U.PORTO

**MASTER'S**
ECONOMICS OF BUSINESS AND STRATEGY

# Self-Selection Into Export Markets? Evidence From Portuguese Manufacturing Firms In The Post-Troika Recovery Period (2015-2019)

Gustavo Nuno Ferreira Tarábbia

**M**

**2026**

U.PORTO

FEP FACULDADE DE ECONOMIA
UNIVERSIDADE DO PORTO

# SELF-SELECTION INTO EXPORT MARKETS? EVIDENCE FROM PORTUGUESE MANUFACTURING FIRMS IN THE POST-TROIKA RECOVERY PERIOD (2015-2019)

**Gustavo Nuno Ferreira Tarábbia**

Dissertation

Master's in Economics of Business and Strategy

Supervised by

**José Manuel Peres Jorge**

2026

## Acknowledgements

As I'm finishing this chapter of my life, I couldn't not say anything to the people that surrounded me and pushed me to the best version of myself. Everyone mentioned here took a part in shaping the person I am today, and I couldn't be more grateful to them for making it possible.

Firstly, I would like to thank my supervisor, Professor José Manuel Peres Jorge, for his dedication and guidance to all his supervised students, specially me. His words were an inspiration, not only throughout the process of writing this dissertation, but also in helping me find my passion. If it weren't for him, I wouldn't even know which career path I'd choose.

Then, I would like to thank my father, my brother, and my girlfriend for always having my back, especially when I felt lost with no clear path to follow. They were the absolute pillars of my well-being and the driving force behind the completion of this dissertation. Their endless patience and understanding of my fears made this entire journey much smoother than it would have been without them.

I couldn't talk about acknowledgements and leave my friends out of the equation. They were the ones that made me feel joy and happiness every single day. Taking me out of my comfort zone, and forcing me to take much-needed breaks, they were my escape from the stress of this academic journey. I am incredibly lucky to have them in my life.

Finally, I would like to thank my mother, whom God happily holds in His arms. She was, and always will be, the most important person in my life. Knowing that she is watching over me from above gives me the daily strength to give everything I have to make her proud, keeping her memory alive in every achievement, even when times are extremely rough. I do everything in my power to honour the love and values she gave me, knowing she is with me in spirit. I love you Mom, and I always will!

## Abstract

This dissertation investigates the self-selection hypothesis, which posits that only the most efficient firms enter foreign markets through overcoming the sunk costs of internationalization, within the Portuguese manufacturing sector during the post-Troika recovery period (2015-2019). The main objective is to determine whether the significant increase in Portuguese exports during this era was driven by firms' productivity differentials. Using firm-level financial data from the SABI database, the estimator developed by Levinsohn and Petrin (2003) is employed to obtain credible measures of Total Factor Productivity (TFP), effectively controlling for simultaneity bias.

The empirical results provide robust evidence in favour of the self-selection hypothesis. This investigation finds that "starters" (firms exporting for the first time in 2017) are structurally superior across all performance indicators long before their first international sale. Specifically, future exporters reveal a significant TFP premium (defined as the systematic efficiency advantage over their purely domestic peers) of approximately 22% to 24% two years prior to entry, supported by a capital stock advantage and higher investment rates. This operational divergence suggests a deliberate process of technological preparation to overcome the sunk costs of internationalization.

Furthermore, the analysis reveals that import-side connectivity acts as a facilitating mechanism, reducing the productivity threshold required for export entry and highlighting the role of Global Value Chains. The self-selection mechanism is found to be stricter in low-technology sectors and for firms targeting markets outside the European Union, where regulatory and geographic barriers are steeper. These findings suggest that for a small open economy like Portugal, productive efficiency and capital intensity are the fundamental prerequisites for sustainable international competitiveness.

**Keywords:** Self-selection; Export Entry; Total Factor Productivity; Portuguese Manufacturing Industry; Firm-level Data

## Resumo

Esta dissertação investiga a hipótese da auto-seleção, na qual apenas as empresas mais eficientes entram no mercado externo superando os custos afundados da internacionalização, no setor industrial português durante o período de recuperação pós-Troika (2015-2019). O objetivo principal é determinar se o aumento das exportações portuguesas neste período foi impulsionado pelo diferencial de produtividade das empresas. Com base em dados financeiros ao nível das empresas provenientes da base de dados SABI, utiliza-se o estimador de Levinsohn e Petrin (2003) para obter medidas credíveis da Produtividade Total dos Fatores (PTF), controlando eficazmente o enviesamento de simultaneidade.

Os resultados empíricos fornecem evidências robustas a favor da hipótese da auto-seleção. Constata-se que as "starters" (empresas que entram no mercado de exportação em 2017) são estruturalmente superiores em todos os indicadores de desempenho antes da sua primeira venda internacional. Mais concretamente, os futuros exportadores apresentam um prémio significativo da PTF (definido como uma vantagem de eficiência sistemática sobre parceiros puramente domésticos) de aproximadamente 22% a 24% dois anos antes da entrada no mercado, apoiado por uma vantagem em termos de stock de capital e por taxas de investimento mais elevadas. Isto sugere um processo deliberado de preparação tecnológica para superar os custos irrecuperáveis da internacionalização.

Além disso, a análise revela que a conectividade internacional através das importações atua como um mecanismo facilitador, reduzindo o limiar de produtividade necessário para a entrada no mercado de exportação e destacando o papel das cadeias de valor globais. Verifica-se que o mecanismo de auto-seleção é particularmente estrito nos setores de baixa tecnologia e para as empresas que visam mercados fora da União Europeia, onde as barreiras regulamentares e geográficas são mais elevadas. Estes resultados sugerem que, para a economia portuguesa, a eficiência produtiva e a intensidade de capital são os pré-requisitos fundamentais para uma competitividade internacional sustentável.



**Palavras-chaves:** Auto-seleção; Entrada no Mercado de Exportação; Produtividade Total dos Fatores; Indústria Portuguesa; Dados ao Nível da Empresa

## Table of Contents

## Index of Tables

# 1. Introduction

The global economic landscape has undergone profound shifts over the last few decades, increasingly defined by the complex integration of national markets and the rising importance of firm-level efficiency. In the specific case of Portugal, the aftermath of the 2008 financial crisis and the subsequent sovereign debt crisis (2011-2014) marked a turning point in its macroeconomic trajectory. Faced with a collapse in domestic consumption and a severe growth of the unemployment rate, which already was in an upward trajectory (Martins, 2016), the Portuguese economy was forced to look outward. The economic adjustment program led by the "Troika" (European Commission, European Central Bank and International Monetary Fund) was the driver of a structural transformation, shifting resources from non-tradable to tradable sectors. This transition was remarkably successful in terms of export performance; the weight of exports in the national GDP surged from approximately 33.5% in 2008 (Gabinete de Estratégia e Estudos, 2011) to 43.7% by 2019 (Portugal Exports, Percent of GDP - Data, Chart | TheGlobalEconomy.com, n.d.), reflecting an unprecedented internationalization of the Portuguese manufacturing sector.

However, beneath the surface of this 'export miracle' lies a more complex reality. While the volume of goods crossing borders increased, the fundamental engine of long-term growth, Total Factor Productivity (TFP), remained largely stagnant (ECB, 2017). This raises an important question: how can a country increase its export intensity while struggling with persistent structural inefficiencies? TFP, representing the portion of output not explained by the mere accumulation of labour and capital, is the ultimate reflection of a firm's non-observable factors, such as technological sophistication, managerial quality, and organizational innovation. Actually, the use of TFP is very much appreciated by global leaders:

"A rise in TFP is the 'hallmark' of new productive forces, Xi Jinping, China's leader, said last year. On October 21st the People's Daily, a party newspaper, urged China to pull 'the bull's nose of innovation and strive to improve total factor productivity'." (The Economist, 2025).

This intense real-world focus underscores that true competitive advantage relies on shifting the actual production frontier rather than simply relying on scale. For a small open economy (SOE) like Portugal, which lacks the domestic scale to only compete on volume, TFP is not just a performance metric; it is the fundamental "entry ticket" to survival in the competitive global landscape.

The relationship between international trade and productivity has been at the heart of economic research since the seminal contribution of Melitz (2003). By introducing firm-level heterogeneity into trade theory, Melitz demonstrated that exposure to international trade triggers a selection process where only the most efficient firms can survive. In this context, two non-mutually exclusive hypotheses emerge. On one hand, the *Learning-by-Exporting* (LBE) hypothesis suggests that firms improve their productivity after entering foreign markets through knowledge spillovers and competitive pressure. On the other hand, the *Self-Selection* (SS) hypothesis argues that firms must be more productive beforehand to overcome the substantial sunk costs of internationalization, such as market research, distribution networks, and compliance with foreign standards.

This dissertation focuses on the latter, aiming to empirically investigate the SS hypothesis within Portuguese manufacturing firms during the post-Troika recovery period (2015-2019). The core research question is whether the "export premia" (systematic performance advantage in size, capital intensity and efficiency that differentiates trading firms from non-traders) observed in Portuguese firms is a result of prior efficiency gains. By analysing the years before the firm's first export sale, this dissertation aims to identify the existence of a "productivity differential" that distinguishes future exporters from their purely domestic peers. Understanding this dynamic is crucial for policymakers: if SS is the dominant force, then policies aimed at simply subsidizing exports may be less effective than those targeted at fostering pre-entry efficiency and managerial upgrading. To address these critical dimensions and provide a clearer understanding of Portugal's structural landscape, this study explores the underlying microeconomic drivers of the country's trade dynamics.

Regarding the core empirical findings, the results of this research provide consistent evidence in support of the self-selection mechanism within the analysed sample. Future exporters ("starters") reveal a statistically significant TFP premium of 22% to 24% two years before entering foreign markets. This efficiency advantage is found to be coupled with a substantial pre-entry accumulation of physical capital stock and higher domestic investment rates, reinforcing the hypothesis of deliberate technological preparation. Furthermore, the models suggest that prior import experience acts as an international shortcut, lowering the productivity threshold required for subsequent export market entry, whereas the productivity cut-offs are found to be significantly higher for firms targeting non-EU destinations and those operating within low-technology, price-competitive industrial sectors.

