



TIAGO TIMOTEO DE SOUZA LEITE

**The effects of public credit guarantee on
Portuguese SMEs**

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Universidade Lusófona de Humanidades e Tecnologias

Lisbon

2023

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Tese defendida em provas públicas na Universidade Lusófona - Centro Universitário de Lisboa no dia 20/07/2023, perante o júri, nomeado pelo Despacho de Nomeação n.º: 302/2023, de 4 de julho de 2023, com a seguinte composição:

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Lisbon

2023

Glossary

AICEP - Agência para o Investimento e Comércio Externo de Portugal

BPF - Banco Português de Fomento

BPLIM - Banco de Portugal Microdata Research Laboratory

CB - Central Balance Sheet

CBHP - Central Balance Sheet Harmonized Panel

CGS - Credit Guarantee Scheme

CRC - Central Credit Responsibility

CSBFP - Canadian Small Business Financing Program

DID - Difference in Differences

ECB - European Central Bank

EU - European Union

FCGM - Fundo de Contragarantia Mútuo

GDP - Gross Domestic Product

IAPMEI - Agência para a Competitividade e Inovação

IES - Simplified Corporate Information

IFD - Instituição Financeira de Desenvolvimento

LTD - Long-Term Debt

MGI - Mutual Guarantee Institutions

MGS - Mutual Guarantee Societies

OECD - Organization for Economic Cooperation and Development

R&D - Research and Development

SBA - Small Business Administration

SMEs - Small and Medium Enterprises

SPGM - Sociedade Portuguesa de Garantia Mútua

TFP - Total Factor productivity

UK - United Kingdom

US - United States

USA - United States of America

Abstract

The aim of this thesis is to evaluate the effectiveness of the Portuguese Credit Guarantee Scheme. The paper examines the economic additionality impact of the programme in the Portuguese context for SME firms in terms of revenue, salaries (employment), exports and investment. The analysis uses propensity score matching estimators and difference-in-differences regression on a sample of 4,700 SME firms between 2003 and 2018. Overall, the impact is positive for the four hypotheses, but less relevant for some of them. Revenue shows a significant negative impact after the loan, while investment has a large positive result and employment and exports have positive but small impacts in the years following the treatment period. It corroborates several other similar articles on the subject, where there is no consensus, and collaborates with the literature on credit guarantee schemes.

Key-words: Credit guarantee, difference-in-differences, SMEs, economic additionality

Resumo

O objetivo desse trabalho é medir a eficiência do Programa Português de Crédito com Garantia Mútua. O texto discute o impacto da adicionalidade económica no contexto português para PME em relação à receita, salários (emprego), exportação e investimento. A análise utiliza o método de *propensity-score matching estimators* e *Difference in Differences regression* em uma amostra de 4.700 PME entre 2003 e 2018. No geral, o impacto é positivo em 3 das 4 hipóteses, mas não relevante em todos eles. Em termos de receita o impacto é significativamente negativo após o empréstimo, enquanto investimento mostra um grande impacto positivo, e emprego e exportação demonstram impactos positivos, mas pouco relevantes em relação aos anos seguintes após o empréstimo. Esses resultados corroboram outros diversos artigos sobre esse tema em que não há consenso e colabora para a literatura de Crédito com Garantia Pública para PME.

Palavras-chave: Crédito com Garantia Mútua, *difference-in-differences*, PME, adicionalidade econômica

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1 Introduction

The economic activity of businesses is one of the main drivers of a country's economic growth and therefore affects the distribution of income and the quality of life of the population. One of the many challenges faced by businesses, especially in their early stages, is financing, and a major source of financing is credit. Access to credit can be a constraint through credit rationing for many firms, especially SMEs. Restrictions on access to credit for SME firms are usually due to the lack of collateral of their founders, which makes sense given that some of them may not have resources of their own and may come from lower income families. One approach commonly used to address this problem is government credit guarantee schemes designed for this specific public and promoted by international organisations such as the World Bank and OECD.

This thesis aims to contribute to the literature on understanding and improving government credit guarantee schemes around the world. As there are three main areas of consideration: economic additionality, financial additionality and sustainability of these programmes, it is crucial to point out the limitations of this work. Due to data and time limitations, the focus is on the economic additionality of the Portuguese of a certain recent period.

In the meantime of the implementation of such programmes, the measurement is key to ensure that the objectives are met. The most relevant and recent bibliography in the evaluation of issues such as these has been reviewed since the 1980s in several parts of the world, and some approaches validated and recommended by the OECD and other institutions will be used in the present work. In summary, this type of issue involves finding a counterfactual group to compare with the so-called treated group, in other words, if a guaranteed loan is given to a group of companies, it is difficult to find an appropriate group with the same characteristics to compare with the first group after the treatment. There are some approaches to be applied depending on some assumptions of each method with possible nuances from the latest techniques used in machine learning prediction matters that can be helpful for specific scenarios.

As the work uses data from the Portuguese Central Bank, it is relevant to understand the structure of the programme in the government and how it relates to the European Union in terms of sharing the same currency and the monetary policy that

affects all countries in the union. In addition, the Portuguese economic context is also essential to understand the main aspects and recent history of the countries and the impact of major events such as the 2008 financial crisis in the US and its spillover in Portugal. These events leave profound consequences for society to resolve, such as what should be the state intervention in the economy, which has been a discussion for a couple of centuries and is not part of the scope of this work. Although, it is important to mention it as it is in the background of government credit guarantee schemes, especially after the Covid-19 crisis in 2020-2021.

Although there are several perspectives to consider when measuring the impact of such a programme on the economy, as described in Chapter 4 through topics such as GDP growth, crisis periods, productivity and exports, this work covers only some of these points due to time and data limitations. The hypothesis on this text works as a proxy for GDP growth, exports and productivity, taking into account that more focused works on issues such as the impact of unproductive firms also known as zombies that affect the overall productivity of the economy when being granted loans. The economic additionality hypothesis is tested in terms of income, employment, investment and exports, using the difference-in-differences approach, which is widely used and recommended. The results confirm recent studies in Portugal and other countries and leave some challenges for both researchers and policy makers to evaluate and improve the programmes towards their objective.

2 SME Credit Guarantee Scheme: Literature Review

2.1 The Challenge of incentivizing SMEs

Access to credit for SMEs has been a major challenge in the credit market over the decades since the 1930s following the Great Depression of 1929 in the US. As referred by Rhyne (1988), the American government and banks began to provide term loans to businesses around 1933-1934 as a result of the crisis, and the Small Business Administration was created in 1953 with loans as its main line of business. In later years, some theorists justified this government intervention in the market by arguing that there was a market failure, the main one being asymmetric information in the case of the credit market. Asymmetric information occurs when consumers and/or producers/sellers do not have qualified information about products, services and consumers, mostly due to the cost of collecting and monitoring it. Varian (2010) argues that "when quality information is costly to obtain, it's no longer plausible that buyers and sellers have the same information about the goods involved in the transaction". In the case of this study, the asymmetric information problem would be that banks do not have information about the behaviour of borrowers to distinguish good payers from bad payers. This problem leads to more specific failures related to asymmetric information, as described by Varian (2010), Besanko & Braeutigam (2011), Samuelson & Nordhaus (2010) and Confraria (2020): adverse selection and moral hazard or, as Varian (2010) also describes hidden information and hidden action. Adverse selection or hidden information "refers to situations where one side of the market cannot observe the "type" or quality of goods on the other side of the market" (Varian, 2010). Moral hazard or hidden action "refers to situations where one side of the market can't observe the actions of the other side" (Varian, 2010). The authors also point out that moral hazard leads to distorted incentives: "The problem of distorted incentives arises when an individual has private information about his or her own actions, but someone else bears the cost of a lack of care or effort" (Krugman & Wells, 2009). Taking loans as an example, adverse selection would be a loan to a borrower who does not have enough funds to pay his debt, and moral hazard would be when the borrower does not invest the money in his business but in personal activities, resulting in not raising enough money to pay the debt. An incentive to limit the moral hazard problem is the collateral required by banks, which influences the borrower's behaviour.

Credit rationing is a phenomenon that occurs in most economies because of the market failure mentioned above. Some researchers explain this situation by arguing that banks would rather ration credit than lend to borrowers who do not have enough

information to be evaluated, even if they are willing to pay a higher interest rate. Stiglitz & Weiss (1981) explain that banks have an optimal interest rate and that above it the bank's return would be lower even if it charged a higher interest rate. "Raising interest rates or increasing collateral requirements could increase the riskiness of the bank's loan portfolio, either by discouraging safer investors or by inducing borrowers to invest in riskier projects, and thus reduce the bank's profits" (Stiglitz & Weiss, 1981). The latter article is widely cited in numerous studies evaluating loan guarantee schemes, demonstrating the relevance of the study, which is the main purpose of this text.

2.2 How to Evaluate CGS

The evaluation of credit guarantee schemes is essential to assess whether the purpose of each scheme is achieving its objective, and therefore to make improvements and adjustments. The aspect of evaluation is a key issue to better understand the results of the programs, because of the broad perspective of the effects that a program such as a credit guarantee scheme can have. An OECD report on the evaluation of publicly supported credit guarantee programmes for SMEs, OECD (2017) describes the three main areas to be evaluated in such programmes, namely financial additionality, financial sustainability and economic additionality. The report is a survey of how these programmes are evaluated in 23 OECD and EU countries, based on 32 survey responses. The sample covers some areas more than others. For example, financial sustainability is less well covered. The other two areas are better covered, and financial additionality is even better covered, with more consistent results. However, although there are as many studies on economic additionality as on financial additionality, the results are less consistent and sometimes ambiguous. Another important part of the report concerns the methodology of the studies, highlighting the need for a biased treatment to compare groups of enterprises that have accessed the loan guarantee programme and those that have not, as the programmes usually have certain requirements that bias the 'treated' group. This is called the counterfactual, which is a scenario of what would have happened to the beneficiary firms if they had not received the loan. "In terms of methodology, the key challenge is to robustly assess the causal impact of policy interventions. Establishing causality between policy inputs and outcomes requires the construction of a valid counterfactual." (OECD, 2017). Table 1 shows a level classification used in the OECD report to classify studies in terms of robustness. The classification groups range from 1 to 5, from the least robust to the most

robust, taking into account the counterfactual method used. The purpose of the present research will be discussed later, but it is important to note that the objective in terms of the classifications just mentioned is to reach level 4.

Level	Building of the counterfactual		Quantitative tools
	Treated vs control group	Control variables	
1	Either no distinction, or distinction but without proper counterfactual	None or inappropriate choice	None or very basic statistical analyses (e.g. tables/graphs)
2			
3	Distinction between treated and control groups to build a counterfactual	Basic regression on control variables to build counterfactual (age, sector, geographical location, etc...)	More sophisticated analyses (e.g. regression, OLS, DID, RDD, ...)
4		Statistical tools or evaluation designs allowing <i>near-randomisation</i> to build the counterfactual (e.g. natural experiments)	
5	Fully randomised experiment		

Table 1: Criteria to classify SME CGSs studies

Source: (OECD, 2017)

2.3 Evaluation of CGS around the World

Now that the basis for this type of research has been presented, let's move on, in chronological order, to the studies related to the evaluation of credit guarantee schemes, mainly in developed countries such as the US, Japan, Germany, China, Italy and Portugal. As already mentioned, a relevant study published in the USA Stiglitz & Weiss (1981) discusses a justification for credit rationing in the credit market, which proves the difficulties of access to credit for a considerable volume of SMEs. Levitsky & Prasad, (1987) and Levitsky (1997) review in technical papers studies on several countries between developed and developing, considering aspects such as objectives, operation and evaluation of the programmes. The assessment described emphasizes the financial additionality, which is one of the recently proposed by OECD (2017), in addition to two other areas to be assessed are the confidence of the program to attract banks and a measure of the loss rate. Rhyne (1988) tries to cover three groups of evaluation in the US: default and subsidy costs, the role of banks and the social and economic objectives of the programme. Both economic and financial additionality are in the latter group, social and economic objectives, and Rhyne (1988) argues that one of the problems with financial additionality is that SMEs do not have access, particularly to

long-term loans in commercial banks, and the SBA programmes partly solve this since there is an increase in larger loans to SMEs in the programme, "suggesting that borrowers are receiving larger loans than they otherwise could". (Rhyne, 1988), but there is little evidence that it works against business cycles when SMEs are more vulnerable. In terms of economic additionality, the areas analysed are employment growth, innovation and competition, but the conclusion is that there is not enough data to be confident in these areas. Meyer & Nagarajan (1996) focuses on agricultural CGS programmes in developing countries, but the concept of counterfactual is introduced in this type of topic.

