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Regulatory Exposure and Firm Growth: Evidence from Portugal

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Abstract

Firm growth is central to business dynamics and to understanding differences in business structures and productivity. However, crossing specific employment thresholds may alter firms' regulatory exposure by triggering additional obligations, potential sanctions or benefits. Although evidence from other European countries suggests that size-dependent regulation can influence employment decisions and the firm-size distribution, recent research for Portugal remains limited. This dissertation examines whether the shift in the applicable regulatory regime around the 50-employee threshold is associated with local distortions in the firm-size distribution and weaker subsequent firm growth.

Using firm-level data on Portuguese firms from SABI over 2014–2024, the study analyses the distribution of firms by their exact number of employees to identify excess concentration immediately below 50 employees. Panel-data models then assess subsequent employment growth and the probability of crossing the threshold. Productivity is incorporated to examine whether more productive firms respond differently near this point, while additional specifications evaluate the robustness of the results and explore sectoral differences.

The results indicate a persistent excess concentration of firms below the threshold and a lower mass above it, with an estimated excess of 9.01% in 2014–2019. The main local comparisons provide limited evidence of weaker growth or reduced threshold crossing, although firms with 45–49 employees display weaker medium-term growth. More productive firms are instead more likely to cross the threshold. Sectoral differences are modest, while greater observed regulatory exposure is not consistently associated with weaker growth.

This dissertation finds evidence of distortions in the firm-size distribution, reflected in an unusual concentration around 50 employees, but only limited support for broader effects on subsequent firm growth.

Keywords: Firm growth, Regulatory exposure, Size-dependent regulation, Bunching.

JEL Codes: L11; L51; J23; D24.

Resumo

O crescimento das empresas é central para a dinâmica empresarial e para explicar diferenças nas estruturas empresariais e na produtividade. No entanto, a passagem de limiares de emprego pode alterar a sua exposição regulatória ao desencadear obrigações adicionais, potenciais sanções ou benefícios. Embora a evidência de outros países europeus sugira que a regulação dependente da dimensão pode influenciar decisões de emprego e a distribuição das empresas por dimensão, a investigação recente para Portugal é limitada. Esta dissertação analisa se a mudança no regime regulatório em torno do limiar dos 50 trabalhadores está associada a distorções locais na distribuição das empresas por dimensão e a um crescimento subsequente mais fraco.

Utilizando dados da SABI para empresas portuguesas entre 2014–2024, o estudo analisa a distribuição das empresas segundo o número exato de trabalhadores, para identificar concentração excessiva imediatamente abaixo dos 50 trabalhadores. Modelos de dados em painel avaliam o crescimento subsequente do emprego e a probabilidade de ultrapassar o limiar. A produtividade é incorporada para analisar se empresas mais produtivas respondem de forma diferente, enquanto especificações adicionais avaliam a robustez e diferenças setoriais.

Os resultados indicam concentração excessiva persistente abaixo do limiar e menor massa acima, com um excesso estimado de 9,01% em 2014–2019. As comparações locais fornecem evidência limitada de menor crescimento ou menor probabilidade de ultrapassar o limiar, embora empresas com 45–49 trabalhadores apresentem crescimento mais fraco a médio prazo. As empresas mais produtivas apresentam, pelo contrário, maior probabilidade de o ultrapassar. As diferenças setoriais são modestas, enquanto uma maior exposição regulatória observada não está consistentemente associada a um crescimento mais fraco.

Esta dissertação encontra evidência de distorções na distribuição das empresas por dimensão, refletidas numa concentração atípica em torno dos 50 trabalhadores, mas apenas indícios limitados de efeitos mais amplos sobre o crescimento empresarial subsequente.

Palavras-chave: Crescimento das empresas, Exposição regulatória, Regulação dependente da dimensão, Bunching.

Códigos JEL: L11; L51; J23; D24.

Table of Contents

Abstract ii

Resumo iii

List of Tables v

List of Figures vi

1. Introduction 1

2. Literature Review 3
   - 2.1. The Firm Size–Productivity Relationship 3
   - 2.2. Weak Scaling, External Frictions and Size-Dependent Regulation 5
   - 2.3. Firm Growth, Productivity and Misallocation in Portugal 7
     - 2.3.1. Portugal's Productivity and Firm-Growth Challenge 7
     - 2.3.2. Resource Misallocation and Sectoral Differences in Portugal 8
   - 2.4. The 50-Employee Threshold and Firm Growth 9
     - 2.4.1. The French Case as an Empirical Benchmark 9
     - 2.4.2. Firm Size and Size-Dependent Regulation in Portugal 10
     - 2.4.3. Contribution of the Present Study 11

3. Institutional and Regulatory Background in Portugal 12
   - 3.1. Firm-Size Classification and the 50-Employee Threshold 12
   - 3.2. Regulatory Mechanisms Around 50 Employees 13
     - 3.2.1. Labour Adjustments and Organisational Requirements 13
     - 3.2.2. Statutory Audit and Financial Reporting 14
     - 3.2.3. Sanctions and Compliance Exposure 14
   - 3.3. Evolution of Regulatory Exposure and Empirical Implications 15

4. Data and Methodology 17
   - 4.1. Data and Panel Construction 17
   - 4.2. Employment Measure and Analytical Sample 18
   - 4.3. Empirical Strategy 19
     - 4.3.1. Firm-size Distribution and Bunching 19
     - 4.3.2. Employment Growth, Threshold Crossing and Productivity 20
     - 4.3.3. Regulatory Exposure, Sectoral Analysis and Robustness 21
   - 4.4. Methodological Limitations 22

5. Results 23
   - 5.1. Firm-Size Distribution and Bunching Findings 23
   - 5.2. Employment Growth, Threshold Crossing and Productivity Findings 25
   - 5.3. Sectoral Heterogeneity Findings 30
   - 5.4. Regulatory Exposure Findings 33
   - 5.5. Additional Robustness Findings 38

6. Conclusion 42

Appendix 44

References 47

List of Tables

Table 3.1 Selected regulatory mechanisms around the 50-employee threshold in Portugal 16
Table 4.1 Sample coverage and availability of key variables....18
Table 4.2 Validation of alternative employment measures....18
Table 5.1 Pooled bunching estimates around the 50-employee threshold....24
Table 5.2 Local tests of employment growth and threshold crossing near 50 employees ...27
Table 5.3 Productivity heterogeneity in employment growth and threshold crossing....28
Table 5.4 Productivity interactions using alternative productivity measures....29
Table 5.5 Sectoral differences around the threshold....32
Table 5.6 Composite regulatory exposure, employment growth and threshold crossing....36
Table 5.7 Robustness of the bunching estimate....38
Table A.1 Annual sample coverage and availability of key variables, 2014–2024....44
Table A.2 Growth slowdown among firms with 45–49 employees....45
Table A.3 Differential attrition around the 50-employee threshold....45
Table A.4 Boundary and local robustness of pre-threshold employment growth....46

List of Figures

Figure 5.1 Observed and counterfactual employment distribution, 2014–2019 23
Figure 5.2 Annual bunching estimates around the 50-employee threshold, 2014–2024 25
Figure 5.3 Employment growth profiles around the 50-employee threshold 26
Figure 5.4 Threshold-crossing probabilities by initial employment 27
Figure 5.5 Estimated bunching around the 50-employee threshold by sector, 2014–2019 . 30
Figure 5.6 Employment growth near the 50-employee threshold by sector 31
Figure 5.7 Threshold-crossing probabilities by sector 32
Figure 5.8 Composition of potential regulatory exposure by firm size 34
Figure 5.9 Employment criterion and statutory-audit exposure around 50 employees 35
Figure 5.10 Employment criterion and NCRF-PE exposure around 50 employees 35
Figure 5.11 Composite regulatory exposure: employment growth 36
Figure 5.12 Composite regulatory exposure: threshold crossing 37
Figure 5.13 Comparison of bunching estimates at the main and placebo thresholds 39
Figure 5.14 Employment-growth deviations across pre-threshold employment ranges 40
Figure A.1 Productivity and firm expansion near the 50-employee threshold by sector 46

1. Introduction

For a firm employing 49 workers, hiring one additional employee may represent more than a marginal increase in labour input. If reaching 50 employees changes the applicable legal, administrative and reporting requirements, firms approaching the threshold may delay crossing it or avoid doing so altogether. When similar decisions are made by a sufficiently large number of firms, they may produce an unusual concentration immediately below the threshold, a reduction in mass above it, and alter firms' probability of crossing 50 employees.

Nevertheless, a concentration of firms below a particular employment level should not automatically be interpreted as evidence of a regulatory constraint. Some businesses may remain small while operating efficiently, whereas others are constrained from expanding. Firm growth is therefore highly heterogeneous, and differences in firms' growth trajectories may reflect characteristics that are already present before their expansion begins (Sterk et al., 2021). The relevant question is therefore whether firms systematically alter their behaviour in response to regulation as they approach the 50-employee threshold.

Productivity is central to the economic relevance of this question. A concentration of firms below 50 employees becomes more consequential if relatively productive firms also reduce hiring or fail to move beyond the threshold, as this may indicate that firm size does not fully adjust to productive capacity. Distortions associated with size-dependent regulation may consequently weaken the relationship between productivity and firm size, reduce average firm size, contribute to weak scaling and hinder the reallocation of resources towards more productive firms (Bento & Restuccia, 2017; Hsieh & Klenow, 2009).

Previous European evidence documents distortions in firm size and growth around regulatory thresholds. Research on France documents distortions around the 50-employee margin, where several regulations become applicable, while evidence from Italy links employment protection rules to lower growth probabilities near the relevant firm-size cut-off (Garicano et al., 2016; Gourio & Roys, 2014; Schivardi & Torrini, 2008).

Portugal offers a particularly relevant context for this analysis. The Portuguese business structure has long been characterised by a strong concentration of small firms and relatively limited post-entry expansion. These characteristics do not, by themselves, demonstrate the existence of a regulatory barrier. However, they make it important to understand whether

the conditions faced by firms as they expand contribute to the persistence of small firm size and weaken the relationship between productivity and scale. Braguinsky et al. (2011) document a shift towards smaller firm sizes in Portugal between 1986 and 2009 but do not identify a strong discontinuity at any single statutory threshold. Their findings suggest that multiple size-dependent requirements operating at different employment levels may jointly influence firms' expansion decisions.

The 50-employee threshold provides a specific setting in which to examine this issue, as crossing it can alter a firm's regulatory exposure. This concept captures obligations, compliance costs, potential sanctions and benefits arising from the applicable regulatory regime. Because the rules surrounding this threshold span several regulatory areas, depend on additional criteria and have changed over time, the present study does not seek to isolate the effect of a single legal provision. Instead, it assesses whether regulatory exposure around the 50-employee threshold is related to the firm-size distribution and firms' subsequent growth. Against this background, the dissertation addresses the following research question:

Is regulatory exposure around the 50-employee threshold associated with distortions in the firm-size distribution and weaker firm growth in Portugal?

The empirical investigation uses longitudinal data from the SABI database for the period 2014–2024. Taking Garicano et al. (2016) as a key empirical benchmark, the analysis combines an examination of the firm-size distribution around the 50-employee threshold with an assessment of subsequent employment growth and the probability of crossing the threshold. The analysis focuses on observable patterns in recent firm-level data for Portugal rather than reproducing the full structural model applied to the French case. It also places emphasis on productivity by examining whether firms with different productivity levels display different growth and crossing patterns near the threshold.

The remainder of the dissertation is organised as follows. Chapter 2 reviews the literature on firm size, growth, productivity, resource allocation and size-dependent regulation. Chapter 3 presents the Portuguese institutional and regulatory framework surrounding the 50-employee threshold and its economic relevance. Chapter 4 describes the data and the empirical strategy. Chapter 5 reports and discusses the empirical results, including sectoral heterogeneity, regulatory exposure and robustness analyses. Chapter 6 concludes by summarising the main findings, their implications and the limitations of the study.

2. Literature Review

2.1. The Firm Size–Productivity Relationship

The relationship between firm size and productivity has long been important in economic research, connecting firms' microeconomic characteristics to differences in macroeconomic outcomes and helping to explain why some economies consistently outperform others. Productivity, at both the firm and aggregate levels, constitutes a key determinant of improvements in living standards, international competitiveness and long-term growth; yet it varies markedly even among advanced economies. These persistent patterns reflect not only technology and sectoral composition, but also broader structural, institutional and regulatory conditions. By affecting firms' incentives, access to resources and scope for expansion, these conditions influence both individual performance and aggregate outcomes.

Firm size is therefore not merely a descriptive characteristic, as it can capture firms' ability to expand, compete and adapt within a particular environment. The distribution of economic activity across firms of different sizes is closely related to aggregate productivity outcomes (Acs et al., 1999; Pagano & Schivardi, 2003). Sectors in which firms operate at a larger average scale tend to display faster productivity growth, while cross-country evidence associates the composition of the firm-size distribution with productivity differences and economic growth. These results suggest that scale-related advantages may contribute to aggregate performance (Pagano & Schivardi, 2003; Silveira, 2022).

While the literature generally finds that larger firms tend to exhibit higher productivity levels, small and medium-sized enterprises (SMEs) remain important sources of employment, experimentation, product introduction and business dynamism (Acs et al., 1999; Li & Rama, 2015; World Bank, 2024). Their prevalence makes their position in the firm-size distribution economically significant, but their contribution to aggregate performance depends on their ability to survive, grow and use resources efficiently (Owalla et al., 2022). Larger firms are generally better positioned to exploit scale advantages, invest and adopt efficient technologies, partly because the fixed costs of these investments can be spread over a broader output base (Leung et al., 2008; Pagano & Schivardi, 2003). Greater capital intensity and access to finance can reinforce this advantage. Firm scale may consequently help translate productive capabilities into measurable productivity outcomes (Acs et al., 1999). Firms of different sizes therefore play distinct but complementary roles in economic performance.

The firm-size distribution may nevertheless reflect constraints that prevent firms from reaching their most efficient scale. Firms often enter at a smaller size than would otherwise be optimal due to restricted access to financial resources and expand only gradually as these constraints are relaxed over time (Cabral & Mata, 2003). This is consistent with a "liability of smallness" (Aldrich & Auster, 1986), involving weaker access to external finance, skilled labour, and managerial capabilities, as well as proportionally greater administrative burdens (Beck et al., 2005; Owalla et al., 2022). These disadvantages can limit the ability of SMEs to invest, innovate and ultimately expand, although SMEs remain highly heterogeneous and small size does not necessarily imply inefficiency or limited growth potential.

Indeed, the relationship between firm size and productivity is characterised by substantial heterogeneity. Considerable productivity dispersion exists within each size class, with relatively efficient small firms coexisting alongside less productive larger firms (Li & Rama, 2015). Firm-size heterogeneity may reflect differences in productive capabilities and firms' production-network relationships (Bernard et al., 2022). In this context, Gibrat's law provides a useful benchmark for firm dynamics, according to which proportional growth is independent of initial firm size (Sutton, 1997). Subsequent growth trajectories may therefore also arise from heterogeneity already present at or before entry, rather than exclusively from shocks occurring after firms begin operating (Sterk et al., 2021).