Shifting to our academic contributions, this study provides three significant advancements to the literature on trade and productivity in Portugal. First, it employs a high-level econometric framework using the Levinsohn and Petrin (2003) approach. This is vital to overcome the simultaneity bias that compromises standard production function estimations, ensuring that these TFP measures are a "real" reflection of efficiency. Second, the research accounts for the geographical nuances of trade by decomposing the self-selection effect by export destination, distinguishing between the highly integrated and lower-barrier European Union (EU) market and the more complex Extra-EU markets. Third, we recognize that "manufacturing" is not a uniform block. By segmenting the sample into an adaptation of Pavitt's 1984 technological intensity groups, this dissertation offers a detailed view of how the efficiency requirements vary between traditional industries, such as textiles and food, and high-tech sectors like chemicals and machinery.

The dissertation is structured into five chapters. Following this introduction, Chapter 2 presents a detailed Literature Review, tracing the evolution from neoclassical trade theories to the dissertation paradigm, and discussing the specificities of the Portuguese case. Chapter 3 describes the Data, the rigorous filtering of the SABI database, as well as robustness checks that validate the consistency of the findings, while also explaining the method used to estimate TFP. Chapter 4 offers a comprehensive Analysis of the Results. Finally, Chapter 5 concludes with a summary of the evidence, a discussion of the practical implications for Portuguese SMEs, and suggestions for future research.

## 2. Literature Review

This chapter establishes the theoretical and empirical foundations needed to contextualize the relationship between productivity and international trade. To provide a logical sequence, this review starts by analysing the concept of Total Factor Productivity and the econometric challenges associated with its unobserved estimation. It then follows the evolution of international trade theory, going from macro-level models to the heterogeneous-firm framework pioneered by Melitz (2003), which serves as the main foundation of this dissertation. Building upon this, the subsequent sections evaluate the two mechanisms defined in the empirical literature: the Self-Selection and the Learning-by-Exporting hypothesis. Finally, the chapter expands the traditional trade matrix to account for global production fragmentation, evaluating the performance hierarchy of two-way traders and firms embedded within Global Value Chains, concluding with an assessment of these structural dynamics within the specific post-crisis environment of the Portuguese economy.

### 2.1 Productivity and Total Factor Productivity (TFP)

The analysis of firm-level economic performance requires a clear distinction between volume and efficiency indicators. At the epicentre of this discussion is *Total Factor Productivity* (TFP), a concept whose modern theoretical foundation was established by Solow (1957). To formalize this relationship, Solow uses an aggregate production function, typically represented in the Cobb-Douglas form:

$$Y_t = A_t K_t^{\beta_k} L_t^{\beta_l} \quad \textbf{(1)}$$

In this equation, Y represents total GDP, K capital input and L labour input. The parameters $\beta_k$ and $\beta_l$ denote GDP elasticities with respect to each factor, respectively. The crucial component for this investigation is the term $A_t$, that the author designated "technical change". Unlike K and L, $A_t$ is not a physical input, but the multiplier that determines the efficiency with which the resources are combined. As Solow (1957) showed, every increase in Y that cannot be attributed to the increase in K or L is attributed to variations in $A_t$. His empirical application concludes that most of the increase in output per capita was due to this shift in the production function and not just to the capital deepening. While classical aggregate applications often treat the factor elasticities ($\beta_k$ and $\beta_l$) as structurally invariant

parameter constants, both theoretical developments and empirical evidence suggest that these parameters can vary substantially (Acemoglu, 2002). In a heterogeneous firm framework, factor elasticities are highly sensitive to sector-specific technological regimes, meaning that the structural weights of labour and capital differ across industries. So, it implies that variations in $\beta_k$ and $\beta_l$ reflect structural shifts in production, capturing biased technological progress. On the other hand, the residual $A_t$ captures the neutral technological progress, which reflects efficiency gains that preserve the relative importance of K and L (Hicks, 1963). In other words, it represents a scenario where a firm generates more output by optimizing the combination of the same available resources.

For this dissertation's context, this distinction is crucial: while volume indicators might mask operational inefficiencies, TFP serves as a proxy for a firm's capacity to transform inputs into outputs, making it a more suitable indicator to measure pre-export competitiveness.

However, Solow's original approach has been the subject of intense debates due to its exogenous nature, treating this residual like a "black box" where all efficiency gains that the neoclassical theory cannot decompose are deposited. Hulten (2001) explores this theoretical gap, offering a critical perspective about the concept's evolution and limitations. The author describes TFP as an "ignorance index", underlining that, although quantitatively measurable, TFP covers a wide range of non-observable factors that go well beyond pure technological progress. In his analysis, Hulten (2001) argues that this residual incorporates organizational innovations, management improvements and even network externalities. In the context of Portuguese SMEs, this nuance is essential, because it suggests that the "entry ticket" to the external market may reflect superior managerial capabilities that are not fully captured by simple productivity measures, such as value added per worker.

Despite this conceptual clarity provided by Hulten (2001), basing the analysis on aggregate data fails to explain why firms that operate in the same institutional framework reveal so disparate efficiency levels. This limitation is addressed by Syverson (2011), who documents substantial and persistent heterogeneity in productivity, even among firms within the same narrowly defined industry. The author shows that this dispersion is driven by internal determinants, such as ownership structure, information technologies, and management practices, and external factors, such as competitive pressure. However, his work focuses on a cross-sectional analysis of industrial structure, leaving a gap regarding the temporal dynamics preceding internationalization. This dissertation aims to fill this gap, assessing

whether Portuguese firms that enter the external market were already located in the upper tail of the productivity distribution in the pre-entry period.

Transitioning from theory to empirical evidence requires methodological rigor in addressing TFP estimation problems. Van Biesebroeck (2005) examines the fragility of traditional estimators, with particular emphasis on simultaneity bias. This problem occurs when firms adjust their input utilization in response to productivity shocks that the researcher does not observe, which can lead to biased conclusions regarding firm performance (the formal mathematical derivation of this structural endogeneity is detailed in Appendix A). The author demonstrates, comparing different estimation techniques, that result robustness depends on the choice of methods that correct for these distortions.

Olley and Pakes (1996) proposed the use of investment as a proxy to control for these unobserved shocks. The thought process behind this proposition comes from the fact that a firm that decides to invest is signalling expectations of higher future productivity, thereby allowing for a "cleaning" of the estimation error. However, this method has practical limitations in firm-level panels, due to the frequent existence of non-investment years, which would lead to the loss of important observations.

As an alternative to address this problem, Levinsohn and Petrin (2003) suggested the use of intermediate inputs (such as raw materials or energy) instead of investment. Unlike investment, which is often sporadic and subject to adjustment costs, intermediate inputs are adjusted almost daily, responding sensitively and continuously to productivity shocks. This approach is particularly adequate to firm-level panels, because it drastically reduces the null values problem, thereby allowing the maintenance of a more representative sample.

## 2.2 Theoretical Foundations: Firm Heterogeneity and Trade

The evolution of international trade theory has been marked by a paradigm shift: from country-based models to firm-based models. Traditionally, the literature focused on sector-level comparative advantages or scale economies. Krugman (1980) established the basis for New Trade Theory by focusing on scale economies and consumer preferences for variety in a monopolistic competition context. However, his model was based on the premise that firms were identical (the "representative firm"). Under this framework, if a sector was an exporter, every firm in that sector would export equally. Although revolutionary, this model failed to account for an empirical reality: why, within the same sector, do only a small fraction of firms export?

This gap was filled by the seminal contribution of Melitz (2003), which introduced firm heterogeneity in international trade. The author breaks with the idea of the "representative firm" by proposing that firms have different levels of productivity, determined randomly at market entry. The key innovation of Melitz (2003) resides in the introduction of export fixed costs (such as marketing, product adaptation, and distribution networks), that work like an efficiency filter. This filter establishes a cutoff point: only firms with a TFP high enough to generate operating profits that cover these fixed costs are able to export. This mechanism is the theoretical basis for SS that this dissertation explores: internationalization is not a random event, but a selection process where only the most efficient firms survive the trade shock.

The impact of this selection is not limited to the individual firm but extends to the entire industry through intra-industry reallocation. According to Melitz (2003), trade liberalization raises competitive pressure in the product market, forcing less productive firms to exit the market and allowing more productive firms to expand their market share. This phenomenon is corroborated by Bernard et al. (2003), who provide a complementary framework accommodating firm heterogeneity and imperfect competition. The authors demonstrate that the exporters' higher productivity is intrinsically linked to their size and technological advantage, confirming that exposure to international trade purifies industrial structure by reallocating resources toward the most efficient producers.

The complexity of this selection process is amplified when considering other forms of internationalization. Helpman et al. (2004) extend the Melitz framework by endogenizing the choice between exporting and Foreign Direct Investment (FDI). The authors establish a productivity hierarchy: less productive firms only serve the domestic market; firms with

intermediate productivity export; and firms at the top of the efficiency distribution become multinationals through FDI. This hierarchy reinforces the idea that entering external markets requires a robust preparation in terms of intrinsic efficiency, highlighting the relevance of pre-entry productivity in determining internationalization decisions.

More recent literature by Chaney (2008) introduces a crucial distinction between intensive margin (how much each firm exports) and extensive margin (how many firms export). The author demonstrates that, in a world of heterogeneous firms, barriers to trade mainly affect the extensive margin, meaning that they determine if a firm can or cannot enter a new market.

In the Portuguese context, this theoretical framework is particularly relevant. According to ECB (2017), Portugal has been facing a persistent TFP stagnation when compared with the EU average, which suggests that the Melitz cut-off may be conditioned by problems of capital and labour allocation. If productivity is the export driver, low performance of national TFP might be limiting the extensive margin of new exporters.

This brings us to the central question of the literature*:* **does exporting lead to productivity, or does productivity lead to exporting?** This dilemma defines the two pillars that will be next discussed: *self-selection* (SS), where productivity precedes exporting, and *learning-by-exporting* (LBE), where gains occur post-entry. Given the context of stagnation highlighted by ECB (2017), understanding if productivity precedes exporting in Portugal is crucial for designing growth policies.

