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INSURING INTERNATIONALIZATION? THE IMPACT OF CREDIT GUARANTEES ON FIRMS' EXPORTS

Luís Pedro Oliveira Ribeiro

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Abstract

Insuring internationalization? This research investigates whether mutual credit guarantees expand firms' exports and stabilize them under shocks. According to liquidity theory, guarantees may operate through a dual mechanism: a collateral channel, by easing borrowing constraints and enabling expansion, and a liquidity-insurance channel, by providing contingent resources in adverse situations. While the first channel has been widely studied, the second remains largely unexplored. The analysis exploits the *PME Crescimento* credit lines 2012–2013 in Portugal, launched amid a domestic recession and banking fragility but resilient external demand. Programs capped guarantees at €18 750 for micro firms and €37 500 for small firms, creating a discontinuity that enables a quasi-experimental identification. The study focuses on firms with 8–11 employees requesting the maximum eligible value, and combines unique administrative microdata from B*anco Português de Fomento* with balance sheet and credit register data from *Banco de Portugal*. Estimation relies on instrumental variables (2SLS) and event-study difference-in-differences. Findings show that guarantees raise exports primarily through the intensive margin, with effects emerging within the first year and persisting up to five years, corresponding to an export multiplier of about 3.1 to 3.9. Extensive-margin effects are weaker and slower to materialize. Guarantees' activation reveals alarmingly high default rates, exceeding 70% among exporters, and no evidence that larger guarantees improve survival or resilience ex-post. Tentative evidence suggests that firms with larger guarantees channel liquidity into exports rather than precautionary buffers, while smaller guarantees appear more supportive of domestic sales. Overall, mutual credit guarantees seem effective ex-ante in scaling exporters, but their ex-post insurance role remains unfulfilled at observed sizes. Policy design may require larger caps or countercyclical features if stabilization is the objective.

JEL Codes: F14, F23, G32, H81, O16

Keywords: Corporate Liquidity, Internationalization, Exports, Credit Guarantee, Collateral, Insurance, Financial Constraints, Sunk Costs, Trade Finance

Resumo

Garantir a internacionalização? Esta investigação analisa se as garantias mútuas de crédito expandem as exportações das empresas e as estabilizam perante choques. De acordo com a teoria da liquidez, as garantias podem atuar através de uma dupla função: um canal colateral ex-ante, ao aliviar restrições de crédito e permitir a expansão, e um canal de seguro de liquidez ex-post, ao fornecer recursos contingentes em situações adversas. Enquanto o primeiro canal tem sido amplamente estudado, o segundo permanece, em grande medida, inexplorado. A análise explora as linhas de crédito PME Crescimento 2012–2013 em Portugal, lançadas num contexto de recessão interna e fragilidade bancária, mas com procura externa resiliente. Os programas fixaram tetos máximos de €18 750 para microempresas e €37 500 para pequenas empresas, criando uma descontinuidade que possibilita uma identificação quasi-experimental. O estudo foca-se em empresas com 8–11 trabalhadores que solicitaram o valor máximo elegível e combina microdados administrativos únicos do Banco Português de Fomento com informação contabilística e creditícia do Banco de Portugal. A estimação baseia-se em variáveis instrumentais (2SLS) e em event-study difference-in-differences. Os resultados mostram que as garantias aumentam as exportações sobretudo pela margem intensiva, com efeitos a surgir logo no primeiro ano e a persistirem até cinco anos, correspondendo a um multiplicador de 3.1 a 3.9 euros. Os efeitos na margem extensiva são mais fracos e lentos a materializar-se. A ativação das garantias revela taxas de incumprimento alarmantes, superiores a 70% entre exportadores, e não há evidência de que garantias maiores melhorem a sobrevivência ou a resiliência ex-post. Ligeira evidência de que as empresas com maiores garantias canalizam liquidez para exportações em vez de reservas, enquanto garantias menores parecem apoiar mais o mercado interno. Em suma, as garantias mútuas de crédito parecem mostrar-se eficazes ex-ante no reforço das exportações, mas o seu papel de seguro ex-post permanece por cumprir nos montantes observados. O desenho das políticas poderá exigir tetos mais elevados ou mecanismos contracíclicos caso a estabilização seja o objetivo.

Códigos JEL: F14, F23, G32, H81, O16

Palavras-chave: Liquidez, Internacionalização, Exportações, Garantias de Crédito, Colateral, Seguro, Restrições Financeiras, Custos Afundados, Financiamento do Comércio

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1. Introduction

Insuring internationalization? This dissertation investigates whether mutual credit guarantees can both expand firms' exports and protect them when adverse shocks occur. These instruments reduce collateral requirements, making it easier for firms to obtain bank financing, while also providing contingent resources that can be drawn upon, when financial distress occurs. Their impact lies in this dual mechanism: ex-ante, they may ease financing constraints and enable entry or expansion abroad; ex-post, they may act as liquidity insurance, protecting firms during adverse conditions.

Given this dual role, the study examines three central questions on how guarantees affect firms' internationalization: (i) Do mutual credit guarantees causally increase firms' exports? (ii) Through which margin do they operate: the intensive margin, by scaling up existing exporters, or the extensive margin, by enabling new firms to enter foreign markets? (iii) Do guarantees provide effective insurance ex-post, when activated under distress, or is their role limited to an ex-ante collateral channel?

The motivation is clear: internationalization is risky. Firms must commit substantial sunk investments that are difficult to recover once incurred. Many may hesitate to enter foreign markets because of these barriers, while those that do remain are vulnerable to shocks that can force them to withdraw. These risks are magnified by financial frictions: collateral and credit constraints restrict firms' ability to borrow at the outset, while liquidity constraints leave them exposed to sudden funding shortages when shocks occur and external finance becomes scarce. Together, these highlight the importance of studying instruments that can mitigate financial frictions and support firms' internationalization – such as credit guarantees.

From a theoretical perspective, models of international trade with financial frictions (Chaney, 2016; Manova, 2013; Leibovici, 2021) show that financing constraints can distort both the extensive and intensive margins of exports, even for productive firms. These models, however, are grounded in the credit-rationing logic of limited pledgeability, as in Holmström and Tirole (1997). Firms can only borrow up to the value they can credibly pledge from future profits and collateral. If this pledgeable income is low, loan size is capped even for profitable projects. Any mechanism that raises this income or eases collateral requirements, raises the cap and expands investment. In contrast, we adopt a dynamic perspective, inspired by Holmström and Tirole (1998), which retains the collateral channel but adds a liquidity-

insurance role. In this framework, firms commit to projects before knowing whether an interim liquidity need will arise; when a shock hits, otherwise profitable projects may be cut short unless liquidity is available. Despite its relevance, this second channel remains largely underexplored in the literature on internationalization.

Empirical evidence supports the importance of external finance for international engagement. Negative credit shocks have been shown to depress exports more sharply than domestic sales, highlighting the dependence of global activity on external funding (Amiti & Weinstein, 2011; Chor & Manova, 2012; Paravisini et al., 2015). Research on export credit guarantees, which target external risks such as buyer default, documents increases in trade volumes, market entry, and firm growth (Badinger & Url, 2013; Jäkel, 2021; Heiland & Yalcin, 2021; Agarwal et al., 2023). Yet far less is known about mutual credit guarantees, which target collateral and liquidity frictions. Custódio et al. (2024) offers the closest evidence, showing that preferential access to mutual credit guarantees mechanisms, through *PME Líder* certification, can facilitate entry in international markets. Yet the study does not directly test the ex-post liquidity-insurance role of guarantees – namely, whether mutual credit guarantees stabilize firms under distress.

This dissertation addresses these gaps with three main contributions. First, it advances the literature on financial frictions and trade by shifting attention from negative shocks, widely studied in contexts such as banking crises, to positive liquidity shocks delivered through credit guarantees; Second, it complements existing work on credit guarantees, which has largely focused on export guarantees, by examining mutual credit guarantees that alleviate internal collateral and liquidity frictions; Third, it provides novel evidence on the liquidity-insurance channel of guarantees, distinguishing between firms that merely received guarantees and those that activated them under distress, thereby directly testing a central prediction of Holmström and Tirole (1998).

The Portuguese setting provides a unique opportunity to empirically examine these contributions and answer our research questions. During 2012–2013, amid a deep domestic recession and banking fragility, the government launched consecutive *PME Crescimento* credit lines granting mutual guarantees to micro and small firms under similar eligibility rules. At the same time, external demand remained resilient, with exports continuing to grow despite austerity. This contrast created an ideal laboratory to test whether additional liquidity through credit guarantees could influence firms' internationalization outcomes.

Our empirical analysis combines unique administrative microdata from *Banco Português de Fomento* – covering approvals, amounts, and activation of guarantees – with firm-level balance sheet and credit register data from the *Banco de Portugal* Microdata Research Laboratory (BPLIM). Identification exploits the discontinuity in maximum guarantee amounts between micro-certified firms (capped at €18 750) and small-certified firms (capped at €37 500). The analysis focuses on firms with 8–11 employees that requested the maximum eligible value, thus restricting the sample to credit-rationed firms and creating a credible quasi-experimental setting. The empirical strategy combines instrumental variables (2SLS) regressions with event-study difference-in-differences estimators to capture both average treatment effects and dynamic trajectories.

We find that guarantees raise exports primarily through the intensive margin, with effects emerging in the first year and persisting thereafter, suggesting quick conversion of liquidity into durable foreign relationships. Extensive-margin effects are also visible but more limited and slower to materialize. Taking together, these results suggest a role for sunk costs and informational barriers. Activation of credit guarantees emerges as a clear distress marker: firms that activated their guarantees display high default rates, and larger guarantees do not seem to improve their survival or export resilience at observed sizes. Weak evidence suggests that firms with larger guarantees prioritize export expansion over liquidity buffers, while complementary analysis indicates that micro-certified firms with smaller guarantees perform relatively better in sustaining domestic sales. From a policy perspective, two implications emerge: guarantees are effective ex-ante in supporting export growth, but their ex-post insurance role is weak, implying that stabilization under shocks may require higher caps or program redesigns with complementary conditions.

The remainder of the dissertation is structured as follows. Section 2 reviews the literature on internationalization, financial frictions, trade finance instruments and credit guarantees. Section 3 presents the conceptual and policy framework, covering liquidity theory, the Portuguese mutual guarantee system, and the macroeconomic context. Sections 4 and 5 describe the data and methodology. Section 6 reports the empirical results and mechanisms, including the distinction between activation and non-activation. The conclusion on Section 7 summarises findings, limitations, and draws policy implications. Appendices B and C report robustness checks and complementary analysis.

2. Literature Review

This literature review is organized around three strands that, together, frame the analysis of how mutual credit guarantees affect firms' internationalization. The discussion follows a funnel-shaped structure: each body of literature progressively narrows the focus and approaches the specific contribution of this dissertation. (i) The first strand reviews theories of firms' entry and persistence in foreign markets, emphasizing the role of heterogeneity, fixed and sunk costs, and uncertainty in shaping internationalization decisions; (ii) the second strand addresses financial frictions that limit firms' ability to bear these costs and influence their export strategies, including the impact of credit shocks on both the extensive and intensive margins of trade; (iii) the third strand considers the literature on trade finance instruments designed to mitigate risks and expand access to funding, highlighting credit guarantees as a key mechanism to support internationalization.

2.1. Theories of Internationalization, Heterogeneity, and Sunk Costs

The understanding of firms' internationalization dynamics was transformed by the so-called new trade theories, which moved beyond the classical view of homogeneous firms and perfectly competitive markets.[1] Krugman's (1980) is pivotal in this shift, introducing a model of monopolistic competition with product differentiation and economies of scale that explains trade between countries with similar productive structures. Yet this framework still assumes identical firms and cannot capture the variability observed in export behaviour.[2]

The conceptual breakthrough comes with Melitz's (2003) seminal work, which incorporates productivity heterogeneity into a model of monopolistic competition. [3] In this framework, only firms with productivity above a certain threshold can cover the fixed and sunk costs of exporting, generating a process of self-selection: the most productive firms enter and expand in foreign markets, while less productive firms remain domestic or exit. This mechanism

[1] The so-called old trade theories explain trade patterns via technological differences and factor endowments. Ricardo (1817) introduces the principle of comparative advantage, demonstrating that even less productive countries can benefit from trade by specializing in goods for which they have the lowest relative opportunity cost. Heckscher (1919) and Ohlin (1933) expand this approach with the Heckscher-Ohlin model, linking comparative advantages to the relative endowment of production factors. Although fundamental, these theories assumed representative firms, ignoring sunk costs, economies of scale, and financial constraints.

[2] Later, Helpman and Krugman (1985) combine Krugman (1980) with traditional comparative advantage models, producing an integrated equilibrium approach to international trade while still assuming a representative firm in each industry.

[3] Melitz (2003) trade model with heterogeneous firms inspired multiple extensions linking entry costs, external shocks, and financial frictions to international trade – dimensions central to this dissertation.

reallocates resources toward efficient firms and raises aggregate productivity. Extensions embed this mechanism in multi-country settings. Helpman et al. (2008) and Chaney (2008) models distinguish between the extensive margin of trade, determined by the number of exporting firms, and the intensive margin, determined by the export volumes of incumbents.

Another crucial dimension of internationalization theory relates to sunk costs and uncertainty. Baldwin (1988) introduces the *"beachhead effect"*, where firms that incur substantial entry costs tend to remain in foreign markets even after the initial conditions for entry fade. Baldwin and Krugman (1989) demonstrate how such hysteresis can durably alter trade patterns and even shift exchange-rate equilibria, as competition and market structure adjust permanently after entry. Dixit (1989a, 1989b) formalizes this reasoning using real-options theory, in which the presence of irreversible costs and uncertainty creates a *"band of inaction"* where entry or exit occurs only after sufficiently large shocks.

An extensive body of empirical literature confirm the importance of sunk costs and uncertainty in shaping export dynamics. Evidence from Roberts and Tybout (1997) on Colombian plants validates the sunk-cost hysteresis hypothesis, as prior export experience significantly increases the probability of current exporting, reflecting high entry costs that make export participation persist over time. Similar findings emerges in different contexts: Bernard and Wagner (2001) for Germany firms, Bugamelli and Infante (2003) for Italian manufacturers, Campa (2004) and Màñez et al. (2008) for Spanish firms, Bernard and Jensen (2004) for the United States, Requena-Silvente (2005) for United Kingdom SMEs, Das et al (2007) for Colombian plants, Meinen (2015) for Denmark, and Fishera and Shevtsova (2018) for Ukraine. All reports significant entry costs and high persistence in export status, even in the face of adverse shocks. Alessandria et al. (2007) further show that fixed and variable trade costs, such as inventory and shipment costs, generate lumpy export flows and reinforce persistence over time.

Although this dissertation does not directly model productivity heterogeneity or hysteresis, these frameworks remain highly relevant. They demonstrate that entry into and persistence in foreign markets requires substantial resources and the ability to absorb initial risks. Mechanisms that alleviate the financial burden of these sunk and fixed costs – such as credit guarantees – can therefore play a decisive role, not only enabling new exporters to enter but also sustaining their long-term presence and expansion. In this way, guarantees have the potential to shape both the extensive and intensive margins of trade.

2.2. Financial Frictions and Internationalization

The integration of financial frictions into trade theory highlights how credit and liquidity constraints shape firms' internationalization strategies. Chaney (2016) introduces liquidity constraints into Melitz (2003) model, showing that even sufficiently productive firms may be unable to export if they lack internal funds to cover fixed entry costs. These financial frictions thus raise the productivity threshold required to export and operate primarily on the extensive margin, determining which firms enter foreign markets. Manova (2013), incorporates credit frictions that affect not only fixed but also variable costs, thereby distorting both the extensive and intensive margins of trade. Quantitatively, about one-third of the total effect arises from reduced entry, while two-thirds reflects lower export volumes per firm. Leibovici (2021) develops a dynamic general-equilibrium model with multiple sectors, in which credit constraints distort resource allocation and reduce both the number of exporters and the volume of exports, reinforcing the idea that financial frictions have persistent and structural implications.[4]

These contributions converge on the conclusion that financial frictions limit the potential for internationalization. Yet most models emphasize credit rationing arising from market imperfections, explaining static barriers to trade, while abstracting from the role of liquidity as an precautionary insurance mechanism.[5] In this regard, Caggese and Cuñat (2013) develop a dynamic model building on Melitz (2003) where financing constraints affect both operational and export entry costs. Constrained firms respond by accumulating precautionary internal funds to reduce bankruptcy risk. While this strategy partly mitigates financial frictions, it also delays export entry and limits expansion, serving only as an imperfect substitute for policy instruments that directly ease these constraints.

This gap motivates one of the central contributions of the present research: by focusing on mutual credit guarantees, the analysis examines not only their direct effect on export propensity and intensity but also their function as an insurance mechanism against liquidity shocks. In this way, it builds on but also departs from credit-rationing models, advancing a more comprehensive view of how financial policies shape internationalization dynamics.

[4] For a literature survey on financial frictions and international trade, see e.g Kohn et al. (2022).

[5] The described models seem to be rooted in static frameworks such as Holmström and Tirole (1997), where firms require both internal funds and access to external finance to invest, while we propose an additional dynamic liquidity-insurance view, inspired by Holmström and Tirole (1998). For details see *Section 3.1.*

Empirical evidence broadly supports these mechanisms, although much of it remains correlational. Evidence from Greenaway et al. (2007), on British firms, shows that financially stronger firms are more likely to sustain and expand exports after entry, while no significant relationship is found ex-ante. Bellone et al. (2010) find, for France firms, that financially unconstrained firms are both more likely to become exporters and to export larger volumes, affecting both margins of trade. Similar findings are documented by Minetti and Zhu (2011) for Italy, who show that credit rationing reduces export participation and sales, and by Muûls (2015) for Belgium, who shows that credit constraints also reduce the number of products and destinations served in addition to overall volumes. Berman and Héricourt (2010), covering nine developing countries, show that the relationship between productivity and exporting materializes only in economies with developed financial systems, suggesting that financial frictions distort the selection mechanism central to heterogeneous-firm models. Feenstra, Li, and Yu (2014) further document in China that exporters are more financially constrained than domestic firms because of risks associated with time-to-ship. While robust and consistent, this body of work relies primarily on associations, limiting causal inference about the link between credit, liquidity, and internationalization.