Theoretical accounts of firm size complement this evidence by emphasising the balance between productive gains and the costs of expansion. Economies of scale allow firms to spread fixed costs, improve production processes and increase specialisation, but growth also raises complexity and coordination challenges. Managerial and organisational capacity to coordinate a growing workforce and additional resources may consequently help explain why firms with similar opportunities operate at different scales (Lucas, 1978; Rosen, 1982).

Overall, firm size should not be treated as a perfect proxy for productivity. Aggregate productivity depends both on the efficiency of individual firms and on how labour, capital and other productive resources are distributed across them. The relevant issue is therefore not simply why larger firms tend to be more productive on average, but what enables or prevents productive firms from operating at a scale consistent with their capabilities. Recognising these mechanisms is important when assessing whether institutional and regulatory conditions impose additional barriers to growth.

2.2. Weak Scaling, External Frictions and Size-Dependent Regulation

Firms with stronger productive capabilities would generally be expected to expand, attract resources and increase their market share. In practice, however, this relationship is often weaker than expected. Productivity advantages do not always translate proportionally into firm growth (Pozzi & Schivardi, 2016), and relatively efficient firms may remain small despite their stronger performance (Hsieh & Klenow, 2009; Restuccia & Rogerson, 2008). This divergence between productivity and scale, referred to here as weak scaling, suggests that observed firm size and growth may not fully reflect underlying productive potential.

Weak scaling is closely related to resource misallocation. In an efficient allocation, labour and capital move towards firms that can use them most productively. Distortions may instead keep productive firms below their efficient scale, while less productive firms continue to absorb a disproportionate share of resources, reducing aggregate total factor productivity (Hsieh & Klenow, 2009; Restuccia & Rogerson, 2008). Restuccia & Rogerson (2017) further highlight that such distortions can have persistent effects on aggregate productivity, especially when they interfere with incentives to invest and adopt more productive technologies. Institutional, financial and regulatory conditions can contribute to this gap by affecting firms' access to resources, investment incentives and expansion decisions.

The institutional and financial environment influences entry and growth through property-rights protection, legal fairness and the development of financial markets. Where institutions are weaker, firms face greater uncertainty and tighter financing constraints, limiting their ability to pursue profitable investment opportunities and expand (Desai et al., 2003). These obstacles, however, do not affect all firms equally: smaller and younger firms tend to face stronger information asymmetries and more binding restrictions in capital markets, because they have fewer resources with which to absorb legal, financial and corruption-related barriers (Beck et al., 2005). If capital flows towards firms with greater collateral and borrowing capacity rather than stronger productive potential, efficient but financially constrained firms may remain below their optimal scale, while less productive competitors continue to attract resources (Gopinath et al., 2017; Maurin & Wolski, 2024).

Regulation constitutes a further external friction. Regulatory frameworks can affect firms' entry and post-entry expansion through product and labour market policies, while administrative and compliance requirements may also influence hiring and investment

(Kalmenovitz, 2023; Scarpetta et al., 2002). Djankov et al. (2002) document substantial cross-country variation in the procedures, time and monetary costs required to start a business, while Branstetter et al. (2014) show that reforms reducing business-entry costs in Portugal increased firm creation and employment, illustrating how regulation can shape the conditions under which firms are created and begin operating. Employment protection legislation can also alter the costs of hiring and dismissing workers, potentially affecting firms' employment decisions and adjustment to shocks (Bentolila & Bertola, 1990; Boeri & Jimeno, 2005). Consistent with this mechanism, Blanchard & Portugal (2001) associate stronger employment protection in Portugal with substantially different patterns of labour-market adjustment relative to the United States, with greater rigidity reflected in lower worker and job flows and longer unemployment duration.

Size-dependent rules represent a particular form of regulation because their applicability changes when firms cross specified employment thresholds, creating incentives to delay expansion or remain below the relevant thresholds (Garicano et al., 2016; Gourio & Roys, 2014). More generally, size-contingent policies can distort employment and production decisions by altering the relative costs of operating at different scales, with consequences for the firm-size distribution and aggregate productivity (Guner et al., 2008). Evidence from other institutional settings similarly shows that policies tied to firm size distort the allocation of productive factors and contribute to resource misallocation (García-Santana & Pijoan-Mas, 2014). The associated costs may be recurring, comparable to a tax on employment, or may take the form of sunk adjustment costs when a firm first becomes subject to a new regulatory regime (Gourio & Roys, 2014).

Here, regulatory exposure refers to the set of obligations, compliance costs, potential sanctions and benefits associated with the regime applicable to a firm. Exposure may vary with firm size, legal form, sector of activity and financial characteristics, and can change when an employment threshold is crossed. When several rules become relevant around the same threshold, their cumulative effect may influence firms' decisions, even if not every provision applies equally to all firms.

Evidence from European economies supports this interpretation. In Italy, stricter employment protection above a statutory threshold has been associated with lower probabilities of firm growth near the cut-off and higher expected firing costs (Schivardi & Torrini, 2008). In France, studies indicate that the concentration of several regulatory

requirements at 50 employees affected firms' employment and expansion decisions (Garicano et al., 2016; Gourio & Roys, 2014). Firms may also adjust behaviour beyond employment, as the share of innovating firms declines when they approach 50 employees (Aghion et al., 2023). Employment thresholds therefore provide a useful setting for examining whether regulatory exposure is associated with distortions in firm size and growth, forming the basis for the analysis of the 50-employee threshold in Portugal.

2.3. Firm Growth, Productivity and Misallocation in Portugal

Portugal represents a pertinent setting for examining the relationship between firm growth, productivity and size-dependent regulation. The Portuguese economy combines a persistent productivity gap with a business structure strongly dominated by SMEs. This prevalence does not itself demonstrate a regulatory barrier, since limited scale may reflect technology, demand or sectoral specialisation. However, it becomes relevant to weak scaling when firms with stronger productive potential are unable to attract resources and grow.

2.3.1. Portugal's Productivity and Firm-Growth Challenge

Despite some degree of institutional and policy convergence, Portugal continues to exhibit structural weaknesses in productivity performance. Labour productivity remains substantially below international benchmarks, standing at approximately 17% below the OECD average, while micro firms account for around 40% of employment in the business economy (V. Duarte, 2023; OECD, 2026). Understanding this structure therefore requires attention to the number and characteristics of firms entering the market, as well as to firms' capacity to grow after entry. Portuguese manufacturing firms tend to enter the market at relatively small scales, with their size distribution gradually shifting towards larger values as they age. Firm selection explains only part of this evolution, while financing constraints help explain why viable young firms initially remain below optimal size and expand only after those constraints ease (Cabral & Mata, 2003). More recent evidence similarly indicates that Portuguese start-ups and young firms grow more slowly than their counterparts in other OECD countries (OECD, 2025). Together, these findings suggest that the highly skewed Portuguese firm-size distribution cannot be understood through entry and exit dynamics alone, as post-entry conditions also shape firms' subsequent growth trajectories.

Size-dependent regulation may therefore constitute an additional friction when reaching an employment level alters the applicable requirements. The Portuguese productivity and firm-

growth challenge thus motivates examining whether firm behaviour changes systematically around regulatory thresholds, without treating regulation as the only constraint on expansion.

2.3.2. Resource Misallocation and Sectoral Differences in Portugal

Institutional constraints become economically consequential when they prevent labour and capital from moving towards the firms that can use them most productively. Within-industry resource misallocation in Portugal increased substantially between 1996 and 2011 and was associated with sizeable losses in aggregate productivity and growth. Dias et al. (2014) estimate that declining allocative efficiency reduced annual GDP growth by around 1.3 percentage points during a period in which real GDP grew by only approximately 1.5% per year. Their counterfactual allocation implies that value-added could have been around 48% higher in 1996 and 79% higher in 2011. These model-based estimates do not represent directly observed output losses but indicate worsening allocative inefficiency over time.

Capital distortions accounted for the largest share of potential efficiency gains, particularly in the services sector, and their contribution increased over time (Dias et al., 2014). Evidence on bank credit similarly shows that substantial financing remained directed towards firms with very low productivity, potentially slowing the reallocation of credit towards more efficient firms and limiting their ability to invest and expand (Azevedo et al., 2018).

Misallocation has been particularly pronounced in services: in 2011, estimated potential value-added gains from more efficient allocation were approximately 92% in services, compared with 54% in manufacturing (Dias et al., 2014). This difference appears to reflect broader sectoral characteristics rather than only the presence of a few abnormally inefficient industries. Price rigidities, slower labour adjustment and greater informality may contribute to higher misallocation observed in services, while weaker competitive pressures and local market structures may reinforce these differences (Dias et al., 2014, 2016). Given the weight of services in the Portuguese economy, sectoral heterogeneity has important implications for aggregate productivity (M. Duarte & Restuccia, 2007, 2010; V. Duarte, 2023).

Policy and institutional arrangements may further affect the allocation of resources. Evidence for Portugal indicates that smaller firms may, on average, benefit from lower capital and labour costs, potentially through size-contingent policies, subsidised credit, regulatory exemptions, differences in tax enforcement or tax avoidance practices (Dias et al., 2014). Although such arrangements can support survival and employment in the short run, they

may also reduce the gains from expansion and weaken incentives for less productive firms to restructure or exit, particularly in sectors with weaker competition (Dias et al., 2016). The net effect on productivity is therefore ambiguous: these arrangements can ease constraints on viable firms but can also discourage growth when the benefits are tied to remaining small.

Overall, financial, sectoral and institutional frictions may restrict the expansion of firms with stronger productive potential, while allowing less efficient firms to persist. This evidence does not establish that a particular regulatory threshold causes firms to remain small, but it helps explain why size-dependent rules merit specific attention.

2.4. The 50-Employee Threshold and Firm Growth

The preceding arguments raise the question of how firm expansion responds when the regulatory regime changes at a given employment level. The 50-employee threshold provides a particularly relevant setting as it marks a discrete shift in several legal, administrative and reporting requirements. Evidence from comparable employment thresholds can therefore serve as a useful benchmark for Portugal, although differences in institutional settings prevent these findings from being transferred directly to the Portuguese case. The French 50-employee threshold represents the closest empirical benchmark because it similarly concentrates several regulatory requirements around the same employment margin, making bunching a useful framework for analysing firms' responses to such thresholds.

When a policy creates a discontinuity in incentives, individuals and firms may adjust their behaviour, generating excess mass in the firm-size distribution (Kleven, 2016; Saez, 2010). The nature of this response depends on the form of the policy: kinks change marginal incentives at the threshold, whereas notches generate a discrete change in the level of the relevant cost or benefit (Kleven & Waseem, 2013). Adjustment costs and other optimisation frictions may, however, limit or delay these responses, so observed bunching may not capture the full underlying behavioural effect of the policy (Chetty et al., 2011). A concentration of firms immediately below the cut-off may therefore be consistent with firms adjusting employment to avoid or delay the additional costs associated with crossing it.

2.4.1. The French Case as an Empirical Benchmark

Garicano et al. (2016) examine the consequences of the 50-employee threshold in France, where a range of labour-related and administrative obligations become more demanding.

Using population data on French firms, they identify a clear break around the 50-worker threshold and observe an excess concentration of firms immediately below the threshold and relatively fewer firms above it. Rather than relying only on a comparison between firms below and above 50 workers, their structural model allows regulation to affect firms' optimal employment choices and constructs counterfactual firm size, productivity and welfare distributions in the absence of the regulatory distortion. The mechanism can be understood through a span-of-control framework. More productive firms would otherwise choose a larger employment scale because they can use additional labour more efficiently. If crossing the 50-employee threshold introduces an additional regulatory cost, however, the optimal size of some firms may shift downward, creating incentives to remain below the threshold rather than expand to their unconstrained scale. This can generate both bunching below the threshold and a distortion in the allocation of labour across firms. Earlier evidence for France identifies irregularities in firm-size distribution around 10, 20 and 50 employees, although the estimated aggregate effects remain relatively limited (Ceci-Renaud & Chevalier, 2010).

2.4.2. Firm Size and Size-Dependent Regulation in Portugal

Braguinsky et al. (2011) document a sustained leftward shift in the Portuguese firm-size distribution, showing that firms became progressively smaller over several decades. Using matched employer-employee data, they associate this pattern with weak productivity growth and a framework in which labour-market institutions may prevent productive firms from reaching their optimal size. However, they do not focus on a single identifiable threshold, but on multiple size-related regulations affecting different stages of expansion. Their analysis therefore provides broader evidence on the relationship between institutions and firm size in Portugal, rather than a local response around a particular employment margin.

Martins (2009) offers more direct evidence on the effects of size-dependent regulation in Portugal, although in a different institutional setting. The analysis exploits a 1989 legal reform under which firms employing 20 or fewer workers were exempted from several administrative requirements associated with dismissals for cause. Using matched employer-employee data and difference-in-differences matching methods, Martins compares the evolution of smaller and larger firms before and after the reform. The results do not provide robust evidence of changes in worker flows but indicate improvements in firm performance alongside lower wage growth among the firms affected by the exemption. This study is relevant because it shows that differentiated legal requirements can affect firm-level

outcomes, while concerning a different threshold, a specific legislative reform and an empirical strategy distinct from that adopted in the present dissertation.

These studies therefore leave open whether the current regulatory environment around the 50-employee threshold is associated with a local change in the behaviour of Portuguese firms. Existing evidence either addresses broader shifts in firm size or a historical reform at a different employment level. Recent research on the 50-employee threshold has yet to fully combine the exact firm-size distribution with subsequent growth and crossing probabilities.

2.4.3. Contribution of the Present Study

Building on this literature, the present study adapts the core empirical logic of Garicano et al. (2016) to the Portuguese context. The objective is not to reproduce the French study in full or to estimate the welfare effects of a particular legal provision. Instead, it examines whether the regulatory regime surrounding the 50-employee threshold is associated with local distortions in the firm-size distribution and firm growth in Portugal. Since regulatory exposure around this threshold combines requirements from different regulatory areas, varies according to additional criteria and has evolved over time, the analysis does not seek to attribute observed firm behaviour to any single rule.

This mechanism leads to three main empirical predictions. First, if crossing the threshold raises the costs of expansion, some firms may remain below 50 employees, creating excess mass below the threshold. Second, the same incentives may reduce subsequent employment growth and the probability of crossing the 50-employee threshold. Third, these responses may differ across firms and sectors. Such effects may be stronger for more productive firms, which would otherwise have greater incentives to expand, and may further vary with firms' regulatory exposure.

This dissertation therefore provides recent evidence for Portugal while focusing on a specific and empirically observable margin of firm expansion where firms' regulatory exposure may change. By incorporating productivity, it also considers whether constraints near the threshold may be particularly relevant for firms with stronger productive potential. This distinction is economically important because a concentration of firms below the threshold would have different implications depending on whether it reflected firms operating efficiently at a smaller scale or productive firms being unable or unwilling to expand. These considerations form the central motivation for the empirical analysis that follows.