### 2.3 Self-Selection Hypothesis

If TFP acts like a pre-entry filter, as suggested by heterogeneous-firms models, then understanding this mechanism is vital to determining whether the low aggregate performance of the Portuguese economy constitutes, by itself, a barrier to the extensive margin of exports. Accordingly, this section synthesizes the contributions that establish exporters' superior performance as an ex-ante attribute, beginning with seminal evidence identifying isolated productivity as the main determinant of firms' export decisions.

According to Bernard & Jensen (1999), export participation is an endogenous process determined by firm-level characteristics. The authors' main insight is that exporting firms exhibit superior performance characteristics in comparison to their non-exporter peers long before any international transaction occurs, a phenomenon commonly referred to as "export premia". However, this evidence raises the question of whether this productivity advantage results from a strategic and deliberate preparation (through investment in productivity-enhancing activities) or from random positive shocks that push firms well beyond the cutoff point. Moreover, by focusing on the large domestic markets, these studies do not fully explain how this selection dynamic behaves in s*mall and open economies* (SOEs) like Portugal, where internal restrictions and competitive pressure are different.

This perspective was further developed by Clerides et al. (1998), who integrated these empirical findings into a structural model centred on sunk entry costs. They tested whether only firms with sufficiently low marginal costs find it profitable to bear the sunk costs of internationalization. Their results support the view that superior productivity performance precedes the exporting decision, thereby raising questions about the role of international experience in generating productivity gains post-entry. Nevertheless, these models focus essentially on the export participation decision, leaving a gap regarding destination-specific entry barriers. It remains unclear whether the productivity cutoff point is uniform or if it changes according to destination-specific barriers (such as the institutional and geographic complexity), a crucial distinction for understanding the positioning of competitive firms across export markets.

Offering a more comprehensive synthesis of this literature, Wagner (2007) classifies the self-selection hypothesis as one of the most established findings in the literature based on international empirical evidence. The author argues that the external market operates as a "gatekeeper", admitting only the most efficient firms. Although this conclusion is strongly

supported, Wagner identifies a persistent and fundamental gap in the literature: the lack of determinants explaining how firms reach such ex-ante productivity levels. Building on Wagner's synthesis, an important gap remains regarding the role of technological sophistication and management quality in shaping pre-export productivity. This channel is still underexplored, while the identification of its causal effects is complicated by the simultaneity between investment decisions and productivity.

The attempt of generalizing these results through the ISGEP - International Study Group on Exports and Productivity (2008) confirmed that future exporters are consistently more productive than their domestic peers across a range of institutional and regulatory environments. Although this collaborative effort demonstrated the prevalence of performance differentials, it lacked a breakdown by technological intensity. A significant gap remains in our understanding of whether the selection "filter" is equally demanding across different manufacturing sectors. Assuming a uniform mechanism may mask sector-specific dynamics. For instance, the productivity premium required to enter high-technology markets might be significantly higher than in traditional, low-tech industries, a nuance that is particularly relevant for an economy like Portugal's, which is characterized by a high presence of traditional manufacturing.

In the Portuguese context, Silva et al. (2010b) provide evidence consistent with the hypothesis that domestic firms self-select for foreign markets based on their past performance. However, as their study focuses on a period of relative stability prior to the sovereign debt crisis, there is a significant time gap in the literature. Since then, the Portuguese economy has gone through profound structural changes, and the current environment is marked by a persistent stagnation in TFP, as highlighted by the ECB (2017). It is, therefore, critical to investigate whether these selection mechanisms still hold under different macroeconomic pressures. Furthermore, it is necessary to explore whether the destination of exports, distinguishing between the integrated EU market and more distant non-EU markets, imposes a productivity leap, a gap that this research seeks to fill by analysing the period 2015–2019.

Taken together, these insights lead to the expectation that Portuguese manufacturing firms do not face a uniform barrier, but rather a heterogeneous selection mechanism where prior TFP advantages are required to overcome the sunk costs of the international market.

## 2.4 Learning-by-Exporting Hypothesis

Whilst the SS hypothesis focuses on the determinants of entry into foreign markets, the Learning-by-Exporting (*LBE*) approach examines the trajectory of firms' productivity after starting their export activity. This hypothesis suggests that exposure to international markets allows firms to access new flows of knowledge, advanced technologies and economies of scale, resulting in efficiency gains that would not be achievable in the domestic market. However, unlike the robust findings in the literature on SS, the empirical evidence on *LBE* is considerably more mixed and dependent on the institutional and methodological context.

The modern debate on LBE was driven by the work of Clerides et al. (1998). Through a structural analysis of developing economies, the authors tested whether participation in international trade reduced firms' marginal costs over time. The main insight from this study was the absence of significant statistical evidence for *LBE*. The authors concluded that the productivity differential observed among exporters is due almost exclusively to ex-ante selection. This conclusion presented a conceptual challenge to the literature: if exporting does not generate efficiency gains, why do firms invest so heavily in internationalization? However, the gap left by this paper lies in its aggregate nature and its focus on economies with low levels of human capital at the time. The authors did not consider that absorptive capacity may vary between firms, suggesting that *LBE* may be a phenomenon 'hidden' behind sectoral averages.

To address this inconsistency, Van Biesebroeck (2005) introduced a crucial perspective when analysing the manufacturing sector in African economies. The author found evidence that exporters are not only more productive prior to entering international markets, but also exhibit significantly higher productivity growth rates following internationalization. The key insight here is that *LBE* may be particularly relevant for firms in countries with small or technologically less advanced domestic markets, where exporting serves as the main channel for modernisation. However, the author identifies a persistent methodological gap: the difficulty in separating the scale effect (producing more reduces average costs) from the real learning effect (a shift in the technology frontier). This distinction is vital, as gains from scale may be temporary, whilst technological learning has long-term structural impacts.

Methodological developments in this area reached a new level with the contributions of De Loecker (2007). By using matching techniques and production functions that control for the endogeneity of the decision to export, De Loecker found robust evidence of post-entry

productivity gains. His main contribution was to demonstrate that LBE is heterogeneous and depends on the destination of exports: firms exporting to more developed countries exhibit higher efficiency gains. Despite this advance, the author acknowledges that his 2007 model still treated productivity in a somewhat passive manner. The exact mechanism of knowledge transfer remained unexplained, that is, how interaction with foreign customers actually translates into new management practices or process innovations within the factory.

To address this conceptual limitation, De Loecker (2013) refined the analysis by proposing a model in which productivity evolves endogenously in response to export activity. The author argues that exporting does not automatically generate learning; it requires firms to invest deliberately in technology and training in order to compete. This insight transforms the LBE view from a passive process into a strategic choice. However, this paper identifies a gap in the literature regarding the role of imported inputs. If a firm exports but also imports more sophisticated raw materials, it becomes difficult to isolate whether the productivity gain comes from "learning to sell abroad" or from "learning to use better components". This interdependence between exports and imports (two-way traders) remains an area of intense debate.

In the Portuguese context, Silva et al. (2010a) explored this hypothesis for the domestic manufacturing sector, finding results that suggest a coexistence of SS and LBE. The main contribution for the case of Portugal is the finding that LBE appears to occur most intensely in the first few years after entry, gradually dissipating as the firm matures in the foreign market. However, as discussed in the previous section, this study is based on a period prior to the major structural transformations of the Portuguese economy post-2015. There is a critical gap in our understanding of how the stagnation of TFP (ECB, 2017) affects learning capacity: if national productivity is stagnant, are our firms losing the ability to absorb knowledge from foreign markets? Furthermore, it remains to be investigated whether LBE in Portugal is driven by diversification of destinations or whether it is confined to the European single market, a question this dissertation will not clarify, but it will be raised as a future research avenue, by analysing the most recent data from the period of economic recovery.

## 2.5 Imports, Two-Way Traders and Global Value Chains

The contemporary landscape of international trade has shifted from a focus on final goods to a complex integration of production processes, where the distinction between exporters and importers is increasingly blurred. This section explores the literature regarding the "two-way traders" (TWT) and the role of imported intermediate inputs as a mechanism for firm-level productivity. If SS and LBE provide the foundation for understanding export dynamics, the integration into Global Value Chains (GVCs) through importing activities offers a more complete view of how firms improve their competitive position.

The shift toward recognizing the importance of the "import side" began with studies like Amiti and Konings (2007). Their research provided seminal evidence that productivity gains from reducing import tariffs on intermediate inputs are significantly larger than those from reducing tariffs on final goods. The key insight is that access to foreign inputs allows firms to benefit from "learning," "variety," and "quality" effects, where better or more diverse inputs directly shift the production frontier. However, a significant gap remains in their analysis regarding the self-selection into importing. While they establish that cheaper inputs raise productivity, they do not fully separate whether firms were already on an upward productivity trajectory that allowed them to start importing, or if the act of importing was the only driver of the observed gains.

Building on the relationship between input variety and firm performance, Goldberg et al. (2010) demonstrated that importing new varieties of intermediate inputs contributes substantially to the expansion of a firm's product scope. Their findings suggest that access to foreign inputs lowers technological constraints, enabling firms to create new products that would be impossible to produce with domestic inputs alone. Nevertheless, while the authors link imports to product innovation, a gap persists concerning the destination of these new products. Their study does not explore whether this expanded product scope is primarily targeted at the domestic market or if it serves as a prerequisite for entering foreign export markets, leaving the "two-way trader" link underdeveloped.

This link is the focus of Kasahara and Lapham (2013), who integrated both importing and exporting into a single structural framework. Their main insight is that there is a complementarity between these two activities: firms that import intermediate inputs are significantly more likely to export, as the productivity boost from imports helps them overcome the sunk costs of export market entry. They suggest that TWT represent the most

productive tier of the manufacturing sector. However, their model assumes a degree of symmetry between importing and exporting costs that may not exist. A notable gap in their work is the failure to account for how institutional distance might disproportionately affect the cost of importing versus the cost of exporting, particularly for small firms in outer economies.

The empirical robustness of the TWT premium was further solidified by Muûls and Pisu (2008). The authors provided evidence that firms involved in both directions of trade are larger, more productive, and more capital-intensive than firms that only export, only import, or remain domestic. This hierarchy suggests that the most efficient firms are those embedded in GVCs. Yet, a persistent gap in this research is the lack of detail regarding the technological nature of the traded goods. It remains unclear if the TWT advantage is driven by the sheer volume of trade or by the technological sophistication of the specific inputs being integrated into the production process.

