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The Economic Impact of Professional Services Liberalisation

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I. INTRODUCTION

Professional services, also known as "liberal professions" are generally defined as occupations requiring special training in the arts or sciences, such as lawyers, engineers, architects and accountants. Some of these professions are closely regulated by national governments, often supported by professional bodies, with varying restrictions on number of entrants into the profession, rates charged, form of business, exclusive rights enjoyed by practitioners. Such regulation can hold back the performance of these sectors, with non-trivial costs for consumers and downstream businesses. That is why large scale reforms in some of these highly regulated services are taking place in a number of Member States, also in the EU policy and European Semester framework ([1]).

This study is an attempt to evaluate the effect of changes in the regulatory barriers of four highly regulated professions ([2]) (legal, accounting, architectural and engineering), on each sector's allocative efficiency (AE) and profits for most EU countries over the period 2008-2011. Differently from what is generally done in the literature in the field, instead of estimating the direct effect of regulation on performance indicators, a "two-step" approach is used.

The first step investigates the impact of reforms proxied by changes in the OECD's Product Market Regulation (PMR) indicator for professional services, on business dynamics (i.e. entry, exit of firms) in the selected highly regulated professional services. The level of regulation at sectoral level is proxied by the OECD's Product Market Regulation (PMR) indicator (including recently published data for 2013) which translates policy action into a quantitative indicator.

The second step quantifies the relationship between business dynamics and two performance indicators, namely allocative efficiency and profitability. Allocative efficiency is defined as the extent to which productive factors are allocated towards their most efficient use and is used to capture the between firms within sector resource allocation. Sectoral profitability is proxied by the gross operating rate in each of the regulated professions considered. The underlying idea is that intensified competition related with less strict regulation would translate into higher allocative efficiency and lower above normal profitability (or better: a return to "normal" profit rates ([3])).

The idea behind this two-step approach is to investigate through which channels product market regulation affects outcome variables such as efficiency or profitability. Less strict product market regulations are intended to strengthen competition in the market, for example by inducing entrepreneurs to start a business. In that sense, the entry of new firms, or the threat of it, induces existing firms to become more efficient through reallocation of resources inside the firm or cutting slack or by investing in innovation to escape competition (allocative, productive and dynamic efficiency gains). In addition, less productive firms will be pushed out of the market while more efficient ones grow and gain market share thus leading to further allocative efficiency gains. Concurrently, more intensive competition is expected to drive prices down and reduce profits. The impact of deregulation thus operates through intensified competition (see also the Product Market Review 2013, chapter 1).

The paper is organised as follows. Chapter 2 provides a theoretical and empirical background on regulated professions. Chapter 3 provides a description of the economic relevance of the four analysed professions, and Chapter 4 gives an overview of the econometric methodology adopted. Results are described and discussed in Chapter 5. Chapter 6 concludes.

([1]) In the context of the 2014 cycle of the European Semester ten MS received a recommendation in the field of professional services (AT, BG, CZ, FR, DE, IT, PL, PT, SI, ES).

([2]) The Professional Qualifications Directive 2005/36/EC defines "regulated professions" as professional activity or group of professional activities, access to which, the pursuit of which, or one of the modes of pursuit of which is subject, directly or indirectly, by virtue of legislative, regulatory or administrative provisions to the possession of specific professional qualifications.

([3]) It is not obvious how to measure "normal profit rates" which is a variable that depends among other things on the capital intensity of the sector, the cycle, etc.

II. REGULATION OF PROFESSIONAL SERVICES: THEORY AND EMPIRICAL BACKGROUND

II.1. THEORETICAL BACKGROUND

This study focuses on legal, accounting, architectural and engineering services, which are all professional services subject to certain degrees of regulation([4]), including (self-)regulation ([5]) to a greater or lesser extent across Member States and for which detailed and comparable cross-country data on the regulatory framework are available.

One of the main justifications for regulation in professional activities is the existence of asymmetric information between the professional and the client. According to this market failure argument, consumers are generally not in a position to assess the quality of the professional service they buy and, being in a position of relative weakness, need to be protected. These kinds of services often fall into the category of "credence" goods: even after buying them a consumer may not be able to judge their quality adequately, and make their decisions based on the average quality they expect. In this circumstance sellers may have an incentive to reduce quality and may offer substandard service while charging an "average" price. Lower quality service may then proliferate, and the market for high quality service may even fail ([6]). In addition, in such a situation, a seller could have an incentive to set higher than competitive prices.

Clearly, there are no guarantees that introducing regulation will necessarily reduce the adverse effects of the aforementioned imperfect information problem, enhance consumers' welfare and strike the right balance between consumer benefits from competition and from protection. In fact, if not appropriately designed and implemented, regulation can effectively create market restrictions, limit consumer choice, and reduce the numbers of professionals being able to enter the market.

([4]) See European map for regulated professions http://ec.europa.eu/internal_market/qualifications/regprof/index.cfm?action=map.

([5]) The 'self' in self-regulation connotes some degree of collective restriction, other than constraints emanating from the government or state.

([6]) Akerlof (1970)

Furthermore, impediments to competition may in turn bear a cost in terms of reduced market performance. Limited competition could hamper an efficient allocation of resources across firms, as inefficient firms may be able to survive when they are sheltered from competition while efficient firms' growth performance may be hampered. In addition, a limited degree of competition in the professional services market may lead to higher prices due to a *de facto* situation in which providers have some degree of market power in service provision. In fact, regulatory barriers can be used by the professions to obtain higher margins, while a more competitive environment is expected to drive prices down to competitive levels. In this context, two types of regulatory barriers can be cited as illustrative examples, both of them potentially affecting profits:

- Restrictions on advertising could raise search costs with the result that consumers give up searching before attaining their optimal quality/price combination. Firms exploit what is in effect a more inelastic demand curve by increasing price above marginal cost and extracting more profit than is possible under a more elastic demand curve.

- Regulated fees may be established above competitive levels, resulting in higher profits. Among restrictions on conduct, restrictions on pricing are potentially highly damaging for competition.

II.2. EUROPEAN POLICY BACKGROUND

Two main European legislative frameworks have been developed to address main regulatory barriers that may hinder the mobility of professionals/companies within the single market, limiting employment and competitiveness: the Services Directive and the Professional Qualification Directive.

The Services Directive ([7]) (SD), adopted in 2006 ([8]), aims to further integrate the Single

([7]) Directive 2006/123/EC

([8]) December 2009 was the deadline for implementation of the Services Directive by the Member States.

Market for services. The Directive has a horizontal nature and covers a large variety of service sectors, including the professional service one. Focusing on the impact of the Directive on regulated professions, the SD addresses both entry regulations (such as economic needs tests, compulsory membership) and conduct regulations (such as regulation of prices and charges, the requirement that companies must adopt a specific legal form, prohibition of cooperation between professions or service activities, ban on advertising for regulated professions). The SD either prohibits these rules (e.g., in the case of economic needs test, ban on advertising) or requires Member States to evaluate them (e.g., in the case of regulation on prices, legal form requirements).

The Professional Qualifications Directive ("PQD") ([9]), adopted in 2005 and recently amended, provides the legislative framework to facilitate the mutual recognition of professional qualifications. The Directive defines a set of rules for professionals wishing to establish or to provide services in another Member State where a particular profession is regulated. The aim of the Directive is to facilitate the mobility of professionals across the European Union.

Following the transposition of the Services Directive, some Member States have relaxed or suppressed many regulatory barriers to the entry to and exercise of professions, though many obstacles remain (for instance legal form and shareholding requirements remain widespread among EU Member States, by contrast most compulsory tariffs seem to have been abolished in the EU) ([10]).

In order to tackle the remaining regulatory barriers, the European Commission has recently undertaken two separate but complementary exercises: a *peer review* ([11]) carried out in the context of the Services Directive that covers restrictions on the exercise of professional activities ([12]) and a *mutual evaluation* ([13]), which is being conducted under the Professional Qualifications Directive, focused on the restrictions related to the access to professions.

As an illustration of reforms, Box II.1 summarises policy action in the field of regulated professions in a selection of Member States.

([9]) Directive 2005/36/EC

([10]) "Communication on the implementation of the Services Directive: A partnership for new growth in services 2012-2015". COM (2012) 261 final.

([11]) The main objective of the peer review is to make it possible for Member States, together with the Commission, to better understand and compare the existing national or regional requirements and their justification.

([12]) See COM SWD(2013) 402, Report on the outcome of the peer review on legal form, shareholding and tariff requirements under the Services Directive.