3. Institutional and Regulatory Background in Portugal

The 50-employee threshold does not correspond to a single regulatory requirement in Portugal. Instead, it marks a point around which several labour, accounting, sanctioning and compliance provisions may change. Some depend directly on employment, whereas others also depend on financial criteria, persistence over time, legal form, sector or specific events. Their effects may range from higher administrative, organisational or adjustment costs to greater flexibility or access to support. The threshold is therefore best understood as a change in the overall regulatory regime rather than as the introduction of one uniform obligation. In this dissertation, regulatory exposure refers to the set of requirements, potential sanctions and benefits that may become relevant to a firm because of its employment level and other observable characteristics. This definition does not imply that every firm crossing 50 employees becomes subject to every provision or incurs the corresponding cost. Rather, it captures the possibility that the conditions under which a firm operates may change as it moves from below to above the threshold.

3.1. Firm-Size Classification and the 50-Employee Threshold

The Portuguese Labour Code (*Código do Trabalho*) provides the principal classification used in employment regulation. Firms with fewer than 10 workers are classified as microenterprises, those with 10–49 workers as small, those with 50–249 workers as medium-sized, and those with 250 or more workers as large. The relevant employment concept is the average number of employees in the preceding calendar year (Labour Code, Article 100). Accordingly, an increase from an average of 49 to 50 employees changes the firm's legal classification from small to medium-sized.

This distinction is economically relevant because several Labour Code provisions differentiate between small and medium-sized firms. However, classification and regulatory consequences are conceptually separate: Article 100 defines the firm's category, while other legal provisions specify the consequences associated with it. Separating the two is important because the existence of a threshold does not, by itself, establish the magnitude or the direction of the resulting economic incentive.

The legal framework governing SME status uses a related but distinct classification. A small enterprise employs fewer than 50 annual work units and meets applicable financial criteria concerning turnover or balance-sheet total; ownership relationships and the wider corporate

group may also be relevant. Medium-sized firms remain within the broader SME category, although some public-support programmes differentiate between small and medium-sized enterprises in their eligibility conditions, aid intensity or other requirements. Crossing 50 employees therefore does not imply the loss of SME status, and its economic relevance depends on the specific support measure. These distinctions matter empirically because different provisions use different employment concepts, including average employment, year-end employment and annual work units. The empirical analysis consequently does not assume that one employment measure perfectly reproduces every legal definition. The selection and validation of the employment variables are discussed in Chapter 4.

3.2. Regulatory Mechanisms Around 50 Employees

3.2.1. Labour Adjustments and Organisational Requirements

The move from small to medium-sized status affects firms' capacity to adjust labour input. Under Article 228 of the Labour Code, the standard annual overtime limit is 175 hours per worker in micro and small firms and 150 hours in medium-sized and large firms, although collective agreements may raise the limit to 200 hours. A growing firm may therefore have less ability to respond to temporary increases in demand through additional hours worked by its existing workforce, potentially increasing the attractiveness of recruitment, external services or production reorganisation (Labour Code, Article 228).

However, not every labour-law change associated with growth increases regulatory costs. A dismissal involving at least two employees over a three-month period may qualify as collective in a micro or small firm, whereas the corresponding minimum is five workers in a medium-sized or large firm. As a result, a reduction involving two to four workers may cease to fall within the collective-redundancy procedure when a firm becomes medium-sized (Labour Code, Article 359), increasing adjustment flexibility in some circumstances.

Other Labour Code consequences concern works councils, worker-representation structures, unpaid training leave, trade-union consultation and business transfers, but they depend on the existence of particular structures, individual requests or specific events, and do not affect every firm crossing the threshold. Sector- and establishment-specific requirements, such as occupational-safety staffing and canteen rules in industrial establishments, may also change around this employment level, although SABI's company-level structure prevents their precise identification.

3.2.2. Statutory Audit and Financial Reporting

Employment also forms part of the rules governing statutory audits and financial reporting. Under Article 262 of the Portuguese Commercial Companies Code (*Código das Sociedades Comerciais*), certain private limited companies without a supervisory board must appoint a statutory auditor when they exceed two of three limits: total assets, sales and other income, and an average of 50 employees for two consecutive years. Employment is one component of a composite test rather than an independent trigger: a firm with 50 employees does not become subject to a statutory audit solely because of its employment level. Nevertheless, for a company already exceeding one of the financial limits, crossing the employment limit can increase the firm's regulatory exposure through audit fees, more demanding reporting procedures and other compliance costs (Commercial Companies Code, Article 262).

A similar composite test applies under the Portuguese Accounting Standardisation System (*Sistema de Normalização Contabilística*) to determine whether an entity qualifies as small and may use the corresponding simplified accounting framework. The applicable financial limits were revised in 2016, while the employment criterion remained at an average of 50 employees[1]. The relevant limits must be exceeded for two consecutive accounting periods before the entity changes category. Thus, crossing the employment threshold does not necessarily change the applicable accounting regime immediately, but it can become decisive for firms that are already close to the relevant financial limits (Decree-Law No. 158/2009, as amended by Law No. 20/2010 and Decree-Law No. 98/2015).

3.2.3. Sanctions and Compliance Exposure

Several provisions change the potential consequences of non-compliance around 50 employees. Under the Social Security Contributory Code (*Código dos Regimes Contributivos do Sistema Previdencial de Segurança Social*), statutory limits for contribution-related fines are increased by 50% for legal persons with fewer than 50 workers and by 100% for those with 50 or more workers (Contributory Code, Article 233). Since 2021, the Legal Framework for Economic Offences (*Regime Jurídico das Contraordenações Económicas*) has also classified firms with 10–49 workers as small and those with 50–249 workers as medium-sized, which may

[1] During 2014 and 2015, the relevant financial limits were a balance-sheet total of €1.5 million and sales and other income of €3 million. From 2016 to 2024, the corresponding limits were a balance-sheet total of €4 million and net turnover of €8 million, while the employment criterion remained at an average of 50 employees.

affect the applicable fine ranges when a covered offence occurs (Decree-Law No. 9/2021, Articles 18 and 19). These rules do not impose a regular cost on compliant firms; their economic relevance lies in increasing the potential cost of non-compliance. SABI can be used to approximate which employment category applies, but it does not identify offences, proceedings or fines actually paid.

The regulatory importance of the threshold increased towards the end of the sample period. Since 2021, firms with 50 or more employees may be required to assess and correct gender pay differences following notification by the labour inspectorate (Law No. 60/2018). Since 2022, covered entities with 50 or more employees have been required to establish internal reporting channels under the whistleblower-protection regime (Law No. 93/2021). Since June 2022, the anti-corruption framework has required covered entities employing 50 or more workers to adopt a compliance programme that includes a risk-prevention plan, code of conduct, training, internal reporting channel and compliance officer (Decree-Law No. 109-E/2021). These obligations may create fixed administrative and organisational costs, although some of their components overlap and should not be counted mechanically as fully independent costs.

3.3. Evolution of Regulatory Exposure and Empirical Implications

The regulatory environment around 50 employees changed during the 2014–2024 period. Core provisions, including Labour Code classification, overtime limits, collective redundancy rules, statutory audit requirements and Social Security sanctions, applied throughout the main pre-pandemic period. The financial limits used in small-entity accounting classification were revised in 2016, while additional regulatory changes occurred between 2018 and 2022, notably in relation to economic offences, pay-difference assessments, whistleblowing and anti-corruption compliance. This evolution supports treating 2014–2019 as the main period and analysing 2020–2024 separately. The latter combines pandemic-related disruptions with the introduction of additional regulatory requirements, so differences between the two periods cannot be interpreted as the causal effect of any individual reform.

The Portuguese framework includes direct employment thresholds, composite tests combining employment with financial criteria and persistence over time, and conditional provisions depending on sector, legal form or specific events. The empirical analysis first examines whether firms concentrate immediately below 50 employees, display weaker

subsequent employment growth or are less likely to cross the threshold. It then uses SABI information on employment, turnover, total assets, legal form and sector to approximate specific forms of regulatory exposure. These measures identify conditions that may make a firm subject to a provision rather than its actual compliance or the costs incurred. The results are consequently interpreted as associations with the combined regulatory environment around 50 employees, rather than as causal effects of any individual rule. Table 3.1 summarises the main regulatory mechanisms around the 50-employee threshold in Portugal.

Table 3.1 Selected regulatory mechanisms around the 50-employee threshold in Portugal

Regulatory Area	Main Rule/Change Around the Threshold	Period
Labour classification and adjustment	Firms move from small to medium-sized status. The standard overtime limit falls from 175 to 150 hours, while the collective-redundancy minimum rises from two to five employees.	2014–2024
Statutory audit	Average employment limit of 50 forms part of a two-of-three test alongside balance-sheet total and sales and other income, applied over two consecutive years.	2014–2024
Accounting classification	Average employment limit of 50 forms part of the criteria for small-entity status. The applicable financial limits changed in 2016, and persistence over two periods applies under the later regime.	2014–2024
SME classification and support	Small-enterprise status requires fewer than 50 annual work units together with financial conditions; medium-sized firms remain SMEs.	2014–2024
Sanctions and organisational compliance	Social Security fine limits increase at 50 workers. Additional economic-offence sanctions, pay-difference, internal-reporting and anti-corruption provisions became relevant from 2021–2022.	2014–2024; additional provisions from 2021–2022
Sector- and establishment-specific requirements	Industrial canteen requirements apply from 50 workers, while occupational-safety staffing requirements increase above 50 workers.	2014–2024

Notes: The table reports selected provisions with the clearest economic relevance. Classification rules and their consequences are conceptually distinct, and not every consequence applies automatically to every firm crossing 50 employees. The complete regulatory inventory is provided in the Annex.

4. Data and Methodology

4.1. Data and Panel Construction

The analysis uses firm-level information from SABI, a database provided by Informa D&B and Bureau Van Dijk containing financial and legal information on Portuguese and Spanish companies. The extraction was restricted to Portuguese firms and to the U1 and C2/U2 consolidation categories, selected to obtain accounts at the individual-company level.

A company was included if it reported at least 10 employees in at least one year between 2014 and 2024. The lower bound of 10 employees corresponds to the employment boundary commonly used to distinguish micro from small enterprises and focuses the analysis on firms for which expansion towards 50 employees is more economically relevant. Since inclusion required a firm to reach 10 employees in at least one year, the panel may still contain firm-year observations with fewer than 10 employees in other years. No upper employment limit was imposed, and firms were also not restricted according to current legal status, economic activity or legal form at extraction. The employment criterion was used only to define the initial extraction universe and did not determine the employment measure subsequently adopted in the empirical analysis.

The extraction produced 87,685 unique companies and was exported in 23 Excel files containing the same 199 original variables. The extracted information includes firm identifiers, legal form, incorporation date, current legal status, geographic and sectoral classifications, corporate-group information, and annual employment and accounting variables for 2014–2024. Monetary values are expressed in thousands of euros. The original files were preserved and appended into a single company-level dataset. Annual employment and accounting fields were converted to numeric format, with values reported as n.a. retained as missing and reported zeros preserved. The data were then reshaped from wide to long format, yielding 964,535 firm-year observations. The resulting panel has a balanced firm-year structure, although annual information is unbalanced across firms, years and variables. The BvD identifier and year jointly identify each observation. Current legal status was combined with the last year of reported employment to construct a proxy for probable exit, rather than an exact dated exit measure.

Table 4.1 illustrates the evolution of sample coverage across the study period.

Table 4.1 Sample coverage and availability of key variables

Measure	2014	2019	2024
Firms in panel	87,685	87,685	87,685
Employment observed	62,574	72,003	69,769
Firms with 10–249 employees	37,156	47,050	52,064
Observations in 40–60 window	3,093	4,003	4,524
Valid 1-year employment growth	35,743	45,596	—
Valid baseline productivity	—	34,580	39,579

4.2. Employment Measure and Analytical Sample

Employees at the end of the year are used as the main employment measure. This variable has the highest coverage and corresponds closely to provisions that evaluate employment at a particular date. The average number of persons engaged is used as the main alternative because several legal provisions refer to average employment over the accounting period. The two measures are highly consistent, agreeing in approximately 99.92% of comparable observations and in around 99.90% of observations between 45 and 54 employees. Detailed coverage checks identify some negative employment values, which are excluded from samples requiring valid positive employment; reported zeros are retained and missing values are not imputed. The same checks show high consistency between the main employment measure and the remunerated, full-time and part-time employment components. The results around the threshold are therefore unlikely to be driven by the choice of employment measure. Table 4.2 confirms consistency across employment measures.

Table 4.2 Validation of alternative employment measures

Sample	Comparable observations	Exact agreement (%)	Different sides of 50
All observations	733,528	99.92	33
45–54 employees	19,724	99.90	5

The analytical sample varies according to the question examined. Firms may report fewer than 10 employees, zero employment or missing values in years other than the year used to qualify for extraction. Each analysis uses the firm-year observations for which the required variables are available and applies the employment, sectoral and functional-form restrictions relevant to that specification. The main specifications use 2014–2019 as the base-year period, while 2020–2024 is examined separately. Outcomes measured over one-, two- and three-year horizons require employment information at the corresponding future date. Missing future employment is therefore examined separately in the robustness analysis to assess whether sample attrition may affect longer-horizon results.

4.3. Empirical Strategy

4.3.1. Firm-size Distribution and Bunching

The first stage examines the exact distribution of firms by employee count for the main period and alternative subperiods, to assess whether firms are unusually concentrated immediately below 50 employees relative to the estimated counterfactual distribution.

The analysis follows the standard bunching logic by comparing the observed firm-size distribution with a smooth counterfactual around the 50-employee threshold. While the literature distinguishes between kinks and notches, the Portuguese threshold combines several regulatory provisions and is not treated as a single pure case of either type. The focus is instead on excess concentration below 50 employees relative to the counterfactual.

The baseline bunching specification uses firms with 30–70 employees and excludes financial and insurance activities and public administration (CAE Rev. 3 Sections K and O). A cubic polynomial in firm size is estimated outside the excluded region around the threshold, with indicators for multiples of five and ten to account for possible reporting or rounding patterns. Excess mass is measured over 45–49 employees relative to the estimated counterfactual distribution. To complement this measure, the analysis also evaluates missing mass above the threshold. The upper bound of the excluded region is varied from 54 to 70 employees, and the value that most closely matches the estimated excess mass below 50 with the missing mass above it is selected. The final specification reports the excess mass in 45–49, the missing mass in 50–54, the integrated missing mass between 50 and the selected upper bound, and a normalised bunching parameter. This procedure should be interpreted as a

discrete mass-matching adaptation of the standard integration logic rather than as a full structural bunching model.

Statistical uncertainty in the main specification is assessed through 500 firm-clustered bootstrap replications. Robustness checks vary the employment measure, estimation window, excluded interval and polynomial order, and include placebo thresholds at 40, 45, 55 and 60 employees. The bunching analysis is estimated separately for 2014–2019, 2020–2024 and the full 2014–2024 period.

4.3.2. Employment Growth, Threshold Crossing and Productivity

The second stage examines subsequent employment growth and threshold crossing among firms approaching 50 employees. Employment growth over one-, two- and three-year horizons is measured using the symmetric growth rate defined in Equation (4.1):

$$Growth_{i,t}^{h} = \frac{2\left(N_{i,t+h} - N_{i,t}\right)}{N_{i,t+h} + N_{i,t}}, h \in \{1,2,3\},$$

where $N_{i,t}$ denotes firm employment in the base year and $N_{i,t+h}$ denotes employment one, two or three years later. This measure allows employment to fall to zero and limits the influence of extreme changes. Threshold crossing is captured by an indicator equal to one when a firm with 40–49 employees in year t reaches at least 50 employees in year $t + h$, and zero otherwise.

