

Export Selection, Labour Market Frictions, and Firm Dynamics

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Abstract

This paper explores the idea that input market friction can limit firms' exporting decisions. I do so by looking at the trade effects of a reform which slashed labour adjustment costs borne by Portuguese manufacturing firms. The economy recorded an unparalleled openness between 2010 and 2013; yet it stalled once those looser constraints were in full effect. Why did this happen? I merge balance sheet, production, and matched employer-employee data to confirm that *i*) entrance in export markets takes place during temporary spells of exceedingly high productivity and profitability, and those episodes also coincide with *ii*) relatively larger workforce adjustments and *iii*) increases in real wages. Labour market frictions are demonstrably relevant, but the estimated policy function for export participation reveals that both its persistence and responsiveness to exogenous profitability innovations remained unaltered after the reform. To better understand this result I set up and estimate a general equilibrium model of firm dynamics. In my framework, firms decide to become exporters upon observing idiosyncratic shocks to their productivity, and domestic and foreign demand. Access is expensive because, in addition to a standard sunk cost of entering, more workers must be hired: employment adjustments are costly and the resulting movement along a positively-sloped labour supply schedule raises wages. A counterfactual exercise shows that, despite the cut in labour adjustment costs, a reduced dispersion of foreign demand shocks generated a more tranquil business environment which altered the incentives for firms to change their export status.

JEL codes: E24, F16, J23, L25

Keywords: Export status, labour adjustment costs, productivity

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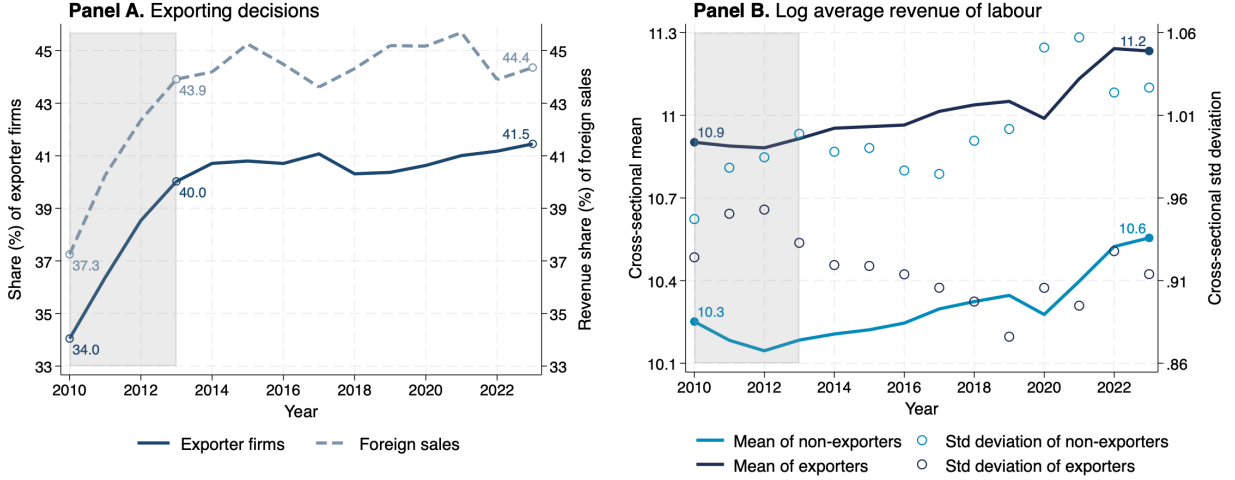
1 Introduction

Exporter firms are a very particular bunch in the economy. On average, they employ more workers, pay greater wages, and exhibit larger labour productivity levels. But they also constitute a very small minority. As a consequence, a pressing concern for policy-makers is to understand which effective strategies can encourage and facilitate entrance in export markets. This paper studies the forces which prompt firms to export, and it does so while exploring the premise that frictions in input markets can be extremely relevant to their exporting choices. Take the case of a non-exporter which suddenly realises its product attracts a large demand from foreign customers. The decision to accommodate it comes with rising costs: not just those associated with operational, shipping, and logistical activities abroad, but also the costly adjustments of labour and capital which are required to lift production accordingly. If hiring costs are prohibitively expensive, for example, the firm cannot upscale as it should and the venture into export markets can be thereby thwarted.

The paper is focused on the particular case of Portuguese manufacturing firms. Although very specific, such a context can be highly informative for general policy-making purposes. First, because the economy has witnessed an unprecedented openness over the last sixteen years (Figure 1, panel A), which has not been accompanied by equally sizeable productivity gains (Figure 1, panel B). Most of that rising exposure actually unfolded between 2010 and 2013, a period marred by a collapse in domestic demand which plummeted the country in a deep recession. And second, in a simultaneous attempt to restore growth and competitiveness, lawmakers progressively implemented a comprehensive reform which added flexibility to what was then the most stringent labour market in the OECD. Since late 2013, new employment contracts have been framed under considerably looser constraints in the labour law: severance paid to employees who are let go was reduced, a new and more flexible reason to justify dismissals was introduced, amongst various other provisions. An exhaustive list of all enacted policies and the timing of their implementation can be found in [OECD \(2017\)](#).

Firing costs were slashed but firms' exporting decisions eventually stalled and productivity gains failed to materialise. **Why did this happen?** The paper first attempts to ascertain **whether these reduced labour adjustment costs do have an impact on firms' exporting choices**. This can be specially tricky. Standard balance sheet and income statement data for the near-universe of Portuguese manufacturing firms record their yearly employment and export status. But these are two endogenous variables, as they both depend on the unobserved levels of productivity and profitability. Through a production function estimation exercise, I retrieve these from a supplementary dataset with reported quantities and prices on all 12-digit products produced and sold by a sample of manufacturers. My estimated values for TFPQ and TFPR, as defined in [Foster et al. \(2008\)](#), allow me to establish two main findings. First, I show that entrance in export markets

Figure 1: Exporting decisions and (log) average revenue of labour of Portuguese manufacturing firms



Notes: In **Panel A.**, a firm f is identified as an exporter in period t if it has generated strictly positive sales of goods and services in foreign markets. In **Panel B.**, the average revenue of labour corresponds to the ratio of a firm's deflated revenues to their stock of workers. The cross-sectional mean of that distribution is displayed on the left axis, the standard deviation on the right. Data from *Sistema de Contas Integradas das Empresas* (Statistics Portugal (2025)).

is strongly associated with temporary spells of high productivity and profitability. The transient nature of those episodes is attested by a noticeable result shared with [Blum et al. \(2024\)](#): the unconditional averages of TFPQ and TFPR of all exporters put together are not statistically greater than those of their non-exporter peers. And second, even though the productivity and profitability premia only hold for exporter firms at the time of their entrance, their underlying distributions have a significant overlap with those of non-exporters.

These two results are intrinsically linked to frictions which hamper firms' decisions to alter their workforce. In the data, extraordinarily high levels of TFPQ and TFPR are not just associated with entrance export markets, but are also the catalysts of costly labour adjustments. Tellingly, the average growth rate of employment at the time of entrance in export markets (4.91%) is more than five times that of all manufacturers in the economy (0.98%). The cost of such a large shift in the labour demand schedule is additionally fuelled by the resulting movement along a positively-sloped labour supply curve. While relying on a dataset with matched employer-employee information, I demonstrate that the choice of joining export markets also comes with a greater real wage growth. A theory which aims to rationalise that discrete decision must then encompass a labour market with adjustment costs and deviations from the perfect competition benchmark. So far, these have been mostly overlooked by the literature on export selection. In the seminal works of [Roberts and Tybout \(1997\)](#) and [Melitz \(2003\)](#), for instance, entrance is fully explained by a profitability threshold in part because those labour market frictions are absent. As the demand for inputs is conveniently expressed as a sole function of profitability, the latter is a sufficient statistic to determine access to export markets. This

prediction is not consistent with the documented overlap in the distribution of TFPR: if a new exporter firm can be as profitable as a non-exporter, then (at least) a second dimension of heterogeneity between them must be considered. In other words, the exogenous realisation of profitability cannot be the unique state variable which defines the exporting policy function.

I estimate a decision rule for export participation which confirms this claim. In my linear specification, the data coefficients indicate that export status depends positively on *i*) lagged participation, *ii*) the inherited stock of workers, and *iii*) a contemporaneous profitability innovation. Together, these account for almost two-thirds of the variation in export status. This particular formulation is not new to the literature, *e.g.* [Cooper et al. \(2026\)](#) also rely on it to better understand the exporting decisions of Chinese businesses. In their study, they argue the removal of labour adjustment costs should erase the importance of the past number of employees, and boost the responsiveness of export status to exogenous profitability shocks. My results tell a different story. I find no statistically significant changes in those two coefficients once more flexible labour clauses were in full effect. For example, I show that a one standard deviation shock to profitability raises the probability of exporting by 9 percentage points, but that response is the same before and after the reform. A similar conclusion holds for intensive margin decisions, when entrance and exit choices are studied separately, and when shocks to productivity and demand are disentangled.

A policy which loosens labour adjustment costs is tantamount to a reduction in the cost of accessing export markets. Yet, contrary to what would be expected, firms' exporting decisions did not become increasingly responsive to changes in their profitability circumstances. **Why did responsiveness stay unchanged? Does that explain why the openness of the economy was halted and did not deliver the expected productivity jumps?** I address this question with a general equilibrium model of firm dynamics, which I estimate through a simulated method of moments exercise. In my framework, firms' profitability varies with idiosyncratic shocks to their technical efficiency, and their domestic and foreign demand. Upon observing these, and conditional on remaining in the economy as incumbents, they are faced with a dynamic labour demand decision, as in [Hopenhayn and Rogerson \(1993\)](#), as well as a costly export market participation resembling that of [Cooper et al. \(2026\)](#). A positively-sloped labour supply schedule emerges from the maximisation problem of a representative household, just like in [Berger et al. \(2022\)](#), and it embeds the aggregate employment and wage rate which infinitesimally small firms take as given. The usefulness of such a model resides in its ability to identify four mechanisms which curb firms' entrance in export markets: *i*) the level of labour adjustment costs and *ii*) the slope of the labour supply curve determine how expensive the associated expansion of the workforce is; *iii*) a varying dispersion of foreign demand shocks alters the incentives firms have to change their export status; and *iv*) the magnitude of the standard entry and fixed costs of exporting found in the trade literature.

