Access to Credit, Exports, and Product Quality*

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Abstract

We show that access to credit is a key barrier in the production and export of high quality goods. We analyze a credit support scheme in Portugal that provided government guarantees on loans to small and medium-sized enterprises. Regression discontinuity estimates based on program eligibility criteria indicate that qualifying firms expanded export activity on both the intensive and extensive margins and increased the quality of exported goods. Panel regressions focusing on a handful of vertically differentiated goods—wine, cork, and olive oil—indicate a similar impact on quality. Our results highlight an understudied mechanism linking financial and economic development.

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1 Introduction

High income countries tend to both demand and export high quality products (Linder, 1961; Hummels and Klenow, 2005; Khandelwal, 2010). Consequently, the ability to produce high quality goods to sell abroad is seen as crucial component of economic development (Kremer, 1993; Amiti and Khandelwal, 2013). A growing literature has documented the role of organizational and input-market frictions as barriers to quality upgrading.[1] However, despite the well established relationship between financial development and economic growth (Schumpeter, 1911; Rajan and Zingales, 1998) there is little evidence on the importance of credit access in the decision to produce and export high quality goods (Verhoogen, 2021).

In this paper, we show that credit access acts as a meaningful driver of export quality. We focus on a natural experiment generated by the eligibility criteria for a Portuguese credit support scheme that provided government guarantees on loans to small and medium sized enterprises in the years following the great recession. Our primary empirical strategy tests whether qualification for the scheme increases export activity and product quality using a regression discontinuity approach. We supplement this using panel regressions that focus on the introduction of the scheme and address the challenges of observing product quality with complementary analyses that focus on (i) input quality and (ii) firms in a selected set of vertically differentiated goods—wine, cork and olive oil—in which quality can be directly measured.

We find that access to the credit guarantee scheme increases exporting on both the intensive and extensive margins and leads to firms to expand their export products and destinations. Furthermore, access to the scheme leads to improvements in various measure of export product quality. Qualifying firms receive higher prices within narrow product-country pairs and have higher quality according to a theory based metric following Khandelwal, Schott, and Wei (2013). Survey evidence suggests that these firms pay higher prices for inputs, consistent with the production of higher quality outputs. Finally, we show that qualifying firms in three major (and vertically differentiated) categories produce higher quality goods: extra virgin olive oil, natural cork, and DOP (Denominaço de Origem Protegida) certified wine. Given the importance of high-quality ex-

[1] This includes Bas and Strauss-Kahn (2015) and Fan, Li, and Yeaple (2015) on import tariffs, Hornbeck and Naidu (2014) and Imbert, Seror, Zhang, and Zylberberg (2018) on the supply of skilled labor, and Atkin, Khandelwal, and Osman (2017) and Hansman, Hjort, León-Ciliotta, and Teachout (2020) on organizational frictions.

porting in industrial development, these results highlight a significant mechanism through which financial markets enable economic growth.

Portugal is an ideal setting in which to study the relationship between credit and export quality for at least three reason. First, the particular implementation of the credit guarantee scheme generated sharp variation in access to credit (Custodio, Bonfim, and Raposo, 2021). Second, detailed transaction level export data are available in the Portuguese context. This includes quantities, prices, destinations, and fine-grained (8-digit) product categories. We match this to rich data on firm financials as well as survey data on production inputs. Third and finally, we study a major period of export expansion. A drop in domestic demand in the post-financial crisis period led firms to shift to external markets. Between 2009 and 2017, exports as a fraction of GDP grew by roughly 15 percentage points. This allows us to focus on a sample in which the returns to upgrading quality may have been particularly high.

Our analysis revolves around the details of the credit guarantee scheme, the *SME-Leader Program*, which began in 2008. This program provided qualifying firms with an official certification—mimicking a standard credit rating—and access to credit lines backed by a partial government guarantee. These credit lines featured below market interest rates, a streamlined approval process, and guarantees of up to 70 percent. Firms qualified for the program if their recent financial and operating performance exceeded fixed thresholds for each of a set of eligibility criteria. The explicit variables considered (and qualifying thresholds) changed from year to year, but included net income, total sales, EBITDA/assets and more. The multidimensional nature of the eligibility criteria generated a series of discontinuities across different financial variables. We convert these to a one-dimensional index following the methodology of Ferreira, Ferreira, and Mariano (2018) and compare firms that marginally qualify to those that just fail to qualify. Consistent with Custodio et al. (2021), surpassing the eligibility criteria sharply increases the probability of program take-up and the quantity of firm borrowing.

