are among the least persistent. Southern European countries, including Spain, Italy and Greece, have relatively high levels of profit persistence. We find that PMR increases profit persistence. In particular, we find that state control and barriers to entrepreneurship are associated with more persistent profits. A simple correlation analysis also shows that there is a negative correlation between opportunity-driven entrepreneurship and profit persistence.

To better understand the sectorial differences in profit persistence, further research is called for. The firms covered in this study are mainly large listed firms, which can be assumed to compete in international markets to a greater extent than many other firms. In the case of Sweden, possible research lines would be to explore further profit persistence in various sectors, such as construction and welfare services.
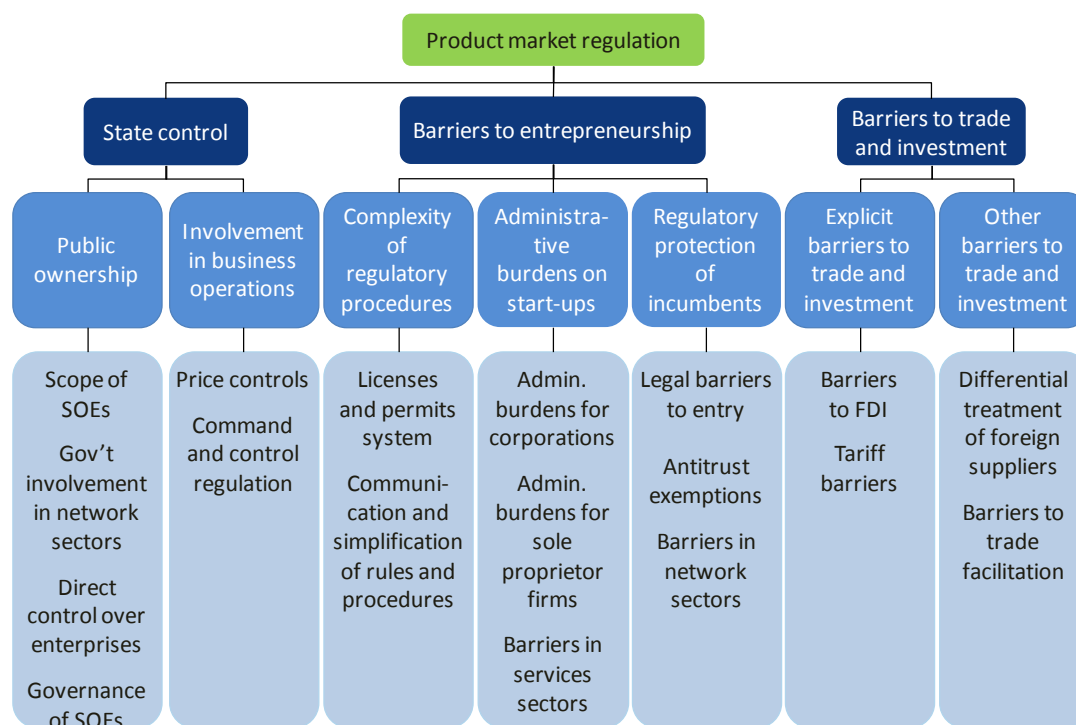
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[13] The number of observations varies depending on the model specification and choice of independent variables

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Appendix 1 Structure of OECD product market regulation index

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                          │  Product market regulation  │
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State control		Barriers to entrepreneurship			Barriers to trade and investment	
Public ownership	Involvement in business operations	Complexity of regulatory procedures	Administrative burdens on start-ups	Regulatory protection of incumbents	Explicit barriers to trade and investment	Other barriers to trade and investment
Scope of SOEs

Gov't involvement in network sectors

Direct control over enterprises

Governance of SOEs | Price controls

Command and control regulation | Licenses and permits system

Communication and simplification of rules and procedures | Admin. burdens for corporations

Admin. burdens for sole proprietor firms

Barriers in services sectors | Legal barriers to entry

Antitrust exemptions

Barriers in network sectors | Barriers to FDI

Tariff barriers | Differential treatment of foreign suppliers

Barriers to trade facilitation |

Source: OECD Regulatory Database

Explanations for different parts of OECD product market regulation components

Scope of public enterprises: measures the pervasiveness of state ownership across business sectors as the proportion of sectors in which the state controls at least one firm (based on 24 business sectors)