The model allows me to conduct a counterfactual which separately identifies the contribution of all these channels. All else equal, if the estimated dispersion of foreign demand shocks had not fallen, the responsiveness of export status to exogenous profitability innovations would have increased by a factor of three and the share of exporters in the economy would have continued its upward trajectory.

Ultimately, the main claim of the paper can be summarised as follows. Although increasing flexibility in the labour market does reduce the costs firms bear when they become exporters, in the Portuguese case those were offset by a more tranquil business environment which reduces the incentives to enter export markets. This particular reform was already the subject of analysis in [Garcia \(2026\)](#). As labour adjustment costs were noticeably slashed, employment responsiveness rose but the expected effects on productivity were outweighed by a concurrent fall in the curvature of firms' revenue function. I now expand upon these findings. First, even though the labour demand decisions of firms have reportedly become more responsive to changes in profitability, the responsiveness of their extensive and intensive margin decision of exporting has remained unaltered. And second, I further substantiate the argument that changes in the overall revenue process of firms neutralised the expected effects of the reform.

The conclusions of the paper can resonate with similar experiences elsewhere. In Spain, for example, [Salas \(2018\)](#) points out that the extraordinary growth of exports also recorded in 2010-2013 was only modestly impacted by the looser constraints which were then included in the national labour law. A more specific answer can be found in [Almunia et al. \(2021\)](#): only when domestic demand tumbled did the quasi-fixed nature of inputs induce Spanish firms to turn to export markets in an attempt to stay afloat. Similarly, [Aw and Lee \(2014\)](#) highlight the role firm-level demand play in determining the decision of Taiwanese firms to become exporters.

The paper also relates to a wide literature on exporter dynamics. [Alessandria et al. \(2021\)](#) provide a clean summary of the existing evidence on the extensive and intensive margin decisions of firms in foreign markets, their aggregate implications, and dissect the standard trade model used to study these topics. An exceptionally important ingredient is the presence of a sunk entry cost. The latter had already been incorporated in the original export selection models of [Roberts and Tybout \(1997\)](#) and [Melitz \(2003\)](#), but a first set of desired estimates would only be found later in [Das et al. \(2007\)](#). Here, I highlight the role labour adjustment costs play in that entry decision.

A more recent and meaningful contribution to this strand of the literature can be found in [Blum et al. \(2024\)](#). Using Chilean firm-product data, they too report the absence of a strong *unconditional* correlation between estimated productivity and export status. *Conditional* on the same demand, however, they argue that exporter firms are more productive than non-exporters. I bring an alternative interpretation to an identical finding, which builds on the concept of hysteresis in export market participation ([Impullitti et al. \(2013\)](#)).

When firms bear sunk costs of entering, they may continue operating in export markets even after their productivity has gone below the level which motivated entrance in the first place. The expected productivity premium of exporters may then elude a simple comparison across export status. I perform a more adequate test, and show that the TFPQ and TFPR levels of firms at the time of entrance in foreign markets is statistically greater than those of non-exporter firms.

Lastly, I also speak to a literature which studies the link between input market frictions and international trade. A pervasive question in this line of work concerns how frictional labour markets muffle the effects of trade liberalisation episodes. A particularly relevant contribution is that of [Kambourov \(2009\)](#): if the elimination of tariffs in Chile had not been accompanied by an equally comprehensive reduction in firing costs, as much as 30% of the associated gains in real output and labour productivity would have been lost. While simulating a tariff-induced decline in the price of imported high-tech manufacturing goods in Brazil, [Dix-Carneiro \(2014\)](#) further emphasises the importance of frictions which curb the resulting reallocation of workers across sectors. A similar but more recent analysis can also be found in [Gurkova et al. \(2026\)](#). Here, I reverse their question. Instead of tracking the labour market effects of a trade shock, I focus on the exporting decisions of firms stemming from a policy which cuts labour adjustment costs. This exercise is closer to those in [Cooper et al. \(2018\)](#) and [Cooper et al. \(2026\)](#), although they both address a reform of the opposite sign in China. Methodologically, my contribution also differs from [Helpman and Itskhoki \(2010\)](#), [Coşar et al. \(2016\)](#), [Fajgelbaum \(2020\)](#), and [Firooz \(2025\)](#). Their frameworks supplement canonical components of the trade literature with search and matching frictions, whereas mine borrows essentially from the workhorse firm dynamics model of [Hopenhayn and Rogerson \(1993\)](#). Relative to [Cooper et al. \(2026\)](#), I frame the model in general equilibrium through the inclusion of a positively-sloped labour supply curve which solves the standard intratemporal trade-off between consumption and leisure of a representative household.

Road map:

The paper is organised as follows. In [Section 2](#) I introduce the various data sources, and show how to retrieve the unobserved levels of TFPQ and TFPR through a production function estimation exercise. These are useful to better understand how sorting, persistence, and the responsiveness of exporting decisions changed throughout time. In order to disentangle the various channels at play, I present the general equilibrium model in [Section 3](#). The structural estimation and the numerical exercises which accompany it are discussed in [Section 4](#). Concluding remarks can be found in [Section 5](#).

2 Data facts

In this section I start by leveraging on a rich dataset of Portuguese manufacturing firms to retrieve the unobserved levels of productivity. These can eventually be used to better understand how firms form their decision to become exporters.

The data cover the manufacturing sector in Portugal between 2010 and 2023. The dataset is built from three different sources which embed the same anonymous firm identifier. Two of those comprise virtually the entire universe of Portuguese manufacturing firms: *Sistema de Contas Integradas das Empresas (SCIE)* provides information on nearly all balance sheet and income statement items, while *Quadros de Pessoal (QdP)* contains detailed matched employer-employee data. Yet neither of these include the necessary production data to estimate the unobserved quantity-based levels of TFP. To circumvent this I rely on a very large sample of manufacturing firms surveyed by *Inquérito à Produção Industrial (IAPI)*: for all 12-digit products produced in a year, these firms report their quantities and prices. Further details on all data construction steps can be found in [Appendix A](#), together with various descriptive statistics.

2.1 Production function estimation

Consider an economy where firm f produces product p at time t according to the following technology:

$$\log(Y_{fpt}) = \log(Z_{ft}) + \log(F_p(k_{fpt}, n_{fpt}, m_{fpt}; \alpha)) + \log(\epsilon_{fpt}) \quad (1)$$

The production function is product-specific, it takes as inputs the stock of tangible capital (k), the number of workers (n), and intermediate materials (m), and is fully parameterised by the vector α . In the Cobb-Douglas specification adopted here those parameters correspond to the output elasticities. The remaining two elements in equation (1) are unobserved to the researcher. The first one is the Hicks-neutral level of productivity, $z_{ft} \equiv \log(Z_{ft})$. The literature commonly refers to it as TFPQ. This is a measure of the firm's intrinsic technical efficiency, *i.e.* how well it is able to transform inputs into physical units of output. Importantly, notice that it is a firm-specific variable. This implies that a multi-product firm exhibits the same productivity level across the production of all its goods.¹ The second unobserved element, $\log(\epsilon_{fpt})$, stands for the measurement error which embeds any unanticipated shocks to output.

An unbiased estimate of α is necessary to retrieve the values of TFPQ off the data. Yet estimating those parameters poses the usual endogeneity bias problem: firms' choice of inputs is highly correlated with their

¹Although [Orr \(2022\)](#) and [Valmari \(2023\)](#) have recently proposed alternative estimation procedures which rely on product-specific productivity measures, since I am particularly interested in studying firm-level outcomes, such as export status, I keep the relatively innocuous assumption of a common TFPQ level across all goods.

contemporaneous productivity. This issue has been at the core of a vast literature on production function estimation, *e.g.* [Olley and Pakes \(1996\)](#), [Levinsohn and Petrin \(2003\)](#), and [Akerberg et al. \(2015\)](#). The solution typically builds on a control function approach. As long as the demand for intermediate materials is fully static, flexible, and strictly monotone in the firm's level of productivity, a combination of a non-parametric regression with GMM-IV estimation cleans the data from measurement error and accurately identifies the parameters of the production function.

However, the formulation in (1) presents two additional challenges. First, standard datasets only record the usage of inputs by the firm, but not how these are allocated across the production of the various goods. This can be of particular relevance in the Portuguese economy, since more than half of all manufacturers consistently produce more than one product every year — see Figure A2. And second, firms also do not report the prices of inputs incorporated in the production of each good.

To better understand these two issues, say the (*unobserved*) product-specific expenditure on any input $v \in \{k, n, m\}$ is a share $\exp(\rho_{fpt}) \in [0, 1]$ of the (*observed*) total firm-level expenditure on that same input. When formally expressed in logs, this means that $\log(v_{fpt}) = \rho_{fpt} - \log(w_{fpt}^v) + \log(\tilde{v}_{ft})$, where w^v corresponds to the price of input v , and $\tilde{v}_{ft} \equiv v_{ft} \cdot w_{ft}^v$ is the overall expenditure the firm has with it. Plugging this in the Cobb-Douglas formulation of (1) yields the following:

$$\begin{aligned} \log(Y_{fpt}) = & \omega_{ft} + \alpha^k \cdot \log(\tilde{k}_{ft}) + \alpha^n \cdot \log(\tilde{n}_{ft}) + \alpha^m \cdot \log(\tilde{m}_{ft}) \\ & + \underbrace{\left(\rho_{fpt} \cdot (\alpha^k + \alpha^n + \alpha^m) \right)}_{A(\rho_{fpt}; \alpha)} + \underbrace{\left(\alpha^k \cdot \log(w_{fpt}^k) + \alpha^n \cdot \log(w_{fpt}^n) + \alpha^m \cdot \log(w_{fpt}^m) \right)}_{B(w_{fpt}; \alpha)} + \log(\epsilon_{fpt}) \end{aligned} \quad (2)$$

From here it should be clear that solving the standard endogeneity problem between inputs and productivity is not sufficient to obtain unbiased estimates of the output elasticities, $\alpha \equiv (\alpha^n, \alpha^k, \alpha^m)'$. On the one hand, the series of input allocations, $\{\rho_{fpt}\}$, of multi-product firms are not observed. This introduces a bias given by the term $A(\rho_{fpt}; \alpha)$. This problem is rendered moot for single-product firms because, by definition, $\exp(\rho_{fpt}) = 1 \iff \rho_{fpt} = 0$. The additional source of bias comes from the fact that product-specific input prices are also unobserved. This is embedded in $B(w_{fpt}; \alpha)$ and requires that the variation of those input prices be controlled for in the estimation procedure.