([13]) A *mutual evaluation process* consists of a thorough evaluation of the regulatory framework applicable to services activities in the Member States following the implementation of the Directives. COM (2013) 676, Communication on evaluating national regulations on access to professions.

Box II.1: **Summary of reforms in the field of regulated professions in a selection of Member States (IT, PT, EL, ES)**

This box provides a summary of some recent reforms undertaken by selected Member States under financial assistance programmes or enhanced economic surveillance (Italy, Portugal, Greece and Spain) in the field of regulated professions.

Italy has taken various legislative actions aimed at improving the functioning of the professional services sector through increased competition. The main measures, taken in 2012, concerned the abolition of compulsory minimum tariffs, more relaxed terms for traineeship (when compulsory), the right to establish companies among professionals and free advertisement. However, in parallel to the general reform, a specific measure providing reference values for lawyers' fees has been approved. The abolition of regulated tariffs, the removal of restrictions on legal form and the freedom of advertising could translate into lower average fees.

Spain transposed the Services Directive into Spanish national law in 2009, establishing a modern regulatory framework for professional services. Tariff restrictions were abolished and professional associations were not even entitled to recommend tariff rates; restrictions on advertising were alleviated, and for some professions it became easier to exercise their activities belonging to different regulated professions at the same time. A new law on professional services and on professional organisations is scheduled to be adopted by the end of 2014. The law is planned to lift some of the existing reserves of activity, leaving pending some others for subsequent regulatory developments. In addition it will clarify competences of professional associations, also when compulsory membership is not required.

Portugal implemented an ambitious reform agenda on regulated professions aiming at eliminating unjustified requirements on access to and exercise of regulated professions in the context of the financial assistance programme. As regards deregulation of professions that does not involve a professional association, in 2013 the government eased requirements on access to a large number of professional activities that were no longer justified or proportionate. In addition, in order to ensure a more open access to a number of highly regulated professions (such as legal activities, architects and engineers) and improve the legal framework applicable to public professional associations, a horizontal framework law reforming professional services governed by professional associations was adopted in 2012. This needs to be followed by the enactment of the professional associations' amended relevant bylaws in conformity with the principles laid down in the horizontal framework law.

In **Greece**, regulatory barriers on professional services were among the highest in the EU and OECD countries as shown by the recently published OECD indicator. In February 2011 the country introduced a framework legislation establishing the principle of professional freedom, eliminating unjustified restrictions to the access and exercise of professions. The legislative changes abolished fixed prices or compulsory minimum fees and the requirement for an administrative license to practice a profession, replacing it by a simple notification accompanied by the necessary supporting credentials.

II.3. EMPIRICAL EVIDENCE

The literature regarding the economic impact of regulation in the field of liberal professions is quite limited, mainly due to data constraints. Most studies concerning professional services' regulatory environment and its impact on different market performance indicators have been conducted in the US. In what concerns the EU countries, Paterson et al. (2007) ([14]) construct two regulatory indicators (entry and conduct regulation) and provide a complete comparison of the legislation, regulations and codes of practice across member states of the European Union on 5 professional services: legal and accountancy services, architects and engineers and pharmacists.

([14]) This study has been based on a survey of the rules, regulations and statutory laws governing the practise of professional services in the legal, accountancy, technical and pharmacy fields in EU member states.

From the descriptive analysis the study found a negative correlation between degree of regulation and productivity for the case of legal, accounting and technical services (engineering and architects). A recent study for the European Commission´s DG Internal Market (2012) provides an inventory of current reserves of activities linked to professional qualifications across 13 EU Member States in three sectors: business services, construction and tourism. It focuses on the relationship between indicators of the restrictions (reserve of activities) applying to practitioners in a profession and indicators such as sectoral turnover, employment, and productivity. However, results are inconclusive which might be due, as the study itself acknowledges, to the small sample size or the omission of key variables explaining the performance measures within a fully specified economic model. Finally Monteagudo et al. (2012) measured the restrictiveness of services regulations, including professional services, and quantified the change in barriers before and after the implementation of the Services Directive. Their results show a marked reduction in restrictive regulation in the EU (though uneven between member states) and that the implementation of the Services Directive has generated an extra 0.8% of EU GDP (ranging from 0.3% to 1.5% depending on the member state in question).

Research on occupational licensing ([15]) in the US mainly focuses on the impact of licensing requirements on various market outcomes. Kleiner (2006) finds that in states where librarians, respiratory therapists, dieticians were not licensed, those occupations grew 20 per cent faster compared to states that were licensed. Kleiner and Kudrle (2000) also find evidence that regulation increases prices without significantly increasing quality. Regarding the impact on wages, Kleiner and Krueger (2009) results lend support to the interpretation that occupational licensing serves as a means to enforce entry barriers to a profession, leading to higher wages. Their results show that licensing is associated with about 18% higher wages. Similarly, Kleiner and Kudrle (2000) find that tougher licensing requirements for dentists raise practitioners' incomes. Timmons and Thornton (2008) conclude that radiologic technologists in states with licensing earn as much as 6.9% more than those working in states without licensing.

Pagliero (2011) tests the hypothesis of public interest theory ([16]) against the alternative of capture theory ([17]). The main result of the paper is that welfare maximization is rejected in favour of capture theory. The results imply that entry barriers, and in particular professional licensing have a significant effect on entry salaries.

Finally, other studies ([18]) have found that a relatively high turnover (per professional) is generally correlated with high degrees of regulation. In that sense, the authors conclude that a connection may be surmised between volume of business per professional and excess profit (compared with the outcome under less restricted competition). This aspect has received less emphasis in the literature, and will be studied in more detail in the present study.

Regarding the literature on product market and economic performance Andrews and Cingano (2012) relate allocative efficiency to framework policies such as the administrative burdens on start-ups, the cost to close a business, and employment protection legislation. There is also an extensive literature on the impact of product market regulation on productivity growth, see for instance the research by the OECD using the Product Market Regulation indicator (e.g. Conway et al., 2006). Cincera and Galgau (2005) study the relationship between market entry and exit and various indicators of product market reforms. Griffith and Harrison (2004) investigate the link between product market reform and macro-economic performance, also using a two-stage approach where the impact of regulatory reforms on labour productivity and total factor productivity is analysed through their impact on economic rents.

([15]) Licensing requires all practitioners to have obtained the appropriate educational requirements and/or to have passed a specific licensing examination.

([16]) According to public interest theory, barriers to entry, in particular permission of state licensing boards and demonstration of some degree of competency, solves the lemons' problem generated by asymmetric information.

([17]) Capture theory predicts that barriers to entry aim at increasing professional salaries and/or profits by restricting supply.

([18]) See Paterson et al. (2007)

Barnes, Haskell and Maliranta (2001) found considerable effects on firms' productivity growth through their internal restructuring process for the OECD countries. Baily, Hulten and Campbell (1992) found similar results for the US manufacturing firms between 1972 and 1988, and so do Griliches and Regev (1995) for the Israeli industry over 1979-1988. There are also studies that decompose aggregate productivity growth into the contributions of entrants, exitors and incumbents, and show that the process of firm entry and exit plays a role in reallocating resources from low to higher productivity units (Scarpetta et al., 1992; Foster et al., 1998; Baldwin and Gu, 2003).

III. REGULATED PROFESSIONS AND THEIR INTERLINKAGES WITH THE REST OF THE ECONOMY

The four regulated professions analysed in this study (legal, accounting, architectural and engineering) represent, on average, 5.3% of EU total value added and 4.7% of total employment; and 10% of EU market services ([19]) value added. These services stand out because of their 'special' characteristics: they rely greatly on professional knowledge, are sources of knowledge and are of competitive importance for their clients (Miles et al., 1995). They perform, mainly for other companies, 'services encompassing a high intellectual value-added' (Muller, 2001) providing customised problem solving assistance for their clients, through tacit and codified knowledge exchange.

Therefore, their role in the economy goes significantly beyond their shares in value added and employment. As shown by an extensive theoretical and empirical literature on knowledge intensive business services (see, among others, Ciriaci et al., 2013; Ciriaci and Palma, 2012; Miles, 2005; Toivonen, 2004; Muller and Zenker, 2001; Den Hertog, 2000), of which these professions are an example, their significance is deeply rooted in their solid forward and backward linkages with the rest of the economy. In fact, they are strongly interconnected with other sectors, both as users of other sectors' inputs (backward linkages), and as inputs into the production process of other sectors (forward linkages).