Expanding on this hierarchy of performance, Castellani et al. (2008) confirmed that TWT exhibit the highest performance levels, but they introduced a critical nuance: the role of destination and origin markets. Their insight was that the complexity of the trading relationship increases with the number of markets served and the diversity of inputs sourced. However, their study focuses on a period before the full maturation of modern GVCs. A gap remains in understanding how the TWT premium evolves when firms are not just trading goods, but are performing specific tasks within a fragmented global production line, where productivity might depend more on "positioning" within the chain rather than just trade status.

Finally, the most recent literature, represented by Hoekman et al. (2026), addresses the integration of firms into GVCs as the definitive environment for modern trade. Their key insight is that productivity is no longer just a driver of trade. They argue that for SOEs like Portugal, GVC participation is the main channel for escaping TFP stagnation. Nevertheless, a critical gap in this literature is the impact of global shocks, such as supply chain disruptions or the recent shifts toward "near-shoring", on the stability of the productivity gains derived from GVCs.

For the Portuguese context, it is yet to be determined whether international connectivity through GVCs acts as a channel that lowers the traditional barriers to export market entry, or if multi-dimensional trade participation imposes an even stricter ex-ante selection filter.

This dissertation intends to bridge this gap by examining the 2015–2019 recovery period, investigating whether prior importing status mitigates the productivity thresholds required for domestic manufacturing firms to initiate their export trajectories.

# 3. Data

This section presents the empirical strategy and econometric frameworks used to examine the relationship between firm performance and international trade. First, the data sources, variable definitions, and the posterior sample filtering criteria used to build the final panel are defined. Then, a set of descriptive statistics is provided, before proceeding to the estimation of the regression equations, to map the ex-ante performance differentials between future exporters and domestic firms before any international exposure occurs.

## 3.1 Sample Extraction and Filtering

The empirical analysis in this dissertation is based on firm-level financial data retrieved from the *SABI* (Sistema de Análise de Balanços Ibéricos) database. *SABI* is a comprehensive longitudinal database that aggregates official accounting information for Portuguese and Spanish firms, sourced primarily from the Informação Empresarial Simplificada (*IES*) and the Conservatória do Registo Comercial.

*SABI* is particularly suitable for this research as it provides granular data on both financial performance and international trade involvement. For the purpose of this study, unconsolidated accounts were used to ensure that the productivity and export dynamics reflect the individual firm's performance. The period under analysis spans from 2015 to 2019, capturing the economic cycle of the post-Troika recovery in Portugal, a period marked by a significant export-led growth strategy.

To construct the necessary indicators for productivity and trade status, a wide range of variables was initially exported for the entire population of firms available in the database. These variables allow for the estimation of TFP using the production function approach and for the identification of firms' geographical trade patterns.

The raw dataset included demographic information such as the VAT Number (NIF), the Activity Code (CAE Rev. 3), Region (NUTS), and the Date of Incorporation. Regarding operational output, the variables extracted were Turnover, Domestic Sales, Supplementary Income, and Operating Subsidies. To accurately measure the production frontier, adjustments were made using the Variation in Production and Capitalized Production.

On the input side, labour was measured through the Number of Employees and Staff Costs, while capital was proxied by Tangible Fixed Assets. Intermediate consumption was captured via Supplies and External Services and the Cost of Goods Sold and Materials Consumed. Furthermore, to distinguish trade profiles, data on Exports and Imports were retrieved, both broken down into Intra-EU and Extra-EU origins and destinations. Finally, Indirect Taxes, Equity, and Total Assets were included as financial controls. The initial extraction resulted in a universe of 366.625 observations (equivalent to 73.325 firms).

A rigorous filtering and cleaning process was implemented to ensure the reliability of the econometric results. The transition from the raw data to the final analytical sample followed a sequential multi-step approach.

First, the sample was restricted to the Manufacturing Sector, specifically firms with CAE codes between 10 and 32. This choice is standard in the literature as manufacturing firms have more clearly defined production functions than service-oriented firms.

Second, in line with Silva et al. (2010b), the data was restricted to match the active firm criteria: a minimum of 2 employees, a turnover of at least 1.000€ and registering positive net fixed assets. Furthermore, exporters were defined as firms exporting at least 1% of their total turnover. To ensure a clean analysis of export entry, we excluded firms with negative output years and those that had already exported prior to the reference year (2017).

Finally, to allow for the estimation of TFP and the analysis of lagged effects in the SS hypothesis, the data was transformed into a balanced panel. This requires each firm to have continuous observations for all variables throughout the five-year period (2015–2019). While restricting the dataset to a balanced panel introduces a degree of survivorship bias (as it excludes exiting firms and newly created firms) this trade-off is strictly necessary to analyse ex-ante structural trajectories of future exporters relative to a consistent domestic baseline.

Following these criteria, the final sample consists of 7069 manufacturing firms (in which 164 are "starters": firms that started exporting in the reference year), totalling 35345 observations.

While the final number of starters is relatively small compared to the total sample size, this sharp reduction is a direct consequence of the rigorous multi-step filtering applied to isolate true macroeconomic entry. By excluding any firms with trade histories or prior international exposure before 2017, this selection provides a "purified" sample, which is vital to validate the self-selection hypothesis without statistical contamination.

This balanced panel provides a robust foundation to analyse the productivity differentials of firms as they enter international markets. Given that these differentials are assessed through the lens of TFP, the complete structural framework, theoretical derivations, and the implementation of the Levinsohn and Petrin (2003) correction are detailed in Appendix A. Also, to ensure the econometric validity of the estimated production functions, a comparative analysis between the baseline Levinsohn-Petrin estimator, an Ordinary Least Squares (OLS) benchmark, and a winsorized specification was conducted. The detailed discussion, along with the estimated coefficients for labour ($\beta_l$) and capital ($\beta_k$), is presented in Appendix B.

### 3.2 Descriptive Statistics

Before proceeding to the formal econometric modelling and the estimation of the regression equations, it is crucial to conduct a preliminary examination of the final panel. Table 1 reports the descriptive statistics for firms in 2016, the year immediately preceding the export market entry for the 'starters' group.

In line with the SS hypothesis, starters are structurally better in all performance indicators. Specifically, they exhibit higher TFP, with an export premia of 0.28 log points. This efficiency is also reflected in the Unit Labour Costs (ULC), where starters show a significantly lower cost structure (-0.12 log points difference).

Furthermore, future exporters are considerably larger in terms of scale. Total sales are 0.69 log points higher, and they operate with a much larger capital stock. While the difference in employment is also positive and significant (0.16 log points), the massive gap in capital stock suggests that starters are not only larger but also more capital-intensive and technologically robust compared to their domestic peers. These descriptive findings provide initial, robust confirmation that firms which successfully transition into export markets are already structural 'outperformers' long before any actual international exposure occurs.

**Table 1: Descriptive Statistics**

| | Non-Starters (n=6905) | Starters (n=164) | Export Premia |
|---|---|---|---|
| TFP (Levinsohn-Petrin) | 3.00 | 3.28*** | +0.28 |
| Value Added (Y) | 4.66 | 5.14*** | +0.48 |
| Total Sales | 5.44 | 6.13*** | +0.69 |
| Unit Labour Costs (ULC) | -0.22 | -0.34*** | -0.12 |
| Employment (L) | 2.00 | 2.16** | +0.16 |
| Capital Stock (K) | 3.48 | 4.63*** | +1.15 |

**Notes:** Source: Own Calculations. All variables are in natural logarithms. All statistics refer to the year 2016 (*t*-1), the year prior to export entry. Non-Starters are firms that never exported between 2015 and 2019. Starters are firms that began exporting in 2017. Significant at: *** p<0.01; ** p<0.05; * p<0.10 based on a two-sample t. Export Premia represents the absolute difference between the means of the two groups.

## 4. Methodology

To provide a rigorous evaluation that avoids relying on a single econometric specification, the empirical assessment is divided into two distinct structural approaches, in line with Silva et al. (2010b). The first method utilizes a parametric approach through a Random Effects Probit model. This allows us to treat export market entry as an endogenous probability determined by a firm's lagged performance variables (including TFP, capital stocks, labour size, and historical import status). By estimating the conditional probabilities of entry, this parametric approach isolates whether ex-ante efficiency acts as a structural gatekeeper, while simultaneously uncovering the role of GVCs and prior international integration by estimating the model for different groups of firms.

The second method shifts the analytical focus from probabilities to physical magnitudes, applying a conditional regression framework to quantify the exact ex-ante level and growth differentials, the so-called "export premia", in the years preceding the internationalization event (2015 and 2016). This multi-period lag structure is essential to verify if future exporters take a deliberate, non-random process of technological and productive preparation to overcome the sunk costs of trade, or if entry is merely triggered by temporary productivity shocks. Together, these steps provide a comprehensive look into how efficiency determines the international trajectory of Portuguese firms.

## 5. Econometric Models and Discussion of Results

This chapter presents and discusses the empirical findings regarding the main drivers of internationalization within the Portuguese manufacturing sector. After establishing the theoretical framework of firm heterogeneity pioneered by Melitz (2003) and refining the estimation of TFP through the correction of Levinsohn and Petrin (2003), we now use their contributions to examine the validity of the SS hypothesis. The analytical objective is to examine the structural dynamics that differentiate future exporters ("starters") from their purely domestic counterparts ("non-starters") during a macroeconomic phase of export-led recovery (2015–2019).