Government involvement in network sectors: measures the extent of public ownership in the energy, communications and transport sectors (based on detailed data for seven network industries)

Direct control over business enterprises: measures the existence of government special voting rights in privately owned firms, constraints on the sale of state-owned equity stakes, and the extent to which legislative bodies control the strategic choices of public enterprises (based on 24 business sectors)

Price controls: reflects the extent of price controls in competitive sectors, such as air travel, retail trade, road freight, professional services, and mobile communications

Use of command and control regulation: indicates the extent to which government uses coercive (as opposed to incentive-based) regulation in general and in specific services sectors (road freight, retail trade, air transport, railways, professional services)

Licenses and permits systems: reflects the use of 'one-stop shops' and 'silence is consent' rules for obtaining information about and the issuing of licenses and permits

Communication and simplification of rules and procedures: reflects aspects of the government's communication strategy and efforts to reduce and simplify the administrative burden of interacting with government

Administrative burdens for corporations: measures the extent of administrative burdens on the creation of corporations

Administrative burdens for sole proprietors: measures the extent of administrative burdens on the creation of sole proprietor firms

Sector-specific administrative burdens: reflects administrative burdens in the road transport and retail distribution sectors

Legal barriers: measures the pervasiveness of barriers to entry across business sectors as the proportion of sectors in which there are explicit legal limitations on the number of competitors (based on 24 business sectors)

Antitrust exemptions: measures the scope of exemptions from competition law for public enterprises

Barriers to entry in network sectors: measures various types of entry barriers in network sectors, as well as the degree of vertical integration in energy, rail transport and telecommunication sector (based on detailed data for seven network sectors)

Barriers to entry in services: measures barriers to entry in retail trade and professional services.

Barriers to foreign direct investment (FDI): measures general and sector-specific restrictions on the foreign acquisition of equity in public and private firms, obligatory screening procedures and operational controls for affiliates of foreign firms (e.g., nationality requirement for key personnel); this indicator covers manufacturing, construction, electricity and 9 services sectors

Tariffs: reflects the average of most-favored-nation tariffs, computed from detailed product data on tariffs

Discriminatory procedures: reflects the extent of discrimination against foreign firms at the procedural level

Regulatory barriers: reflects other non-tariff barriers to trade, such as lack of mutual recognition agreements or international harmonization of standards