"To assess the impact of a loan it is necessary to estimate the 'counter factual', that is, what would the borrower have done without the loan, then compare that with what was done with the loan. The counter factual can never be measured so some proxy is needed." (Meyer & Nagarajan, 1996)

Then, after the 'treatment', the comparison can be made with a control group. In the meantime, this is an important improvement because it provides a method that can be applied in a trustworthy way and is recognised by an institution such as the OECD. Furthermore, the study shows that there is no evidence to support the CGS in question. Bradshaw (2002) examines a programme in California, USA, not using a counterfactual method, but comparing before and after the programme to assess changes in employment and economic activity. The study shows an overall increase of 40% in employment in firms that received loans after repayment, and there is also significant economic growth in terms of taxes and sales. Riding, Madill, & Haines Jr. (2007) proposes a different method for analysing the additionality of such programmes in Canada, using a logistic regression to estimate the so-called financial additionality under two hypotheses: H1: It is not possible to measure incrementality (or additionality) with a known degree of precision, and H2: There is no incrementality in the programme. It finds financial additionality of 74.8% and rejects both hypotheses. Zecchini & Ventura (2009) investigates financial additionality and reduction of borrowing costs using a counterfactual method called difference-in-difference, which is one of the methods recommended by OECD (2017). This paper concludes that there is a 20.23% reduction in financing costs and an overall financial additionality of 9.64% in Italy. Oh, Lee, Heshmati, & Choi (2009) conducted a study in South Korea focusing on the economic additionality aspect including productivity, sales, employment, investment, R&D, wage level and survival rate. It uses a counterfactual method, propensity score matching, first introduced by Rosenbaum & Rubin (1983). "The empirical analysis for the Korean credit guarantee policy showed that the policy had a positive effect on the growth of sales,

employment, wage levels, and the survival rate of the supported firms". (Oh, Lee, Heshmati & Choi, 2009). In Italy, research not using the counterfactual method was published by Columba, Gambacorta, & Mistrulli (2010), which argues that firms that join Mutual Guarantee Institutions (MGI) pay lower loan fees than other firms due to the better screening and monitoring capacity of MGI than banks. Another paper, which does not use the Canadian counterfactual, also focuses on economic additionality, stating that "Based on this analysis, participation in the CSBFP [Canadian programme] would have increased growth in wages, employment, and sales by 12, 12, and 7 percentage points, respectively, between 2004 and 2006." (Chandler, 2012). Allinson, Robson, & Stone (2013) examines financial and economic additionality using OLS regression and finds evidence of financial and economic additionality in terms of employment growth in the economic area. Bach (2014) does not study CGS directly, but conducts research to validate the value of helping SMEs access credit through government subsidies in France. The study uses the difference-in-difference method as a counterfactual to compare with untreated firms and finds that there is fiscal additionality in the market through the subsidised credit programme, but on the other hand, the public guarantee programme increases the bankruptcy rate. DANG (2015) examines three of the most developed countries in the CGS region, namely Thailand, Indonesia and Malaysia. The paper focuses on financial additionality, shows that the programmes help SMEs to access credit and provides some recommendations for improvement. Brown & EARLE, (2017) analyses the employment impact of SBA (Small Business Administration) loans in the US using a counterfactual methodology and finds evidence of an increase of 3 to 3.5 jobs per million dollars of loans. From another perspective, Duarte, Rodrigues, & Madeira (2018) aims to show the relevance of the mutual credit guarantee system in long-term debt (LTD) and bank loans to SMEs. A multiple regression model shows that the LTD is positively influenced by the government guarantee in the loans. Saito & Tsuruta (2018) tries to test the hypothesis of asymmetric information problems in the Japanese market using a counterfactual method and shows that this hypothesis is true, the CGS programme increases the availability of credit (financial additionality), but risky companies are also granted credit, which worsens the default rate. Pólvera (2019) uses the Portuguese line of a specific program with difference-in-difference method to analyse financial and economic additionality, such as credit growth, employment, investment and export volume. The overall results show positive impacts in terms of both financial and economic additionality. A research conducted in Italy by Caselli, Corbetta, Rossolini, & Vecchi (2019) examines the effects of the Italian CGS on the profitability of SMEs using the difference-in-difference method to compare with non-treated firms. It finds a positive effect in a specific sector of the economy, raising the question of the tailoring of such a

programme. From a macroeconomic perspective, Hennecke, Neuberger, & Ulbricht (2019) compares the fiscal and net results with other countries and other studies in Germany. Table 2 and Table 3 show these comparisons from a macroeconomic perspective.

Authors (region)	Finance additionality	Project additionality	Economic and fiscal benefits
Schmidt and Elkan (2006)	60–82% (95%) additional loans to SMEs (start-ups), 43% additional information	67% (72%) additional investments at SMEs (start-ups), 60% additional jobs, 5 new jobs and 2.5 saved jobs per guarantee	Multipliers per million euro guarantees, scenario 75% project additionality: investments 2.14, GDP 3.2, state budget 0.65, jobs 12.66
Schmidt and Elkan (2010)		71% (60%) additional investments at SMEs (start-ups), 31% additional sales	Growth of GDP, employment, state budget (7 times the costs of counter-guarantees)
Neuberger and R��thke (2008)	50% add. loans, 23% higher loan volume, 9% lower loan rates, 16% higher loan volume and lower loan rates	61% additional sales	
Kramer (2008)	Credit institutions: 67% additional security during credit assessment, 33% additional information		Per million euro counter-guarantee: 64.1 million euro additional investments, 2,000 additional or saved jobs
Althammer et al. (2011)	67% additional loans, lower loan rates	100% additional start-ups	Growth of GDP and employment
Valentin and Henschel (2013)	68% add. loans, 68% more regular information, 49% add. information, 43% more intensive lending relation		
BMWT (2010)	90% better loan access during crisis, lower loan rates		
Brauttsch et al. (2015)			GDP-multiplier 1.3–1.5

Table 2: Germany's studies comparisons

Source: (Hennecke, Neuberger, & Ulbricht, 2019)

Authors	Country	Guarantee scheme (type, coverage ratio)	Effects
Bartoli et al. (2013), Columba et al. (2010), Zecchini and Ventura (2009), Boschi et al. (2014), De Blasio et al. (2017)	Italy	Confidi (private, min. 50%), SGS (public, max. 80%, counter-guarantee max. 90%); FG (public)	Better credit access (Confidi, SGS, FG), better information (Confidi), lower loan rates (Confidi, SGS), below average default rate (SGS), higher default rate (FG)
Garcia-Tabuenca and Crespo-Espert (2010)	Spain	CERSA (private, 100%, counter-guarantee 30–75%)	Better credit access for the weakest firms, support of the most efficient firms
Lelarge et al. (2010)	France	SOFARIS (mixed, max. 70%)	Better credit access, lower loan rates, higher sales and employment growth, but higher default rates at supported firms
Cowling (2010a, 2010b), Allison et al. (2013), Ughetto et al. (2017)	UK	SFLG, EFG (public, 75%)	Better credit access, finance additionality up to 83%, reduction of growth barriers, job creation and maintenance, lower loan rates for working capital loans
Riding and Haines (2001), Riding et al. (2006)	Canada	SBLA (public, max. 90%)	Better credit access, creation of new jobs, low costs per additional job, positive and increasing net benefit for economy and state, benefit-cost ratio: 7.1 for the economy, 16.4 for the state
Hancock et al. (2007), Craig et al. (2008)	USA	SBA (public, 90%)	Higher economic growth, employment, wages, higher stabilization of the economy, additional jobs mainly in low-income regions
Uesugi et al. (2010), Yoshino and Taghizadeh-Hesary (2016)	Japan	SCG (public, 100%, today: 80%)	Better credit access, but windfall gains because of full coverage of credit risk
Kang and Heshmati (2008)	Korea	KODIT (public, 85%), KOTEC (public)	Better credit access, higher sales and productivity growth
Cowan et al. (2015), Larra��n and Quiroz (2006)	Chile	Fogape (public, max. 80%)	Better credit access, higher sales and profits, costs covered by revenues

Table 3: Other countries comparison

Source: (Hennecke, Neuberger, & Ulbricht, 2019)

Tables 1 and 2 show that financial additionality is achieved in most of the studies compared by Hennecke, Neuberger, & Ulbricht (2019), while economic additionality is not as consistent. The study concludes that per guarantee, there is an increase in GDP of €1.2 per year and a net fiscal gain of several hundred million euros in the German Länder. D'Ignazio & Menon (2020) examines financial additionality without a counterfactual methodology and finds positive additionality, but notes an increase in the probability of default for SMEs. Yang, Tang, Yuan, & Xu (2021) focuses on an economic downturn to investigate the social and economic benefits of CGS programmes in China and finds that these programmes improve the economic indicator, while the social benefits are not clear.

In this summary of studies in recent years, it can be seen that both financial and economic areas are covered, with more consistent results on the positive financial side and less consistent results on the economic side. Considering the OECD (2017) as a guideline for new studies, it is clear that the sustainability aspect is missing in new studies, perhaps due to the availability of information. Nevertheless, the purpose of the present study is to reach level 4 in the OECD (2017) scale with data from the Portuguese economy from 2006 and 2018, provided by the Portuguese Central Bank. The focus is on economic additionality in terms of employment, investment, income and exports. A counterfactual methodology is used to compare treated and non-treated groups.

3 Portuguese CGS Program in the European Union

State intervention has been discussed for at least two centuries, and when there is a crisis, the discussion becomes even more public. It is important to note the historical period that the world was going through at the time of this work. The outbreak of Covid-19 in 2020 is an enormous crisis that has cost the lives of millions of people around the world, not to mention the catastrophic impact on the economy. World GDP shrinks by -3.4% in 2020 due to the pandemic, -6.8% in the euro area, -3.5% in the US and even more in countries like France and the UK, -8.2% and -9.9% respectively. On the other hand, China recorded growth of 2.3% over the same period, thanks to its rapid control of the spread of the virus. Despite this sharp decline, the report OECD (2021) forecasts a recovery in 2021 of 5.6% growth in the world economy, 3% in the euro area and 6.5% in the US due to "the significant fiscal stimulus in the United States, together with faster vaccination ... with welcome demand spillovers in major trading partners". (OECD, 2021). France and the UK are forecast to grow by 5.9% and 5.1% respectively, while China is forecast to grow by 7.8% (OECD, 2021). Part of the less severe downturn and recovery is due to fiscal stimulus in many countries in several areas. "Public sector support through loans, credit guarantees and tax deferrals, as well as temporary changes to insolvency regimes, have so far prevented a sharp rise in bankruptcies during the pandemic." (OECD, 2021). Once again, government stimulus is an essential tool that can support many sectors of the economy, such as SMEs, and bring economic and social benefits to society. In this context, let us focus on the European context and then on the Portuguese case, which is the main objective of this article. As mentioned above, the euro area has been hit hard in terms of economic impact, such as the Portuguese economy, which has contracted by -7.6% and a projected recovery of 3.9% in 2021 according to Banco de Portugal (2021), supported by a significant increase in public spending, from 0.5% growth in 2020 to 3.7% in 2021. The Banco de Portugal report highlights the importance of government support for SMEs during this period to reduce the damage in terms of bankruptcies and employment.

SMEs are essential to the European economy, both in terms of growth and employment. "They represent over 99% of enterprises in the EU. They employ two out of three workers, create 85% of all new jobs and generate around three-fifths of EU value added". (European Commission, 2021). The European Union has a number of ways of supporting SMEs. The COSME (Competitiveness of Enterprises and Small and Medium-sized Enterprises) programme is an instrument to improve access to credit in the euro area, which has been active since 2014. It is managed by the European Investment Fund (EIF) and has a budget of €2.3 billion for the period 2014-2020, capable of mobilising up

to €35 billion in financing. COSME has two instruments, the Loan Guarantee Facility (LGF) and the Equity Facility for Growth (EFG), which reach SMEs through the flow shown in Figure 1. Portuguese SMEs have received €184.7 million through the Loan Guarantee Facility since 2014.

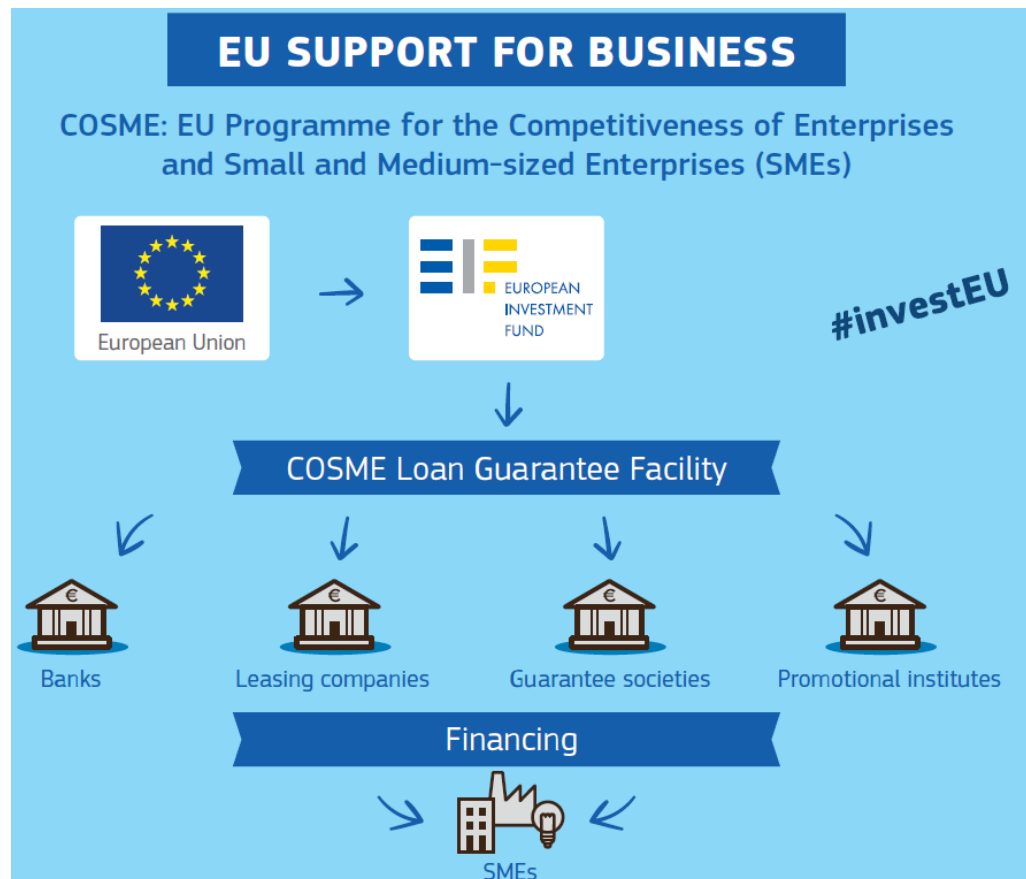


Figure 1: COSME Money Flow
Source: (European Commission, 2021)

The Portuguese structure was changed in 2020 with the creation of a national development bank, the Banco Português de Fomento (BPF), following a designation adopted by the European Union in 2015 and aligned with the climate change challenges of this century. The BPF was created to maximise the efficiency of the existing structure, and the bank incorporated some other Portuguese institutions, such as the Development Finance Institute (IFD), the SME Investment Institute (PME Investimentos) and the Investment Society (SPGM). SPGM changes its name to BPF and this new institution manages the programmes in Portugal. The BPF's mission is to support operations aimed at "improving the financing conditions of non-financial entities, promoting investment, development, innovation, territorial cohesion, carbon neutrality, the circular economy, the environmental economy and business restructuring..." (Diary of the Portuguese Republic, 2020). The BPF has a share capital of €255 million, of which 41.28% is held

by the Portuguese State, 47.01% by IAPMEI (Agency for Competitiveness and Innovation), 7.93% by IP (Portuguese Institute for Tourism) and 3.77% by AICEP (Foreign Trade and Investment Agency), a totally public control of the bank. Figure 2 shows the Portuguese guarantee structure, noting the recent replacement of the SGPM by the BPF. The BPF manages all the resources of the national fund, which receives funds from the European Investment Fund (e.g. the COSME programme), the 4 mutual guarantee societies (MGS) that provide the guarantees and the Portuguese State Fund (FCGM) as a counter-guarantee for the credit.