As shown in Graph III.1, the four professions under analysis have a large multiplier effect on the rest of the economy. The output multipliers reported in this Figure, and calculated from Input-Output tables from the WIOD dataset, show for EU27 the total production generated, directly and indirectly, to satisfy 1 euro of final demand for each service sector considered. For instance, 1 euro of final demand for architectural and engineering activities generates 1.9 euros of gross production in the whole economy. Concurrently, 1 euro of final demand for legal and accounting activities generates 1.8 euros of gross production.

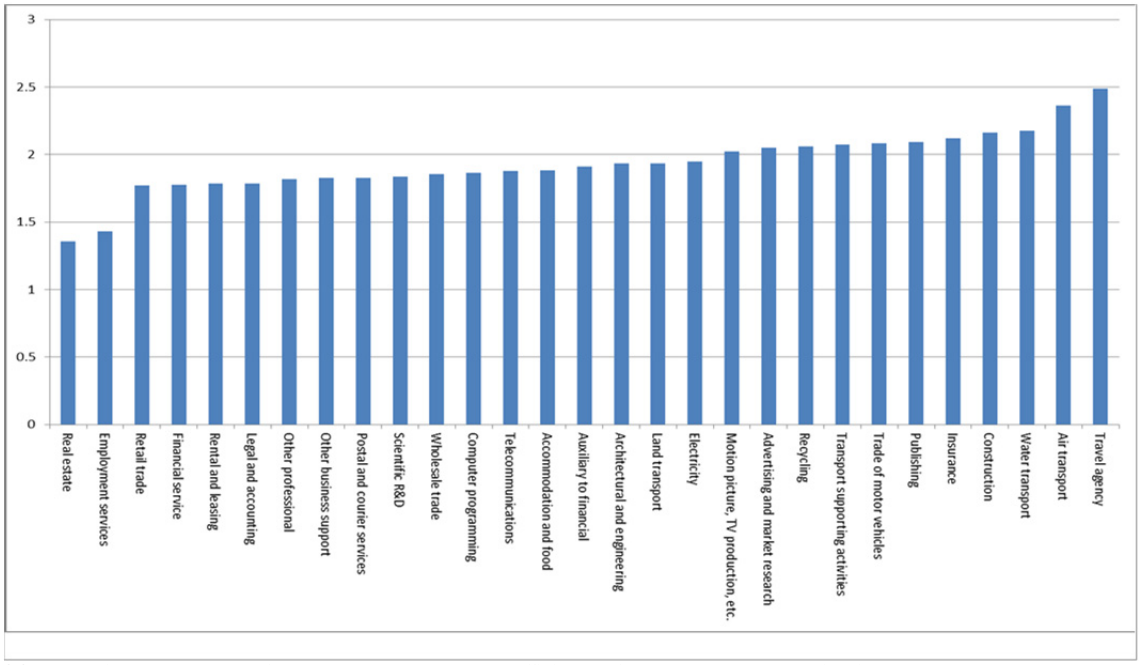
As already stressed, another way to assess the importance that these professional services' inter-linkages have in the economy, is looking at their forward linkages, i.e. their role as intermediate inputs into the production of all goods and services produced in the economy. In this case the indicator used is the share of the given service in the total value of all the intermediate inputs used in the economy ([20]). Graph III.2 shows for the EU27 the share (%) of the various service sectors in the total value of the intermediate inputs used in the economy. The higher the value, the higher is the use of a certain sector as intermediate input by the rest of the economy. In what concerns the four professions under analysis, we find that legal and accounting activities have one of the highest knock-on effects, while lower, though still important, effects are found for architectural and engineering activities.

In short, as professional services have strong spillover effects across the whole economy, a more competitive professional services sector is likely to significantly affect the rest of the economy, beyond the sectors concerned.

([19]) Market services are defined as NACE Rev 2 sectors G to M.

([20]) It includes both services' shares as direct inputs into the production of other goods and services, as well as indirect inputs via other industries (feedback effect).

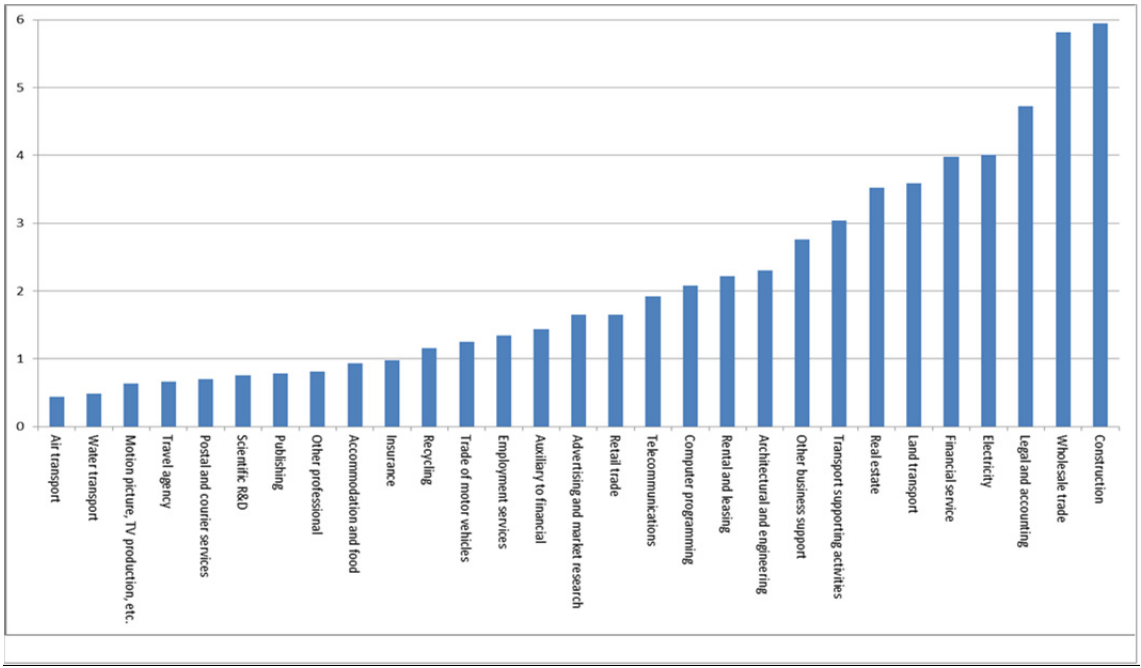
Graph III.1: **Market services: output multipliers (EU27, 2008)**



(1) The available data dates from 2008, though these coefficients reflect structural productive linkages that are very stable over time.

Source: Own calculations with Eurostat Input-Output tables

Graph III.2: **Market services: share in the value of total intermediate inputs (EU27, 2008)**



Source: Own calculations with Eurostat Input-Output tables

IV. METHODOLOGY: DATA AND ECONOMETRIC APPROACH

IV.1. DESCRIPTION OF THE DATA

The following chapter provides a description of the variables used in the analysis. Two datasets have been the main sources: the OECD regulatory indicators and Eurostat Structural Business Statistics (SBS) (in combination with business demography data). As mentioned, the analysis covers four sectors: legal activities (NACE Rev.2 M691), accountants (M692), architects (M7111), and engineers (M7112). In the following, we firstly describe the OECD regulatory indicator, and provide information on business dynamics in the four professions. Finally, we provide also a detailed description of the two main outcome variables: allocative efficiency and profitability.

IV.1.1. Product market regulations and business dynamics

The regulatory level in legal ([21]), accounting, architectural and engineering services can be proxied using the OECD PMR composite indicator ([22]) (in the following, *overall PMR* indicator), whose value spans from 0 to 6 (a low value corresponds to light regulation). This indicator is an average of two more detailed (composite) indicators assessing the level of entry and conduct regulation (see Table IV.1 for a description of their components), and whose values range from 0 to 6 as well. Typically market entry regulations are qualification requirements, such as formal certificates of qualifications (i.e. academic degrees, professional examinations), registration or membership in a professional body, and rules on areas of reserved activity ([23]). Conduct regulations are regulation of prices and fees (fixed prices, minimum and/or maximum prices etc.), regulation of advertising, restrictions on inter-professional co-operation or restrictions on forms of business. ([24])

([21]) Legal activities are defined in a very broad sense (legal advice, representation of clients before courts, etc.).

([22]) For detailed information about the OECD indicators and its components see http://www.oecd.org/eco/reform/indicatorsofproductmarketregulationhomepage.htm.

([23]) Economic needs tests are another form of entry regulation, however such restrictions are not included in the PMR index.