Several studies exploit exogenous variation to establish causal effects, substantially advancing the literature. Amiti and Weinstein (2011), using the Japanese banking crisis as a natural experiment, show that firms linked to weaker banks experienced sharp declines in exports relative to domestic sales, suggesting exports are especially vulnerable to credit shocks. Chor and Manova (2012) reinforce this evidence during the 2008–2009 global financial crisis, finding that firms in industries more dependent on external finance and with fewer tangible assets suffer larger export contractions, confirming that financial vulnerability amplifies systemic shocks. Similarly, Paravisini et al. (2015), using matched Peruvian bank credit and customs data, estimate that a 10% reduction in credit causes a 1.95% decline in exports, through the intensive margin, and no significant changes in the range of products exported or countries served. These studies demonstrate the causal role of credit and liquidity in shaping internationalization but focus predominantly on negative shocks. By contrast, this dissertation investigates positive liquidity shocks in the form of credit guarantees, which expand ex-ante access to credit lines that can be drawn upon ex-post, particularly during periods of financial distress. This perspective – treating guarantees as an insurance mechanism – remains underexplored in the literature, leaving open important questions on

how policies that expand liquidity provision can sustain firms' international engagement and enhance trade.

2.3. Trade Finance and Credit Guarantees

The literature on trade finance aligns closely, in some respects, with the liquidity-insurance framework discussed above and moves toward the focus of this research. It emphasizes that access to specific financial instruments is crucial for mitigating default risk, weak contract enforcement, and liquidity constraints in international trade. Schmidt-Eisenlohr (2013) shows that different forms of financing – such as cash-in-advance, open account, or bank-intermediated financing – arise precisely as responses to these frictions. Antràs and Foley (2015) further demonstrate that the choice of payment contract depends on both the buyer's risk of default and the exporter's liquidity position, while Ahn (2011) theoretically predicts that the cost of trade finance is strongly procyclical, rising during periods of heightened risk. These theoretical contributions underscore that, under uncertainty, financial mitigation mechanisms are essential to sustaining exports, opening the door for the role of credit guarantees.

Empirical evidence on export credit guarantees documents significant positive effects, although with varying degrees of methodological robustness. Studies such as Egger and Url (2006) for Austria, Moser et al. (2008), and Felbermayr and Yalcin (2013) for Germany, using mostly aggregate country or sector-level data rather than firm-level information, find that public export guarantees are associated with substantial increases in trade, particularly toward riskier destinations, affecting both entry into new markets and the reinforcement of existing flows. Complementarily, van der Veer (2015), using data from a global private insurer, shows that insured exports grow more than proportionally with coverage, reinforcing both the extensive and intensive margins, although without directly observing firm-level mechanisms.

Causal identification studies analyzing firm-level data provide stronger evidence on the impact of these policies. Badinger and Url (2013) for Austria, using an instrumental variables strategy on firm-level survey data, estimate that export guarantees increase exports by around 80–100%, and in some specifications by 100–130%, with particularly strong effects for SMEs. Jäkel (2021) for Denmark finds that beneficiary firms experience an additional growth of about 16.4 percentage points in exports and 9.8 percentage points in sales, as well as positive spillovers to domestic suppliers. Heiland and Yalcin (2021) further highlight that

positive effects are concentrated among financially dependent firms, in large and risky projects, and when private refinancing conditions are tight.

In most of these studies, identification relies on comparisons between firms with and without guarantees, which provides robust estimates but may be affected by structural differences in internationalization opportunities between treated and untreated firms. Agarwal et al. (2023) address this concern by exploiting the 250-employee eligibility cutoff in the Swedish guarantee program, which creates a quasi-natural experiment: firms just below the threshold are more likely to receive guarantees, while those just above serve as a counterfactual. Results show substantial effects both on the intensive margin, by more than a factor of three, and on the extensive margin, by about 16.4 and 4.3 percentage points in the same and following year of guarantee issuance, particularly among financially constrained SMEs.

Despite the robustness of this literature, it focuses primarily on export credit guarantees, which are designed to mitigate external risks associated with foreign buyers' default. These differ from mutual credit guarantees, which target internal financial frictions by reducing collateral requirements and improving firms' access to bank credit for development activities. Whereas export guarantees are tied to specific foreign trade contracts and attenuate informational risks external to the firm, mutual credit guarantees operate on the structural conditions of financing, enabling firms to mobilize liquidity to cover the fixed costs of entry and international expansion. This distinction is particularly relevant, as it implies different transmission mechanisms: export credit guarantees reduce the risks tied to international transactions, while mutual credit guarantees alleviate internal liquidity constraints, directly affecting firms' ability to initiate and expand international activities – an assumption much closer to the focus and instruments used in this dissertation.

To the best of our knowledge, Custódio et al. (2024) provide the only causal contribution in this field, by analysing the Portuguese *PME Líder* program, which grants firms preferential access to mutual credit guarantees.[6] The study shows that eligibility for the program increases by about 12 percentage points the probability of exporting, leading to greater entry into new markets and products. Beyond the extensive margin, it also finds a reinforcement of the intensive margin, with significant growth in the export value of already internationalized

[6] A variety of empirical studies – including Uesugi et al. (2010) for Japan; Zecchini and Ventura (2009) and D'Ignazio and Menon (2020) for Italy; Bonfim et al. (2023) and Grilo et al. (2025) for Portugal; and Bachas et al. (2021) for the United States – provide causal evidence on the impact of mutual credit guarantee programs on firms, although none of them specifically focus on internationalization.

firms. These effects persist up to three years after firms exit the program, reflecting a hysteresis mechanism associated with the sunk costs of internationalization. The heterogeneity of results reveals stronger impacts on SMEs and younger firms, which face greater difficulties in accessing credit, suggesting complementarity between external financing and export performance.

This dissertation is closely related to Custódio et al. (2024) but differs in two fundamental respects. First, their analysis does not fully disentangle the effect of *PME Líder* certification from that of guarantees, which may bias interpretation. Second, it omits an analysis of the liquidity-insurance function of guarantees related to their activation or non-activation, a central dimension that the present study explores.

In sum, the literature shows that financial frictions persistently constrain firms' internationalization and that financial instruments – particularly credit guarantees – can mitigate these constraints. Yet important gaps remain. On the theoretical side, most models privilege a static view of credit rationing, relegating to the background the role of liquidity as a dynamic insurance mechanism. On the empirical side, while evidence demonstrates that negative liquidity shocks sharply reduce exports, there is little work on how positive liquidity shocks – through guarantees, for instance – can function as protection and stabilization instruments. Moreover, the closest evidence to this concept remains centred on export guarantees, which reduce external risks associated with foreign buyers' default, whereas mutual credit guarantees, which target internal financial frictions and may operate through collateral mechanisms, have been much less explored. The recent study Custódio et al. (2024) moves in this direction, though it faces methodological limitations and does not directly examine the insurance function.

It is in this space that the present dissertation is positioned. Using unique microdata for Portuguese firms, which record not only the granting but also the ex-post activation of guarantees under two distinct thresholds, it becomes possible to causally identify the impact of mutual credit guarantees on the extensive and intensive margins of internationalization. By distinguishing between guarantees that are merely granted and those activated during episodes of financial fragility, this research contributes to a deeper understanding of guarantees as liquidity-insurance instruments and to explaining how they enhance firms' resilience and international competitiveness.

3. Conceptual and Policy Framework

Building on the gaps identified in the literature, this section develops the conceptual and institutional framework guiding the empirical analysis. It first discusses the liquidity theory of credit guarantees, distinguishing between their role in relaxing credit rationing and in providing insurance against shocks. It then describes the Portuguese mutual guarantee system and the specific credit lines under study. Finally, it situates the analysis in the broader macroeconomic context of Portugal during 2012–2013, a period marked by domestic austerity and banking fragility, but resilient external demand.

3.1. Liquidity Theory and Credit Guarantees

A key theoretical foundation for analysing credit guarantees lies in the distinction between credit rationing models and liquidity insurance models. Traditional approaches, such as Holmström and Tirole (1997), emphasize the role of collateral in credit markets: firms require both internal funds and external finance to undertake investment, but limited pledgeable assets constrain borrowing even for profitable projects. In this one-period collateral perspective, guarantees function primarily by increasing pledgeable income, thereby relaxing credit rationing and enabling higher investment.

However, this static perspective neglects the role of liquidity as insurance. Holmström and Tirole (1998) develop a dynamic, two-period framework in which firms face uncertainty about future liquidity needs. At the initial stage, firms commit to projects without knowing whether they will encounter a liquidity shock, i.e. unexpected financing needs arising in the future. Because external finance is limited by pledgeable income, firms may lack the resources to refinance or be unable to continue otherwise profitable projects when such shocks occur, leading to inefficient liquidation and underinvestment relative to the social optimum.

In this setting, a credit guarantee functions as an insurance contract: by paying an upfront fee, firms secure the right to access external funding if adverse conditions materialize. Guarantees therefore serve two complementary channels: collateral channel, expanding access to credit ex-ante by increasing the pledgeable income available to secure loans; and liquidity channel, providing insurance ex-post against liquidity shocks, thereby preventing inefficient liquidation and stabilizing firms' activity.

This dual role has important implications. First, guarantees not only determine the scale of initial investment, but also affect firms' capacity to withstand shocks, shaping their risk-taking

and survival probabilities. Second, there is a potential trade-off between liquidity and scale: larger guarantees ensure continuity upon shocks but may constrain firms' incentive to expand initial projects; smaller guarantees permit greater upfront investment but increase vulnerability to shocks. These mechanisms are especially relevant for internationalization, where sunk entry costs mean liquidity shocks can lead to premature exit from export markets or reluctance to enter them in the first place. By reducing credit rationing and providing insurance against adverse financial states, credit guarantees can therefore facilitate entry into export markets, support persistence in international activities, and foster expansion along the intensive margin of trade – implications that will be tested in this research.

From a policy perspective, this distinction clarifies why guarantees should not be understood solely as instruments to ease credit rationing. Their value also lies in acting as liquidity insurance, especially relevant in economies where shocks are frequent and financial systems are prone to procyclicality. The effectiveness of a guarantee scheme must therefore be assessed not only by whether it increases firms' credit volumes or investment levels, but also by its ability to enhance resilience in the face of financial distress.

In empirical terms, this framework predicts that guarantees shape exporters' decisions along both the extensive and intensive margins. By easing access to credit, guarantees facilitate entry into foreign markets, while by providing liquidity insurance they reduce the risk of premature exit after shocks, thus supporting resilience. Furthermore, the trade-off between liquidity and scale implies that firms with larger guarantees may allocate more resources to liquidity buffers relative to upfront export expansion.

3.2. Portuguese Mutual Guarantee System and *Linha de Crédito PME Crescimento*

The Portuguese mutual guarantee system was created in 1994 with the establishment of SPGM – *Sociedade de Investimento*, S.A., in a pilot initiative by IAPMEI to support SME financing. In 1998, its legal framework was established with the definition of Mutual Guarantee Societies (SGM) and the creation of the Mutual Counter-Guarantee Fund (FCGM), managed by SPGM. The current configuration was consolidated in 2002/2003 with the establishment of Norgarante, Lisgarante, and Garval, and later Agrogarante, resulting in a two-tier system: SPGM – integrated since 2020 into *Banco Português de Fomento*, which provides part of the data used in this research – acts as the de facto holding company

and manages the FCGM, while the four SGMs issue regional and sectoral guarantees (Rodrigues et al., 2018).

This study focuses on two consecutive guarantee programs with similar features, designed to allow firms to access bank credit under more favourable conditions: the *Linha de Crédito PME Crescimento*, in place from 16 January 2012 to 15 February 2013, and its successor, the *Linha de Crédito PME Crescimento 2013*, launched on 23 January 2013 and running until 14 June 2013, when it was replaced by a similar program under tighter conditions. For micro and small enterprises, guarantees covered up to 75% of the loan value, while for medium and large firms coverage was 50% (SGM, 2013).

Operationally, guarantees involve three parties: the firm, the bank, and the SGM. The bank evaluates and forwards the firm's request to the SGM, which, without privileged information about the firm, decides on its eligibility – with very low rejection rates, around 1.1% in our sample. If the guarantee is approved, and for the micro/small-targeted guarantees analysed in this research, the loan is granted with up to 75% coverage of the bank credit, with risk-taking divided between the FCGM (60%), the SGM (15%), and the remaining 25% left with the bank. For the firm, the costs include paying a premium of 5% over the 3-month Euribor, as well as subscribing SGM shares equivalent to 2% of the guarantee value, which can be sold back if the guarantee is not executed (SGM, 2012).

Table 1: Certification thresholds and maximum guarantee amounts

Dimension	Number of employees	Annual Sales		Total Assets	Max Guarantee
Micro firm	<10	≤ €2M	or	≤ €2M	€18 750
Small firm	[10, 50[	≤ €10M	or	≤ €10M	€37 500

Note: Criteria used to classify firms as micro or small, based on the number of employees, and either annual sales or total assets, accordingly to European Commission Recommendation 2003/361/EC. The last column reports the maximum guarantee available under the PME Crescimento credit lines based on certification status.

Eligibility for these guarantees required SME certification granted by IAPMEI, in line with the European Commission Recommendation 2003/361/EC, adopted by Portuguese law in 2007. The certification process, documented in Cruz et al. (2014), classified firms as "micro" or "small" according to employment, sales, or total assets (see Table 1), while also requiring verification of ownership structure, and a stability rule stipulating that status only changed if thresholds were exceeded for two consecutive years. Under this regime, micro firms could

obtain guarantees up to €18 750, corresponding to loans of €25 000, while small firms could access up to €37 500, corresponding to loans of €50 000 (SGM, 2013).

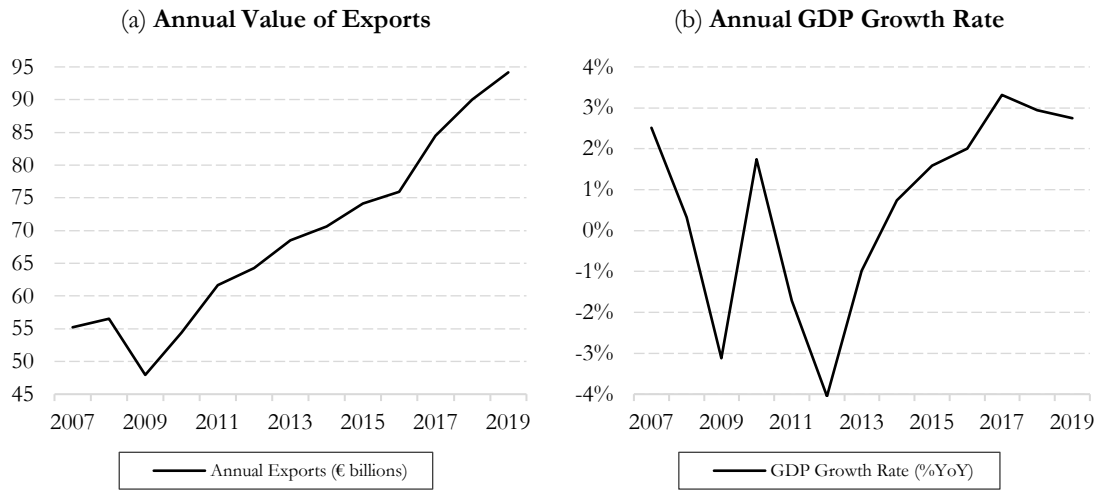
This certification process is particularly relevant because it underpins the instrumental variable used in this study. The two-year stability rule ensures that firms' classification evolves only gradually and in a predictable way, reducing the scope for manipulation. Accordingly, certification status defines the treatment and control groups at our identification strategy.

These loans followed standardized provisions: instalment loans with constant quarterly repayments over a four-year amortization period, including a six-month grace period. Each firm was limited to one operation per credit line edition. In addition to certification, further solvency requirements applied: no incidents with the banking system, tax or social security authorities; positive equity in the previous year; positive net results in at least two of the four preceding years; and a commitment to maintain employment levels during the financing period.

3.3. Portuguese Macroeconomic Context

The period covered by this study overlaps with one of the most challenging phases in Portugal's recent economic history. Following the global financial crisis and the subsequent sovereign debt crisis in Europe, Portugal entered the *Programa de Assistência Económica e Financeira* (PAEF) in 2011, which imposed strict austerity measures in exchange for international financial support.

Figure 1: Portuguese key economic performance indicators, 2007-2019



Note: The figure displays two key Portuguese economic indicators for the period between 2007 and 2019. Panel (a) shows the evolution of the nominal value of annual exports in billions of euros. Panel (b) illustrates the annual real Gross Domestic Product growth rate, at market prices, as a year-on-year percentage change. The charts highlight the economic downturn around 2009 and 2012, followed by a sustained recovery in both exports and GDP. Data Source: BPStat

As shown in Figure 1, in 2012 and 2013, the domestic economy contracted sharply, with GDP falling by 4.05% in 2012 and 0.98% in 2013. These declines reflect the contractionary effects of austerity policies, combined with fragile banking sector conditions – Portuguese banks reported combined losses of around €1.66 billion in 2013, the highest in history. Inflation reached an average of just 0.27% in 2013, the lowest since 2009, mainly due to economic contraction and falling energy prices (BPstat).