### 5.1 Parametric Approach

Using the first method, to formally test the SS hypothesis and identify the drivers of export market entry, a Random Effects Probit model is estimated. The decision of a firm *i* to start exporting at time *t* is modelled through a latent variable $y_{it}^{*}$, representing the expected net benefits of internationalization:

$$y_{it}^{*} = \beta \mathrm{X}_{i,t-1} + \alpha_i + \varepsilon_{it} \quad \textbf{(2)}$$

where the vector $\mathrm{X}_{i,t-1}$ includes the lagged determinants: $\widehat{TFP}_{i,t-1}$ , Capital Stock, Employment, and Import status. The term $\alpha_i$ accounts for unobserved firm-specific heterogeneity, and $\varepsilon_{it}$ is the idiosyncratic error. The observed binary outcome, whether a firm enters the export market ($Export_{it} = 1$), in line with Altăr and Cazacu (2016), is determined by the probability:

$$P(Export_{it} = 1 | \mathrm{X}_{i,t-1}, \alpha_i) = \Phi(\beta \mathrm{X}_{i,t-1} + \alpha_i) \quad \textbf{(3)}$$

A potential econometric concern within this framework is the endogeneity of TFP, as forward-looking firms might deliberately invest in efficiency improvements specifically to prepare for foreign market entry. To mitigate this reverse causality bias, all explanatory variables in $X_{i,t-1}$ are lagged by one period, ensuring strict temporal precedence. While firms may jointly determine technology investment and international expansion strategies (Costantini & Melitz, 2008), the lagged structural parameter $\widehat{TFP}_{i,t-1}$ remains the critical

operational threshold required to overcome the sunk costs of export entry, making it an econometrically valid pre-condition in the probit specification.

The results of this estimation, presented as marginal effects in Table 2, provide strong evidence for the SS hypothesis of more efficient firms into international trade. Both TFP and Capital Stock reveal positive and statistically significant marginal effects (0.0068 and 0.0070, respectively). This confirms that firms with higher productivity and a more robust technological capability are better equipped to overcome the sunk costs associated with entering foreign markets.

Interestingly, the variable with the highest impact on the probability of becoming an exporter is 'Imports' (0.0097, significant at the 5% level). This finding suggests a "learning-by-importing" effect, where previous experience in international markets through the acquisition of foreign inputs reduces entry barriers and facilitates integration into GVCs. Contrarily, the marginal effect of Employment is negative and not significant, indicating that, ceteris paribus, sheer size in terms of labour force does not increase the likelihood of exporting. Instead, the results suggest that export entry is primarily driven by productive efficiency, capital intensity, and prior international integration.

**Table 2: Self-selection into exporting (probit model)**

| | Marginal Effects |
|---|---|
| TFP | 0.0068* |
| | (0.0034) |
| Capital | 0.0070*** |
| | (0.0013) |
| Employment | -0.0028+ |
| | (0.0025) |
| Imports | 0.0097** |
| | (0.0043) |
| Obs. | 7069 |

**Notes:** Source: Own calculations. The dependent variable is the probability of a firm becoming a "Starter". Robust standard errors in parentheses. Significant at: *** p<0.01; ** p<0.05; * p<0.10. + means not significant.

To further investigate the mechanisms of SS, the sample is decomposed into two distinct groups (Importers and Non-Importers), where *g* denotes each specific group. This approach

tests whether the productivity threshold required to enter the export market differs between firms that already engage in importing activities and those purely domestic. The results, estimated through a Probit model and reported as marginal effects, are presented in Table 3.

The model for each group *g* is defined as:

$$P(Export_{it} = 1|TFP_{i,t-1}, Group_g) = \Phi(\beta_g TFP_{i,t-1} + \varepsilon_{it}) \quad \textbf{(4)}$$

The findings reveal a striking distinction between the two groups. For Non-Importers (firms with no prior import or export activity), the marginal effect of TFP is positive (0.0072) and statistically significant at the 10% level. This confirms that for domestic firms lacking international "shortcuts", productivity is a fundamental requirement to overcome entry barriers.

In contrast, for the Importers, the marginal effect of TFP (0.0090) is not statistically significant. This suggests that for existing importers, the TFP premium becomes less critical for export entry. In other words, the experience, networks, and knowledge acquired through importing activities may act as a substitute for high TFP, lowering the productivity threshold required to start exporting. This reinforces the hypothesis that international integration provides a strategic advantage that can partially compensate the traditional SS requirements based purely on productive efficiency.

**Table 3: Self-selection into exporting using importer dummy (probit model)**

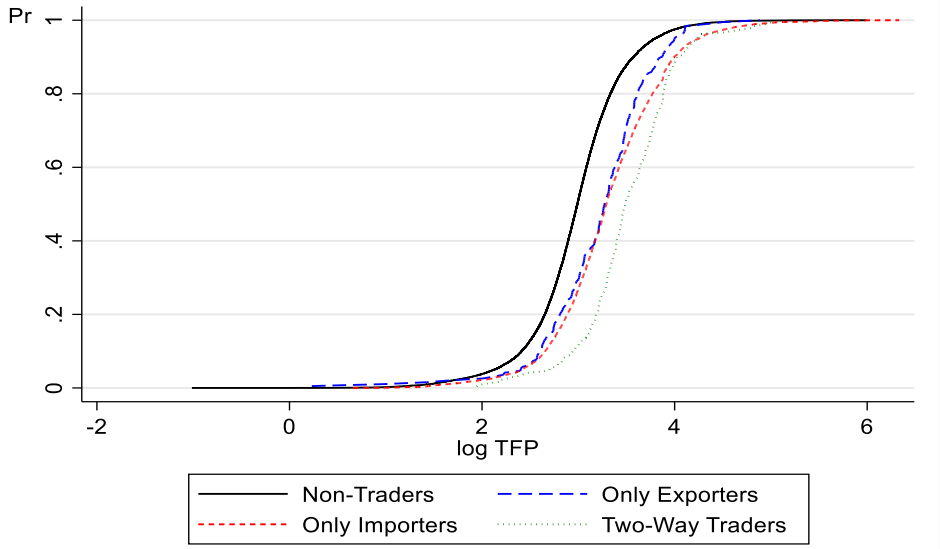
| | Importers | Non-Importers |
|---|---|---|
| TFP | 0.0090$^{+}$ | 0.0072$^{*}$ |
| | (0.0101) | (0.0040) |
| Obs. | 1113 | 5956 |

**Notes:** Source: Own calculations. The dependent variable is the probability of a firm becoming a "Starter". Marginal effects (*dy/dx*) reported. Robust standard errors in parentheses. Column 2 includes firms that imported but did not export in *t*-1. Column 3 includes purely domestic firms (no imports or exports in *t*-1). Significant at: *** p<0.01; ** p<0.05; * p<0.10. + means not significant.

To fully complement the parametric results and analyse the interaction between different international trade profiles, Figure 1 plots the Cumulative Distribution Function (CDF) of TFP across the entire pooled panel (2015–2019). The graphical distribution illustrates a clear

productivity hierarchy among the analysed groups. Purely domestic non-traders are heavily concentrated on the leftmost side of the productivity spectrum, establishing the baseline efficiency floor. In contrast, the distribution for TWT is visibly shifted to the far right. Meanwhile, the productivity distributions for firms classified as only exporters or only importers are tightly bundled in the intermediate range, dominating domestic actors but remaining dominated by TWT. Although this graphical representation highlights a distinct efficiency sorting, it serves as an illustration of the structural differences across trade profiles rather than identifying the underlying mechanisms, which are evaluated through the regression models.

**Figure 1: Cumulative Distribution Function by Trade Profile (Pooled Panel)**




**Notes:** Source: Own elaboration

### 5.2 Ex-ante Differences Approach

Moving on to the second method, to provide a more rigorous evaluation of the SS hypothesis, it is estimated the ex-ante performance differentials using a regression framework. This method allows for a precise quantification of the performance differential between future exporters and domestic firms before any international activity takes place. The following equation, as performed by Bernard et al. (1999), Temouri et al. (2013) and Serti and Tomasi (2008), is estimated for each performance variable $y$ at time $t - \delta$:

$$y_{i,t-\delta} = \alpha + \beta Starter_{i,t} + \gamma Controls_{i,t-\delta} + \varepsilon_{i,t} \; with \; 0 \leq \delta \leq 2 \qquad \textbf{(5)}$$

where $y_{i,t-\delta}$ represents the specific performance variables (in logarithms) under analysis for firm *i* at time $t - \delta$. To capture a multi-dimensional profile of pre-entry competitiveness, the dependent variables evaluated include productivity metrics (TFP and Labour Productivity), scale dimensions (Employment and Sales), investment and capital structures (Capital Stock, Capital Intensity and Investment), and cost-efficiency (Unit Labour Cost). The variable $Starter_{i,t}$ is a dummy equal to 1 if firm *i* enters the export market in the reference year *t* (2017) and 0 if it remains purely domestic, while $Controls_{i,t-\delta}$ is a vector of sector-specific and year control variables evaluated at the lagged period $\delta$.

In this specification, the coefficient $\beta$ represents the export premia. As the variables are estimated in logs, the coefficients are transformed using the expression ($e^{\beta 1}$-1) x 100 to obtain the exact percentage differential between the two groups. The results, detailed in Table 4, validate the structural superiority of starters.

The data reveals that future exporters already exhibit a significant TFP premium of 22.07% two years before entry, which grows to 24.36% in the year immediately preceding internationalization. A similar trajectory is observed for Labour Productivity (LP), reinforcing the efficiency-driven nature of the selection process. Moreover, the scale of operations for starters is vastly superior to their domestic counterparts. Sales are approximately 87-95% higher than those of domestic peers, while the Capital Stock shows a massive premium exceeding 200% across both periods. The deliberate nature of this preparation is further evidenced by a 49.87% higher investment rate in *t*-1 and a consistently higher Capital Intensity (CI) of approximately 130%. Finally, the competitive advantage is reflected in cost efficiency, with starters maintaining Unit Labour Costs (ULC) roughly 9% lower than non-exporters. Collectively, these findings provide robust evidence that starters go through a process of technological and productive preparation long before their first export sale.

**Table 4: Self-selection into Exporting: Levels**

| Dependent Variables | *t*-2 | *t*-1 |
|---|---|---|
| TFP | 22.07*** | 24.36*** |
| | (0.048) | (0.045) |
| LP | 23.04*** | 24.18*** |
| | (0.049) | (0.045) |
| Employment | 28.95*** | 34.57*** |
| | (0.077) | (0.074) |
| Sales | 87.48*** | 95.63*** |
| | (0.095) | (0.091) |
| Capital | 200.31*** | 210.30*** |
| | (0.143) | (0.142) |
| CI[(a)] | 132.89*** | 130.58*** |
| | (0.115) | (0.116) |
| Investment | - | 49.87*** |
| | | (0.155) |
| ULC | -9.04** | -9.41*** |
| | (0.039) | (0.031) |
| Obs.[(b)] | 7069 | 7069 |

**Notes:** Source: Own calculations. (a) represents Capital Intensity; (b) is the maximum number of observations available for each time lag; In computing the coefficients we use the exact percentage differential given by ($e^{\beta 1}$-1) x 100; Robust standard errors in parentheses. See also Table 1.