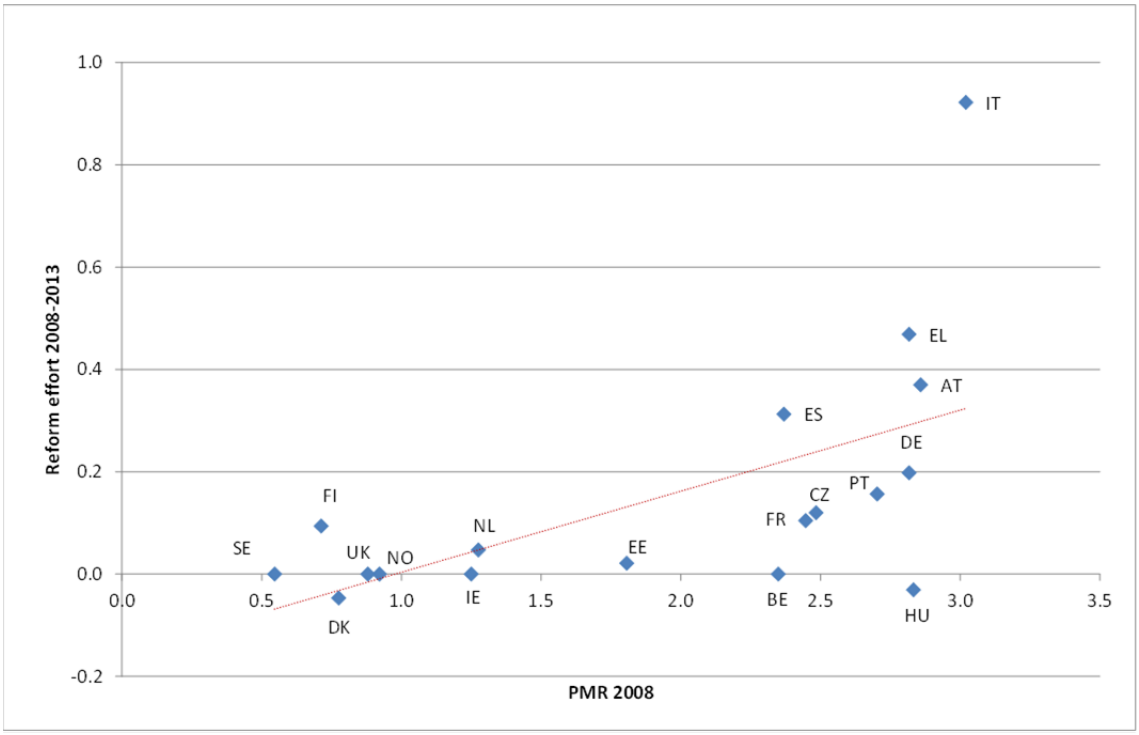
([24]) Restrictions on shareholding requirements imposed on professional companies are another form of conduct regulation, however such restrictions are not included in the PMR index.

Table IV.1: **Entry and conduct regulation indicators, PMR, OECD**

Entry regulations	Exclusive or shared exclusive rights	The number of service providers is restricted, and services can only be provided under an exclusive or shared exclusive right.
	Education requirements	Requirement of a university degree, professional examinations, etc.
	Quotas	Restrictions by quotas of the number of practising professionals.
	Compulsory chamber membership	Membership in a professional organization is compulsory in order to provide the service.
Conduct regulations	Regulations on the form of business	Specific legal forms requirement.
	Regulations on inter-professional co-operation	Restrictions on cooperation between professionals.
	Regulations on advertising	Restrictions on advertising.
	Regulations on prices and fees	Fixed prices, minimum, maximum prices and non-binding reference prices.

Source: OECD

Graph IV.1: **Level of regulation (2008) and reform effort in the 4 professions under analysis**



(1) Reform effort is OECD PMR 2013-2008 (times [-1]). Best performers are the countries with the lowest PMR level in 2013. Trend line in red.
Source: OECD

Graph IV.1 shows the change over time of the overall PMR indicator for the countries in the sample. Regulatory barriers have decreased over time in most countries and in particular in Italy, Greece, Austria and Spain. For instance, the PMR value for Italy decreased from 3.0 to 2.1 (the reform effort being 0.9), from 2.8 to 2.3 in the case of Greece, from 2.9 to 2.5 in the case of Austria and from 2.4 to 2.1 in Spain, over the period 2008-2013. However the 2013 PMR values of those countries are still above the best performers, as in 2013 PMR values for UK, Sweden and Denmark are 0.9, 0.5 and 0.8 respectively, suggesting that there is ample room for further reductions.

Table IV.2: **Entry and conduct regulation index for four professions in the 19 EU countries covered by the OECD PMR**

		PMR Entry Regulation		PMR Conduct Regulation	
		2008	2013	2008	2013
Legal Activities	Mean	3,66	3,67	2,59	2,32
	Median	4,08	4,04	2,38	2,38
	Number of countries that decrease PMR index between 2008 - 2013	7		8	
Accountancy	Mean	3,51	3,38	1,15	0,76
	Median	3,83	4	1,13	0,75
	Number of countries that decrease PMR index between 2008 - 2013	5		7	
Architects	Mean	2,82	2,87	0,94	0,70
	Median	3,42	3,58	0,50	0,00
	Number of countries that decrease PMR index between 2008 - 2013	5		8	
Engineers	Mean	2,12	2,11	0,61	0,42
	Median	2,17	2,50	0,00	0,00
	Number of countries that decrease PMR index between 2008 - 2013	5		8	

Source: Own calculations based on OECD

Table IV.3: **Description of variables used to proxy business dynamics**

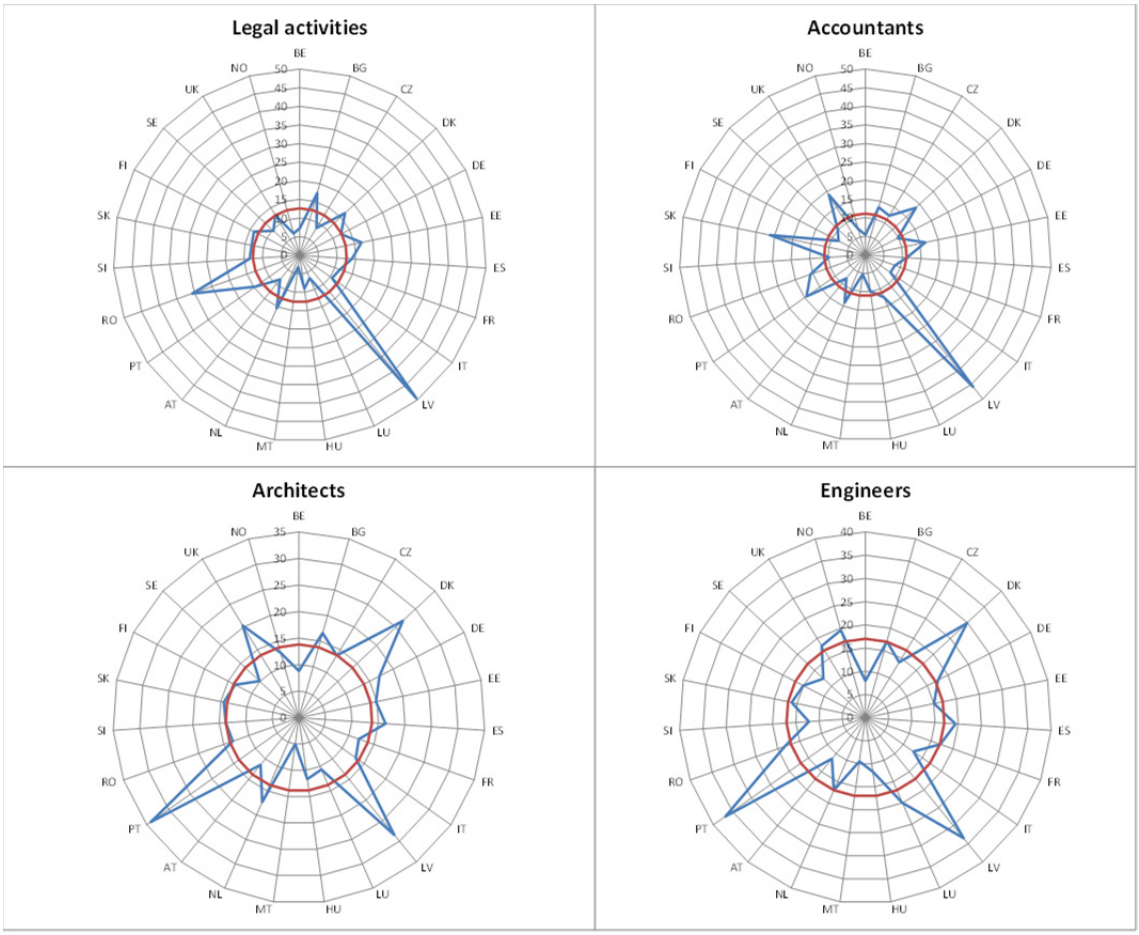
Variable	Definition	Scale /units
Birth rate	Number of newly born firms that enter a market in a given year as a percentage of all the active firms in that market at the end of the year (which include the new and continuing firms)	%
Death rate	Number of firms that exit the market in a given year as a percentage of all the active firms in that market at the end of the year	%
Churn rate	Sum of birth as death rates expressed as percentage of the total number of active firms in an industry	%