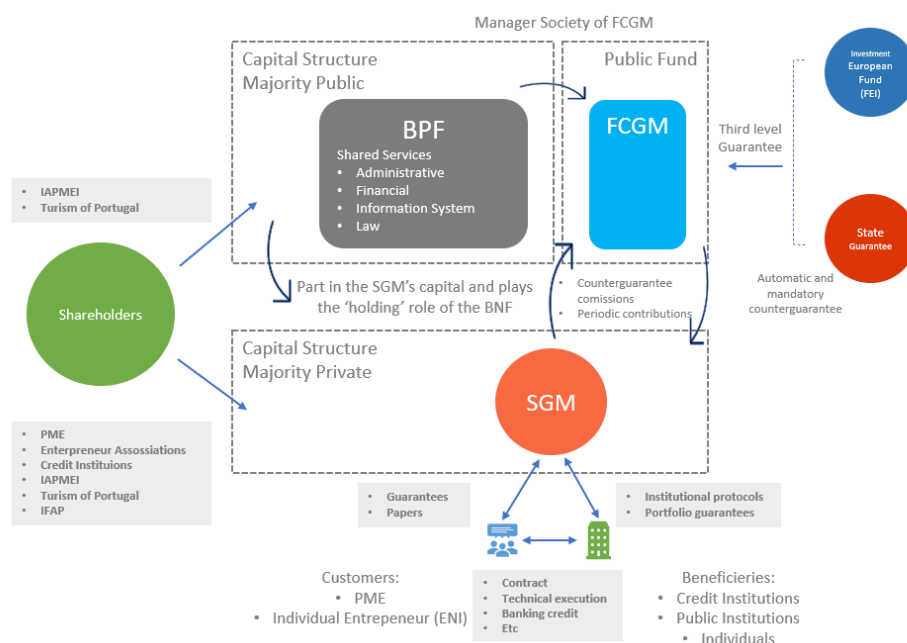


Figure 2: Portuguese Credit Guarantee Structure

Source: (SGPM Sociedade de Investimento, 2020) Author's Adaptation

The MGS (Mutual Guarantee Societies) have four institutions representing specific territories and sectors in Portugal, in order to better support local specificities; moreover, the majority of the capital is private, composed of companies, associations, credit institutions, IAPMEI, IFT and BPF. Agrogarante supports the primary sector in Portugal, Norgarante focuses on SMEs in the north of the country, Lisgarante has offices in Lisbon, the south and on the island of Madeira and is made up of business associations, innovation and tourism institutions and others. The fourth institution is Garval, made up of the main Portuguese banks and the BPF.

4 Portuguese Economic Context

GDP and its Evolution

The Portuguese economy has its peculiarities, as every country has its own. This chapter describes the Portuguese economic context and its growth challenges, based on a relevant highlight of several articles consolidated by the Banco de Portugal in a work entitled Portuguese economic growth: A view on structural features, blockages and reforms, published in 2019 (Banco de Portugal, 2019). The document discusses a handful of key issues, such as potential output and its comparison with the euro area, how technological progress and efficiency developments have contributed to growth, the role of access to finance for firms' performance in a crisis, the importance of credit constraints for SMEs' exit and investment decisions, the destination of bank credit: do they go to the most productive firms? The issue of workers' bargaining power is presented in the context of price-cost margins. How zombie firms constrain the growth of viable firms and what would define a zombie firm, the impact of resource reallocation on growth and the influence of exporting on the likelihood of survival in the market. Furthermore, the issue of internationalisation and its effects on market entry and exit, the diversification of non-tourism companies in the international environment, given that Portuguese tourism is the strongest economic export sector. The last aspect worth mentioning is the influence of regulatory costs on the productivity of companies.

A relevant question is how to compare Portugal with its European pairs, considering that Portugal is a small country in the euro area Duarte, R. Maria, & Sazedj (2019) employs the difference between the potential output and the gross domestic product (GDP) to compare Portugal with the other countries. The estimation of potential output is done by mixing price and wage inflation equations with a version of Okun's law and a production function with capital, labour and total factor productivity (TFP). The data cover the period between 1980 and 2018, using the databases of Statistics Portugal, Banco de Portugal and Eurostat. Figure 3 shows the GDP growth rate and the potential output growth rate. After the international crises in 2008 and the consequences in the sovereign crises in 2011 and 2012, a sharp decline to negative growth rates can be seen, with a trend recovery of 1% in 2017.

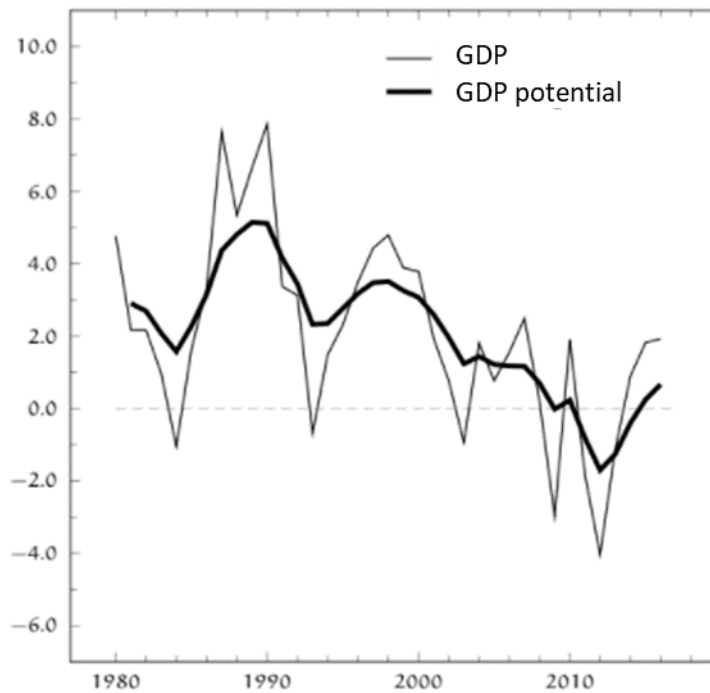


Figure 3: GDP growth rate in Portugal
Source: (Duarte , R. Maria, & Sazedj, 2019)

Figure 4 shows the evolution of the gap between Portugal and the euro-zone in terms of GDP, potential output, GDP per capita and potential output per capita. It shows that in the first period, from 1980 to 1998, the gap between Portugal and the euro area was decreasing for both GDP and potential output, reaching the same level in 1999, while both indicators were close to each other. On the other hand, the second period shows the opposite direction, with potential output in Portugal moving away from the euro and reaching the levels observed in the 1990s. However, in the second period it can be observed that the gap difference increases from 1999 onwards. The authors draw 3 main conclusions: First, the rate of growth of potential output slowed down in the second period, observing that the NAWRU (Non-Accelerating Wage Rate Unemployment) was around 5.5%, while it reached 8.5% in the second period, and the sovereign crises of 2010 had a prolonged effect in the sign of recovery in 2017; Second, the Portuguese potential output has been declining compared to the euro area since 2003, "reflecting both trend and cyclical components and suggesting that structural reforms are needed to catch up with the economic performance of the euro area." (Duarte , R. Maria, & Sazedj, 2019); The third conclusion focuses on the output gap and the fact that labour market slack is greater in Portugal than in the euro area.

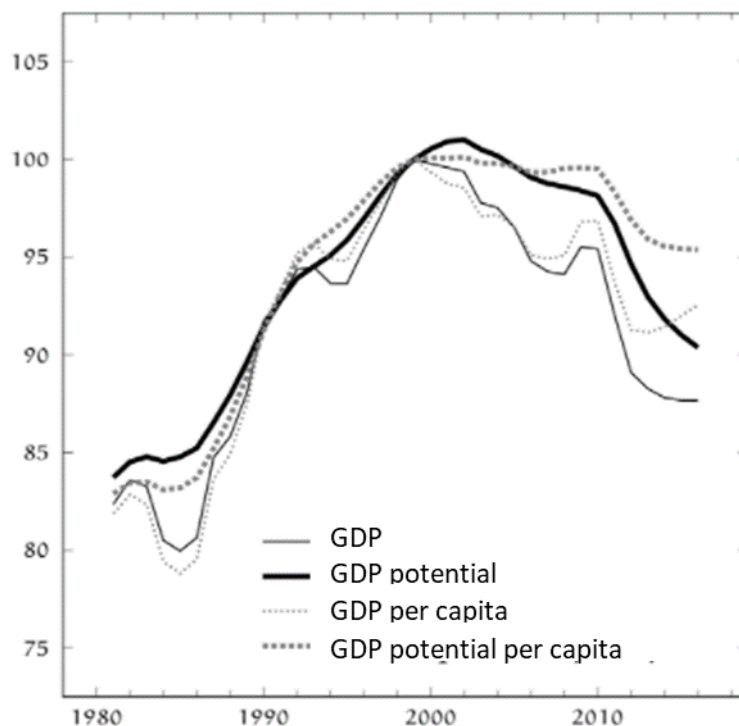


Figure 4: Cumulated growth differentials between Portugal and the euro area | Index (1999=100)
Source: (Duarte , R. Maria, & Sazedj, 2019)

In an article that analyses how technological progress and efficiency developments have contributed to Portuguese growth in the period between 1995 and 2014, using a database from Penn World Tables for all members of the European Union (EU28). Amador, Coimbra, & R. Dos Santos (2019) assumes that every country has access to the world's technology and decomposes the total factor productivity (TFP) as the contribution of technological progress and efficiency. TFP is the ability of an economy to grow beyond the accumulation of inputs such as capital and labour. The analysis was carried out over 3 periods of 10 years in order to observe the evolution of the indicator. The model calculates the capital elasticity with respect to GDP and it shows that Portugal has a high capital elasticity, which means that investment has a huge relevance in terms of GDP growth. Furthermore, the contribution of technological progress and efficiency to growth can be seen in Tables 4 and 5 below, which present Portugal and the EU28 respectively. As can be seen in Table 1 for the decade ending in 2014, "the last decade has witnessed a disappointing performance of the Portuguese economy, with an average GDP growth of -0.24 percent". (Amador, Coimbra, & R. Dos Santos, 2019). The authors highlight the impact of the 2008 crisis and the sovereign debt crisis on this result, highlighting the effect on labour, -0.5 percent of the contribution, due to the lack of investment. In addition, technological progress had a negative effect of -0.74%, while efficiency had a positive result of 0.09%.

Decades ending	Observed GDP	Expected GDP	Input			Total Factor Productivity	
			Total	Capital	Labour	Technology	Efficiency
2005	2.43	2.83 (2.09)	3.25 (0.13)	2.99	0.26	1.10 (0.55)	-1.52 (2.13)
2010	0.74	0.86 (2.03)	1.80 (0.14)	1.92	-0.13	0.09 (0.52)	-1.03 (2.08)
2014	-0.24	-0.22 (2.05)	0.43 (0.15)	0.92	-0.50	-0.74 (0.51)	0.09 (2.11)

Table 4: Growth results for Portugal

Source: (Amador, Coimbra, & R. Dos Santos, 2019)

Note: Values in italics in parenthesis stand for interquartile ranges. Observed and expected GDP are presented as percentage average decade growth rates, while inputs and total factor productivity are presented as percentage points (geometric) average decade contributions.

On the other hand, the results for the first decade of the study, ending in 2005, had a better overall result, with 2.43% GDP growth, driven by capital accumulation, represented in the table by 2.99%, but in a negative contribution of TFP, with 1.10% positive in the technological indicator, offset by a negative 1.52% in efficiency, "signalling that structural weaknesses in the Portuguese economy existed before the recent crisis and went beyond input accumulation". (Amador, Coimbra, & R. Dos Santos, 2019).

Decades ending in:	Observed GDP	Expected GDP	Input			Total Factor Productivity	
			Total	Capital	Labour	Technology	Efficiency
2005	3.53	3.60 (1.7)	2.27 (0.12)	2.17	0.10	1.04 (0.84)	0.29 (1.62)
2010	2.38	2.50 (1.6)	2.18 (0.16)	2.07	0.12	0.14 (0.81)	0.18 (1.54)
2014	1.42	1.31 (1.5)	1.64 (0.15)	1.55	0.09	-0.50 (0.78)	0.17 (1.43)

Table 5: Growth results for EU28

Source: (Amador, Coimbra, & R. Dos Santos, 2019)

Table 5 describes the result for the 28 countries of the European Union (research carried out before Brexit) and shows a better performance compared to Portugal in the above periods, especially in terms of efficiency, with positive contributions in all three cycles. "These comparisons put into perspective the results obtained for Portugal, highlighting the structural difficulties that existed before the recent crisis and are still largely present." (Amador, Coimbra, & R. Dos Santos, 2019).

4.1 The period between 2008 and 2016

Another issue not covered in the paper is undoubtedly important in times of crisis, especially at the time of writing this article due to the impact of the Covid-19 pandemic, which is the importance of financing for performance in a crisis. Karmakar (2019) studies the sovereign debt crisis of 2010 using data from the Central Credit Register of the Banco de Portugal, which includes information on the loan level with a threshold of 50 euros. Data from the bank's balance sheet is also used. The crisis triggered by Greece in 2010 affected countries such as Ireland, Portugal and Italy. Portugal lost its access to the international market due to the possible spill-over effects suspected by investors and saw its default risk rise along with the spread. This sudden movement mainly affected the financing channel. As shown in Figure 5, after a period of increase until 2010, there was a sharp decline in the percentage of market funding.



Figure 5: % Market Funding in Portugal
Source: (Karmakar, 2019)

Figure 6 shows the short-term lending rates for Portugal and some other euro area countries. It is possible to observe that the interest rates had a sharp fall from 2009 and a recovery from 2012 due to the crisis in between. It is also possible to see the different evolution in countries other than Portugal.

The author also highlights these other articles that have studied this topic

“find that highly leveraged firms and firms that had a substantial amount of short-term debt on their balance sheets contracted significantly more during the crisis. These firms experienced a reduction in credit and were unable to tap into alternative sources of funding.” (Karmakar, 2019).

This affirmation is in convergence with the issue studied in the present work, as SME access to credit through credit guarantee schemes and its impact on economic indicators and being an alternative also in times of hardship.