To complement the analysis of performance levels, it is examined whether future exporters show superior growth dynamics prior to their entry into the international market. This is estimated by regressing the growth rate of several indicators on the starter dummy, as specified in the following equation:

$$ln\, y_{i,t-s} - ln\, y_{i,t-\delta} = \alpha + \beta_1 Starter_{i,t} + \beta_2 Controls_{i,t-\delta} + \varepsilon_{i,t}\,, 0 \leq \delta \leq 2 \; and \; 0 \leq s \leq 1 \qquad \textbf{(6)}$$

where the vector $y$ encompasses the exact same variables previously defined for Table 4.

The results, presented in Table 5, offer a refined view of the self-selection process. Interestingly, the growth differentials for TFP and LP are not statistically significant in the periods preceding entry. This suggests that the productivity advantage of starters is structural and pre-existing. These firms do not experience a sudden surge in efficiency to become exporters, but rather maintain a stable, superior level of productivity that was established well before the internationalization decision. However, significant strategic preparation is evident in terms of firm scale. Future exporters show a higher growth rate in Employment (4.3% in the *t*-1/*t*-2 period and 8.5% in the *t*/*t*-1 period). Most notably, in the year of entry (*t*/*t*-1), starters experience a substantial and highly significant rise in Total Sales growth (17%). This accelerated growth in size and sales, combined with the earlier evidence of massive capital stocks, suggests a deliberate scaling-up process. Firms appear to expand their operational capacity and market presence domestically as a final step to overcome the sunk costs and competitive pressures of the global market.

**Table 5: Self-selection into exporting: Growth Rates**

| Dependent Variables | *t*-1/*t*-2 | *t*/*t*-1 |
|---|---|---|
| TFP | 0.018$^{+}$ | 0.027$^{+}$ |
| | (0.032) | (0.024) |
| LP | 0.011$^{+}$ | 0.018$^{+}$ |
| | (0.035) | (0.025) |
| Employment | 0.043$^{**}$ | 0.085$^{***}$ |
| | (0.020) | (0.029) |
| Sales | 0.037$^{+}$ | 0.170$^{***}$ |
| | (0.031) | (0.035) |
| Capital | 0.023$^{+}$ | 0.100$^{*}$ |
| | (0.041) | (0.054) |
| CI[(a)] | -0.008$^{+}$ | 0.031$^{+}$ |
| | (0.042) | (0.060) |
| Investment | - | 0.397$^{**}$ |
| | | (0.0.189) |
| ULC | -0.011$^{+}$ | -0.003$^{+}$ |
| | (0.023) | (0.031) |

| | | |
|---|---|---|
| Obs.[(b)] | 7069 | 7069 |

**Notes:** Source: Own calculations. All regressions include foreign-ownership dummy, sectoral, number of employees (except when the number of employees is the dependent variable) and year dummies as controls. Robust standard errors in parentheses. Significant at: *** p<0.01; ** p<0.05; * p<0.10; + means not statistically significant. See table 4.

### 5.3 Geographic and Sectoral Approach

The next step of the ex-ante analysis explores whether the productivity thresholds for SS vary according to the destination of exports. Due to database disparities between this analysis and the one from Silva et al. (2010b), it will only be used "intra-community" (EU) and "extra-community" (Outside-EU), as well as targeting both markets at the same time. Distinguishing these markets is crucial, as distances, either geographical or institutional, often entail different sunk costs. To capture this heterogeneity, it is estimated the following equation for TFP levels at *t*-1 and *t*-2:

$$\ln TFP_{i,t-s} = \alpha + \beta_1 E_{i,t}^{EU} + \beta_2 E_{i,t}^{OEU} + \beta_3 E_{i,t}^{BOTH} + \gamma Controls_{i,t} + \varepsilon_{i,t} \; with \; 0 \leq s \leq 2 \qquad \textbf{(7)}$$

where $E_{i,t}$ represents dummy variables for firms entering only the EU market, only markets outside the EU, or both simultaneously. The results, presented in Table 6, show that the SS mechanism is present across all destinations, but with different degrees of intensity. Firms entering the EU market reveal a robust and statistically significant TFP premium, which increases as they approach the entry year, rising from 0.103 in t-2 to 0.116 in t-1. Notably, firms that enter markets outside the EU display the highest and most robust efficiency advantages, with a stable TFP premium of 0.144 in t-2 and 0.121 in t-1, both statistically significant at the 5% level. These findings suggest that markets outside the European Union, typically associated with higher regulatory barriers, different trade standards, and greater transportation costs, require a more substantial ex-ante efficiency level to overcome the higher sunk costs of entry. Contrarily, the estimates for firms diversifying into both regions simultaneously (0.117 in t-2 and 0.104 in t-1) lack statistical significance, indicating that a well-defined productivity premium is most decisive when handling distinct, non-EU institutional boundaries rather than generic multi-destination entry.

**Table 6: Self Selection by destination country of exports**

| | TFP | |
|---|---|---|
| | t-2 | t-1 |
| EU | 0.103* | 0.116** |
| | (0.062) | (0.051) |
| Outside-EU | 0.144** | 0.121** |
| | (0.060) | (0.058) |
| Both | 0.117+ | 0.104+ |
| | (0.078) | (0.102) |
| R-Squared | 0.24 | 0.26 |

**Notes:** Source: Own calculations. Robust standard errors in parentheses. Significant at: *** p<0.01; ** p<0.05; * p<0.10; + means not statistically significant.

The final step of analysing the ex-ante productivity differentials considers the sectoral heterogeneity of productivity thresholds. To account for sectoral differences, the initial CAE codes were aggregated into five groups based on their level of technological sophistication, following an adaptation of Pavitt's (1984) taxonomy, in line with Silva et al. (2010b). The groups are as follow: food, beverages and tobacco (Group 1); textiles, wearing apparel and leather (Group 2); wood, pulp, paper, printing and furniture (Group 3); chemicals, rubber, plastic, non-metallic goods, basic-metallic goods, fabricated-metallic goods and recycling sectors (Group 4); machinery, office machines, computers, electrical machinery, medical instruments, motor vehicles and other transport equipment (Group 5). This categorization allows for a verification of whether the SS mechanism is driven by specific industrial characteristics. The following equation is estimated for each group *g*:

$$ln\, TFP^{g}_{i,t-\delta} = \alpha + \beta Starter^{g}_{i,t} + \gamma Controls^{g}_{i,t-\delta} + \varepsilon^{g}_{i,t}\ with\ 0 \leq \delta \leq 2 \qquad \textbf{(8)}$$

where $ln\, TFP^{g}_{i,t-\delta}$ represents the performance variable for firm *i* in sector group *g* at time t-δ. The coefficient β identifies the ex-ante export premia. The results, detailed in Table 7 reveal that the "efficiency premium" required to enter international markets is dependent on the specific industrial context.

The most robust evidence of SS is revealed in Group 1, where future exporters reveal a highly significant TFP premium of 103.14% two years before entry, which increases to 125.13% in the year immediately preceding internationalization. Economically, this suggests

that in traditional sectors with highly homogeneous products and intense price competition, only the most exceptionally efficient domestic firms can overcome the sunk costs of trade and survive the international shock.

A critical finding in this analysis is the behaviour of Group 3 and Group 5. Group 3 reveals a stable and highly significant export premia at the 1% level, standing at 35.82% in *t*-2 and 35.56% in *t*-1, which implies a baseline of efficiency superiority that domestic firms must establish long before exporting. Similarly, Group 5 shows a highly significant, upward trajectory, growing from an ex-ante premium of 25.16% in *t*-2 to 25.77% in *t*-1. This confirms that in high-technology manufacturing, where firms compete on product differentiation and technical compliance rather than just price margins, a solid foundation of inherent efficiency remains a prerequisite for internationalization. In contrast, for Group 2 and Group 4, the estimated point premia lack statistical significance across both time horizons. This suggests that in these sectors, the productivity differential between "starters" and domestic firms is not the deciding factor. This analysis suggests that these firms start exporting because they are pulled into international trade by external demand, subcontracting agreements, or GVCs, rather than an independent push from having a higher TFP.

**Table 7: Self Selection in levels for different groups of sectors**

| TFP | *t*-2 | *t*-1 |
|---|---|---|
| Gr. 1 | 103.14*** | 125.13*** |
| | (0.225) | (0.177) |
| Gr. 2 | 11.40+ | 15.11+ |
| | (0.137) | (0.094) |
| Gr. 3 | 35.82*** | 35.56*** |
| | (0.090) | (0.099) |
| Gr. 4 | 8.30+ | 9.50+ |
| | (0.063) | (0.063) |
| Gr. 5 | 25.16* | 25.77** |
| | (0.118) | (0.104) |

**Notes:** Source: Own calculations. Robust standard errors in parentheses. In computing the coefficients, we use the exact percentage differential given by $(e^{\beta 1}-1) \times 100$. Significant at: *** p<0.01; ** p<0.05; * p<0.10; + means not statistically significant.

## 5. Conclusions and Avenues for Future Research

This dissertation set out to investigate the dynamics of the SS hypothesis within the Portuguese manufacturing sector during a period of economic recovery (2015-2019). By using the Levinsohn and Petrin (2003) approach to estimate TFP, this dissertation aimed to determine whether the observed export premia in Portuguese firms was a prerequisite for market entry. The empirical evidence collected throughout this study provides a robust confirmation of the SS mechanism, suggesting that the "export miracle" of the post-Troika era was deeply rooted in the prior efficiency and strategic preparation of individual firms.