Source: Eurostat

These general findings are confirmed also if we consider the two main components of the overall PMR indicator. Besides, we find that the level of entry regulation is higher than conduct regulation as shown in Table IV.2. Furthermore, when comparing the number of countries that have decreased the level of regulatory barriers during the period 2008-2013, we find that the PMR conduct index has decreased in a larger number of countries during this period, while fewer countries have undertaken reforms reducing the level of regulatory entry barriers.

Table IV.3 reports a definition of the variables used to proxy business dynamics: birth, death and churn rates. If we focus on the market churn rate, defined as the sum of birth and death rates (expressed as percentage of the total number of active firms in an industry), it is an indication for the dynamic competitive process in a market. A higher churn rate is often associated with stronger competition as the replacement of less productive firms by new entrants is more intensive. Graph IV.2 compares churn rates across Member States in the four professions under analysis. Three broad groups of countries emerge. The first group consists of countries that show consistently low churn rates across all professions. This group comprises of BE, IT, HU, MT, and SE. The second group contains the countries that show high churn rates in all professions, including BG, DK, ES, LV, NL, PT, and UK. Third group contains those countries where the trend across sectors is less clear.

Graph IV.2: **Churn rates in the four professions under analysis, 2011**



(1) The red line marks the median country in the comparison.
Source: Eurostat

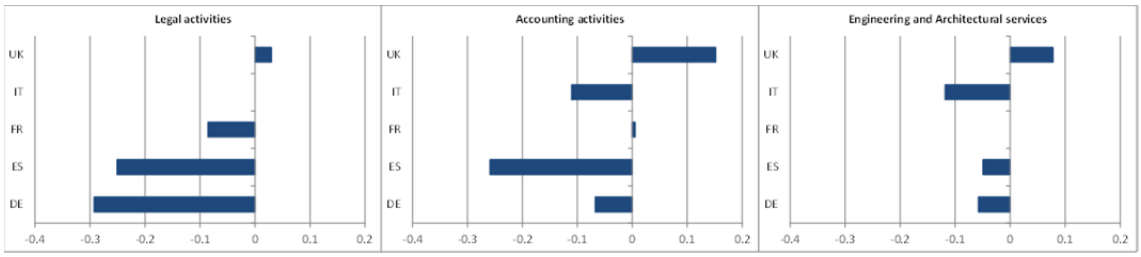
IV.1.2. Allocative efficiency

Restrictive product market regulations lead to a misallocation of productive resources. A way to capture the between firms within sector resource reallocation is computing the productivity decomposition proposed by Olley and Pakes (1996), which measures the extent to which productive factors are allocated towards their most efficient use. This is the definition used here for allocative efficiency (AE). The productivity decomposition is implemented for legal services, accounting services, architectural and engineering services using sectoral data from Eurostat on labour productivity and employment by size class. An index of AE is calculated from labour productivity and market shares of firms in different size classes, capturing the extent to which more productive firms have higher market shares. ([25]) A positive (negative) number for AE means that resources are allocated in a more (less) efficient way relative to the baseline. Relatively low allocative efficiency points at forces in the economy preventing competition from working properly, such as excessive regulation, rent-seeking, ineffective procurement, clientelism.

Graph IV.3 shows the measurement of AE in legal, accounting, architectural and engineering services in a selected number of EU countries. The UK is the best performing EU country in terms of AE in these professions. As clearly shown by the graph, the level of AE is negative for almost all professions in all countries but the UK, suggesting

([25]) See DG ECFIN's Product Market Review 2013 for a more extensive explanation of the calculation of the AE-index

Graph IV.3: **Allocative efficiency in Legal, Accounting and Architectural and Engineering Services in selected countries, 2011**



(1) M691, M692 corresponds to legal activities, accountants respectively. M711 include Architects and Engineers. Data were not available for all countries.
Source: Own calculations based on Eurostat data

that in those countries the room for improvement may be significant. AE in manufacturing is typically higher than in service sectors ([26]). While a myriad of factors may be at play here to explain this difference, including differences in technology, we investigate whether part of the divergence may be related with reduced competition connected with product market regulations in the regulated professions. For example, in the German sector "legal activities" the AE-index is almost -30%, indicating that average labour productivity is 30% below the value it would have been if the market shares of the firms in the various size classes would be uniformly distributed (which is taken as the benchmark to calculate the AE-index). As seen above, Germany is among the countries with the highest level of regulation in the sector in 2008 and the lowest reform effort.

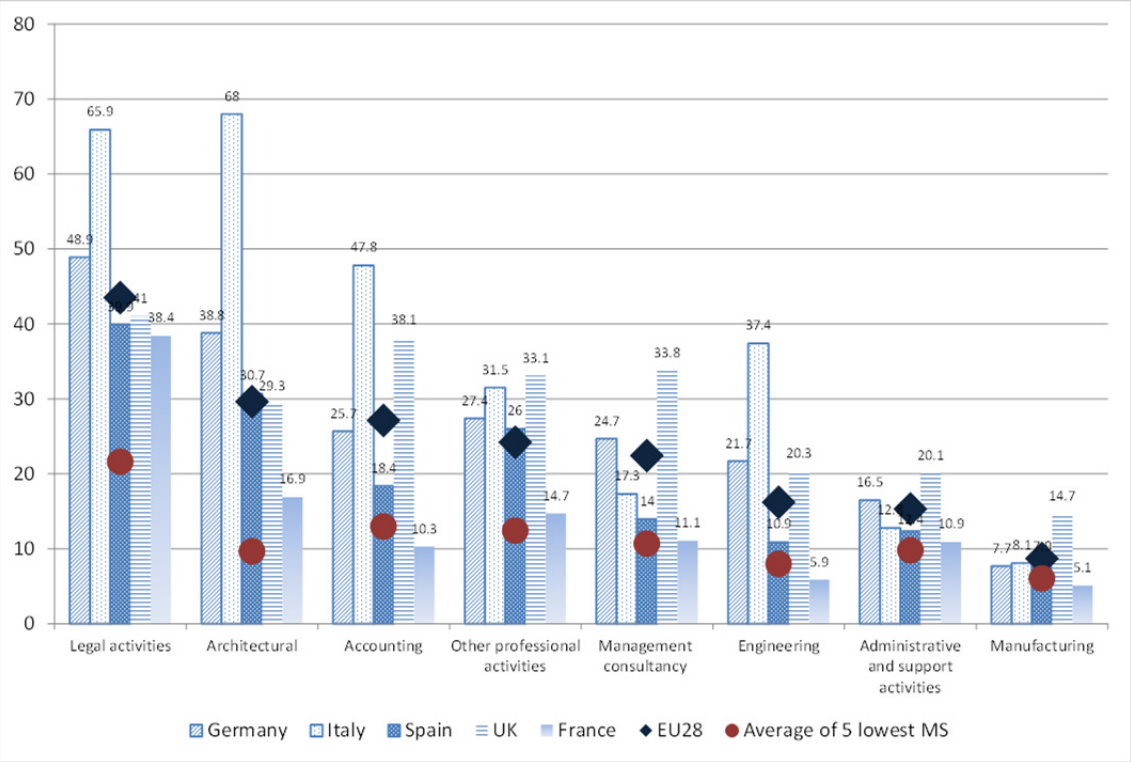
IV.1.3. Profitability

As a proxy to measure profitability we use the gross operating rate defined as the ratio of gross operating surplus to turnover. Graph IV.4 illustrates the gross operating rate in selected professional activities and the manufacturing sector in 2011 for five selected countries, Germany, Italy, Spain, UK and France together with EU28 and the average of the 5 countries with the lowest profit rates. Across professions there are significant differences, for instance legal services display the highest profits within the EU, followed by architects and accountants. In addition the graph also shows significant differences between the average gross operating rate of EU28 and the average of the five lowest Member States for almost all professions, while in the case of manufacturing gross operating rates seem to be quite homogeneous across countries. Though there is not a precise definition of excessive profits, it seems that gross operating rates in particular in three of the four regulated professions under analysis (legal, architectural and accounting activities) are considerably above other professional services that are less heavily regulated and the manufacturing sector ([27]). These large rates might be indicative of higher rents accruing to the sector.