We begin by showing that program eligibility led to increases in export activity in our sample period (2009-2017). Our regression discontinuity estimates suggest that qualifying firms were more likely to export compared to similar non-qualifying firms and exported greater quantities. We also show that these firms exported in a more diverse set of 8-digit product categories and reached a larger number of export destinations. We confirm these results using a panel approach

that includes firm and year fixed effects and exploits variation in the timing of qualification across firms.

We then turn to showing our central result: that the credit access provided by the SME-Leader Program allowed firms to increase the quality of exported goods. Measuring product quality is notoriously challenging, but our baseline strategies utilize the fine detail of Portuguese export data. We take two approaches. First, we consider unit-prices within narrow product-destination-year cells. In other words, fixing the year, destination country, and product, we ask whether eligible firms charge higher export prices compared to ineligible firms. Both our regression discontinuity and panel approaches confirm that this is the case. We then consider an alternative quality measure derived from the assumption of a CES demand system following Khandelwal et al. (2013). This approach effectively considers relative market shares, conditional on price, for different firms within product-destination-year cells. We again find that eligibility improves this measure of product quality using both regression discontinuity and panel approaches.

Both of these approaches are subject to a key criticism, which is that differences in prices across firms might reflect differences in mark-ups, market power, or marginal costs rather than product quality. We address this possibility in two ways. First, following Kugler and Verhoogen (2011) and Bastos, Silva, and Verhoogen (2018), we consider the prices paid by qualifying firms on the *inputs* into their production processes as a measure of quality. The key intuition is that more productive firms should both demand higher quality inputs and produce higher quality outputs. We find that access to credit via the SME-Leader Program indeed leads firms to pay more for inputs within narrow product categories. The fact that qualifying firms also export larger quantities suggests that this is indeed a reflection of quality production, rather than differences in marginal cost.

We next address this criticism by considering a series of vertically differentiated product categories with well developed and observable quality measures. We look specifically at three major Portuguese exports: olive oil, cork, and wine. For each, we focus on a binary metric of quality: extra-virgin olive oil, natural (vs. agglomerated) cork and DOP certified wine, which is recoverable within our export data. We analyze exports to core high-income export markets in North America. We find that access to the credit guarantee program increases exports of high quality goods within each product category. This provides a confirmation of our baseline results that is not dependant on an inferred or model-implied quality metrics.

The primary contribution of our paper comes in providing causal evidence on the role of credit access as a driver of export quality. This adds directly to a fast growing literature, as reviewed in Verhoogen (2021), on barriers to quality upgrading. This includes work on the role of access to imported inputs (e.g. Goldberg, Khandelwal, Pavcnik, and Topalova, 2010; Bas and Strauss-Kahn, 2015; Fan et al., 2015; Bas and Paunov, 2021), domestic inputs (e.g. Hornbeck and Naidu, 2014; Imbert et al., 2018), asymmetric information on product quality (e.g. Bai, Gazze, and Wang, 2021), knowledge and access to best practices (Bloom, Mahajan, McKenzie, and Roberts, 2020) and more. Despite the central role of access to trade credit for export activity, and widespread evidence on efficiencies generated by credit constraints across sectors, little evidence exists on the role of credit in the quality upgrading process.[2]

We also contribute to a broader literature on the role of credit in export activity by providing causal evidence of an impact on the extensive margin. This echos a theoretical literature that emphasizes an extensive margin effect of credit access using Melitz (2003) style models with fixed export costs (e.g. Manova, 2013; Chaney, 2016) which has largely been supported by empirical work that uses inferred or survey based measures of credit constraints (Minetti and Zhu, 2011; Muûls, 2015). However, well identified shock-based estimates on the role of credit supply in trade has largely emphasized the intensive margin (Paravisini, Rappoport, Schnabl, and Wolfenzon, 2015).