Despite this adverse domestic backdrop, external demand provided a crucial buffer. Exports recovered rapidly after the global financial crisis, rising from €47.94 billion in 2010 to €64.28 billion in 2012 and €68.51 billion in 2013 (BPstat). Even with GDP contraction, exports maintained an upward trajectory, highlighting their role as driver of growth during the adjustment period. Tourism contributed strongly to this performance: World Bank data indicate that tourism accounted for 17.7% of total exports in 2013, corresponding to about €12.1 billion, virtually unchanged from 2012.

The macroeconomic environment is thus characterized by a paradox: while domestic conditions were highly restrictive, with credit costly and banks under pressure, external demand was resilient.

4. Data Description

4.1. Data

The empirical analysis builds on a unique dataset that combines information from multiple sources. The starting point is a confidential database provided by *Banco Português de Fomento*, covering all applications to the *PME Crescimento 2012 and 2013* credit lines. The original file contains 41 391 applications, of which 30 201 (72.97%) refer to micro and small firms – the group that constitutes the focus of this dissertation. Each application records whether the guarantee was approved or rejected, along with the reason for rejection. The overall rejection rate is low (1.1%) and, when present, typically reflects administrative issues such as incomplete documentation or failure to satisfy formal eligibility criteria, rather than traditional bank-level risk assessments.

This study focuses specifically on applications from micro and small firms submitted between 16 January 2012 and 14 June 2013, which complied with the eligibility and financing rules detailed in Section 3.2. This restriction yields an initial sample of 17 331 observations. For approved guarantees, the dataset provides detailed contractual information, including the value of the guarantee, the associated loan, interest rate, fees, maturity, grace period, and the dates of application and approval. Importantly, it also identifies whether the guarantee was activated, and the amount recovered after activation, which enrich our analysis. The dataset further includes information on additional guarantees obtained by firms outside the 2012–2013 window, including their respective value and any subsequent activation.

This dataset was later matched with two anonymised firm-level datasets from the *Banco de Portugal* Microdata Research Laboratory (BPLIM). The first is the Central Balance Sheet Database – Harmonised Panel (CBHP), which provides annual firm-level data from 2006 to 2019, primarily drawn from the Simplified Corporate Information (IES). It contains variables such as employment, firm age, sector of activity, and a full set of financial/accounting indicators. This database covers the universe of non-financial corporations in Portugal, excluding sole proprietorships and self-employed workers. The second is the Harmonised Central Credit Register (HCRC), which provides monthly information on all credit accounts above €50 for Portuguese firms, between 2009 and 2019.

Several steps were taken to ensure consistency. Guarantees issued by banks not simultaneously recorded in both the HCRC and the BPF databases were removed. After

merging the three sources, the dataset comprised 14 931 guarantees corresponding to 13 682 firms. Whenever the same firm received guarantees in both 2012 and 2013, only the first was retained, ensuring a direct correspondence between the number of guarantees and the number of firms. In addition, 104 applications that violated amortisation rules were excluded. Since the CBHP does not report ownership structures, some firms classified as micro in our sample may have been deemed small by IAPMEI, and so we drop as well 291 observations of firms obtaining loans above €25 000 while being classified as micro.

The resulting dataset is an unbalanced panel of 13 287 firms observed between 2007 and 2016, all of which obtained at least one guarantee in 2012 or 2013. Continuous variables (excluding guarantee value) were winsorised at the 1st and 99th percentiles within each year to reduce the influence of extreme values, which led to the exclusion of one additional firm. Within this final sample, two key subgroups are identified: 3 600 exporting firms and 9 686 non-exporting firms in the baseline year.

4.2. Variables

Our treatment variable is the value of the guarantee, expressed in thousand of euros, while the main outcome of interest is exports, measured as the total value of goods and services sold abroad each year, covering both EU and extra-EU markets. Other firm-level variables used in the empirical analysis include liquidity and performance outcomes, whose description and construction are detailed in Appendix A.

We do not directly observe firm certification status from IAPMEI. Instead, we reconstruct certification following the stability rule described in Section 3.3 and using the number of employees, total sales, and total assets to assert a score.

Table 2 reports descriptive statistics for the final dataset of 13 286 firms. The average firm employs fewer than eight workers. Exporting activity is highly heterogeneous: while mean exports reach €43 080, the median is zero, indicating that most firms do not export at all – for the average exporter, mean exports is roughly €159 000. Firms also show wide financial dispersion: mean total assets exceed €500 000, but cash holdings average only 10% of assets, while liabilities amount to about 70% of assets, highlighting the reliance on external finance.

Substantial gaps between mean and median values suggest skewed distributions, so average statistics should be interpreted with caution. When comparing the full sample with the exporter sub-sample, clear differences emerge. Exporters are systematically larger, with

higher values of assets and liabilities, and they employ more workers on average – around 10. They also receive larger guarantees, on average, reflecting both their size and the higher financing needs associated with international operations. These contrasts justify distinguishing between exporters and non-exporters in the subsequent analysis, as the role of guarantees is likely to differ across margins of trade.

A key concern is the potential correlation between credit guarantees and subsidies. The distribution of subsidies is highly skewed: while average values are positive, the 75th percentile is zero, suggesting that only a limited share firms benefit from such programs. Results should be interpreted with caution to avoid bias if subsidies were more concentrated among small firms.

Table 2: Dataset summary statistics

	(1) Entire sample, N = 13 286					(2) Exporters, N = 3600				
	Mean	P25	Median	P75	Std. Dev.	Mean	P25	Median	P75	Std. Dev.
Value of guarantee	21.56	18.75	18.75	18.75	8.09	24.35	18.75	18.75	37.5	9.01
Previous guarantees	0.25	0	0	0	3.14	0.23	0	0	0	3.06
Number of employees	7.76	3	5	10	7.21	9.93	4	8	14	8.20
Exports	43.08	0	0	0.7	200.51	158.99	4.53	30.76	143.67	360.52
Total Assets	523.52	153.05	319.34	646.73	633.41	761.15	276.86	531.45	974	769.93
Fixed Assets	153.68	17.06	57.01	169.46	295.24	200.38	29.71	93.09	248.33	311.47
Firm Output	157.35	50.6	100.76	205.88	169.21	222.98	82.68	160.97	300.34	203.64
Sales	605.9	170.2	353.85	744.27	755.42	872.39	319.71	602.85	1111.95	868.88
Cash and Deposits	46.39	6.7	20.32	51.97	82.36	56.61	9.35	27	65.33	89.6
Total liabilities	362.91	93.63	210.08	445.23	468.4	535.89	180.96	365.05	692.73	569.85
Current liabilities	251.2	52.79	134.28	312.98	349.28	386.24	112.29	250.89	495.1	441.69
Subsidies	2.44	0	0	0	32.03	1.74	0	0	0	15.93

Note: All monetary values are reported in thousands of euros. The table displays descriptive statistics for the variables included in the analysis, covering the entire sample of 13 286 firms, as well as a sub-sample of 3 600 exporters, issuing at least one guarantee in 2012 or 2013. All firms are SMEs. The reference period is the year prior to the issuance of the credit guarantee. P25, Median and P75 correspond to the 25th, 50th and 75th percentiles, respectively. Data sources: Banco Português do Fomento and Banco de Portugal.

5. Methodology

This section sets out the empirical strategy adopted, following Grilo et al. (2025), to estimate the impact of credit guarantees on firms' internationalization outcomes. We progressively refine the sample and identification strategy across different steps, each of which is documented with descriptive comparisons between treated and control firms, before presenting the empirical specification used in the regression analysis.

5.1. Treatment and Control Identification Mechanism

The key institutional feature underlying our analysis is that the maximum eligible guarantee depends mechanically on the firm's certification status. Small-certified firms are eligible for larger guarantees, up to €37 500, while micro-certified firms are eligible only for smaller guarantees, up to €18 750. This discontinuity creates quasi-experimental variation in guarantee size, which we exploit for identification.

We define the treatment variable $Treated_i$ as a binary indicator equal to 1 for small-certified firms and 0 for micro-certified firms. In practice, certification status serves as an instrument for the value of the guarantee. The relevance condition is satisfied since certification strongly predicts the maximum amount firms can obtain. The exclusion restriction assumes that, conditional on firm characteristics, certification affects outcomes, like exports, only through its effect on guarantee size. This provides a credible setting to estimate the causal impact of liquidity support.

To enhance comparability between treated and control firms, we restrict the sample to companies with 8 to 11 employees in the pre-treatment year, i.e. firms located around the 10-employee cutoff. Loosely speaking, we compare firms with 8–9 employees (more likely to be classified as micro) with those with 10–11 employees (more likely to be classified as small). The underlying idea is that firms around this cutoff are virtually identical in their investment opportunities, so any systematic differences in guarantee size can be attributed to certification status rather than structural heterogeneity.

It is important to clarify why we do not rely on comparisons between firms with and without guarantees. Firms that never applied for guarantees constitute an inappropriate control group: they either lacked investment and internationalization opportunities or had no demand for external finance. By restricting attention to firms that both applied for and obtained a guarantee, we ensure that treatment and control firms are comparable in their

demonstrated interest in financing. Moreover, to guarantee that certification status is not influenced by the decision to apply, we further restrict the sample so that certification is determined at least one year before the guarantee application.

Table 3: Statistics for Treated and Control groups for all firms

	Mean		Test of differences	
	Treated	Control	t-test	p-value
Value of guarantee	28.252	18.291	-29.897	0
Previous guarantees	0.248	0.165	-0.722	0.471
Number of employees	10.890	7.958	-36.929	0
Exports	82.589	28.244	-3.82	0
Total Assets	808.105	529.107	-10.231	0
Fixed Assets	241.217	141.344	-7.582	0
Firm Output	234.215	158.482	-15.03	0
Sales	926.078	630.812	-8.097	0
Cash and Deposits	65.540	48.887	-3.472	0.001
Total liabilities	560.583	358.964	-9.765	0
Current liabilities	380.805	257.968	-7.593	0
Subsidies	2.576	5.264	1.066	0.287

Note: All monetary values are reported in thousands of euros. The table displays mean statistics for the variables included in the analysis, covering all firms close to the cutoff of approximately 8-11 employers. The treated group comprises 849 small-certified firms, while the control group includes 736 micro-certified firms. The reference period is the year prior to the issuance of the credit guarantee. Data sources: Banco Português do Fomento and Banco de Portugal.

Table 3 reports descriptive statistics for both groups. Differences in previous guarantees and subsidies between groups aren't statistically significative, which mitigate our previous concerns on possible funding bias. While differences in size and assets are expected, given the certification thresholds, firms are otherwise comparable in terms of financial structure, supporting the plausibility of the identification strategy.

A potential concern is that firms may manipulate certification status to access larger guarantees. However, this risk is mitigated because: (i) Certification is based on historical data and remains fixed for at least one year, limiting firms' ability to adapt status in anticipation of guarantee applications. (ii) the potential gains from manipulation are small relative to the costs (e.g., hiring an additional employee to cross the threshold). (iii) program rules were announced with short notice, further reducing scope for anticipatory behaviour.

5.2. Investment Opportunities Restriction

Although certification generates exogenous variation, it is crucial to ensure that treatment and control firms face comparable investment opportunities, as liquidity theory predicts that the effect of liquidity provision is most visible when firms are constrained relative to their desired investment level.

Some firms in the dataset applied for guarantees below €18 750. These are unlikely to be rationed in their demand for liquidity and therefore may not be directly comparable to firms at the cap. To address this, we restrict the sample to firms requesting guarantees at the maximum eligible value. This ensures that control firms (micro-certified) are effectively rationed at €18 750, while treated firms (small-certified) can access up to €37 500.

By excluding 1 462 observations from the initial sample (out of 13 286 firms), with guarantees below the maximum, we sharpen the contrast between groups and reduce heterogeneity in investment demand. We also exclude 1 096 small-certified firms that requested exactly €18 750, since these firms could be misclassified or may not genuinely require the larger cap.

Table 4: Statistics for Treated and Control groups for firms with high investment opportunities

	Mean		Test of differences	
	Treated	Control	t-test	p-value
Value of guarantee	36.640	18.750	-115.307	0
Previous guarantees	0.386	0.142	-1.22	0.223
Number of employees	11.140	7.996	-36.248	0
Exports	82.434	28.164	-4.274	0
Total Assets	876.125	546.803	-10.851	0
Fixed Assets	262.800	144.488	-8.009	0
Firm Output	258.123	160.506	-16.464	0
Sales	1 043.755	646.803	-9.166	0
Cash and Deposits	68.788	48.642	-4.044	0
Total liabilities	607.801	370.49	-10.358	0
Current liabilities	407.275	263.661	-8.39	0
Subsidies	1.215	1.239	0.066	0.948

Note: All monetary values are reported in thousands of euros. The table displays mean statistics for the variables included in the analysis, covering all firms close to the cutoff of approximately 8-11 employers. Small-certified firms receiving guarantees equal to or below €18 750 and micro-certified firms receiving guarantees below €18 750 are excluded from the sample. The treated group comprises 437 small-certified firms, while the control group includes 686 small-certified firms. The reference period is the year prior to the issuance of the credit guarantee. Data sources: Banco Português do Fomento and Banco de Portugal.

Table 4 documents the characteristics of treated and control firms after this restriction. Differences in firm size remains, but now the value of guarantee indicates that almost all firms apply for the maximum, indicating that both groups are rationed in liquidity.

5.3. Treatment and Control Groups

To strengthen the credibility of our identification strategy, we refine the comparison between treated and control firms by implementing a matching procedure. The goal is to ensure that the control group provides a credible counterfactual for treated firms, reducing bias from observable differences in firm characteristics. This step is particularly important in a dynamic difference-in-differences setting, where outcomes are expressed in changes and firm fixed effects absorb time-invariant heterogeneity.

Table 5: Statistics for Treated and Control groups for firms with high investment opportunities with matching

	(1) All firms, N=634			(2) Exporters, N=216			(3) Non Exporters, N=418		
	Mean		Test of diff. p-value	Mean		Test of diff. p-value	Mean		Test of diff. p-value
	Treated	Control		Treated	Control		Treated	Control	
Value of guarantee	36.617	18.75	0	36.504	18.75	0	36.675	18.75	0
Previous guarantees	0.272	0.168	0	0	0		0.413	0.255	0
Number of employees	10.571	8.237	0	10.731	8.269	0	10.488	8.22	0
Exports	80.926	38.851	0	237.534	114.034	0			
Total Assets	894.182	567.85	0	999.563	676.911	0	839.727	511.494	0
Fixed Assets	262.602	144.485	0	256.661	144.519	0	265.672	144.468	0
Firm Output	243.891	162.999	0	261.316	176.024	0	234.887	156.269	0
Sales	1 078.733	661.644	0	1 178.921	744.49	0	1 026.962	618.834	0
Cash and Deposits	70.497	50.079	0	69.512	43.68	0	71.006	53.386	0
Total liabilities	619.070	380.320	0	693.314	458.724	0	580.705	339.805	0
Current liabilities	422.352	269.382	0	488.445	328.371	0	388.199	238.899	0
Subsidies	0.821	0.838	0	0.708	0.74	0	0.879	0.889	0

Note: All monetary values are reported in thousands of euros. The table displays mean statistics for the variables included in the analysis covering – on column (1) – all firms close to the cutoff of approximately 8-11 employers as well as sub-samples for exporters and non-exporters – on column (2) and (3) respectively. Small-certified firms receiving guarantees equal to or below €18 750 and micro-certified firms receiving guarantees below €18 750 are excluded from the sample. K-to-k CEM is performed on the 3-year average of annual growth rates of the number of employees, total assets, fixed assets, sales, exports and leverage. The treated group comprises 317 small-certified firms (108 exporters and 209 non-exporters), while the control group includes 317 small-certified firms (108 exporters and 209 non-exporters). The reference period is the year prior to the issuance of the credit guarantee. Data sources: Banco Português do Fomento and Banco de Portugal.

We build bins based on firm characteristics observed in the three years prior to treatment. Specifically, we compute the average growth rate of the number of employees, total assets, fixed assets, sales. For each variable, firms are classified into bins according to whether they

exhibit positive or negative average growth; for leverage, we construct bins using the 25th, 50th, and 75th percentiles. For exports is created a binary bin distinguishing exporters from non-exporters. Based on this bin structure, we apply k-to-k coarsened exact matching (CEM) as proposed by Blackwell et al. (2009). This procedure temporarily coarsens the data and performs exact matching within strata, ensuring that each treated firm is matched to a control firm within the same bin. Observations from treated firms that do not obtain a suitable match are discarded.

After matching, the final sample comprises 317 treated firms (small-certified) and 317 control firms (micro-certified), divided into two sub-samples: 108 treated exporters matched to 108 control exporters, and 209 treated non-exporters matched to 209 control non-exporters. Table 5 reports mean statistics for both groups across the full sample, exporters, and non-exporters. Remarkably, exporters receive their first guarantee in both groups.

5.4. Empirical Specification

The empirical specification follows an instrumental variables (IV) model, where firm classification (micro vs. small-firm) is used as an instrument for the effective value of the guarantee received. A two-stage procedure (Two-Stage Least Squares – 2SLS) is implemented on a pooled panel.

In the first-stage:

$$G_i = \alpha_1 + \beta \cdot Treated_i + \gamma_1 X_i + \epsilon_{1,i} \quad (1)$$

where i indexes firms, G_i is the value of the guarantee received by firm i, $Treated_i$ is the treatment indicator variable (1 for small firms, 0 for micro firms), and X_i represents a vector of firm-level controls.

