What is the Impact of Increased Business Competition? *

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Abstract

This paper studies the macroeconomic effect and underlying firm-level transmission channels of a reduction in business entry costs. We provide novel evidence on the response of firms' entry, exit, and employment decisions. To do so, we use as a natural experiment a reform in Portugal that reduced entry time and costs. Using the staggered implementation of the policy across the Portuguese municipalities, we find that the reform increased local entry and employment by, respectively, 25% and 4.8% per year in the first four years. Importantly, around 60% of the increase in employment came from incumbent firms expanding their size, with most of the rise occurring among the most productive firms. Standard models of entry, exit, and firm dynamics, which assume a constant elasticity of substitution, are inconsistent with these findings. We show that a model with heterogeneous firms and markups, which vary endogenously with a firm's market share and with the mass of operating firms, accounts for our evidence. In this framework, the most productive firms face a lower demand elasticity and increase their employment in response to the rise in entry. Our calibrated model reveals that the change in the level and distribution of markups account for around two thirds of the increase in employment and welfare.

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1 Introduction

Business competition is a fundamental driver of productivity and output growth. Recently however, extensive research has documented a decline in firm entry across advanced economies (Decker et al., 2014; Hathaway and Litan, 2014), and a rise in industry-level concentration (Grullon et al., 2018; Bajgar et al., 2019). While the causes of the two phenomena are unsettled, there is an increased interest in understanding the macroeconomic implications of policies aimed at increasing entry and competition.

However, there is limited empirical evidence regarding the effects of higher business competition. This is due to important identification challenges. Competition reforms are often implemented in response to poor economic performance. In addition, firm entry, hiring, and investment decisions are endogenous in nature and depend on the state of the economy (Lee and Mukoyama, 2008; Bilbiie et al., 2012). So it is hard to distinguish between the dynamics triggered by the policy and other macroeconomic forces affecting the economy. For this reason, the literature has mostly relied on model-based predictions.

This paper makes both an empirical and a theoretical contribution to this question. To empirically study the effects of an increase in entry and business competition, we use as a natural experiment a reform that was implemented in Portugal starting in 2005. The reform reduced the bureaucratic and monetary costs required to start a business, drastically decreasing entry costs for firms. To identify the causal response to the reform, we exploit its staggered implementation over time across municipalities, which provides a quasi-random change in the competitive environment for both entrants and incumbent firms. This allows us to identify both the local macroeconomic impact of the reform, and the underlying firm-level channels. Specifically, we ask three questions: (i) How did the reform affect firm entry? (ii) What was the impact of the reform on local employment? (iii) What are the firm-level mechanisms underlying the observed response of employment?

We then study the effects of the reform in a model with heterogeneous firms and monopolistic competition. We show that a demand system with heterogeneous markups, which vary endogenously with a firm's market share and with the mass of operating firms, accounts for our evidence. This framework provides novel insights on the channels linking higher entry and macroeconomic dynamics. We use the model to evaluate the relative importance of such channels and quantify the effect of the reform on aggregate employment and welfare.

The Portuguese reform was called Empresa na Hora, which means "Business On the Spot". Before the reform, Portugal was ranked around the 113th out of 155 countries in the "Doing Business Index" of the World Bank. It would take between 54 to 78 days to complete the required bureaucracy to start a new business (Leitão Marques, 2007). After the reform, registering a new business took less than an hour and could be accomplished at one specific

office, called One-Stop Shop.[1] Because of the reform, Portugal climbed to around the 33rd position in the ranking of the World Bank (see Branstetter et al., 2014).

A key feature of the reform is that it was implemented gradually across the country. That is, One-Stop Shops opened over different years in the various municipalities. This was due to constraints on the availability of office space and trained public servants. The staggered implementation of the reform allows us to adopt a generalized difference-in-differences strategy to identify its effects. In particular, we compare the evolution of firm entry, exit, and employment across municipalities with and without the One-Stop Shop in the years preceding and following the opening of the office. Importantly, our results show no evidence of divergent trends in the pre-reform period, which supports our identification assumption that the choice of the opening of the One-Stop Shops was not made based on past or expected economic performance of the different municipalities.

Our empirical analysis is based on administrative firm-level data from Portugal on the population of limited-liability employer firms, i.e., firms with at least one employee. In addition, we use publicly-available information on the opening dates of the One-Stop Shops in the different municipalities. Our dataset covers the years 2000-2008, that is, our findings apply to at most four years after the implementation of the reform.

In the first part of our empirical analysis, we study the impact of the reform on firm entry and employment at the municipality level. We show that the reform significantly and persistently increased entry. In municipalities with the One-Stop Shop, entry increased on average by 25% per year.[2] We then study employment and find that, due to the reform, local employment increased on average by 4.8% per year.

Next, we explore the micro-level mechanisms underlying the observed increase in employment. To begin, we study the contribution of entrants and incumbents to the rise in local employment. We measure that about 60% of the increase in employment is coming from incumbent firms, which expanded their average size (i.e. *intensive margin* contribution). The remaining share is due to a rise in the number of entrants (i.e. *extensive margin* contribution). In fact, the average size of new entrants is unchanged or lower than before.

Lastly, we delve deeper in the response of incumbent firms and find that the most productive ones are driving the employment expansion in treated municipalities. In particular, we find that the firms belonging to the top tercile of the productivity distribution increased their workforce in treated municipalities, while this is not the case for the firms in the bottom tercile.[3]

[1] Total monetary costs to register a new business fell as well, from 2,000 to 360 euro.

[2] The entry rate of limited-liability firms in the Portuguese municipalities in 2000-2008 averaged around 7.5%, so the reform increased annual entry rate by approximately 1.8 percentage points.

[3] Importantly, since current level of productivity is endogenous to a firm's employment decision, we follow different criteria to rank firms based on their level of revenue productivity in 2004 – the year preceding the

In the second part of the paper, we cast our empirical findings against the predictions of a model of heterogeneous firms and monopolistic competition under a generalized demand system following Baqaee et al. (2024). This demand system nests a variety of monopolistic competition models, such as CES (Melitz, 2003) and translog (Feenstra, 2003), but allows for more flexibly in firms' price elasticity and pass-through rates – while remaining highly tractable. We show that this more general specification is necessary to match the heterogeneous employment responses of firms due to increase in entry caused by the introduction of One-Stop Shops. Moreover, we argue that such flexibility is crucial for assessing the impact of changing entry costs.

We begin by characterizing the environment of the model. Demand comes from a representative consumer whose expenditure on heterogeneous varieties is a general function of variety's price and an aggregate price index. Varieties are supplied by firms that compete monopolistically. Firms' markups are heterogeneous, reflecting the heterogeneous demand elasticities faced by different variety producers. There is free entry subject to a fixed cost, and, finally, the household labor supply is endogenous.

The strength of this minimalistic setup lies in the general specification of demand for varieties. First, we show that a decline in the fixed cost of entry – such as that following the introduction of One-Stop Shops – leads to a decline in the aggregate price index. Lower costs of entry reduce the expected profits that make entry worthwhile. As a result, more firms enter, bringing down the aggregate price. Second, the price index decline increases the real wages. Households respond by supplying more labor, in line with the positive aggregate labor response we find in the data. Third, we show that, theoretically, the decline in the fixed cost of entry has an ambiguous effect on firm-level employment. On one hand, the increase in the labor supply makes more labor available for firms to hire. On the other hand, as the competitive pressure increases, firms respond by contracting their employment, but to a different degree: firms that face a relatively less elastic demand contract their employment by less. Fourth, we show that which firms expand in relative terms depends on the shape of the demand curves. In particular, if the demand system satisfies Marshall's second and third laws of demand – that is, if firm-level price elasticities strictly increase and pass-through rates decrease in firm-level price – then the more productive firms expand in relative terms, in line with our empirical evidence. Finally, we show that the decline in the fixed cost of entry increases real consumption and welfare.

We conclude by exploring the operation of the mechanism and welfare implications of One-Stop Shops using a quantitative model. To do so, we estimate the demand system for firms in our data non-parametrically. This approach allows the data to pin down the relative responses of firms to increase in entry that we causally estimate. In the model, as in the

announcement and implementation of the reform.

data, more productive firms expand their employment in relative terms: by 15.8 percentage points. In turn, aggregate labor supply increases by 2.8 p.p., compared to 4.8 p.p. in the data. Finally, we estimate that the introduction of One-Stop Shops has increased welfare by 2.8 percentage points. Crucially, we would have missed around a two thirds of the total welfare effect if we assumed an off-the-shelf CES utility function.

Related Literature. This work relates to three strands of literature in macroeconomics. The first investigates the general equilibrium effects of product market reforms, modeled as a generalized reduction in firms' markups (Blanchard and Giavazzi, 2003; Eggertsson, 2012; Eggertsson et al., 2014)[4] or in entry costs (Bilbiie et al., 2012)[5]. In these models, firms are homogeneous and equally reduce their employment following a rise in competition, leading to a short-run recession.[6] Our analysis, instead, points to an heterogeneous response across firms, which results in an overall expansion of output. This motivates our extension of existing models with translog demand to a framework with heterogeneous firms.

By including firm heterogeneity, we connect to a second strand of literature, which focuses on the role of firm dynamics in shaping aggregate fluctuations (Hopenhayn, 1992; Melitz, 2003; Lee and Mukoyama, 2008; Clementi and Palazzo, 2016). Relative to these papers, we show empirically and theoretically that firm heterogeneity and CES demand are not sufficient to deliver micro and macro responses in line with our evidence.

Importantly, we relate to an expanding literature investigating how different demand specifications affect the dynamics of markups, productivity, production factors and output across heterogeneous firms. This literature includes papers using the symmetric translog demand specification (Feenstra, 2003; Bilbiie et al., 2012), the Kimball aggregator (Klenow and Willis, 2016; Edmond et al., 2023), or developing models of oligopolistic competition

[4]In Eggertsson (2012) and Eggertsson et al. (2014), competition reforms are evaluated in a New Keynesian model with binding Zero Lower Bound Constraint. An increase in competition is found to be recessionary, because it reduces prices and increases the real interest rates, inducing households to postpone consumption (via the so-called *substitution effect*). We share with these models a setting with exogenous and fixed interest rate. However, our analysis shows an expansionary response of output, which is not supportive of the predominance of the "substitution effect".

[5]. Importantly, Bilbiie et al. (2012) introduced, for the first time, endogenous producer entry and translog demand in a representative firm model of the business cycle. An important reference in this literature is Cacciatore and Fiori (2016), who extend Bilbiie et al. (2012) by including capital adjustment costs and search frictions in the labor market. Related papers, which add New Keynesian and/or open macro features, are Cacciatore et al. 2016a,b,? and Cacciatore et al. (2021).

[6]Given the endogeneity of government's decision to implement competition reforms, contributions in this literature are mostly theoretical. Empirical evidence on the macroeconomic impact of such reforms is based on macroeconometric models that exploit cross-country variation in the aggregate index of product-market deregulation provided by the OECD. Other works use national/sectorial reform shocks identified via narrative analysis (Bouis et al., 2016; Duval and Furceri, 2018).

(Atkeson and Burstein, 2008; Edmond et al., 2015). These demand systems have also been shown to be more appropriate to study the gains from opening to international trade (Zhelobodko et al., 2012; Arkolakis et al., 2019). Our first contribution to this literature is empirical, as we provide novel quasi-experimental evidence supporting the heterogeneous-firm dynamics implied by these demand systems, following a rise in firm entry. On the theory side, our framework with symmetric translog demand, heterogeneous firms and endogenous entry provides closed-form expressions for the heterogeneous response of firms to the entry shock, for the aggregate labor wedge and for the misallocation wedge.

Finally, our empirical analysis connects to a broad literature in applied microeconomics in the field of barriers to entry and entrepreneurship (Bertrand and Kramarz, 2002; Viviano, 2008; Kaplan et al., 2011; Branstetter et al., 2014; Hombert et al., 2020; Amici et al., 2016). Branstetter et al. (2014), in particular, studied the same Portuguese reform as we do. While we share the idea of exploiting the staggered opening of One-Stop Shops across the Portuguese municipalities and the finding of a comparable relevant increase in firm entry, we depart from this work both in terms of research questions and empirical methodology. Their research aims at characterizing entrants and testing models of occupational choice, while our focus is on characterizing the response of entrant and incumbent firms, as well as macro aggregates to a change in the competitive environment.

Outline. The remainder of the paper is organized as follows. Section 2 describes the reform and the data. Section 3 presents the empirical analysis. Section 4 presents the theoretical and Section 5 presents the numerical analysis. Section 6 concludes.

2 Institutional Setting and Data

In this section we present the institutional details of Empresa na Hora (Section 2.1), and provide an overview of the macroeconomic background leading to the reform (Section 2.2). We then describe our dataset and provide some statistics on the Portuguese business sector.

2.1 Portugal and the Empresa na Hora Reform

After joining the European Monetary Union in 1999, Portugal entered a prolonged slump, with anemic productivity and output growth (Blanchard, 2007). When a country with relevant structural weaknesses like Portugal loses control of its monetary policy and exchange rate, the call for structural reforms becomes even more compelling.

Until 2005, Portugal was considered one the least business-friendly countries, according to international ranking. In particular, before the reform, it took 56-78 days to start a business, making it slower than the Democratic Republic of Congo, as documented by Leitão Marques

(2007). An entrepreneur needed to fill in around 20 forms, provided by different public agencies, and complete 11 procedures, for a total cost of €2,000.

From February 2005 to May 2005 a cross-departmental task force, called *Unidade de Coordenação da Modernização Administrativa* (UCMA), designed and managed a broad plan of modernization and simplification of public services for both citizens and businesses. The plan was called SIMPLEX and covered areas such as digitalization of income tax declaration, simplification of immigration admission procedures, and approval of licenses and permits for different industrial and retail activities.

The reform that we are studying, which was called Empresa na Hora, was a relevant part of this broader plan and aimed at significantly reducing both time and monetary costs of starting a business. The program made it possible to start a business "on the spot", by means of a single personal visit to an official Registry. UCMA designed standardized pre-approved documents created on pre-defined firm names.[7] Within an hour, on average, an entrepreneur receives an official legal person identification card, a Social Security number and a registration of the enterprise in the Business Registry. Monetary costs shrunk to €360, making this procedure among the cheapest in Europe. The law was approved on July 6^{th}, 2005 (*Decreto Lei 111/2005*).

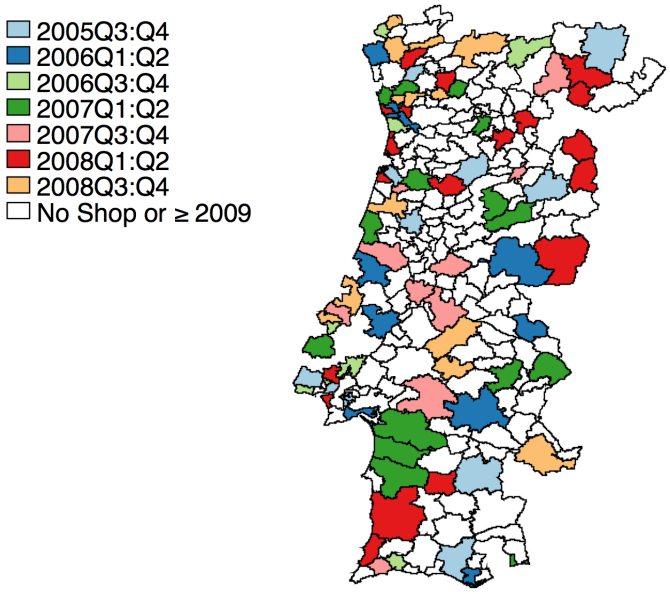
There are several features of the program that require a deeper discussion, since they will be key in our empirical analysis. First, the program involved virtually all sectors of economic activity and was intensively advertised by the government. Accordingly, the country moved from averaging around the 113th position (out of 155 countries) in the Doing Business Index of the World Bank to around the 33rd, suggesting that the reform had potentially relevant macroeconomic implications. Second, the program was implemented in a staggered fashion across the different municipalities. This was mostly due to budget constraints and the need to assess the program and train public servants.

As soon as the *Decreto Lei* was approved in July 2005, six One-Stop Shops were opened in four different cities: Coimbra, Aveiro, Moita and Barreiro. Over the following years the program gradually expanded across the country. Table 1 is taken from Branstetter et al. (2014) and describes the timing of the opening of the One-Stop Shops across Portugal. Out of the 308 municipalities, 99 had a One-Stop Shop by the end of 2008. Figure 1 shows the pattern of the opening of One-Stop Shops in a map of the country.

A second feature of the program is that a firm was allowed to register in any One-Stop Shop, regardless of the location of the company. In our empirical exercise, however, we assume that firms registered in the same municipality in which they were operating.

[7]Note, however, that it is possible for an entrepreneur to request a personalized name for the business and have all documents ready withing two business days.

Figure 1: Timing of the Opening of One-Stop Shops across the Country



Source: Instituto dos Registos e Notariado.

The figure shows the pattern of opening of the One-Stop Shops across the Portuguese municipalities.

Conversations with public officials reassured us that the relevant coverage of each One-Stop Shops was local, so that the number of new firms registered in a One-Stop Shop in a given municipality and year provides a good approximation of the number of new firms in the same municipality and year. Nevertheless, as we will argue in details in our discussion on the identification strategy (see Section 3.1), this aspect would, if anything, bias our estimates on the expansionary effect of the reform downwards.

Table 1: One-Stop Shop Program Implementation

	2005	**2006**	**2007**	**2008**	**2009**	**Total**
Number of shops	20	28	31	36	49	164
Number of counties implementing	13	24	28	34	46	145
Number of counties $>$ 1 shop	6	3	1	2	0	12

Source: Branstetter et al. (2014) based on publicly available calendar data provided by the Instituto dos Registos e Notariado.

2.1.1 Implementation of Empresa na Hora

Our identification strategy exploits the staggered opening of the One-Stop Shops across the Portuguese municipalities. The gradual implementation of the reform was motivated by constraints in the availability of both trained public officials to run the program and physical venues to open the offices. This is why One-Stop-Shops generally took advantage of pre-existing Trade Registry Offices and Business Formality Centers (Branstetter et al., 2014). Accordingly, conversations with public officials reveal that municipalities were not chosen based on past or expected economic activity, which would invalidate our empirical analysis. We now provide some first statistical evidence supporting this claim.