All these issues have been successfully handled by [De Loecker et al. \(2016\)](#). I follow closely their methodology in an attempt to recover the unbiased measures of firm-level log productivity, z_{ft} . I leave the discussion on all required assumptions and technical details for the appendix; here I just provide a quick sketch of the broad steps necessary to implement their estimation strategy.

1. Obtain estimates of log output net of measurement error, $\log(\hat{Y}_{fpt}) \equiv \log(Y_{fpt}) - \log(\epsilon_{fpt})$.
2. Estimate the output elasticities using the set of single-product firms. To do so, run GMM-IV on $\log(\hat{Y}_{ft})$

with the moment conditions of [Akerberg et al. \(2015\)](#), and both the selection and input price correction procedures of [De Loecker et al. \(2016\)](#). This step provides estimates for the output elasticities, $\hat{\alpha}$, as well the vector of coefficients $\hat{\delta}$ which parameterise a proxy function for input prices.

3. Log productivity of single-product firms can be immediately read off the data with $\hat{\alpha}$ and $\hat{\delta}$. On the other hand, for multi-product firms solve the system of equations which recovers z_{ft} together with $\{\rho_{fpt}\}$, subject to the restriction that $\sum_p \exp(\rho_{fpt}) = 1$.

This recipe ultimately provides unbiased estimates for the output elasticities α . Some summary statistics are reported in Table ?? . More importantly, this procedure also retrieves the firm-level values of log TFPQ, z_{ft} . The latter is an object imbued with economic significance. In the world of [Melitz \(2003\)](#), for example, it single-handedly determines entrance in export markets: for a certain threshold $\bar{z}$, firms with $z_{ft} \geq \bar{z}$ will export, while those with $z_{ft} < \bar{z}$ will not. But beyond pure technical efficiency, [Blum et al. \(2024\)](#) have recently placed particular emphasis on the role of heterogeneous demand advantages as drivers of export status. So, to have a better grasp of how productivity and demand can jointly influence export status, I also consider the firm-level profitability measure of [Foster et al. \(2008\)](#): $a_{ft} \equiv z_{ft} + p_{ft}$, where p_{ft} is the (log) weighted average price of firm f in period t . This is also known as TFPR, and it embeds both the technological and demand circumstances faced by the firm.

TFPQ and TFPR differences across export status

The estimated values of TFPQ and TFPR are useful to have a first understanding of how firms sort into export markets. Table 1 below formally tests whether these are statistically different across export status. To do so, consider two different indicator variables: one which takes the unity when firm f has exported in period t ("*Dummy exporter*"), and another one which takes the value one when firm f (re-)enters export markets in period t ("*Dummy new exporter*"). Specifications (1) and (2) regress the log values of TFPQ and TFPR, respectively, on those two indicator variables using all surveyed manufacturing firms. Specifications (3) and (4), on the other hand, only rely on exporter firms.

Most of the literature on international trade report large productivity and profitability advantages of exporter firms — see [Bernard et al. \(2012\)](#). Yet, after controlling for year and industry fixed effects, I find no noticeable differences in productivity or profitability between exporters and non-exporters: the coefficient associated with the dummy variable which identifies exporter firms is statistically insignificant. Surprising as it may be, this finding is not entirely new. Recently, [Blum et al. \(2024\)](#) documented the absence of a similar productivity premium amongst Chilean firms. In their view, this is masked by the strong correlation between demand and production costs, so much so that, when comparing exporters and non-exporters with similar

Table 1: TFPQ and TFPR differences across export status

	<i>All firms</i>		<i>Exporter firms</i>	
	Log TFPQ	Log TFPR	Log TFPQ	Log TFPR
	(1)	(2)	(3)	(4)
Dummy exporter	0.49 (0.77)	0.55 (0.80)		
Dummy new exporter	0.36*** (0.12)	0.36*** (0.12)	0.40*** (0.11)	0.39*** (0.12)
Industry-Year FE	Yes	Yes	Yes	Yes
R^2	0.03	0.02	0.30	0.21
Observations	152 515	152 515	87 359	87 359

Notes: *Dummy exporter* is an indicator variable which takes the value 1 when firm f in period t has exported; *Dummy new exporter* is another indicator variable which takes the value 1 when firm f does not export in $t - 1$ but it does so in period t . Standard errors are clustered at 2-digit industry levels.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

demand schedules, exporter firms are indeed shown to be more productive.

Here, I explore a complementary narrative which resides in the concept of hysteresis in export market participation, as first coined by [Impullitti et al. \(2013\)](#). Given the existence of sunk entry costs, some exporter firms may decide to remain in foreign markets even after their productivity and profitability have dipped below the entrance levels. The lack of a statistically significant difference simply masks that composition amongst exporters: some of them are highly productive and profitable because they have just entered, while others have gone below the initial productivity and profitability levels which prompted their entrance in the first place. This potential justification is also supported by the data. Although there are no statistically significant differences over export status, entrance in export markets is actually associated with exceedingly higher values of productivity and profitability. Those new exporters are not just more productivity and more profitable than non-exporter firms, but also exhibit the same advantages in comparison to their exporter peers.

2.2 Sorting into export markets

In the previous section I showed that entrance in export markets is strongly associated with temporary spells of high productivity and profitability. I now take a closer look at how this sorting takes place. To do so I focus on the distribution of the natural logarithm of TFPR both before and after the more flexible labour clauses

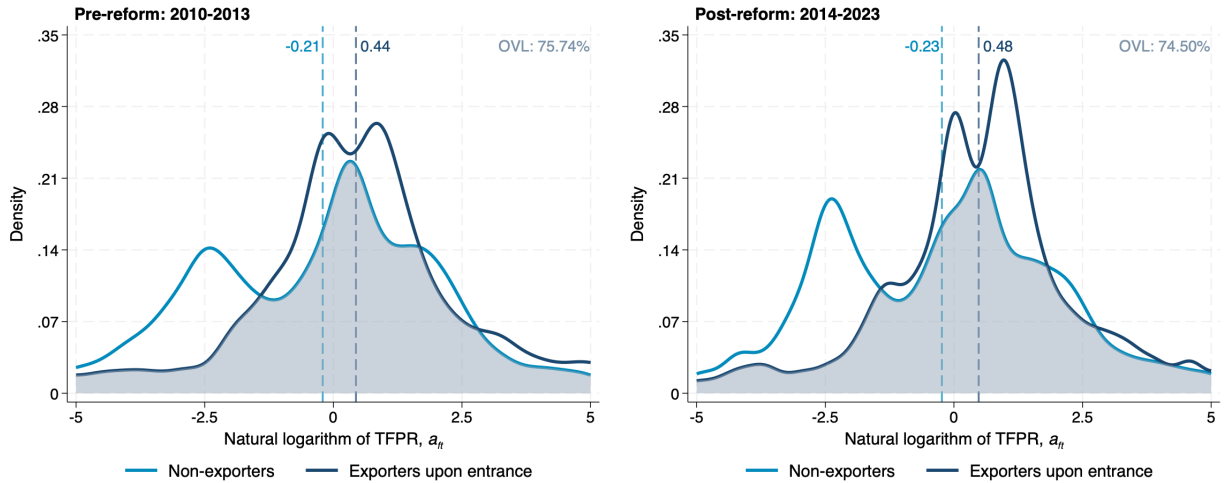
were in full effect.

This particular exercise is justified by theory. Take again the prediction of Melitz (2003): absent any frictions in input markets, entrance in export markets is fully determined by a cutoff profitability level. This implies that the distribution of profitability of new entrants lies entirely to the right of that of non-exporters. In other words, those two distributions are disjoint. A labour market reform which slashes costs of adjustments can then be construed as a step towards that framework. A natural question to be posed is whether the post-reform period implied that those two distributions became more separate. This requires that a measure of overlap be used. Consider then two probability density functions, $f(x)$ and $h(x)$, whose domains are subsets of the real line. The overlapping index (OVL) between the two is defined as follows:

$$\text{OVL} \equiv \int_{x \in \mathbb{R}} \min \{f(x), h(x)\} dx \quad (3)$$

When two distributions are fully disjoint $\min\{f(x), h(x)\} = 0$ for any real number, $x \in \mathbb{R}$. Integrating over the real line implies that $\text{OVL} = 0$. On the contrary, when there is full overlap, then $f(x) = h(x)$ and the corresponding minimum integrates to the unity, $\text{OVL} = 1$. Figure 2 below displays the estimated density of profitability in the two periods and reports the associated OVL in the top-right corner.

Figure 2: Distribution of log profitability amongst manufacturing firms



Notes: The dashed vertical lines correspond to the panel unweighted averages of log TFPR. The density functions are estimated with a gaussian kernel whose associated bandwidth is the optimal one. The overlapping index (OVL) reported in the top right corner of each panel corresponds to the integral of the shaded area. This statistic ranges between 0% (fully disjoint distributions) and 100% (complete overlap).

As it had already been documented in Table 1, firms which decide to join export markets are, on average, more profitable than those which remain only in the domestic market. However, the main result to be drawn from Figure 2 concerns the significant overlap in the two distributions — the OVL index ranges between 74.5% and 75.7%. The fact that they are not disjoint is blatantly inconsistent with the narrative of Melitz

(2003): the exporting policy function must be more complex than that implied by a simple cut-off profitability level. Basically, beyond profitability, that policy function must surely encompass at least a second source of firm heterogeneity. Here I study the role played by frictions in input markets, specifically those pertaining to employment choices. Particularly stringent adjustment costs exacerbate the employment dispersion in the economy and may prevent some firms from acquiring a sufficiently large scale to operate as exporters. I now offer additional evidence on the prominence of this channel.

Export status decisions and input choices

Firms rely on exceptionally fortunate productivity and profitability circumstances to pay the cost of entering export markets. But these spells of exceedingly high levels of productivity and profitability are also typical catalysts of costly input adjustments. This is attested by Table 2 below, which displays the average growth of employment, real wages, and capital for different groups of firms: all manufacturers in the economy, those which export, and those which have just started exporting.

Table 2: Average growth of employment, real wages, and capital

	Employment growth (%)	Real wage growth (%)	Investment rate (%)
All firms	0.98	2.71	21.81
Exporters	2.77	2.73	24.88
Exporters upon entrance	4.91	3.58	27.87

Notes: All figures above correspond to the panel averages between 2010 and 2023. Employment growth is measured with the usual formula $\frac{n_{ft} - n_{ft-1}}{0.5 \times (n_{ft} + n_{ft-1})}$ and relies on SCIE data. Data on wages are taken from *Quadros de Pessoal* and encompass one's base income and any supplements paid. The investment rate is defined as the ratio between net investment flows reported in SCIE and the lagged stock of capital.