In the second-stage, the impact of the guarantee value on firm outcomes is estimated, particularly, but not exclusively, for Exports:

$$y_{i,t} - y_{i,0} = \alpha_2 + \delta \widehat{G_i} + \gamma_2 X_i + \epsilon_{2,i} \quad (2)$$

where $y_{i,t}$ represents the outcome variable (e.g., exports, output, liquidity, etc.) in the years $t=2$ and $t=5$ after treatment, and $y_{i,0}$ corresponds to the pre-treatment value, that is, year 0. The coefficient δ captures the causal effect of the guarantee value on the outcome considered. Heteroskedasticity-robust standard errors are reported.

Complementarily, a dynamic version of the difference-in-differences estimator (DiD) – event study – is applied, exploiting the rich temporal variation in the data, from 3 years before treatment to five years after treatment:

$$y_{i,t} - y_{i,0} = \sum_{k=-3, k\neq 0}^{5} \delta_k \times Treated_i \times Year_t + \eta_i + \eta_t + \epsilon_{i,t} \qquad (3)$$

where $Year_t$ are year dummies with $t \in \{-3,\ldots,5\}$ and η_i and η_t represent firm, industry and time fixed effects. Year 0 (the year before the guarantee is granted) is the baseline category. The coefficients δ_k measure the differential effect of the guarantee in each period relative to the pre-treatment year. Heteroscedasticity-consistent and clustered (at the firm and industry level) standard errors follow Bertrand et al. (2004).

The key assumption for the validity of the DiD estimator is that of parallel trends: in the absence of treatment, the control and treatment groups would have followed similar trajectories. This hypothesis is tested directly by comparing the coefficients δ_k for pre-treatment periods, verifying if they are not significantly different from zero.

To explore heterogeneity of effects, the sample is further splitted into two sub-samples using a binary variable $Exporter_i$ that takes the value 1 if the firm recorded exports in the pre-treatment year, and 0 otherwise. The analysis of exporters captures effects on the intensive margin while the analysis of non-exporters captures potential effects on the extensive margin, related to entry into international markets. For each sub-sample, both the baseline (2SLS) and dynamic (DiD) specifications are estimated, and results are reported separately.

A similar procedure is carried out to study the liquidity-insurance effect, by splitting the sample into two sub-samples using a binary variable $Activation_i$, which takes the value 1 if the firm activated the guarantee after the pre-treatment year, and 0 otherwise. In the dynamic specification of the DiD estimator, we exclude firms that both activated a guarantee and subsequently disappeared from the dataset. This adjustment is necessary because of the way missing values are handled: firms that activated a guarantee at t>0 and then exited were treated as defaults, with post-exit outcomes coded as zeros; in contrast, firms that did not activate a guarantee but disappeared are assumed to have exited for strategic reasons (e.g., mergers or acquisitions), and their outcomes are forward-filled with the last observed value. Without this adjustment, the results for activated firms were systematically biased downward.

6. Results and Empirical Analysis

This section presents and discusses the empirical results. We begin by validating the instrument through first-stage regressions and then move to the second-stage results, where we examine the impact of guarantees on exports. The analysis is first conducted for the full sample of firms and then disentangled into intensive and extensive margins of trade. We next explore the liquidity-insurance function of guarantees by distinguishing between firms that activated and those that did not activate their guarantees. Finally, we turn to liquidity-export ratio, providing additional insights into the mechanisms behind the export results. Complementary and robustness analysis are presented in appendixes B and C.

6.1. First-Stage: Instrument Validation

Before turning to the main results, it is necessary to establish the validity of the empirical strategy. Since the analysis follows an IV approach, the first step is to verify that the instrument – firm certification status at the micro/small-firm threshold – predicts the treatment intensity, measured by the value of the credit guarantee. This validation is essential for two reasons. First, it ensures that the treatment variable constructed from certification status replicates the official SME certification process by which guarantees are allocated. Second, it documents the discontinuity in guarantee values between micro and small-certified firms, which provides the source of identification in the econometric framework.

Table 6: Stage 1 regression results for all firms, exporters and non-exporters

	(1) All firms	(2) Exporters	(3) Non-Exporters
	Value of guarantee	Value of guarantee	Value of guarantee
Treated$_i$	17.797*** (0.211)	18.099*** (0.394)	17.778*** (0.248)
Control Variables	Yes	Yes	Yes
First-Stage	Yes	Yes	Yes
Second-Stage	No	No	No
Observations	634	216	418
Adjusted R-squared	0.933	0.937	0.940

Note: The table displays estimates of the coefficient on Treated$_i$ from regressions of the value of the guarantee, in thousands of euros, on Treated$_i$ and firm-level controls, including total assets, fixed assets, sales, exports, cash and deposits and leverage. The variable Treated$_i$ is a binary indicator equal to 1 if the firm is small-certified. Column (1) presents results for the sample of covering all 634 firms close to the cutoff of approximately 8-11 employers, with matching, while column (2) and (3) presents, respectively, results for sub-samples for 216 exporters and 418 non-exporters. Robust standard errors are reported in parentheses, and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Data sources: Banco Português de Fomento and Banco de Portugal. Full table on annex 2.

Table 6 reports the first-stage estimates that address this requirement., where the dependent variable is the value of the credit guarantee and the key explanatory variable is $Treated_i$, an indicator equal to 1 if the firm is classified as small-certification and 0 otherwise. Control variables for total assets, fixed assets, sales, exports, cash and deposits and leverage are included in all specifications, despite being omitted.

For the full sample of firms, on column (1), the coefficient on $Treated_i$ is positive, large, and statistically significant at the 1% level, indicating that small-certification firms receive, on average, €17 797 more in guarantees than micro-certification firms. This result validates the empirical strategy by confirming that the classification rule employed in this study replicates the official certification process and successfully predicts the value of the guarantee. The very high adjusted-R^2 (0.933) reflects the quasi-deterministic nature of the allocation rule, reinforcing that certification status accounts for almost all variation in the guarantee value.

Columns (2) and (3) replicate the analysis for exporters and non-exporters, respectively. In both cases, the results remain consistent: $Treated_i$ continues to be strongly significant at the 1% level, with coefficients of €18 099 for exporters and €17 778 for non-exporters. The difference between the two groups may reflect exporters' greater financing needs and tendency to fully exploit the maximum guarantee limit, while non-exporters face less intensive liquidity demands. Nonetheless, the proximity of the estimates suggests that any variation across subsamples is minor and largely driven by sample composition rather than systematic differences. This robustness across subsamples indicates that the instrument is valid not only for the aggregate population of firms but also when the analysis is restricted to exporters and non-exporters separately.

The magnitude of the estimated coefficient is also informative. The average difference in guarantee values between treated and control firms is close to the theoretical maximum of €18 750, implying that most small-certified firms exhaust the upper bound of their available guarantee (€37 500), while micro-certified firms are constrained at €18 750. This interpretation suggests that all firms in the sample are liquidity-rationed, albeit at different levels, which is consistent with the theoretical framework presented in Section 3.1.

Taken together, these first-stage results confirm the relevance and robustness of the certification threshold as an instrument. The classification rule strongly predicts the value of the guarantee, the estimates hold across exporters and non-exporters, and the quasi-

deterministic assignment produces very high explanatory power. Having validated the instrument, the analysis now turns to the causal effects of credit guarantees on firms' exports.

6.2. Second-Stage: Impact on Exports

This section turns to the second-stage estimates, which quantify the causal impact of credit guarantees on firms' export performance. Table 7 reports the second-stage regression results for exports, where the value of the credit guarantee is instrumented by firm certification status (micro vs. small-firms). Columns (1) to (3) present estimates for the second year after treatment, while Columns (4) to (6) report results for the fifth year. Within each period, results are shown for the full sample of firms, as well as separately for exporters and non-exporters in the pre-treatment year. All specifications include firm-level controls.[7]

Table 7: Stage 2 regression results for exports for all firms, exporters and non-exporters, two and five years after treatment

	2nd Year after treatment			5th Year after treatment		
	(1) All firms	(2) Exporters	(3) Non-Exporters	(4) All firms	(5) Exporters	(6) Non-Exporters
	Exports	Exports	Exports	Exports	Exports	Exports
Value of guarantee	595.882 (556.554)	3 191.512** (1 340.405)	-103.405 (462.823)	2 121.251** (911.262)	3 930.136* (2 379.058)	975.756 (648.825)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
First-Stage	No	No	No	No	No	No
Second-Stage	Yes	Yes	Yes	Yes	Yes	Yes
Observations	634	216	418	634	216	418
Adjusted R-squared	0.009	0.034	-0.030	-0.036	-0.052	-0.096

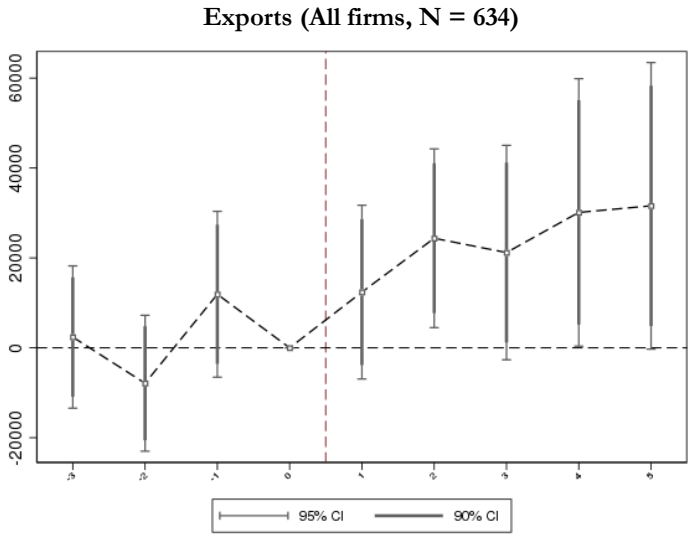
Note: The table reports the 2SLS estimates of the effect of the value of the credit guarantee on firms' exports, where the guarantee value, in thousand of euros, is instrumented by firm certification status (micro vs. small). Columns (1) to (3) present results for the second year after treatment, while Columns (4) to (6) present results for the fifth year after treatment. Columns (1) and (4) include the full sample of 634 firms, columns (2) and (5) restrict the sample to 216 exporters, and columns (3) and (6) to 418 non-exporters. Control variables include total assets, fixed assets, sales, exports, cash and deposits, and leverage. Robust standard errors are reported in parentheses, and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Data sources: Banco Português de Fomento and Banco de Portugal. Full table on annex 3.

For the full sample of firms (Columns 1 and 4), the estimated impact of credit guarantees on exports is positive but heterogeneous across horizons. Two years after treatment, the coefficient is small and statistically insignificant, suggesting that the short-run aggregate effect of guarantees on exports is limited. By the fifth year, however, the effect becomes both

[7] As it may seems odd to observe very low or negative adjusted-R^2 statistics, in 2SLS regressions the reported R^2 or adjusted R^2 has no natural interpretation, since the variance decomposition that underlies OLS does not hold when regressors are replaced by fitted values from the instruments. Consequently, the statistic can even be negative and should not be used as a measure of goodness of fit (Wooldridge, 2013).

statistically and economically significant, at the 5% level: relative to the control group, each additional €1 000 of guaranteed credit is, on average, associated with approximately €2 121 in additional exports. This delayed response indicates that the benefits of guarantees tend to materialize gradually, consistent with the idea that firms require time to transform improved financing conditions into international sales.

Figure 2: Event-study estimates of the impact of credit guarantees on exports for all firms



Note: The figure plots dynamic DiD estimates of the effect of credit guarantees on firms' exports for the full sample of 634 firms, relative to the year of treatment (t = 0). Coefficients δ_k associated with the variable $Treated_i$, where the dependent variable is exports, are reported with 95% and 90% confidence intervals. Firm, industry and year fixed effects are included. The horizontal axis represents time in years before and after the treatment (baseline = 0), with the vertical dashed line marking the guarantee's origination date. The vertical axis measures differences in exports (euros) between the treated and the control groups. The treated group consists of 317 small-certified firms, while the control includes 317 micro-certified firms, with matching. Sample period: 2008-2017. Data sources: Banco Português de Fomento and Banco de Portugal.

The event-study estimates from equation (3) in Figure 2 reinforce this interpretation. The pre-treatment coefficients fluctuate around zero and are statistically insignificant, supporting the parallel trends assumption. After treatment, however, the coefficients diverge upward, with the difference between treated and control firms growing steadily and reaching statistical significance by year 2, at the 5% level, maintaining statistically significant effects on further years. The trajectory confirms that guarantees have no immediate effect at origination but generate persistent export growth in the medium-long run, consistent with the hypothesis of hysteresis (Baldwin 1988; Dixit 1989a,b; Krugman, 1989).

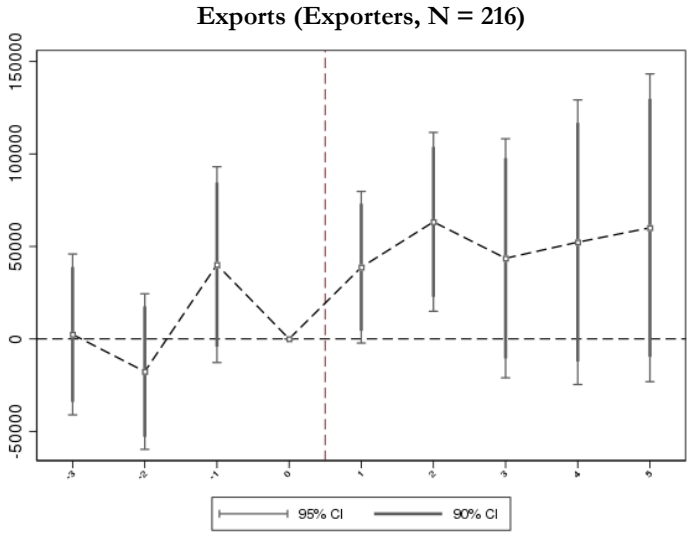
Overall, the full-sample results highlight that credit guarantees support firms' internationalization, though their effect is not instantaneous. The aggregate impact only becomes visible at least two years after treatment, pointing to the time required for firms to channel improved liquidity into export expansion. To better understand the mechanisms

underlying this aggregate effect, and following the literature, the analysis next disentangles the results by separating the intensive and extensive margins. Following Helpman et al. (2008), in this framework we assume the intensive margin refers to the effect of guarantees on firms that were already exporters before treatment, capturing their capacity to expand existing foreign sales. The extensive margin, in turn, refers to the effect of guarantees on firms that did not export prior to treatment, where any observed post-treatment exports are interpreted as entry and expansion into international markets.

6.2.1. Intensive Margin of Exports

The results in Table 7 (Columns 2 and 5) show that guarantees have a strong and persistent impact on exporters' performance. Two years after treatment, the coefficient is positive and significant at the 5% level: relative to the control group, each additional €1 000 of guarantees is associated with approximately €3 192 in additional exports. Five years after treatment, the effect remains significant, at the 10% level, with the coefficient slightly rising at around €3 930 per €1 000 guaranteed. These magnitudes confirm that guarantees reinforce the ability of existing exporters to sustain and expand their activities over time, with the effect materializing quickly and persisting in the medium-long run.

Figure 3: Event-study estimates of the impact of credit guarantees on exports for already exporting firms



Note: The figure plots dynamic DiD estimates of the effect of credit guarantees on firms' exports for the sub-sample of 216 exporting firms, relative to the year of treatment (t = 0). Coefficients δ_k associated with the variable $Treated_i$, where the dependent variable is exports, are reported with 95% and 90% confidence intervals. Firm, industry and year fixed effects are included. The horizontal axis represents time in years before and after the treatment (baseline = 0), with the vertical dashed line marking the guarantee's origination date. The vertical axis measures differences in exports (euros) between the treated and control groups. The treated group consists of 108 small-certified firms while the control group includes 108 micro-certified firms, with matching. Sample period: 2008-2017. Data sources: Banco Português de Fomento and Banco de Portugal.

Figure 3 complements these results by showing the dynamic trajectory of exports in the period of analysis. Pre-treatment estimates fluctuate around zero and are statistically insignificant, consistent with the parallel trends assumption. After treatment, however, coefficients diverge upward: treated exporters significantly increase their exports relative to the control group at the 10% level as early as year 1, and the effect persists throughout the medium run, with significant relative increase on year 2, at the 5%. Later the effect seems to persist, despite with no statistical significance. The event-study pattern thus corroborates the regression evidence of a strong intensive-margin effect at the short-medium run.

Our results are consistent with theoretical contributions that stress the effect of financial frictions on the volume of trade, in particular with Manova (2013), who shows that most of the distortion caused by financial frictions falls on the intensive margin. They also align with empirical evidence by Bellone et al. (2010), Minetti and Zhu (2011), Muûls (2015), and Paravisini et al. (2015), who all find that access to finance significantly shapes export volumes of existing exporters. More closely related, our findings are in line with studies of export credit guarantees such as Badinger & Url (2013), Van der Veer (2015), Jäkel (2021) and Agarwal et al. (2023), as well as the evidence on mutual credit guarantees by Custódio et al. (2024), who report substantial positive effects on exporters' sales.