Growth profiles are estimated for firms with 40–60 employees, while crossing models are restricted to firms initially employing 40–49 workers. Particular attention is given to firms with 45–49 employees immediately below the threshold, including comparisons with firms employing 40–44 workers. A local test compares the increase in crossing probability between 48 and 49 employees with the average increase observed between 44 and 48 employees, using the immediately preceding increments as a local benchmark while reducing reliance on a single transition. Models control for year and two-digit CAE effects, with standard errors clustered at the firm level. Minimum detectable effects are also calculated for the main local contrasts, and p-values across the three horizons are adjusted within predefined test families using the Benjamini–Hochberg procedure. Labour productivity is measured as gross value added per worker. For firm i and year t, it is defined in Equation (4.2):

$$lp_{it} = \ln\left(\frac{VAB_{it}}{N_{it}}\right),$$

where N_{it} denotes employment. The measure is defined for observations with positive gross value added and employment. Its logarithm is then centred relative to the mean log productivity of firms in the same two-digit CAE division and year, with s indexing the two-digit CAE division. Sector-year cells are required to contain at least 10 valid productivity observations, and the centred measure is defined in Equation (4.3):

$$lp^{c}_{ist} = lp_{it} - \bar{lp}_{st}.$$

Predetermined productivity is measured as the average of the centred values in $t-2$ and $t-1$. Productivity in $t-1$ alone is used as a robustness check. To reduce the mechanical link created by using employment in both the productivity denominator and employment outcomes, alternative specifications use gross value added per hour worked and per unit of personnel cost and control for prior employment change.

The models examine whether previously more productive firms generally grow faster and whether this relationship changes near the threshold. Additional specifications assess broader pre-threshold adjustment, alternative reference windows, local-linear estimates and placebo employment ranges. Linear probability model predictions are also examined to verify that the crossing results are not driven by systematic predictions outside the unit interval. Predicted probabilities outside the unit interval are rare, accounting for 1.69%, 0.26% and 0.09% of observations at the one-, two- and three-year horizons, respectively.

4.3.3. Regulatory Exposure, Sectoral Analysis and Robustness

The baseline analysis treats the 50-employee threshold as a change in the combined regulatory environment. As an extension, potential regulatory exposure is approximated by distinguishing requirements directly linked to employment from regimes that also depend on financial or other firm characteristics. Composite exposure measures capture the potential applicability of statutory-audit and simplified-accounting regimes using information available in SABI, while additional indicators cover employment-based requirements and proxies for sector- or establishment-specific rules. These measures represent potential regulatory exposure rather than actual compliance costs, which SABI does not report.

Sectoral heterogeneity is examined using both a four-group classification comprising the primary sector, industry, construction and services, and a more direct comparison between industry and services. Industry comprises CAE Rev. 3 Sections B–E and services comprise Sections G–S, subject to the baseline sector exclusions, while the primary sector and construction are excluded from the binary comparison. The updated bunching procedure is also applied separately by sector. Additional robustness checks consider log-difference employment growth, alternative productivity measures based on $t-1$, gross value added per hour worked, gross value added per unit of personnel cost, boundary and placebo specifications, attrition and probable exit, and alternative regulatory-exposure definitions.

4.4. Methodological Limitations

The dataset does not represent the complete population of Portuguese firms, as companies remaining below 10 employees throughout 2014–2024 were not included. Annual information is not available for every firm and variable, and missing values cannot be interpreted unambiguously as inactivity, so estimation samples differ across specifications.

Attrition checks do not indicate systematically higher missing future employment in the main comparisons immediately below the threshold. Lee bounds were therefore not implemented, as differential attrition is not concentrated in these contrasts and their application would require further selection assumptions in this observational setting. Some differential attrition is nevertheless observed between firms with 49 and 50 employees at longer horizons.

The employment measures available in SABI do not reproduce every legal definition exactly, although their close empirical agreement reduces concerns about the selected measure.

SABI also records companies rather than establishments, limiting the identification of workplace-level requirements. It also does not fully capture group-level structures or ownership relationships, which may affect classifications under regulatory criteria that consider linked or partner enterprises. Current legal status is not a dated exit measure, so the probable-exit indicator is used only as a robustness proxy.

Finally, the analysis does not exploit a single exogenous legal reform. Results around 50 employees should therefore be interpreted as associations with potential regulatory exposure rather than as causal effects of an individual provision.

5. Results

5.1. Firm-Size Distribution and Bunching Findings

The first set of results examines the firm-size distribution around the 50-employee threshold. The first hypothesis (H1) predicts an excess concentration of firms immediately below the threshold relative to the estimated counterfactual distribution. The analysis also examines how any corresponding deficit is distributed above 50 employees in order to characterise the adjustment around the threshold. The assessment first considers the main 2014–2019 period, before evaluating the persistence of this pattern over time and across alternative specifications.

Figure 5.1 compares the observed and estimated counterfactual employment distributions between 30 and 70 employees in 2014–2019.

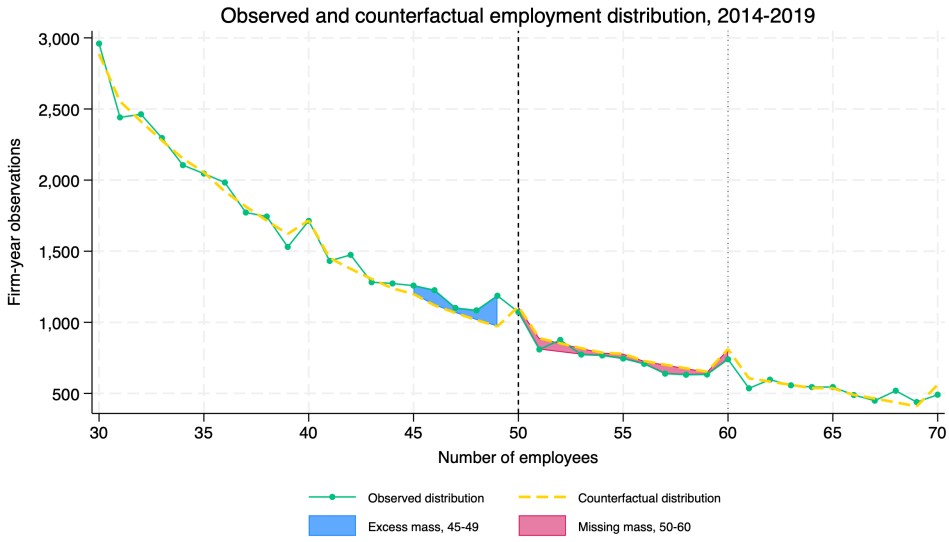


Figure 5.1 Observed and counterfactual employment distribution, 2014–2019

The figure shows a clear concentration of firms immediately below 50 employees. In the 45–49 interval, the observed distribution contains 5,856 firm-year observations, compared with a counterfactual of 5,372, implying excess mass of 483.8 observations. This corresponds to 9.01% of the counterfactual distribution, with a normalised bunching estimate of 0.450 (SE=0.102), confirming statistically significant bunching below the threshold.

Immediately above the threshold, the estimated missing mass between 50 and 54 employees is considerably smaller, at 158.93 observations (SE=85.52), and is imprecisely estimated. Using the mass-matching procedure, the selected upper bound is 60 employees in the baseline specification. Over the 50–60 interval, the estimated missing mass reaches 412.8 observations (SE=144.8), compared with 483.8 excess observations below the threshold, leaving a difference of 71.1 observations, or about 14.7% of the excess mass.

These results provide evidence of excess mass immediately below the 50-employee threshold. The missing mass exercise is not independent evidence for H1, since the upper bound is selected to bring the estimated deficit above the threshold as close as possible to the excess below it. Its informative feature is instead the location of that deficit. Only 158.93 observations are missing within 50–54, whereas the selected upper bound extends to 60 employees, indicating that the estimated deficit is absorbed more diffusely over the post-threshold distribution rather than being concentrated immediately above 50.

This pattern is less consistent with the sharp post-threshold gap that would be expected under a pure notch, which would generate an immediate discrete adjustment in firm size. It instead suggests a more gradual or heterogeneous displacement of firms above the threshold. H1 is therefore supported by the statistically significant excess concentration below 50 employees, while the distribution of missing mass helps characterise the form of the adjustment rather than providing an independent test of the hypothesis.

To assess whether this pattern is specific to the baseline period, the same specification is also estimated for the full 2014–2024 period and separately for 2020–2024 in Table 5.1.

Table 5.1 Pooled bunching estimates around the 50-employee threshold

Specification	Period	Estimate (bootstrap SE)	95% CI	N / firms
Baseline	2014–2019	9.006*** (2.042)	[5.00, 13.01]	47,930 / 14,371
Later period	2020–2024	9.632*** (1.978)	[5.75, 13.51]	47,781 / 15,611
Full period	2014–2024	9.320*** (1.585)	[6.21, 12.43]	95,711 / 20,799

Notes: Excess mass refers to the 45–49 interval relative to the estimated counterfactual. Estimates use a cubic specification over a 30–70 employment window, with multiples-of-five and multiples-of-ten controls and a mass-matched upper bound of 60. Standard errors are based on 500 firm-clustered bootstrap replications. N denotes firm-year observations, and firms denotes unique firms. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

The estimated excess mass remains stable across periods, reaching 9.32% for 2014–2024 and 9.63% for 2020–2024, compared with 9.01% in the baseline period. All three estimates are statistically different from zero, indicating that the excess concentration below the threshold is not confined to the pre-pandemic period.

The annual estimates provide a more detailed view of this persistence. Figure 5.2 reports the bunching estimate separately for each year using the same mass-matching procedure as in the pooled specification.

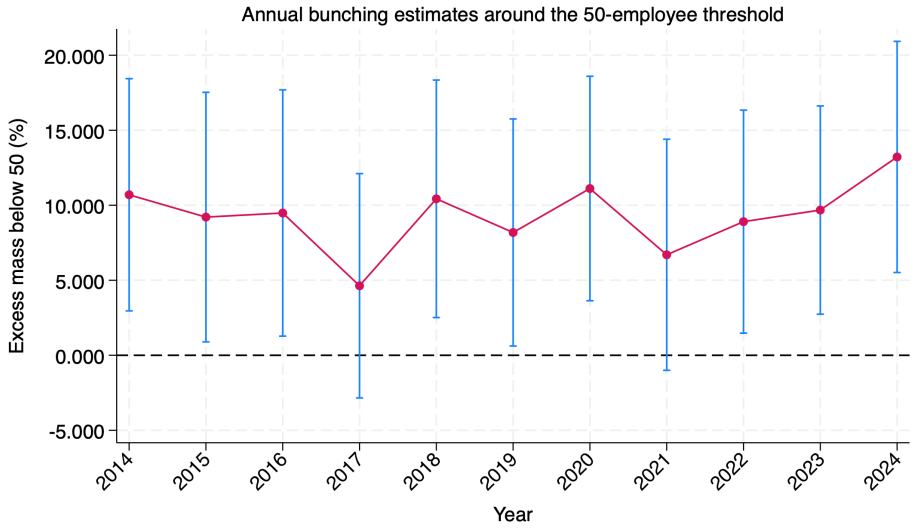


Figure 5.2 Annual bunching estimates around the 50-employee threshold, 2014–2024

The estimated excess remains positive throughout 2014–2024, although its magnitude and precision vary across years.

Overall, the persistence of excess mass immediately below 50 employees supports H1. The corresponding deficit is distributed over a broader range above the 50-employee threshold, pointing to a more gradual pattern of adjustment rather than a sharp displacement directly above 50 that would characterise a pure notch response.

5.2. Employment Growth, Threshold Crossing and Productivity Findings

The second hypothesis (H2) examines whether firms approaching the 50-employee threshold subsequently display weaker employment growth or a lower probability of moving beyond it. While the bunching results identify an unusual concentration of firms immediately below 50 employees, they do not by themselves establish whether firms close to the

threshold subsequently expand more slowly. The analysis considers both adjusted employment growth and crossing probabilities over one-, two- and three-year horizons.

Figure 5.3 presents the adjusted employment-growth profiles for firms initially employing 40–60 workers during the 2014–2019 period. Each point represents the estimated growth rate for an initial employment level, conditional on year and two-digit CAE effects, while the vertical bars report 95% confidence intervals. The dashed vertical line marks the threshold.

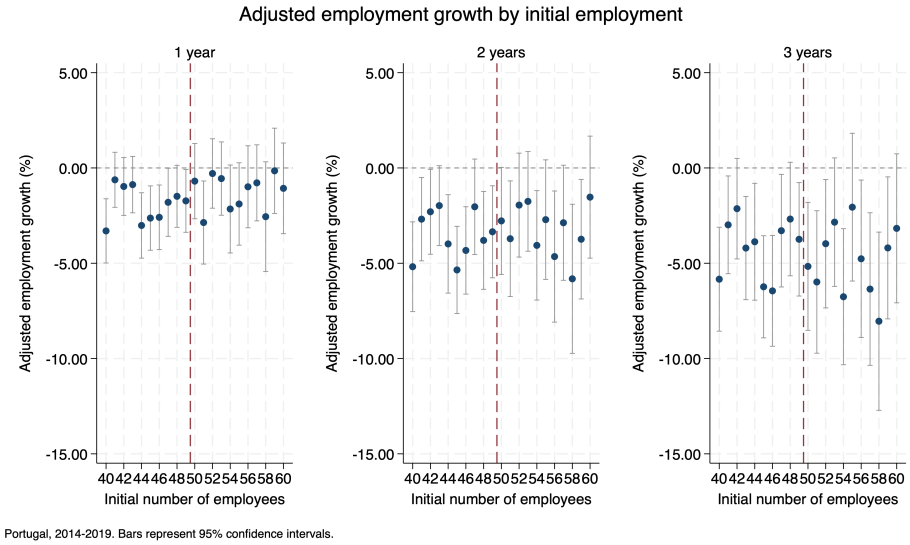


Figure 5.3 Employment growth profiles around the 50-employee threshold

The adjusted profiles do not reveal a clear discontinuity in employment growth around the 50-employee threshold. Growth is generally negative across much of the local employment range and becomes more variable at longer horizons, but firms immediately below the threshold do not display a systematic decline relative to neighbouring employment levels. There is no visible sharp change between firms with 49 and 50 employees across the three horizons. The visual evidence provides limited support for an immediate slowdown at the threshold, although it does not rule out a more gradual adjustment below 50 employees.

Figure 5.4 illustrates how crossing probabilities vary with initial employment.