In Table .4 we present the summary statistics of the Portuguese municipalities organized in four partitions. In columns (1) and (2) we summarize the information on *Treated*[8] relative to *Never-Treated* municipalities. Columns (3) and (4) refer to the *Early-Treated* and *Late-Treated* municipalities.[9] The Table characterizes the different municipality groups according to measures of firm demographics, aggregate macroeconomic characteristics and the sector composition of economic activity. It provides the mean and standard deviation of each variable, as well as the 25^{th} and 75^{th} percentiles. We notice that the different municipality groups did not significantly differ from each other in the pre-reform period. In fact, the

[8]We consider as *Treated* those municipalities in which a One-Stop Shop opened by the end of 2008.

[9]We include in the former all those municipalities in which a One-Stop Shop opened in 2005-2006, and in the latter those reformed in 2007-2008.

standard deviations are very high. This is because there is a strong heterogeneity across the municipalities within each cohort. Accordingly, municipalities in different groups had similar 25^{th} and 75^{th} percentiles.

While this descriptive evidence provides a first pass on the absence of relevant economic criteria in choosing the order the implementation of the reform across the country, it is not sufficient to support our identification strategy. The latter requires that economic variables evolved homogeneously over time across the different cohorts of municipalities. We address this issue in detail in Section 3.1.

2.2 Data and Summary Statistics

Our analysis mainly relies on one dataset with detailed administrative records on the universe of limited-liability firms with at least one employee in Portugal. We cover the years 2000-2008. The dataset is called Quadros de Pessoal and is built from a census submitted each year in October. The dataset is managed by the Portuguese Ministry of Employment and Social Security and provides information at the firm, establishment, and worker level. In this project we use annual information on firms' entry, exit, sector of activity (provided at the 5-digit level), location at the municipality level, annual nominal sales, and employment. This choice is justified by the fact that Empresa na Hora concerned the creation of new firms rather than the opening of establishments. Moreover, while it is true that the opening of an establishment may change local competition and affect our estimates, over 93% of firms in Portugal have only one establishment.

While the reform was approved in 2005, the time coverage of our dataset allows us to include the five years preceding the reform and inspect the presence of pre-reform trends that may harm the validity of our analysis. Our sample ends in 2008, as there was a drop in the coverage of the Quadros in the following years. As a consequence, we can measure the impact of the reform during the first four years of implementation.[10]

We exploit the panel structure of the dataset to construct a measure of firm exit. In particular, we say that a firm exists if it stops appearing in our dataset for at least two consecutive years.[11] As mergers and acquisitions play a very marginal role in Portugal, we are confident about our measure. In addition, because our dataset originally has information on private employer firms of any legal form (such as cooperatives, or sole proprietorships), we dropped all pre-existing firms that change their legal form to limited liability company over their life cycle. This allows to avoid capturing the effect of the reform on changing the

[10]Note, however, that since the reform was implemented gradually, we are not able to track all reformed municipalities for the same number of years after the opening of the local One-Stop Shop.

[11]This method is equivalent to define exit as the last time a firm appeared in the dataset for more than 97% of the cases.

legal form of existing businesses.

Our final dataset has, on average, 125,000 non-financial private corporations per year, spanning all private sectors of the economy, except for Mining, Electricity, Gas and Water, and Insurance. In the time window considered, the average entry rate is 7.5% and exit rate is 9.5%. Information on the size distribution across firms reveals that the Portuguese business sector is mostly characterized by very small enterprises: 50% of firms have less than 4 employees and 50% of entrants have less than 2.[12]

We complement the Quadros de Pessoal with other publicly available datasets. The first is provided by the Instituto dos Registos e Notariado, equivalent to the Portuguese Business Registry, and contains the exact opening date of each One-Stop Shop across the Portuguese municipalities. The second is provided by the Instituto Nacional de Estatística and includes municipality-level data on total residents and more detailed local demographic information.

3 Empirical Analysis

In this section, we describe the methodology and the results of the empirical analysis. We start by describing the identification strategy and its underlying assumptions (Section 3.1). We then show the results on the impact of the reform on firm creation (Section 3.2) and local employment (Section 3.3). Next, we move to the analysis of the underlying channels. In particular, we study the contribution of younger firms and older incumbents to the observed aggregate response of employment (Section 3.4.1, 3.4.2 and 3.4.3). We then explore the role of incumbents heterogeneity (Section 3.4.4). Lastly, we present more disaggregated evidence at the level of the sector of economic activity (Section 3.5).

3.1 Empirical Specification and Identification

To study the impact of the reform, we use a difference-in-differences specification that exploits the staggered opening of the One-Stop Shops across the Portuguese municipalities. In most of our specifications, our unit of analysis is a municipality in a given year. More specifically, our baseline specification is the following:

$$y_{m,t} = \alpha_m + \delta_t + \sum_{\tau} \beta_\tau \mathbb{1}(t - \tau = \tau_{0,m}) + \gamma X_{m,t} + \epsilon_{m,t}. \tag{1}$$

In this regression, α_m and δ_t are the municipality and year fixed effects, respectively, $X_{m,t}$ is a vector of municipality-level controls, which we will discuss in more detail in Section 3.2, $\epsilon_{m,t}$ is an error term with the usual statistical properties. Importantly, $\mathbb{1}(t - \tau = \tau_{0,m})$

[12] See Table .5 in the Appendix for the relevant summary statistics for the non-financial firms in our dataset.

is a municipality-year dummy that equals 1 whenever municipality m is τ years from the opening of its office. A negative value for τ corresponds to the years preceding the reform. Because of the staggered implementation of the reform, the year of the opening of the local One-Stop Shop varies by municipality, i.e., $\tau_{0,m}$ varies with m. We normalize $\beta_{-1} = 0$, so that β_τ measures the average treatment effect at the municipality level for each time lag and lead relative to the year prior to the opening of the office. In particular, β_τ captures the following variation:

$$\beta_\tau = \underbrace{E\left[y_{(\tau)}^{\text{treated}} - y_{(-1)}^{treated}\right]}_{\text{treated municipalities}} - \underbrace{E\left[y_{(\tau)}^{\text{control}} - y_{(-1)}^{control}\right]}_{\text{control municipalities}}.$$

The key identification assumption is that the variation in the dependent variable, at the municipality level, and for each year after the opening of the One-Stop Shop, is only due to the reform (i.e. *"parallel-trend assumption"*). In other words, we require that all the unobserved determinants of the outcome, as reflected in the residual, evolve in parallel over time for the different municipalities. Identification assumptions are inherently not testable, as they refer to unobserved scenarios. However, since our dataset includes the 5-year period before the approval of the reform, our regression model can explicitly test for and visually detect the presence of differential trends among the observables of the *Treated* and *Control* municipalities. As we show in the next sections, there is no trend in the periods leading to the reform, supporting our identification assumption. Moreover, since we are exploiting a specific timing of the opening of One-Stop Shops across Portuguese municipalities, our identification strategy is not affected by nation-wide reforms. Finally, political affiliation at the municipality level does not play a role in program adoption (Branstetter et al., 2014).

3.2 Analysis of Entry

We now show how the reform affected firm creation. To do so, we construct our dependent variable, $y_{m,t}$ by aggregating the number of entrants in each municipality and year and scaling it over 1,000 residents. This provides a more homogeneous measure of entry across the different municipalities. Following the description of our identification strategy, our main regression equation is

$$y_{m,t} = \alpha_m + \delta_t + \sum_{\tau=-7}^{\tau=3} \beta_\tau \mathbb{1}(t - \tau = \tau_{0,m}) + \gamma_m \mathbb{1}(\text{Municipality}_m = 1)t + \epsilon_{m,t}. \tag{2}$$

In this regression, α_m and δ_t are municipality and year fixed effects, respectively. The indicator $\mathbb{1}(t - \tau = \tau_{0,m})$ refers to the time lag or lead of the reform for each municipality, and we normalize for β_{-1} to be equal to zero. In our benchmark regression, we allow for municipality-specific trends. That is, we let our vector of controls in equation (1) - $X_{m,t}$ - be

defined as $X_{m,t} \equiv \mathbb{1}(\text{Municipality}_m = 1)t$. This is a very strict control that allows for cleaner estimates of the impact of the reform over time across highly heterogeneous municipalities. We cluster standard errors at the municipality level.

Figure 2 presents our estimates for β_τ for different lags and leads. We see that the opening of the One-Stop Shops significantly increased annual firm entry at the municipality level. The coefficients in Figure 2 refer to the absolute change in the annual number of entrants per 1,000 residents at the municipality level. Using back-of-the-envelope calculations, we find that this increase corresponds to an annual rise in local entry between 12% to 40%, corresponding to an average of 25% per year following the reform. Since the pre-reform value of our entry rate in the Treated municipalities is around 8.5%, the reform led to an approximate increase in the entry of two percentage points. [13] [14]

As described in Section 2.1, a firm could register in a different municipality than the one where it was operating. As a consequence, entrepreneurs living in a municipality belonging to the control group could have driven to the closest One-Stop Shop. However, we assume that firms registered in the same municipality in which they were operating. While we mentioned that One-Stop Shops operated predominantly on a local scale, the possibility of driving from a *Control* municipality to the closest One-Stop Shop would bias our estimates downwards. To the extent that we see a positive and statistically significant effect of the reform, we do not consider this feature of the reform as a concern. The possibility of registering a firm in an office located in a different municipality ensures as well that our results are not picking a form of "strategically delayed entry". This is also confirmed by the fact that we do not observe a drop in the entry rate in the year preceding the opening of One-Stop Shops and by the fact that our results are robust to relaxing municipality-specific trends (which may pick up any form of municipality-specific delay in entry).

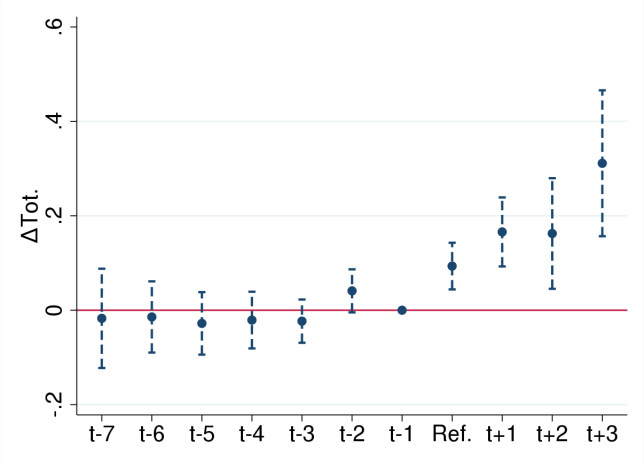
Our entry results are robust to a number of different specifications that we present in the Appendix.[15]

[13] Note, however, that the coefficients for the $t+2$ and $t+3$ lags are noisier, because they are based on a smaller number of treated municipalities. For this reason, we prefer focusing on the average increase, and the positive sign and significance of our coefficients over the time span of the analysis.

[14] Our cross-municipality results in the main text are unweighted, because of our focus on the detection of the mechanism of the reform. In the Appendix, instead, we present weighted regressions, using as weights the number of active firms in each municipality. The rise in entry is robust to this specification, and so is the magnitude.

[15] In the Appendix we relax municipality-specific trends and allow trends to differ across groups of municipalities defined over some pre-reform characteristics. In one such specifications, we rank municipalities based on pre-period values of population and predominance of a service-oriented economy, and allow for decile-specific trends. This is shown in Figure A.3 in the Appendix. As can be seen in the Figure, the coefficients of β_τ do not differ substantially. In results not shown, we also include quadratic and cubic time trends, and allow for separate trends for the municipalities belonging to the different deciles of total population only.

Figure 2: Impact of Empresa Na Hora on Aggregate Local Firm Creation



The figure shows the estimates of β_τ from the following regression at the municipality level:

$$y_{m,t} = \alpha_m + \delta_t + \sum_{\tau=-7}^{\tau=3} \beta_\tau \mathbb{1}(t - \tau_{0,m} = \tau) + \sum_m \gamma_m \mathbb{1}(\text{Municipality}_m = 1)t + \epsilon_{m,t},$$

where $y_{m,t}$ = total entrants per 1,000 residents, $\tau_{0,m}$ corresponds to the year in which the One-Stop Shop opened in municipality m and γ is a vector of coefficients for municipality-specific trends. Standard errors are clustered at the municipality level. 90% confidence intervals.

3.3 Analysis of Local Employment

We now move to the analysis of employment. We use equation (2) and define the dependent variable $y_{m,t}$ as the log of municipality-level employment in a given year normalized over 1,000 residents. We choose to aggregate the firm-level information at the municipality level to remedy the measurement error associated with firms of very small size.

Differently from the entry regression, we choose $t-3$ as a reference (rather than $t-1$) – i.e., $\beta_{-3}=0$. This choice simply allows for a more transparent display of the employment response to the reform. Since the reform became perfectly anticipated by the incumbents once it started to be implemented in 2005, the response of aggregate employment captures not only the direct impact of higher entry and incumbents' reaction to actual entry, but also incumbents' reaction to *expected* entry. This means that each β_τ in the employment regression captures the impact of both an actual and an expected change in entry. To the extent that firms face convex adjustment costs in labor, we should expect incumbents to start adjusting their workforce even before the actual opening of the One-Stop Shop in their municipality.

Figure 3 shows the resulting regression coefficients for each reform lag and lead. We see that employment increased significantly in *Treated* municipalities relative to the *Control* ones. While the coefficients are statistically significant only for the year of the reform and onwards, it is worth highlighting that employment started rising two years prior the reform. Since the lags from $t-7$ to $t-3$ are flat and not statistically different from zero, the slight increase in employment in $t-2$ and $t-1$ likely captures the adjustment of employment by incumbents anticipating a change in their competitive environment and not differential pre-trends across municipalities (which, in fact, are added as controls in all specifications).

We interpret the coefficients as the cumulative percentage increase in municipality-level employment relative to $t-3$. Accordingly, we see that local employment increased by 5% in the year of the reform, and then continued growing at an average annual rate of 4.8%.[16] Results on employment dynamics are robust to different trend specifications, which are reported in the Appendix.[17]

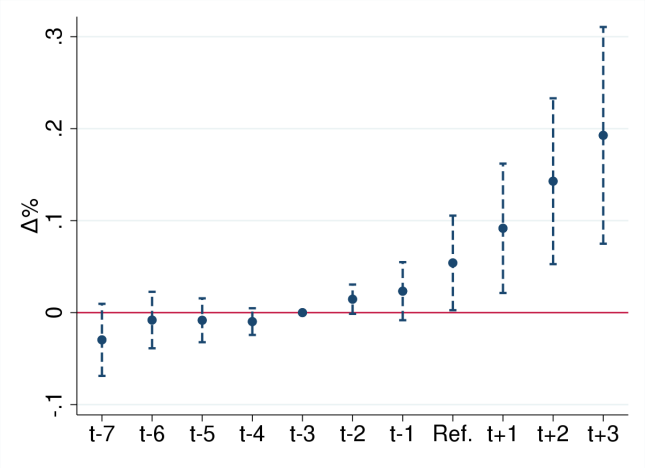
While the reform setting allows to estimate the causal impact of the reduction in entry costs on employment, we emphasize that our estimates of a 4.8% increase measure a local effect. In particular, we claim that this represents an upper bound on the impact of the reform on country-level employment. The response of local employment is higher than the

Our results are noisier but robust to this specification.

[16] In the weighted regression shown in the Appendix we get an average annual increase in local employment of 2.5%.

[17] For instance, Figure A.3 in the Appendix shows the results of a specification that allows for trends by municipalities grouped by deciles of total residents and per-capita value of activity in services during the pre-reform period.

Figure 3: Impact of Empresa na Hora on Aggregate Local Employment



The figure shows estimates of β_τ from the following regression with municipality-level aggregates:

$$y_{m,t} = \alpha_m + \delta_t + \sum_{\tau=-7}^{\tau=3} \beta_\tau \mathbb{1}(t - \tau_{0,m} = \tau) + \sum_m \gamma_m \mathbb{1}(\text{Municipality}_m = 1)t + \epsilon_{m,t},$$

where $y_{m,t} = \log(\text{total employment per 1,000 residents})$, $\tau_{0,m}$ corresponds to the year in which the One-Stop Shop opened in municipality m and γ is a vector of coefficients for municipality-specific trends. Standard errors are clustered at the municipality level. 90% confidence intervals.

aggregate one for two main reasons. First, our estimates refer to the private sector only, and so include within-municipality employment movements to and from government-owned entities. Second, the local effect is an upper bound for the national effect because it includes cross-municipality movement of workers.[18]

3.4 Analysis of the Underlying Channels

In this section, we explore the micro-level forces driving our results on local employment. We start by decomposing the increase in employment between the contributions of entrants and incumbent firms (Section 3.4.1). We then study the extent to which the responses of these two groups are driven by an intensive or extensive margin of adjustment. To do so, we investigate for each group the evolution of firms' average size (Section 3.4.2), and the changes in their exit probability (Section 3.4.3). We then study whether the employment and exit decisions of incumbent firms masks some relevant heterogeneity (Section 3.4.4).

3.4.1 The Response of Employment by Entrants and Incumbent Firms

We start by analyzing the role of entrants and incumbent firms in explaining the observed response of local employment. To ensure a sufficiently homogeneous sample of firms across each municipality, we classify firms according to three age classes: age $0-5$, $6-15$, and older than 15 (15+ henceforth).[19]

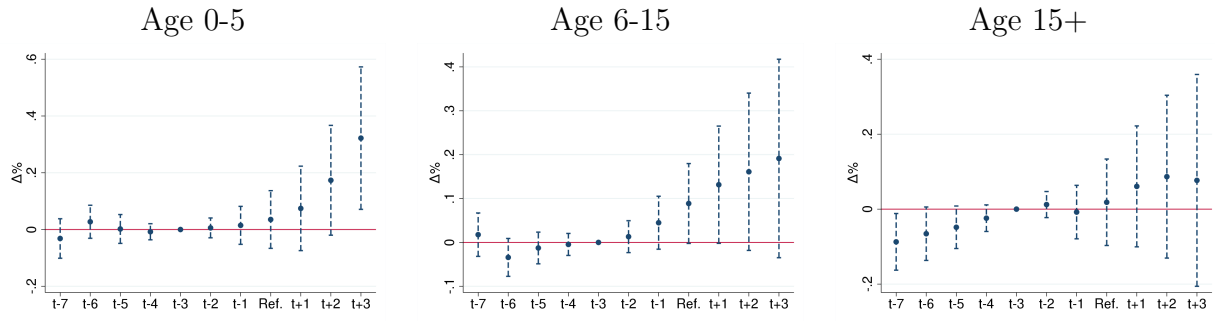
We aggregate the employment of firms in each municipality and year by the three age groups, and estimate equation (2) separately for each age group.[20] We classify firms based on their current age. This means that the sample of firms is not constant over time. This method identifies the contribution of the different age groups under the identification assumption that

[18] To check whether our evidence of a local increase in employment is consistent with aggregate labor market variables, we plot in Figure A.2 the evolution of the Portuguese labor force participation rate and unemployment. The Figure shows that the unemployment rate flattened out around the time of the reform, after having trended upwards in the preceding years, and that the labor force started rising approximately from 2005. Aggregate dynamics seem then consistent with our estimated local effects.