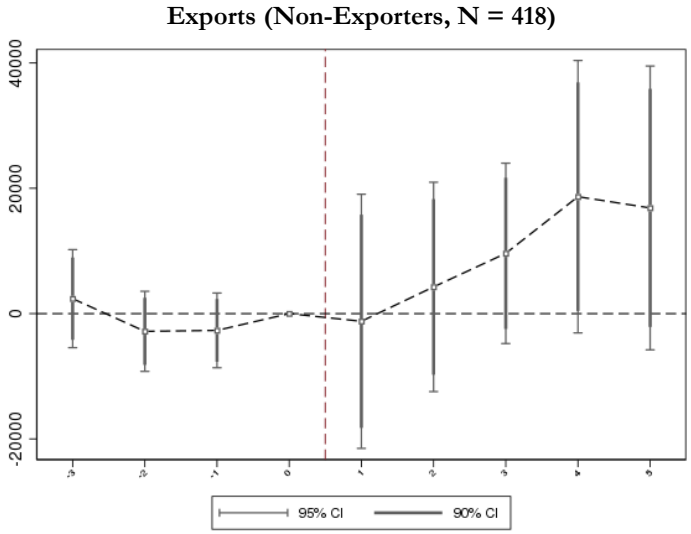
Taken together, the evidence confirms that mutual credit guarantees act as an effective tool to strengthen the intensive margin of trade. These effects are best understood through the collateral channel: by relaxing credit rationing and reducing collateral requirements at the time of loan origination, guarantees expand exporters' access to finance and enable them to increase their foreign sales. This mechanism allows existing exporters to reinforce trade relationships and persist in international markets.

6.2.2. Extensive Margin of Exports

To assess the extensive margin, the analysis focuses on firms that were non-exporters in the pre-treatment year. The underlying assumption is that any subsequent exports by these firms can be interpreted as market entry, allowing to identify whether credit guarantees facilitate entry into international markets by easing financial frictions associated with the sunk and fixed costs of exporting. It is important to alert that this approach may capture additional dynamics beyond "pure" entry. Some firms might have exported in the more distant past and later re-entered, while part of what we measure could also reflect intensive-margin

adjustments in the years following entry. Even so, we believe this approach adequately reflects firms' relative behaviour on the extensive margin, and the estimates should therefore be interpreted as an approximation of these effects.

Figure 4: Event-study estimates of the impact of credit guarantees on exports for non-exporting firms



Note: The figure plots dynamic DiD estimates of the effect of credit guarantees on firms' exports for the sub-sample of 418 non-exporting firms, relative to the year of treatment (t = 0). Coefficients δ_k associated with the variable $Treated_i$, where the dependent variable is exports, are reported with 95% and 90% confidence intervals. Firm, industry and year fixed effects are included. The horizontal axis represents time in years before and after the treatment (baseline = 0), with the vertical dashed line marking the guarantee's origination date. The vertical axis measures differences in exports between the treated and control groups. The treated group consists of 209 small-certified firms, while the control includes 209 micro-certified firms, with matching. Sample period: 2008-2017. Data sources: Banco Português de Fomento and Banco de Portugal.

The results in Table 7 (Columns 3 and 6) show no statistically significant short-run effect of guarantees on the export performance of non-exporters. Two years after treatment, the coefficient is negatively small and close to zero, suggesting that guarantees did not instantly trigger entry into foreign markets. By the fifth year, the coefficient turns positive but remains statistically insignificant at conventional levels, indicating only suggestive evidence of a long-term effect. Nevertheless, descriptive patterns in the data reveal that 94 firms out of the 418 baseline non-exporters had begun exporting by the fifth year, while 62 firms out of the initial 216 exporters had stopped exporting. On balance, the exporter pool grew from 216 to 248 firms – a net increase of 32 exporters, corresponding to a 14.8% rise in the total number of exporters, suggesting some expansion along the extensive margin.

Figure 4 reinforces this interpretation. While pre-treatment coefficients are close to zero, supporting the parallel trends assumption, the post-treatment trajectory displays a slowly gradual upward trend, with effects becoming marginally significant at the 10% level around year 4 after treatment. This suggests that guarantees may have played a role in enabling entry

for some firms, though the evidence remains weaker and less consistent than for existing exporters.

Compared with the literature, our results are more modest. Prior research such as Bellone et al. (2010), Minetti and Zhu (2011), and Muûls (2015) reports stronger financial effects on the probability of becoming an exporter, while Custódio et al. (2024) find that access to mutual credit guarantees in Portugal significantly increased firms' entry into international markets. Our evidence does not contradict these findings but suggests that entry effects, in our context, are smaller and slower to materialize. One interpretation is that sunk entry costs and informational barriers remain high, and the relative liquidity provided by our guarantee scheme may not be sufficient to overcome these barriers. A second interpretation is that internationalization is a gradual process, and our five-year window may not fully capture its impact – although attributing later effects directly to guarantees becomes less convincing. A third interpretation is related to firm selection: non-exporters in our sample may be systematically less prepared or less inclined to internationalize, such that even with greater liquidity, they are less likely to enter foreign markets.

Evidence from export credit guarantees also points to robust extensive-margin effects, with Egger and Url (2006), Moser et al. (2008), Felbermayr and Yalcin (2013) and Agarwal et al. (2023), all documenting significant increases in firms' likelihood of entering new export markets. In contrast, our results suggest that mutual credit guarantees are less effective in inducing non-exporters to enter international markets.

Overall, the evidence suggests that credit guarantees play only a modest role in fostering the extensive margin of trade. While some firms do enter international markets in the medium-long run, the effects are weaker, slower to materialize, and less robust than those documented for the intensive margin.

The analysis of both export margins reveals an important asymmetry, consistent with Paravisini et. al (2015) findings, showing that (negative) financial shocks primarily affect the intensive rather than the extensive margin of trade. On the one hand, credit guarantees have a strong and persistent effect on existing exporters, consistent with guarantees easing liquidity constraints ex-ante and enabling firms to expand the scale of their foreign sales. On the other hand, the effect on non-exporters is weaker and slower to materialize, with only marginal signs of entry over the medium-long run. This suggests that, while guarantees

facilitate the intensive margin of trade, they are less effective in driving the extensive margin, where sunk costs and informational barriers remain substantial.

From a theoretical perspective, these results are consistent with the collateral channel of guarantees. By increasing pledgeable income, guarantees expand access to credit at origination, allowing firms – particularly those already engaged in international markets – to finance production, trade costs, and working capital.

The liquidity-insurance channel is only partially reflected in these aggregate results. In our framework, the insurance role of guarantees becomes visible when firms actually face a liquidity shock and activate the guarantee, securing the resources needed to avoid inefficient liquidation or exit. Accordingly, while the results on margins highlight the ex-ante benefits of guarantees, the next section turns explicitly to the ex-post benefits from activation.

6.3. Guarantee Activation and Liquidity-Insurance Channel

In this section, we distinguish between firms that activated and those that did not activate their guarantees. By doing so, we move beyond the ex-ante effects of expanded credit access and directly test the ex-post insurance role of guarantees. The goal is to assess whether firms that activated their guarantees were better able to stabilize or expand their export activities under financial distress.

Once again, we validate the instrument by testing whether the discontinuity in guarantee values at the micro/small certification threshold holds when firms are separated by activation status. Table 8 reports the first-stage estimates, where the dependent variable is the value of the credit guarantee. The coefficient on $Treated_i$ remains strongly positive and statistically significant at the 1% level across all specifications: for the full sample of firms (Column 1), the coefficient on $Treated_i$ is positive, large, and statistically significant at the 1% level, indicating that small-certificated firms receive, on average, €17 797 more in guarantees.

When splitting the sample, the coefficient is €17 836 for non-activated firms (Column 2) and €17 780 for activated firms (Column 3), both highly significant. These very similar magnitudes, together with the high explanatory power of the models, confirm that the discontinuity is preserved regardless of activation status, thereby validating the instrument for the subsequent analysis.

Table 8: Stage 1 regression results for firms that activated and didn't activate the guarantee

	(1) All firms	(2) Firms that did not activate	(3) Firms that activated
	Value of guarantee	Value of guarantee	Value of guarantee
Treated$_i$	17.797*** (0.211)	17.836*** (0.212)	17.780*** (1.545)
Control Variables	Yes	Yes	Yes
First-Stage	Yes	Yes	Yes
Second-Stage	No	No	No
Observations	634	588	46
Adjusted R-squared	0.933	0.938	0.844

Note: The table displays estimates of the coefficient on Treated$_i$ from regressions of the value of the guarantee, in thousands of euros, on Treated$_i$ and firm-level controls, including total assets, fixed assets, sales, exports, cash and deposits and leverage. The variable Treated$_i$ is a binary indicator equal to 1 if the firm is small-certified. Column (1) presents results for the sample of covering all 634 firms close to the cutoff of approximately 8-11 employers, with matching, while column (2) and (3) presents, respectively, results for sub-samples for 588 firms that didn't activate the guarantee and 46 firms that activated guarantees at some point of our sample period. Robust standard errors are reported in parentheses, and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Data sources: Banco Português de Fomento and Banco de Portugal. Full table on annex 4.

Table 9: Activation and default outcomes

	(1) All firms			(2) Treatment Group			(3) Control Group		
Guarantee Status	Total Firms	Exit	Exit Rate (%)	Total Firms	Exit	Exit Rate (%)	Total Firms	Exit	Exit Rate (%)
(a) All firms									
Activated	46	27	58.70%	28	18	64.29%	18	9	50.00%
Non-Activated	588	16	2.72%	289	5	1.73%	299	11	3.68%
Default Rate (%)			4.26%			5.68%			2.84%
(b) Exporters									
Activated	15	11	73.33%	9	7	77.78%	6	4	66.67%
Non-Activated	201	1	0.50%	99	0	0.00%	102	1	0.98%
Default Rate (%)			5.09%			6.48%			3.70%
c) Non-Exporters									
Activated	31	16	51.61%	19	11	57.89%	12	5	41.67%
Non-Activated	387	15	3.88%	190	5	2.63%	197	10	5.08%
Default Rate (%)			3.83%			5.26%			2.39%

Note: The table reports the number of firms that activated or did not activate a credit guarantee in our matched sample (8 to 11 employees, N = 634). Panel (a) covers the full sample, (b) exporters (N = 216), and (c) non-exporters (N = 418). Default is defined as disappearance from the dataset after activating a guarantee; firms that exited without activating a guarantee are not considered defaults, as these cases are assumed to reflect strategic decisions (e.g., mergers or acquisitions). For each group, the table shows the total number of firms, the number of exits from the dataset, and the corresponding exit rate. The last row in each panel reports the default rate, defined as the defaults divided by the total number of firms in the specification. Columns (2) and (3) further break down the results by certification status, distinguishing between small (treatment) and micro (control) certified firms. Data sources: Banco Português de Fomento and Banco de Portugal.

It is important to stress, however, that the number of activated firms is relatively small - only 46, equivalent to 7.56% of our matched sample. While the instrument remains valid, this low

number of observations reduces statistical power, meaning that second-stage results for activated firms, particularly when further divided into exporters (N = 15) and non-exporters (N = 31), must be interpreted with caution.

To analyse the liquidity-insurance role of guarantees, it is important to first examine firms' survival outcomes. A default occurs when a firm disappears from the dataset after activating a guarantee. Firms that disappear without activating are treated instead as strategic exits, typically reflecting mergers or acquisitions. Table 9 reports the number of firms that activated or did not activate a guarantee, further disaggregated by exporter status and certification. The table shows both exit rates (share of disappearing firms within each specification) and the overall default rate (defaults among activated firms as a share of all firms in the specification).

The results confirm activation as an indicator of financial distress. Among the 46 firms that activated their guarantees, 27 defaulted, corresponding to a conditional default rate of 58.7%. In contrast, only 2.72% of the 588 non-activated firms exited, consistent with the interpretation that these disappearances mostly reflect strategic restructuring rather than distress. This contrast highlights that activation tends to occur under adverse conditions, when firms face liquidity shocks or heightened financial fragility. The high exit rate after activation also indicate that guarantees don't provide enough protection to shocks.

Export status magnifies this pattern. Among exporters (Panel b), the exit rate after activation reached 73.3%, compared with 51.6% among non-exporters (Panel c). The corresponding overall default rates were 5.09% and 3.83% respectively, suggesting that exporting firms were more exposed and vulnerable to liquidity shocks, consistent with the evidence of Amiti and Weinstein (2011) and Chor and Manova (2012), that shows international sales are disproportionately sensitive to financial conditions.

Breaking down the results by micro/small-certified firms helps us assess whether larger guarantees translate into higher survival rates, as predicted by the liquidity-insurance channel. Looking at Panel (a) for all firms, default rates are consistently higher for small-certified firms. Among activated firms, 64.3% of small firms defaulted, compared with 50.0% of micro firms. Similar asymmetries appear among exporters and non-exporters: 77.9% of small-certified firms defaulted, against 66.7% of micro-certified firms among exporters, while 57.89% of small-certified firms defaulted, compared with 41.7% of micro-certified firms among non-exporters. Their overall default rates – 5.68% for small-certified firms vs. 2.84%

for micro-certified firms in the full sample, 6.48% vs. 3.70% among exporters, and 5.26% vs. 2.39% among non-exporters – confirm that defaults were more concentrated among the group with larger guarantees. Consistently, activation was also more prevalent among these.

Taken together, these findings suggest that larger guarantees did not translate into greater survival. Instead, small-certified firms exhibited systematically higher default incidence, which contrasts with the liquidity-insurance perspective of Holmström and Tirole (1998). This indicates that relative differences in guarantee size may not provide sufficient protection against distress. Other factors, such as leverage or broader financial exposure, may have been more decisive in shaping outcomes.

Having examined survival outcomes, we now turn to the export performance of firms that activated or did not activate guarantees. If the liquidity-insurance channel is effective, activation should provide firms with liquidity to withstand distress and maintain or expand exports. The comparison between micro and small-certified firms remains crucial: if the mechanism works as predicted, larger guarantees should provide more protection, allowing small-certified firms to perform relatively better under distress. Non-activated firms serve as benchmark, showing the ex-ante collateral channel without the ex-post insurance dimension.

Table 10: Stage 2 regression results for exports for activated and non-activated guarantees, 2 and 5 years after treatment

	2nd Year after treatment			5th Year after treatment		
	(1) All firms	(2) Firms that did not activate	(3) Firms that activated	(4) All firms	(5) Firms that did not activate	(6) Firms that activated
	Exports	Exports	Exports	Exports	Exports	Exports
Value of guarantee	595.882 (556.554)	736.603 (585.009)	1 032.139 (1186.952)	2 121.251** (911.262)	2 401.69*** (895.863)	390.425 (787.629)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
First-Stage	No	No	No	No	No	No
Second-Stage	Yes	Yes	Yes	Yes	Yes	Yes
Observations	634	588	46	634	588	46
Adjusted R-squared	0.009	0.012	0.196	-0.036	0.013	0.950

Note: The table reports the 2SLS estimates of the effect of the value of the credit guarantee on firms' exports, where the guarantee value, in thousands of euros, is instrumented by firm certification status (micro vs. small). Columns (1) to (3) present results for the second year after treatment, while Columns (4) to (6) present results for the fifth year after treatment. Columns (1) and (4) include the full sample of 634 firms, columns (2) and (5) restrict the sample to 588 firms that didn't activate the guarantee and columns (3) and (6) to 46 firms that activated guarantees at some point of our sample period. Control variables include total assets, fixed assets, sales, exports, cash and deposits, and leverage. Robust standard errors are reported in parentheses, and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Data sources: Banco Português de Fomento and Banco de Portugal. Full table on annex 5.

Table 10 reports the second-stage regression results for exports at two and five years after treatment, separately for activated and non-activated firms. For firms that activated a guarantee, the results do not provide evidence that larger guarantees translate into stronger export performance. Coefficients are not statistically significant and even decline over time.[8] This lack of effect suggests that, although guarantees provide liquidity in times of distress, the additional amounts available to small-certified firms may not have been sufficient to offset the severity of shocks, or to generate export growth. For firms that did not activated guarantees, by contrast, the results broadly mirror those of the full sample: positive long-run impacts on exports, significant at the 1% level, consistent with guarantees facilitating internationalization ex-ante. Relative to the control group, each additional €1 000 of non-activated guaranteed credit generates, on average, approximately €2 402 in additional exports.