Finally, we contribute to the expanding literature on the role and efficacy of government backed loan guarantee programs. This includes companion work on the SME-Leader Program in Portugal (Custodio et al., 2021), analyses of similar programs in the UK after the great recession and during the COVID crisis (Gonzalez-Uribe and Wang, 2020), the analysis of similar programs across international contexts (Lelarge, Sraer, and Thesmar, 2010; Bach, 2014; Bachas, Kim, and Yannelis, 2021; Columba, Gambacorta, and Mistrulli, 2010), and theoretically grounded work on the trade-offs inherent in credit guarantee schemes. We add to this work by considering the efficacy of these programs for export activity generally, and the production of high quality goods in particular.

Our paper is organized as follows. In Section 2 we introduce the details of the SME Leader

[2]In indirectly related work Bau and Matray (2020) consider the impacts of of capital market integration and Rotemberg (2019) consider the impacts of firm subsidies on TFPQ in India, both finding no discernible impact.

Scheme and describe the data used in our analysis. In Section 3 we introduce our empirical strategy and in Section 4 we present our results. We conclude in Section 5.

2 Data and the Portuguese Credit Guarantee Scheme

2.1 The Portuguese Credit Guarantee Scheme: The SME-Leader Program

The *SME-Leader Program* is a credit guarantee scheme in Portugal run by a government agency (IAPMEI). The scheme begin in the aftermath of the financial crisis with the stated goal of ensuring that the best performing SMEs had access to financing during the downturn. Since 2008, this program has provided qualifying firms with an official certification—mimicking a standard credit rating—and access to credit lines backed by a partial government guarantee. This allows firms to borrow at subsidised rates and in a more streamlined and standardized process for credit approval. The terms and conditions applied vary across credit lines and changed throughout the sample period. For illustration purposes, the maximum spread that banks could place on credit lines granted to *SME-Leader firms* in 2015 ranged between 2.7 and 3 p.p. above the 6-month Euribor.[3] Firms also had to pay a commission for access to the mutual guarantee, which was at most 0.65%. The maximum government guarantee and loan maturity varied across credit lines. In 2015, the maximum guarantee was between 50% and 70%, while the maximum loan maturity allowed was 10 years.

To be eligible for *SME Leader* status in a given year, a firm has to satisfy a set of criteria based on financial and operational indicators. The eligibility criteria are defined with respect to financial statements on the previous year. These have changed every year since the creation of the program. Over time, the set of criteria included the following financial variables and ratios: total assets, number of employees, total sales, net income, EBITDA, net income/assets, net income/equity, equity/assets, EBITDA/assets, EBITDA/sales, debt/EBITDA, sales growth and EBITDA growth. Thresholds for each criteria have also changed over time. Appendix B shows the explicit set of criteria for each year.

Firms submit their application to the program through a Portuguese commercial bank that participates in the scheme. All the largest banks in Portugal participated in the program. There

[3]For reference, the average spread for new loans under 1 million euros was 3.8 p.p. in the same period.

is no application fee. The bank evaluates whether the firm meets the eligibility criteria, performs credit screening, and submits the final application to IAPMEI. The bank also negotiates the interest rate and other commercial fees with the firm and maintains its monitoring function. The official certification is valid for one year and must be renewed every year under the new conditions, although both loans and guaranties can have longer maturity.

Unlike credit rating agencies, IAPMEI does not screen the firms, it simply defines the criteria for eligibility. If conditions are met, firms are automatically qualified. The typical timeline of the program in a given year is as follows. Firms submit their annual financial reports during April to the relevant authorities; eligibility criteria based on the filed financial statements are announced, and firms apply to the program during the summer; the list of certified firms is publicly announced by IAPMEI early in the fall; firms benefit from their certified status until September of the following year. Over the years of the program the announcement of the list of certified firms has shifted more towards later in the fall, but the application has never preceded the filing for financial information, which reduces the ability of firms to manipulate financial data in order to be eligible.

2.2 Data

We use data from a number of sources:

Data on Enrollment and Qualification for the Guarantee Scheme (IAPMEI). We use data on the program criteria and identity of certified firms between 2008 and 2018 from the government agency responsible for the *SME-Leader* program (IAPMEI).