Appendix 2 OECD product market regulation indicators

Country	Product Market Regulation				State Control				Barriers to Entrepreneurship				Barriers to Trade and Investment			
	1998	2003	2008	2013	1998	2003	2008	2013	1998	2003	2008	2013	1998	2003	2008	2013
Australia	1.70	1.31	1.43	1.26	2.28	1.59	2.21	1.99	1.86	1.68	1.56	1.61	0.95	0.67	0.53	0.19
Austria	2.11	1.60	1.35	1.17	3.11	2.34	1.92	1.63	2.45	1.79	1.46	1.31	0.76	0.68	0.68	0.57
Belgium	2.25	1.62	1.55	1.39	3.04	2.29	2.22	2.20	3.00	2.26	2.14	1.78	0.71	0.30	0.30	0.18
Canada	1.85	1.58	1.48	1.37	2.15	2.08	1.96	1.92	1.82	1.44	1.36	1.34	1.59	1.24	1.11	0.85
Chile	.	.	1.71	1.48	.	.	2.22	1.99	.	.	2.45	2.02	.	.	0.47	0.43
Czech Republic	2.63	1.87	1.50	1.39	3.28	2.58	2.11	1.95	2.76	2.17	1.90	1.82	1.87	0.85	0.48	0.42
Denmark	1.65	1.48	1.31	1.22	2.32	1.83	2.03	1.97	2.42	2.12	1.42	1.26	0.23	0.48	0.48	0.45
Estonia	.	.	1.38	1.33	.	.	1.81	1.70	.	.	1.78	1.56	.	.	0.55	0.73
Finland	1.94	1.49	1.34	1.29	2.75	2.26	2.18	2.13	2.36	1.77	1.58	1.55	0.70	0.45	0.27	0.20
France	2.33	1.74	1.49	1.43	3.32	2.74	2.35	2.29	3.13	2.07	1.71	1.66	0.54	0.40	0.40	0.35
Germany	2.17	1.71	1.33	1.21	2.57	2.03	1.91	1.75	2.79	2.24	1.73	1.51	1.16	0.84	0.34	0.36
Greece	2.71	2.45	2.19	1.68	4.20	3.67	3.26	2.61	3.03	2.87	2.53	1.91	0.89	0.82	0.79	0.52
Hungary	2.65	2.08	1.40	1.31	3.34	2.42	1.99	2.02	2.77	2.27	1.87	1.69	1.82	1.54	0.36	0.22
Iceland	1.99	1.50	1.45	1.46	2.60	1.68	1.84	1.97	2.78	2.16	2.15	2.04	0.61	0.67	0.36	0.38
Ireland	1.85	1.58	1.38	1.44	2.99	2.49	1.93	2.08	2.35	2.02	1.99	1.98	0.23	0.23	0.23	0.26
Israel	.	.	2.24	2.16	.	.	3.02	2.92	.	.	2.57	2.50	.	.	1.12	1.06
Italy	2.35	1.81	1.49	1.26	3.82	3.15	2.58	2.14	2.57	1.70	1.30	1.22	0.65	0.59	0.58	0.42
Japan	2.22	1.48	1.54	1.51	1.89	1.68	1.90	1.84	3.22	1.69	1.65	1.67	1.55	1.08	1.06	1.03
South Korea	2.49	1.89	1.88	1.88	2.60	2.10	2.44	2.47	2.44	2.22	1.98	1.88	2.44	1.37	1.23	1.30
Netherlands	1.81	1.49	0.96	0.91	2.97	2.28	1.44	1.41	2.19	1.92	1.31	1.19	0.27	0.27	0.14	0.12
New Zealand	1.45	1.29	1.22	1.27	1.18	1.56	1.90	2.06	2.04	1.61	1.08	1.18	1.13	0.69	0.69	0.56
Norway	1.87	1.55	1.50	1.49	2.81	2.18	2.09	2.21	2.19	1.88	1.82	1.69	0.60	0.60	0.60	0.57
Portugal	2.55	2.09	1.70	1.30	4.04	3.42	3.00	2.28	2.76	2.00	1.81	1.33	0.86	0.86	0.30	0.30

Country	Product Market Regulation				State Control				Barriers to Entrepreneurship				Barriers to Trade and Investment			
Slovak Republic	.	1.93	1.57	1.31	.	3.04	2.32	2.31	.	2.15	1.74	1.15	.	0.60	0.65	0.47
Slovenia	.	.	1.99	1.80	.	.	2.74	2.50	.	.	2.00	1.81	.	.	1.23	1.09
Spain	2.37	1.77	1.58	1.45	3.65	2.49	2.16	1.95	3.09	2.47	2.20	2.10	0.36	0.36	0.36	0.31
Sweden	1.88	1.50	1.64	1.55	2.19	1.90	2.48	2.32	2.82	1.99	1.81	1.71	0.62	0.62	0.62	0.62
Switzerland	2.49	1.99	1.55	1.50	3.05	2.75	2.66	2.68	2.94	2.51	1.62	1.56	1.46	0.71	0.37	0.26
United Kingdom	1.32	1.10	1.21	1.09	1.68	1.16	1.65	1.59	1.96	1.81	1.73	1.48	0.32	0.32	0.25	0.20
United States	1.50	1.30	1.11	.	1.62	1.43	1.50	.	1.97	1.64	1.23	.	0.91	0.85	0.60	.
Bulgaria	.	.	.	1.57	.	.	.	2.80	.	.	.	1.70	.	.	.	0.23
Indonesia	.	.	2.42	.	.	.	3.75	.	.	.	1.92	.	.	.	1.59	.
South Africa	.	.	2.52	2.05	.	.	3.50	3.10	.	.	2.65	2.17	.	.	1.41	0.88
Average	2.09	1.66	1.58	1.44	2.78	2.27	2.28	2.15	2.55	2.02	1.81	1.66	0.93	0.70	0.63	0.50