Between 2010 and 2023, the average yearly employment growth rate of all Portuguese manufacturers was 0.98%; that of all exporters was 2.77%, whereas access to export markets typically entailed a 4.91% increase in the workforce. This last figure implies that the average job creation rate amongst new exporters was five times as large as that of the entire economy. Beyond that, the average real wage growth of those new exporters was nearly a full percentage point greater than the mean reported for the set of all manufacturers.

I had already shown that entrance alone in export markets is strongly associated with bouts of exceedingly high productivity and profitability levels. Since hiring is costly, that decision is also accompanied by sizeable changes in the workforce: those firms take advantage of very fortunate circumstances to pay the cost of entering and the cost of taking in more workers, and, as the labour demand curve is pushed to the right, the movement along a positively sloped supply curve ensures that real wages rise.

These results do suggest that frictions in the labour market are relevant to firms' exporting decisions. Although entrance also entails relatively larger adjustments in the capital stock, the focus on labour is justified by two main reasons. First, the gap to the unconditional mean of the economy is particularly wide.² And second, because it allows to leverage on the effects generated by the comprehensive labour market reform implemented between 2011 and 2013. Either through adjustment costs or through the slope of the supply curve, which typically mirrors the degree of labour market power, the cost of accessing export markets is greater than what it would be in a completely frictionless environment. A reform which reduces some of those frictions ought to have an effect on firms' exporting choices. In the next sub-section I take a more formal look into that by estimating the underlying policy functions.

2.3 Exporting policy function: extensive margin

In the previous sub-section I showed that *i)* sorting into export markets depends on a source of heterogeneity beyond profitability, and *ii)* export status is strongly associated with input adjustments, specifically labour. Between 2010 and 2023, the average employment growth of entrants in export markets was five times as large that of the entire economy. Even more noticeable, entrance in export markets typically entailed considerably larger employment and real wage adjustments.

Given the importance of labour adjustments, one should naturally expect that a reform which slashes adjustments costs to produce a tangible effect on the sorting of firms. I now take a closer look at this through the lens of an exporting policy function. The goal is to understand how multiple variables impact the discrete decision of becoming an exporter. To do so, let x_{ft} be an indicator variable which takes the unity when firm f has exported in period t , and 0 otherwise. The policy function is expressed as follows:

$$x_{ft} = \delta_1 \cdot x_{ft-1} + \delta_2 \cdot \log(n_{ft-1}) + \delta_3 \cdot \xi_{ft} + \Delta' \Xi_{ft} + \epsilon_{ft}, \quad (4)$$

Current export status is a function of the export participation in the previous period x_{ft-1} , the inherited stock of workers $\log(n_{ft-1})$, and a log TFPR exogenous innovation ξ_{ft} . The latter is defined by $\xi_{ft} = a_{ft} - g(a_{ft-1})$, where $g(\cdot)$ is estimated non-parametrically. A vector of controls Ξ_{ft} is also included. The results are shown in Table 3 below.

Current export status is positively associated with past participation, lagged employment, and contemporaneous shocks to profitability. Yet all their corresponding coefficients remain largely unchanged throughout the various time periods. It is worth to go through each of those individually.

²In the post-reform period, the mean employment growth of firms entering export markets has persistently outweighed the yearly average of all manufacturers in the economy.

Table 3: Determinants of export status

	Full sample: 2010-2023	Pre-reform: 2010-2013	Post-reform: 2014-2023
Lagged export status	0.66*** (0.03)	0.65*** (0.04)	0.66*** (0.04)
Log lagged employees	0.02*** (0.00)	0.02*** (0.00)	0.02*** (0.00)
Log TFPR innovation	0.08* (0.04)	0.07* (0.04)	0.08* (0.04)
Industry-Year FE	Yes	Yes	Yes
R^2	0.65	0.64	0.65
Observations	172 116	27 427	144 689

Notes: Standard errors are clustered at 2-digit industry levels. The vector of controls, Ξ_{it} , includes the contemporaneous stock of (log) capital, and the lagged export-to-sales ratio

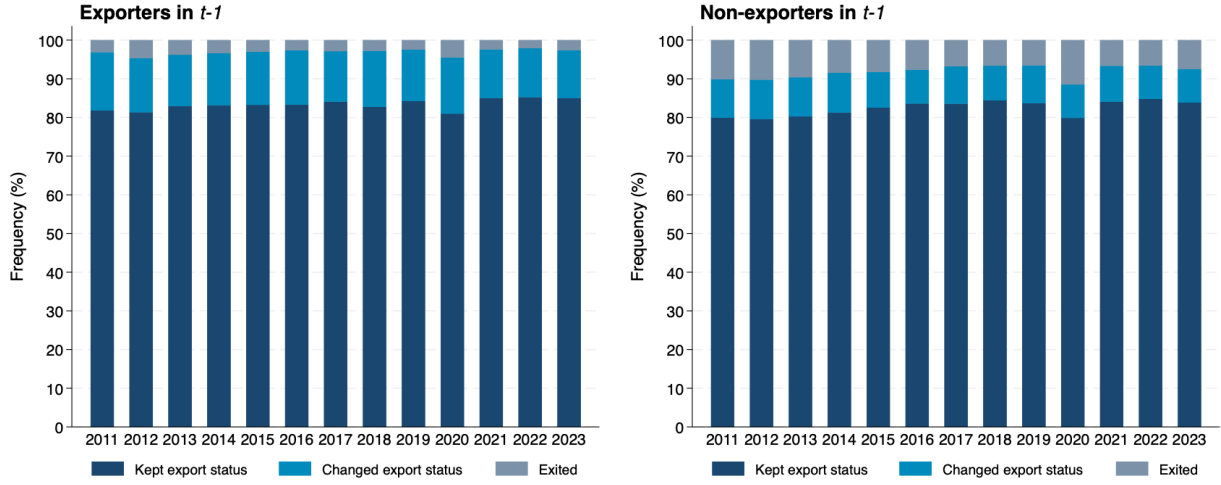
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Past participation and lagged employment

The persistence of export status, δ_1 , ranges between 0.65 and 0.66. These values are remarkably similar to those reported by [Alessandria et al. \(2021\)](#) for Colombian firms, albeit slightly smaller than those computed by [Cooper et al. \(2026\)](#) for Chinese businesses. The parameter can be particularly informative about the numerous costs firms are required to bear when they decide to join export markets. These include not just sunk entry costs and fixed costs of shipping production abroad, for example, but also the costs of scaling up the workforce in order to accommodate the increasing demand. To that extent, export status is also positively associated with lagged employment, $\delta_2 > 0$.

As the estimated parameter δ_1 remains largely unchanged throughout the sample, so too does the persistence of export status. This can be attested in Figure 3, which displays how the conditional transition matrix has evolved throughout time for exporters (left panel) and non-exporters (right panel). On average, 83% of firms have kept their export status of the preceding period. More noticeably, that figure has hardly changed throughout time. This is an admittedly interesting development: entrance in export markets is associated with large swings in the workforce, but a labour market reform which eases those adjustments did not boost export status transitions.

Figure 3: Persistence of export status



Responsiveness to profitability shocks

The exporting policy function specified in (4) is a linear probability model: it posits how the different co-variates affect the probability of being an exporter. Parameter δ_3 can then be construed as responsiveness measure, *i.e.* how export status responds to exogenous profitability shocks. The estimated values reported in Table 3 range between 0.07 and 0.08. Given the dispersion of the underlying shocks, these figures imply that, all else equal, a one standard deviation profitability innovation raises the probability of exporting between 9 and 10 percentage points.

More importantly, however, this too is an object which remains largely unaltered throughout time. In other words, the responsiveness of export status to changes in the profitability environment of firms did not change, even though the cost of accessing export markets was effectively cut. In Appendix B I demonstrate this is not a feature of extensive margin decisions. Instead, I show that the responsiveness to exogenous profitability shocks remains the same when *i)* studying the intensive margin decision of exporters, *ii)* when the entrance and exit decisions into exporting are estimated separately, and *iii)* when the gradual exposure of firms to looser labour constraints is taken into account. Generally, this missing responsiveness contrasts with a finding reported in Garcia (2026): the same labour market reform actually boosted the employment responsiveness of Portuguese firms.

3 The model

3.1 Households

There is a representative household in the economy. Following [Berger et al. \(2022\)](#), I assume it comprises a unit measure of atomistic and homogeneous workers, each endowed with one unit of labour supply. The maximisation problem is standard: every period the household chooses *a*) the consumption level c_t , *b*) savings s_{t+1} to carry to next period, and *c*) the measure of workers to supply to each firm $f \in \{1, \dots, \mathcal{F}\}$ in the economy, n_{ft} , in order to maximise the discounted value of its expected lifetime utility. Formally:

$$\begin{aligned} \max_{\{c_t, s_{t+1}, n_{ft}\}_{t=0}^{\infty}} \left\{ \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left(\frac{c_t^{1-\varsigma}}{1-\varsigma} - \frac{\mathbf{n}_t^{1+\phi}}{1+\phi} \right) \right\}, \quad \text{subject to} \quad c_t + \frac{1}{1+r} \cdot s_{t+1} \leq \sum_{f=1}^{\mathcal{F}} w_{ft} \cdot n_{ft} + s_t + \pi_t \\ \mathbf{n}_t \equiv \left(\sum_{f=1}^{\mathcal{F}} n_{ft}^{\frac{1+\psi}{\psi}} \right)^{\frac{\psi}{1+\psi}} \end{aligned} \quad (5)$$