[19] We decided to keep the analysis of age $6-15$ and 15+ separate because the sample of firms of age 15+ is small and very unevenly distributed across the different municipalities, making our results on the behavior of incumbents very noisy.

[20] The reason why we chose to aggregate employment at the municipality level for each age group deserves further discussion. An alternative strategy could have been using firm-level data on employment. In that case, the β_s on each time lag and lead would measure the impact of the reform on the size of the *average firm* by age group, given the sample of surviving firms in each period. While firm-level regressions allow us to rely on a much larger sample and on more controls, the resulting coefficients are subject to an upward bias. Since exiting firms are on average smaller than surviving ones, results from firm-level regressions artificially lead to an increase in the size of the average firm. Aggregate employment by the different age groups, instead, solves this selection-into-exit problem.

Figure 4: Impact of Empresa na Hora on Employment by Age Groups



The figures show the estimates of β_τ from the following regression with municipality-level aggregates:

$$y_{m,t} = \alpha_m + \delta_t + \sum_{\tau=-7}^{\tau=3} \beta_\tau \mathbb{1}(t - \tau_{0,m} = \tau) + \sum_m \gamma_m \mathbb{1}(\text{Municipality}_m = 1)t + \epsilon_{m,t},$$

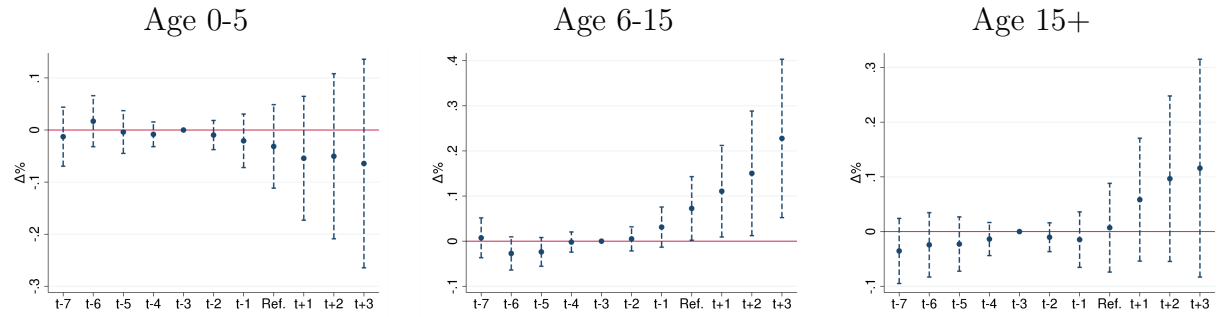
where $y_{m,t}$ = total employment per 1,000 residents by the different age groups, $\tau_{0,m}$ corresponds to the year in which the One-Stop Shop opened in municipality m and γ is a vector of coefficients for municipality-specific trends. Standard errors are clustered at the municipality level. 90% confidence intervals.

firms belonging to any age group in the *Treated* municipalities would have behaved as the corresponding ones in the *Control* municipalities absent the reform, and absent different trends across the municipalities.

Figure 4 shows the results of these regressions. With the caveat for firms older than 15 years showing a noisier and essentially flat response – mostly due to the small and uneven distribution of such firms across the different municipalities – we see that both entrants and incumbent firms contribute positively to the rise in local employment. We do some back of the envelope calculations to understand the relative contribution of each age group to the overall increase in local employment. To do so, we use the coefficients from the age-group regressions and combine them with information on the average employment share of each age group in the pre-reform period. This exercise reveals that around 60% of the overall increase in local employment is due to the response of incumbents older than 5 years old, while entrants and young firms account for the remaining 40%.

While evidence on the positive contribution of incumbents to local employment growth is new and of interest by itself, the estimates in Figure 4 are silent on the mechanisms underlying these responses. As a next step, we investigate the extent to which the results are driven by an *intensive* or an *extensive* margin of adjustment. The former is related to changes in employment accounted by operating firms, the latter captures the role of entry

Figure 5: Impact of Empresa na Hora on Average Size by Age Groups



The figures show the estimates of β_τ from the following regression with municipality-level aggregates:

$$y_{m,t} = \alpha_m + \delta_t + \sum_{\tau=-7}^{\tau=3} \beta_\tau \mathbb{1}(t - \tau_{0,m} = \tau) + \sum_m \gamma_m \mathbb{1}(\text{Municipality}_m = 1)t + \epsilon_{m,t},$$

where $y_{m,t}$ = average size = $\frac{\text{Tot. Employment}}{\text{Tot. Firms}}$ for the different age groups, $\tau_{0,m}$ corresponds to the year in which the One-Stop Shop opened in municipality m and γ is a vector of coefficients for municipality-specific trends. Standard errors are clustered at the municipality level. 90% confidence intervals.

and exit.

3.4.2 Analysis of the Intensive Margin of Adjustment by Age Groups

To capture the intensive margin of adjustment, we study the evolution of the average size of firms in the different age groups. We construct this measure using the following ratio

$$y_{m,a,t} = \frac{\sum_{i \in (m,a,t)} \text{employment}_i}{\sum_{i \in (m,a,t)} \text{active firms}_i},$$

that is, we sum the employment of each firm i belonging to municipality m, age group a and year t, and divide it by the corresponding value for the number of operating firms. We then use this measure as the dependent variable in the regression equation (2).

Figure 5 shows the estimated coefficients. We notice that the average size of incumbent firms increased, while that of entrants and young firms remained unchanged, that is, they contributed to the aggregate rise in employment exclusively by the fact that their increase in number after the reform (i.e., extensive margin). Incumbents, instead, contributed via the intensive margin.[21]

[21] This result is robust to relaxing municipality-specific trends and allowing for different trends (see Figure A.3 in the Appendix).

The observed expansion by incumbent firms supports the evidence that there was an actual increase in the number of firms, and that we are not just capturing the impact of the reform on firms' decision to move from the informal to formal market.

Evidence of the expansion of incumbent firms following increased entry is novel and inconsistent with the predictions of current workhorse models of firm dynamics, as explained in Section 4. What this evidence does not say, however, is whether the increase in the size of incumbents holds along the whole distribution of firms or whether it is driven by a smaller subset of them.

3.4.3 Analysis of the Extensive Margin of Adjustment by Age Groups

To get a better understanding of the role of the extensive margin in shaping local aggregate dynamics, we study whether and how the reform affected the exit probability of entrants and incumbent firms.

Our analysis is conducted at the firm level. This means that we study the evolution of the exit probability for the average firm.[22]

Our baseline firm-level regression is specified as follows:

$$Pr(exit_{it} = 1) = \alpha_m + \delta_t + \sum_{\tau=-7}^{\tau=3} \beta_\tau \mathbb{1}(t - \tau_{0,m} = \tau) + \sum_m \gamma_m \mathbb{1}(\text{Municipality}_m = 1)t + \epsilon_{i,t}, \quad (3)$$

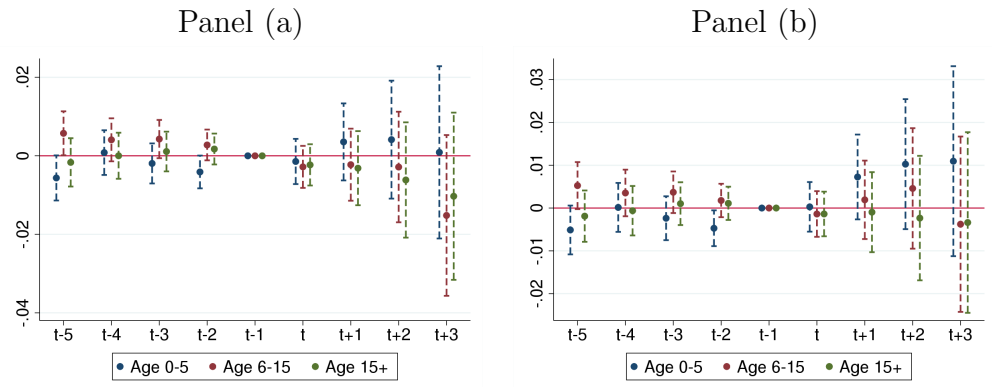
where $exit_{it}$ is an indicator variable equal to 1 if firm i exits operations in year t. By allowing for the municipality-effect only, we are controlling just for within-municipality variation, while we allow for variation across sectors of economic activity. We do this to remain consistent with the previous municipality-level regressions.

We estimate equation (3) keeping one age group at a time. Panel (a) of Figure 6 shows the resulting estimated coefficients. We see that the exit probability for the average firm remained mostly unaffected by the reform across all age groups.[23] While this result calls for a more in-depth analysis of the heterogeneity of firms' responses, which is done in the next Section, it is useful to bear in mind the rigidities of the Portuguese economy, where firms are slow to exit.

[22] In contrast to the analysis of employment, the analysis of exit at the firm level is not subject to problems of selection or to measurement errors. For these reasons, we prefer exploiting the maximum amount of information available for our estimates.

[23] This result is robust to replacing the municipality fixed effect with a fixed effect for the municipality interacted with the 3-digit sector of activity, as shown in Panel (b). It is also robust to replacing municipality-specific trends with trends by deciles of municipalities based on total residents and per-capital value of activity in services in the pre-reform period, as shown in Figure A.3 in the Appendix.

Figure 6: Impact on Exit Probability by Age Groups



The figures show estimates of β_τ from the following regression at the firm level that we run for each age group (age 0-5, 6-15, 15+):

$$Pr(exit_{it}) = \alpha_m + \delta_t + \sum_{\tau=-7}^{\tau=3} \beta_\tau \mathbb{1}(t - \tau_{0,m} = \tau) + \sum_m \gamma_m \mathbb{1}(\text{Municipality}_m = 1)t + \epsilon_{i,t},$$

where α_m and δ_t are municipality and year fixed effects, respectively. $\tau_{0,m}$ corresponds to the year in which the One-Stop Shop opened in municipality m and γ is a vector of coefficients for municipality-specific trends. Standard errors are clustered at the municipality level. 90%. confidence intervals. In Panel (b) we also allow for a 3-digit sector of activity fixed effect interacted with the municipality fixed effect.

3.4.4 Analysis of the Heterogeneous Response of Incumbents

In this section, we explore the possibility of an underlying heterogeneity across incumbent firms. The dimension of heterogeneity we study is differences in productivity across firms. Exploring the role of heterogeneity based on *current* measures of productivity leads to biased estimates: the current productivity of the firm is endogenous to its employment decisions. As a consequence, we classify firms based on a proxy for their idiosyncratic productivity measured in the period before the implementation of the reform. For this reason, we can only study the heterogeneity of the responses by incumbent firms. Given the available data, we proxy for labor productivity using the ratio of nominal sales over employment for each firm, that is, revenue labor productivity.

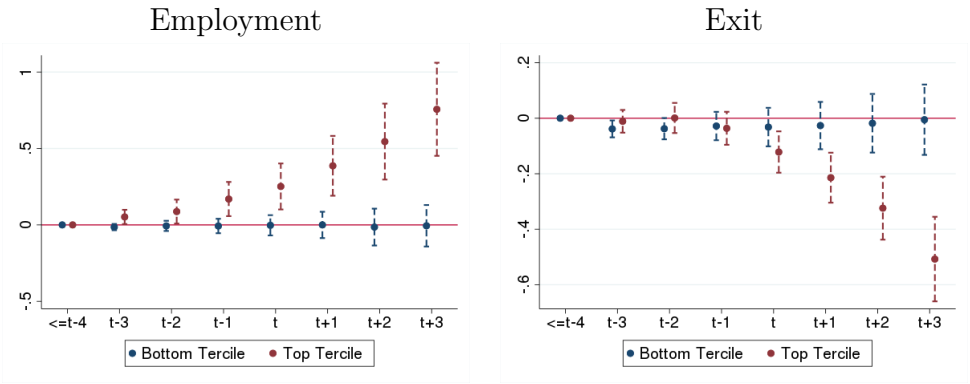
To be able to study the heterogeneous impact of the reform on the largest sample of young firms, we choose the year 2004 - being the year preceding the announcement and implementation of the reform - as the initial year of our analysis. We rank operating firms in 2004 according to our proxy of labor productivity. Our specification ranks firms based on their revenue labor productivity within each age group (0-5, 5-15, 15+), 3-digit sector of activity,[24] and municipality. This grouping is narrow enough to minimize heterogeneity in capital intensity and prices across firms, but also broad enough to ensure an even coverage of our data points across the different municipalities. We then aggregate total employment and total exit at the municipality-year level for the first and third terciles, and separately study their evolution over the different reform lags and leads as in the regression equation (2). We use as dependent variable the implied municipality-level aggregate of employment and exit for each tercile normalized by $1,000$ residents.

Figure 7 shows the results of this exercise for both total employment and exit (Panels (a) and (b), respectively). The estimates unveil substantial heterogeneity in firms' response, according to their productivity level. We see that the increase in aggregate employment is driven by the most productive firms, while the behavior of the bottom tercile remained unchanged after the reform. A similar story emerges from the analysis of exit. In particular, the number of exiting firms in the top tercile dropped significantly after the reform, while the exit behavior of the bottom tercile remained unaffected.[25] The rise in employment of the most productive incumbent firms and the decline in their exit rates will then be interpreted through the lenses of the model presented in Section 4 as a combination of a selection effect from higher competition and a positive aggregate demand effect from a reduction in prices.

[24] While we have data at the 5-digit sector level, a broader sector grouping allows to obtain a reasonably large and homogeneous sample of firms across each group.

[25] As a robustness exercise, we alternatively rank firms based on their productivity within 3-digit sector of economic activity and municipality (that is, pooling the age groups together). Our results are weaker but still robust to this specification, as shown in Figure A.4 in the Appendix.[26]

Figure 7: Heterogeneous Responses in Employment and Exit by Incumbents



The figures show the estimates of β_τ from the regression of municipality-level aggregates for firms in the top and bottom terciles of the productivity distribution measured in 2004. We proxy productivity with the value of sales per employee at the firm level. We rank firms based on sales per employees within 3-digit sector of activity, municipality and age group (age 0-5, 6-15, 15+). Our regression model is specified as follows:

$$y_{m,t} = \alpha_m + \delta_t + \sum_{\tau=-7}^{\tau=3} \beta_\tau \mathbb{1}(t - \tau_{0,m} = \tau) + \sum_m \gamma_m \mathbb{1}(\text{Municipality}_m = 1)t + \epsilon_{m,t},$$

where $y_{m,t} = \{\text{total employment per 1,000 residents; total exit per 1,000 residents}\}$. $\tau_{0,m}$ corresponds to the year in which the One-Stop Shop opened in municipality m and γ is a vector of coefficients for municipality-specific trends. Standard errors are clustered at the municipality level. 90%. confidence intervals.

3.5 Analysis of the Reform by Sector

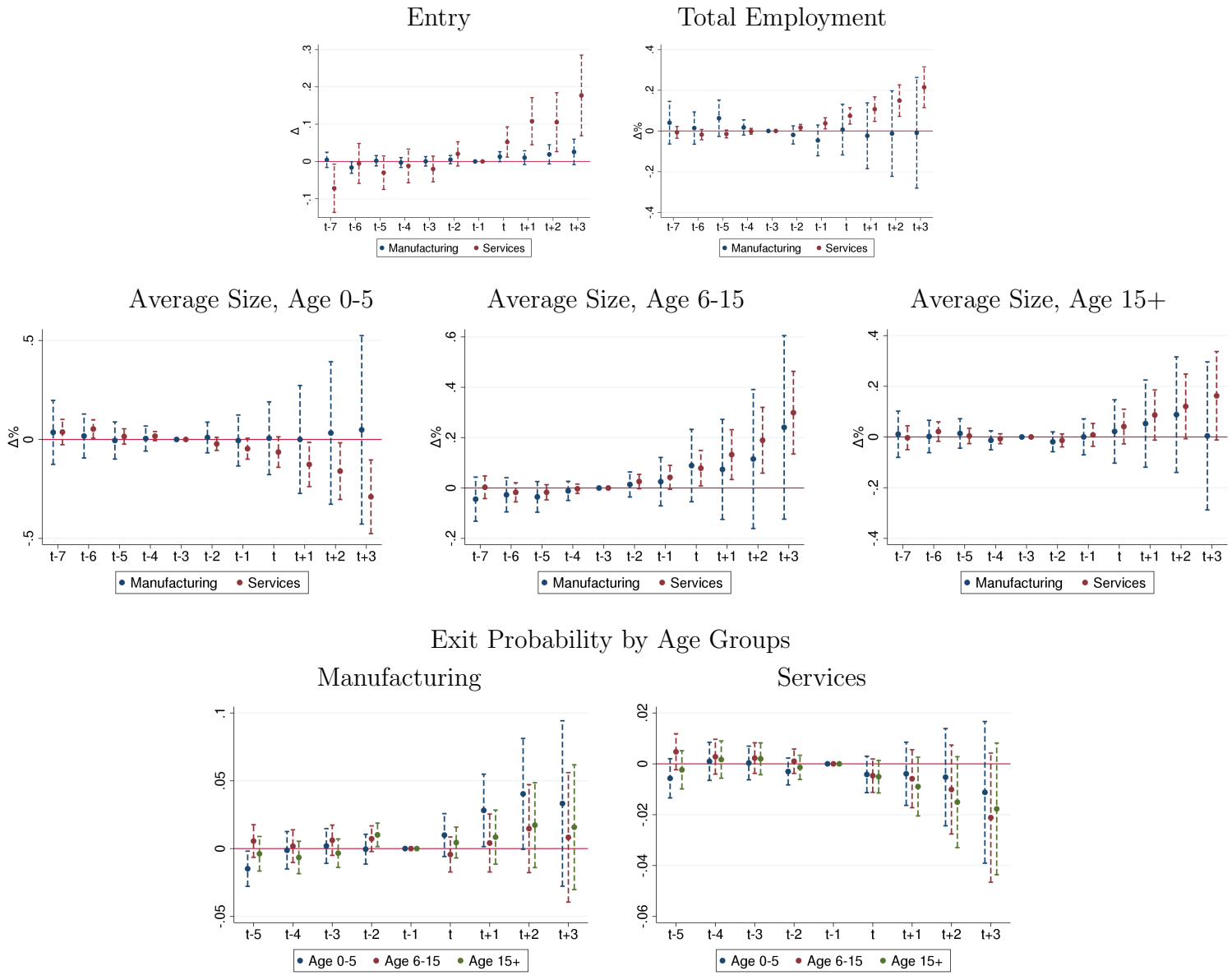
We conclude the empirical analysis by providing evidence on the impact of the reform disaggregated by sector of economic activity. We consider sectors classified at the 1-digit level. This is because any finer classification leads to very noisy results, given that that the firm coverage across municipalities may get extremely uneven. We focus on manufacturing and services only, which are larger and more homogeneously distributed across the municipalities, and so allow to use cross-municipality variation. We redo the exercises presented in the previous sections, separately for these two macro sectors.