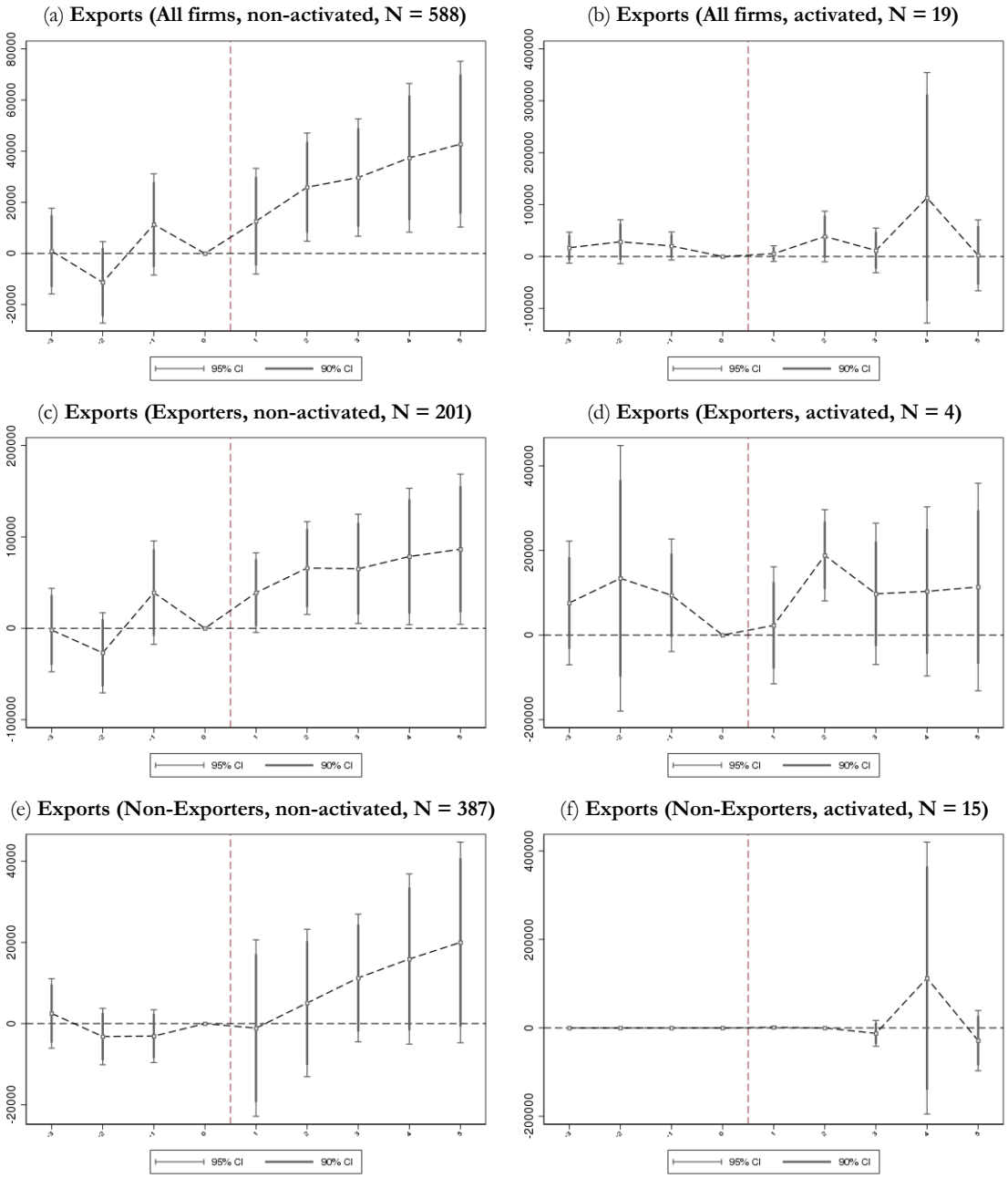
Figure 5 presents dynamic event-study estimates of exports for firms that activated and did not activate their guarantees, revealing a clear divergence between the two samples. For firms that did not activate their guarantees (left-side panels), exports display a steady and gradual upward trend following treatment, reinforcing the results discussed in Section 6.2. These effects seem even more pronounced and emerging earlier, particularly along the intensive margin, where a statistically significant difference of almost €50 000, at the 10% level, is already visible in the first year after treatment.

By contrast, the trajectories for firms that activated guarantees (right-side Panels) are considerably more volatile and lack systematic significance. This pattern reflects the fact that activation occurs under financial distress, where guarantees may prevent collapse but are insufficient to generate clear export gains. Interestingly, Panel (d) offers an exception, where coefficients briefly become significant, showing that exporters who activated larger guarantees record on average an approximately €200 000 relative increase in exports in the second year after treatment, compared to their controls. This result may suggest that activation may provide a short-lived buffer during periods of financial distress, temporarily sustaining international sales and quickly fading, without persistent export gains are observed in subsequent years. However, we can't assume parallel trends and the number of firms

[8] This apparent coefficient reduction along the period of analysis may reflect, in some extent, the way missing values for defaulted firms are handled. Since default rates are higher among small-certified firms, filling missing values with zeros may mechanically amplify measured export reductions in this group. Nonetheless, the lack of statistical significance in the estimates indicates that these patterns should not be over-interpreted. Note: To avoid this problem in the event-study, these observations were further dropped from our sample

driving this effect is very small (N = 4), which makes the result fragile and prevents us from drawing firm causal conclusions.

Figure 5: Event-study estimates of the impact of credit guarantees on exports by guarantee activation status



Note: The figure plots dynamic DiD estimates of the effect of credit guarantees on firms' exports, relative to the year of treatment (t = 0), distinguishing between firms that activated their guarantees (right) and those that did not (left). Panel (a) and (b) report results for all firms, Panel (c) and (d) for exporters only, and Panel (e) and (f) for non-exporters. Coefficients δ_k associated with the variable *Treated*, where the dependent variable is exports, are reported with 95% and 90% confidence intervals. Firm, industry and year fixed effects are included. The horizontal axis represents time in years before and after the treatment (baseline = 0), with the vertical dashed line marking the origination date of the guarantee. The vertical axis measures differences in exports (euros) between the treated and the control groups. Firms that activated guarantees but subsequently disappeared from the dataset – considered as bankrupt – were dropped from firms that activated guarantees' sub-samples. Sample period: 2008-2017. Data sources: Banco Português de Fomento and Banco de Portugal.

The evidence presented in this section highlights important differences between the ex-ante and ex-post roles of credit guarantees. First, as it was expected, activation is strongly associated with financial fragility: firms that activated their guarantees displayed alarmingly high default rates, particularly exporters, who are more vulnerable to shocks. Importantly, default rates were higher among small-certified firms, suggesting that larger guarantees did not translate into higher survival probabilities. This finding contrasts with the liquidity-insurance perspective of Holmström and Tirole (1998), which would predict that greater access to liquidity buffers should reduce the likelihood of collapse under adverse shocks.

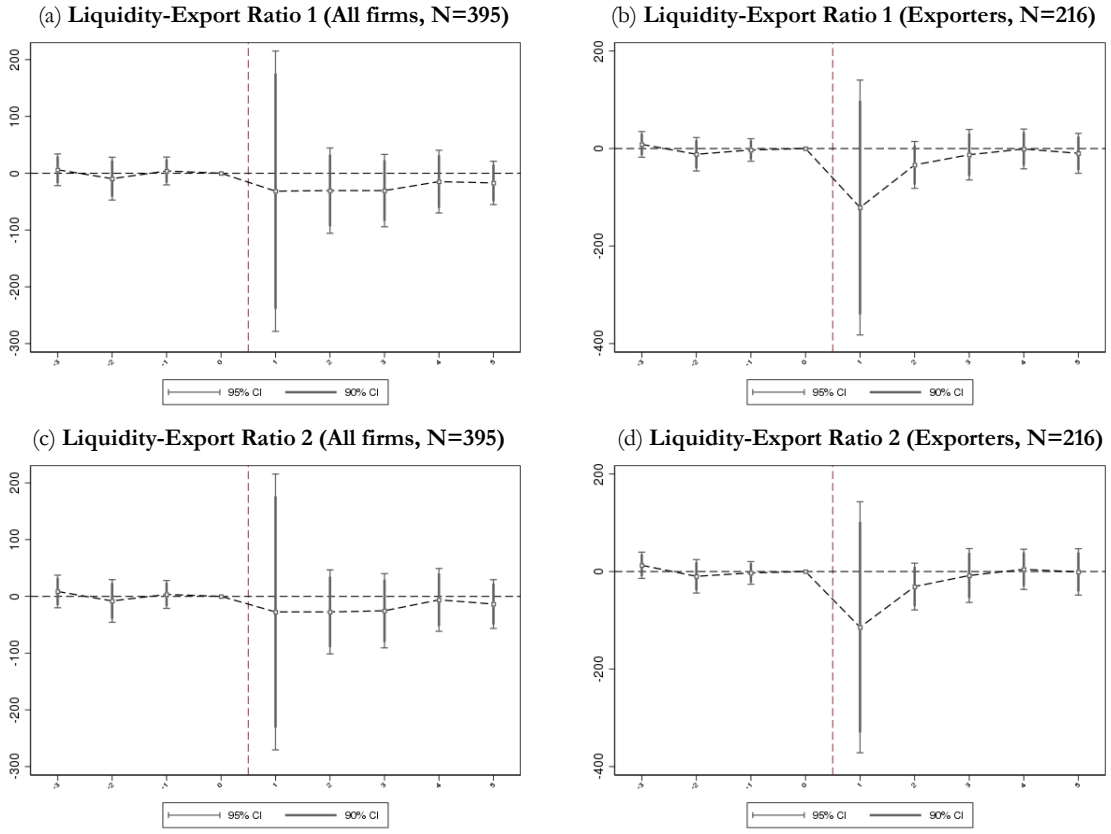
Second, the analysis of export outcomes, despite not much informative, reinforces this picture. In line with the results for the overall sample, firms that did not activate guarantees show clear export gains from larger guarantees, consistent with the collateral channel that expands credit access ex-ante. By contrast, there's no strong evidence that once activation takes place, larger guarantees lead to measurable improvements in export performance. The second-stage regressions and the dynamic event-study estimates for all firms (N = 19) indicate that activated firms exhibit volatile and statistically insignificant export trajectories. This pattern suggests that while guarantees ease financial constraints before shocks occur, they may not provide sufficient liquidity to sustain or expand exports once liquidity shocks materialize.

Taken together, these findings imply that the ex-ante role of guarantees – easing credit rationing and enabling firms to internationalize – is robustly supported in our data. However, the ex-post insurance channel does not emerge: larger guarantees do not seem to enhance survival or export resilience when activated. From a policy perspective, this distinction is critical. Guarantees should not be understood as a one-dimensional instrument but rather as combining two potential functions: a collateral channel, which we confirm empirically as a driver of internationalization, and a liquidity-insurance channel, which theory predicts but our evidence does not validate in this setting. This divergence underlines the importance of calibrating guarantee schemes not only to improve firms' credit access ex-ante but also to ensure that, if activation occurs, the liquidity provided is sufficient to stabilize firms and preserve their international engagement.

6.4. Liquidity-Export Trade-off

To further explore the mechanisms behind our previous results, we explore the relation between liquidity provision and export performance through liquidity–export ratios. Two measures are considered: the first is defined as cash and deposits plus guarantees originated in 2012/2013 relative to exports, and the second expands the former measure to include all guarantees obtained by firms.[9] By comparing both groups, we capture the relative evolution of liquidity buffers vis-à-vis export activity across firms, allowing us to assess whether firms benefiting from larger guarantees accumulate additional liquidity relative to exports, or instead channel the guaranteed resources directly into international activities.

Figure 6: Event-study estimates of the impact of credit guarantees on liquidity-export ratios for all firms and exporters



Note: The figure plots dynamic DiD estimates of the effect of credit guarantees on firms' liquidity-export ratio, relative to the year of treatment (t = 0). Panel (a) and (c) report results for all firms reporting exports along the treatment period, while Panel (b) and (d) for exporters at the baseline year. Panel (a) and (b) include a liquidity measure composed by cash and deposits and guarantees originated in 2012/2013. Panel (c) and (d) include a similar liquidity measure that also includes all other conceded guarantees. Coefficients δ_k associated with the variable $Treated_i$, where the dependent variable is exports, are reported with 95% and 90% confidence intervals. Firm, industry and year fixed effects are included. The horizontal axis represents time in years before and after the treatment (baseline = 0), with the vertical dashed line marking the origination date of the guarantee. The vertical axis measures differences in liquidity-export ratio values between the treated and the control groups. Sample period: 2008-2017. Data sources: Banco Português de Fomento and Banco de Portugal.

[9] It's important to note that when exports equal zero, the liquidity–export ratio is mathematically undefined. Thus, observations with zero exports in a given year for a given firm are automatically dropped from the computation (equivalent to 64.67% of the all firms' sample, and 24.79% of the exporters' sample).

Overall, the estimates reveal a downward trajectory in the relative liquidity–export ratio of treated firms compared to controls, suggesting that small firms with larger guarantees tend to allocate liquidity more toward exports, while micro firms with smaller guarantees accumulate relatively more liquidity buffers. However, it is important to emphasize that most coefficients are not statistically significant, meaning the evidence for a systematic trade-off is weak. The only partial exceptions arises in the exporter sample under both specifications, where the second year after treatment shows a marginally significant effect (close to the 10% level). This result may point to a short-run trade-off: micro firms, with smaller guarantees, appear to accumulate liquidity more intensively relative to their export activity, while small firms, with larger guarantees, channel relatively more liquidity into sustaining or expanding exports. Beyond this isolated case, however, the results do not provide robust evidence of a consistent liquidity–export trade-off.

Taken together, the analysis of liquidity–export ratios does not provide strong statistical evidence of a systematic trade-off between holding liquidity and expanding exports. However, the direction of the results may be informative. The ratios tend to decline for firms with larger guarantees, suggesting that, relative to the control group, these firms accumulate less liquidity in proportion to their exports. This pattern does not seem consistent with the mechanism proposed by Holmström and Tirole (1998): when firms gain access to additional liquidity through guarantees, they appear to channel it toward internationalization rather than keeping it in reserve. In this sense, even though statistically limited, these results points to a possible trade-off where firms prioritize export expansion over liquidity accumulation.

7. Conclusion

This dissertation set out to answer a central question: Can mutual credit guarantees insure internationalization? By easing collateral constraints and potentially providing liquidity insurance, guarantees were expected to both expand firms' capacity to internationalize ex-ante and stabilize them ex-post when adverse shocks occur (Holmström & Tirole, 1997, 1998). Using Portuguese administrative microdata from the *PME Crescimento* 2012/2013 credit lines, combined with firm-level balance sheet and credit register data, this study examined whether guarantees effectively supported firms' exports, through which margins, and under what conditions, filling a vital gap in both scientific research and policy debate.

The empirical strategy exploited the mechanical discontinuity in maximum guarantee amounts between micro and small firms, focusing on firms with 8–11 employees and requesting the maximum eligible value. By combining this design 2SLS estimation, and dynamic event studies, the analysis achieved credible causal identification of the effects of mutual credit guarantees on firms' internationalization outcomes.

The results yield four key conclusions:

(i) Guarantees boost exports primarily through the intensive margin. Export gains are concentrated among firms that were already exporters, with relative effects emerging right in the first year after treatment and persisting growth along the period. We measured the causal effect of such guarantees, corresponding to an export multiplier of about 3.1 and 3.9 in the second and fifth year after treatment. These findings are consistent with short time required to convert liquidity into durable foreign market relationships, and aligns with theories where financial frictions primarily distort the volume of exports rather than entry.

(ii) Extensive-margin effects are limited and slow. Some firms entered export markets in the medium run, but results are weaker, less robust, and slower to materialize, with differences between firms with larger and smaller guarantees becoming most visible about four years after treatment. These finding suggests that sunk entry costs and informational barriers remain high, consistent with the sunk-cost literature on internationalization. It contrasts with trade finance literature that shows high rates of extensive margin effects.

(iii) The descriptive evidence on guarantee activation reveals alarmingly high default rates among firms that activated guarantees, exceeding 50%, especially in exporters with default rates over 70%. There's no evidence that larger guarantees did improve survival or export

resilience once shocks materialized, not supporting the liquidity-insurance role posited by Holmström and Tirole (1998). In opposition, guarantees were effective mainly ex-ante, by easing collateral constraints before shocks occurred.

(iv) Liquidity–export dynamics point to prioritization of exports. While evidence is not statistically robust, patterns suggest that firms with larger guarantees allocate relatively more liquidity to exports than to precautionary buffers, which is not consistent with Holmström and Tirole (1998). Morover, complementary outcomes (appendix C) show that micro-certified firms with smaller guarantees often perform better in sustaining domestic sales, reinforcing the idea that liquidity support is disproportionately channelled toward external rather than internal markets.

Robustness checks with larger sample provide similar conclusions. Taken together, these findings clarify the dual role of mutual credit guarantees. They are effective in expanding export capacity ex-ante, particularly by scaling up existing exporters, but they do not seem to provide meaningful insurance ex-post once shocks occur at the *PME Crescimento* guarantee sizes observed. In this sense, the collateral channel is empirically validated, but the liquidity-insurance channel remains elusive.

Policy implications follow directly. Mutual guarantees are a valuable tool to support internationalization, especially for SMEs already engaged in foreign markets. This is consistent with recent government strategies that explicitly incorporated credit guarantees among the instruments to foster exports, notably the *Programa Internacionalizar* approved in 2017 by Council of Ministers Resolution (CRM 43/2017) and its successor *Internacionalizar* 2030 approved in 2021 (CRM 20/2021). Yet, if such programs are to function as effective stabilization instruments, their design should evolve. Options include raising guarantee caps, introducing countercyclical or trigger-based components that release additional liquidity during crises, extending grace periods, promoting market-access support, or linking guarantees with complementary tools such as export credit insurance. Properly calibrated, guarantees could provide not only entry-volume, but also genuine shock-contingent liquidity buffers, transforming them into full-fledged insurance mechanisms for internationalization.

This dissertation also offers a strong counterfactual methodology to analyse public policy instruments, addressing a gap in Portuguese reports that have often relied on descriptive or non-causal analyses of such program impacts. For instance, Figueiredo et al. (2013) and

Primitivo et al. (2019) evaluate, respectively, the strategic contribution of innovation and internationalization policies under QREN 2007–2012 and the implementation of PT2020 business support incentives up to 2017, but without applying counterfactual methods, which limits conclusions about policy impacts. By contrast, Mamede et al. (2018) use counterfactual approaches to assess the effects of QREN 2007–2013 incentives on firms' performance, though the comparison between beneficiaries and non-beneficiaries may bias results due to different investment opportunities across groups. This dissertation adopts a theory-driven and methodologically robust approach that may serve as a reference for future impact evaluations of public policies.

Naturally, this research has limitations. The number of activated firms in the sample is small, limiting statistical power in testing the ex-post insurance channel. Certification status was reconstructed, not directly observed, which may introduce measurement noise, despite our strong internal validation of the instrument. The extensive margin was analysed at the firm level, capturing some noise from the intensive margin and without dismantling other dimensions like product or destination diversification. Finally, the results reflect the specific context of Portugal during the sovereign debt crisis, where external demand faced a big boost, and generalization beyond this setting should be made with caution.