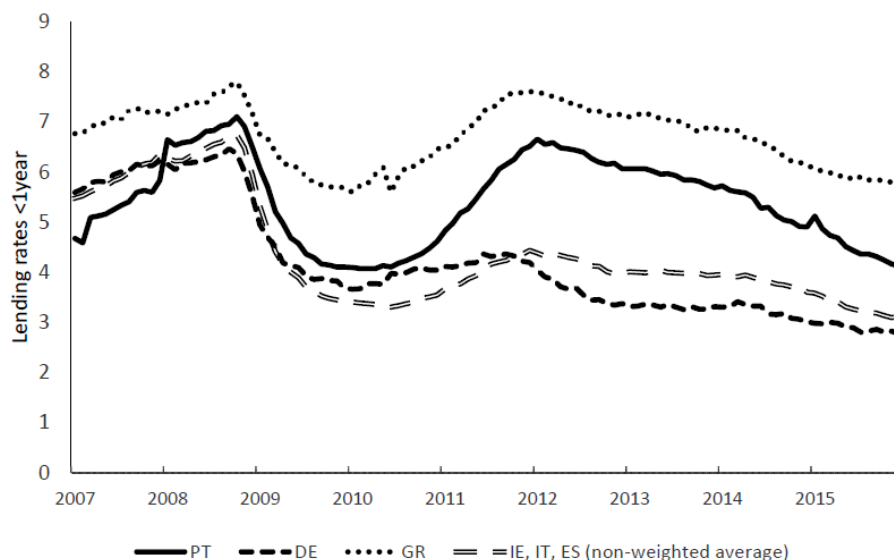


Figure 6: Short-term interest rate

Source: (Karmakar, 2019)

Note: IIS in the bottom panel signifies Ireland, Italy and Spain.

One of the results of Karmakar (2019) shows that firms with higher leverage and significant short-term debt had a harder time getting new credit after the onset of the sovereign crisis. On the other hand, firms with less debt in the sample did not experience severe credit contraction during the same period. Those firms that were unable to access new credit "had to reduce the size of their operations and therefore report lower growth rates in employment, fixed assets, and intermediate goods." (Karmakar, 2019). The author concludes that the debt structure of Portuguese companies is much more sensitive to interest rates than to cash flow.

In another article that contributes to the topic, Farinha & Félix (2019) address the relevance of borrowing constraints for the exit and investment decisions of Portuguese SMEs. The authors start with a sentence from a former ECB President, Mario Draghi:

“[...], credit conditions remain very heterogeneous across countries and sectors. According to the latest ECB survey on credit access by small- and medium-sized enterprises (SMEs), supply constraints remain especially strong for SMEs in stressed

countries. The percentage of financially constrained but viable SMEs – i.e. those with positive turnover in the last six months seeking a bank loan – varies from a minimum of 1% in Germany and Austria to a quarter of the total population in Spain and as much as a third in Portugal.” 2014, by Mario Draghi, ECB Forum on Central Banking

It shows that Portugal has an opportunity to improve its financial structure to grant access to SMEs, especially the viable ones. The researchers used the Portuguese database Simplified Corporate Information – IES with a sample from 2010 to 2012 and a model to estimate the real demand for credit for under the assumption that the observed credit granted does not necessary matches the real supply due a partly credit rationing. Table 6 shows the calculate percentual per type of firm. It can be observed that SMEs and Young SMEs are among the most affected firms in terms of credit rationing due constraints, meaning that those companies required more credit than was given.

Partial rationing (in % of firms with loans)	
SMEs	15
Very small firms	19
Small firms	13
Medium firms	9
Young SMEs	26
Manufacturing	12
Construction	21
Trade	16
Hotel and restaurant	9
Information and communication	11
Other services	14

Table 6: Credit Rationing for Portuguese SMEs
Source: (Farinha & Félix, 2019)

The research also shows that credit constraints have a negative impact on both exit and investment rates. The higher the probability of credit constraints for a firm, the higher the probability of exit. For the sample, credit-constrained firms are 64% less likely to survive than their counterparts. In terms of investment, the model estimates that credit rationing for identified SMEs is on average 2.7 percentage points lower than for other firms. The authors point to the diversification of credit access to minimise the negative effects in firms in crisis. Azevedo, Mateus, & Pina (2019) examines the relationship between credit allocation and productivity, in other words, it analyses how much of the

credit goes to productive firms, since the productivity of an economy is essential for growth, especially in countries that rely heavily on credit, as is the case in Europe, and in this case Portugal. The paper examines two questions: "how the stock of outstanding credit granted by banks operating in Portugal to non-financial corporations is distributed among firms with different levels of productivity". (Azevedo, Mateus, & Pina, 2019) and "whether changes in this stock respond positively to firm productivity, thereby inducing a reallocation of credit towards more productive firms, and how this response is affected by the existing allocation." (Azevedo, Mateus, & Pina, 2019). It is important to note that Portugal has one of the higher relative credit misallocation rates in Europe. The data used come from the Simplified Corporate Information (IES) and the Central Credit Register of the Banco de Portugal for the period between 2006 and 2016. There is a classification of firms based on whether there is information in the first database (IES), the productivity estimate (gross value added, employment and capital stock) and whether firms are zombie. A firm is considered a zombie "if it is at least 10 years old and has operating income below interest payments for three consecutive years". (Azevedo, Mateus, & Pina, 2019).

		Zombies	Non-zombies
Firms with IES reporting	GVA, K, L > 0	9903	185584
	GVA, K > 0, L = 0 or missing	745	14597
	GVA ≤ 0 or K ≤ 0	19763	128716
Firms without IES reporting but with outstanding loans		48166	

Table 7: Classification of firms by category

Source: (Azevedo, Mateus, & Pina, 2019)

Note: Shading is applied to categories deemed unproductive

Table 7 shows the result of the above classification based on productivity. It can be seen that the shaded areas are enterprises that are considered unproductive, taking into account enterprises with no information and zombies. Figure 7 shows the distribution of loans to enterprises by year and by productivity classification. It can be seen that there

is a high proportion of loans to low-productivity firms, and that this proportion increased between 2008 and 2013 due to the crisis.

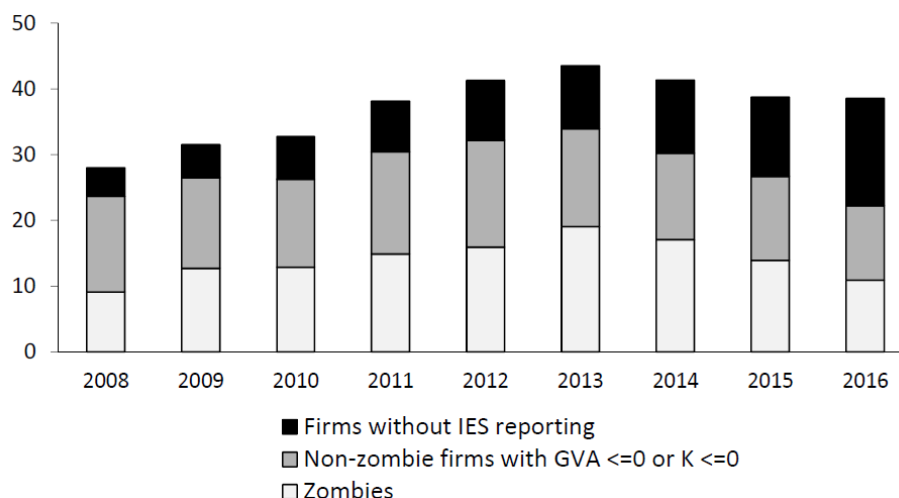


Figure 7: Share of unproductive firms in total bank credit to firms | Percent
Source: (Azevedo, Mateus, & Pina, 2019)

The authors explain that "a deep economic crisis, following a long accumulation of imbalances in the Portuguese economy, helps explain the sharp increase in the credit share of unproductive firms between 2008 and 2013." (Azevedo, Mateus, & Pina, 2019). However, poor decisions in both credit demand and supply could also have contributed to the credit share of unproductive firms, especially before the crisis. Moreover, the paper concludes that "despite welcome developments, such as a shift in new credit from higher-risk to lower-risk firms since 2013, there is still a significant misallocation of credit in the Portuguese economy:" (Azevedo, Mateus, & Pina, 2019). This shows that there is still a long way to go in terms of productive credit allocation.

4.2 Productivity

Another necessary aspect for an economy to grow is related to the product market. Alves & Figueira (2019) studies the level of competition of the Portuguese economy in different sectors through the markup in both the product and labour markets, which measures the relationship between price and cost and is usually used as an indicator of competition. It is important to note that a positive mark-up means that the market in question is not perfectly competitive and that firms therefore have market power vis-à-vis workers. However, this assumption also requires perfect competition in the labour market. The model uses data from the Banco de Portugal for the period

between 2010 and 2016. "The results show that the hypothesis of perfect competition is broadly rejected in Portuguese product markets" (Alves & Figueira, 2019). Both labour and products are not perfectly competitive. In Figure 8, we can see the relationship between the imperfection of the bargaining power of the labor and the price-cost margin (markup), the higher the markup, the higher the power of the labor, confirming the rejection of the hypothesis of perfect competition in the two variables.

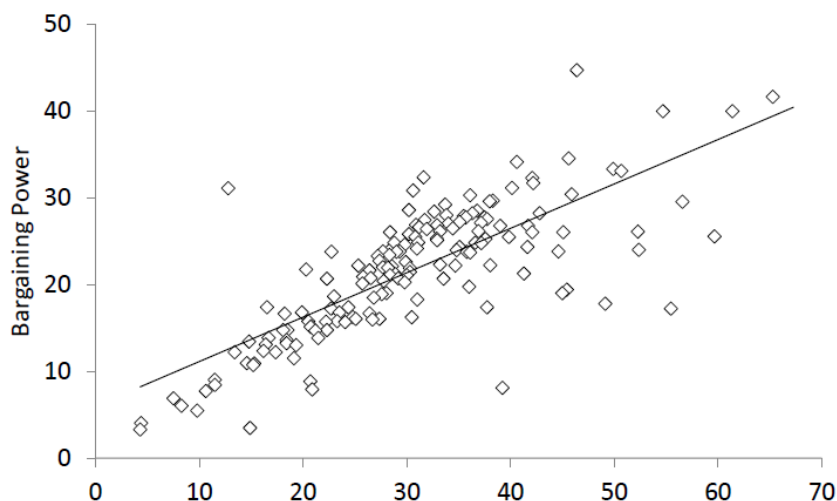


Figure 8: Product and labor market imperfection, percent
Source: (Alves & Figueira, 2019)

"One explanation is that a high bargaining power leads to increased wages and a reduction of the rents left to the firm. As a result, some firms exit the market and there is a decrease in the degree of competition in the product market (and consequently an increase in markups)." (Alves & Figueira, 2019).

Table 8 describes the different sectors, their mark-up and the workers' bargaining power in two different periods, 2012 and 2016. It can be observed that some sectors, such as Electricity, Gas & Water, have low bargaining power while the markup is high, showing the imperfect competitive market. On the other hand, Other Services has high bargaining power and a high mark-up, again showing the imperfect competitive market, but its workers have more power to increase their wages. Moreover, it is clear that the Portuguese economy as a whole has a long way to go to reach a perfectly competitive environment in both perspectives, labour and product markets.

	Price-cost Margin				Bargaining Power			
	2012		2016		2012		2016	
	GVA	Employment	GVA	Employment	GVA	Employment	GVA	Employment
Overall economy	30.29	27.48	29.11	26.57	20.43	21.48	18.63	19.71
Tradable	29.42	29.27	28.58	28.24	22.13	22.67	20.31	21.10
Non-Tradable	31.08	25.87	29.65	24.97	18.90	20.42	13.36	17.85
Manufacturing	28.73	28.75	28.42	27.80	22.10	22.66	21.47	21.30
Non-Manufacturing	30.89	26.88	29.42	25.94	19.79	20.93	17.37	18.89
of which								
Electricity, Gas & Water	54.26	39.34	49.91	38.66	16.54	13.66	5.97	9.51
Construction	30.93	30.89	28.62	28.25	25.72	25.62	24.01	23.69
Trade	15.51	15.75	15.30	15.68	12.21	12.61	11.89	12.30
Transports & Communications	32.60	32.65	31.76	31.10	22.35	24.06	20.98	22.24
Other Services	36.05	33.57	25.60	26.48	25.60	26.48	22.45	22.18

Table 8: Price-cost margins and workers' bargaining power per sector
Source: (Alves & Figueira, 2019)

To study productivity from a different perspective and to understand its evolution in Portugal, Gouveia & Osterhold (2019) use data from the Banco de Portugal to investigate whether zombie firms are holding back the growth of viable firms. One indicator used to understand productivity is the % GDP growth per hour worked, which is one of the starting points for this paper. Figure 9 shows that this indicator has been declining since the period 1987-1996, with productivity growth from over 2% to less than 1% in the period 2007-2016. "One driver of the so-called 'productivity paradox' is related to the breakdown of technological diffusion mechanisms, which translates into the emergence of 'winner-takes-all' dynamics - where one or a few firms dominate the market". (Gouveia & Osterhold, 2019). The companies that cannot overcome this "technological frontier" do not grow at the same rate as the leaders, creating a gap where some companies grow strongly while others stagnate, as the data shows. Another factor that justifies these indicators is related to the so-called creative destruction process, which leads to "fewer market entries, fewer exits and fewer opportunities for the best companies to grow". (Gouveia & Osterhold, 2019). It has to do with the misallocation of resources to less productive firms. This issue has been mentioned from a credit perspective in the above paper Azevedo, Mateus, & Pina (2019). These less productive firms are classified as "zombie" firms.

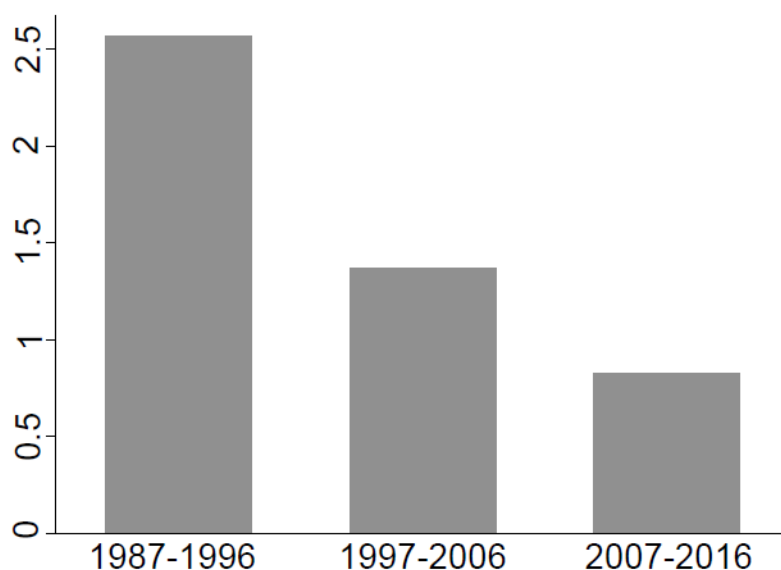


Figure 9: Portuguese average annual productivity growth in % (GDP per hour worked)

Source: (Gouveia & Osterhold, 2019)

The "zombie" firms "not only directly reduce aggregate productivity (by being less productive), but also hinder the growth of healthy firms by crowding out financing and human capital, and by crowding out markets." (Gouveia & Osterhold, 2019). Figure 10 supports the argument of the difference in productivity between leading and less productive firms, showing the labour productivity indicator since 2008 in Portugal. It can be observed that there is an increase in the leading firms, while the lagging firms remain below 1.0.