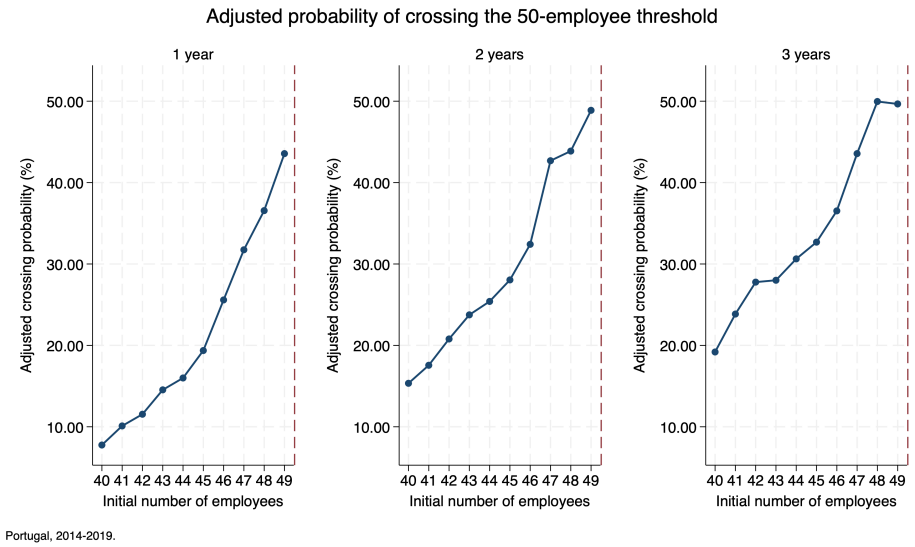


Figure 5.4 Threshold-crossing probabilities by initial employment

Crossing probabilities rise strongly as firms approach the threshold. Firms starting closer to 50 employees are progressively more likely to reach or exceed it at each horizon, and the profile does not show a decline among firms starting with 49 employees. The visual evidence does not indicate a generalised reduction in the probability of crossing.

Table 5.2 complements the figures with local contrasts for growth and threshold crossing.

Table 5.2 Local tests of employment growth and threshold crossing near 50 employees

Outcome	Horizon	Local contrast	Estimate (SE)	p-value	N / firms
Growth	1 year	49 − 48 employees	−0.240 (1.176)	0.839	20,735 / 7,685
Growth	2 years	49 − 48 employees	0.450 (1.784)	0.801	20,227 / 7,449
Growth	3 years	49 − 48 employees	−1.061 (2.094)	0.612	19,802 / 7,256
Crossing	1 year	Last increase vs. average 44–48	1.861 (2.391)	0.436	12,632 / 5,886
Crossing	2 years	Last increase vs. average 44–48	0.391 (2.576)	0.879	12,353 / 5,734
Crossing	3 years	Last increase vs. average 44–48	−5.133 (2.598)	0.048	12,096 / 5,590

Notes: Growth estimates compare firms with 49 and 48 employees. Crossing estimates compare the 48–49 increase in crossing probability with average increase between 44 and 48 employees. Estimates are expressed in percentage points.

The crossing results provide a more nuanced picture. The increase in crossing probability between 48 and 49 employees is not statistically different from the average increase observed between 44 and 48 employees at one- and two-year horizons. At three years, the final increase is estimated to be 5.13 percentage points smaller than the average increase (p=0.048). However, this result does not remain significant after applying the Benjamini–Hochberg correction for multiple testing (q=0.144). Overall, the crossing results provide limited evidence of a flattening in the crossing profile immediately below the threshold.

The corresponding minimum detectable effects for the 49–48 growth contrast range from approximately 3.3 percentage points at one year to 5.9 percentage points at three years, indicating that moderate local effects cannot be ruled out. Table 5.3 examines whether these patterns vary with firm productivity.

Table 5.3 Productivity heterogeneity in employment growth and threshold crossing

Outcome	Horizon	Near-threshold × productivity	Estimate (SE)	p-value	N / firms
Growth	1 year	Interaction	0.009 (0.013)	0.455	7,985 / 4,183
Growth	2 years	Interaction	0.018 (0.018)	0.328	7,859 / 4,114
Growth	3 years	Interaction	0.029 (0.022)	0.184	7,718 / 4,024
Crossing	1 year	Interaction	0.061*** (0.016)	<0.001	7,985 / 4,183
Crossing	2 years	Interaction	0.050** (0.021)	0.016	7,859 / 4,114
Crossing	3 years	Interaction	0.065*** (0.021)	0.003	7,718 / 4,024

Notes: Productivity is measured as the centred logarithm of value added per employee, measured as the average of t−2 and t−1. The comparison is between firms with 45–49 and 40–44 employees. CAE-year cells require at least 10 valid productivity observations. *** p < 0.01, ** p < 0.05, * p < 0.10.

For employment growth, the interaction between productivity and proximity to the threshold is positive but statistically insignificant at all three horizons. More productive firms do not appear to experience a stronger growth penalty when operating immediately below the threshold. This result does not support the idea that the regulatory margin particularly constrains the employment growth of firms with greater productive capacity.

The results for threshold crossing are different. The interaction is positive and statistically significant at each horizon. The corresponding productivity effects among firms with 45–49 employees are also positive, indicating that more productive firms immediately below the

threshold are more likely to cross it. Together, these results suggest that the positive association between productivity and the probability of reaching at least 50 employees is stronger among firms starting with 45–49 workers than among firms with 40–44 workers. Rather than appearing particularly constrained by the threshold, more productive firms close to 50 are instead more likely to move beyond it. Overall, there is no consistent evidence that productivity intensifies growth avoidance around the threshold.

Table 5.4 reports the corresponding robustness estimates using alternative productivity measures based on value added per hour worked and value added relative to personnel costs. These specifications also control for prior employment changes to reduce concerns about the mechanical link with subsequent employment outcomes.

Table 5.4 Productivity interactions using alternative productivity measures

Outcome	Horizon	VAB per hour (SE)	p-value	VAB per personnel cost (SE)	p-value
Growth	1 year	0.001 (0.012)	0.953	0.028 (0.019)	0.135
Growth	2 years	0.019 (0.017)	0.272	0.078*** (0.027)	0.003
Growth	3 years	0.012 (0.022)	0.569	0.077** (0.032)	0.018
Crossing	1 year	0.041** (0.016)	0.010	0.068*** (0.025)	0.006
Crossing	2 years	0.030 (0.019)	0.116	0.067** (0.030)	0.026
Crossing	3 years	0.032* (0.019)	0.095	0.085*** (0.031)	0.006

Notes: Entries report the interaction between the 45–49 employee indicator and alternative productivity measures. Standard errors are clustered at the firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

These findings are broadly consistent when productivity is alternatively measured using value added per hour worked or value added relative to personnel costs, while also controlling for prior employment changes. The positive association with threshold crossing remains evident, although estimates based on value added per hour become less precise at two- and three-year horizons. This reduces concerns that the baseline results are driven by a mechanical use of employment in the denominator of the productivity measure.

Taken together, the main specifications provide limited support for H2. Local growth contrasts do not reveal a systematic slowdown in employment growth immediately before the 50-employee threshold, while crossing probabilities show no consistent reduction across

horizons once multiple testing is considered. Productivity does not appear to strengthen a growth penalty near 50 and is instead associated with a higher probability of crossing among firms closest to the threshold. The results therefore do not indicate a generalised barrier to expansion immediately below 50 employees. The broader pre-threshold analyses reported in Section 5.5 nevertheless provide some evidence of weaker medium-term growth among firms in the 45–49 employee range, although the magnitude of this pattern is sensitive to the specification.

5.3. Sectoral Heterogeneity Findings

The third hypothesis (H3) examines whether the patterns around the 50-employee threshold differ across sectors. Sectoral characteristics may affect both firms' exposure to size-dependent requirements and their ability to adjust employment as they expand. The analysis focuses primarily on the comparison between industry and services, while the broader four-sector classification is used as a complementary check. Figure 5.5 shows how bunching around the 50-employee threshold differs between industry and services.

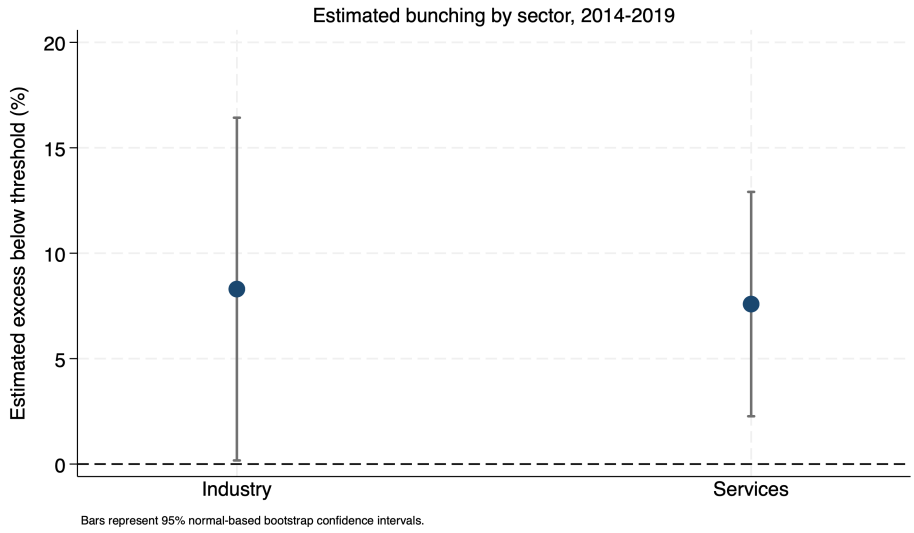


Figure 5.5 Estimated bunching around the 50-employee threshold by sector, 2014–2019

Bunching is positive and statistically significant in both industry (8.30%) and services (7.59%), while the estimated difference between them is only 0.71 percentage points and is not statistically significant ($p = 0.886$). The pattern thus appears in both sectors, with no evidence that its magnitude differs systematically between industry and services, either in the baseline period or in 2020–2024 and 2014–2024.

Sectoral differences in subsequent employment growth are assessed in Figure 5.6, using the same 45–49 versus 40–44 worker comparison as in the main H2 specification.

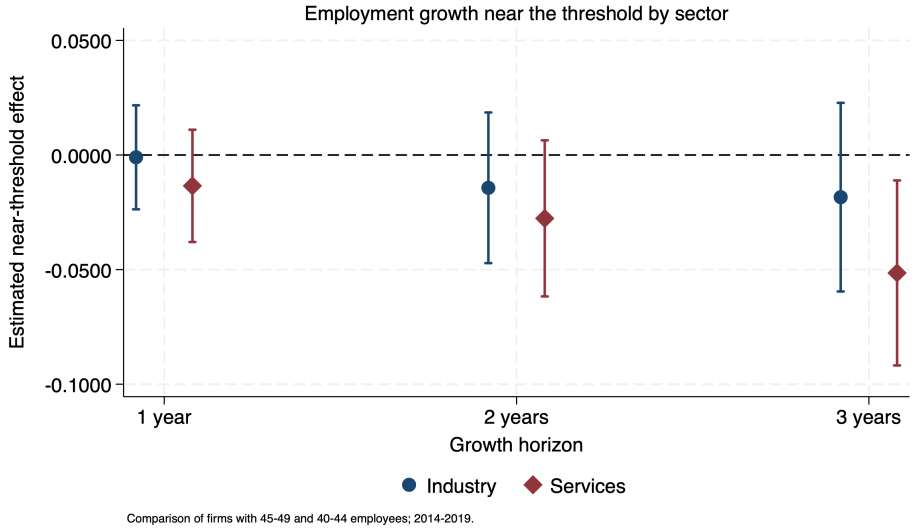


Figure 5.6 Employment growth near the 50-employee threshold by sector

The estimated near-threshold growth effects are negative in both sectors at most horizons, and consistently more negative in services. The estimates for industry and services are, respectively, close to zero and −1.35 percentage points at one year, −1.43 and −2.76 at two years, and −1.84 and −5.14 at three years. The services estimate becomes statistically significant only at the three-year horizon. However, the formal industry–services differences are not statistically significant at the 5% level at any horizon. The largest difference occurs at three years, when the services effect is 3.31 percentage points more negative than the industry effect, with a p-value of 0.072. The results therefore suggest some evidence of weaker longer-term growth near the threshold in services, but do not establish a statistically robust difference between the two sectors.

Figure 5.7 and Table 5.5 examine the same sectoral comparison using the probability of reaching at least 50 employees. Near-threshold crossing effects are small in both sectors. They are slightly positive in industry at all three horizons and approximately zero or negative in services. Neither pattern indicates a systematic reduction, and the formal differences between industry and services are statistically insignificant at all horizons.

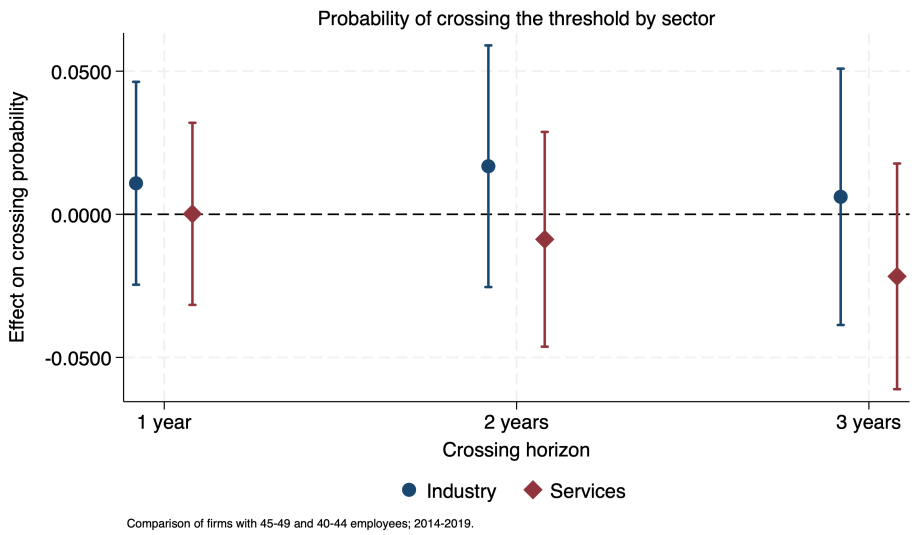


Figure 5.7 Threshold-crossing probabilities by sector

Table 5.5 Sectoral differences around the threshold

Panel A. Bunching and employment growth

Outcome	Horizon	Contrast	Estimate (SE)	p-value	N / firms
Bunching	—	Industry − services	0.711 (4.957)	0.886	42,027 / 12,208
Growth	1 year	Services − industry	−1.247 (1.021)	0.222	11,071 / 5,020
Growth	2 years	Services − industry	−1.333 (1.486)	0.370	10,832 / 4,895
Growth	3 years	Services − industry	−3.306 (1.840)	0.072	10,616 / 4,783

Panel B. Threshold crossing

Outcome	Horizon	Contrast	Estimate (SE)	p-value	N / firms
Crossing	1 year	Services − industry	−1.068 (1.585)	0.500	11,071 / 5,020
Crossing	2 years	Services − industry	−2.553 (1.940)	0.188	10,832 / 4,895
Crossing	3 years	Services − industry	−2.779 (2.060)	0.177	10,616 / 4,783

Notes: Industry comprises CAE Rev.3 Sections B–E and services comprise Sections G–S, subject to the baseline sector exclusions. Growth and crossing models compare firms with 45–49 and 40–44 employees; bunching inference uses firm-clustered bootstrap standard errors.