Figure 8 compares entry, exit, employment and the behavior of incumbents for firms operating in the manufacturing and service sectors. We start from the analysis of entry. This Figure reveals that entry grew significantly after the reform for the service sector, while it remained flat for manufacturing. This result is not surprising. Indeed firms in the manufacturing sectors are highly intensive in capital, so they face high fixed capital investment. As a consequence, entry decision may not be substantially influenced by the change in time and monetary entry costs induced by the reform. Another interpretation of this result is to consider services and manufacturing as non-tradable and tradable goods, respectively. The firms in the service sector are more influenced by variations in local demand, and so are more responsive to the change in the local economy induced by the opening of the One-Stop Shop.

We then look at employment and find that it increases for the service sector, while it did not significantly change for manufacturing. Next, we investigate the impact of the reform on the average size of firms in different age groups across the two sectors. We see that the average size of entrants and young firms in the service sector decreased. This is consistent with the fact that the smallest firms should be more responsive to a reduction in entry costs. On the other hand, incumbents expanded their average size in services, and mildly did so also in manufacturing.[27]

[27] We consider the evidence on the expansion of incumbent firms in manufacturing as suggestive, given the small number of firms in the sample, which translates into noisy coefficients.

Figure 8: The Impact of Empresa na Hora for Different Sectors of Economic Activity



The figures show the estimates of the β_τ from the regressions of municipality-level aggregates separately for manufacturing and services. The regressions allow for municipality-specific trends. Standard errors are clustered at the municipality level. 90% confidence intervals.

4 Theoretical Analysis

In this section, we cast the empirical findings of Section 3 against the predictions of a model with heterogeneous firms and monopolistic competition. We start by describing a general framework that nests a variety of models of monopolistic competition (Section 4.1). We then present the effects of the introduction of One-Stop Shops, modeled as a decline in the fixed costs of entry, on a battery of model outcomes (Section 4.2). Finally, in Section 4.3 we link the predictions of the model back to our empirical results.

4.1 Model

Building on Baqaee et al. (2024), we now provide a description of a model of heterogeneous firms and monopolistic competition under a generalized homothetic demand system. This demand system nests a variety of monopolistic competition models, such as CES (Melitz, 2003) and translog (Feenstra, 2003), but allows for more flexibly – firms' price elasticity and pass-through rates can vary with the position on the demand curve – while remaining highly tractable. This more general specification is necessary to match the data, and, as we show in this section, is crucial for assessing the impact of changing entry costs.[28]

4.1.1 Consumers

The economy has a representative consumer. The consumer derives utility from consuming a final good Y and disutility from providing labor L following Greenwood et al. (1988):

$$U(Y, L) = \frac{1}{1-\gamma}\left(Y - \frac{L^{1+1/\eta}}{1+1/\eta}\right)^{1-\gamma}. \tag{4}$$

The final good Y combines varieties indexed by a type $\theta \in [0, 1]$. The expenditure on each variety of type θ is

$$p_\theta y_\theta = s_\theta\left(\frac{p_\theta}{P}\right) I, \tag{5}$$

where y_θ is the consumption of the variety θ, p_θ is its price, $s_\theta(\cdot)$ is a decreasing function and I is the consumer's income. In turn, P is a price aggregator defined implicitly by

$$\int_0^1 s_\theta\left(\frac{p_\theta}{P}\right) dF(\theta) = 1, \tag{6}$$

[28] Empirical evidence suggests that more productive firms charge higher markups and exhibit lower pass-through rates (De Loecker and Goldberg, 2014; Amiti et al., 2014; Feenstra and Weinstein, 2017). This is in contrast with CES, where both are constant, and translog, where pass-through rates increase in productivity. In turn, Matsuyama and Ushchev (2017); Baqaee et al. (2024) show that the propagation of shocks to market size depend crucially on the distribution and responses of both markups and pass-throughs.

where $dF(\theta)$ is a measure of varieties of type θ to be defined shortly.[29]

Households maximize utility in (4) subject to their budget constraint

$$\int_0^1 p_\theta y_\theta dF(\theta) = P^Y Y = wL = I, \tag{7}$$

where P^Y is the ideal price index and w is the wage.[30] From here onward, we set $w = 1$.

4.1.2 Firms

The market structure follows Melitz (2003). Each firm supplies a single variety and seeks to maximize profits, taking its residual demand curve as given. To enter the market, a firm needs to hire f_e units of labor. After paying the entry cost, a firm draws its type from the distribution $g(\theta)$ with cumulative distribution function $G(\theta)$. Firm's production is linear in labor: $y_\theta = A_\theta l_\theta$. Firm productivities A_θ are heterogeneous and vary with the firm's type θ.

We denote the price elasticity of demand for variety of type θ by σ_θ. From equation (5),

$$\sigma_\theta\left(\frac{p}{P}\right) = -\frac{\partial \log y_\theta}{\partial \log p_\theta} = 1 - \frac{p}{P}\frac{s'_\theta\left(\frac{p}{P}\right)}{s_\theta\left(\frac{p}{P}\right)} > 1. \tag{8}$$

Crucially, firm's price elasticity is a function of its relative price, which, in turn is a function of the firm's productivity.[31]

Firms maximize profits by setting their price as a markup μ_θ over their marginal cost $1/A_\theta$. The markup is given by the Lerner formula:

$$\mu_\theta\left(\frac{p}{P}\right) = \frac{1}{1 - \frac{1}{\sigma_\theta\left(\frac{p}{P}\right)}}. \tag{9}$$

In other words, firms that face less elastic demand, i.e. lower σ_θ, charge a higher markup.

Each period, firms face an exogenous probability of exit Δ. The mass of entrants M is endogenous and is determined by the free entry condition: firms enter until their expected lifetime variable profits are equal to the cost of entry. Thus, for positive M,

$$\frac{1}{\Delta}\int_0^1 \left[p_\theta y_\theta\left(1 - \frac{1}{\mu_\theta}\right) g(\theta)\, d\theta\right] = f_e. \tag{10}$$

Finally, the density of varieties available to the consumer, $F(\theta)$, is given by $Mg(\theta)d\theta$.

[29] We follow Baqaee et al. (2024) in assuming that $s_\theta(\cdot)$ is strictly decreasing, $\lim_{x\to 0} s_\theta(x) = \infty$, $\lim_{x\to\infty} s_\theta(x) = 0$, and $xs''_\theta(x) < \left[\frac{xs'_\theta(x)}{s_\theta(x)} - 1\right] s'_\theta(x)$ for all x and all θ. These assumptions ensure that the demand curves for each variety are downward sloping and each firm's profit-maximizing price is unique.

[30] Note that outside of the CES special case, the price aggregator P and the ideal price index P_Y are distinct. The former mediates competition across varieties, whereas the latter determines welfare (see Matsuyama and Ushchev (2017) for details). Note further that households do not receive profits as these are equal to the fixed costs of entry paid to labor which the household is in receipt of.

[31] Note that for CES preferences $s_\theta\left(\frac{p_\theta}{P}\right) = \left(\frac{p_\theta}{P}\right)^{1-\sigma}$, so expression (8) collapses to a constant σ.

4.1.3 Aggregate Variables

Aggregate labor supply L^S obtains from the consumer's labor supply optimality condition:

$$L^S = \left(\frac{w}{P^Y}\right)^{\eta}. \tag{11}$$

In turn, labor demand combines the production labor and labor used for entry:

$$L^D = \int_0^1 l_\theta M g(\theta)\, d\theta + M f_e = \int_0^1 p_\theta y_\theta M g(\theta)\, d\theta, \tag{12}$$

where the second equality makes use of the wage normalization, free entry condition (10) and the optimal firm-level labor demand to substitute $l_\theta = y_\theta A_\theta^{-1} = p_\theta y_\theta \mu_\theta^{-1}$.

4.1.4 Equilibrium

An equilibrium in this economy consists of the mass of entrants, price indices, labor and income $\{M, P, P^Y, L, I\}$ and firm-level prices $\{p_\theta\}$ for each variety type $\theta \in [0,1]$, such that:

(i) Consumers maximize utility defined in (4)-(6) subject to their budget constraint (7).

(ii) Given the aggregate variables, the markup set by each firm satisfies equation (9).

(iii) Free-entry condition (10) holds.

(iv) The labor market clears. In particular, $L^S = L^D$, defined in (11) and (12) respectively.

4.2 Comparative Statics

In this section, we present the dynamics of the model, log-linearized around its steady state. We adapt many results from Baqaee et al. (2024) and refer readers to this paper for a more detailed discussion.

Let $d\log x = dx/x$ denote the deviation of x from its steady state level. We model the introduction of One-Stop Shops as a decline in the fixed cost of entry: $d\log f_e < 0$. In Appendix B.1, we show that the model dynamics reduce to the following system of equations.

The price change satisfies

$$d\log p_\theta = (1-\rho_\theta)\, d\log P, \quad \text{where} \quad \rho_\theta\left(\frac{p}{P}\right) = \frac{1}{1 - \frac{p}{P}\frac{\mu_\theta'\left(\frac{p}{P}\right)}{\mu_\theta\left(\frac{p}{P}\right)}} \tag{13}$$

is the elasticity of the price of a variety to its marginal cost, or pass-through.[32]

[32] Note that under CES preferences, firms' pass-through is complete ($\rho_\theta = 1$), as their markups are constant.

The definition of the price index yields the change in the mass of operating firms:

$$d\log M = \mathbb{E}_\lambda\left(\sigma_\theta - 1\right)\left(d\log p_\theta - d\log P\right) = \mathbb{E}_\lambda\left(1-\sigma_\theta\right)\rho_\theta d\log P, \tag{14}$$

where $\mathbb{E}_x$ is an x-weighted average, $\lambda_\theta = s_\theta M$ is the sales share density of variety θ, and the second equality obtains by substituting individual firms' price responses.[33] Note that since $\sigma_\theta > 1$ for all θ, the mass of operating firms and price index are inversely related. Intuitively, a toughening of competitive pressure in form of a lower aggregate price index drives all firms to reduce prices. However, inasmuch as adjustment is not one-to-one ($\rho_\theta > 0$), the relative prices increase and expenditure shares decline, making space for new entry.

Free entry condition becomes

$$d\log P = \left(\overline{\mu} - 1\right)\left(d\log f_e - d\log I\right), \tag{15}$$

where $\overline{\mu} = \left[\mathbb{E}_\lambda \mu_\theta^{-1}\right]^{-1}$ is the sales-weighted harmonic mean markup in the economy.

The household budget constraint together with the labor supply condition yield

$$d\log I = -\eta d\log P^Y. \tag{16}$$

Baqaee et al. (2024) show that the ideal and aggregate price indies link via

$$d\log P^Y = \left(\left(\mathbb{E}_\lambda \delta_\theta - 1\right)\mathbb{E}_\lambda\left(\sigma_\theta - 1\right)\rho_\theta + \mathbb{E}_\lambda(1-\rho_\theta)\right) d\log P = \varepsilon_P^{P^Y} d\log P, \tag{17}$$

where δ_θ is the ratio of consumer surplus and sales for each variety.[34] From here onward, we will use shorthand $\varepsilon_{x,y} \equiv \dfrac{d\log x}{d\log y}$ to denote the elasticity of x with respect to y.

Finally, we impose a parametric restriction on the labor supply elasticity.

Assumption 1. *The Frisch elasticity η satisfies $\eta < [(\overline{\mu}-1)\varepsilon_P^{P^Y}]^{-1}$.*

This restriction ensures the steady state is stable and holds for standard parameter values.[35] We are now ready for our first proposition, which links the creation of One-Stop Shops, which we model as a decline in the fixed cost of entry, and the aggregate price.

Proposition 1. *A decline in the fixed cost of entry leads to a decline in the aggregate price:*

$$\frac{d\log P}{d\log f_e} = \frac{\overline{\mu}-1}{1-(\overline{\mu}-1)\varepsilon_P^{P^Y}\eta} = \varepsilon_{f_e}^P \geq 0.$$

[33] Note that from the definition of price index, sales shares density integrates to 1: $\int_0^1 \lambda_\theta dg(\theta)d\theta = 1$.

[34] Specifically, $\delta_\theta = 1 + \dfrac{\int_{p_\theta/P}^\infty \frac{s(\xi)}{\xi}d\xi}{s_\theta\left(\frac{p_\theta}{P}\right)}$.

[35] If the labor supply elasticity lies outside of this parametric restriction, a feedback loop emerges: an increase in the price level increases the labor supply and income. A larger market size encourages entry and, via the love of variety effect, reduces the price level further. Our assumption rules out such dynamics. For $\varepsilon_P^{P^Y} = 1$ (CES), we require that Frisch elasticity lies below 7.3 (5.8) given an aggregate markup of 1.05 (1.15).

Proof. The proof of all propositions in this section can be found in Appendix B.1. □

Lower costs of entry reduce the expected profits that make entry worthwhile. As a result, more firms enter and the competitive pressure in the market increases – reflected in a lower aggregate price level.

Our second proposition outlines the effect of the introduction of One-Stop Shops on the aggregate economy.

Proposition 2. *A decline in the fixed cost of entry increases the mass of operating firms, labor supply, and income:*

$$\frac{d\log M}{d\log f_e} = -\varepsilon^P_{f_e}\mathbb{E}_\lambda\left(\sigma_\theta - 1\right)\rho_\theta \leq 0, \quad \frac{d\log I}{d\log f_e} = \frac{d\log L}{d\log f_e} = -\varepsilon^P_{f_e}\varepsilon^{P^Y}_P\,\eta \leq 0.$$

Lower cost encourages more entry, resulting in a higher number of operating firms. Note that a higher price elasticity of demand results in a more reactive entry margin as incumbent firms shrink more in response to rising competitive pressure, making space for more entry. In turn, as the aggregate and ideal price indices decline, the real wage goes up, increasing both labor supply and income. The higher the elasticity of labor supply η, the higher is the increase in labor supply and, consequently, incomes.

Our third proposition breaks down the effect of the introduction of One-Stop Shops on firm-level employment.

Proposition 3. *A decline in the fixed cost of entry has an ambiguous effect on firm-level employment:*

$$\frac{d\log l_\theta}{d\log f_e} = \varepsilon^P_{f_e}(\sigma_\theta\rho_\theta - 1 - \varepsilon^{P^Y}_P\,\eta) \lesseqgtr 0.$$

Moreover, this total effect can be broken down into individual channels as follows:

$$\frac{d\log l_\theta}{d\log f_e} = \xi^L + \xi^\epsilon + \xi^\mu,$$

where

$$\begin{aligned}
(\textit{Labor Supply Effect})\ \xi^L &= -\varepsilon^P_{f_e}\varepsilon^{P^Y}_P\,\eta \leq 0,\\
(\textit{Darwinian Effect})\ \xi^\epsilon &= \ \varepsilon^P_{f_e}(\sigma_\theta - 1) \geq 0,\\
(\textit{Pro/Anticompetitive Effect})\ \xi^\mu &= -\varepsilon^P_{f_e}\sigma_\theta(1-\rho_\theta) \leq 0.
\end{aligned}$$

An increase in the labor supply makes more labor available for firms to hire. We refer to this as the labor supply effect. We label the second and third effects Darwinian and pro/anticompetitive, following Baqaee et al. (2024). A decline in the fixed cost of entry and resultant increase in the mass of operating firms result in a more competitive environment.

This reduces employment in all firms, but to a different degree: firms that face a relatively less elastic demand summarized by σ_θ contract their employment by less. Finally, the pro/anticompetitive effect reflects the changes in employment after the firms have adjusted their markups in response to the change in entry. As firms bring their prices down, some of the loss of demand is mitigated, which pushes firm-level employment up.

The relative response of employment across firms is summarized in Proposition 4.

Proposition 4. *Consider two firms producing varieties θ and θ' such that the former faces a less elastic residual demand: $\sigma_\theta < \sigma_{\theta'}$. A decline in the fixed cost of entry has an ambiguous effect on the relative employment in these two firms:*

$$\frac{d\log l_\theta}{d\log f_e} - \frac{d\log l_{\theta'}}{d\log f_e} = \varepsilon^P_{f_e}(\sigma_\theta\rho_\theta - \sigma_{\theta'}\rho_{\theta'}) \gtreqless 0.$$

Moreover, this total effect can be broken down into individual channels as follows:

$$\frac{d\log l_\theta}{d\log f_e} = (\xi^\epsilon_\theta - \xi^\epsilon_{\theta'}) + (\xi^\mu_\theta - \xi^\mu_{\theta'}),$$

where

$$\begin{aligned}(\textit{Darwinian Effect})\ \xi^\epsilon_\theta - \xi^\epsilon_{\theta'} &= \ \varepsilon^P_{f_e}(\sigma_\theta - \sigma_{\theta'}) \leq 0,\\ (\textit{Pro/Anticompetitive Effect})\ \xi^\mu_\theta - \xi^\mu_{\theta'} &= -\varepsilon^P_{f_e}\left(\sigma_\theta(1-\rho_\theta) - \sigma_{\theta'}(1-\rho_{\theta'})\right) \gtreqless 0.\end{aligned}$$

This result follows immediately from Proposition 3: firms that face less elastic demand contract their employment by less due to increase in competitive pressure (Darwinian effect). As a result, their relative employment increases. However, as firms adjust their markups, the relative employment adjusts further. The direction of this adjustment is ambiguous and depends not only on the elasticity of demand but also on how responsive firms markups are to the changes in aggregate price, summarized by the firm-level pass-through ρ.