([26]) See chapter 1 in Product Market Review 2013

([27]) Comparison across sectors should be done with caution. In the graph, manufacturing, typically more exposed to international competition, can be seen as a reference. The notion of "normal" and "excessive" profitability bears some resemblance to the concept of "normal" and "excessive" returns to investment, where the normal return equals the risk-free return on capital (for example based on LIBOR/EURIBOR) plus a premium to compensate for the risk associated with the investment. For example, a long term average of the returns to stocks is about 8%, which is about 500 basis points higher than the long term average of the returns to investment in bonds (cf. Arnott and Bernstein, 2002).

Graph IV.4: **Gross operating rates in selected professional services in 2011**



(1) Other professional activities include design activities, photographic activities, translation and interpretation, among others.
Source: Eurostat

IV.2. THE ESTIMATED EQUATIONS

In our analysis, we investigate the effect of regulatory barriers on the four regulated professions' AE and profits. We pay particular attention to the transmission channels through which regulation affects their performance by including business dynamics, proxied by churn rates (and its two components: birth and death rates) in the empirical framework. The hypothesis behind is that intensified competition related with less strict regulation would translate into higher allocative efficiency and lower abnormal profitability associated with sheltered sectors. Therefore, this approach differs from what is generally done in the literature because it analyses the transmission channels through which deregulation may affect sectoral performance.

The impact of regulation in legal, accounting, architectural and engineering services on sectoral allocative efficiency and profit rate is estimated using a two-step sequential approach.

The 1st step (EQ 1) estimates the impact of regulation on business dynamics. The model takes the following form:

$$BUSdyn_{s,c,t} = \beta_0 + \beta_1 PMR_{s,c,t} + w_{s,c} + \varepsilon_t \qquad EQ(1)$$

where BUSdyn is proxied, separately, by churn rates (see section V.1) or its two components birth and death rates (section V.2), $\omega_{s,c}$ is the country/sector fixed effect and ε_t is the idiosyncratic error term. ([28]) The level of regulation ($PMR_{s,c,t}$) in the four professions analysed is proxied either by the PMR indicator for professional services – labelled in the following as PMR_overall – or by its two more detailed sub-

([28]) Although we have used several different specifications also controlling for sectoral characteristics, in the above specification these are assumed to be captured by the country/sectoral fixed effects.

components covering entry and conduct regulation and labelled PMR_entry and PMR_conduct, respectively. ([29])

We used this first step to calculate the predicted values of churn rates (or birth and death rates) that are then used to explain, respectively, the level of allocative efficiency and profit rates in the four sectors of interest. This implies that churn, birth and death rates are the channels through which regulation impacts our aforementioned output variables. It follows that the 2nd step estimates the impact of regulation (i.e. PMR_overall, PMR_entry and PMR_conduct) through the business dynamics indicators on AE (EQ 2a) and profits (EQ 2b):

$$AE_{s,c,t} = \beta_0 + \beta_1 BUSdyn^*_{s,c,t} + \beta_2 Y_{s,c,t} + w_{s,c} + \varepsilon_t \qquad EQ(2a)$$

$$\Pr ofits_{s,c,t} = \beta_0 + \beta_1 BUSdyn^*_{s,c,t} + \beta_2 Y_{s,c,t} + w_{s,c} + \varepsilon_t \qquad EQ(2b)$$

where BUSdyn* is the predicted value of the business dynamics indicator used as dependent variable in the first step; $Y_{s,c,t}$ is a vector of control variables; $w_{s,c}$ is the country/sector fixed effects and ε_t is the idiosyncratic error term. It is worth stressing that, depending on the business dynamics index used as dependent variable in the first step, we have used the following control variables: i) average firm size at time t as a measure of the market structure, and ii) employment at birth at time t. ([30])

As shown in Table IV.4, if we consider our four sectors of interest there is a statistically significant negative pairwise correlation between our first-step key dependent variables (churn, birth and death rates) and, on the other side, the level of regulation proxied by the three aforementioned indexes. Tables IV.5 and IV.6 report instead the pairwise correlation between the level of regulation in the four analysed sectors and their respective AE and profits, showing correlations in line with the theoretical expectations. Finally, Table IV.7 reports the main descriptive statistics of the variable of interest.

In all cases, a generalized Hausman-type test has indicated a preference for a random effect model. Therefore, the first stage and the second stage equations are estimated sequentially using a random effect model with country&sector-specific time-invariant factors. These effects will capture unobserved country/sectoral heterogeneity and account for differences in size, specialization, labour market characteristics etc, all relevant aspects when analysing business dynamics and sectoral performance but which are difficult to proxy at the level of sectoral disaggregation used in the analysis. Furthermore, as the standard errors from the second stage are not corrected for the possible correlation of the error terms of the two equations - given that the system of equations is estimated sequentially and not simultaneously -, we have computed bootstrap estimates for the standard errors of the coefficients, to correct them. ([31])

Last but not least, it is worth noting that the system of equation has been estimated also modelling the error term of the first stage equation as an autoregressive process of order one, AR(1), to control for business dynamics correlation over time; introducing in the first step equation a lag for the PMR indicators; ([32]) and controlling in both steps for common to all sectors and countries macroeconomic shocks with time dummies. For the sake of simplicity, we won't report the results of these robustness checks, ([33]) but their results are in line with those which will be presented in chapter V.

([29]) To have a coherent match between structural business statistics data for the four professional services sectors and the PMR data, we have calculated the PMRs for 2009-2011 using a linear intrapolation procedure (using 2008 and 2013 as the two points of observation). The PMR value in 2013 will be then used as a "shock" to predict – out of the sample - the extent to which recent changes in regulation affect AE and profitability.

([30]) These variables have been used also as exclusion restrictions.

([31]) See, among others, J.D. Angrist and J. Steffen Pischke (2009), Mostly harming econometrics, Princeton University Press.

([32]) Within this respect and as far as the first step is considered, results are always confirmed. In the case of the second step, instead, although results are always confirmed for AE, in the case of Profits the second step is not always identified (but all key variables are significant and enter the equations with the expected sign).

([33]) Results are available upon request.

Table IV.4: **Pairwise correlation coefficients between sectoral business dynamics and PMR regulation indicators**

	Churn rates	Birth rates	Death rates	PMR_overall	PMR_entry	PMR_conduct
Churn rates	1					
Birth rates	0.7875*	1				
Death rates	0.7895*	0.2922*	1			
PMR_overall	-0.3230*	-0.3116*	-0.2341*	1		
PMR_entry	-0.1937*	-0.1908*	-0.1388*	0.9047*	1	
PMR_conduct	-0.3917*	-0.3455*	-0.3021*	0.8058*	0.4767*	1

(1) Indicates correlation coefficients significant at least at the 5% level.
Source: Own calculations

Table IV.5: **Pairwise correlation coefficients between sectoral PMR regulation indicators and AE**

	PMR_overall	PMR_entry	PMR_conduct	AE
PMR_overall	1			
PMR_entry	0.8738*	1		
PMR_conduct	0.8394*	0.4691*	1	
AE	-0.5599*	-0.5039*	-0.4792*	1

(1) Indicates correlation coefficients significant at least at the 5% level.
Source: Own calculations

Table IV.6: **Pairwise correlation coefficients between sectoral PMR regulation indicators and profits**

	PMR_overall	PMR_entry	PMR_conduct	AE
PMR_overall	1			
PMR_entry	0.8942*	1		
PMR_conduct	0.8286*	0.4902*	1	
Profits	0.5462*	'0.4187*	0.5717*	1

(1) Indicates correlation coefficients significant at least at the 5% level.
Source: Own calculations

Table IV.7: **Main descriptive statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
Churn rates	292	15.21	7.09	2	41.42
Birth rates	404	8.3	4.37	0.4	30.59
Death rates	376	6.93	4.68	0.54	33.56
PMR_overall	340	1.96	1.21	0	4.08
PMR_entry	346	2.81	1.62	0	4.384
PMR_conduct	356	1.14	1.16	0	4.13
Profits	392	25.05	13.14	3.5	76.4
AE	108	-0.08	0.13	-0.39	0.17
Average firms' size	400	3.32	1.98	1.07	15.69
Employment at birth	465	1.37	0.75	0.2	14.33

Source: Own calculations

V. RESULTS

In the following we present the results of the estimation of the systems of equation described in the previous section. Although robust, they should be interpreted with caution, given the time period covered by the analysis, the limited availability of control variables at the level of sectoral disaggregation used, and the consequential econometric difficulties in estimating a non-linear system of equations. The estimates obtained for allocative efficiency and profits in the case of churn rates are presented in section V.1. Those obtained using as dependent variables in the first step its components are reported in section V.2.