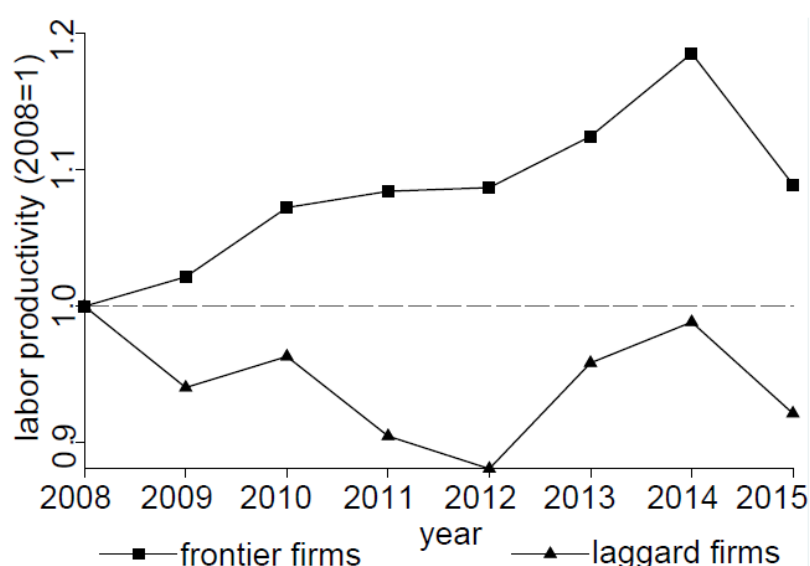


Figure 10: Firm level productivity - frontier v. laggards

Source: (Gouveia & Osterhold, 2019)

The authors point out that the same behaviour is observed in OECD countries and cite a number of studies that confirm the Portuguese findings. Moreover, the study points to three main results: the high prevalence of zombie firms in some sectors, the fact that this prevalence has limited the growth of viable firms, and the improvement of the exit and restructuring apparatus leading to a reduction in zombie firms. The definition of a zombie firm used is the same as in Azevedo, Mateus, & Pina (2019), which is "the operating income is lower than the interest expenses for at least three consecutive years and the firm has been in operation for more than 10 years". (Gouveia & Osterhold, 2019). The indicators used in the paper to measure the relevance of zombie firms in the Portuguese economy are "the weight of the tangible assets of zombie firms in relation to the total tangible assets of the sector, and the share of workers employed by zombies in relation to all workers in the sector." (Gouveia & Osterhold, 2019). The share of resources in zombie firms according to both indicators, distributed by sector, can be seen in Figures 11 and 12, with some sectors reaching around 30%.

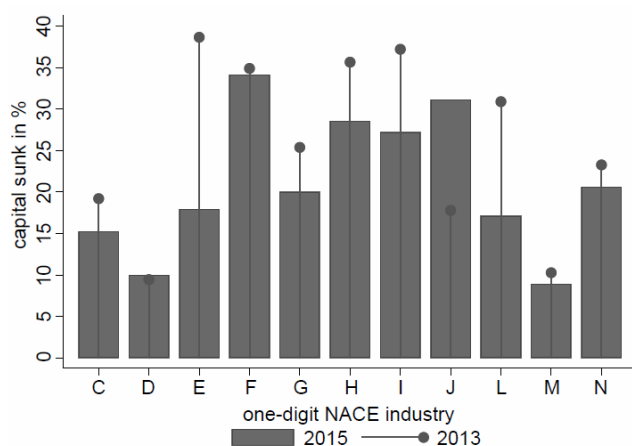


Figure 11: Capital sunk - industry level
Source: (Gouveia & Osterhold, 2019)

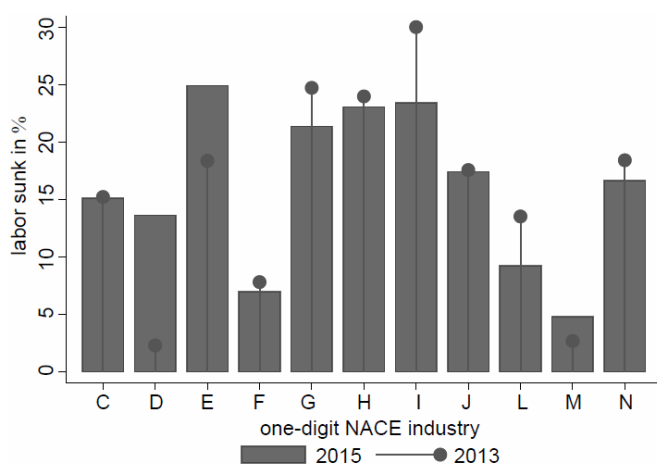


Figure 12: Labor sunk - industry level
Source: (Gouveia & Osterhold, 2019)

In addition, Figures 11 and 12 compare the results in 2013 and 2015, where it can be observed that from 2013 to 2015 there was a reduction in % in most sectors, mainly in terms of capital. The results show that "the investment of the typical Portuguese healthy firm (in relation to that of zombies within the same sector) is negatively affected by the resources - capital or labour - sunk in zombies". (Gouveia & Osterhold, 2019) and "However, there is no effect on the relative employment growth of the average non-zombie, which may reflect the relative flexibility of capital compared to labour." (Gouveia & Osterhold, 2019). Although Portugal has some negative indicators and areas for improvement, the authors show that the insolvency indicator published by the OECD in 2017 shows an improvement influenced by adjustments in public policies. Finally, it is highlighted that improvements in the exit of zombie firms from the market must take into account the impact on the country's labour market and other social costs, given that zombie firms are on average larger than the most productive.

“Zombie prevalence has been curbing the growth of viable firms in Portugal. Accordingly, fostering the exit of the least productive firms is certainly appealing, but one needs to carefully consider the broad implications. In Portugal, zombies are responsible for a significant part of employment: in some sectors, more than 1 out of 5 workers are employed in a zombie firm; and, in some regions, the figure increases to 1 out of 3.” (Gouveia & Osterhold, 2019)

Still on productivity and using total factor productivity (TFP), Marques (2019) analyses how resource reallocation affects productivity growth in Portugal using data from the Banco de Portugal between 2006 and 2015. The author compares different sectors of the economy and decomposes the TFP into three categories: entry, exit and survival firms. Productivity is also decomposed into two parts: First, the within effect, which can be seen as innovation and more efficient technologies in the market; the second, called the between effect, which represents the reallocation of resources, namely labour and capital.

Sectors	Survivors			Entry	Exit	Net entry	Total reallocation	Total change
	Within	Between	Total					
(1)	(2)	(3)	(4)=(2)+(3)	(5)	(6)	(7)=(5)+(6)	(8)=(3)+(7)	(9)=(4)+(7)
Manufacturing	1.0	3.8	4.7	8.9	-6.6	2.4	6.2	7.2
Tradable services	-8.1	-1.7	-9.7	14.3	4.3	18.7	17.0	8.9
Nontradable services	3.8	-0.8	3.0	-26.8	18.6	-8.3	-9.1	-5.3
Total economy	0.5	-1.0	-0.5	-11.4	7.6	-3.8	-4.8	-4.3

Table 9: Productivity decomposition
Source: (Marques, 2019)

Table 9 shows the cumulative productivity decomposition for the period under review. It can be seen that the entrants made a negative contribution of -11.4 to the productivity of the economy as a whole, while the exits made a positive contribution of 7.6. This means that surviving enterprises are more productive than the latter two groups. However, when looking at these indicators in different sectors, the results are quite different. In the entry group, manufacturing and tradable services made positive contributions of 8.9 and 14.3 respectively, while non-tradable services made a negative contribution of -26.8. "The larger contribution of entry firms and the smaller contribution of exit firms in the tradable sector may be related to the greater international competition that this sector faces" (Marques, 2019). Moreover, the overall reallocation follows the same pattern as above.

4.3 Firm's Survival

Simões & Rodrigues (2019) investigate the impact of exporting on firm survival using data from Portugal between 2008 and 2012. The objective is to "study the impact of financial constraints on firm survival and determine whether the likelihood of survival differs between exporters and non-exporters" (Simões & Rodrigues, 2019). The results show the relevance of variables such as leverage, profitability and availability of assets that could be presented as collateral on the exit rate. Firms with higher leverage, lower return and lower share of assets have a higher probability of exit, although after controlling for financial variables, exporter firms have a higher probability of survival. Table 10 shows the death rate by type of enterprise and year of export. It can be seen that exporters have lower death rates than non-exporters, with the exception of exiters from export markets.

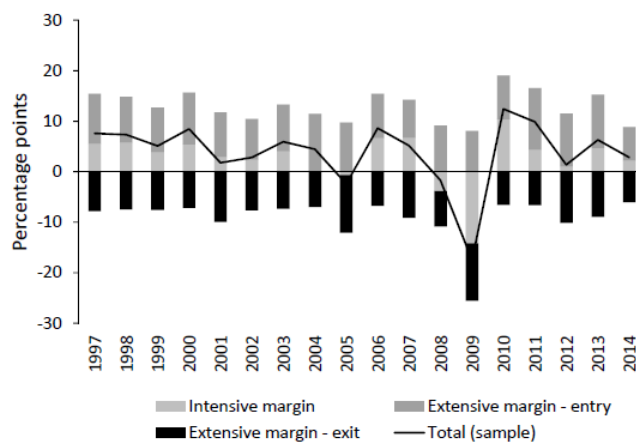
	2008	2009	2010	2011	2012
Non-exporter	8.5	6.8	6.6	7.4	7.6
Exporter	4.8	4.1	3.5	4.1	3.9
Exiter from export markets	9.6	10.3	8.8	8.1	9.0
Continuous exporter	4.6	4.0	3.3	3.9	3.8
Continuous non-exporter	8.4	6.7	6.5	7.3	7.5
Starter/switcher	5.4	4.6	4.0	4.5	4.3

Table 10: Evolution of death rates of firms by export status
Source: (Simões & Rodrigues, 2019)

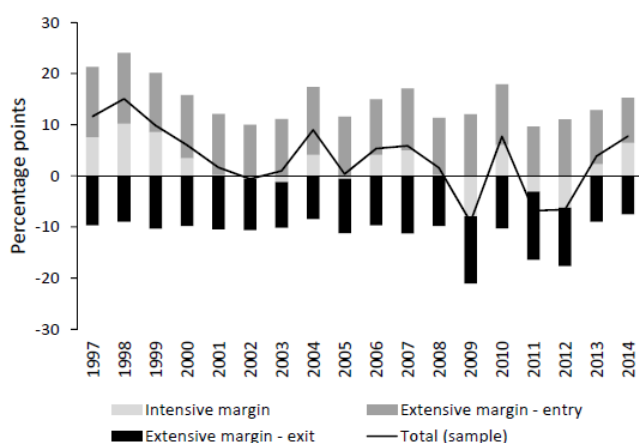
The continuous exporter group has the best rate over the years, although it is close to the exporter group, suggesting that the higher the participation in the international market, the higher the probability of survival. The article concludes that "the empirical analysis also shows that, after controlling for financial effects, firm characteristics such as age and size, sector characteristics, macro and random firm effects, exporters were more likely to survive than non-exporting firms." (Simões & Rodrigues, 2019).

The importance of entry and exit in the international market can play a relevant role in the survival rate of firms, and this is studied by Amador & Opromolla (2019), who evaluate the contribution of the intensive and extensive margins to the import and export of firms in the period between 1995 and 2014, using data from the Instituto Nacional de Estatística. "The main finding is that the intensive margin is the main driver of the growth

rates of both trade flows." (Amador & Opromolla, 2019). In Figure 13, we can see that exports (a) and imports (b) follow the trend of the total in each part of the graph.



(a) Exports



(b) Imports

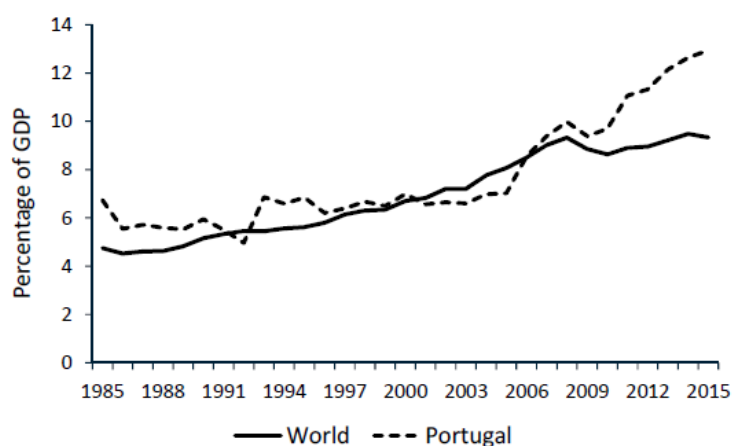
Figure 13: Yearly intensive and extensive margins
Source: (Amador & Opromolla, 2019)

The authors also point out that the exit rate for new exporters is high in the first year, with around 30% leaving the export business. In the first five years of the sample, the rate reaches 60%. Moreover, "the temptation to blindly support newborn firms should be avoided, as it is costly and does not necessarily improve overall export performance". (Amador & Opromolla, 2019).