These limitations also open avenues for future research. Product and destination-level data could refine the measurement of extensive margins, as in Custódio et. al (2024), and other similar studies. Longer observation horizons could capture delayed effects of guarantees, particularly on entry, despite its causal effects could be difficult to isolate. Program evaluation could extend to alternative designs – larger or layered guarantees, automatic top-ups under shocks, or hybrid schemes combining liquidity support with information and advisory services. Cross-country comparisons would also help assess the external validity of these results and identify best practices in guarantee design.

In closing, this dissertation shows that mutual credit guarantees can play a decisive role in enabling firms to internationalize, but primarily as an ex-ante catalyst rather than as an ex-post shield. They help firms that are already in foreign markets to deepen their presence and increase exports, but they do little to protect them once liquidity shocks strike. Insuring internationalization? If internationalization is to be truly "insured," guarantee schemes must go beyond easing collateral constraints and provide stronger, contingent liquidity support capable of sustaining firms in the face of shocks.

Appendix A. Variables

Here are described the variables used in the empirical analysis, constructed from CBHP. Guarantee values are additionally matched from *Banco Português de Fomento*.

Table A1: Definition of variables used in the empirical analysis

Variable	Formula (CBHP codes)	Components	Interpretation
Exports	MG004 + MG005 + MG007 + MG008	MG004 Sales – EU market MG005 Services – EU market MG007 Sales – Extra-EU market MG008 Services – Extra-EU market	Total exports of goods and services, both intra-EU and extra-EU.
Number of employees	E001	Paid and unpaid employees (headcount)	Firm size measure in terms of employment.
Cash and Deposits	B049	Current assets – Cash and bank deposits	Liquidity buffer in immediately available form.
Liq 1 (Liquidity Level 1)	B049 + Guarantees originated in 2012/2013	B049 Cash and deposits Guarantees under *PME Crescimento* lines 12/13 (BPF)	Basic liquidity buffer: cash holdings plus eligible guarantees.
Liq 2 (Liquidity Level 2)	B049 + All guarantees	B049 Cash and deposits Value of all credit guarantees obtained (BPF)	Broader liquidity buffer: cash plus total guarantees.
Liquidity–Export Ratio	$\frac{\text{Liq 1 V Liq 2}}{\text{Exports}}$	Liquidity Level 1 or 2 Exports	Relative measure of liquidity buffers compared to export sales. High values = stronger liquidity per unit of exports; low values = greater vulnerability to liquidity shocks.
VBP (Gross Production Value)	D001 + D006 + D007 + DL043 + D005	D001 Turnover D006 Variation in production D007 Capitalized production DL043 Supplementary income D005 Operating subsidies	Total value generated by the firm's production activity, broader than turnover alone.
CI (Intermediate Consumption)	D025 + D026 + DL047	D025 Costs of goods sold and material consumed D026 Supplies and external services DL047 Indirect taxes and fees	Value of inputs and services consumed in the production process, including indirect taxes.
Firm Output	$\max\{\text{VBP} - \text{CI}; 0\}$	VBP CI	Net output created by the firm. If inputs exceed production value, output is set to zero (proxy for gross value added at basic prices).
Sales	D001	Turnover (sales of goods, products, and services)	Standard sales revenue measure.
Total assets	B001	Non-current + current assets	Stock of all firm assets (financial, tangible, and intangible).
Fixed assets	B005 (alt. B012 for tangible only)	Intangible assets (incl. goodwill), Land and buildings, Basic equipment, Other fixed assets, Payments on account of fixed assets	Long-term productive resources used in operations. B005 includes both tangible and intangible fixed assets; B012 restricts to tangible only.
Score (RDD running variable)	$\max\left\{E001 \times 5; \frac{min\{D001; B005\}}{40\,000}\right\}$	E001 Number of Employers D001 Turnover B005 Fixed Assets (Normalized so cutoff = 0)	Running variable for regression discontinuity design, determining eligibility. [−10.5, 9.5], ≈ 8–11 employees. [−25.5, 24.95], ≈ 5–14 employees.
Long-term bank credit	B085	Non-current liabilities – Obtained funding	Bank loans and other debt with maturity longer than one year.
Total liabilities	B080	All current and non-current liabilities	Total amount owed to creditors.
Current liabilities	B089	Short-term obligations (suppliers, short-term debt, etc.)	Liabilities with maturity less than one year.
Subsidies	D005	Operating subsidies	Direct financial support to the firm's operations.

Note: Source: Author's construction based on *Banco de Portugal* Central Balance Sheet Harmonized Panel (CBHP). Guarantee values matched from *Banco Português de Fomento* (BPF).

Appendix B. Robustness

To assess the robustness of the findings, we replicated part of the analysis using a broader simple sample of 3 818 firms with 5-14 employees. This extended sample enlarges the number of observations and increases statistical power, though at the cost of reducing internal comparability between treatment and control groups.

Table B1 reports the distribution of activation and default outcomes for this larger sample. The results closely mirror those obtained with the main sample, and there is no evidence that larger guarantees reduce the probability of default, reinforcing the conclusion from Section 6.3 that differences in guarantee size are insufficient to provide resilience against shocks.

Figures B1 replicate the event-study for the expanded sample. Activation patterns remain consistent with the main sample: activated firms display volatile and insignificant dynamics. Among exporters, results confirm positive medium-run effects, albeit with slightly weaker significance. For non-exporters, the extended sample reveals earlier significant gains (at the 10% level) that were not evident before – possibly capturing intensive-margin effects or reflecting the broader, non-rationed sample. Nonetheless, the magnitude and trajectory of the effects are similar across samples.

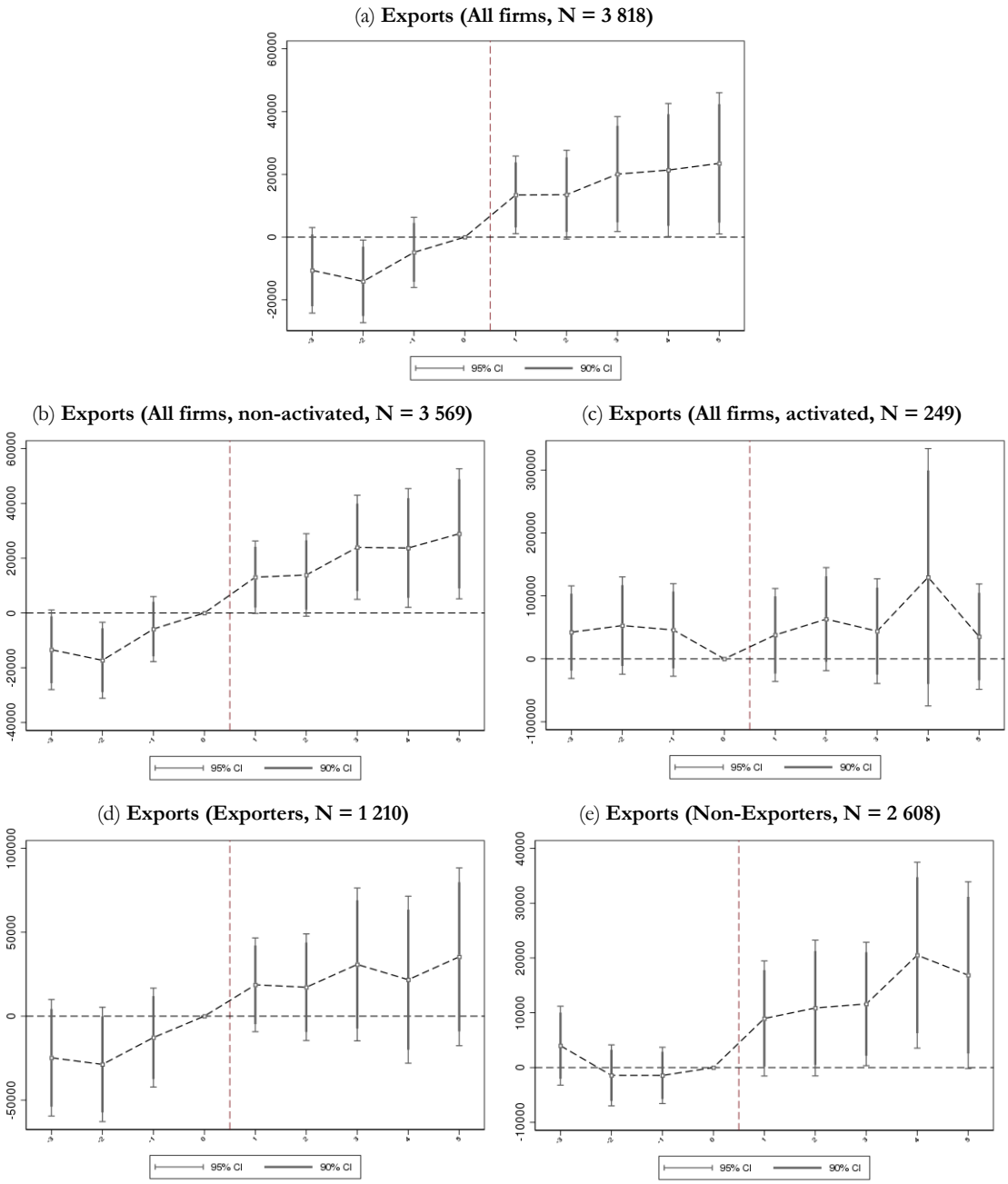
Table B1: Activation and default outcomes (simple, expanded sample)

	(1) All firms			(2) Treatment Group			(3) Control Group		
Guarantee Status	Total Firms	Exit	Exit Rate (%)	Total Firms	Exit	Exit Rate (%)	Total Firms	Exit	Exit Rate (%)
(a) All firms, N = 3 818									
Activated	251	151	60.16%	82	52	63.41%	169	99	58.58%
Non-Activated	3567	96	2.69%	879	15	1.71%	2 688	81	3.01%
Default Rate (%)			3.95%			5.41%			3.47%
(b) Exporters, N = 1 210									
Activated	83	61	73.49%	29	22	75.86%	54	39	72.22%
Non-Activated	1 127	18	1.60%	368	5	1.36%	759	13	1.71%
Default Rate (%)			5.04%			5.54%			4.80%
c) Non-Exporters, N = 2 608									
Activated	168	90	53.57%	53	30	56.60%	115	60	52.17%
Non-Activated	2 440	78	3.20%	511	10	1.96%	1 929	68	3.53%
Default Rate (%)			3.45%			5.32%			2.94%

Note: The table reports the number of firms that activated or did not activate a credit guarantee in our matched sample (5 to 14 employees, N = 3 818). Panel (a) covers the full sample, (b) exporters (N = 1 210), and (c) non-exporters (N = 2 608). Default is defined as disappearance from the dataset after activating a guarantee; firms that exited without activating a guarantee are not considered defaults, as these cases are assumed to reflect strategic decisions (e.g., mergers or acquisitions). For each group, the table shows the total number of firms, the number of exits from the dataset, and the corresponding exit rate. The last row in each panel reports the default rate, defined as the defaults divided by the total number of firms in the specification. Columns (2) and (3) further break down the results by certification status, distinguishing between small (treatment) and micro (control) certified firms. Data sources: Banco Português de Fomento and Banco de Portugal.

Taken together, these checks confirm the main insights: larger guarantees do not improve survival outcomes, and the export-promoting effects of guarantees are robust to alternative specifications, even if their timing and statistical precision vary with sample definition.

Figure B1: Event-study estimates of the impact of credit guarantees on exports (simple, expanded sample)

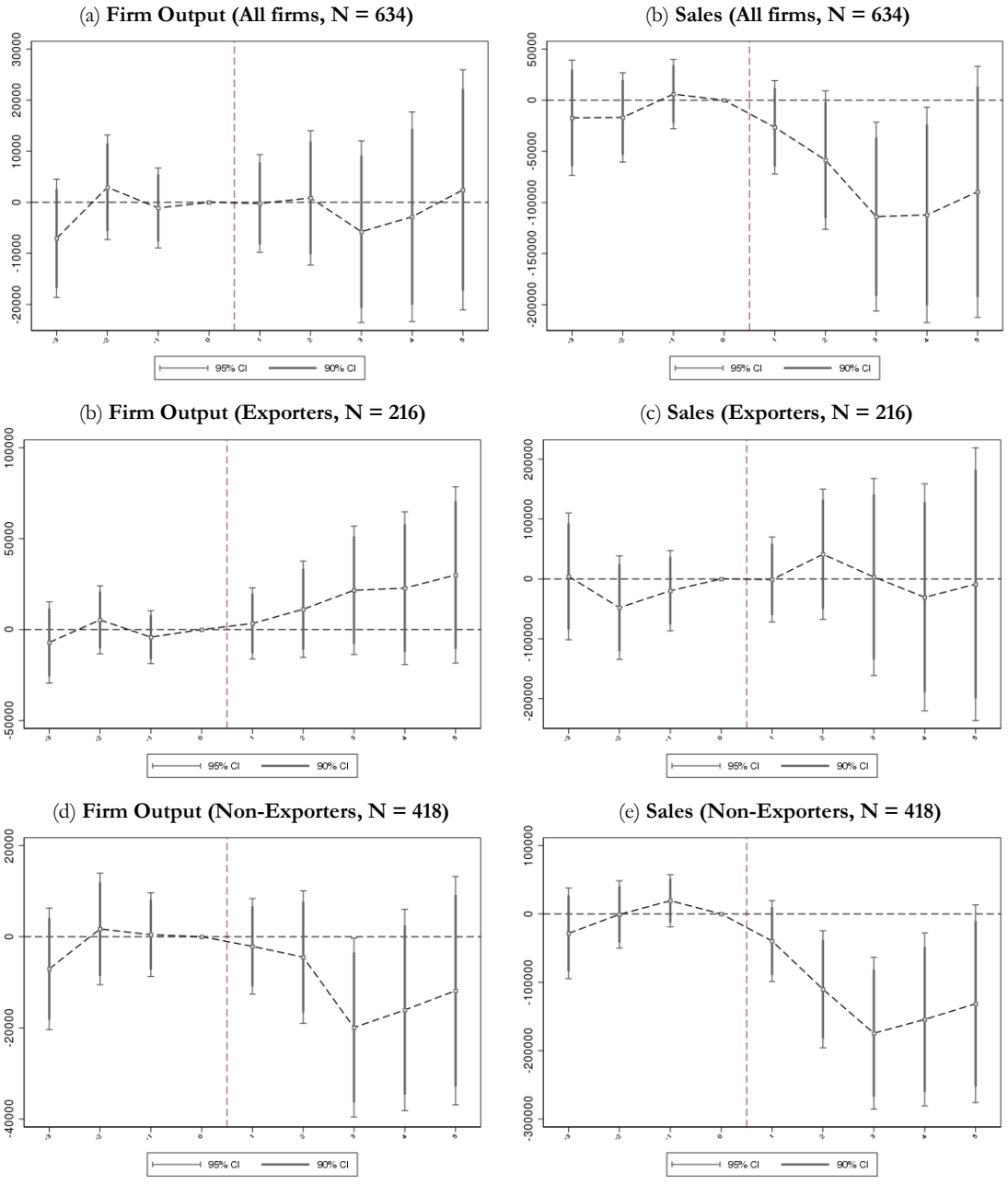


Note: The figure plots dynamic DiD estimates of the effect of credit guarantees on firms' exports, relative to the year of treatment (t = 0), on a simpler expanded sample. Panel (a) report results for all 3 818 firms, Panel (b) and (c) reports results for 3 569 firms that did not activate guarantees and 249 firms that did activate, while Panel (d) and (e) reports results for 1 210 exporters and 2 608 non-exporters. Coefficients δ_k associated with the variable $Treated_i$, where the dependent variable is exports, are reported with 95% and 90% confidence intervals. Firm, industry and year fixed effects are included. The horizontal axis represents time in years before and after the treatment (baseline = 0), with the vertical dashed line marking the origination date of the guarantee. The vertical axis measures differences in exports (euros) between the treated and the control groups. Sample period: 2008-2017. Data sources: Banco Português de Fomento and Banco de Portugal.

Appendix C. Complementary Analysis

To complement the export-focused analysis, this section investigates additional firm outcomes, providing a broader view of how guarantees shape firm dynamic, and help to interpret the heterogeneous export results presented in section 6.

Figure C1: Event-study estimates of the impact of credit guarantees on firm output and sales



Note: The figure plots dynamic DiD estimates of the effect of credit guarantees on firm output (right) and sales (left), relative to the year of treatment (t = 0). Panel (a) and (b) report results for all firms, Panel (c) and (d) for exporters only, and Panel (e) and (f) for non-exporters. Coefficients δ_k associated with the variable $Treated_i$, where the dependent variable is exports, are reported with 95% and 90% confidence intervals. Firm, industry and year fixed effects are included. The horizontal axis represents time in years before and after the treatment (baseline = 0), with the vertical dashed line marking the origination date of the guarantee. The vertical axis measures differences in firm output/sales (euros) between the treated and the control groups. Sample period: 2008-2017. Data sources: Banco Português de Fomento and Banco de Portugal.

Table C1: Stage 2 regression results for firm output and sales, two and five years after treatment

	2nd Year after treatment				5th Year after treatment			
	All firms		Exporters		All firms		Exporters	
	(1) Firm Output	(2) Sales	(3) Firm Output	(4) Sales	(5) Firm Output	(6) Sales	(7) Firm Output	(8) Sales
Value of guarantee	-39.460	-2229.242	1390.039*	4111.976	114.762	-3101.222	2080.006	3961.005
	(369.504)	(1926.765)	(746.051)	(3094.422)	(651.819)	(3494.716)	(1390.623)	(6509.069)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-Stage	No	No	No	No	No	No	No	No
Second-Stage	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	634	634	216	216	634	634	216	216
Adjusted R-squared	-0.007	-0.027	-0.027	-0.049	0.019	-0.031	-0.062	-0.061

Note: The table reports the 2SLS estimates of the effect of the value of the credit guarantee on firm output and sales, where the guarantee value, in thousands of euros, is instrumented by firm certification status (micro vs. small). Columns (1) to (4) present results for the second year after treatment, while Columns (5) to (8) present results for the fifth year after treatment. Columns (1), (3), (5) and (7) include the full sample of 634 firms, columns (2), (4), (5) and (8) restrict the sample to 216 exporters. Control variables include total assets, fixed assets, sales, exports, cash and deposits, and leverage. Robust standard errors are reported in parentheses, and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Data sources: Banco Português de Fomento and Banco de Portugal. Full table on annex 6.