Balance Sheet Data (SCIE). We merge these data with firms' detailed accounting data that we retrieve from the Portuguese Central Balance Sheet database. We use each firm's unique fiscal identification number as the common identifier. The Portuguese Central Balance Sheet database covers all non-financial firms operating in Portugal . The data are sourced from *Sistema de Contas Integradas das Empresas* (SCIE), a joint project of the Ministry of Finance, Ministry of Justice, Statistics Portugal and Banco de Portugal. The aim of this project is to integrate most of the information that all Portuguese firms have to report for legal, fiscal and statistical purposes. This is the

information used in the program to confirm whether a firm meets the eligibility criteria. Banco de Portugal revises the data for economic and statistical analysis purposes (this revised version of the data is the Central Balance Sheet database). We collect this data from 2007 to 2018.

The fact that we have access to firms' accounting data and to the eligibility criteria defined by IAPMEI allows us to reconstruct the criteria for each firm and identify all firms that are eligible for the program in each year. Additionally, the SCIE database also includes the total export volume of goods and services by firm, in each year, which we will use as outcome variable.

Trade Flows (INE) We combine these data with export flows data. The Foreign Trade Statistics (FTS) database records virtually all trade flows of goods between Portuguese firms and international trade partners. This database includes firm-level detailed information on the product exported, the destination market, and the value and quantity exported. These data is collected by the *Instituto Nacional de Estatística (INE)* (Portuguese national statistics institute) and it is the official Portuguese source of information on imports and exports both with EU and non-EU trade partners. Data on trade transactions with non-EU countries (*Estatísticas Correntes do Comércio Extracomunitário*) are obtained from the customs clearance system, covering the universe of external trade transactions of good. Data on transactions with EU members (*Estatísticas Correntes do Comércio Intracomunitário*) are recorded trough *Instrastat*. This system requires firms whose annual value of total exports exceeds a predetermined threshold to provide information on all its exports and imports. This threshold is determined to assure that at least 97% of the total value of intra EU trade transactions is reported in this database. We obtain data from the FTS from 2008 to 2017.

Exported products' classification is defined at an eight-digit code level entitled *Nomenclatura Combinada* (Combined Nomenclature). This system of classification is standardized for all EU members, and it provides a product description. For each recorded export, this database contains the destination country, the quantity exported (in kilograms) and the corresponding total value (in euros). Export values in these data are *free-on-board*, thus excluding any duties or shipping charges. As an example, in 2017 there were 26,124 exporting firms, and total of 7,928 exported products to 215 destination countries.

Input Data (IAPI) Finally, we also analyze input data from the *Inquérito Anual à Produção Industrial (IAPI)* (Annual Survey on Industrial Production) between 2008 and 2018. This dataset combines survey data on values and physical quantities of outputs and inputs, as well as energy sources of firms. This survey is only applied to a restricted set of Portuguese manufacturing firms (around 1500 in 2008, decreasing to around 200 in 2018). The input classification is made through a twelve-digit code, accompanied by the corresponding product description.

Summary Statistics

Table 1 presents summary statistics. Given the focus of the program, we focus on small and medium sized enterprises, and require that all firms have at least 5 employees. Panel A displays unique firm financial and operational characteristics for the first year the firm is present in our sample. The median firm in our sample has 18 employees, sales of 1.1 million euros and around 1 million euros in total assets. The median net income is 9.6 thousand euros. Panel B shows statistics on the export variables from the SCIE dataset. In our sample period (2008-2018), the average firm exported a total of 642 thousand euros in goods and services. In 47% of the firm-year observations, we observe a positive value of total exports. In panels C and D, we display statistics on the FTS dataset. On average, each firm exports 6.43 products to 1.89 countries (panel C). The fact that this database provides information on the quantity exported (in kilograms) and the corresponding total value (in euros) allows us to compute the export price per kilogram. The average export price is 113 euros, with a standard deviation of 7,664 euros (panel D). As for inputs, the average price is 92 euros (panel E).

3 Empirical Strategy

Our basic approach is a regression discontinuity design that compares export-related outcomes for firms that qualified for the SME-Leader program against outcomes for ineligible firms. We focus specifically on comparing firms that met the criteria for eligibility by a small margin against those that failed to meet the criteria by a small margin. Because theses criteria were multidimensional (and varied from year to year), implementing a regression discontinuity requires a clear definition of what it means to meet the criteria "by a small margin."