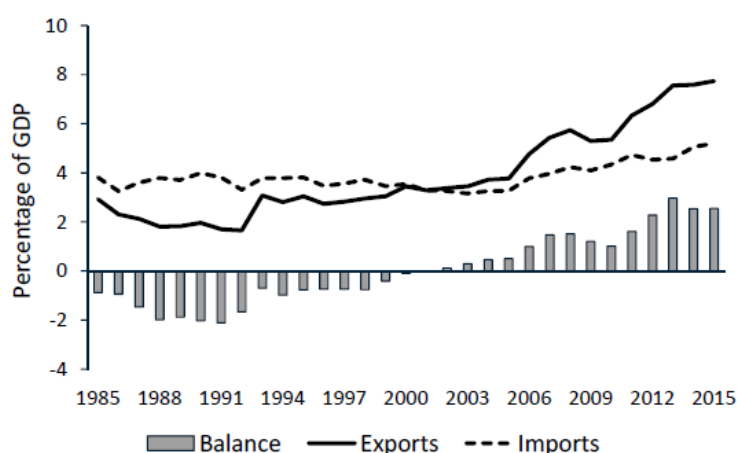
4.4 Portuguese Exports

Today, the importance of services in the global economy is massive, and in Portugal, tourism is the most important sector of international trade, accounting for around 45% of exports and trade in services. Amador, Cabral, & Ringstad (2019) studied the diversity of non-tourism international trade in Portugal, using firm-level data from the

Banco de Portugal for 2014 and 2015 to provide a portrait. Figure 14 shows the growth of the non-tourism sector in Portugal and the world (a) and the deficits/surpluses in the non-tourism services account between 1985 and 2015, as a percentage of GDP. It can be seen that Portugal has gone from around 6% of GDP in 1985 to more than 12%, the indicator has doubled, above the world rate. Moreover, the balance has been in surplus since 2003 and has been growing.



(a) International trade in non-tourism services



(b) Portuguese exports and imports of non-tourism services

Figure 14: International trade of non-tourism services as a percentage of GDP
Source: (Amador, Cabral, & Ringstad, 2019)

Table 11 shows the shares of exports and imports by activity. The three most important sectors for exporters are 'Other business services' with 50% of exporters, 'Transport' with 19% and 'Telecommunications, computers and information' with 8%. Table 12 shows the main partner countries for both exports and imports. The United Kingdom, Spain and France are the main partners for exports, while the United Kingdom, Spain and Germany are the main partners for imports. The Portuguese-speaking countries, Brazil and Angola, have a high rate of trade due to the historical links between

Portugal and both countries. In addition, the authors analyse the productivity and profitability of companies, dividing them into export only, import only and two-way, as shown in Figure 15. "Compared to one-way traders, these two-way traders in services tend to be more productive and more profitable". (Amador, Cabral, & Ringstad, 2019)

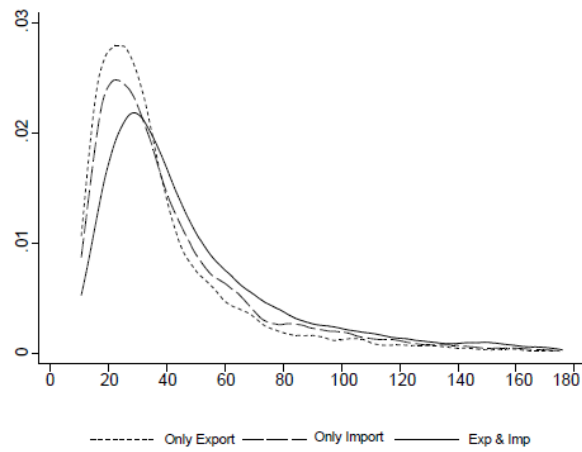
Code	Description	Exports	Exporters	Imports	Importers
SB	Maintenance and repairs	3.4	5.1	4.9	7.9
SC	Transports	48.2	19.1	27.5	11.6
SE	Construction	4.4	6.7	1.5	2.8
SF	Insurance	0.4	3.4	1.0	4.6
SG	Financial services	0.5	2.2	1.1	5.3
SH	Charges for the use of intellectual property	0.5	1.4	9.1	2.9
SI	Telecommunications, computer, and information	10.6	8.3	15.6	17.9
SJ	Other business services	30.6	50.0	35.7	41.0
SK	Personal, cultural, and recreational services	1.3	3.7	3.5	5.8
SL	Government goods and services	0.00	0.02	0.00	0.16
	Total	100.0	100.0	100.0	100.0

Table 11: Shares in total trade and in total number of firms by broad service categories, 2014-2015 Source: (Amador, Cabral, & Ringstad, 2019)

Countries	Exports	Exporters	Countries	Imports	Importers
UK	12.1	5.9	Spain	17.7	14.2
Spain	11.1	10.5	UK	13.4	8.8
France	10.3	7.6	Germany	10.2	7.5
Germany	7.9	6.8	USA	9.0	5.0
Angola	7.2	2.9	France	8.4	8.0
Brazil	5.7	1.6	Netherlands	6.2	5.3
USA	5.5	3.2	Switzerland	4.1	2.9
Switzerland	4.8	3.2	Belgium	3.9	3.8
Netherlands	3.7	4.7	Ireland	3.3	3.6
Italy	3.3	3.4	Brazil	3.3	1.7
Other	28.4	50.1	Other	20.6	39.1
Total	100.0	100.0	Total	100.0	100.0

Table 12: Main partner countries - shares in total trade and in total number of firms, 2014-2015

Source: (Amador, Cabral, & Ringstad, 2019)



(a) Labour productivity

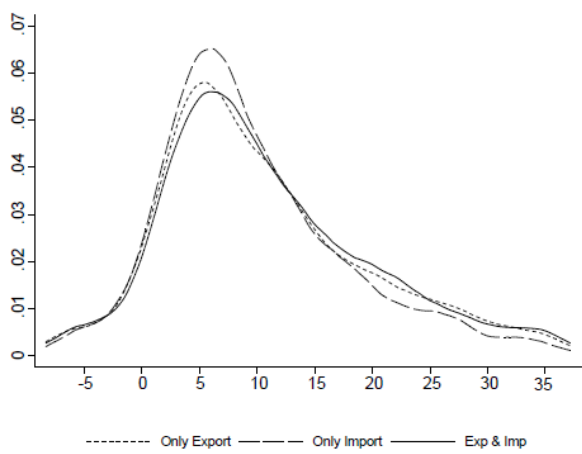


Figure 15: Distribution of labour productivity and profitability, 2014-2015
Source: (Amador, Cabral, & Ringstad, 2019)

5 Methodology

As mentioned in chapter 2, the methodology used in this paper allows the construction of a counterfactual to compare the treated group with a control group and to estimate a random effect. The difference-in-differences approach is most commonly used in such cases, as we have seen. Figure 16 illustrates the idea behind this method. The counterfactual trend would be a hypothetical outcome in the treated group if the treatment had not been given to the treated group, and the difference in the true trend would be the intervention effect.

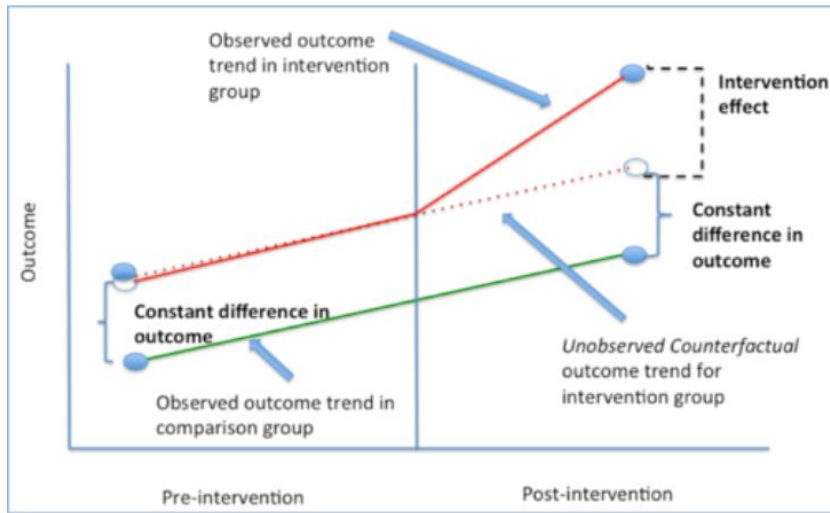


Figure 16: Difference-in-Difference estimation, graphical explanation
Source: (Columbia University Mailman School of Public Health, 2022)

The method is applied through a regression model as an interaction term between time and treatment group dummy. The dummies are $\beta_1[Time]$ and $\beta_2[Intervention]$.

$$Y = \beta_0 + \beta_1[Time] + \beta_2[Intervention] + \beta_3[Time * Intervention] + \beta_4[Covariates] + \varepsilon$$

However, there are three assumptions that must be met before this option is chosen: the intervention is unrelated to the outcome at baseline, the composition of the intervention and comparison groups is stable for repeated cross-sectional design, and the treatment/intervention and control groups have parallel trends in outcome. "The parallel trend assumption is the most critical of the four assumptions for ensuring the internal validity of DID models and the most difficult to meet." (Columbia University Mailman School of Public Health, 2022). Figures 17, 18, 19 and 20 show the median trends for the four hypotheses for the control and treatment groups. It can be seen that

in none of the four cases do the trends support the hypothesis, so the regression difference cannot be used without a counterfactual.

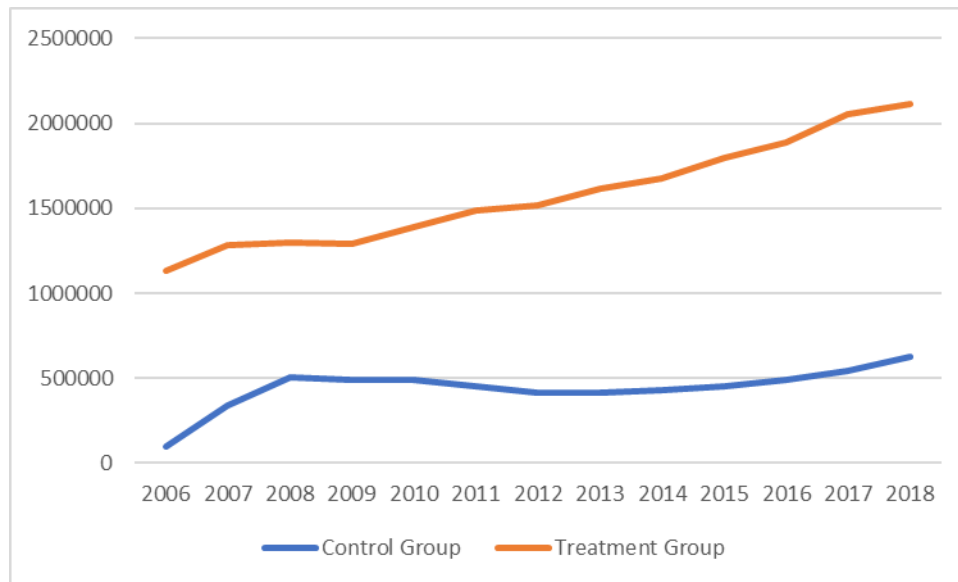


Figure 17: Revenue control group x treatment group (median)
Source: Author's calculation

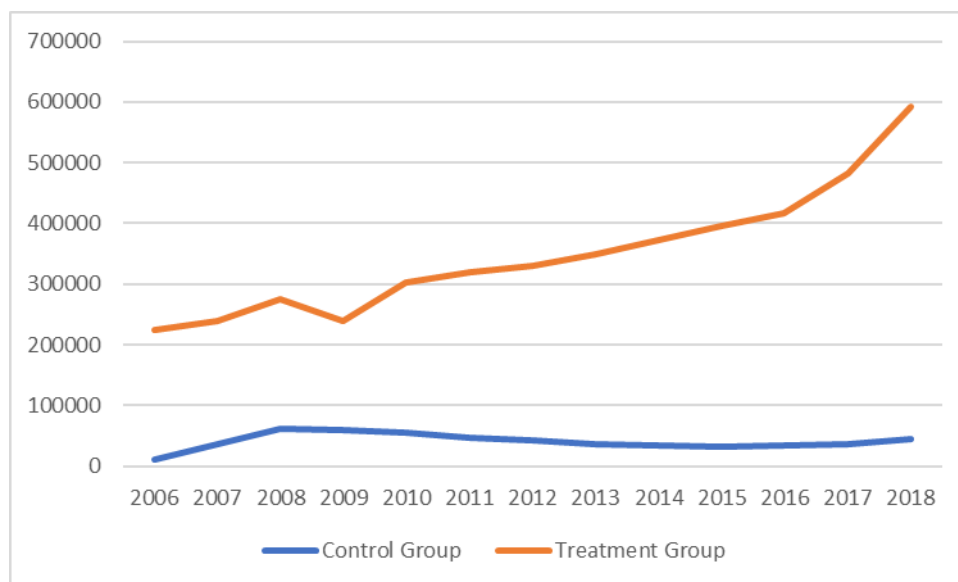


Figure 18: Investment control group x treatment group (median)
Source: Author's calculation

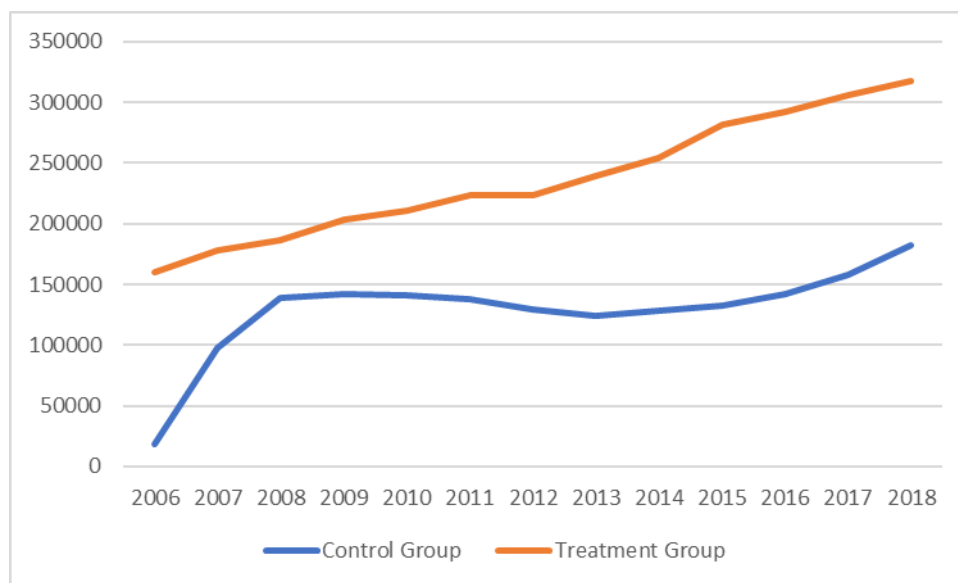


Figure 19: Salaries control group x treatment group (median)
Source: Author's calculation

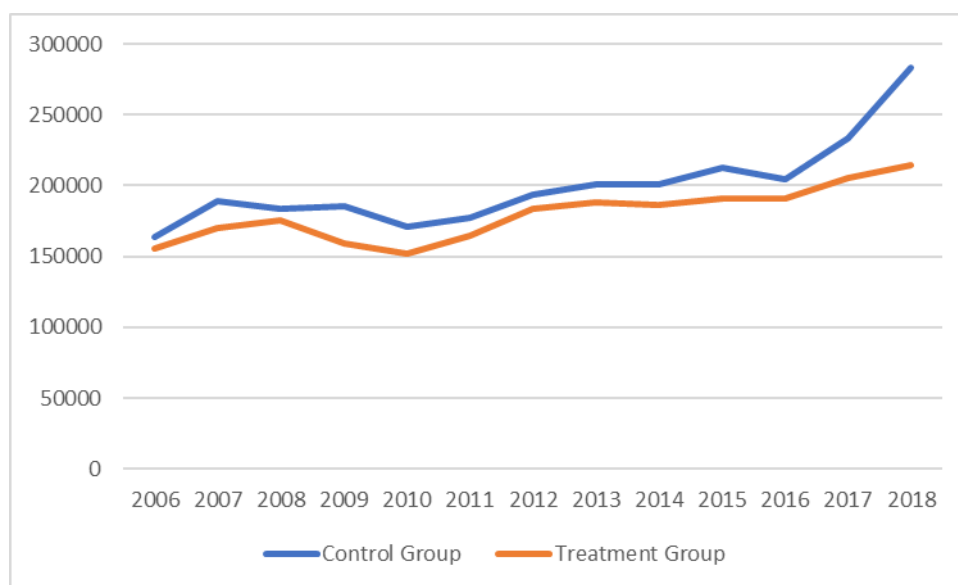


Figure 20: Exportation control group x treatment group (median)
Source: Author's calculation

However, there are other options in the literature, such as the matching propensity score, which is most commonly used to create a control group as a counterfactual to compare with the treatment group, which has similar characteristics in terms of receiving the treatment, which in this case is the loan.