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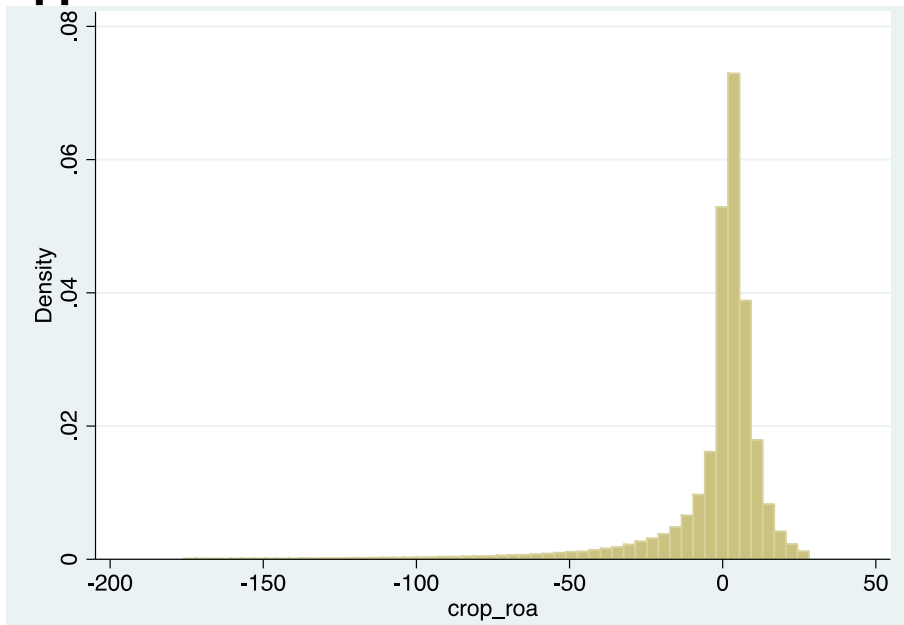# Appendix 3 Distribution of returns on assets (RoA)

Figure 4

Figure 4 shows the distribution of the returns on assets for the firms in our sample. As seen in this figure, there are a number of firms with significant negative returns on assets. To achieve a more normal distribution, we remove firms with return on assets < -25. These firms can be assumed to receive loss coverage and not belong to the same group of firms. It can, for example, be R&D firms who systematically have negative RoA but still receive funding, thus making it possible for them to continue operating.
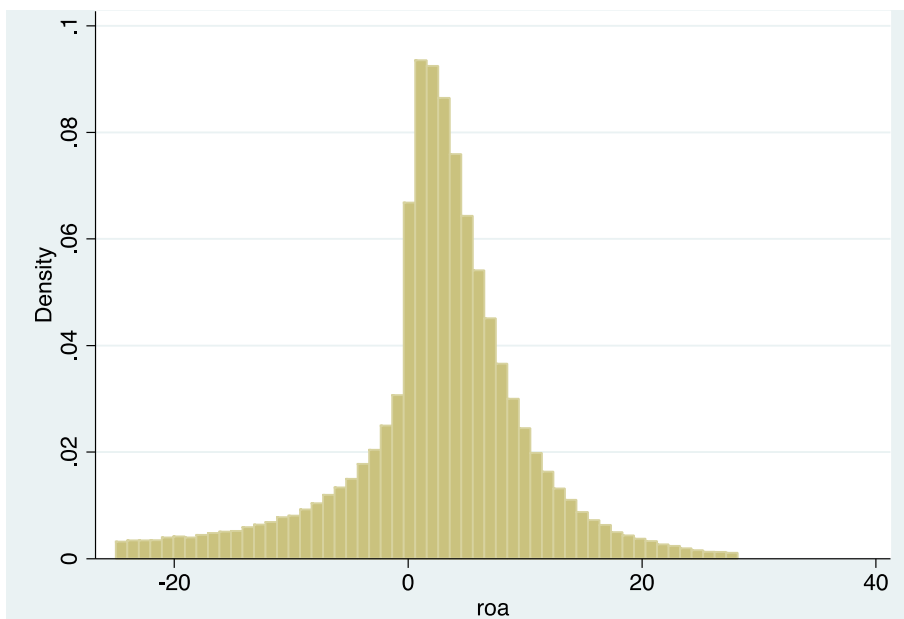

Figure 5

Figure 5 shows the distribution once we have excluded this group of firms (i.e., RoA < -25).