The household exhibits separable preferences over consumption and aggregate labour supply. The CRRA coefficient is $\varsigma \leq 1$, with log utility when it equals the unity, while the inverse of Frisch elasticity is $\phi \geq 0$. Suppose there is a unique labour market where a constant and exogenously given mass of $\mathcal{F}$ firms meet their potential employees. Within that single market, the aggregate labour supply index, $\mathbf{n}_t$, depends on the substitutability of employment across firms, $\psi > 0$. The greater that degree of substitutability, the greater the level of labour market competition. Although I remain agnostic about the underlying sources of that substitutability, these can potentially be traced back to various mechanisms documented in the literature: worker-firm-specific amenities and non-wage preferences, search frictions, firm granularity, and workers' incomplete information about their outside options (see [Berger et al. \(2024\)](#) and [Berger et al. \(2026\)](#)). As the effect produced by any of these channels dwindles, that substitutability rises, $\psi \rightarrow \infty$, and the labour market approaches the perfect competition benchmark. Naturally, this is mirrored in the slope of the inverse labour supply curve:

$$\underbrace{n_{ft} = \mathbf{n}_t \cdot \left(\frac{w_{ft}}{\mathbf{w}_t} \right)^{\psi}}_{\text{Labour supply for firm } i} \iff \underbrace{w_{ft} = \mathbf{w}_t \cdot \left(\frac{n_{ft}}{\mathbf{n}_t} \right)^{1/\psi}}_{\text{Inverse labour supply curve}} \quad (6)$$

3.2 Heterogeneous firms

The economy is populated by a continuum of heterogeneous firms, which operate in monopolistic competition in both the product and labour markets. To ease exposition I suppress the firm-specific index f . The *real* side of the economy is described by a Cobb-Douglas production function: $y = z \cdot n^{\alpha}$, where z is a stochastic idiosyncratic productivity level, n is the stock of workers employed in the period, and $\alpha < 1$ ensures the

existence of decreasing returns to scale. On the *nominal* side, say these firms face both a domestic and foreign downward sloping demand curves: $p(y) = (\theta/y)^{1/\varepsilon}$ and $p^*(y^*) = (\theta^*/y^*)^{1/\varepsilon^*}$, respectively. For the remainder of this paper, foreign variables are shown with an asterisk as a superscript. For example, $\varepsilon \geq 0$ is the price elasticity of domestic demand, while $\varepsilon^* \geq 0$ is its external counterpart. Similarly, θ is a stochastic shifter in the domestic demand function, and θ^* the shifter in the demand from abroad.

At the beginning of the period surviving firms observe their productivity level and the two demand shifters. These follow independent and stationary log-normal distributions with finite variance. For convenience of notation let $\mu \in \Delta$ be the vector which comprises these three exogenous state variables: $\mu \equiv [z, \theta, \theta^*]'$. Since the individual distributions are assumed to be independent, μ evolves according to a conditional distribution $\Pi(\mu'|\mu)$ which is simply the product of the three individual ones.

Incumbent firms also observe the number of workers employed in the previous period, n_{-1} , and their inherited export status, $x_{-1} \in \{0, 1\}$. If $x_{-1} = 0$ the firm has only sold in the domestic market, whereas if $x_{-1} = 1$ the firm is an exporter: it has operated in both the domestic and the foreign market. Together with μ , these endogenous variables constitute the state vector of the firm. Firms immediately rely on this tuple to determine if they want to remain in the economy as incumbents or to exit permanently. Formally:

$$V(\mu, n_{-1}, x_{-1}; \mathbf{n}, \mathbf{w}) = \max \left\{ \underbrace{V^i(\mu, n_{-1}, x_{-1}; \mathbf{n}, \mathbf{w})}_{\text{Incumbents}}, \underbrace{V^o(n_{-1})}_{\text{Exiters}} \right\} \quad (7)$$

Incumbent firms

Firms which decide to continue their operations use the state vector (μ, n_{-1}, x_{-1}) to optimally choose their employment and export status for the period. Formally, their dynamic programming problem can be written as follows:

$$V^i(\mu, n_{-1}, x_{-1}; \mathbf{n}, \mathbf{w}) = \max_{n \geq 0, x \in \{0, 1\}} \left\{ R(\mu, n, x) - \omega(n; \mathbf{n}, \mathbf{w}) \cdot n - C(n_{-1}, n) - \chi(x_{-1}, x) - c \right. \\ \left. + \beta \int_{\mu' \in \Delta} V(\mu', n, x) \cdot d\Pi(\mu'|\mu) \right\} \quad (8)$$

The sum expressed in the first line of equation (8) stands for the contemporaneous profit made by the firm. Given the vector of exogenous shocks μ and the optimal decisions on employment and export status, the revenue flow of the firm is $R(\mu, n, x)$. This function encompasses an intratemporal optimisation problem. The firm observes demand from the domestic and foreign markets, and constrained by the production possibility frontier set by the current level of productivity and the number of workers employed, must decide the share of output to allocate to each market in order to maximise total revenue. That problem can then be written as

follows:

$$R(\mu, n, x) = \max_{y>0, y^*\geq 0} \left\{ y \cdot \left(\frac{\theta}{y} \right)^{1/\varepsilon} + y^* \cdot \left(\frac{\theta^*}{y^*} \right)^{1/\varepsilon^*} \cdot \mathbb{1}\{x = 1\} \right\}, \quad (9)$$

subject to $y + y^* \cdot \mathbb{1}\{x = 1\} \leq z \cdot n^\alpha$

The solution to (9) defines the entire revenue flow of the firm, but also its export intensity. Say the firm decides not to export, $x = 0$. In this case all output is sold domestically and the revenue amounts to $y \cdot (\theta/y)^{1/\varepsilon}$, where the level of production is pinned down by the technological constraint $y = z \cdot n^\alpha$. Yet for an exporter firm, $x = 1$, the problem is slightly more complex. There is an interior solution to the amount of output to be sold in the domestic market, which is implicitly given by the following condition:

$$z \cdot n^\alpha - y = \left(\frac{\theta^{1/\varepsilon}}{\theta^{*1/\varepsilon^*}} \cdot \frac{1 - 1/\varepsilon}{1 - 1/\varepsilon^*} \right)^{-\varepsilon^*} y^{\varepsilon^*/\varepsilon} \quad (10)$$

Equation (10) admits a closed-form solution in the knife-edge case that the price elasticities in the domestic and foreign markets take the exact same values, $\varepsilon = \varepsilon^*$. But these are two objects which are to be estimated. As such, a more general solution requires that numerical methods be employed, *e.g.* a bisection.

The remaining elements included in the profit function shown in (8) refer to the cost structure of incumbent firms. The wage paid to each employed worker is $\omega(n; \mathbf{n}, \mathbf{w})$. This is a general equilibrium object. In particular, it matches the inverse labour supply curve derived in (6). Since firms are assumed to be infinitesimally small in the economy, they take as given their competitors' employment decisions which define the aggregate indices $\mathbf{n}$ and $\mathbf{w}$.

Labour adjustments are expensive to carry out and that is embedded in $C(n_{-1}, n)$, an adjustment cost function. I adopt a piecewise formulation to create the distinction between *net* costs of job creation and destruction, and includes both fixed and linear forms of adjustment.

$$C(n_{-1}, n) \equiv \begin{cases} \Gamma_f + \gamma_f \cdot (n_{-1} - n) & \text{if } n_{-1} > n \\ 0 & \text{if } n_{-1} = n \\ \Gamma_h + \gamma_h \cdot (n - n_{-1}) & \text{if } n_{-1} < n \end{cases} \quad (11)$$

The inclusion of non-covexities, Γ_f and Γ_h , is essential to capture the pervasiveness of employment inaction in the Portuguese economy, as first documented by [Varejão and Portugal \(2007\)](#). Conversely, the linear components, γ_f and γ_h , are meant to capture the absence of frequent episodes of very large labour adjustments. The subscripts *f* and *h* stand for *firing* and *hiring*, respectively. An identical function has also been used by [Garcia \(2026\)](#) to study the productivity effects of a comprehensive reform which slashed adjustment costs.

Incumbents also bear fixed costs of production. Regardless of export status, firms are required to pay $c > 0$. This generates endogenous exit from all markets, since some low profitability firms may not be able to

pay that cost. But there are also costs specific to exporting activities. Firms which decide to become exporters must pay a sunk entry cost of $\Lambda \geq 0$. And every time they do export, a fixed cost λ must also be borne.

$$\chi(x_{-1}, x) \equiv \lambda \cdot \mathbb{1}\{x = 1\} + \Lambda \cdot \mathbb{1}\{x = 1 | x_{-1} = 0\} \quad (12)$$

Exiter firms and the prospect of entering

Exit is not free. Firms which decide to permanently shut down their operations must pay severance to all workers who are currently on payroll. This is captured by the linear cost of firing, γ_f . Since no other liabilities are due, the value of exit corresponds to the following:

$$V^o(n_{-1}) = -\gamma_f \times n_{-1} \quad (13)$$

The model also includes endogenous entrance in the economy. For each exiting firm say there exists a potential entrant which is endowed with a signal about its prospective productivity and demand. That signal, $\tilde{\mu} \in \Delta$, is drawn from the corresponding stationary distribution, $\iota(\cdot)$. Upon observing it, the firm can then decide to enter the following period and start operating at the lowest level of employment, $\underline{n}$, if and only if the conditional expected value of becoming an incumbent is weakly positive:

$$\int_{\mu' \in \Delta} V(\mu', \underline{n}, 0; \mathbf{n}, \mathbf{w}) \cdot d\Pi(\mu' | \tilde{\mu}) \geq 0 \quad (14)$$

3.3 Equilibrium

A general equilibrium of this model encompasses *i*) a value function $V(\mu, n_{-1}, x_{-1}; \mathbf{n}, \mathbf{w})$; *ii*) decision rules for employment $n(\mu, n_{-1}, x_{-1}; \mathbf{n}, \mathbf{w})$, export status $x(\mu, n_{-1}, x_{-1}; \mathbf{n}, \mathbf{w})$, domestic production $y(\mu, n, x)$, foreign production $y^*(\mu, n, x)$, exit $\eta(\mu, n_{-1}, x_{-1}; \mathbf{n}, \mathbf{w})$, and entrance $e(\tilde{\mu})$; *iii*) a wage schedule $\omega(n; \mathbf{n}, \mathbf{w})$; *iv*) a measure of firms $\varphi_t(\mu, n_{-1}, x_{-1})$; and *v*) aggregate consumption levels for consumption c_t , employment $\mathbf{n}_t$, and the wage rate $\mathbf{w}_t$ such that:

1. **Firm optimisation.** Firm optimally decide whether to continue production or to exit according to (7). For incumbents, the policy functions for employment and export status solve the Bellman equation in (8); their domestic and foreign production levels define the revenue function in (9). Potential entrants decide to begin operation the following period as long as condition (14) holds.
2. **Household optimisation.** The wage schedule $\omega(n; \mathbf{n}, \mathbf{w})$ solves the intratemporal consumption-leisure problem in (5), with $\mathbf{w}_t = c_t^\zeta \cdot \mathbf{n}_t^\phi$.