6 Data

This work is based on data from the Banco de Portugal, from the Banco de Portugal Microdata Research Laboratory (BPLIM), so the data are reliable in terms of both consistency and integrity. This department makes several databases available to internal and external researchers. Three of these databases are used in this study: Central Balance Sheet (CB), Central Balance Sheet Harmonised Panel (CBHP) and Central Credit Responsibility (CRC). The period covered in all these databases is between 2006 and 2018. It is important to note that one of the main inputs, the information on credit guarantee flags, is only available since 2014, which may affect the results.

The Central Balance Sheet "provides economic and financial information on non-financial corporations operating in Portugal. This dataset is mainly based on information reported through the Informação Empresarial Simplificada (IES) and contains annual data" (Banco de Portugal, 2022). Although the period begins in 2006, there was a structural change that changed the organisation of the data, but this does not affect the current work. The Simplified Corporate Information provides complete information, as it is mandatory for companies in Portugal, and the data is composed of 21 annexes, as can be seen in Table 13.

Annexes	Type of Information	Entities	Annexes used in CB
A	Corporate Income Tax	Resident entities carrying on commercial, industrial or agricultural activities as main activity	x
		Non-resident entities with a permanent establishment	
A1		Resident entities carrying on commercial, industrial or agricultural activities as main activity- consolidated accounts	
B		Financial Sector	
B1		Financial Sector- consolidated accounts	
C		Insurance Sector	
C1		Insurance Sector- consolidated accounts	
D		Resident entities not carrying commercial, industrial or agricultural activities as main activity	
E		Non-resident entities without a permanent establishment	
F		Fiscal Benefits	
G		Especial Regimes	
H		Operations with non-resident entities	
I	Personal Income Tax	Tax payers with organized accounting method	
L	Value Added Tax	Accounting and Tax elements	
M		Operations carried on in a different local than headquarter	
N		Especial Regimes	
O		Summary of clients	
P		Summary of suppliers	
Q	Stamp Duty	Accounting and Tax elements	
R	Establishment Data / Statistical Information	Resident entities carrying on commercial, industrial or agricultural activities as main activity	x
		Non-resident entities with a permanent establishment	
		Individual limited liability establishments	
S		Financial Sector	
T		Insurance Sector	

Table 13: IES forms
Source: (Banco de Portugal, 2022)

Table 14 shows an example of the groups of variables contained in the CB database, although only some of them are used to test the hypothesis.

O/1	Variable	Description
1	B001	Total Assets (QS)
1	B060	Equity and Liabilities (QS)
1	B061	Equity (QS)
1	B080	Liabilities (QS)
1	B081	Non-current liabilities
1	B085	Non-current liabilities - Obtained funding
1	B160	Non-current liabilities - Remaining non-current liabilities
1	B089	Current liabilities (QS)
1	B093	Current liabilities - Suppliers
1	B161	Current liabilities - Remaining current liabilities
1	B094	Current liabilities - State and other public entities
1	D021	Total income
1	D001	Turnover
1	D002	Sales
1	DL017	Services
1	D111	Remaining Income
1	D005	Operating subsidies
1	D006	Variation in production
1	D007	Capitalized production
1	DL043	Supplementary income
1	D013	Other incomes - Income from financial assets
1	D062	Total Expenses (QS)
1	D082	Operating net income
1	D084	Earnings before Interest, Taxes, Depreciation and Amortization - EBITDA
1	D085	Earning before Interest and Tax - EBIT
1	D086	Earnings before Tax - EBT
1	D087	Net income

Table 14: CB variables

Source : (Banco de Portugal, 2022)

The second database, Central Balance Sheet - Harmonised Panel (CBHP), is based on the CB database with variables that were not affected by the structural change mentioned above. These two databases have been merged for the purpose of this study.

The third and final data source used is the Central Credit Register (CCR). "The Central Credit Register (CCR) is a database managed by the Banco de Portugal that collects information provided by registered entities (credit-granting institutions) on the credit granted to their customers." (Banco de Portugal, 2022). The databases store monthly information with almost all legal credit transactions in Portugal from several institutions since 1999. For the purpose of this work, the period considered is between 2006 and 2018, since the CB and CBPH databases are available for the same period.

Before entering into the description of the selected variables and their preliminary analyses, it is necessary to highlight an important limitation of the data concerning the information on the government guarantee given and its relationship with the current credit guarantee programme mentioned in Chapter 3. The data provided by the Banco de Portugal do not allow us to identify the specific programme from which the guarantee originates and whether the entire credit for the period is exclusively guaranteed by the State. However, this limitation does not affect the objective of the research, which is to test the hypothesis of the effect of such credits on firms.

Revenue: Concerning the Hypothesis 1 – Revenue Growth

In order to measure turnover variation, two variables were selected and summed. Total turnover and total services were selected from the CBHP database and are used to test the hypothesis of turnover growth. Table 15 shows the initial statistical description of turnover. There are more than 5 million observations for 727,944 enterprises with a large variation in turnover, including all enterprise sizes.

Revenue	
count	5 028 327
mean	837 136
Std dev	20 905 531
min	0
25%	9 649
50%	66 106
75%	229 648
max	9 628 761 417

Table 15: Revenue statistical description
Source: Author's calculation

Number of employees: Auxiliary variable

The number of employees is used to define the size of the enterprise. The field is taken from the CBHP database, number of employees (paid and unpaid). For this variable, the last observation of each enterprise was taken into account in order to observe the last position of the enterprise. It can be seen in Table 16, the first statistical description, that the vast majority of enterprises, 75%, have 3 employees.

Number of Employees	
count	718 358
mean	5,28
Std dev	71,98
min	0,00
25%	0,00
50%	1,00
75%	3,00
max	25 614,00

Table 16: Number of employees statistical description
Source: Author's calculation

This variable is an auxiliary variable defining the size of enterprises. The size definition is taken from the OECD definition: micro enterprises with less than 10

employees, small enterprises with 10 to 49 employees, medium enterprises with 50 to 249 employees and large enterprises with 250 employees or more. Table 17 shows the size classification of the 727 944 most recent observations, where more than 90% are micro, 7.084% small, 0.010% medium, 0.002% large and 0.002% have no information on the number of employees.

Firm's distribution	
micro	90,385%
small	7,084%
N/A	0,013%
medium	0,011%
large	0,002%

Table 17: Firm's size distribution
Source: Author's calculation

Investment: Concerning the Hypothesis 2 – Investment Growth

To measure investment, the variable chosen was tangible and intangible fixed assets. Table 18 shows the first statistical description, it can be observed that the investment is concentrated in few enterprises, due to the high mean (451,576 euros) and the Q3 (75%) of 61,455 euros.

Investment	
count	5 028 327
mean	451 576,00
Std dev	18 518 276,00
min	-1 037 362,00
25%	277,00
50%	9 710,00
75%	61 455,00
max	7 938 850 907,00

Table 18: Investment statistical description
Source: Author's calculation

Employment: Concerning the Hypothesis 3 – Employment Growth

Expenditure on wages and salaries has been chosen to measure the impact on employment growth, although the above-mentioned variable of the number of persons employed is also tested to validate this hypothesis. Table 19 provides a first look at the data and shows the same pattern of concentration as before.

Employment	
count	5 028 327
mean	92 470,58
Std dev	1 303 038,77
min	0,00
25%	0,00
50%	12 602,99
75%	41 114,40
max	474 242 704,00

Table 19: Salaries spending statistical description
Source: Author's calculation

Exportation: Concerning the Hypothesis 4 – Exportation Growth

The export information comes from the sum of 4 variables of the CBHP, namely total sales to the EU market, total services to the EU market, total sales to the extra-EU market and total services to the extra-EU market. Table 20 shows the distribution of the last variable. The pattern of concentration is even more pronounced than for the variables presented previously, with more than 75% of the sample not exporting at all in the period considered.

Exportation	
count	5 028 327
mean	160 174,38
Std dev	7 590 674,98
min	0,00
25%	0,00
50%	0,00
75%	0,00
max	3 693 663 336

Table 20: Exportation statistical description
Source: Author's calculation

This increased concentration may be due to the fact that not every enterprise exports, so in order to adjust the data for this reality, only those enterprises were taken into account that had more than zero exports in at least one of the years from 2006 onwards. This corresponds to 162 126 out of 727 944 enterprises, or 22% of the total number of enterprises that exported over the period. Table 21 shows the adjusted distribution, which is more balanced.

Adjusted Exports	
count	1 415 631
mean	568 940,05
Std dev	14 297 836,88
min	0,00
25%	0,00
50%	0,00
75%	30 980,40
max	3 693 663 336

Table 21: Adjusted Exportation statistical description
Source: Author's calculation

Government Credit Guarantee: Auxiliary variable

The information on state-guaranteed loans comes from the CRC database. As a key input for the proposed analysis, this information is missing in some years of the data due to changes in the way the Banco de Portugal collects it from financial institutions, so it is only available in two years, 2015 and 2017. The idea for this variable is to set in the timeline of each affected company when the government credit guarantee was granted, in other words, the beginning of the intervention or treatment. Then, in the final database, we set the first year of appearance of the credit for each firm, aiming to have a unique firm ID and its respective starting year. The result was 924 firms with a government credit guarantee, 794 in 2015 and 130 in 2017. Since the methodology recommends setting the beginning of the treatment in the data to measure the results after this intervention, and considering that the available data go until 2018 and most of the treated firms (government credit guarantee) are in 2015, leaving three years of post-treatment to be observed, it was decided to use only the 794 cases of 2015 in the analysis.

7 Results

All the calculations were done in Python using the above data and the results are presented in Microsoft Excel. The first step is to construct a counterfactual that can be used as a control group and compared to the firms that received the treatment, or in other words, the firms that were able to obtain the loan guarantee from the government.

"The counterfactual is what would have happened - what would have been the outcome (Y) for the programme participant - in the absence of the programme (P)". (Gertler, Martinez, Premand, Rawlings, & Vermeersch, 2016). As mentioned above, the firms in the counterfactual group are estimated by propensity matching scores through logistic regression.

$$\ln \frac{\rho_i}{1 - \rho_i} = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_k x_{ki}$$

where $\rho_i = P(Y_i = 1) = 1 - P(Y_i = 0)$,

$P(Y_i = 1), P(Y_i = 0)$ is the probability of taking a government guaranteed credit or not of an observation i respectively.

The calculation was carried out using the available data described earlier, such as the company's balance sheets and credit data. The method used to select the variables that are part of the logistic regression analysis is the weight of evidence presented by Soloshenko (2015). The general equation is expressed as

$$WoE = \ln(g_i/b_i) ,$$

"The categorical indicator g_i is the ratio of the number of elements with a unit target result in the segment of the category with the number i to the total number of elements with a unit target result of all categories" (Soloshenko, 2015), and "the categorical indicator b_i is the ratio of the number of elements with a zero target result in the segment of the category with the number i to the total number of elements with a zero target result of all categories" (Soloshenko, 2015).

Table 22 shows the WoE for each of the variables.

Variable	WOE
firm size	0,196581
regime	0,533454
exporta	0,467985
age	0,196581
revenue	1,282616
investment	0,611456
salaries	1,026488
exportation	0,436662
effective value	1,813511
potencial value	2,203669
short value	0,980208
long value	1,740078
max relationship	2,808326
nb relationship	2,310638
hhi relationship	2,940843
long term value 3	1,317096
long term value 1	1,100137
g2 value	0,161359
median value	0,237536
g3 value	0,121056
g5 value	2,526536
short term r	1,100137
long term value 4	0,13191
median value o	0,323611
g4 value	1,088012
long term value 2	1,590560

Table 22: Weight of Evidence (WOE) for the logistic regression
Source: Author's calculation

The higher the indicator in Table 23, the more weight it has in explaining the event, in this case the credit guarantee. The selected variables have a WOE of 0.2 and above. It can be observed that variables related to the credit relationship with banks, such as 'effective value', 'potential value', 'max relationship', among others, which are firms that already have access to credit in banks in more than one bank, have more weight than individual variables such as the size of the firm, age, export regime, etc. This suggests that firms with more structure and already consolidated credit relationships with banks have more weight in explaining the event. It suggests that firms with more structure and already consolidated have more access to the Portuguese programme than SMEs that could benefit from it and spill it over the economy in terms of job creation and competitiveness.