Appendix 4 Persistence of profits including control variables

Table 10 Regression results

Dependent variable: $\bar{\pi}_{j,t}$ (profit $_{j,t}$)	(1)	(2)	(3)	(4)
Constant	-5.89*** (1.02)	-6.23*** (1.09)	-6.40*** (1.05)	-5.37*** (0.917)
$\bar{\pi}_{j,t-1}$ (Profit $_{j,t-1}$)	0.298*** (0.031)	0.317*** (0.026)	0.160*** (0.035)	0.354*** (0.015)
$\bar{\pi}_{j,t-2}$ (Profit $_{j,t-2}$)	0.051*** (0.007)	0.051*** (0.007)	0.051*** (0.007)	0.051*** (0.007)
$\bar{\pi}_{j,t-3}$ (Profit $_{j,t-3}$)	0.034*** (0.006)	0.034*** (0.006)	0.034*** (0.006)	0.034*** (0.006)
Product Market Regulation	-0.284** (0.132)			
State Control		-0.102 (0.070)		
Barriers to Entrepreneurship			-0.018 (0.111)	
Barriers to Trade and Investment				-0.570*** (0.168)
Interaction terms with profit $_{j,t-1}$				
Product Market Regulation	0.021 (0.019)			
State Control		0.006 (0.012)		
Barriers to Entrepreneurship			0.095*** (0.019)	
Barriers to Trade and Investment				-0.029** (0.014)
Control variables				
Tax Rate	-0.104 (0.359)	0.058 (0.364)	0.100 (0.361)	-0.690* (0.355)
Firm Size	0.574*** (0.040)	0.574*** (0.039)	0.569*** (0.039)	0.575*** (0.040)
Domestic Competition	-0.306* (0.159)	-0.306* (0.159)	-0.336** (0.158)	-0.326** (0.158)
Tangibles	5.14*** (1.05)	5.14*** (1.05)	5.12*** (1.05)	5.22*** (1.07)
Openness	-0.592*** (0.151)	-0.556*** (0.155)	-0.562*** (0.156)	-0.919*** (0.147)
New Business Density	0.143*** (0.016)	0.149*** (0.016)	0.151*** (0.016)	0.120*** (0.014)
TFP Growth	0.018* (0.011)	0.016 (0.011)	0.015 (0.011)	0.027** (0.011)
No. of Observations	62 373	62 373	62 373	62 373
No. of Firms	12 263	12 263	12 263	12 263
R^2	0.36	0.36	0.36	0.36
VIF	6.09	4.65	7.67	2.34

Note: Statistical Significance is reported at 1, 5 and 10% (***, ** and *, respectively). Random effects model with firm effects. Robust standard errors are reported in brackets. Data cover 2007-2013.

Appendix 5 Persistence of profits and entrepreneurship

Table 11 Profit persistence and opportunity driven entrepreneurship

Country	Profit Persistence	Opportunity Driven
Iceland	0.422	68.5
Germany	0.457	48.7
Norway	0.466	70.3
Japan	0.471	62.8
Sweden	0.478	64.3
Israel	0.481	49.7
Austria	0.483	47.3
New Zealand	0.485	79
Denmark	0.489	64.7
South Korea	0.5	45.0
France	0.504	58.2
Australia	0.51	64.2
United Kingdom	0.53	48.7
Canada	0.531	66.6
Indonesia	0.54	47.7
United States	0.545	60.0
Slovak Republic	0.549	42.2
South-Africa	0.555	40.1
Portugal	0.567	52.7
Netherlands	0.567	63.9
Chile	0.588	55.5
Belgium	0.645	52.1
Ireland	0.668	47.3
Estonia	0.67	46.7
Finland	0.69	61.7
Hungary	0.7	41.6
Slovenia	0.726	61.0
Switzerland	0.726	61.0
Bulgaria	0.728	-
Spain	0.737	43.0
Italy	0.791	48.3
Czech Republic	0.791	59.3
Greece	0.891	42.8

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