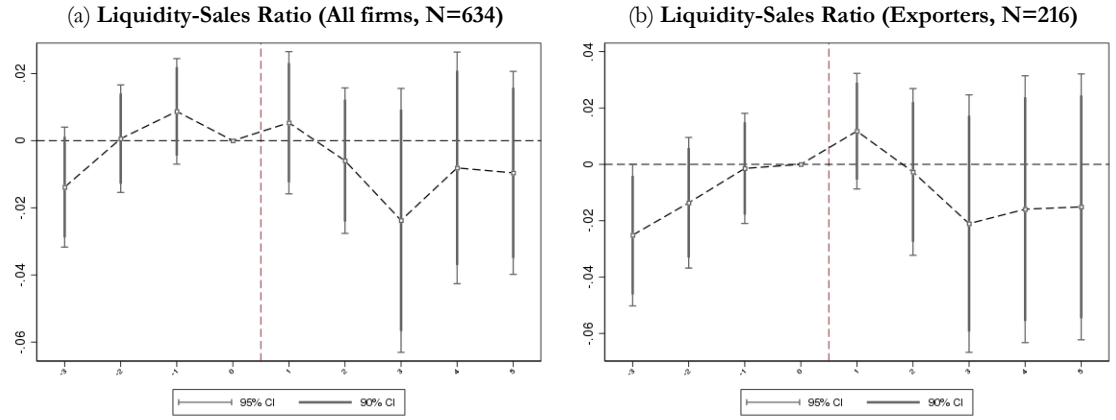
The results for firm output (Table C1; Figure C1, left-side Panels) show no significant effects for the full sample. However, when distinguishing by exporter status, different patterns emerge. Among exporters, output displays a temporary positive effect in the second year after treatment, significant at the 10% level in the regression estimates, and an upward trend in the event-study. This finding is consistent with the earlier evidence of guarantees supporting the intensive export margin in the short run. In contrast, non-exporters show a negative trend, with a statistically significant effect on output around the third year (Figure 7d), suggesting that, in the domestic market, micro-certified firms with smaller guarantees may perform relatively better than those with larger guarantees. These insights seems aligned with internationalization literature associating exporters tendency to be bigger and more productive firms, with lower liquidity constraints (Melitz, 2003; Channey, 2016).

Turning to sales (Table C1; Figure C1, right-side Panels), which reflect domestic market performance along with exports, the results reveal no positive effects of larger guarantees. On the contrary, for the full sample, sales exhibit a downward trajectory in the event-study estimates, significant from the second year, with non-exporters driving this decline. These results contrast with the export-oriented findings in Section 6.2, where larger guarantees supported internationalization along the intensive and extensive margins. Taken together, they suggest that the benefits of larger guarantees are more strongly associated with international rather than domestic expansion, while micro-certified firms with smaller

guarantees may retain an advantage in sustaining local sales growth. This asymmetry highlights that the mechanism of guarantees may not be neutral across markets and while they boost external competitiveness, they do not necessarily reinforce firms' internal demand performance.

Finally, the liquidity-sales ratio (Figure C2) measure captures the extent to which guarantees affect firms' liquidity position in proportion to their overall activity, regardless of whether sales are domestic or export-oriented. We can't assume parallel trends and results show greater variability than those obtained for liquidity–export ratios, with coefficients never reaching statistical significance. In other words, we do not find evidence that differences in guarantee size translate into changes in liquidity relative to firms' total activity. Compared to the liquidity–export ratios, where some weak evidence suggested that firms with larger guarantees prioritize exports over liquidity accumulation, the liquidity–sales ratios do not point to any consistent reallocation.

Figure C2: Event-study estimates of the impact of credit guarantees on liquidity-sales ratio



Note: The figure plots dynamic DiD estimates of the effect of credit guarantees on firms' liquidity-sale ratio, relative to the year of treatment (t = 0). The ratio include a liquidity measure composed by cash and deposits and guarantees originated in 2012/2013. Panel (a) report results for all firms, while Panel (b) for exporters only. Coefficients δ_k associated with the variable *Treated*, where the dependent variable is exports, are reported with 95% and 90% confidence intervals. Firm, industry and year fixed effects are included. The horizontal axis represents time in years before and after the treatment (baseline = 0), with the vertical dashed line marking the origination date of the guarantee. The vertical axis measures differences in liquidity-sales ratio between the treated and the control groups. Sample period: 2008-2017. Data sources: Banco Português de Fomento and Banco de Portugal.

Overall, this complementary analysis shows that while larger guarantees play an important role in enabling export expansion, especially among exporters, their effects on broader firm performance are less clear. In some cases, smaller guarantees are associated with relatively better outcomes, particularly in domestic market indicators such as sales and firm output among non-exporters.

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Annex 1: Portuguese Key Performance Indicators 2007-2019

	Gdp Growth Rate (%)	Exports Volume (M€)	Inflation Rate (%)	Tourism receipts (% of exports)
2007	2.507	55 225.51	2.45	17.09
2008	0.319	56 528.38	2.59	16.88
2009	-3.122	47 942.54	-0.83	18.44
2010	1.738	54 386.02	1.4	18.03
2011	-1.714	61646.63	3.65	17.37
2012	**-4.051**	**64 282.69**	**2.77**	**17.66**
2013	**-0.984**	**68 517.77**	**0.27**	**17.67**
2014	0.741	70 588.37	-0.28	18.75
2015	1.59	74 122.96	0.49	19.47
2016	2.004	75 896.97	0.61	20.65
2017	3.315	84 439.8	1.37	22.58
2018	2.946	90 007.75	0.99	22.94
2019	2.746	94 166.11	0.34	23.33
Data Source	BPStat *Serie/12518303*	BPStat *Serie/12512408*	BPStar *Serie/12704650*	World Bank *ST.INT.RCPT.XP.ZS*
Last update	May 20, 2025	August 19, 2025	April 30, 2025	n.d.

Note: The table reports annual values for four macroeconomic indicators. GDP Growth Rate (%) is measured as the year-on-year change in chained-volume gross domestic product at market prices. Exports Volume (M€) corresponds to the credit side of the balance of payments goods and services account for the total economy with all counterparties, reported in millions of euros. Inflation Rate (%) is the annual year-on-year change in the Consumer Price Index for all items. Tourism receipts (% of exports) measure international tourism receipts (including payments for passenger transport) as a share of total exports of goods and services, following IMF balance of payments definitions. Sample period: 2007-2019. Restriction for Portugal. Source: Author's construction based on BPStat (https://bpstat.bportugal.pt/) and World Bank (https://databank.worldbank.org/source/world-development-indicators) data.

Annex 2: Extended Table 5:
Stage 1 regression results for all firms, exporters and non-exporters

	(1) Value of guarantee (All Firms)	(2) Value of guarantee (Exporters)	(3) Value of guarantee (Non-Exporters)
Treated$_i$	17.797***	18.099***	17.778***
	(0.211)	(0.394)	(0.248)
Total Assets	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Fixed Assets	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Sales	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Exports	0.000	0.000	
	(0.000)	(0.000)	
Cash and Deposits	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Leverage	0.884	0.817	0.419
	(0.564)	(1.127)	(0.648)
First-Stage	Yes	Yes	Yes
Second-Stage	No	No	No
Observations	634	216	418
Adjusted R-squared	0.933	0.937	0.940

Note: The table displays estimates of the coefficient on Treated$_i$ from regressions of the value of the guarantee on Treated$_i$ and firm-level controls, including total assets, fixed assets, sales, exports, cash and deposits and leverage. The variable Treated$_i$ is a binary indicator equal to 1 if the firm is small-certified. Column (1) presents results for the sample of covering all 634 firms close to the cutoff of approximately 8-11 employers, with matching, while column (2) and (3) presents, respectively, results for sub-samples for 216 exporters and 418 non-exporters. Robust standard errors are reported in parentheses, and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Data sources: Banco Português de Fomento and Banco de Portugal.

Annex 3: Extended Table 7:

Stage 2 regression results for exports for all firms, exporters and non-exporters, 2 and 5 years after treatment

	2nd Year after treatment			5th Year after treatment		
	(1) All firms	(2) Exporters	(3) Non-Exporters	(4) All firms	(5) Exporters	(6) Non-Exporters
	Exports	Exports	Exports	Exports	Exports	Exports
Value of guarantee	595.882	3 191.512**	-103.405	2 121.251**	3 930.136*	975.756
	(556.554)	(1 340.405)	(462.823)	(911.262)	(2 379.058)	(648.825)
Total Assets	0.022*	0.095***	-0.017	-0.026	0.003	-0.000
	(0.013)	(0.030)	(0.011)	(0.021)	(0.054)	(0.016)
Fixed Assets	-0.054**	-0.214***	0.000	0.051	0.148	-0.017
	(0.025)	(0.069)	(0.021)	(0.042)	(0.122)	(0.029)
Sales	0.027***	0.009	0.029***	-0.022*	-0.099***	0.000
	(0.008)	(0.020)	(0.007)	(0.013)	(0.035)	(0.009)
Exports	0.039*	0.014		0.107***	0.184***	
	(0.021)	(0.033)		(0.035)	(0.059)	
Cash and Deposits	-0.120**	-0.492***	-0.019	-0.030	-0.323	-0.023
	(0.059)	(0.167)	(0.046)	(0.096)	(0.297)	(0.065)
Leverage	-14 193.105	-21 985.501	-9 441.665	40 734.736	96 182.011	12 921.245
	(26 246.306)	(67 023.340)	(2 1247.739)	(42 973.819)	(118 958.44)	(29 786.896)
First-Stage	No	No	No	No	No	No
Second-Stage	Yes	Yes	Yes	Yes	Yes	Yes
Observations	634	216	418	634	216	418
Adjusted R-squared	0.009	0.034	-0.030	-0.036	-0.052	-0.096

Note: The table reports the 2SLS estimates of the effect of the value of the credit guarantee on firms' exports, where the guarantee value, in thousands, is instrumented by firm certification status (micro vs. small). Columns (1) to (3) present results for the second year after treatment, while Columns (4) to (6) present results for the fifth year after treatment. Columns (1) and (4) include the full sample of 634 firms, columns (2) and (5) restrict the sample to 216 exporters, and columns (3) and (6) to 418 non-exporters. Control variables include total assets, fixed assets, sales, exports, cash and deposits, and leverage. Robust standard errors are reported in parentheses, and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Data sources: Banco Português de Fomento and Banco de Portugal.

Annex 4: Extended Table 8:
Stage 1 regression results for firms that activated and didn't activate the guarantee

	(1) All firms	(2) Firms that did not activate	(3) Firms that activated
	Value of guarantee	Value of guarantee	Value of guarantee
Treated$_i$	17.797***	17.836***	17.780***
	(0.211)	(0.212)	(1.545)
Total Assets	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Fixed Assets	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Sales	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Exports	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Cash and Deposits	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Leverage	0.884	1.193**	-2.657
	(0.564)	(0.564)	(5.032)
First-Stage	Yes	Yes	Yes
Second-Stage	No	No	No
Observations	634	588	46
Adjusted R-squared	0.933	0.938	0.844

Note: The table displays estimates of the coefficient on Treated$_i$ from regressions of the value of the guarantee on Treated$_i$ and firm-level controls, including total assets, fixed assets, sales, exports, cash and deposits and leverage. The variable Treated$_i$ is a binary indicator equal to 1 if the firm is small-certified. Column (1) presents results for the sample of covering all 634 firms close to the cutoff of approximately 8-11 employers, with matching, while column (2) and (3) presents, respectively, results for sub-samples for 588 firms that didn't activate the guarantee and 46 firms that activated guarantees at some point of our sample period. Robust standard errors are reported in parentheses, and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Data sources: Banco Português de Fomento and Banco de Portugal.

Annex 5: Extended Table 10:

Stage 2 regression results for exports for activated and non-activated guarantees, 2 and 5 years after treatment.

	2nd Year after treatment			5th Year after treatment		
	(1) All firms	(2) Firms that did not activate	(3) Firms that activated	(4) All firms	(5) Firms that did not activate	(6) Firms that activated
	Exports	Exports	Exports	Exports	Exports	Exports
Value of guarantee	595.882	736.603	1 032.139	2 121.251**	2 401.69***	390.425
	(556.554)	(585.009)	(1186.952)	(911.262)	(895.863)	(787.629)
Total Assets	0.022*	0.027*	-0.026	-0.026	-0.023	-0.033***
	(0.013)	(0.015)	(0.018)	(0.021)	(0.022)	(0.012)
Fixed Assets	-0.054**	-0.064**	0.048	0.051	0.035	0.083**
	(0.025)	(0.027)	(0.061)	(0.042)	(0.041)	(0.041)
Sales	0.027***	0.032***	-0.005	-0.022*	-0.003	-0.003
	(0.008)	(0.009)	(0.011)	(0.013)	(0.013)	(0.008)
Exports	0.039*	0.021	0.212***	0.107***	0.196***	-0.785***
	(0.021)	(0.022)	(0.037)	(0.035)	(0.034)	(0.024)
Cash and Deposits	-0.120**	-0.150**	0.266	-0.030	-0.113	0.342**
	(0.059)	(0.062)	(0.218)	(0.096)	(0.094)	(0.145)
Leverage	-14 193.105	-16201.892		40 734.736	50 738.572	
	(26 246.306)	(27 482.578)		(42 973.819)	(42 085.861)	
First-Stage	No	No	No	No	No	No
Second-Stage	Yes	Yes	Yes	Yes	Yes	Yes
Observations	634	588	46	634	588	46
Adjusted R-squared	0.009	0.012	0.196	-0.036	0.013	0.950

Note: The table reports the 2SLS estimates of the effect of the value of the credit guarantee on firms' exports, where the guarantee value, in thousands, is instrumented by firm certification status (micro vs. small). Columns (1) to (3) present results for the second year after treatment, while Columns (4) to (6) present results for the fifth year after treatment. Columns (1) and (4) include the full sample of 634 firms, columns (2) and (5) restrict the sample to 588 firms that didn't activate the guarantee and and columns (3) and (6) to 46 firms that activated guarantees at some point of our sample period. Control variables include total assets, fixed assets, sales, exports, cash and deposits, and leverage. Robust standard errors are reported in parentheses, and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Data sources: Banco Português de Fomento and Banco de Portugal.

Annex 6: Extended Table B1:

Stage 2 regression results for firm output and sales, 2 and 5 years after treatment

	2nd Year after treatment				5th Year after treatment			
	All firms		Exporters		All firms		Exporters	
	(1) Firm Output	(2) Sales	(3) Firm Output	(3) Sales	(5) Firm Output	(3) Sales	(7) Firm Output	(4) Sales
Value of guarantee	-39.460	-2229.242	1390.039*	4111.976	114.762	-3101.222	2080.006	3961.005
	(369.504)	(1926.765)	(746.051)	(3094.422)	(651.819)	(3494.716)	(1390.623)	(6509.069)
Total Assets	-0.016*	0.012	-0.006	0.060	-0.044***	-0.200**	-0.067**	-0.306**
	(0.009)	(0.045)	(0.017)	(0.070)	(0.015)	(0.082)	(0.031)	(0.146)
Fixed Assets	0.022	0.029	-0.056	-0.451***	0.050*	0.416***	0.028	0.168
	(0.017)	(0.088)	(0.038)	(0.159)	(0.030)	(0.160)	(0.072)	(0.335)
Sales	0.004	-0.097***	-0.014	-0.014	0.002	-0.124**	-0.001	-0.091
	(0.005)	(0.027)	(0.011)	(0.045)	(0.009)	(0.049)	(0.020)	(0.095)
Exports	0.005	0.093	0.005	-0.052	0.063**	0.199	0.054	0.076
	(0.014)	(0.073)	(0.019)	(0.077)	(0.025)	(0.133)	(0.035)	(0.162)
Cash and Deposits	0.016	0.328	-0.115	-0.471	0.126*	0.906**	0.020	0.659
	(0.039)	(0.204)	(0.093)	(0.387)	(0.069)	(0.370)	(0.174)	(0.813)
Leverage	-28643.732	-33201.838	-37113.275	-76727.673	-16012.872	8092.022	-27040.857	-92402.059
	(17425.303)	(90863.543)	(37304.285)	(154728.275)	(30738.879)	(164805.890)	(69534.393)	(325468.543)
First-Stage	No	No	No	No	No	No	No	No
Second-Stage	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	634	634	216	216	634	634	216	216
Adjusted R-squared	-0.007	-0.027	-0.027	-0.049	0.019	-0.031	-0.062	-0.061

Note: The table reports the 2SLS estimates of the effect of the value of the credit guarantee on firm output and sales, where the guarantee value, in thousands, is instrumented by firm certification status (micro vs. small). Columns (1) to (4) present results for the second year after treatment, while Columns (5) to (8) present results for the fifth year after treatment. Columns (1), (3), (5) and (7) include the full sample of 634 firms, columns (2), (4), (5) and (8) restrict the sample to 216 exporters. Control variables include total assets, fixed assets, sales, exports, cash and deposits, and leverage. Robust standard errors are reported in parentheses, and ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Data sources: Banco Português de Fomento and Banco de Portugal.

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