For our fifth proposition, it is helpful to define two laws of demand.

Definition 1. *Marshall's 2nd law of demand:* $\dfrac{d\sigma_\theta}{dp_\theta} > 0.$

This definition states that firm-level price elasticities of demand strictly increase in firm-level price. An immediate implication of this assumption is that firms that set higher prices charge lower markups on their sales.

Definition 2. *Marshall's 3rd law of demand (weak):* $\dfrac{d\rho_\theta}{dp_\theta} \geq 0.$

The weak version of Marshall's third law of demand stipulates that firms that charge higher prices feature a weakly higher pass-through rate.

Finally, up until now, we have put little structure on firm types. We now re-label firm types such that productivity strictly increases in type: $\theta > \theta' \implies A_\theta > A_{\theta'}$.

Lemma 1. *Under Marshall's 2nd law of demand,* $\dfrac{dp_\theta}{dA_\theta} < 0.$

This Lemma enables us to interchangeably rank firms in order of increasing type, increasing productivity, or decreasing price. We are now ready for Proposition 5.

Proposition 5. *Suppose the demand system satisfies Marshall's 2nd and 3rd laws of demand. Consider two firms producing varieties* θ *and* θ' *such that* $A_\theta > A_{\theta'}$*. A decline in the fixed cost of entry increases the relative employment of the more productive firm:*

$$\frac{d\log l_\theta}{d\log f_e} - \frac{d\log l_{\theta'}}{d\log f_e} = \varepsilon^P_{f_e}(\sigma_\theta\rho_\theta - \sigma_{\theta'}\rho_{\theta'}) \leq 0.$$

This proposition leverages the structure that Marshall's 2nd and 3rd laws of demand put on the demand system to sign the sum of the Darwinian and pro/anticompetitive effects. Specifically, if both hold, then Darwinian effect always dominates the pro/anticompetitive effect. In other words, the shifts in demand due to the adjustment in markups is weaker than the direct effect of higher competitive pressure on firm-level sales and, therefore, employment.

Our last proposition discusses the welfare effects of the introduction of One-Stop Shops.

Proposition 6. *A decline in the fixed cost of entry increases real consumption and welfare:*

$$\frac{d\log U}{d\log f_e} = \frac{d\log Y}{d\log f_e}\frac{\eta+\nu}{\eta+1} = -\varepsilon^P_{f_e}\varepsilon^{P^Y}_P(\eta+\nu) = -\left(\zeta^{t.e.} + \zeta^{\epsilon} + \zeta^{\mu}\right)(\eta+\nu) \leq 0,$$

where $\nu = \left(1 - \frac{L^{1+1/\eta}}{Y(1+1/\eta)}\right)^{-1} \geq 1,$

$$\begin{aligned}
(\textit{Technical Efficiency})\ \zeta^{t.e.} &= \frac{(\mathbb{E}_\lambda\delta_\theta - 1)\,\varepsilon^P_{f_e}}{\overline{\mu}-1} \geq 0,\\
(\textit{Darwinian Effect})\ \zeta^{\epsilon} &= \frac{\overline{\mu}\,(\mathbb{E}_\lambda\delta_\theta - 1)\,\varepsilon^P_{f_e}}{\overline{\mu}-1}\,Cov_\lambda\left(\sigma_\theta, \frac{1}{\mu_\theta}\right) \geq 0,\\
(\textit{Pro/Anticompetitive Effect})\ \zeta^{\mu} &= \varepsilon^P_{f_e}\,\mathbb{E}_\lambda\left[(1-\rho_\theta)\sigma_\theta\left(1 - \frac{\mathbb{E}_\lambda\delta_\theta}{\mu_\theta}\right)\right] \lesseqgtr 0.
\end{aligned}$$

The welfare effects of change in entry costs come from multiple sources. First, a decline in the cost of entry increases the competitive pressure in the market, which in turn decreases the welfare-relevant ideal price index. Following Baqaee et al. (2024), we decompose the change in the ideal price index into technical and allocative efficiency terms. The former captures the effect of the entry of new varieties holding the allocation constant. This is the standard love of varieties effect. The other two terms represent the welfare effects of reallocation of production across firms. The Darwinian effect, as before, captures the reallocation of production towards firms that face less elastic demand. Since these are suboptimally small,

such reallocation is welfare improving. The pro/anticompetitive term, instead, captures the allocative effects that result from firms adjusting their prices. This reallocation may increase or decrease welfare, depending on the pattern of misallocation in the data before the change in the cost of entry. Finally, when labor supply is elastic, a decrease in the ideal price index and the corresponding increase in real wage incentivizes consumers to supply more labor. This comes at the cost of some disutility of labor, but the aggregate expenditure goes up further than under the inelastic labor supply ($\eta = 0$). The net welfare effect is positive and, with our specification of utility, takes the form of a multiplier ($\eta + \nu$).

4.3 Linking the Model and the Data

In this section, we briefly map the results in the previous segment with our empirical findings. First, in Section 3.2 we show that the introduction of One-Stop Shops has resulted in an increase in entry. This is in line with results in Proposition 2. Second, Section 3.3 shows that the local employment has increased after OSS introduction, in line with Proposition 3. Finally, Section 3.4 shows that the more productive firms have expanded their employment, compared to the least productive firms, in line with Proposition 5.[36]

5 Quantitative Exercise

In Section 4 we have leveraged a general model of monopolistic competition to interpret our empirical results. In this section, we explore the welfare implications of One-Stop Shops.

5.1 Calibration Strategy

Results in Section 4.2 indicate that the welfare impacts of the increase in entry depend on the shape of the joint distribution of consumer surplus ratios, elasticities of substitution, and pass-through rates across product types. Moreover, our empirical results are informative of the shape of such distribution, with the relative expansion of more productive firms in line with the operation of Marshall's 2nd and 3rd laws of demand. At the same time, virtually none of the utility function specifications commonly used satisfy both.[37] Thus, in order to estimate the welfare effects of the change in entry brought by the introduction of OSS, we

[36] Note that Proposition 5 assumes that Marshall's 2nd and 3rd laws of demand hold. These are sufficient but not necessary to observe a relative increase in employment among the most productive firms. Nonetheless, as evidence mounts in support of these laws being at work, we view our findings in section 3.4 as consistent with the operation of both.

[37] For example, CES violates the 2nd, whereas translog violates the 3rd Marshall's laws of demand.

implement the non-parametric calibration approach developed in Baqaee et al. (2024).[38] The strategy amounts to leveraging the observed sales shares and pass-through rates to obtain the markup and consumer surplus ratio distributions consistent with equilibrium conditions of the model. We then use the moments of the estimated distributions to compute the model-implied elasticities of firm-level employment and welfare with respect to entry.

The first step is to take a stance on the shape of expenditure share functions across types:

Assumption 2. $s_\theta = s\left(\frac{1}{B_\theta}\frac{p_\theta}{P}\right) = s\left(\frac{1}{A_\theta B_\theta}\frac{\mu_\theta}{P}\right)$, *where* B_θ *are type-specific quality shifters.*

Under this assumption, firms with higher quality adjusted productivity $A_\theta B_\theta$ feature higher sales shares λ_θ. Thus, Assumption 2 allows us to map types to firm's quality adjusted productivity $A_\theta B_\theta$ and firm's sales shares interchangeably.

Second, conditional on the aggregate markup $\overline{\mu}$ and the average consumer surplus ratio $\overline{\delta}$, firm-level sales shares, markups, pass-throughs and consumer surplus ratios are linked via the following set of differential equations:

$$\frac{d\log\mu_\theta}{d\theta} = (\mu_\theta - 1)\frac{1-\rho_\theta}{\rho_\theta}\frac{d\log\lambda_\theta}{d\theta} \quad \text{s.t. } \mathbb{E}_\lambda[\mu_\theta^{-1}]^{-1} = \overline{\mu}, \tag{18}$$

$$\frac{d\log\delta_\theta}{d\theta} = \left(\frac{\sigma_\theta}{(\sigma_\theta - 1)\delta_\theta} - 1\right)\frac{d\log\lambda_\theta}{d\theta} \quad \text{s.t. } \mathbb{E}_\lambda[\delta_\theta] = \overline{\delta}. \tag{19}$$

Intuitively, firm's markup and sales share both depend on firm's marginal costs, with both relationships mediated by the firm's pass-through rate. This gives rise to equation (18). In turn, the change in consumer surplus ratio reflects the balance of the changes in consumer surplus and sales respectively. The former is governed by the local slope of the demand curve, that is, demand elasticity, which gives rise to equation (19). Together, the two equations and two respective boundary conditions are sufficient to back out the distributions of markups and consumer surplus ratios using the data on the joint distribution of firm sales shares and pass-throughs. Finally, once these are obtained, we recover the quality-adjusted productivity from the differential equation that links quality-adjusted productivity and markups

$$\frac{d\log\mu_\theta}{d\theta} = (1-\rho_\theta)\frac{d\log A_\theta B_\theta}{d\theta} \quad \text{s.t. } \underline{A_\theta B_\theta} = 1, \tag{20}$$

where the quality-adjusted productivity of the lowest type $A_\theta B_\theta$ is normalized to 1 without loss of generality. The details of the implementation can be found in Appendix C.1.

[38] Since we follow the steps outlined in Baqaee et al. (2024) closely, we do not reproduce the proofs undelying the algorithm here. We refer the reader to this paper for detailed discussion.

5.2 Calibration Implementation

In order to compute the model-implied impact of One-Stop Shops, we need to estimate the joint distribution of sales shares and pass-through rates, take a stance on the boundary conditions $\overline{\mu}$ and $\overline{\delta}$ and labor supply elasticity η, and finally measure the size of the shock.

Sales shares. We compute firms' sales shares as the ratio of nominal sales to total sales in a given year. The data on nominal sales comes from the Quadros de Pessoal dataset.

Pass-through rates. We obtain pass-through rates distribution from Fernandes and Winters (2021). The authors exploit the exchange rate shock following the Brexit referendum to study the export price response of Portuguese firms using a difference-in-differences approach. They find that, in response to the shock, more productive firms decreased the prices they charge by more, resulting in a relatively more muted increase in the British pound price of their goods. This behavior is consistent with lower pass-through rates of more productive firms found in Amiti et al. (2014) and Li et al. (2015). The mapping of pass-through rates to the firm sales distribution is described in Appendix C.1.

Boundary conditions. De Loecker and Eeckhout (2018) estimate the average markup for Portugal of 1.16. The authors compute the sales-weighted arithmetic mean, whereas in our model, $\overline{\mu}$ is the harmonic mean. We thus treat 1.16 as the upper bound and use $\overline{\mu} = 1.1$ as our baseline. We additionally report our results for alternative values of 1.05 and 1.15. Measuring consumer surplus ratios to obtain the second boundary condition is difficult as this requires estimating demand curves, including the region away from observed sales. Typically, this would require making parametric assumptions regarding the shape of demand curves, against the spirit of the exercise. An alternative route, following Baqaee et al. (2024), is to impose efficient entry or efficient selection. In case of efficient entry, this amounts to assuming that $\overline{\delta} = \overline{\mu}$. Since, in line with our empirical results, we do not model selection, we assume efficient entry and thus set $\overline{\delta} = 1.1$ as the second boundary condition.[39]

Labor supply elasticity. We set the labor supply elasticity parameter η to 2. This value is between the typical macro and micro estimates of labor supply elasticities and comes from Clementi and Palazzo (2016) who match labor supply responses in a model of firm dynamics. As a robustness check, we additionally compute all our results for values of η of 1 and 5.

Measuring the size of the shock. Our point of departure here is to observe that the causally identified response in entry is a sufficient statistic for the change in the competitive pressure driven by the decline in the costs of entry. In steady state, entry and exit offset exactly: $M_e = \Delta M$. However, with an introduction of One-Stop Shops, we record an increase in entry which cumulates to approximately 100% of the initial level of annual entry. With

[39] For example, under CES, consumer surplus ratio is constant and equal to $\frac{\sigma}{\sigma-1} = \overline{\mu}$ and entry is efficient.

an average entry rate of 8.5%, this comprises a corresponding 8.5% increase in the number of operating firms. Therefore, we consider $d\log M = 0.085$ to be our treatment.

Constructing a counterfactual. Once we have solved for the joint distribution of firm-level variables, we leverage results from Propositions 1, 2, 3 and 6 to compute the model-implied change in firm-level employment, labor supply and real consumption as follows:

$$\begin{aligned} d\log l_\theta &= \varepsilon_M^P \left(\sigma_\theta \rho_\theta - 1 - \varepsilon_P^{P^Y} \eta\right) d\log M, \\ d\log L &= -\varepsilon_M^P \varepsilon_P^{P^Y} \eta d\log M, \\ d\log Y &= -\varepsilon_M^P \varepsilon_P^{P^Y} (\eta+1) d\log M, \end{aligned}$$

where $\varepsilon_M^P = \left[\mathbb{E}_\lambda\left(1-\sigma_\theta\right)\rho_\theta\right]^{-1}$ and $\varepsilon_P^{P^Y} = \left(\left(\mathbb{E}_\lambda \delta_\theta - 1\right)\mathbb{E}_\lambda\left(\sigma_\theta - 1\right)\rho_\theta + \mathbb{E}_\lambda(1-\rho_\theta)\right)$.[40]

5.3 Results

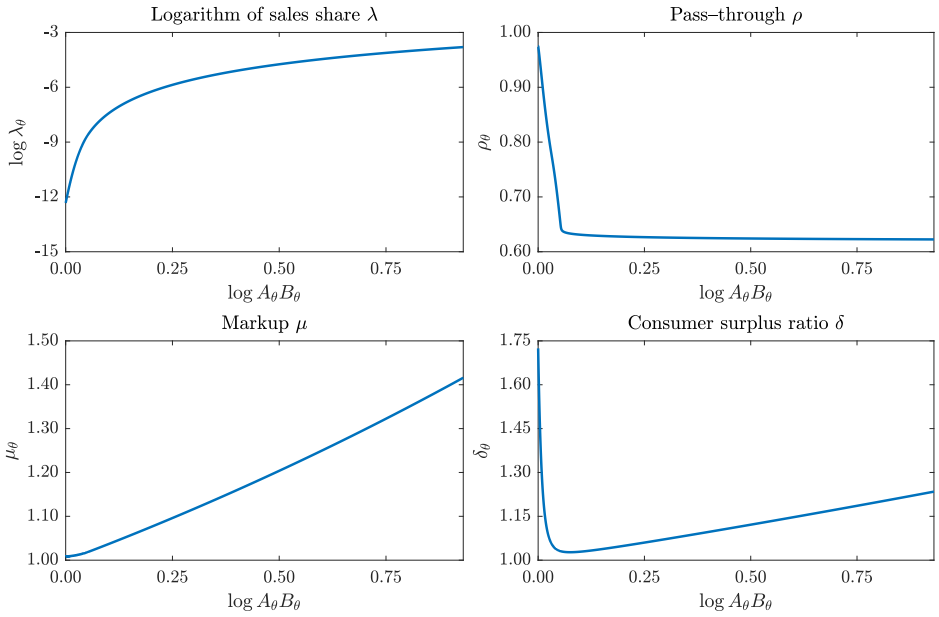
Figure 9 presents the sales shares, pass-through rates, markups and consumer surplus ratios across the firm types. The former two are the inputs we use to back out the latter two. The model-implied markups increase in firms' quality-adjusted productivities, whereas the consumer surplus ratios are non-monotonic.

The solid line in Figure 10 presents the model-implied change in firm-level employment after a One-Stop Shop has been introduced in the municipality. The least productive firms contract whereas the most productive firms see virtually no change in their employment. To better understand the heterogeneous responses in firm-level employment, we decompose the change in employment into the three channels identified in Proposition 3. The terms of decomposition are presented with dashed lines. The main driver behind the disproportional contraction in employment in unproductive firms is the Darwinian effect. These firms face relatively more elastic demand and therefore are much more sensitive to the increase in competitive pressure caused by the introduction of One-Stop Shops. The operation of this channel is much weaker for productive firms. Some of this decline is offset via the decrease in markups charged by the relatively less productive firms, captured by the pro/anticompetitive effect term. Finally, as labor supply increases, all firms expand their employment via the labor supply channel. However, under baseline calibration, this effect is quantitatively small.

Next, we compute the average change in employment for terciles of firm productivity distribution. We find that employment of the top tercile expanded by 15.8% relative to that in the bottom tercile. This result is in line with our empirical findings in Section 3.4, where we

[40] Note that in order to compute the change in welfare, we need to compute ν which requires knowledge of pre-reform consumption and labor in levels. Since we have no moments to discipline these, we compute real consumption, and use it as the lower bound for change in welfare, as $d\log U = \frac{\nu+\eta}{1+\eta} d\log Y$, $\frac{\nu+\eta}{1+\eta} \geq 1$.