3. **Stationary measure.** The measure of firms is a stationary distribution, *i.e.* it corresponds to the fixed point of the following law of motion:

$$\begin{aligned} \varphi_{t+1}(\mu', n, x) = & \int \left((1 - \eta(\mu, n_{-1}, x_{-1})) \cdot \mathbb{1}\{n(\mu, n_{-1}, x_{-1}) = n\} \cdot \mathbb{1}\{x(\mu, n_{-1}, x_{-1}) = x\} \cdot \pi(\mu' | \mu) \right) d\varphi_t(\mu, n_{-1}, x_{-1}) \\ & + \int \int \left(\eta(\mu, n_{-1}, x_{-1}) \cdot \iota(\tilde{\mu}) e(\tilde{\mu}) \cdot \mathbb{1}\{n = \underline{n}\} \cdot \mathbb{1}\{x = 0\} \cdot \pi(\mu' | \tilde{\mu}) d\tilde{\mu} \right) d\varphi_t(\mu, n_{-1}, x_{-1}) \end{aligned}$$

4. **Labour market clearing.** The aggregate level of labour demand equals the labour supply decision of the household, $\sum_{f=1}^F n_{ft} = \int n_t(\mu, n_{-1}, x_{-1}) \cdot d\varphi_t(\mu, n_{-1}, x_{-1})$.
5. **Goods market clearing.** The consumption level of the household matches the aggregate level of firms' domestic production, $c_t = \int y_t(\mu, n(\mu, n_{-1}, x_{-1}), x(\mu, n_{-1}, x_{-1})) \cdot d\varphi_t(\mu, n_{-1}, x_{-1})$.

4 Quantitative analysis

4.1 Structural estimation

The general equilibrium model of the previous section is parameterised in two steps. First, I exogenously fix a small subset of parameters — see Table ???. And second, conditional on those, I estimate the twelve remaining ones with a simulated method of moments exercise. The corresponding estimator, $\hat{\Theta}$, minimises the following objective function, F :

$$\hat{\Theta} = \arg \min_{\Theta \in \mathbb{R}_{12}} \left\{ \left((m^d - m^s(\Theta)) / m^d \right)' W \left((m^d - m^s(\Theta)) / m^d \right) \right\}, \quad (15)$$

where $m^s(\Theta)$ is the vector of simulated moments obtained when the model is parameterised by Θ , and m^d the vector with the data counterparts of those moments. The model is just-identified, which allows to rely on the conforming identity matrix as the weighting matrix, W .

Estimated parameters

I estimate the model parameters for two time windows: one targeting the data moments of 2010-2013, and another one targeting those of 2014-2023. I do so to capture the effects the labour market intervention produced on labour adjustment cost parameters, and to understand how others may have changed as well. Table 4 shows those estimates.

Table 4: SMM estimated parameters

	Labour adjustment costs				Trade costs		Demand process				Fixed cost	Labour supply
	Γ_f	γ_f	Γ_h	γ_h	λ	Λ	ε	σ	ε^*	σ^*	c	ψ
2010-2013	0.67	0.5	0.7	0.3	0.4	0.2	1.8	0.9	1.4	0.4	0.5	7.1
2014-2023	0.7	0.35	0.4	0.2	0.1	0	1.9	0.9	2.2	0.1	0.3	8

Estimation fit

The fitness of the SMM estimation is reported in Table 5 below. For each targeted moment I compare their data and model-predicted values in the two periods under analysis.

Table 5: SMM estimation fit — targeted moments

Moments	2010-2013		2014-2023	
	<i>Data</i>	<i>Model</i>	<i>Data</i>	<i>Model</i>
Exit rate (%)	7.4	4.6	5.6	3.9
Std. deviation log employment	1.3	0.9	1.3	1.0
Bursts of large employment creation	6.3	8.7	8.5	7.6
Bursts of large employment destruction	9.2	8.7	6.3	6.6
Responsiveness of export status	0.1	0.1	0.1	0.1
Share (%) of exporters	37.2	12.5	40.8	68.7
Average export intensity (%) of exporters	46.5	63.1	50	61.4
Serial correlation of export status	0.6	0.8	0.7	0.9
Labour productivity advantage of exporters	1.1	1.1	1.1	0.8
Std. deviation of labour productivity of exporters	0.9	0.4	0.9	0.5
Std deviation of labour productivity of non-exporters	1.0	0.9	1.0	0.7
Real wage growth (%) of exporters upon entrance	3.1	3.2	3.7	4.7
Distance, $F(\hat{\Theta})$	1.3		1.6	

The sum of squared distances — the objective function in (15)— takes very small values in the two periods. This can be interpreted as a signal that the model does a successful job replicating the various moments.

Counterfactuals

The usefulness of the model resides in its ability to separately quantify the mechanisms which may be muting the exporting responsiveness of firms. This exercise is implemented in Table 6 below, where I study how exporting-related moments would have behaved if both the slope of the labour supply curve and the dispersion of foreign demand shock had not changed. More specifically, I focus on the share of exporter firms in the economy (*Participation*), as well as on the *Persistence* and *Responsiveness* components of the extensive margin decision formulated in equation (4).

Table 6: Counterfactual exercises

		<u>Targeted moments</u>			<u>Distance</u>
		Participation	Persistence	Responsiveness	$F(\hat{\Theta})$
2010-2013	<i>Data</i>	37.24	0.65	0.07	
	<i>Model</i>	12.49	0.77	0.07	1.32
2014-2023	<i>Data</i>	40.82	0.66	0.08	
	<i>Model</i>	68.74	0.87	0.13	1.57
	Counterfactual, ψ	68.4	0.86	0.22	4.1
	Counterfactual, σ^*	72.04	0.94	0.44	23.15

Notes: The three targeted moments are the share of exporters (*Participation*), the serial correlation of export status (*Persistence*), and the responsiveness of export status to profitability shocks (*Responsiveness*).

In **Counterfactual, ψ** all parameters take their 2014-2023 values with the exception of the slope of the labour supply curve.

In **Counterfactual, σ^*** all parameters take their 2014-2023 values with the exception of the dispersion of foreign demand innovations.

The results above indicate that the dispersion of foreign demand shocks plays a disproportionately larger role than the slope of the labour supply schedule. If the estimated standard deviation had not fallen from 0.4 to 0.1, the share of exporter firms would have risen, export status would have become more persistent, and the responsiveness to exogenous profitability shocks would have increased threefold. The counterfactual slope of the labour supply curve, on the other hand, would have hardly changed the export participation and persistence.

This conclusion is embedded with economic significance. The dispersion of foreign demand shocks triggers two offsetting mechanisms. On the one hand, the estimated reduction is translated into more predictable demand swings. As the uncertainty regarding these falls, firms can forecast more easily the payoff of access export markets, and participation should increase accordingly. On the other, such a more tranquil environment makes it harder for firms to draw a sufficiently appealing shock which would drive them into becoming

exporters. These preliminary estimates suggest this latter mechanism offset the former and the increasing ability of firms to adjust their workforce.

5 Conclusion

Entrance in export markets typically requires sizeable input adjustments. This paper used merged firm-level, production, and matched employer-employee data on Portuguese manufacturing firms to confirm that those episodes do take place during temporary spells of exceedingly high levels of TFPQ and TFPR — those which also prompt firms to carry out relatively larger adjustments of employment and real wage increases.

A reform which reduces the burden of these labour adjustments can then be reasonably interpreted as a policy which eases entrance in export markets. In the case of Portugal, however, the share of exporters and their export share stalled once looser constraints were included in the labour law. I attempt to rationalise these findings with a general equilibrium framework of firm dynamics. According to my preliminary estimates, despite lower labour adjustment costs, a reduced dispersion of foreign demand shocks generated a more tranquil business environment abroad which muted the incentives for firms to alter their export status.

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A Firm-level data

The data are obtained from two main sources. The first one, *Sistema de Contas Integradas das Empresas (SCIE)*, reports balance sheet and income statement data for the near-universe of Portuguese non-financial firms. Despite such an extraordinarily high coverage, this paper focus only on the exporting and labour demand decisions of manufacturers — descriptive statistics can be found in Table A1 below. Such a narrow subject was purposefully chosen. The manufacturing sector boasts the largest employment share in the Portuguese economy (Garcia (2026)), and it is also the only one covered in an additional and very useful dataset. That second source of data is a yearly sample of manufacturing firms, *Inquérito Anual à Produção Industrial (IAPI)*. This dataset is maintained by the national statistical agency in Portugal, and surveys a significant share of all manufacturers on the volume and value of their production. While volume is recorded in units of measurement (number of items, kilograms, meters, liters), value is measured in current euros. This implies a researcher can infer quantities and prices for all 12-digit products produced and sold by those firms.

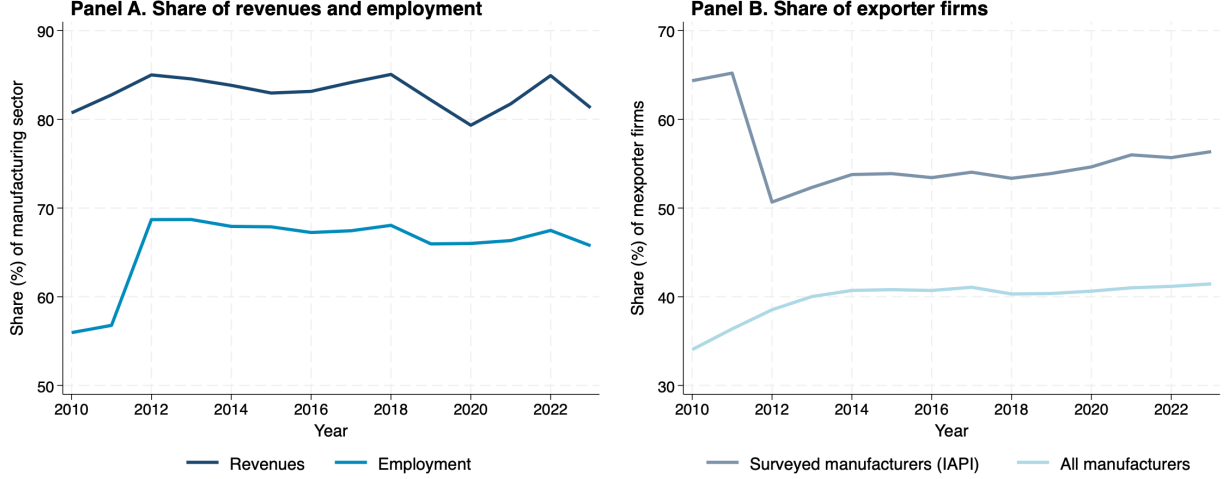
Table A1: Descriptive statistics of the Portuguese manufacturing sector

		Full sample:	Pre-reform:	Post-reform:
		2010-2023	2010-2013	2014-2023
Observations		475 827	133 953	341 874
Nr. unique firms		62 034	41 008	52 156
<i>Exporters</i>	Average share (%)	39.80	37.18	40.83
	Mean employees	36.34	35.59	36.60
	Mean log ARL	11.02	10.90	11.06
	Std. dev. log ARL	0.92	0.94	0.91
<i>Non-exporters</i>	Average share (%)	60.20	62.82	59.17
	Mean employees	7.97	8.07	7.93
	Mean log ARL	10.30	10.19	10.34
	Std. dev. log ARL	1.01	0.98	1.02
Exit rate (%)	Time-series average	6.13	7.36	5.58

The two datasets share the same anonymous firm-identifier and therefore can be merged. This is particularly useful to retrieve the unobserved levels of TFPQ and TFPR through a production function estimation exercise. Yet two pressing issues are worth addressing. The first one concerns the representativeness of the sample of manufacturers. By construction, *IAPI* must cover at least 90% of the value of aggregate production.