The main findings of this research corroborate the theoretical predictions of Melitz (2003). We identified that "starters" (firms entering the export market for the first time) already exhibited a structural superiority across all performance indicators long before their first international sale. Specifically, these firms displayed a TFP premium of approximately 22% to 24% in the two years preceding entry. This advantage was not just a result of random shocks: it was accompanied by a massive capital stock premium exceeding 200% and a significantly higher investment rate. These results imply a deliberate process of technological preparation, where firms expand their operational capacity and scale-up domestically to overcome the high sunk costs associated with foreign market entry.

A particularly innovative contribution of this study is the identification of the role played by international integration through imports. Our results show that firms already engaged in importing activities face a lower productivity threshold for export entry compared to purely domestic non-traders. This "learning-by-importing" effect suggests that access to foreign inputs and participation in GVCs provide strategic shortcuts, allowing firms to overcome efficiency barriers through better-quality components and established networks. This finding highlights that for a SOE like Portugal, the distinction between "importer" and "exporter" is increasingly null. The most successful firms are those deeply embedded in two-way trade.

Furthermore, the decomposition by export destination and technological intensity revealed significant heterogeneity. The efficiency threshold required to enter markets outside the European Union is particularly evident in the earlier preparation phase (t-2) compared to the integrated EU market, reflecting the steeper regulatory and geographic barriers of extra-community trade. Simultaneously, the SS mechanism proved to be most rigorous in low-technology sectors, such as food and beverages, where products are more homogeneous and competition is primarily price-based. In these industries, the productivity gap between

starters and domestic peers is a decisive survival factor, whereas in high-tech sectors, other variables like innovation and branding may slightly dilute the pure TFP requirement.

From a policy perspective, these conclusions suggest that government initiatives should shift from simply incentivizing export volume to fostering the fundamental determinants of firm-level productivity. If the "gatekeeper" to international markets is ex-ante efficiency, then support for managerial training, capital investment, and R&D is arguably more critical for long-term export success than direct export subsidies. Encouraging firms to integrate into GVCs as importers may also serve as an effective springboard for future internationalization.

Despite the robustness of the findings, this research is not without limitations. The use of the SABI database, while providing a comprehensive financial overview, lacks qualitative data on management practices or specific product innovations. Furthermore, while this dissertation provides empirical evidence regarding the SS mechanism, it leaves the post-entry trajectory unexamined. A crucial avenue for future research would be to formally test the LBE hypothesis within this same sample. Investigating whether these Portuguese starters experience post-entry efficiency gains would offer a complete picture of the trade-productivity link. Additionally, future research could benefit from a more granular analysis of the post-2019 period, specifically examining how the COVID-19 pandemic acted as a shock to international trade dynamics. This extension is directly connected to the core findings of this dissertation by questioning whether the productivity thresholds required for market entry remained valid when global demand and supply channels collapsed. It remains to be determined whether the pandemic-induced GVC disruptions and the subsequent strategic shift toward 'near-shoring' have increased these efficiency barriers for Portuguese exporters. Investigating whether the efficiency differential identified in this study (2015-2019) was sufficient for firms to survive the pandemic's volatility would provide critical insights into the long-term resilience of the Portuguese manufacturing sector. In conclusion, the recovery of the Portuguese economy during 2015-2019 was not a random phenomenon but a selection process that rewarded the most efficient and technologically robust firms, confirming that in the global arena, productivity is the ultimate driver of international competitiveness.

# Appendix A: TFP Econometric Estimation

## Why TFP?

While the literature review established the conceptual importance of TFP, its empirical estimation requires a rigorous mathematical framework to ensure it truly measures firm performance rather than pure size. In empirical trade literature, testing the SS hypothesis requires separating a firm's true, intrinsic efficiency from absolute scale or input accumulation. Unlike single-factor performance metrics, TFP isolates how effectively a firm combines all its resources (Comin, 2010; Hulten, 2001), making it the ideal tool to capture true pre-export competitiveness.

To understand the methodological necessity of this choice, it is necessary to first look at the structural limitations of partial productivity indicators, such as labour productivity (LP). Typically calculated as real value added divided by total labour input (Y/L), LP is subject to an economic distortion known as *capital deepening*. LP fails to separate increasing outputs with productivity, which makes it artificially inflated by simply increasing the volume of capital, without any actual improvement in the firm's performance (Avdiu, 2022).

To illustrate this distortion intuitively, consider two manufacturing firms in the same industry, both employing the exact same number of workers. The first firm relies on basic, manual assembly, while the second invests heavily in automated industrial robotics. Because of this massive physical capital capability, the second firm will naturally generate a much higher volume of output per worker. If an empirical researcher looks strictly at LP, the automated firm will appear much more "productive". However, this performance gap does not mean that its managers are more capable, its workers are more skilled, or its organizational routines are more innovative. It is simply a statistical reflection of capital accumulation and a larger financial budget for equipment.

If a dissertation relies solely on LP to validate the self-selection hypothesis, it risks misidentifying capital-heavy, structurally stagnant domestic firms as highly efficient international candidates. TFP overcomes this problem by forcing the evaluation onto a levelled playing field, isolating true efficiency as a residual.

This information gap creates what is known as simultaneity bias (Van Biesebrock, 2005). If a factory experiences a positive productivity shock, its managers will immediately react by hiring more temporary workers or ordering more inputs to maximize profits. Because the

researcher cannot observe this productivity shock, it ends up trapped inside the error term of the regression. Since the choice of inputs (labour and capital) changes simultaneously with this unobserved shock, standard Ordinary Least Squares (OLS) estimations break down, yielding biased and inconsistent coefficients that overestimate input contributions and ruin the TFP residual.

So, to estimate TFP, we start with the functional form of the firm-level Cobb-Douglas production function, as illustrated in the following equation:

$$Y_{it} = A_{it} K_{it}^{\beta_k} L_{it}^{\beta_l} \quad \textbf{(9)}$$

Where $Y_{it}$ is the real value added of firm $i$ at time $K_{it}t$, is the capital stock, and $L_{it}$ is the labour input. The parameter $A_{it}$ represents the true efficiency baseline we want to capture.

To find the A parameter, we can manipulate the equation:

$$\hat{A}_{it} = \frac{Y_{it}}{K_{it}^{\widehat{\beta_k}} L_{it}^{\widehat{\beta_l}}} \quad \textbf{(10)}$$

The superiority of this measure stems from the fact that it captures the synergy between inputs. In the context of our research, if an aspiring exporter shows a higher $A_{it}$, it implies that the firm can generate more output with the same amount of resources as its peers, signalling a true competitive advantage rather than just a larger scale of production.

For estimation purposes, equation **(9)** is transformed into a linear logarithmic model:

$$y_{it} = \beta_0 + \beta_k k_{it} + \beta_l l_{it} + \omega_{it} + \varepsilon_{it} \quad \textbf{(11)}$$

Where $y$, $l$, and $k$ are the natural logarithms of the variables. The error term is decomposed into two parts: $\omega_{it}$, which represents the productivity shock known to the firm but unobserved by the researcher, and $\varepsilon_{it}$,which is the idiosyncratic error. This leads to the endogeneity bias problem: firms with a high $\omega_{it}$ will logically hire more labor, creating a correlation between the inputs and the error term, which renders standard OLS estimates biased and inconsistent.

**The Levinsohn and Petrin (2003) Correction**

To overcome the limitations of OLS and provide a consistent estimate of $\beta_l$ and $\beta_k$, this study implements the correction developed by Levinsohn and Petrin (2003). This method is technically superior for our sample because it uses intermediate inputs $m_{it}$, such as raw materials and electricity, to proxy for the unobserved productivity shock $\omega_{it}$.

Unlike capital investments (Olley & Pakes, 1996), which are substantial, sporadic, and often zero in many years (which would force dropping firms from the sample), intermediate inputs are adjusted on a daily basis. A firm responding to a positive productivity shock will burn more electricity or consume more raw materials. Therefore, intermediate inputs act as a useful proxy, tracking the unobserved shock continuously.

The mathematical solution assumes that the firm's demand for intermediate inputs is a strictly increasing function of its productivity and capital:

$$m_{it} = f(\omega_{it}, k_{it}) \quad \textbf{(12)}$$

Because this relationship is monotonic, the function can be inverted, allowing us to isolate and express the unobserved productivity shock strictly as a function of observable data:

$$\omega_{it} = f^{-1}(m_{it}, k_{it}) \quad \textbf{(13)}$$

By substituting this function back into equation **(4)**, we effectively control for the unobserved shock. This allows us to "clean" the coefficients $\beta_l$ and $\beta_k$ from the simultaneity bias. With these consistent elasticities secured, the structural TFP ($A_{it}$) for each individual firm is successfully recovered as the remaining residual:

$$\widehat{TFP_{it}} = y_{it} - \hat{\beta}_k k_{it} - \hat{\beta}_l l_{it} \quad \textbf{(14)}$$

This resulting value is what we use in the subsequent chapters to test the self-selection hypothesis. By using this specific methodology, we provide strong reassurance that the "productivity premium" identified in Portuguese exporters is not a statistical artifact of their size or input choices, but a robust reflection of their operational efficiency.

## Appendix B: Estimators' Comparison and Sensitivity Analysis

To ensure the integrity of the empirical findings and confirm that the identified SS patterns are not sensitive to specific econometric choices or data anomalies, this section presents a comparative analysis between estimators presented in Table 8.

First, we address the potential impact of extreme observations and measurement errors in the SABI database by re-estimating the production function using a winsorized sample at the 1st and 99th percentiles. As observed in the comparison between the Levinsohn and Petrin (LevPet) and its respective winsorized model (LevPet Winsorized) in Table 1, the coefficients for labour ($\beta_l$) and capital ($\beta_k$) remain highly stable and statistically significant. This stability indicates that the productivity premium identified is a structural characteristic of the Portuguese manufacturing sector and is not driven by a small fraction of outliers or data entry errors.

Second, we evaluate the necessity of the Levinsohn and Petrin (2003) correction by contrasting our baseline results with a standard Ordinary Least Squares (OLS) estimation. The comparative analysis in Table 8 reveals a clear and substantial simultaneity bias in the OLS specification. Specifically, the labour coefficient increased from approximately 0.73 in the Levinsohn-Petrin (L&P) model to 0.98 in the OLS estimation, while the capital coefficient rose from 0.05 to nearly 0.10.