Figure 9: Distributions across productivity types

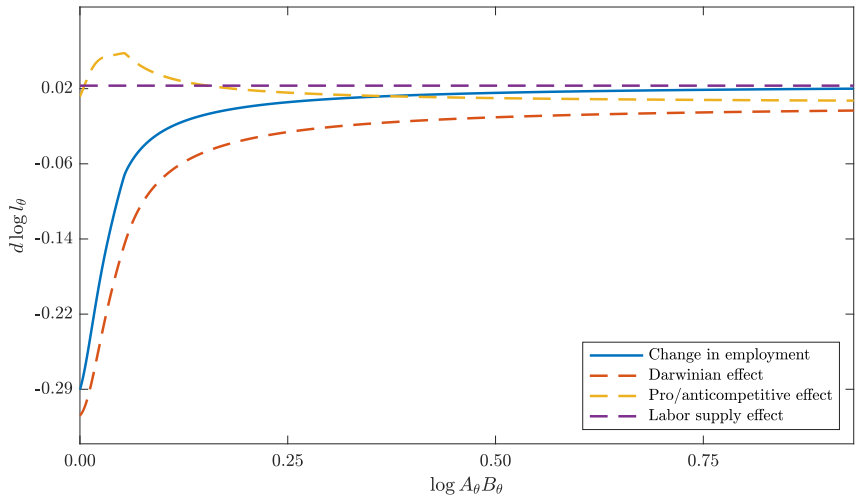


This figure plots firm-level variables across firm types. The panels show, respectively, the logarithm of sales shares ($\log(\lambda_\theta)$), markups (μ_θ), consumer surplus ratios (δ_θ), and pass-throughs (ρ_θ). The horizontal axis in each subplot is the logarithm of quality-adjusted productivity $A_\theta B_\theta$.

find that the firms in the top tercile expand relative to those in the bottom tercile. Results in Figure 10, in turn, identify heterogeneous price elasticity faced by producers as the key driver behind the heterogeneous response. This result is robust to picking alternative aggregate markup and labor supply elasticity values, with the difference in employment response between top and bottom terciles of 15.6% to 15.9% for different parameter combinations.

Table 2 reports the change in labor supply following an introduction of a One-Stop Shop. For our baseline calibration, we find that the labor supply increases by 2.1%. Note that this response is qualitatively in line with our empirical findings in Section 3.3. However, our empirical findings indicate a stronger labor supply response than the one implied by our model. In the empirical analysis, we claimed that the local increase in employment was an upper bound for the economy-wide impact of the reform. The labor supply elasticity is higher at the municipality level, because workers can commute across municipalities. Moreover, since our dataset only considers firms in the private sector, the measured labor supply is further raised by the fact that we cannot control for workers moving away from government-owned firms within each municipality. We can proxy for the effects of labor supply from different municipalities and government-owned firms by setting a higher labor supply elasticity. For $\eta = 5$, we find that labor supply increases by 4.7%, compared to 4.8% in the data.

Figure 10: Distributions across productivity types



This figure plots the model-implied change in firm-level employment following an introduction of a One-Stop Shop. The horizontal axis is the logarithm of quality-adjusted productivity $A_\theta B_\theta$.

Table 2: Change in labor supply (%) from One-Stop Shop introduction

	$\eta = 1$	$\eta = 2$	$\eta = 5$
%Δ Labor Supply	0.9	1.9	4.7

This table presents the simulated change in municipality-level employment following an introduction of a One-Stop Shop. The columns list results for different values of labor supply elasticity.

We conclude by assessing the welfare effects of the reform. Recall that the change in welfare is weakly greater than the increase in real consumption, which in turn is a product of the elasticity of ideal price index with respect to the mass of operating firms, the change in the mass of operating firms, and the labor supply multiplier $\eta+1$. Analogously to Proposition 6, the former can be broken down into the technical and allocative efficiency terms:

Lemma 2. *An increase in the mass of operating firms increases real consumption:*

$$\frac{d \log Y}{d \log M} = -\varepsilon_M^{PY} (\eta + 1) \geq 0.$$

where

$$\varepsilon_M^{PY} = \underbrace{-\frac{(\mathbb{E}_\lambda \delta_\theta - 1)\, \varepsilon_M^P}{\overline{\mu} - 1}}_{\textit{Technical Efficiency}} \underbrace{-\frac{\overline{\mu}\,(\mathbb{E}_\lambda \delta_\theta - 1)\, \varepsilon_M^P}{\overline{\mu} - 1}\, Cov_\lambda \left(\sigma_\theta, \frac{1}{\mu_\theta} \right)}_{\textit{Darwinian Effect}} \underbrace{-\varepsilon_M^P\, \mathbb{E}_\lambda \left[(1 - \rho_\theta) \sigma_\theta \left(1 - \frac{\mathbb{E}_\lambda \delta_\theta}{\mu_\theta} \right) \right]}_{\textit{Pro/Anticompetitive Effect}}.$$

Table 3 reports the lower bound of the change in welfare after the reform, as well as the decomposition of the elasticity of ideal price index following Lemma 2. We find a real consumption increase of 2.8%. The elasticity of the ideal price index with respect to the change in the mass of operating firms is 0.112. In turn, under our baseline calibration, this total effect is driven mainly by the Darwinian effect. In the model, the most productive firms are also the ones that are suboptimally small. Increase in competitive pressure reallocates production towards these firms, thereby improving welfare. The contribution of the technical efficiency term is positive but smaller in magnitude, and that of the pro/anticompetitive effect is small but negative.[41] Crucially, we would have missed around a two thirds of the total welfare effect if we assumed an off-the-shelf CES utility function.

Table 3: Change welfare (%) from One-Stop Shop introduction

		$\mu = 1.1,\ \eta = 2$
$\varepsilon_M^{P^Y}$		11.2
	Technical Efficiency	3.2
	Darwinian Effect	10.2
	Pro/Anticompetitive Effect	-2.3
% Δ Welfare (lower bound)		2.8

This table presents the simulated change in municipality-level welfare following an introduction of a One-Stop Shop and the decomposition of the ideal price index elasticity following Lemma 2.

6 Conclusion

In this paper we provide novel evidence on the macroeconomic impact and firm-level channels of a reform that reduced entry costs for firms and increased business competition. We do so by using an economy-wide entry deregulation reform in Portugal as a natural experiment. The reform led to an increase in firm entry and aggregate employment. We then uncover the drivers of the response of employment. We find that the bulk of the increase in employment is coming from incumbent firms who were the most productive before the reform.

We show that a model with heterogeneous firms and variable markups is consistent with our empirical findings. Our calibrated model reveals that the change in the level and

[41] We find that our quantitative results are not sensitive to the level of the aggregate markup that we use, with real consumption increasing by 2.7% and 3% for $\overline{\mu} = \{1.05, 1.15\}$ respectively. Likewise, the split between the technical efficiency, Darwinian and Pro/anticompetitive effects is largely unaffected.

distribution of markups account for around two thirds of the increase in real consumption. The rest is due to the love-of-variety effect driven by the rise in the mass of operating firms.

The Portuguese experiment allows us to identify the impact of the reform. However, a concern can be raised about the external validity of our results. Evidence of no change in the exit probability for the least productive incumbents may be related to rigidities specific to the Portuguese economy. However, the key takeaways from this paper hold beyond the Portuguese setting. A theoretical framework able to capture the heterogeneity in the responses of firms to an entry shock requires a demand system featuring variable markups.

References

Amici, M., S. Giacomelli, F. Manaresi, and M. Tonello (2016). Red tape reduction and firm entry: New evidence from an italian reform. Economics Letters 146, 24–27.

Amiti, M., O. Itskhoki, and J. Konings (2014). Importers, exporters, and exchange rate disconnect. American Economic Review 104(7), 1942–1978.

Arkolakis, C., A. Costinot, D. Donaldson, and A. Rodríguez-Clare (2019). The elusive pro-competitive effects of trade. The Review of Economic Studies 86(1), 46–80.

Atkeson, A. and A. Burstein (2008). Pricing-to-market, trade costs, and international relative prices. American Economic Review 98(5), 1998–2031.

Bajgar, M., G. Berlingieri, S. Calligaris, C. Criscuolo, and J. Timmis (2019). Industry concentration in europe and north america.

Baqaee, D. R., E. Farhi, and K. Sangani (2024). The darwinian returns to scale. Review of Economic Studies 91(3), 1373–1405.

Bertrand, M. and F. Kramarz (2002). Does entry regulation hinder job creation? evidence from the french retail industry. Quarterly Journal of Economics 117, 1369–1414.

Bilbiie, F., F. Ghironi, and M. J. Melitz (2012). Endogenous entry, product variety, and business cycles. Journal of Political Economy 120(2).

Blanchard, O. (2007). Adjustment within the euro. the difficult case of portugal. Portuguese Economic Journal 6(1), 1–21.

Blanchard, O. and F. Giavazzi (2003). Macroeconomic effects of regulation and deregulation in goods and labor markets. The Quarterly journal of economics 118(3), 879–907.

Bouis, R., M. R. A. Duval, and J. Eugster (2016). Product Market Deregulation and Growth: New Country-Industry-Level Evidence. International Monetary Fund.

Branstetter, L., F. Lima, L. J. Taylor, and A. Venâncio (2014). Do entry regulations deter entrepreneurship and job creation? evidence from recent reforms in portugal. The Economic Journal 124(577), 805–832.

Cacciatore, M., R. Duval, G. Fiori, and F. Ghironi (2016a). Market reforms in the time of imbalance. Journal of Economic Dynamics and Control 72, 69–93.

Cacciatore, M., R. Duval, G. Fiori, and F. Ghironi (2016b). Short-term pain for long-term gain: Market deregulation and monetary policy in small open economies. Journal of International Money and Finance 68, 358–385.

Cacciatore, M., R. Duval, G. Fiori, and F. Ghironi (2021). Market reforms at the zero lower bound. Journal of Money, Credit and Banking 53(4), 745–777.

Cacciatore, M. and G. Fiori (2016). The macroeconomic effects of goods and labor markets deregulation. Review of Economic Dynamics 20, 1–24.

Cacciatore, M., G. Fiori, and F. Ghironi (2016). Market deregulation and optimal monetary policy in a monetary union. Journal of International Economics 99, 120–137.

Clementi, G. L. and B. Palazzo (2016). Entry, exit, firm dynamics, and aggregate ffuctuations. American Economic Journal: Macroeconomics 8(3), 1–41.

De Loecker, J. and J. Eeckhout (2018). Global market power. Technical report, National Bureau of Economic Research.

De Loecker, J. and P. K. Goldberg (2014). Firm performance in a global market. Annu. Rev. Econ. 6(1), 201–227.

Decker, R., J. Haltiwanger, R. Jarmin, and J. Miranda (2014). The role of entrepreneurship in us job creation and economic dynamism. Journal of Economic Perspectives 28(3), 3–24.

Duval, R. and D. Furceri (2018). The effects of labor and product market reforms: the role of macroeconomic conditions and policies. IMF Economic Review 66(1), 31–69.

Edmond, C., V. Midrigan, and D. Y. Xu (2015). Competition, markups, and the gains from international trade. American Economic Review 105(10), 3183–3221.

Edmond, C., V. Midrigan, and D. Y. Xu (2023). How costly are markups? Journal of Political Economy 131(7), 1619–1675.

Eggertsson, G., A. Ferrero, and A. Raffo (2014). Can structural reforms help europe? Journal of Monetary Economics 61, 2–22.

Eggertsson, G. B. (2012). Was the new deal contractionary? American Economic Review 102(1), 524–555.

Feenstra, R. C. (2003). A homothetic utility function for monopolistic competition models, without constant price elasticity. Economics Letters 78(1), 79–86.

Feenstra, R. C. and D. E. Weinstein (2017). Globalization, markups, and us welfare. Journal of Political Economy 125(4), 1040–1074.

Fernandes, A. P. and L. A. Winters (2021). Exporters and shocks: The impact of the brexit vote shock on bilateral exports to the uk. Journal of International Economics 131, 103489.

Greenwood, J., Z. Hercowitz, and G. W. Huffman (1988). Investment, capacity utilization, and the real business cycle. The American Economic Review, 402–417.

Grullon, G., Y. Larkin, and R. Michaely (2018). Are us industries becoming more concentrated? Forthcoming, Review of Finance.

Hathaway, I. and R. E. Litan (2014). Declining business dynamism in the united states: A look at states and metros. Brookings Institution, 2.

Hombert, J., A. Schoar, D. Sraer, and D. Thesmar (2020). Can unemployment insurance spur entrepreneurial activity? evidence from france. The Journal of Finance 75(3), 1247–1285.

Hopenhayn, H. A. (1992). Entry, exit, and firm dynamics in long-run equilibrium. Econometrica: Journal of the Econometric Society, 1127–1150.

Kaplan, D. S., E. Piedra, and E. Seira (2011). Entry regulation and business start-ups: Evidence from mexico. Journal of Public Economics 95(11), 1501–1515.

Klenow, P. J. and J. L. Willis (2016). Real rigidities and nominal price changes. Economica 83(331), 443–472.

Lee, Y. and T. Mukoyama (2008). Entry, exit and plant-level dynamics over the business cycle.

Leitão Marques, M. M. (2007). One-stop shopping in portugal. World Bank , Smart Lessons in Advisory Services.

Li, H., H. Ma, and Y. Xu (2015). How do exchange rate movements affect chinese exports?—a firm-level investigation. Journal of International Economics 97(1), 148–161.

Matsuyama, K. and P. Ushchev (2017). Beyond ces: three alternative classes of flexible homothetic demand systems. Global Poverty Research Lab Working Paper (17-109).

Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. Econometrica 71(6), 1695–1725.

Viviano, E. (2008). Entry regulations and labour market outcomes: Evidence from the italian retail trade sector. Labour Economics 15(6), 1200–1222.

Zhelobodko, E., S. Kokovin, M. Parenti, and J.-F. Thisse (2012). Monopolistic competition: Beyond the constant elasticity of substitution. Econometrica 80(6), 2765–2784.

Tables

Table .4: Descriptive Statistics on Municipality Groups in the Pre-Reform Period

	Treated Municipalities	Never-Treated	Early-Treated	Late-Treated
Firm Demographics				
Entry rate	8.5% (4.6%)	9.4% (6.9%)	7.9% (4%)	8.8% (5%)
	[5.7%, 10.2%]	[5.4%, 11.9%]	[5.8%, 8.7%]	[5.6%, 10.8%]
Entrants x 1,000 inhab	0.83 (0.4)	0.71(0.45)	0.88 (0.34)	0.81 (0.42)
	[0.56, 1.02]	[0.4, 0.97]	[0.64, 1.03]	[0.54, 1.01]
Exit rate	8.4%(2.8%)	7.7%(4.1%)	8.5%(2.3%)	8.3%(3%)
	[6.8%, 10%]	[5.3%, 10%]	[7%, 9.7%]	[6.6%, 9.9%]
Exit x 1,000 inhab	0.93 (0.38)	0.68 (0.4)	1.1 (0.39)	0.84 (0.35)
	[0.67, 1.1]	[0.38, 0.94]	[0.8, 1.3]	[0.6, 1.1]
Active firms x 1,000 inhab	10.67 (3.8)	8.32 (3.4)	12.21 (3.8)	9.8 (3.5)
	[8.1, 12.9]	[5.7, 10.4]	[9.4, 15.1]	[7.4, 11.7]
Macroeconomic Characteristics				
Employment rate (Census)	47.2% (24%)	34.1% (21%)	53.7%(27%)	43.4% (18%)
	[34.4%, 59.2%]	[25.8%, 44.3%]	[39.8%, 65.7%]	[30.6%, 54.9%]
Residents (mean)	66,896.1 (128,244)	18,540,7 (41,762.5)	114,213.3 (149,881.3)	39,421.6 (56,260.2)
	[17,852, 74,965]	[6,396, 21,135]	[44,162, 142,728]	[14,241, 52,604]
Share of pop aged 65 or more	19.07%(6.5%)	22.05%(8.2%)	16.31% (3.99%)	20.7% (7.21%)
	[14.3%, 22.3%]	[17.3%, 26.3%]	[12.9%, 19.9%]	[16.2%, 24.7%]
Macro-Sector of Activity				
Agriculture - Sales	2.82%(6%)	3.9%(6%)	1.37%(4%)	3.67%(6%)
	[0.1%, 2.8%]	[0.4%, 5.2%]	[0.1%, 1.3%]	[0.2%, 3.8%]
Manufacturing - Sales	28.3% (19%)	27.2% (20%)	28.2% (20%)	28.3% (20%)
	[11.1%, 40.5%]	[11.7%, 40.4%]	[14.3%, 45.4%]	[10.9%, 40.5%]
Construction - Sales	12.1% (9%)	16.9% (13%)	10.4% (7%)	13.1% (10%)
	[5.3%, 14.6%]	[7.2%, 22%]	[6.2%, 12.7%]	[4.8% 16.6%]
Services - Sales	46.66% (19%)	41.13% (15%)	53.76% (17%)	41.92% (16%)
	[42.5%, 70.1%]	[39.6%, 65.3%]	[43.9%, 73.5%]	[42%, 66.2%]

Source: *Quadros de Pessoal and Portugal National Statistics Institute.*

The Table displays the mean of each variable. Standard deviations are in round parenthesis. The 25^{th} and 75^{th} percentiles are in square parenthesis. The statistics refer to the period 2000-2004.

Table .5: Descriptive Statistics on Non-Financial Corporations

	yearly average
Relevant Statistics	
Entry Rate	7.5%
Exit Rate	9.3%
Operating Firms	125,015
Employment Sector Shares	
Agriculture	1.63%
Manufacturing	32.6%
Construction	15.13%
Services	50.64%
Sales Sector Shares	
Agriculture	1.52%
Manufacturing	26.6%
Construction	10.14%
Services	61.74%

	$p1$	$p25$	$p50$	*mean*	$p75$	$p99$
Relevant Distributions						
Size Distribution	1	2	4	7.13	8	55
Age Distribution	0	2	6	10.87	15	59
Size of Entrants	1	1	2	3.75	4	27
Size of Young Firms ($\leq$ 5 yrs)	1	2	3	4.95	5	36
Size of Old Firms	1	3	5	8.96	10	64

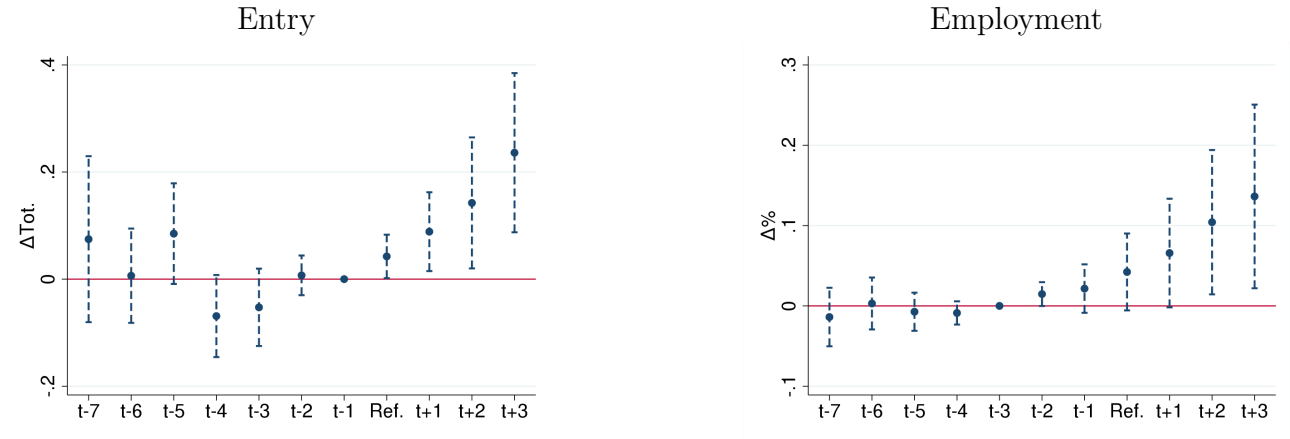
	Entrants	Age 0-2	3-5	6-15	15 +	Young Firms	Old Firms
Average Statistics by Age Groups							
Municipality Sales Share	2.5%	13.7%	16.2%	37.7%	34%	29.7%	70.3%
Municipality Employment Share	5%	14.4%	17.8%	35.6%	28.7%	36.9%	63.1%
Municipality Exit Share	12.5%	43.2%	23.7%	23.3%	10.3%	66.7%	33.3%
Municipality Count Firm Share							
Size	3.75	4.42	5.7	7.71	10.5	4.9	9
Exit Rate	16.6%	15.7%	11.4%	7.45%	5.4%	13.9%	6.5%
2-yr Survival Rate Entrants	69.7%						
4-yr Survival Rate Entrant	46.6%						

Source: *Quadros de Pessoal*

The statistics refer to the period 2000-2008.