In addition, Figure A1 indicates that the set of surveyed firms persistently comprises 80% of all revenues generated by the manufacturing sector, and approximately 70% of all employment. Exporter firms are, however, relatively more pervasive.

Figure A1: Representativeness of the IAPI dataset



And second, the prevalence of multi-product firms in the merged dataset. This is attested by Figure A2 below, which shows that approximately 60% of all surveyed manufacturers produce more than one good every year. This poses all sorts of problems explored in the main text. One potential solution would be to rely only on single-product firms. As this would be admittedly restrictive, I instead employ the strategy of De Loecker et al. (2016): output elasticities are recovered from the sample of single-product firms using a sample correction procedure, and productivity is then inferred for all firms via the subsequent estimation of input allocations.

B Additional empirical facts

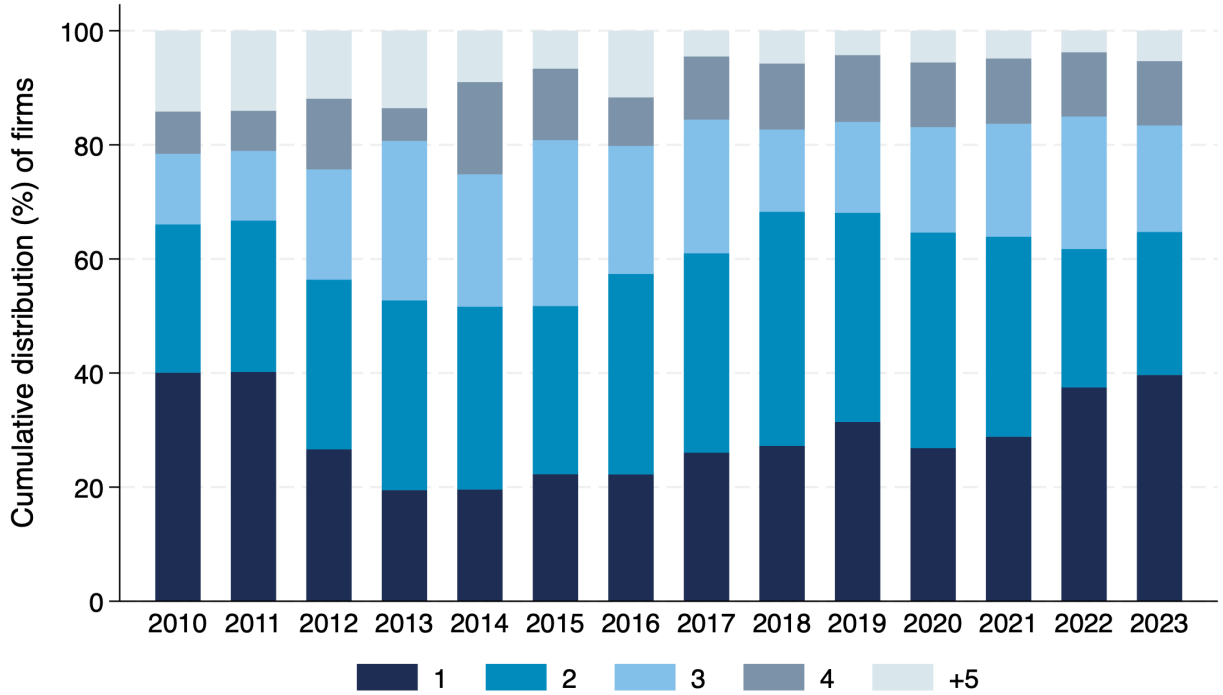
B.1 Production function estimation

I assume production takes place with a Cobb-Douglas technology. This implies that equation (1) in the main text can be more specifically expressed as follows:

$$\log(Y_{fpt}) = \log(\mathcal{Z}_{ft}) + \alpha^k \cdot \log(k_{fpt}) + \alpha^n \cdot \log(n_{fpt}) + \alpha^m \cdot \log(m_{fpt}) + \log(\epsilon_{fpt}) \quad (\text{B1})$$

As long as the vector of output elasticities, $\alpha \equiv (\alpha^k, \alpha^n, \alpha^m)$ is unbiasedly estimated, so too will be the level of TFPQ, $z_{ft} \equiv \mathcal{Z}_{ft}$. This is the ultimate goal of the production function estimation exercise.

Figure A2: Number of products produced by surveyed manufacturers



B.2 Exporting policy function: extensive margin

From the coefficients reported in Table 3 one can conclude that both the persistence and responsiveness of export status have remained unaltered over the entire sample period. I now take a closer look at these results. More specifically, I assess that same extensive margin decision of exporting through two supplemental formulations: *i*) a separate analysis of the entrance and exit choices, and *ii*) an identification of the responses to TFPQ and TFPR shocks.

I start by separating the discrete decisions related to export markets. To do so, consider two different indicator variables: one which takes the unity when firm f changes from non-exporter to exporter in period t , and another which takes that same value when f exits the export market in period t . I regress both these variables in the firm's lagged stock of employees and the contemporaneous shock to profitability. These can then be construed as linear probability models on the entrance and exit decisions. The estimated coefficients are displayed in Table B1.

As expected, entrance depends positively on lagged size and the exogenous realisation of TFPR; conversely, the larger that stock of workers and the more profitable the firm becomes, the less likely it is to exit export markets. However, much like in the original specification, all coefficients remain constant over time.

Table B1: Discrete margins of exporting

	Full sample:		Pre-reform:		Post-reform:	
	2010-2023		2010-2013		2014-2023	
	Entrance	Exit	Entrance	Exit	Entrance	Exit
Log lagged employees	0.03*** (0.01)	−0.02*** (0.00)	0.04*** (0.01)	−0.01*** (0.00)	0.03*** (0.01)	−0.02*** (0.00)
Log TFPR innovation	0.09* (0.05)	−0.05* (0.03)	0.09* (0.05)	−0.05* (0.03)	0.09* (0.05)	−0.05* (0.03)
Year-Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.17	0.11	0.18	0.11	0.17	0.11
Observations	63 264	50 493	10 440	10 370	52 824	40 123

Notes: Regressions for export entrants in period t only includes firms which were non-exporters in $t - 1$. The vector of controls only includes the contemporaneous stock of (log) capital. On the other hand, regressions for export exiters in t only includes firms which were exporters in $t - 1$. The vector of controls includes the lagged export-to-sales ratio, and the lagged (log) number of foreign destinations served. In all cases, standard errors are clustered at 2-digit industry levels.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Those pertaining to responsiveness are particularly noticeable. A one standard deviation shock to profitability raises the probability of accessing export markets by roughly 11 percentage points (pp), and lowers the probability of exiting by 6 pp. Despite the increasing flexibility added to the labour market, these responses of the extensive margin decision remain largely the same.

A potential justification for this lack of responsiveness resides in the actual concept of shocks to TFPR. The latter embeds fluctuations in TFPQ, *i.e.* the technical efficiency of turning inputs into output, but also in domestic and foreign demand. Conceivably, firms may respond more to changes in demand coming from abroad but not as much to swings in their intrinsic productivity, for example. I estimate a second formulation of the extensive margin decision to prove this is not the case. To do so, I disentangle the TFPQ and demand components included in shocks to profitability. Since the former is directly obtained in the production function estimation exercise, the remaining challenge is to separately identify shocks to domestic and foreign demand.

Firm-level shocks to export demand are obtained with a shift-share instrument identical to that in [Hummels et al. \(2014\)](#), and later similarly replicated in [Garin and Silvério \(2024\)](#) in the context of the Portuguese economy. Let $\mathcal{M}_{ft}$ be an exogenous foreign demand shock hitting firm f in year t . That innovation is set up

as follows:

$$\mathcal{M}_{ft} = \sum_c \sum_p s_{fpct-1} \cdot \log(M_{pct}), \quad (\text{B2})$$

where M_{pct} corresponds to total imports of product p which country c buys from all over the world (excluding Portugal) in period t , and s_{fpct-1} is the revenue share of firm f sales of product p in country c in period $t - 1$. The identification strategy can be summarised as follows. By excluding purchases from Portuguese firms, the world import demand of product p from whichever country c — the share M_{pct} — evolves mostly in accordance with factors they take as exogenous, *e.g.* changes in local consumer tastes or in the comparative advantage of national producers. Those swings will impact Portuguese firms differently: some of them are highly exposed to sales of product p to country c , while others are immune to those. This idea is encapsulated in the share s_{fpct-1} .

The implementation of this strategy requires additional data. To compute total demand in multiple destination markets I use bilateral trade data from the publicly available BACI database ([Gaulier and Zignago \(2010\)](#)). Information on sales of Portuguese firms to different markets is provided by a annual administrative customs dataset, *Comércio Internacional (CI)*, which reports exports and imports of Portuguese firms to and from various markets and at the six-digit product (HS6) level. Since the firm-identifier is again the same as in the remaining datasets, a complete merge is possible³.