Sectoral heterogeneity in the role of productivity provides a similar picture. For employment growth, the near-threshold × productivity interaction is positive in both sectors but insignificant at the 5% level at any horizon. For threshold crossing, it is positive and statistically significant in services at all three horizons and in industry at the three-year

horizon. However, the differences in the productivity interaction between industry and services are statistically insignificant at every horizon. The sectoral results do not indicate that productivity generates substantially different threshold responses across the two sectors. The corresponding sector-specific productivity estimates are reported in the Appendix.

Overall, the results point to only modest sectoral heterogeneity around the 50-employee threshold. Bunching is present in both industry and services and remains similar across periods, while services show somewhat weaker long-term growth near the threshold. Crossing patterns and the role of productivity also show some differences in magnitude across sectors. However, the industry–services contrasts are not statistically significant at the 5% level across the main outcomes. The evidence therefore suggests that the patterns associated with the 50-employee threshold are not confined to a single broad sector, while providing limited evidence of systematic sectoral heterogeneity in their magnitude.

As a complementary check, the four-sector classification produces broadly similar results but also reveals some sector-specific variation. Bunching is positive in all four sectors, although the primary-sector estimate is imprecise. Employment-growth estimates are generally statistically insignificant, except for negative services estimates at the two- and three-year horizons. For threshold crossing, construction shows negative estimates at the one- and two-year horizons, while the remaining sector-specific estimates are not statistically significant. These results suggest some sectoral variation in magnitude, but do not provide evidence of a systematic sector-wide pattern of adjustment around the threshold.

5.4. Regulatory Exposure Findings

The preceding analyses treat the 50-employee threshold as a change in the combined regulatory environment. However, the provisions described in Chapter 3 do not apply uniformly to every firm reaching 50 employees. Some depend directly on employment, while others also require financial, sectoral or legal conditions to be satisfied. Accordingly, this section refines the analysis by distinguishing different components of potential regulatory exposure and by examining whether firms for which the employment criterion is more likely to be relevant display different patterns around the threshold.

Figure 5.8 illustrates how potential regulatory exposure varies with firm employment between 40 and 60 workers. The measure represents a lower-bound count of regulatory

components that can be approximated using the information available in SABI and should not be interpreted as the number of obligations actually incurred by each firm.

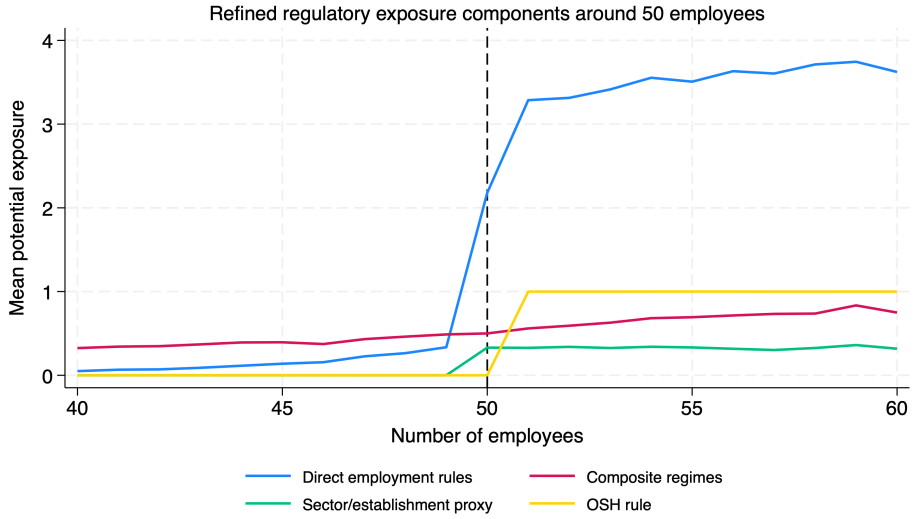


Figure 5.8 Composition of potential regulatory exposure by firm size

The figure shows a pronounced increase in observable regulatory exposure around the 50-employee threshold. Direct employment-based requirements account for the largest discrete increase at 50 employees, while the occupational-safety component changes above 50. By contrast, exposure to composite regimes increases more gradually because employment is only one of several applicability criteria. Sector- and establishment-related exposure is also more limited, reflecting both its narrower scope and the fact that establishment-level conditions cannot be fully identified in SABI. Overall, the figure shows that reaching 50 employees is associated with a substantial change in potential regulatory exposure, while also illustrating why firms at the same employment level may face different combinations of regulatory requirements.

The composite regimes provide a more demanding test of the relevance of the employment threshold because reaching 50 employees is not sufficient, by itself, to change the applicable regime. For both the statutory-audit requirements and the NCRF-PE classification, financial criteria determine whether employment can become decisive. Firms are therefore divided according to their position relative to those financial thresholds, independently of their employment level. Figure 5.9 examines the statutory-audit exposure around the threshold.

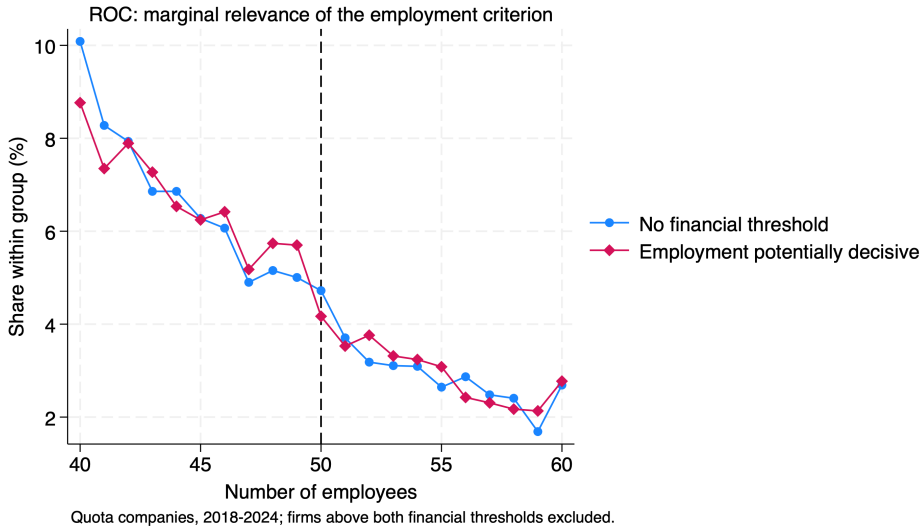


Figure 5.9 Employment criterion and statutory-audit exposure around 50 employees

For the statutory-audit regime, the firm-size distribution declines with employment, with no clear concentration at 49 employees among firms for which employment is potentially decisive. For firms satisfying one versus no financial thresholds, the estimated difference at 49 employees is 0.69 percentage points and is not statistically significant (p=0.182).

Figure 5.10 presents the corresponding pattern for NCRF-PE.

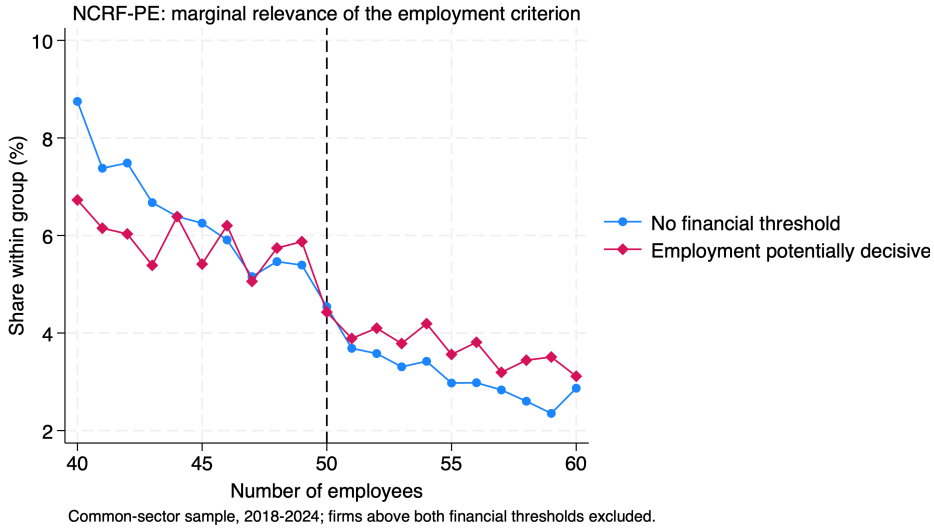


Figure 5.10 Employment criterion and NCRF-PE exposure around 50 employees

For NCRF-PE, firms satisfying one financial threshold do not show a significantly greater concentration at 49 employees than firms satisfying none (0.45 percentage points; p=0.278).

However, the two-versus-zero contrast is significant in the 47–49 versus 50–52 comparison. Overall, the evidence for stronger bunching under NCRF-PE is mixed.

The models compare firms exposed to at least one composite regime with those with no identified exposure, controlling for initial employment, year and two-digit CAE effects.

Table 5.6 reports the corresponding growth and crossing estimates.

Table 5.6 Composite regulatory exposure, employment growth and threshold crossing

Outcome	Horizon	Estimate (SE)	p-value	N / firms
Growth	1 year	1.840*** (0.415)	<0.001	22,055 / 7,806
Growth	2 years	3.292*** (0.714)	<0.001	17,705 / 6,816
Growth	3 years	5.418*** (1.000)	<0.001	13,613 / 5,892
Crossing	1 year	−0.472 (0.817)	0.563	13,580 / 5,963
Crossing	2 years	2.341** (1.146)	0.041	10,909 / 5,138
Crossing	3 years	4.922*** (1.461)	0.001	8,394 / 4,332

Notes: Exposure compares firms with and without identified composite regulatory exposure. Growth uses the symmetric employment-growth rate and a 40–60 employment window. Crossing uses firms initially employing 40–49 workers. The period is 2018–2024. Models include exact initial employment, year and two-digit CAE fixed effects. Estimates are expressed in percentage points. *** p < 0.01, ** p < 0.05, * p < 0.10.

Figures 5.11 and 5.12 complement Table 5.6 by illustrating the relationship between composite regulatory exposure and subsequent employment growth and threshold crossing.

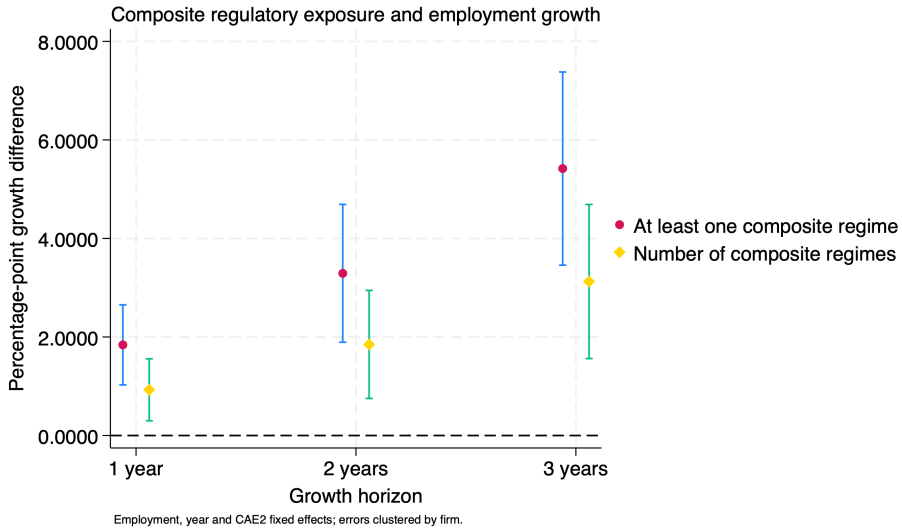


Figure 5.11 Composite regulatory exposure: employment growth

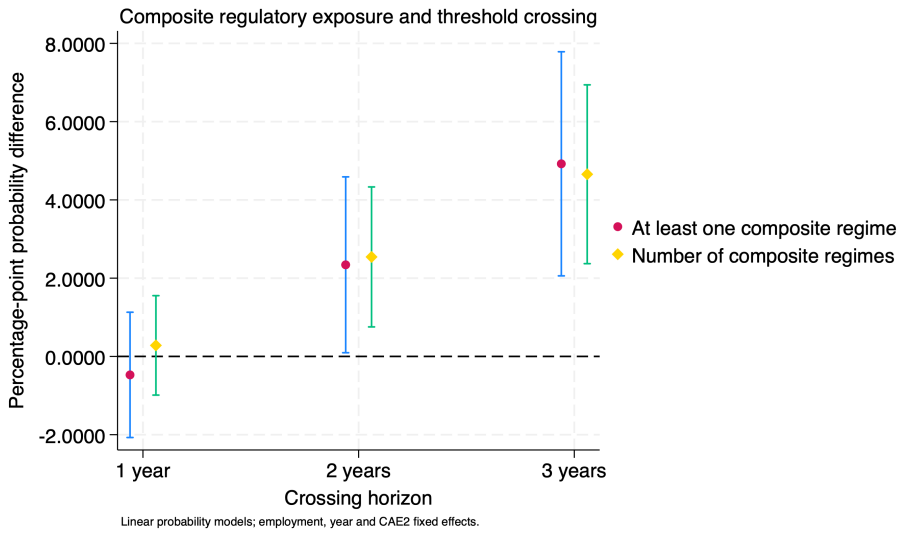


Figure 5.12 Composite regulatory exposure: threshold crossing

The results do not indicate weaker employment growth among firms with identified composite regulatory exposure. An alternative specification based on the number of composite regimes produces the same qualitative pattern. The estimated associations are positive at all three horizons and increase with the length of the horizon, from 1.84 percentage points after one year to 5.42 percentage points after three years.

The crossing estimates also provide no evidence that composite exposure reduces firms' probability of moving beyond the threshold. The one-year estimate is small and statistically insignificant, while the associations become positive and statistically significant at the two- and three-year horizons. Firms with at least one identified composite exposure are estimated to be 2.34 percentage points more likely to reach 50 employees within two years and 4.92 percentage points more likely within three years.

These positive associations should not be interpreted as evidence that regulatory exposure promotes firm growth. Exposure to the composite regimes is partly determined by firms' financial characteristics, meaning that firms classified as exposed may already be larger, financially stronger or better positioned to expand. The positive coefficients are thus consistent with positive selection into composite exposure rather than a beneficial causal effect of regulation. More importantly for the purpose of this extension, the results provide no evidence that firms with greater observable exposure systematically restrain employment growth or become less likely to cross the 50-employee threshold.

Taken together, the regulatory-exposure extension reinforces the interpretation of the preceding results. Potential regulatory exposure increases markedly around 50 employees, confirming that the threshold represents a meaningful change in the observable regulatory environment. However, the regime-specific bunching results are not uniform, and greater composite exposure is not associated with weaker subsequent growth or a lower probability of crossing the threshold. The evidence therefore suggests that the existence of a discrete increase in regulatory exposure does not translate into a correspondingly clear pattern of growth avoidance among the firms identified as more exposed.

5.5. Additional Robustness Findings

The preceding sections report the main specifications for firm-size distribution, employment growth, threshold crossing, sectoral heterogeneity and regulatory exposure. A set of additional exercises assesses whether the main conclusions depend on particular choices concerning the employment measure, estimation window, functional form, productivity measure or sample period. This section summarises the most informative robustness results.

Table 5.7 summarises the main robustness checks for the bunching estimates.