A Tables and Figures

Figure A.1: Impact of Empresa Na Hora - Weighted Regressions

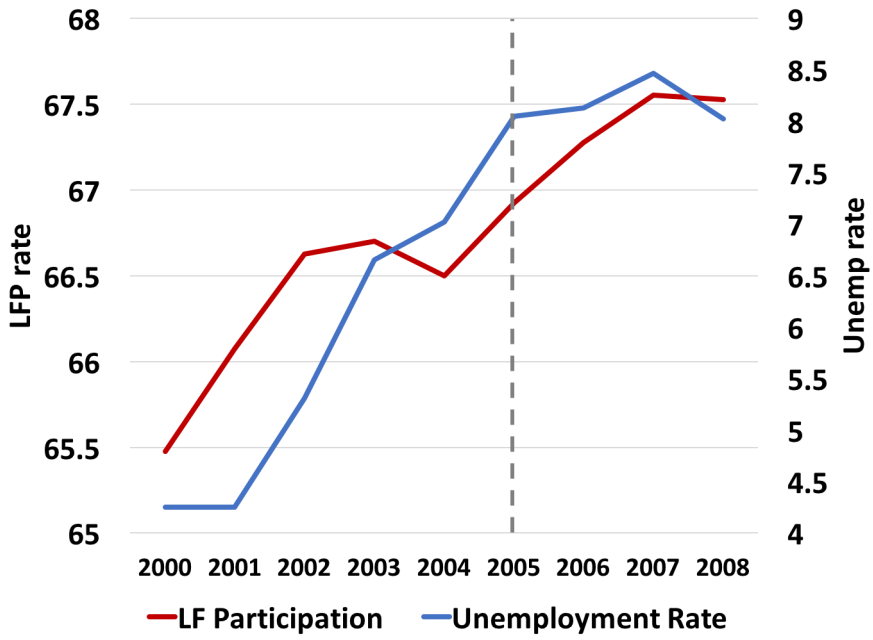


The figure shows the estimates of β_τ from the following regressions at the municipality level weighted by the number of firms in each municipality:

$$y_{m,t} = \alpha_m + \delta_t + \sum_{\tau=-7}^{\tau=3} \beta_\tau \mathbb{1}(t - \tau_{0,m} = \tau) + \sum_m \gamma_m \mathbb{1}(\text{Municipality}_m = 1)t + \epsilon_{m,t},$$

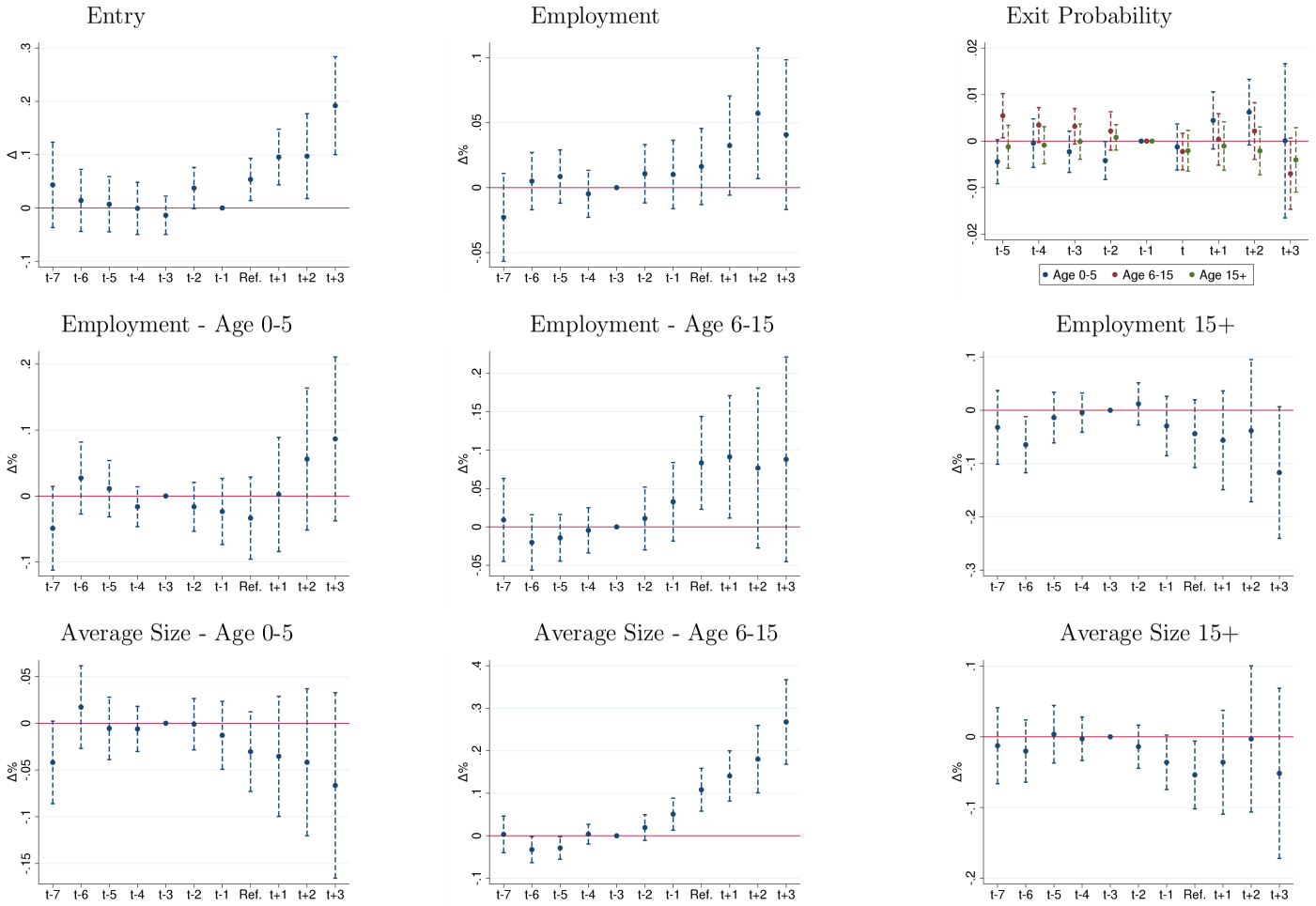
where $y_{m,t} = \{\text{total entrants per 1,000 residents}, log(\text{total employment per 1,000 residents})\}$, $\tau_{0,m}$ corresponds to the year in which the One-Stop Shop opened in municipality m and γ is a vector of coefficients for municipality-specific trends. Standard errors are clustered at the municipality level. 90% confidence intervals.

Figure A.2: Employment and Labor Force Participation in Portugal



The figure shows the series for the labor force participation rate and for the unemployment rate in Portugal between 2000 and 2008.

Figure A.3: Impact of Empresa Na Hora - Decile-Specific Trends

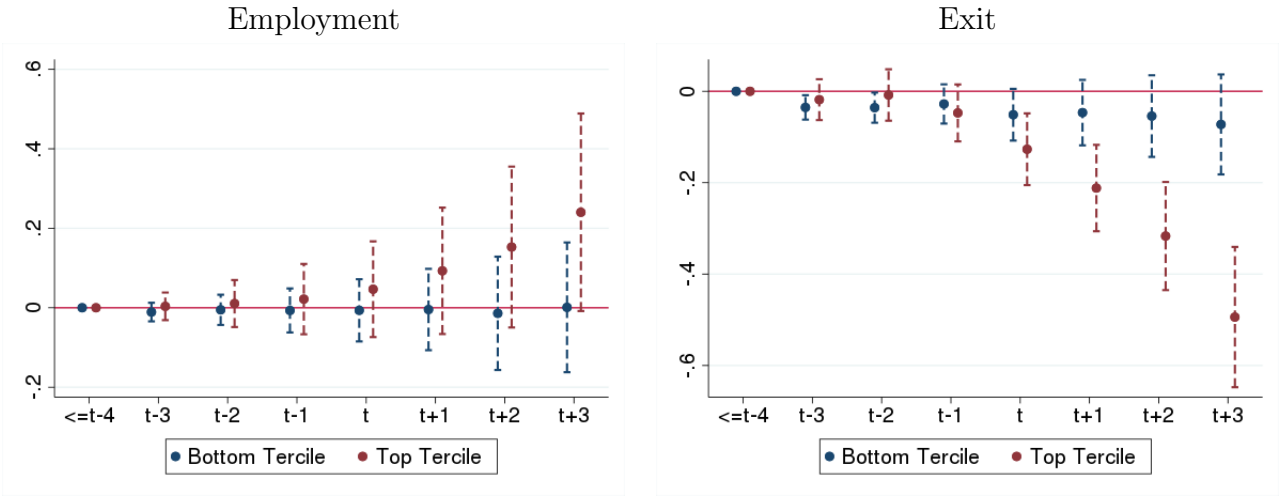


The figures show the estimates of β_τ from the following regression at the municipality level:

$$y_{m,t} = \alpha_m + \delta_t + \sum_{\tau=-7}^{\tau=3} \beta_\tau \mathbb{1}(t - \tau_{0,m} = \tau) + \sum_{q=1}^{10} \eta_q \mathbb{1}\{m \in q\} + \epsilon_{m,t},$$

η is a vector of coefficients for decile-specific trends for municipalities based on the number of residents and the value of sales in services per capita at the municipality level in the pre-period. The regression of the exit probability is run at the firm-level. Standard errors are clustered at the municipality level. 90% confidence intervals. Entry and Employment measures are normalized per 1,000 residents.

Figure A.4: Heterogeneous Responses in Employment and Exit by Incumbents - Robustness



The figures show estimates of β_τ from the regression of municipality-level aggregates of the top and bottom terciles of firms productivity as measured in 2004. Differently from the main specification, we rank firms based on sales per employees within 3-digit sector of activity and municipality. That is, we rank across all age groups. Therefore:

$$y_{m,t} = \alpha_m + \delta_t + \sum_{\tau=-7}^{\tau=3} \beta_\tau \mathbb{1}(t - \tau_{0,m} = \tau) + \sum_{q=1}^{10} \eta_q \mathbb{1}\{m \in q\} t + \epsilon_{m,t},$$

where $y_{m,t} = \{$total employment per 1,000 residents; total exit per 1,000 residents$\}$. $\tau_{0,m}$ corresponds to the year in which the One-Stop Shop opened in municipality m. η is a vector of coefficients for decile-specific trends for municipalities based on the number of residents and the value of sales in services per capita at the municipality level in the pre-period. Standard errors are clustered at the municipality level. 90% confidence intervals. In Panel (b) we also allow for a 3-digit sector of activity fixed effect interacted with the municipality fixed effect.

B Mathematical Appendix

B.1 Derivations and Proofs

Below, we log-linearize the model presented in Section 4.1. We denote $d \log x = \frac{dx}{x}$.

i Differentiating the expenditure share function, we obtain

$$d \log s_\theta \left(\frac{p_\theta}{P} \right) = \frac{d s_\theta \left(\frac{p_\theta}{P} \right)}{s_\theta \left(\frac{p_\theta}{P} \right)} = \frac{s'_\theta \left(\frac{p_\theta}{P} \right)}{s_\theta \left(\frac{p_\theta}{P} \right)} \frac{p_\theta}{P} \left(\frac{dp_\theta}{p_\theta} - \frac{dP}{P} \right) = \frac{s'_\theta \left(\frac{p_\theta}{P} \right)}{s_\theta \left(\frac{p_\theta}{P} \right)} \frac{p_\theta}{P} \left(d \log p_\theta - d \log P \right).$$

Plugging in the price elasticity of demand $\sigma_\theta\left(\frac{p}{P}\right) = -\frac{\partial \log y_\theta}{\partial \log p_\theta} = 1 - \frac{p}{P}\frac{s'_\theta\left(\frac{p}{P}\right)}{s_\theta\left(\frac{p}{P}\right)}$,

$$d\log s_\theta\left(\frac{p_\theta}{P}\right) = (1-\sigma_\theta)\left(d\log p_\theta - d\log P\right).$$

ii Differentiating the variety-level demand (5), we obtain

$$d\log p_\theta + d\log y_\theta = d\log s_\theta\left(\frac{p_\theta}{P}\right) + d\log I = (1-\sigma_\theta)\left(d\log p_\theta - d\log P\right) + d\log I.$$

iii Differentiating the prices equation, we get

$$d\log p_\theta = d\log \mu_\theta + d\log w - d\log A_\theta = d\log \mu_\theta - d\log A_\theta,$$

where the second equality holds due to the normalization $w = 1$.

iv Differentiating the markup function, we obtain

$$d\log \mu_\theta\left(\frac{p_\theta}{P}\right) = \frac{d\mu_\theta\left(\frac{p_\theta}{P}\right)}{\mu_\theta\left(\frac{p_\theta}{P}\right)} = \frac{\mu'_\theta\left(\frac{p_\theta}{P}\right)}{\mu_\theta\left(\frac{p_\theta}{P}\right)}\frac{p_\theta}{P}\left(\frac{dp_\theta}{p_\theta} - \frac{dP}{P}\right) = \frac{\mu'_\theta\left(\frac{p_\theta}{P}\right)}{\mu_\theta\left(\frac{p_\theta}{P}\right)}\frac{p_\theta}{P}\left(d\log p_\theta - d\log P\right).$$

Plugging in the definition of pass-through $\rho_\theta\left(\frac{p}{P}\right) = \frac{\partial p_\theta}{\partial mc_\theta} = \left(1 - \frac{p}{P}\frac{\mu'_\theta\left(\frac{p}{P}\right)}{\mu_\theta\left(\frac{p}{P}\right)}\right)^{-1}$,

$$d\log \mu_\theta\left(\frac{p_\theta}{P}\right) = \frac{\rho_\theta - 1}{\rho_\theta}\left(d\log p_\theta - d\log P\right).$$

Using the expression for markups and rearranging we obtain:

$$d\log p_\theta = (1-\rho_\theta)d\log P - \rho_\theta d\log A_\theta.$$

v Differentiating the definition of the price index (6) yields

$$\int_0^1 \left(\frac{ds_\theta\left(\frac{p_\theta}{P}\right)}{s_\theta\left(\frac{p_\theta}{P}\right)} + \frac{dM}{M}\right) s_\theta\left(\frac{p_\theta}{P}\right) Mg(\theta)d\theta = \int_0^1 \left(d\log s_\theta\left(\frac{p_\theta}{P}\right) + d\log M\right) s_\theta\left(\frac{p_\theta}{P}\right) Mg(\theta)d\theta = 0.$$

Multiplying both sides by I^{-1}, denoting an x-weighted average as $\mathbb{E}_x$ and rearranging,

$$d\log M = -\int_0^1 d\log s_\theta\left(\frac{p_\theta}{P}\right)\lambda_\theta g(\theta)d\theta = -\mathbb{E}_\lambda d\log s_\theta\left(\frac{p_\theta}{P}\right) = \mathbb{E}_\lambda(\sigma_\theta - 1)\left(d\log p_\theta - d\log P\right).$$

vi Differentiating the free-entry condition (10), we get

$$\int_0^1 \left(d\log p_\theta + d\log y_\theta + \frac{1}{\mu_\theta - 1}d\log \mu_\theta\right) p_\theta y_\theta \left(1 - \frac{1}{\mu_\theta}\right) g\left(\theta\right) d\theta = \Delta df_e = \Delta f_e d\log f_e.$$

Multiplying both sides by MI^{-1}, and substituting for markup from (9)

$$\int_0^1 \left(d\log p_\theta + d\log y_\theta + (\sigma_\theta - 1)d\log \mu_\theta\right)\lambda_\theta\left(1-\frac{1}{\mu_\theta}\right)g(\theta)\,d\theta = \Delta MI^{-1}f_e d\log f_e.$$

Substituting in for $d\log p_\theta$, $d\log y_\theta$ and $d\log \mu_\theta$ and collecting terms,

$$\int_0^1 \left(d\log I + (\sigma_\theta - 1)\left(d\log P + d\log A_\theta\right)\right)\lambda_\theta\left(1-\frac{1}{\mu_\theta}\right)g(\theta)\,d\theta = \Delta MI^{-1}f_e d\log f_e.$$

Re-arranging and noting that $\Delta MI^{-1}f_e = 1-\overline{\mu}^{-1}$,

$$d\log I\int_0^1 \lambda_\theta\left(1-\frac{1}{\mu_\theta}\right)g(\theta)\,d\theta + d\log P\int_0^1 \lambda_\theta\mu_\theta^{-1}g(\theta)\,d\theta + \int_0^1 d\log A_\theta\lambda_\theta\mu_\theta^{-1}g(\theta)\,d\theta =$$
$$\left(1-\overline{\mu}^{-1}\right)d\log I + \overline{\mu}^{-1}d\log P + \mathbb{E}_{\lambda\mu^{-1}}d\log A_\theta = \left(1-\overline{\mu}^{-1}\right)d\log f_e.$$

Multiplying both sides by $\overline{\mu}$ and rearranging,

$$d\log P = (\overline{\mu}-1)\left(d\log f_e - d\log I\right) - \overline{\mu}\mathbb{E}_{\lambda\mu^{-1}}d\log A_\theta.$$

vii Differentiating the labor supply condition (11) and combining with the household budget constraint, we get

$$d\log I = d\log w + d\log L^S = d\log L^S = -\eta d\log P^Y,$$

where the second equality holds due to normalization $w = 1$.

viii Differentiating the production function and substituting in for output from ii

$$d\log l_\theta = d\log A_\theta + d\log y_\theta = d\log A_\theta - \sigma_\theta d\log p_\theta + (\sigma_\theta - 1)d\log P + d\log I.$$

ix Finally, Matsuyama and Ushchev (2017) show that the ideal and aggregate price indices link via $\log P^Y = \log P - \int_0^1\left[\int_{p_\theta/P}^\infty \frac{s(\xi)}{\xi}d\xi\right]dF(\theta)$. Differentiating this expression yields

$$d\log P^Y = \left(\mathbb{E}_\lambda\delta_\theta - 1\right)\mathbb{E}_\lambda\left(1-\sigma_\theta\right)\left(d\log p_\theta - d\log P\right) + \mathbb{E}_\lambda d\log p_\theta, \text{ where } \delta_\theta = 1 + \frac{\int_{p_\theta/P}^\infty \frac{s(\xi)}{\xi}d\xi}{s_\theta\left(\frac{p_\theta}{P}\right)}.$$

The five equation summary of the model dynamics in Section 4.2 is composed of conditions iv - ix with $d\log A_\theta = 0$ for all θ.