V.1. THE EFFECT OF REGULATION ON SECTORAL PERFORMANCE: THE ROLE OF CHURN RATES

The results from the "two-step" econometric estimation, linking regulation to business dynamics and, through this channel, to allocative efficiency and profit rates (see Table V.1) show that a reduction of the professional services regulation indicator (PMR) by 1 point increases the churn rate on average by 1.75 p.p. This leads to an increase of the AE index by 5.7 p.p. (namely 1.75 times 3.26) and to a decrease of the profit rates by 5.36 p.p. (1.75 times 3.063).

Table V.1: **The impact of PMR regulation on AE and profits through churn rate**

VARIABLES	AE		Profits	
	Step1: Dependent variable: Churn rate	Step 2: Dependent variable AE	Step 1: Dependent variable: Churn rate	Step 2: Dependent variable Profits
pmr_overall (2)	-1.748***		-1.749***	
	(-0.590)		(-0.514)	
Churn*		0.033***		-3.063***
		(-0.008)		(-0.396)
Avsize		0.029***		
		(-0.005)		
Empl at birth				2.711*
				(-1.463)
Constant	17.530***	-0.643***	17.46***	64.230***
	(-1.443)	(-0.103)	(-1.188)	(-5.984)
Country & sector fixed effects	YES	YES	YES	YES
Observations/Groups	170/52	95/31	206/69	251/67

(1) Bootstrapped standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The variables included as controls and for identification are average firm size (for AE) and firm size at birth (for profits); several other specifications were used; results are available upon request.
(2) The elasticities of churn rates to the PMR indicator differ in the case of AE and profits because the first stages are estimated on the basis of samples with different country coverage. In addition, in the case of the AE equation we employ a three digit NACE classification, with architecture and engineering activities aggregated in sector M711, whereas for profitability we could use a four digit sectoral classification (i.e. M7111 for architectural activities and M7112 for engineering activities).
Source: Own calculations

Once we consider separately the two components of the overall PMR index, *entry* and *conduct* regulation (see Table V.2), we find that entry regulation is not significant at conventional significance levels, whereas conduct regulation is. As far as conduct regulation is concerned, a decrease in the PMR conduct regulation indicator of 1 point leads to an increase by 1.86 p.p. in the churn rate and, through this channel, to an increase of the AE index by 5.6 p.p. (namely 1.86 times 2.98). Concurrently, if the system of equations is estimated for profit rates, a decrease in PMR conduct regulation leads to an increase by 1.77 p.p. in the churn rate which leads to a decrease of the profit rates by 4.16 p.p. (1.77 times 2.352).

Assessed in terms of observed changes in the relevant PMR indicator, most of the policy action in the period under consideration has been in the domain of conduct regulation. ([34]) Entry regulation has shown less variation, which may have created a statistical mismatch with a dependant variable such as sectoral churn rates, which, instead, varies significantly over time. Therefore, an insignificant effect in the regression for business churn does not imply that future action in the field of entry regulation would not yield benefits, especially considering that it is still strict in several Member States. Entry regulation protects incumbent firms against competition from newcomers, which can lead to excessive prices and/or lower quality products/services and/or less innovation. In line with these considerations, the results from an analysis of the impact of the cost of starting a business on sectoral firm entry (see Ciriaci 2014) show that the number of procedures to start a business have a significant impact on birth rates (and it is likely that a large number of procedures corresponds to stricter regulation).

([34]) This may be due to the fact that, given its construction (see Table IV.1), the PMR conduct regulation index better captures the implementation of the SD than the PMR entry regulation index, which covers only changes in compulsory chamber membership.

Table V.2: **The impact of PMR conduct and entry regulation on AE and profits through churn rate**

VARIABLES	AE		Profits	
	Step1: Dependent variable: Churn rate	Step 2: Dependent variable AE	Step 1: Dependent variable: Churn rate	Step 2: Dependent variable Profits
PMR_entry (2)	-0.087		-0.261	
	(-0.488)		(-0.426)	
PMR_conduct (2)	-1.856***		-1.770***	
	(-0.569)		(-0.562)	
Churn*		0.029**		-2.352***
		(-0.014)		(-0.507)
Avsize		0.033***		
		(-0.006)		
Empl at birth				2.868**
				(-1.309)
Constant	16.460***	-0.619***	16.750***	53.950***
	(-1.503)	(-0.186)	(-1.235)	(-7.769)
Country & sector fixed effects	YES	YES	YES	YES
Observations/Groups	170/52	95/31	206/69	251/67

(1) Bootstrapped standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The variables included as controls and for identification are average firm size (for AE) and firm size at birth (for profits).
(2) The elasticities of churn rates to the PMR indicator differ in the case of AE and profits because the first stages are estimated on the basis of samples with different country coverage. In addition, in the case of the AE equation we employ a three digit NACE classification, with architecture and engineering activities aggregated in sector M711, whereas for profitability we could use a four digit sectoral classification (i.e. M7111 for architectural activities and M7112 for engineering activities).
Source: Own calculations

V.2. THE EFFECT OF REGULATION ON SECTORAL PERFORMANCE: THE ROLE OF BIRTH AND DEATH RATES

As a robustness check, we decided to focus separately on the two components of churn rates, i.e. birth and death rates (see Annex 1). Overall, results are confirmed as both transmission channels are found to properly work and affect the performance variables: a decrease of the level of regulation positively affects both birth and death rates and, through them, favours a better within sector allocation of resources and decreases profits. Stated simply, reducing barriers to the reallocation of capital and labour within sectors helps ensuring that the most productive firms can achieve their growth potential and that less efficient ones leave the industry (or get restructured).

For instance, if we firstly consider entry rates, we find that a 1 point decrease of the overall PMR index decreases birth rates by 0.77 p.p. This leads to an increase of the AE index by 5.7 p.p. (namely 0.65 times 8.77) and to a decrease in profits by 5.3 p.p. (namely 0.77 times 6.9). In the case of death rates, a 1 point increase of the overall PMR index decreases them by 1.01 p.p., leading to an increase of the AE index by 5.7p.p (namely 1.11 times 5.12) and to a decrease in profits by 5.4 p.p. (namely 1.01 times 5.291).

Box V.1: **Effects of changes in PMR professional services on AE and profits. Out-of sample prediction**

The elasticities obtained in the previous section can be used to predict, *ceteris paribus*, the potential effect that changes in regulation introduced over the period 2011-2013 ([1]) in EU countries may have on their allocative efficiency and profit rates.

Focusing on the churn rate transmission channel, table V.3 reports the results of this out of sample prediction for the countries where data were available considering both the potential effect on AE and profits of the change in the overall PMR indicator for professional services. Italy reported the largest change in the PMR for professional services over the period 2011-2013 (from 2.86 to 2.4) which is predicted to lead to a noteworthy increase of the AE index - between 2 and 3 p.p. (depending on the profession) - and a decrease in profitability between 2.4 p.p. and 1.7 p.p.