Table 5.7 Robustness of the bunching estimate

Specification	Period	Estimate (SE)	p-value	N / firms
Baseline	2014–2019	9.006*** (2.042)	<0.001	47,930 / 14,371
Window 35–65	2014–2019	9.787*** (2.440)	<0.001	33,278 / 10,815
Quadratic polynomial	2014–2019	7.253*** (2.208)	0.001	47,930 / 14,371
Quartic polynomial	2014–2019	7.686*** (2.385)	0.001	47,930 / 14,371
Average persons engaged	2014–2019	9.710*** (2.093)	<0.001	46,630 / 13,828

Notes: Estimates report excess mass below the 50-employee threshold relative to the estimated counterfactual distribution. Unless otherwise indicated, specifications use the 2014–2019 period and end-of-year employment. p-values are based on firm-clustered bootstrap standard errors. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

The bunching estimate remains positive across the main alternative specifications. The 35–65 window produces an estimate of 9.79%, close to the 9.01% baseline. Quadratic and quartic specifications yield estimates of 7.25% and 7.69%, respectively, while average persons engaged produces an estimate of 9.71%. Overall, the excess mass below 50 is not driven by

a single employment measure, polynomial order or estimation window. Figure 5.13 compares the main and placebo bunching estimates.

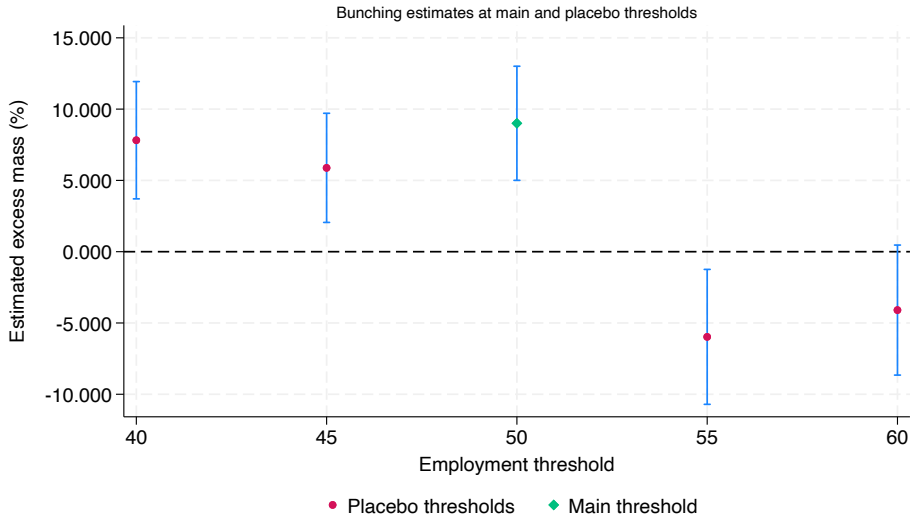


Figure 5.13 Comparison of bunching estimates at the main and placebo thresholds

The placebo exercises provide a stricter assessment of the specificity of the bunching pattern at 50 employees. Under the mass-matching procedure used in the baseline specification, excess mass is also positive at the lower placebo thresholds of 40 and 45 employees, reaching 7.82% and 5.88%, respectively, compared with 9.01% at 50. In particular, the sizeable estimate at 40 employees, where no comparable regulatory threshold is identified, weakens the interpretation of the baseline estimate as a pattern specific to the 50-employee threshold. By contrast, the corresponding estimates at 55 and 60 employees are negative.

To assess whether these placebo results depend on the mass-matching procedure, the exercise was repeated using the fixed and narrow excluded region employed in the earlier specification. Under this common treatment of the counterfactual, the estimate at 40 becomes negative (−3.67%), while the estimate at 45 is smaller and only marginally significant (3.92%, p=0.069). The estimate at 50 is 10.53% and remains clearly larger than the positive placebo estimate at 45, whereas the estimates at 55 and 60 are negative. These results indicate that the strong positive placebo at 40 is sensitive to the way the excluded region is selected, although the mass-matching placebos still warrant caution when interpreting the bunching at 50 as uniquely threshold-specific.

The absence of a sharp 45–49 growth discontinuity does not rule out the possibility that firms begin adjusting before reaching the threshold. Firms with 45–49 employees are tested

for an additional deviation from the underlying size-growth profile, with placebo ranges farther below 50 used for comparison.

Figure 5.14 reports the corresponding pre-threshold growth deviations.

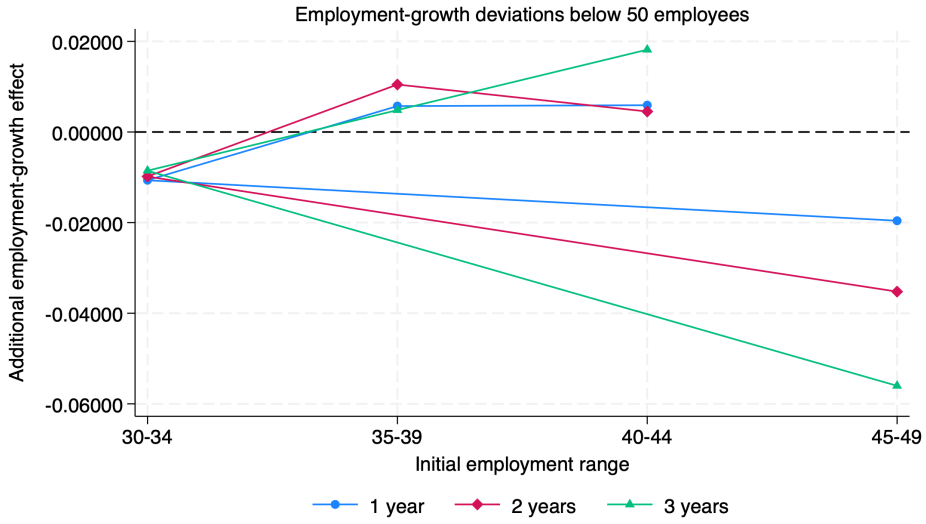


Figure 5.14 Employment-growth deviations across pre-threshold employment ranges

The results provide evidence of weaker subsequent growth among firms immediately below the threshold, particularly at longer horizons. Conditional on the underlying size-growth profile, firms with 45–49 employees exhibit an additional growth difference of −1.96, −3.52 and −5.60 percentage points after one, two and three years, respectively. The one-year estimate is only marginally significant ($p=0.084$), whereas the two- and three-year estimates are statistically significant. Placebo ranges do not show the same pattern. The 30–34 estimate is negative across all three horizons, but statistically significant only at one year, while estimates for 35–39 employees are positive and insignificant. This distinctive feature of the 45–49 range is therefore not simply the presence of an isolated negative coefficient, but the increasingly negative and stronger pattern as the horizon extends.

The result is preserved across alternative specifications: the three-year slowdown remains negative and statistically significant under a wider 15–49 employment range, a quadratic size profile, log-difference growth and productivity measured only at t−1. Further robustness checks assess whether the pre-threshold slowdown depends on the boundary treatment or the local functional form. The 35–39 boundary placebo does not display the same increasingly negative pattern observed for firms immediately below the threshold, truncating the fitted size profile at 44 employees does not overturn the weaker subsequent growth

observed among firms with 45–49 employees, and local-linear estimates also become more negative as the horizon increases and are statistically significant at longer horizons. These exercises indicate that the medium-term slowdown near 50 employees is not driven solely by the boundary treatment or the baseline functional form. The boundary placebo and local-linear estimates are reported in Table A.4.

A complementary within-firm exercise provides directionally consistent evidence. Among firms observed both below 45 employees and within the 45–49 range, the estimated growth difference becomes more negative as the horizon increases, although the baseline firm-fixed-effects estimates are not statistically significant.

Sample retention provides an additional robustness consideration at longer horizons. At the three-year horizon, attrition is higher among firms starting at 50 employees than among those starting at 49, with a difference of 3.96 percentage points ($p < 0.001$).

Extending the crossing analysis to firms initially employing 35–49 workers does not reveal a systematic decline in the probability of reaching 50 employees. Even though some adjacent employment increments flatten at particular horizons, the pattern is not consistent across the range. This suggests that adjustment may take the form of weaker medium-term growth among some firms close to the threshold rather than a generalised avoidance.

Sectoral and regulatory robustness checks lead to similar conclusions. Using the broader four-sector classification and alternative local specifications changes the magnitude of some estimates but does not reveal consistently different responses across sectors, while alternative regulatory-exposure measures provide no systematic evidence of weaker growth or crossing among more exposed firms. These exercises reinforce the interpretation that the main findings are not driven by a particular sectoral classification or exposure measure.

To conclude, the robustness exercises support a more balanced interpretation of firms' expansion near 50 employees. The main local comparisons do not reveal consistent growth or crossing discontinuities, while more productive firms remain more likely to cross. However, broader specifications indicate unusually weak medium-term growth among firms with 45–49 employees, without a generalised decline in the probability of reaching 50. Overall, the results are better aligned with gradual and heterogeneous adjustment near the threshold than with a uniform barrier to crossing it.

6. Conclusion

This dissertation studied the relationship between the regulatory environment surrounding the 50-employee threshold, firm-size concentration and subsequent growth in Portugal. Using firm-level data from SABI, the analysis combined evidence on the distribution of firms by exact employment size with subsequent employment growth, threshold crossing and productivity. The main period was 2014–2019, while the later years were considered separately due to pandemic-related disruptions and regulatory changes.

The results provide evidence of a persistent concentration of firms immediately below 50 employees and a lower mass above the threshold. Excess mass remains positive across alternative specifications, employment measures and estimation windows, although positive excess concentration is also observed at lower placebo thresholds. This is consistent with a change in potential regulatory exposure around 50 employees. However, the distributional evidence alone does not establish that firms actively avoid the threshold, since firm-size patterns may also reflect differences in productivity, sector and other characteristics.

The employment-growth results are more mixed. Main local comparisons do not reveal a statistically robust reduction in growth or in the probability of crossing among firms immediately below 50 employees. Crossing probabilities generally increase with initial employment and do not suggest a systematic decline as firms approach the threshold. Nevertheless, broader specifications that flexibly control for the underlying relationship between initial size and growth indicate weaker subsequent growth among firms with 45–49 employees, particularly over two- and three-year horizons. This effect remains negative across several alternative specifications, while placebo ranges do not show the same increasing medium-term pattern. The evidence therefore suggests that firms do not respond uniformly as they approach the threshold.

Productivity further qualifies this interpretation. More productive firms generally grow faster and are more likely to cross. There is no robust evidence that productivity intensifies the weaker growth observed near 50 employees; instead, more productive firms close to the threshold are more likely to cross it. The concentration below 50 therefore does not appear to reflect a uniform constraint on firms with stronger productive capacity.

The sectoral analysis finds only modest heterogeneity. Near-threshold growth effects are generally more negative in services than in industry at longer horizons, but formal sector

differences are not statistically significant. Sectoral conditions may influence the timing and intensity of firms' responses, but the results are not confined to a single sector.

The regulatory-exposure extension confirms that potential exposure increases around 50 employees, while showing that the applicable regime differs across firms because some provisions also depend on financial, legal or persistence criteria. Firms identified as potentially exposed to composite regimes do not display weaker subsequent growth or a lower probability of crossing. Positive associations in some specifications should not be interpreted as evidence that regulation promotes growth, since firms classified as more exposed may already be financially stronger and better positioned to expand, reflecting positive selection. Overall, the increase in potential regulatory exposure does not translate into a clear and universal pattern of growth avoidance.

This study is subject to limitations. The initial extraction excludes firms that remained below 10 employees throughout 2014–2024, annual information is not available for all firms and variables, and the employment measures do not reproduce every legal definition exactly. Several provisions also depend on establishment-level conditions, legal events or compliance decisions that cannot properly be observed in SABI. The analysis consequently identifies associations with the combined regulatory environment rather than the causal effect of any individual rule, and the results should not be interpreted as implying that all firms crossing 50 employees face the same costs.

Future research could combine firm-level accounts with administrative employment records and direct measures of regulatory compliance. This would help distinguish anticipation before the threshold, adjustment after crossing and selection into different regulatory regimes, while identifying which provisions matter most and whether their effects vary with productivity, ownership and financial conditions. Despite these limitations, the dissertation shows that the 50-employee threshold is associated with a meaningful change in the observable regulatory environment and a persistent concentration of firms below it, while its effects on firm growth are selective, gradual and heterogeneous. More productive firms are generally more likely to grow and cross the threshold, suggesting that productivity may help firms overcome potential expansion barriers. This highlights the relevance of firm productivity for firms' ability to expand in Portugal, particularly near the 50-employee threshold, where more productive firms are generally more likely to cross it despite the potential presence of size-dependent regulatory constraints.

Appendix

Table A.1 Annual sample coverage and availability of key variables, 2014–2024

Panel A. Main period, 2014–2019

Measure	2014	2015	2016	2017	2018	2019
Employment observed	62,574	64,932	67,100	68,819	70,239	72,003
10–249 employees	37,156	39,075	40,815	42,690	44,770	47,050
40–60 window	3,093	3,211	3,484	3,750	3,882	4,003
Valid 1-year growth	35,743	37,769	39,376	41,098	43,245	45,596
Valid 2-year growth	34,883	36,778	38,362	40,304	42,485	44,812
Valid 3-year growth	33,993	35,917	37,577	39,605	41,696	43,791
Baseline productivity	—	—	29,633	31,357	32,925	34,580

Panel B. Later period, 2020–2024

Measure	2020	2021	2022	2023	2024
Employment observed	72,882	73,592	73,539	72,288	69,769
10–249 employees	46,494	47,648	50,149	51,389	52,064
40–60 window	3,962	4,065	4,385	4,517	4,524
Valid 1-year growth	45,121	45,995	47,818	48,499	—
Valid 2-year growth	44,099	44,594	46,001	—	—
Valid 3-year growth	42,738	42,908	—	—	—
Baseline productivity	35,751	36,890	37,595	38,515	39,579

Notes: The panel contains 87,685 firms observed over the 2014–2024 period. Dashes indicate variables that are structurally unavailable because the required lead or lag years fall outside the observation period.