I include these estimated foreign demand shocks in an alternative specification to (4). In addition to the original three covariates, I now saturate the model with *i*) innovations to TFPQ, and *ii*) the shocks to foreign demand. By explicitly controlling for changes in technical efficiency and swings in demand from abroad, innovations to profitability should only mirror varying circumstances in the domestic market. This also constitutes a novel contribution of this paper. Given data restrictions, [Cooper et al. \(2026\)](#) only implemented a similar exercise on simulated panels of Chinese firms. Here, I investigate how different shocks shape firms' responsiveness in real data.

The results are reported in Table B2 below. The coefficients associated with lagged status and lagged worker are mostly the same as in the main specification. The remaining parameters exhibit a substantial heterogeneity in responsiveness: the export status of firms responds essentially to changes in technical efficiency and foreign demand, but not to domestic demand shocks. More importantly, the size of those responses has indeed been kept unchanged over time. The lack of an aggregate response of profitability documented in Table 3 does not mask a changing composition in the sensitivity to shocks of a different nature.

³Two additional aspects are worth pointing out. First, unlike that of firms, the product classification followed in this dataset does not match that of *IAPL*. As a consequence, a researcher can see that a firm is an exporter, but cannot determine which produced goods were specifically assigned to foreign markets. And second, those flows correspond to the universe of transactions with countries outside the European Union (EU). For intra-EU shipments, however, reporting is only mandatory for flows in excess of a certain threshold.

Table B2: Export status and the decomposition of profitability

	Full sample: 2010-2023	Pre-reform: 2010-2013	Post-reform: 2014-2023
Lagged export status	0.66*** (0.04)	0.66*** (0.04)	0.66*** (0.04)
Lagged log employees	0.02*** (0.00)	0.02*** (0.00)	0.02*** (0.00)
Log TFPQ innovation	0.08* (0.04)	0.08* (0.04)	0.08** (0.04)
Foreign demand shock	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
Domestic demand shock	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
Year-Industry FE	Yes	Yes	Yes
R^2	0.66	0.65	0.66
Observations	172 116	27 427	144 689

Notes: Standard errors are clustered at 2-digit industry levels. The vector of controls, Ξ_{it} , includes the contemporaneous stock of (log) capital, and the lagged export-to-sales ratio

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

B.3 Exporting policy function: intensive margin

In this subsection I explore another margin of firms' exporting choices. More specifically, instead of focusing on their export participation, I now assess how decisions within export markets are formulated. To do so, I consider two different specifications of the corresponding policy function. The first one regresses the revenue share of exporters' foreign sales on *i*) the lagged share, *ii*) the lagged number of workers, and *iii*) the contemporaneous realisation of the profitability shock. As for the second, I adopt a similar formulation but with the number of destination countries as the variable of interest. These two exercises rely on the structure of (4) to expand the analysis to intensive margin choices.

The results associated with the export sales ratio are displayed in Table B3 below. Notice the regression only includes exporter firms, *i.e.* firms whose export sales ratio is strictly positive. That share is shown to be exceedingly persistent: the autoregressive component in the estimated policy function is very close to 0.9 in all periods. Interestingly, the effect of the profitability innovation is not statistically significant.

I also measure the intensive margin decision of exporters with an alternative metric. Using the Portuguese

Table B3: Determinants of export sales ratio amongst exporter firms

	Full sample: 2010-2023	Pre-reform: 2010-2013	Post-reform: 2014-2023
Lagged export sales ratio	0.89*** (0.01)	0.88*** (0.01)	0.89*** (0.01)
Log lagged employees	0.00** (0.00)	0.01*** (0.00)	0.00 (0.00)
Log TFPR innovation	0.01 (0.00)	0.00 (0.00)	0.01 (0.00)
Industry-Year FE	Yes	Yes	Yes
R^2	0.85	0.85	0.85
Observations	96 649	16 233	80 416

Notes: Standard errors are clustered at 2-digit industry levels. The vector of controls, Ξ_{ft} , includes the contemporaneous stock of (log) capital, and the lagged (log) value of total revenues.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

customs data described before, I estimate the same regression but with the number of destination markets as the dependent variable. The underlying reason is as follows. Instead of exploring the increasing flexibility of the labour market to change export status or to assign a larger share of their production to foreign markets, exporter firms may be actually trying to access new markets, and that is presumably the margin that responds more to exogenous profitability shocks. Table B4 shows this is not the case. There is again a large persistence in the number of foreign markets served, but innovations to profitability do not significantly alter that decision. More importantly, that responsiveness is again kept unchanged throughout time.

B.4 Legacy clauses

The set of new and more flexible clauses introduced in the labour law were grandfathered in, *i.e.* they would only apply to new contracts set from then on. Such an institutional feature can have serious economic consequences: firms will only be exposed to the increasingly flexible regime once they start replacing their existing contracts by newer ones.

To assess how that exposure has evolved throughout time I rely on *Quadros de Pessoal*, the employer-employee matched dataset where the unit of observation is the labour relationship between the two parties. Under the premise that all clauses were enacted until the end of 2013, let the exposure of a firm f in year t be the share of employees in its workforce whose current contract was set as of January 2014. The cross-sectional mean of that metric is displayed in Figure B1.

Table B4: Determinants of number of destination countries amongst exporter firms

	Full sample: 2010-2023	Pre-reform: 2010-2013	Post-reform: 2014-2023
Log lagged # of destinations	0.82*** (0.01)	0.82*** (0.01)	0.82*** (0.01)
Log lagged employees	0.04*** (0.01)	0.04*** (0.01)	0.04*** (0.01)
Log TFPR innovation	0.00 (0.00)	0.01** (0.01)	−0.00 (0.01)
Industry-Year FE	Yes	Yes	Yes
R^2	0.82	0.83	0.81
Observations	50 661	9972	40 689

Notes: Standard errors are clustered at 2-digit industry levels. The vector of controls, Ξ_{ft} , includes the contemporaneous stock of (log) capital, the lagged (log) value of total revenues, and the lagged export-to-sales ratio. Regressions only include exporter firms in period t .

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

This measure can be useful to understand whether this exposure to the increasing flexibility of the labour market may be masking some of the results documented so far. For example, the lack of a changing responsiveness of the several exporting decisions to profitability shocks may just hide the fact that very few firms already became exposed to the new rules, while others are still tied by rigid constraints. I consider a firm to be treated at time t when its exposure variable is greater than the computed average of its sector. With that treatment assignment, I then run again the policy functions for the extensive and intensive margin decisions while interacting the profitability innovation with the treatment dummy. The results are shown in Table B5.

Figure B1: Average share of contracts set under more flexible clauses

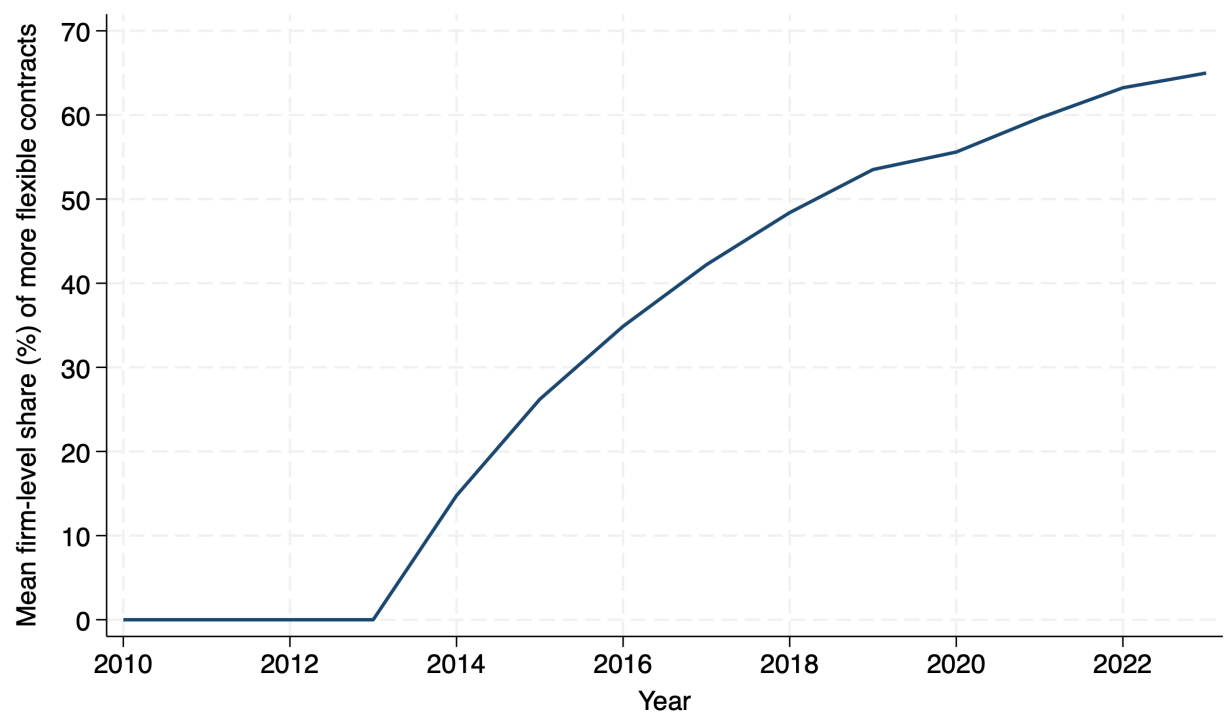


Table B5: Exporting decisions of treated and non-treated firms

	Export status, x_{ft}	Export-to-sales ratio, $\varkappa_{ft}$
	(1)	(2)
Lagged export status	0.66*** (0.04)	
Lagged share		0.85*** (0.01)
Log lagged employees	0.02*** (0.00)	0.00 (0.00)
Log TFPR innovation	0.08* (0.04)	0.01 (0.01)
Log TFPR innovation $\times \mathbb{1}\{\text{Treated}_{ft}\}$	0.00 (0.01)	0.00* (0.00)
Industry-Year FE	Yes	Yes
R^2	0.65	0.85
Observations	144 990	53 096

Notes: Firms are assigned to treatment if their share of more flexible contracts, *i.e.* those governed by the new rules set by the reform, is greater than the median in the corresponding year t . The specification in (1) includes as controls the contemporaneous stock of (log) capital, the lagged export-to-sales ratio, and the lagged share of more flexible contracts. The specification in (2) only incorporates exporter firms, and includes as controls the contemporaneous stock of (log) capital, the (log) number of foreign destinations served, the lagged value of log revenue, and the lagged share of more flexible contracts. In both cases standard errors are clustered at 2-digit industry levels.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$