The hypothesis considered in this work concerns four of these indicators: revenue, exportation, investment, and salaries. There are important some areas that is

not the scope of the work due the time and data limitation, but those were mentioned in the bibliography, and they point out the financial costs and debt reduction with access to lower rates.

The logistic regression selected 14,644 SMEs out of the 215,814 in the database for the control group as the counterfactual. This is because one of the assumptions of the method is that the two groups have similar characteristics to compare. Figure 29 shows that 18 out of 22 numerical variables have T-test p-values with 95% confidence indicating that the means are statistically equal, except 'revenue', 'salaries', 'exportation' and 'nb relationship'.

Variable	T-test / p-value
revenue	0,001528
investment	0,309646
salaries	0,012851
exportation	0,035078
effective value	8,158728
potencial value	1,202985
short value	1,308381
long value	1,576927
max relationship	0,807732
nb relationship	0,010828
hhi relationship	0,22979
long term value 3	0,586968
long term value 1	0,8886
g2 value	0,692779
median value	0,422672
g3 value	0,45765
g5 value	2,650072
short term r	0,8886
long term value 4	9,406415
median value o	0,284548
g4 value	0,622712
long term value 2	2,761968

Table 23: T-test results of treatment x control group variables
Source: Author's calculation

With the two groups of companies consistent, the next step is to apply the difference in differences method.

$$Y = \beta_0 + \beta_1[Time] + \beta_2[Intervention] + \beta_3[Time * Intervention] + \beta_4[Covariates] + \varepsilon$$

Table 24 shows the final dataset after the initial analysis and the construction of the counterfactual, in which both groups of firms are consolidated into a smaller dataset

with the average for each group and year, with flags to differentiate the period after the treatment (loan guarantee).

year	revenue	investment	salaries	exportation	global value p	effective value	treatment	flag period
2006	5 404 930	2 325 161	538 938	946 431	2 325 475	1 756 668	0	0
2007	5 557 278	2 276 866	586 440	1 057 369	2 553 226	2 026 804	0	0
2008	5 882 424	2 388 042	624 554	1 128 821	2 325 475	1 756 668	0	0
2009	5 622 906	2 458 474	631 406	1 041 718	2 369 340	1 769 137	0	0
2010	5 989 979	2 421 016	556 092	1 177 980	2 501 595	1 838 807	0	0
2011	5 910 433	2 405 473	650 787	1 255 620	2 325 475	1 756 668	0	0
2012	5 639 955	2 335 533	621 846	1 319 212	2 325 575	1 756 668	0	0
2013	5 745 974	2 295 234	623 539	1 360 348	2 325 575	1 756 668	0	0
2014	6 020 461	2 351 955	649 083	1 432 777	2 325 575	1 756 668	0	0
2015	6 286 951	2 406 525	685 046	1 444 221	2 223 103	1 669 683	0	0
2016	6 508 571	2 474 286	721 161	1 441 310	2 325 475	1 756 668	0	1
2017	7 058 401	2 540 039	776 044	1 572 630	2 007 321	1 514 615	0	1
2018	7 464 125	2 639 689	836 101	1 637 344	2 325 475	1 756 668	0	1
2006	5 647 620	1 644 105	774 324	960 684	2 509 862	1 953 444	1	0
2007	6 106 491	1 654 222	788 404	1 158 254	2 603 193	2 183 423	1	0
2008	6 231 992	1 854 085	813 572	1 353 047	2 509 862	1 953 444	1	0
2009	5 494 905	1 923 534	848 780	1 307 319	2 371 856	1 856 980	1	0
2010	6 410 143	2 027 211	894 072	1 278 148	2 638 333	1 977 460	1	0
2011	6 739 651	2 885 037	874 430	1 354 858	2 509 862	1 953 444	1	0
2012	6 293 981	2 794 369	802 781	1 366 828	2 509 862	1 953 444	1	0
2013	6 563 143	2 964 305	829 405	1 750 853	2 509 862	1 953 444	1	0
2014	6 802 775	3 257 871	856 814	1 777 413	2 509 862	1 953 444	1	0
2015	7 143 969	3 335 698	903 034	1 941 637	2 603 324	1 964 460	1	0
2016	7 328 833	3 673 354	966 937	1 913 488	2 509 862	1 953 444	1	1
2017	8 294 773	3 830 049	1 070 845	2 300 297	2 334 816	1 801 046	1	1
2018	7 148 833	3 920 359	1 182 775	1 676 685	2 509 862	1 953 444	1	1

Table 24: Final table to apply the difference in differences method
Source: Author

In Figure 22 we can see that the result of the credit guarantee loan has a significant negative impact on the revenue (hypothesis 1), as it shows a negative coefficient of -762.201, which is significant given an average of 6 million euros for these enterprises, as it represents around 12%. This could be a warning for programmes of this type, as can be seen in other articles. However, it cannot be seen in isolation, as this analysis is only 3 years after the loan, and should be analysed in combination with other indicators. Some papers had opposite evidence for revenue, as in Allinson, Robson, & Stone, 2013 for the UK, Chandler, 2012 in Canada, Hennecke, Neuberger, & Ulbricht, 2019 in Germany and Oh, Lee, Heshmati, & Choi, 2009 in South Korea, whose results were positive for the similar hypothesis. However, Pólvara, 2019 and *Sistema Português de Garantia Mútua*, 2018 find similar negative effects in their study also using Portuguese data and similar time periods. These differences could be explained by several country, program, data or period specificities. This can be explored in future research.

REVENUE	coef	std err	t-stat
Intercept	126100000	87300000	1.444
treatment	-469600	368000	-1.275
flag period	651900	247000	2.642**
flag period:treatment	-762200	341000	-2.235**
year	-62220	43800	-1.420
effective value	0.3418	0.627	0.545
salaries	2.8272	1.350	2.094
investment	0.1918	0.182	1.054
exporation	1.5913	0.428	3.715*

* p-value<0.1 **p-value<0.05 ***p-value<0.01

N=26

F-stat=23.04

R²=0.916

Figure 21: Linear Regression result for Revenue
Source: Author's calculation

For investment (hypothesis 2), the results are positively related as the coefficient is 1,183,794 and considering an average annual investment of 2 million euros, suggesting that this type of loan can leverage the investment and it combined with income can explain the two outcomes for 3 years after the loan. Moreover, Oh, Lee, Heshmati, & Choi, 2009 and Pólvera, 2019 found no evidence of both positive and negative impacts, while other papers for other countries do not explore such a measure. Sistema Português de Garantia Mútua, 2018 confirms these findings for the period between 2011 and 2016.

INVESTMENT	coef	std err	t
Intercept	-135900000	114000000	-1.356
treatment	-66380	498000	-0.133
flag period	651900	348000	-1.759
flag period:treatment	1184000	410000	2.844*
year	-76590	56900	1.346
effective value	0.3596	0.812	0.443
salaries	-0.6424	1.949	-0.330
revenue	0.3199	0.303	1.054
exporation	0.1593	0.744	0.202

* p-value<0.1 **p-value<0.05 ***p-value<0.01

N=26

F-stat=8.707

R²=0.804

Figure 22: Linear Regression result for Investment
Source: Author's calculation

Figure 24 shows the result for salaries (hypothesis 3) in relation to the employment hypothesis. It can be seen that the coefficient is 133.384, which has a small impact on the total volume of salaries spent by these groups of enterprises, since the average is around 3.5 and 4.5 million euros. It can be interpreted as a long-term reflection, since the investments would increase first and some years later the salaries would increase, but this could be a hypothesis for other works. As for other works, such as Allinson, Robson, & Stone, 2013, Chandler, 2012, Hennecke, Neuberger, & Ulbricht, 2019, Oh, Lee, Heshmati, & Choi, 2009 and Pólvara, 2019, the results confirm the positive impact on salaries/employment. This result suggests that at least part of the loan is used to increase wage costs, which could also affect production in the years following the loan.

SALARIES	coef	std err	t
Intercept	-37160000	11800000	-3.158***
treatment	220300	30900	7.123***
flag period	3817.8345	46900	0.081
flag period:treatment	133400	53000	2.515**
year	18740	5867.196	3.195***
effective value	-0.0366	0.101	-0.362
investment	-0.0099	0.030	-0.330
revenue	0.0725	0.035	2.094
exporation	-0.1921	0.080	-2.409**

* p-value<0.1 **p-value<0.05 ***p-value<0.01

N=26

F-stat=42.17

R²=0.929

Figure 23: Linear Regression result for Salaries (Employment)
Source: Author's calculation

The fourth and last hypothesis to be tested in this work concerns the volume of exports (Hypothesis 4). It can be seen in Figure 25 that the coefficient of 293,295 is not a relevant impact when compared to the average of 8 million and 19 million euros of the two groups, representing around 2% of the increase. Pólvara (2019) also tested this hypothesis and found no evidence of an impact, since there were no such tests for the same variable for the other papers used in this work.

EXPORTS	coef	std err	t
Intercept	-109300000	28500000	-3.837***
treatment	375200	134000	2.796**
flag period	-186500	115000	-1.626
flag period:treatment	293300	147000	1.997
year	54750	14300	3.836***
effective value	-0.2077	0.261	-0.795
investment	-0.0159	0.079	0.202
revenue	0.2816	0.076	3.715***
salaries	-1.3247	0.550	-2.409**

* p-value<0.1 **p-value<0.05 ***p-value<0.01

N=26

F-stat=26.98

R²=0.893

Figure 24: Linear Regression result for Exportation
Source: Author's calculation

Overall, the results for the four hypotheses raised in this work: increase in revenue, investment, salaries (employment) and exports, are in line with the results of

other articles mentioned above in terms of economic additionality. Only investment (Hypothesis 2) shows a relevant and positive contribution in the period of 3 years after the credit guarantee loan, confirming the most recent official Portuguese study. "Mutual guarantees enabled additional investments in tangible assets of €1.7 billion (2011-2016)." (Sistema Português de Garantia Mútua, 2018).

With regard to exports (Hypothesis 4), the results show a positive but insignificant impact, in line with the Portuguese study mentioned above and others. "The estimates obtained show that the use of mutual guarantees increases the export rate by 0.14 percentage points for the median firm." (Sistema Português de Garantia Mútua, 2018). The salary (Hypothesis 3) variable, which is related to employment, showed similar results, a small but positive impact, representing 0.38% of the increase in three years. "Employment in Portugal increased between 0.5% and 0.78% per year due to the availability of mutual guarantees." (Sistema Português de Garantia Mútua, 2018).

The variable revenue (Hypothesis 1) is intended to measure, or at least be a proxy for, profitability. The results show a relatively negative impact over the period analysed, which is in line with the Portuguese study. "For a company with the average characteristics of the sample, the impact of the mutual guarantee on profitability is negative by 1.2 percentage points". (Sistema Português de Garantia Mútua, 2018).

	Revenue (Hypothesis 1)	Investment (Hypothesis 2)	Salaries (Hypothesis 3)	Exports (Hypothesis 4)
This Work	Negative	Positive	Positive	Positive
Other papers in Portugal	Positive / Negative	Positive / No evidence	Positive	Positive
Other papers - No Portugal	Positive	No evidence	Positive	No investigation

Table 25: Hypothesis impact comparison
Source: Author's calculation

Table 25 summarises the results of the four hypotheses tested in this work. It compares the results of this work with papers analysing the Portuguese economy and other countries classified as 'Other papers - No Portugal'. It helps to interpret the results and to take into account the peculiarities of each country, due to the specificities of each programme and programme. In the first column, entitled 'Revenue', it is possible to observe different results: while this paper shows a negative impact, other papers in Portugal suggest both positive and negative impacts, while for papers outside Portugal

the results are positive. With regard to 'investment', it can be observed that the conclusion is less clear than other hypotheses, as this paper shows a positive impact, while other papers find positive and no evidence of an impact for investment after receiving a loan guarantee. 'Salaries', on the other hand, has a clearer conclusion as a positive impact in all the papers referenced in this work, suggesting that firms use this credit as a way to increase their workforce. The fourth hypothesis, 'Exports', indicates that the results are positive for Portugal, but there is a lack of research for other countries that could collaborate for this comparison. This table does not intend to suggest a precise conclusion on the issue, but it collaborates with the academia in the study of the public credit guarantee.

8 Conclusion

As credit programmes are essential for both developed and developing countries to stimulate the economy through public or private structures such as banks and financial branches, especially for SME's firms, this work intended to give an overview of the challenges of the credit guarantee scheme, how it is evaluated around the world and what methods are used to measure it. Secondly, to introduce the structure of the European Union and Portugal, discussing the last decades of economic development in the continent and in Portugal, to give the reader a broader understanding of the context. Thirdly, show the most used methodologies and the recommendations of the main institutions on the subject as the ODCE. Finally, the development of the research itself, detailing the specificities of this work.

Finally, this study aims to contribute to the discussion on the role of governments in stimulating the competitiveness of SMEs, as it is relevant to the economy, especially in terms of employment and income distribution around the world. Of the three aspects of this issue discussed in the literature, financial additionality, sustainability and economic additionality, the latter has been chosen as the subject of this work. Portugal is the country of analysis, with official data from the Banco de Portugal (Portuguese Central Bank), as it is a relatively developed country in terms of social and economic indicators and represents a challenge for several countries to improve in this area.

Although the available data does not include the Covid-19 pandemic that will begin in 2020, the debate that has been raging for decades around the world about

government involvement in the economy has added a new chapter, making this study even more relevant.

It was presented a history of how the studies in these areas have developed around the globe in several countries in the last decades, as the OECD consolidated several studies and methods applied in the analysis of public policies, showing the Difference-in-Difference as one of the most reliable in this matter. The structure of the Portuguese Mutual Guarantee Programme and the context of the Portuguese economy were described to show the relevance of the issue, together with other studies in the same country.

The hypothesis raised to explore the economic additionality in the Portuguese economy: Revenue, Investment, Salaries and Exports, sought to provide an overview of the spill over in the economy after the mutual guarantee loan in 2015. The results generally confirm the most recent study by the Portuguese government, published in 2018, that investment, salaries, and exports show a limited positive impact in the years immediately following the loan, while shows negative impact in the case of revenues. Moreover, paper from other countries corroborates, in part, the findings of this work.

In general, the Portuguese program have had a great impact on the SME firms, but still have the challenge of increasing the economic indicators of the firms that have received the mutual guarantee. It may be that other measures are needed in addition to the guarantee to help SMEs to grow or at least to grow faster. The peculiarities of this programme can be the subject of other studies in the future, taking into account the challenges of access to information from the institutions.

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