Additional pre-threshold growth tests

Table A.2 Growth slowdown among firms with 45–49 employees

Specification	1 year	2 years	3 years
Baseline: 25–49, cubic profile	−1.958* (1.133)	−3.523** (1.555)	−5.603*** (1.908)
Wider window: 15–49	−0.769 (1.007)	−2.138 (1.418)	−4.153** (1.725)
Quadratic profile	−1.181 (0.951)	−2.986** (1.340)	−4.694*** (1.618)
Log-difference growth	−1.746 (1.321)	−2.363 (1.811)	−6.204*** (2.275)
Productivity at t−1	−1.063 (1.034)	−2.047 (1.444)	−3.866** (1.750)

Panel B. Within-firm growth differences in the 45–49 range

Specification	1 year	2 years	3 years
Symmetric growth	−0.253 (1.349)	−1.134 (1.445)	−2.268 (1.497)
Log-difference growth	0.239 (1.352)	−2.154 (1.691)	−3.544* (1.972)
Productivity at t−1	−0.512 (1.062)	−0.434 (1.255)	−2.707** (1.272)

Panel C. Adjacent threshold-crossing increments near 50

Initial-employment increment	1 year	2 years	3 years
45→46	6.195*** (2.123)	3.781* (2.260)	2.893 (2.348)
46→47	7.753*** (2.402)	13.545*** (2.546)	8.138*** (2.546)
47→48	0.772 (2.564)	−1.729 (2.743)	5.680** (2.762)
48→49	9.254*** (2.588)	5.650** (2.736)	0.865 (2.743)

Notes: Panels A and B report employment-growth differences ×100. Panel A gives the additional effect for firms with 45–49 employees; Panel B firm-fixed-effects estimates. Panel C reports adjacent changes in crossing probability. All models use 2014–2019 and cluster standard errors by firm.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table A.3 Differential attrition around the 50-employee threshold

Horizon	50 − 49 attrition difference (SE)	p-value
1 year	0.86 (0.67)	0.200
2 years	2.22** (1.02)	0.030
3 years	3.96*** (1.19)	<0.001

Notes: Attrition difference between firms starting at 50 and 49 employees, in percentage points; clustered standard errors. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table A.4 Boundary and local robustness of pre-threshold employment growth

Specification	Horizon	Estimate	SE	p-value	N / firms
Boundary placebo: 35–39	1 year	0.021**	0.009	0.020	62,356 / 22,711
	2 years	0.017	0.013	0.180	61,415 / 22,442
	3 years	0.015	0.015	0.317	60,496 / 22,044
Local-linear: 35–49	1 year	−0.006	0.009	0.534	13,495 / 6,134
	2 years	−0.020	0.012	0.105	13,273 / 6,035
	3 years	−0.037**	0.015	0.015	13,051 / 5,916
Local-linear: 40–49	1 year	−0.025**	0.012	0.047	7,985 / 4,183
	2 years	−0.048***	0.017	0.005	7,859 / 4,114
	3 years	−0.068***	0.021	0.001	7,718 / 4,024

Notes: The boundary placebo tests the 35–39 range using a cubic profile estimated over 15–39 employees. Local-linear specifications use the indicated employment windows. Estimates are reported in decimal form. Standard errors are clustered at the firm level. *** p < 0.01, ** p < 0.05, * p < 0.10.

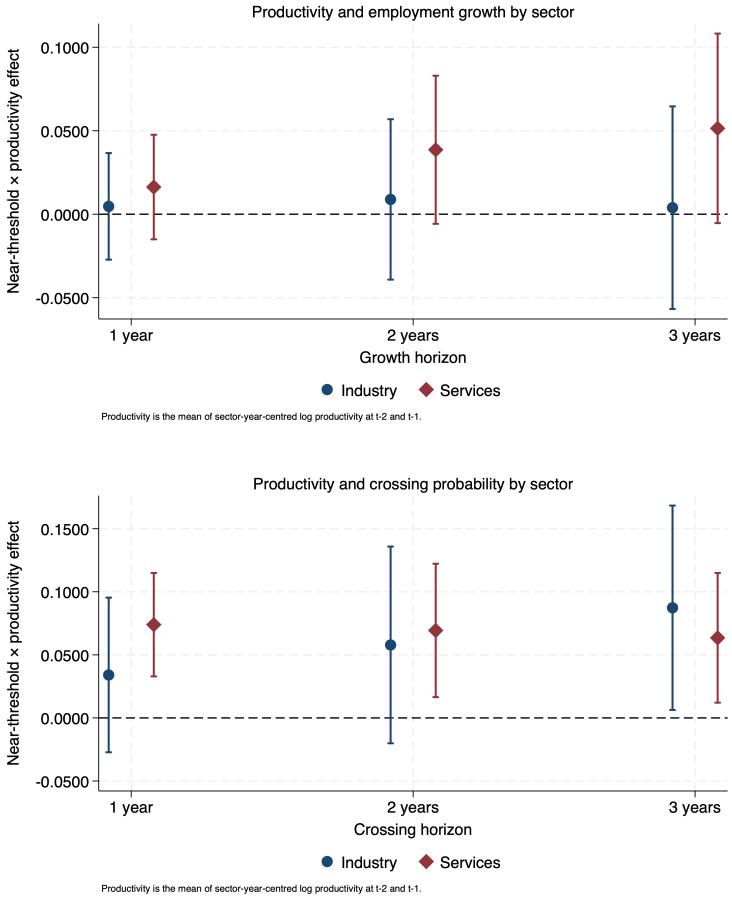


Figure A.1 Productivity and firm expansion near the 50-employee threshold by sector

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Annex

Regulatory Framework

A.1. Classification rules

R1. Labour-law classification by firm size

Legal basis: Labour Code, Article 100.

Rule: Firms are classified as small when they employ 10–49 employees, as medium-sized when they employ 50–249, and as large when they employ 250 or more employees. No financial criterion applies.

Measurement and empirical relevance: Classification is based on average employment in the preceding calendar year. Average annual employment is therefore the preferred measure, although year-end employment may be used as an approximation.

R2. Statutory-audit test

Legal basis: Commercial Companies Code, Article 262(2)–(3).

Rule: Eligible private limited companies must appoint a statutory auditor when they exceed at least two of three limits for two consecutive financial years: balance-sheet total above €1.5 million, net sales and other income above €3 million, and average employment above 50.

Measurement and empirical relevance: The test can be approximated using employment, total assets, sales and other income, and legal form. Crossing 50 alone is insufficient, and supervisory-board status, actual auditor appointment and audit costs may not be fully observed.

R3. Small-entity classification and NCRF-PE eligibility, 2014–2015

Legal basis: Decree-Law 158/2009, Article 9, as amended by Law 20/2010.

Rule: The relevant limits were a balance-sheet total of €1.5 million, sales and other income of €3 million, and average employment of 50. Eligibility depended on not exceeding at least two of the three limits, subject to the temporal rules applicable under the regime then in force. Entities subject to statutory audit were excluded from NCRF-PE eligibility.

Measurement and empirical relevance: Employment was measured as an annual average. The classification can be approximated using employment, assets, income and legal form, although statutory-audit status may be incomplete.

R4. Small-entity classification and NCRF-PE eligibility, 2016–2024

Legal basis: Decree-Law 158/2009, Articles 9, 9-A and 9-C, as amended by Decree-Law 98/2015.

Rule: The relevant limits are a balance-sheet total of €4 million, net turnover of €8 million, and average employment of 50. Exceeding at least two of the three limits for two consecutive reporting periods results in the loss of small-entity status from the third reporting period.

Measurement and empirical relevance: The test can be approximated using employment, assets and turnover. Crossing 50 alone is insufficient, and the two-period persistence condition must be considered.

R5. Small-enterprise classification under the SME Statute

Legal basis: Decree-Law 372/2007, Annex, Articles 2–6.

Rule: A small enterprise employs fewer than 50 annual work units and has either turnover or a balance-sheet total not exceeding €10 million. Ownership links may also affect the classification.

Measurement and empirical relevance: Employment is measured in annual work units rather than year-end headcount. Average employment can be used as an approximation, but SABI may not contain enough information on linked and partner enterprises to reproduce official SME certification.

R6. Size classification under the Legal Framework for Economic Offences

Legal basis: Decree-Law 9/2021, Annex, Articles 18–19.

Rule: Legal persons are classified as small with 10–49 employees and medium-sized with 50–249. The classification determines the applicable fine ranges when a covered economic offence occurs.

Measurement and empirical relevance: Employment is measured on 31 December of the calendar year preceding the date on which the offence is recorded by the competent authority. Year-end employment closely approximates this concept, but SABI does not observe offences, proceedings or fines.

A.2. Labour and workplace consequences

C1. Reduction in the annual overtime limit

Legal basis: Labour Code, Article 228.

Trigger and content: On entering the medium-sized category, the standard annual overtime limit falls from 175 to 150 hours per employee. Collective regulation instruments may increase it to 200 hours.

Relevance: The change may reduce short-run labour flexibility. Overtime and collective regulation instruments are not observed in SABI.

C2. Change in the collective-redundancy threshold

Legal basis: Labour Code, Article 359.

Trigger and content: The minimum number of dismissals within three months triggering the collective-redundancy procedure rises from two in micro and small firms to five in medium-sized and large firms.

Relevance: This change may increase employment-adjustment flexibility after the threshold. Dismissal events are not observed in SABI.

C3. Increase in the maximum number of works-council members

Legal basis: Labour Code, Article 417.

Trigger and content: In a medium-sized firm with a works council, the maximum number of members rises from two to three.

Relevance: This is a conditional organisational consequence because it only applies where a works council exists, which is not identified in SABI.

C4. Increase in the maximum number of works-subcommittee members

Legal basis: Labour Code, Article 417.

Trigger and content: In establishments with 50–200 employees, the maximum number of works-subcommittee members may rise from one to three.

Relevance: The provision is conditional and applies at the establishment level. SABI does not observe establishment employment or the existence of subcommittees.

C5. Loss of a specific ground for refusing unpaid education or training leave

Legal basis: Labour Code, Article 317.

Trigger and content: A specific ground for refusal available to micro and small firms ceases to apply when the employer becomes medium-sized.

Relevance: The provision may reduce employer discretion but only matters when an eligible employee submits a request. Such requests and decisions are not observed.

C6. Information and consultation rights of trade-union representatives

Legal basis: Labour Code, Article 466.

Trigger and content: Additional information and consultation duties apply in medium-sized and large firms where a trade-union representative exists.

Relevance: The consequence is conditional on union representation, which is not observed in SABI.

C7. Automatic notification to ACT following a business transfer

Legal basis: Labour Code, Article 285(8)–(9), as amended by Law 14/2018.

Trigger and content: For medium-sized and large firms, notification to the Authority for Working Conditions becomes automatic when a firm or establishment is transferred. For smaller firms, notification occurs at ACT's request.

Relevance: The additional procedure only arises when a transfer occurs, which is not identified in SABI. The provision applies since 20 March 2018.

C8. Increase in the minimum number of occupational-safety technicians

Legal basis: Law 102/2009, Article 101.

Trigger and content: Establishments with up to 50 employees require one technician. Above 50, the requirement becomes two technicians per 1,500 employees in industrial establishments or per 3,000 in other establishments, including at least one senior technician.

Relevance: The effective change occurs from 50 to 51 employees and may create a discrete compliance cost. SABI does not observe employment or technicians at the establishment level.

C9. Canteen requirement in industrial establishments

Legal basis: Ministerial Order 53/71, Article 141.

Trigger and content: Industrial establishments with at least 50 employees must provide suitable premises and equipment for a canteen.

Relevance: The requirement may create facilities and operating costs. Sector and employment approximate exposure, but existing facilities and establishment-level employment are not observed.

A.3. Reporting, compliance, sanctions and support consequences

C10. Increase in Social Security fine limits

Legal basis: Contributory Code, Article 233.

Trigger and content: Fine limits are increased by 50% in the lower employment bracket and by 100% for legal persons with 50 or more employees.

Relevance: The rule increases the expected cost of non-compliance but only matters when an offence occurs. Offences and fines are not observed in SABI.

C11. Mandatory appointment of a statutory auditor

Legal basis: Commercial Companies Code, Article 262.

Trigger and content: The requirement applies when the composite test described in R2 is satisfied. Employment above 50 is only one of three criteria.

Relevance: Statutory audit may create accounting, reporting and administrative costs. The test can be approximated, but actual appointments and audit fees may not be observed.

C12. Loss of eligibility for the NCRF-PE

Legal basis: Decree-Law 158/2009 and Decree-Law 98/2015.

Trigger and content: The consequence arises when the entity leaves the small-entity category under the test described in R3 or R4.

Relevance: The entity may have to apply a more demanding accounting framework. The category can be approximated, but the accounting framework actually used may not be directly identified.

C13. Changes in public-support conditions associated with SME classification

Legal basis: Decree-Law 372/2007 and programme-specific rules.

Trigger and content: Reaching 50 annual work units means that the firm no longer satisfies the employment condition for classification as a small-enterprise, although its final classification also depends on the remaining SME criteria.

Relevance: Some programmes may distinguish between small and medium-sized firms in eligibility, aid intensity or financing conditions. SABI does not observe applications, approvals or support received.

C14. Pay-difference assessment and correction plan

Legal basis: Law 60/2018, Article 5 and 18(3).

Trigger and content: Firms with at least 50 employees may be required to assess pay differences and prepare a correction plan following notification by ACT.

Relevance: The rule may create administrative and adjustment costs but is conditional on notification and identified pay differences. It applies to this employment bracket since 21 February 2021.

C15. Internal reporting channel

Legal basis: Law 93/2021, Articles 8–11.

Trigger and content: Covered entities with at least 50 employees must establish a secure internal reporting channel and follow-up procedures. Entities with 50–249 employees may share resources.

Relevance: The requirement may create implementation and operating costs. SABI can approximate exposure through employment and sector but does not observe the channel or its costs. It applies since 18 June 2022.

C16. Anti-corruption compliance programme

Legal basis: Decree-Law 109-E/2021, Articles 2, 6–9 and 28–29.

Trigger and content: Covered entities with at least 50 employees must adopt a risk-prevention plan, code of conduct, training programme, reporting channel and compliance officer.

Relevance: The regime may create organisational and compliance costs, although some elements overlap with C15. Actual implementation and costs are not observed. The RGPC entered into force in June 2022. The production of effects of Chapter IV, concerning the sanctions regime, is subject to the transitional rule in Article 28, including a specific two-year deferral for private entities already classified as medium-sized at the date of entry into force.

C17. Increase in fine ranges for economic offences

Legal basis: Decree-Law 9/2021, Articles 18–19.

Trigger and content: Fine ranges increase when a legal person enters the medium-sized category and commits a covered economic offence. For example, a serious offence may carry a fine of €4,000–€8,000 for a small firm and €8,000–€16,000 for a medium-sized firm.
Relevance: The rule raises the expected cost of non-compliance but does not create an automatic annual cost. It applies since 28 July 2021.

C18. Mandatory remuneration committee in insurance undertakings

Legal basis: ASF Regulatory Standard 4/2022-R, Article 89, with the applicable production-of-effects rule in Article 121(2).
Trigger and content: Covered insurance and reinsurance undertakings with at least 50 employees must establish a remuneration committee with governance and review responsibilities.
Relevance: This is a sector-specific compliance requirement. Sector and employment identify potential exposure, but the existence and cost of the committee are not observed.

A.4. Methodological notes

The provisions do not use a uniform employment measure. While most labour-law and accounting rules rely on average employment, the SME Statute uses annual work units and the Legal Framework for Economic Offences uses employment on 31 December. SABI therefore provides an approximation of legal exposure where the relevant concept differs from year-end employment. Moreover, several provisions depend on additional financial, sectoral, legal-form or event-specific conditions. Reaching 50 employees does not imply that all listed consequences apply simultaneously or that the associated costs are directly observed. Temporary measures, provisions applying at other employment thresholds and rules based on the number of unionised employees are not included as general consequences of the 50-employee threshold. Accordingly, the indicators constructed from SABI should be interpreted as measures of potential or observable regulatory exposure, rather than as evidence that a particular obligation was effectively triggered or that the associated cost was incurred. Sector-specific provisions are included selectively and should not be interpreted as an exhaustive inventory of all sectoral regulation applicable around this employment level.