3.1 Defining the Running Variable r_{it}

We follow the strategy implemented in Ferreira et al. (2018) and Custodio et al. (2021) and transform the multidimensional criteria into univariate running variable for firm i in year t: r_{it}. The approach is as follows. Suppose there is a set of K criteria, where firm i qualifies for the program in year t if financial or operating variable c_{it}^k exceeds threshold T^k ($c_{it}^k > T_k$) for all k in K.

Our first step is to create a standardized version of each criterion c_{it}^k.

$$\tilde{c}_{it}^k = \frac{c_{it}^k - T_k}{\sigma_k}.$$

Where σ_k represents the standard deviation of c_{it}^k. We then define the running variable as the *most binding* across the full set of criteria. Formally, this is just the minimum:

$$r_{it} = \min_{k \in K} \tilde{c}_{it}^k.$$

The intuition is relatively straightforward, r_{it} represents the variable that which most directly determines the eligibility status of firm i. In principle, if $r_{it} > 0$ the firm is eligible, and if $r_{it} < 0$ it is not. For r_{it} below 0, this represents the c_{it} that is furthest below the threshold. For r_{it} above 0, this represents the c_{it} closest to the threshold. In either case, if r_{it} is in a small neighborhood around 0, a small change in the relevant c_{it} could cause an eligible firm to become ineligible (or vice-versa). With this r_{it} defined, we can then conduct relatively straightforward regression discontinuity estimates.

In practice, different c_{it}^k are more or less manipulable by firms or have various degrees of inherent bunching near the threshold T_k. As a result, in portions of our analysis we consider different versions of r_{it} that correspond to different subsets of the criteria in K. When this is the case, $r_{it} > 0$ should correspond to a discrete jump in the probability a firm is eligible, but may not determine eligibility completely. For our RD approach, we consider the period 2009-2014, in which a subset of the criteria lead to a plausibly smooth density in the running variable. We show results for our full sample period (2009-2017) in the appendix.

3.2 Implementing the Regression Discontinuity

Our primary focus is on the local impact of program eligibility, the intention-to-treat (ITT) effect, at the eligibility threshold $r_{it} = 0$. Formally, for outcome y_{it}, we define $y_{it}(1)$ and $y_{it}(0)$ as the potential outcomes observed if firm i were eligible or ineligible, respectively, for the credit guarantee scheme at time t. Our parameter of interest is

$$\tau = E[y_{it}(1) - y_{it}(0)|r_{it} = 0].$$

We take a non-parametric local linear (or local polynomial) approach to estimating this parameter following (Cattaneo, Idrobo, and Titiunik, 2019). Given a bandwidth h, we estimate separate weighted least squares regressions of y_{it} for observations with $r_{it} > 0$ and $r_{it} < 0$, weighting each observation according to some kernel function $K(\frac{r_{it}}{h})$. We then recover the intercepts α_+ (using observations with positive values of r_{it}) such that

$$\hat{y}_{it} = \hat{\alpha}_+ + \hat{\beta}_+ r_{it},$$

and α_- (using observations with negative values of r_{it}) such that

$$\hat{y}_{it} = \hat{\alpha}_- + \hat{\beta}_- r_{it}.$$

Our estimate is then

$$\hat{\tau} = \hat{\alpha}_+ - \hat{\alpha}_-.$$

Our baseline approach uses a triangular kernel, although we consider alternative kernels for robustness. When considering a rectangular kernel, the above simplifies to estimating the following linear regression (for observations with $r_{it} \in [-h, h]$):

$$y_{it} = \alpha_- + \beta_- r_{it} + \tau \mathbb{1}\{r_{it} > 0\} + (\beta_+ - \beta_-)\mathbb{1}\{r_{it} > 0\} \times r_{it} + \varepsilon_{it}.$$

Our key identifying assumption is continuity in potential outcomes in the average potential outcomes functions across the threshold. In other words, that both $E[y_{it}|r_{it}]$ and $E[y_{it}|r_{it}]$ are continu-

ous at the point $r_{it} = 0$.. We select symmetric MSE-optimal bandwidths following Calonico, Cattaneo, and Titiunik (2014) and (Calonico, Cattaneo, Farrell, and Titiunik, 2019) and compute standard errors clustered at the firm level using the plug-in residual approach outlined in (Calonico et al., 2019). We report both conventional and robust bias corrected confidence intervals.