Proof of Proposition 1

Proof. The elasticity of the aggregate price index with respect to fixed cost of entry obtains by combining equations iv, vi, vii and ix of the log-linearized model. First, from iv and ix,

$$\begin{aligned} d\log P^Y &= (\mathbb{E}_\lambda \delta_\theta - 1)\,\mathbb{E}_\lambda\,(1-\sigma_\theta)\,(d\log p_\theta - d\log P) + \mathbb{E}_\lambda d\log p_\theta = \\ &= ((\mathbb{E}_\lambda \delta_\theta - 1)\,\mathbb{E}_\lambda\,(\sigma_\theta - 1)\,\rho_\theta + \mathbb{E}_\lambda(1-\rho_\theta))\,d\log P = \varepsilon_P^{P^Y} d\log P \end{aligned}$$

Next, plugging into vi and vii and re-arranging, we obtain

$$\begin{aligned} d\log P &= (\overline{\mu}-1)\,(d\log f_e - d\log I) = (\overline{\mu}-1)\left(d\log f_e + \eta d\log P^Y\right) \\ &= (\overline{\mu}-1)\left(d\log f_e + \eta\varepsilon_P^{P^Y} d\log P\right) = \frac{\overline{\mu}-1}{1-(\overline{\mu}-1)\varepsilon_P^{P^Y}\eta} d\log f_e. \end{aligned}$$

We know that $\overline{\mu} \geq 1$ and assume that $\eta < [(\overline{\mu}-1)\varepsilon_P^{P^Y}]^{-1}$. Therefore, $\frac{d\log P}{d\log f_e} \geq 0$.

□

Proof of Proposition 2

Proof. The elasticity of the mass of operating firms with respect to fixed cost of entry obtains by combining equations iv and v of the log-linearized model with the aggregate price index elasticity obtained earlier:

$$d\log M = -\mathbb{E}_\lambda(\sigma_\theta - 1)\rho_\theta d\log P = -\frac{(\overline{\mu}-1)\mathbb{E}_\lambda\,(\sigma_\theta-1)\,\rho_\theta}{1-(\overline{\mu}-1)\varepsilon_P^{P^Y}\eta} d\log f_e.$$

We know that $\overline{\mu} \geq 1, \sigma_\theta \geq 1, \rho_\theta \geq 0$ and assume that $\eta < [(\overline{\mu}-1)\varepsilon_P^{P^Y}]^{-1}$. Then, $\frac{d\log M}{d\log f_e} \leq 0$.

In turn, the elasticities of labor supply and employment obtain by rearranging results from the previous proposition:

$$d\log I = d\log L^S = -\varepsilon_P^{P^Y}\eta d\log P = -\frac{(\overline{\mu}-1)\varepsilon_P^{P^Y}\eta}{1-(\overline{\mu}-1)\varepsilon_P^{P^Y}\eta} d\log f_e.$$

We know that $\varepsilon_P^{P^Y} \geq 0$ since $0 \leq \rho_\theta \leq 1, \sigma_\theta \geq 1, \delta_\theta \geq 1$. Moreover, $\overline{\mu} \geq 1$, $\eta \geq 0$ and we assume that $\eta < [(\overline{\mu}-1)\varepsilon_P^{P^Y}]^{-1}$. Then, $\frac{d\log I}{d\log f_e} = \frac{d\log L^S}{d\log f_e} \leq 0$. □

Proof of Proposition 3

Proof. The elasticity of the firm-level labor demand with respect to fixed cost of entry obtains by combining equations iv, vii and viii of the log-linearized model with the aggregate price index elasticity obtained earlier:

$$\begin{aligned} d\log l_\theta = -\sigma_\theta d\log p_\theta + (\sigma_\theta - 1)d\log P + d\log I = (\sigma_\theta\rho_\theta - 1 - \varepsilon_P^{P^Y}\eta)d\log P = \\ = \frac{(\overline{\mu}-1)(\sigma_\theta\rho_\theta - 1 - \varepsilon_P^{P^Y}\eta)}{1-(\overline{\mu}-1)\varepsilon_P^{P^Y}\eta} d\log f_e. \end{aligned}$$

We know that $\rho_\theta \geq 1, \sigma_\theta \geq 1, \varepsilon_P^{P^Y} \geq 0, \overline{\mu} \geq 1, \eta \geq 0$ and we assume that $\eta < [(\overline{\mu}-1)\varepsilon_P^{P^Y}]^{-1}$. Then, $\frac{d\log l_\theta}{d\log f_e} \lesseqgtr 0$. □

Proof of Proposition 4

Proof. The result obtains immediately by subtracting employment elasticities derived in the previous proof for firms of types θ and θ'. □

Proof of Proposition 5

Proof. The result is immediate from the Definitions 1 and 2. If $\frac{d\sigma_\theta}{dp_\theta} \geq 0$ and $\frac{d\rho_\theta}{dp_\theta} \geq 0$, then

$$\frac{d\log l_\theta}{d\log f_e} - \frac{d\log l_{\theta'}}{d\log f_e} = \frac{(\overline{\mu}-1)(\sigma_\theta\rho_\theta - \sigma_{\theta'}\rho_{\theta'})}{1-(\overline{\mu}-1)\varepsilon_P^{P^Y}\eta} \geq 0$$

for θ and θ' with $p_\theta > p_{\theta'}$ and consequently $\lambda_\theta < \lambda_{\theta'}$.

□

Proof of Proposition 6

Proof. The elasticity of welfare with respect to fixed cost of entry obtains by first log-linearizing the utility function:

$$d\log U = \nu d\log Y + (1-\nu)d\log L = \nu(d\log I - d\log P^Y) + (1-\nu)d\log I = d\log I - \nu d\log P^Y.$$

where we use identities $YP^Y = I$ and $L = I$, and where $\nu = \left(1 - \frac{L^{1+1/\eta}}{Y(1+1/\eta)}\right)^{-1} \geq 1$. From Proposition 2,

$$d\log U = -(\eta+\nu)d\log P^Y = -(\eta+\nu)\varepsilon_{f_e}^P \varepsilon_P^{P^Y} d\log f_e.$$

Manipulating the same conditions,

$$d\log Y = -(\eta+1)d\log P^Y = -(\eta+1)\varepsilon_{f_e}^P \varepsilon_P^{P^Y} d\log f_e = \frac{\eta+1}{\eta+\nu} d\log U.$$

Finally, to obtain the decomposition of ideal price index elasticity into technical and allocative efficiency terms, begin with expression (17):

$$\varepsilon_P^{P^Y} = (\mathbb{E}_\lambda\delta_\theta - 1)\,\mathbb{E}_\lambda\,(\sigma_\theta - 1)\,\rho_\theta + \mathbb{E}_\lambda(1-\rho_\theta) + \frac{\overline{\mu}\,(\mathbb{E}_\lambda\delta_\theta - 1)}{\overline{\mu}-1}\left(Cov\left(\sigma_\theta, \frac{1}{\mu_\theta}\right) - Cov\left(\sigma_\theta, \frac{1}{\mu_\theta}\right)\right),$$

where the last bracket is zero. Rewrite

$$-\frac{\overline{\mu}\,(\mathbb{E}_\lambda\delta_\theta - 1)}{\overline{\mu}-1} Cov\left(\sigma_\theta, \frac{1}{\mu_\theta}\right) = \frac{1}{\overline{\mu}-1}(\mathbb{E}_\lambda\delta_\theta - 1)\,\mathbb{E}_\lambda\sigma_\theta - \left(1 + \frac{1}{\overline{\mu}-1}\right)(\mathbb{E}_\lambda\delta_\theta - 1)\,\mathbb{E}_\lambda(\sigma_\theta - 1).$$

Collecting terms and using $\sigma_\theta = \frac{1}{1-\mu_\theta^{-1}}$,

$$\varepsilon_P^{P^Y} = \frac{\mathbb{E}_\lambda\delta_\theta - 1}{\overline{\mu}-1} + \frac{\overline{\mu}\,(\mathbb{E}_\lambda\delta_\theta - 1)}{\overline{\mu}-1} Cov\left(\sigma_\theta, \frac{1}{\mu_\theta}\right) + \mathbb{E}_\lambda(1-\rho_\theta)\sigma_\theta\left(1 - \frac{\mathbb{E}_\lambda\delta_\theta}{\mu_\theta}\right).$$

□

C Quantitative Appendix

C.1 Calibration Details

Sales-share grid. First, we collect the cumulative distribution of firm counts and sales for year 2006, presented in Table C.1. We assign θ_i to the the cumulative share of firms below the given size bin, and $\Lambda(\theta_i)$ to the corresponding cumulative sales share, such that

$$\Lambda(\theta) = \int_0^{\theta} \lambda(x)\, dx,$$

where $\lambda(\theta)$ is the sales-share density. We fit the parametric curve $\log \Lambda(\theta) = c_0 + c_1\theta + c_2\theta^{c_3} - (c_0 + c_1 + c_2)$ to $\{\theta_i, \Lambda(\theta_i)\}$ from the data, evaluate it on a fine grid $\theta = 0{:}10^{-4}{:}1$, and obtain $\lambda(\theta) = d\Lambda/d\theta$. The resulting 10000-point grid $\{\theta, \lambda(\theta)\}$ is used in all simulations.

Table C.1: Cumulative count and sales shares by firm size (employment)

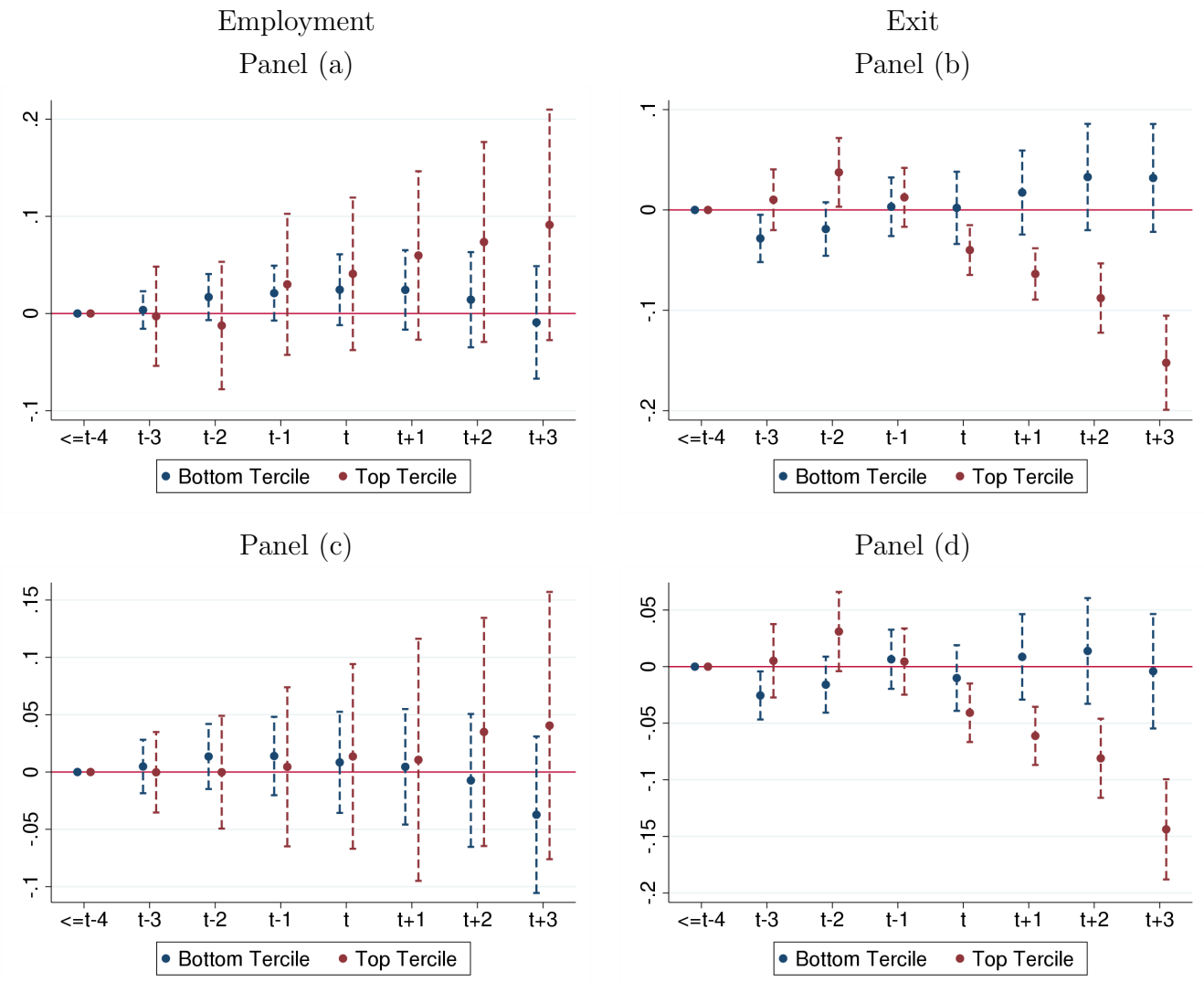
Bin	Employment	Cumulative Count	Cumulative Sales
1	1	0.1895	0.0187
2	2	0.3788	0.0537
3	3	0.5153	0.1107
4	4–5	0.6839	0.1783
5	6–10	0.8528	0.2861
6	11–20	0.9391	0.3992
7	21–30	0.9644	0.4590
8	31–40	0.9825	0.5269
9	41–50	0.9896	0.5735
10	51–75	0.9929	0.6080
11	76–100	0.9970	0.6805
12	201–300	0.9983	0.7263
13	301–400	0.9989	0.7627
14	401–500	0.9992	0.7870
15	501–1000	0.9997	0.8598
16	1001–2500	0.9999	0.9149
17	>2500	1.0000	1.0000

Pass-throughs grid. We obtain pass-through rates distribution from Fernandes and Winters (2021). The authors report pass-through estimates for the four quartiles of Portuguese exporters ranked by value added per worker: $\beta_q = \{-0.00163; -0.0284; -0.0201; -0.0379\}$. We adapt these estimates for our analysis in four steps. First, Fernandes and Winters (2021) report the change in Euro unit values of exported goods in response to the Brexit shock dummy. We convert these estimates into marginal cost pass-throughs as $\rho_q = 1 - \beta_q/0.1$

using the size of depreciation of British pound ($\approx 10\%$). Our resultant pass-through rates for the four quartiles are thus $\rho_q = \{0.9837;\ 0.7160;\ 0.7990;\ 0.6210\}$. Second, we assume that value added per worker is a sufficient statistic to identify firm type. Thus, we assume that, conditional on type, the estimates apply to non-exporters and exporters alike. Third, exporters are not a representative sample of firms. To match these four pass-through rates to the full sample of firm sales, we identify four segments of unconditional firm size distribution with the same average sales as the four quartiles of exporting firms ranked by sales. We do so by computing average sales of the top n firms until the average equals that of the top quartile of exporters. These are then excluded from the sample, and we repeat the steps to obtain the segment of distribution that matches the average sales for the third quartile, and repeat steps for the remaining quartiles. Finally, we fit a spline function to the four estimates to obtain a distribution of pass-through rates to fit our sales shares grid.

Markups and consumer surplus ratio. Finally, once we have obtained the sales shares and pass-throughs, we obtain the quality-adjusted productivity, markup and pass-throughs by solving the differential equations (18)-(20) using the Runge-Kutta algorithm.

Figure A.5: Heterogeneous Responses in Employment and Exit by Incumbents. Decile-Specific Trends



These figures show estimates of β_τ from the regression of municipality-level aggregates of firms in the top and bottom terciles of the productivity distribution in 2004. Specifically, we run:

$$y_{m,t} = \alpha_m + \delta_t + \sum_{\tau=-7}^{\tau=3} \beta_\tau \mathbb{1}(t - \tau_{0,m} = \tau) + \sum_{q=1}^{10} \eta_q \mathbb{1}\{m \in q\} + \epsilon_{m,t},$$

where $y_{m,t}$ = {total employment per 1,000 residents; total exit per 1,000 residents}. $\tau_{0,m}$ corresponds to the year in which the One-Stop Shop opened in municipality m. η is a vector of coefficients for decile-specific trends for municipalities based on the number of residents and the value of sales in services per capita at the municipality level in the pre-period. Panels (a) and (b) use the ranking of firms' productivity within 3-digit sector of activity, municipality and age group. Panels (c) and (d) rank firms within 3-digit sector of activity and municipality. Employment and exit are normalized per 1,000 residents. Standard errors are clustered at the municipality level. 90% confidence intervals.