Table V.3 Effect of changes in PMR for professional services after 2011 on AE and on profits. Transmission channel churn rate

	Effect on AE (pp)				Effect on profits (pp)			
	Legal	Accounting	Architects	Engineering	Legal	Accountants	Architects	Engineering
AT	0.87	1.55	0.52	0.41	-0.81	-1.46	-0.49	-0.39
BE	-	-	-	-	-	-	-	-
CZ	-	0.18	-	0.89	-	-0.17	-	-0.84
DE	-0.05	-	1.55	0.27	0.04	-	-1.46	-0.26
EE	-	-	0.09	0.09	-	-	-0.09	-0.09
EL*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ES	1.89	-	1.05	-0.09	-1.78	-	-0.99	0.09
FI	-	0.84	-	-	-	-0.79	-	-
FR	-	0.84	0.09	-	-	-0.79	-0.09	-
HU	-	-	-0.09	0.21	-	-	0.09	-0.19
IE	-	-	-	-	-	-	-	-
IT	2.6	1.82	1.98	1.98	-2.44	-1.71	-1.86	-1.86
LU	N/A	N/A	2.37	N/A	N/A	N/A	-2.23	N/A
NL	-	0.41	-	-	-	-0.39	-	-
PL	N/A	N/A	-	N/A	N/A	N/A	-	N/A
PT	0.09	-	-	1.32	-0.09	-	-	-1.24
SE	-	-	-	-	-	-	-	-
SI	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
SK	N/A	-	0.87	0.48	N/A	-	-0.81	-0.45
UK	-	-	-	-	-	-	-	-

Note: Not all professions experienced a regulatory change: a "-" means that no change in the PMR indicator took place. A negative (positive) effect on AE means that the regulation increased (decreased) over the period 2011-2013. A positive (negative) effect on profits means that the regulation increased (decreased) over the period 2011-2013.

*Results on Greece are not reported because data on sectoral performance were not available at this level of disaggregation but changes of the PMR indicator have been quite substantial over the period 2008-2013.

([1]) The change in PMR over the period 2008-2013 is annualized, using a linear intrapolation technique.

(Continued on the next page)

Box (continued)

An important caveat to bear in mind is that the predicted AE index and profit rates in 2013 obtained through an out of the sample prediction may not coincide with the real values in 2013. This is due to the fact that the elasticities used to estimate them are obtained on the base of "other things being equal" assumption and that common elasticities for AE index (5.7) and for profit rates (5.4) are used to predict the effect of changes in regulation in the different countries.

VI. CONCLUSIONS

This study evaluates the impact of changes in the regulatory barriers of four regulated professions (legal, accounting, architectural and engineering) on two sectoral performance indicators – allocative efficiency (AE) and profit rates - through business dynamics over the period 2008-2011.

When analysing the reform effort in the EU Member States, the OECD Product Market Regulation indicator for professional services shows that those countries that, at the beginning of the period (2008), displayed the higher level of regulatory barriers are also those that, in the following years, have done considerable reform efforts to liberalise regulated professions. In particular, if we consider separately the two components of the overall PMR index, *entry* and *conduct* regulation, we find that most of the policy action observed in the period under consideration has been in the domain of conduct regulation. On the contrary, entry regulation has shown less variation, suggesting that there might be room for improvement.

All the professions under study are characterized by negative values of allocative efficiency in almost all EU countries, but the UK. This suggests that their resources are not allocated efficiently. In addition, the profit rates in the four professions, though to a lesser extent in the case of engineers, tend to be considerably above those of other professional services less heavily regulated and of those observed in the manufacturing sector for most countries under analysis.

In line with this, results show that changes in the level of regulation affect business dynamics and, through it, sectoral performance. A reduction of the PMR indicator for regulated professions by 1 point increases sectoral churn rates on average by 1.75 p.p., which in turn increases allocative efficiency by 5.7 p.p. and decreases profitability by 5.4 p.p.. The same econometric analysis has also been carried out for the different regulatory components of the PMR and the results show that a decrease in the PMR conduct regulation indicator has a similar impact than the overall professional services regulatory indicator. However, PMR entry regulation was found not significant, which may be partly due to the limited changes shown by the index in the period analysed.

Finally, if more recent changes in the regulatory barriers of these professions are considered (i.e. reforms introduced after 2011 and reflected in the 2013 PMR), an out of sample prediction, using the average elasticities calculated for the period 2008-11, confirms their high potential impact, especially in those countries showing the larger change in the overall regulatory indicator (Italy, Greece and Austria).

To conclude, it is worth stressing that the full economic impact of reforms in regulated professions is expected to be significantly larger than the already substantial estimates reported in our analysis. First of all, our study focuses only on a limited subset of professions. Secondly, deregulation could generate additional indirect benefits in the sense that, as shown by our analysis, professional services constitute an important intermediate input to down-stream sectors such as manufacturing. Therefore, efficiency gains will disseminate and spread to the rest of the economy through their backward and forward linkages. Finally from a European single market perspective, restrictions on access and the existence of regulatory barriers to exercise a professional activity make the mobility of professionals within the single market more difficult limiting employment and competitiveness in the economic sectors concerned. Reducing them will facilitate professionals' mobility, favouring a better match in the labour market and enhancing competition. ([35])

([35]) The effect of the internal market is not explored in this paper, and can be a topic for further investigations.

ANNEX 1

The effect of regulation on AE and profits through birth and death rates

Table Annex1.1: **The impact of PMR regulation on AE and profits through birth rate**

	AE		Profits	
VARIABLES	Step1: Dependent variable: Birth rate	Step 2: Dependent variable AE	Step 1: Dependent variable: Birth rate	Step 2: Dependent variable Profits
pmr_overall	-0.650**		-0.767***	
	(-0.315)		(-0.260)	
Birth*		0.088***		-6.985***
		(-0.021)		(-0.930)
Empl at birth				2.711*
				(-1.620)
Avsize		0.029***		
		(-0.005)		
Constant	8.846***		8.979***	73.460***
	(-0.769)		(-0.598)	(-7.664)
Country & sector fixed effects	YES	YES	YES	YES
Observations/Groups	222/52	95/31	275/69	251/67

(1) Bootstrapped standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The variables included for identification of the model are average firm size (for AE) and firm size at birth (for profits).
Source: Own calculations

Table Annex1.2: **The impact of PMR conduct and entry regulation on AE and profits through birth rate**

	AE		Profits	
VARIABLES	Step1: Dependent variable: Birth rate	Step 2: Dependent variable AE	Step 1: Dependent variable: Birth rate	Step 2: Dependent variable Profits
PMR_entry	-0.071		-0.181	
	(-0.263)		(-0.214)	
PMR_conduct	-0.631**		-0.677**	
	(-0.296)		(-0.279)	
Birth*		0.085**		-5.935***
		(-0.035)		(-1.158)
Empl at birth				2.788
				(-1.730)
Avsize		0.032***		
		(-0.004)		
Constant	8.480***		8.736***	65.400***
	(-0.817)		(-0.626)	(-9.284)
Country & sector fixed effects	YES	YES	YES	YES
Observations/Groups	222/52	95/31	275/69	251/67

(1) Bootstrapped standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The variables included for identification of the model are average firm size (for AE) and firm size at birth (for profits).
Source: Own calculations

Table Annex1.3: **The impact of PMR regulation on AE and profits through death rate**

	AE		Profits	
VARIABLES	Step1: Dependent variable: Death rate	Step 2: Dependent variable AE	Step 1: Dependent variable: Death rate	Step 2: Dependent variable Profits
pmr_overall	-1.113***		-1.012***	
	(-0.338)		(-0.316)	
Death*		0.051***		-5.291***
		(-0.013)		(-0.650)
Avsize		0.029***		
		(-0.005)		
Empl at birth				2.711*
				(-1.618)
Constant	8.700***	-0.517***	8.567***	56.080***
	(-0.825)	(-0.077)	(-0.728)	(-4.949)
Country & sector fixed effects	YES	YES	YES	YES
Observations/Groups	167/52	95/31	266/69	251/67

(1) Bootstrapped standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The variables included for identification of the model are average firm size (for AE) and firm size at death (for profits).
Source: Own calculations

Table Annex1.4: **The impact of PMR conduct and entry regulation on AE and profits through death rates**

	AE		Profits	
VARIABLES	Step1: Dependent variable: Death rate	Step 2: Dependent variable AE	Step 1: Dependent variable: Death rate	Step 2: Dependent variable Profits
PMR_entry	-0.111		-0.061	
	(-0.284)		(-0.261)	
PMR_conduct	-1.131***		-1.139	
	(-0.340)		(-0.336)	
Death*		0.048***		-3.686***
		(-0.018)		(-0.647)
Avsize		0.033***		
		(-0.005)		
Empl at birth				2.954*
				(-1.794)
Constant	8.121***	-0.508***	8.016***	45.030***
	(-0.870)	(-0.108)	(-0.764)	(-4.626)
Country & sector fixed effects	YES	YES	YES	YES
Observations/Groups	167/52	95/31	266/69	251/67

(1) Bootstrapped standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The variables included for identification of the model are average firm size (for AE) and firm size at death (for profits).
Source: Own calculations

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