This upward bias in OLS confirms that firms actively adjust their input levels, particularly labour, in response to unobserved productivity shocks. By failing to account for this endogeneity, OLS overestimates the contribution of physical inputs, thereby contaminating the productivity residual. The fact that the LevPet methodology successfully "cleans" these coefficients provides a more purified and reliable measure of TFP. Consequently, the persistence of the self-selection evidence across both the LevPet and (to a lesser extent) the OLS-derived productivity measures reinforces the robustness of the productivity leap hypothesis as a prerequisite for export market entry.

**Table 8: TFP Estimation – Comparison**

| Variable | LevPet | LevPet Winsorized | OLS |
|---|---|---|---|
| $\beta_l$ | 0.731*** | 0.723*** | 0.987*** |
| | (0.007) | (0.006) | (0.008) |
| $\beta_k$ | 0.053*** | 0.063*** | 0.099*** |
| | (0.005) | (0.005) | (0.004) |
| Observations | 35345 | 35345 | 35345 |
| R-squared / Wald chi2 | 647.67 | 841.66 | 0.7991 |

**Notes:** Standard errors in parentheses. *** p<0.01, p<0.05, * p<0.1

Looking at the results in Table 8, the fact that the coefficients are very similar in both Levinsohn-Petrin specifications indicates the empirical robustness of our production function baseline. Nevertheless, the minor variations in the estimated elasticities suggest that extreme observations, even if minor, are present in the raw data. Because of this, as a precautionary measure, and to safeguard our next empirical tests from potential errors or anomalies in the SABI database, the winsorized TFP variable was chosen as the main benchmark measure of efficiency for the rest of this dissertation. By switching to this cleaner version, the findings regarding pre-export productivity hurdles are more likely to reflect true, structural features of Portuguese manufacturing, rather than just random distortions in the data.

## References


Acemoglu, D. (2002). Directed technical change. *The Review of Economic Studies*, *69*(4), 781–809. https://doi.org/10.1111/1467-937x.00226

Altăr, M., & Cazacu, A.-M. (2016). Testing Self-Selection and Learning By Exporting Hypotheses. The Case of Romania. *Economic Computation and Economic Cybernetics Studies and Research*, *50*(1/2016), 5–22. https://www.researchgate.net/publication/323885534_Testing_self-selection_and_learning_by_exporting_hypotheses_The_case_of_Romania

Amiti, M., & Konings, J. (2007). Trade Liberalization, Intermediate Inputs, and Productivity: Evidence from Indonesia. *American Economic Review*, *97*(5), 1611–1638. https://doi.org/10.1257/aer.97.5.1611

Avdiu, B. (2022). Improving productivity measurement in World Bank Group interventions. In *World Bank, Washington, DC eBooks*. https://doi.org/10.1596/38100

Bernard, A. B., Eaton, J., Jensen, J. B., & Kortum, S. (2003). Plants and productivity in international trade. *American Economic Review*, *93*(4), 1268–1290. https://doi.org/10.1257/000282803769206296

Bernard, A., & Jensen, J. (1999). Exceptional exporter performance: cause, effect, or both? *Journal of International Economics*, *47*(1), 1–25. https://doi.org/10.1016/s0022-1996(98)00027-0

Castellani, D., Serti, F., & Tomasi, C. (2008). Firms in International Trade: Importers' and Exporters' Heterogeneity in Italian Manufacturing Industry. *World Economy*, *33*(3), 424–457. https://doi.org/10.1111/j.1467-9701.2010.01262.x

Chaney, T. (2008). Distorted gravity: the intensive and extensive margins of international trade. *American Economic Review*, *98*(4), 1707–1721. https://doi.org/10.1257/aer.98.4.1707

Clerides, S. K., Lach, S., & Tybout, J. R. (1998). Is Learning by Exporting Important? Micro-Dynamic Evidence from Colombia, Mexico, and Morocco. *The Quarterly Journal of Economics*, *113*(3), 903–947. https://doi.org/10.1162/003355398555784

Comin, D. (2010). total factor productivity. In *Palgrave Macmillan UK eBooks* (pp. 260–263). https://doi.org/10.1057/9780230280823_32

Costantini, J. A., & Melitz, M. J. (2008). 4. The dynamics of Firm-Level adjustment to trade liberalization. In *Harvard University Press eBooks* (pp. 107–141). https://doi.org/10.4159/9780674038547-004

De Loecker, J. (2007). Do exports generate higher productivity? Evidence from Slovenia. *Journal of International Economics*, *73*(1), 69–98. https://doi.org/10.1016/j.jinteco.2007.03.003

De Loecker, J. (2013). Detecting learning by exporting. *American Economic Journal Microeconomics*, *5*(3), 1–21. https://doi.org/10.1257/mic.5.3.1

ECB [European Central Bank]. (2017). *Firm heterogeneity and competitiveness in the European Union*. Retrieved December 7, 2025, from https://www.ecb.europa.eu/pub/pdf/other/eb201702_article02.en.pdf

Gabinete De Estratégia E Estudos. (2011, December). *The Internationalization of the Portuguese Economy*. https://www.gee.gov.pt/pt/?option=com_fileman&view=file&routed=1&name=Competitividade%2011%2011.pdf&folder=estudos-e-seminarios/competitividade&container=fileman-files. https://www.gee.gov.pt/pt/estudos-e-seminarios/competitividade-category/331-ficha-de-competitividade-internacionalizacao-competitividade-dezembro-2011

Goldberg, P. K., Khandelwal, A. K., Topalova, P., & Pavcnik, N. (2010). Imported Intermediate Inputs and Domestic Product Growth: Evidence From India. *ResearchGate*. https://doi.org/10.2307/40961017

Helpman, E., Melitz, M. J., & Yeaple, S. R. (2004). Export versus FDI with Heterogeneous Firms. *The American Economic Review*, *94*(1), 300–316. https://www.jstor.org/stable/3592780

Hicks, J. R. (1963). The theory of wages. In *Palgrave Macmillan UK eBooks*. https://doi.org/10.1007/978-1-349-00189-7

Hoekman, B., Sanfilippo, M., & Tambussi, M. (2026). Foreign Direct investment and structural transformation in Africa. *The World Bank Economic Review*, *40*(2), 255–276. https://doi.org/10.1093/wber/lhaf009

Hulten, C. (2001). Total Factor Productivity: A short Biography. In *National Bureau of Economic Research*. https://doi.org/10.3386/w7471

International Study Group on Exports and Productivity. (2008). Understanding Cross-Country Differences in Exporter Premia: Comparable evidence for 14 countries. *Review of World Economics*, *144*(4), 596–635. https://doi.org/10.1007/s10290-008-0163-y

Kasahara, H., & Lapham, B. (2013). Productivity and the decision to import and export: Theory and evidence. *Journal of International Economics*, *89*(2), 297–316. https://doi.org/10.1016/j.jinteco.2012.08.005

Krugman, P. (1980). Scale Economies, Product Differentiation, and the Pattern of Trade. *The American Economic Review*, *70*(5), 950–959. https://www.jstor.org/stable/1805774

Levinsohn, J., & Petrin, A. (2003). Estimating production functions using inputs to control for unobservables. In *National Bureau of Economic Research*. https://doi.org/10.3386/w7819

Martins, F. (2016). A reação das empresas portuguesas à crise económica e financeira: principais choques e canais de ajustamento. *RePEc: Research Papers in Economics*, 1–25.

Melitz, M. J. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. *Econometrica*, *71*(6), 1695–1725. https://www.jstor.org/stable/1555536

Muûls, M., & Pisu, M. (2008). Imports and Exports at the Level of the Firm: Evidence from Belgium. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1004464

Olley, G. S., & Pakes, A. (1996). The dynamics of productivity in the telecommunications equipment industry. *Econometrica*, *64*(6), 1263. https://doi.org/10.2307/2171831

Pavitt, K. (1984). Sectoral patterns of technical change: Towards a taxonomy and a theory. *Research Policy*, *13*(6), 343–373. https://doi.org/10.1016/0048-7333(84)90018-0

*Portugal Exports, percent of GDP - data, chart | TheGlobalEconomy.com*. (n.d.). TheGlobalEconomy.com. Retrieved May 13, 2026, from https://www.theglobaleconomy.com/Portugal/exports/

Serti, F., & Tomasi, C. (2008). Self-Selection and Post-Entry Effects of Exports: Evidence from Italian Manufacturing Firms. *Review of World Economics*, *144*(4), 660–694. https://doi.org/10.1007/s10290-008-0165-9

Silva, A., Afonso, O., & Africano, A. P. (2010a). Learning-by-Exporting: What We Know and What We Would Like to Know. *The International Trade Journal*, *26*(3), 255–288. https://doi.org/10.1080/08853908.2012.682022

Silva, A., Afonso, O., & Africano, A. P. (2010b). Do Portuguese manufacturing firms self select to exports? *ResearchGate*. https://www.researchgate.net/publication/228646338_Do_Portuguese_manufacturing_firms_self_select_to_exports

Solow, R. M. (1957). Technical change and the aggregate production function. *The Review of Economics and Statistics*, *39*(3), 312. https://doi.org/10.2307/1926047

Syverson, C. (2011). What determines productivity? *Journal of Economic Literature*, *49*(2), 326–365. https://doi.org/10.1257/jel.49.2.326

Temouri, Y., Vogel, A., & Wagner, J. (2013). Self-selection into export markets by business services firms – Evidence from France, Germany and the United Kingdom. *Structural Change and Economic Dynamics*, *25*, 146–158. https://doi.org/10.1016/j.strueco.2012.02.004

The Economist. (2025, October 23). China is being fuelled by inspiration, not perspiration. *The Economist*. https://www.economist.com/finance-and-economics/2025/10/23/china-is-being-fuelled-by-inspiration-not-perspiration

Van Biesebroeck, J. (2005). Exporting raises productivity in Sub-Saharan African manufacturing plants. In *National Bureau of Economic Research*. https://doi.org/10.3386/w10020

Wagner, J. (2007). Exports and Productivity: A Survey of the Evidence from Firm-level Data. *World Economy*, *30*(1), 60–82. https://doi.org/10.1111/j.1467-9701.2007.00872.x

FACULDADE DE **ECONOMIA**