3.3 Panel Regressions

We complement our regression discontinuity approach with a series of panel regressions with saturated fixed effects (including firm and year). This strategy reinforces our RD approaches and lets us consider the impacts in a sample that includes firms outside of a local neighborhood around the eligibility threshold.

We estimate linear regressions of export related outcomes on an indicator ($Certified_{it}$) equal to one if firm i is certified—enrolled in the government guarantee scheme—in year t.

$$y_{it} = \theta Certified_{it} + \gamma_i + \delta_t + \varepsilon_{it}.$$

Here, γ_i and δ_t represent firm and year fixed effects, respectively. In some specifications we include more granular fixed effects (e.g. firm$\times$ product) if appropriate. We cluster standard errors at the firm level throughout. Our parameter of interest in these regressions is θ, which captures the impact of enrolling in the program itself (versus the ITT captured by our regression discontinuity approach).

4 Results

4.1 Manipulation Tests

We begin by evaluating the core identifying assumption in our RD approach, that average potential outcomes are continuous at the threshold $r_{it} = 0$. To do so, we conduct tests in the spirit of McCrary (2008) that test whether the density of the running variable r_{it} is continuous at the threshold. We implement the tests outlined in Cattaneo, Jansson, and Ma (2018) based on local polynomial density estimators. For these tests we again use the MSE optimal bandwidth and show both conventional and robust, bias corrected, t-statistics.

The null hypothesis for these tests is no bunching or continuity of the density at the point $r_{it} = 0$. We begin by considering our *comprehensive* running variable, which incorporates all criteria. We plot the density of this running variable above and below the threshold in Panel A of Figure 1. A clear mass is present to the right of the threshold, violating the assumption of no bunching. Indeed the test-statistic from our manipulation tests is over 37.

While this pattern is potentially problematic, the large majority appears not to be the result of manipulation, but rather of a natural bunching in one of the underlying criteria. Specifically, in a large fraction of years, program qualification required firms to have positive *net income* in the past year. As a result, a large mass of firms above 0 in the distribution of net income leads to a large mass in the distribution of the running variable r_{it}.

To address this concern, we construct an alternative version of r_{it}, which we refer to as our *simplified* running variable. To do so, we remove net income from the set of criteria used to construct the running variable and focus on a set of four core financial variables: the level of sales, sales growth, EBITDA growth, and equity/assets. Panel B of Figure 1 shows the density of this simplified measure, displaying substantially smoother pattern through the threshold. Indeed, our estimated manipulation tests are insignificant, with a T-statistic of 0.34. While this version of r_{it} does not fully determine eligibility, we should still expect a sharp increase in program eligibility and uptake for firms above the threshold (and should expect firms below the threshold to be ineligible).

To complement these measures, the remaining panels of Figure 1 show further simplified measures. In Panel (C), we remove equity/assets and in Panel (D) we further remove the level of sales. Both show smooth densities through the threshold and insignificant test-statistics. Panel (A) of Table A1 reports the conventional and robust test statistics for all four measures.

4.2 Impact on Program Enrollment

We next show that our regression discontinuity indeed captures a meaningful change in program take-up. To do so, we run our basic regression discontinuity approach, considering a binary outcome y_{it} equal to 1 if firm i is officially enrolled in the SME-Leader program in year t. We present our results in Figure 2 and Panel (B) of Table A1.

Panels (A) and (B) of Figure 2 that being above the threshold corresponds to a sharp jump in the probability of enrollment using both our comprehensive and simplified running variables. The point estimates for $\hat{\tau}$ in Table A1 suggest that firms with a value r_{it} just above the threshold were roughly 25 percent more likely to enroll based on our comprehensive measure, and roughly 10 percent more likely to enroll based on our simplified measure. Both estimates are statistically significant at any conventional level. We see a similar (if slightly smaller) effect when excluding equity-assets, but little jump when also removing the level of sales. These results suggest our regression discontinuity approach can provide insight into the impact of the guarantee program on firm outcomes.

4.3 Impacts on Exporting and Export Volume

Our first results concern the impacts of credit access on export activity. While program eligibility does not necessarily improve credit access, we direct readers to the results found in a companion paper (Custodio et al., 2021), which shows reductions in the costs of borrowing and increases in the quantity of borrowing. As a starting point we consider two firm level outcomes, each measured at the yearly level. The first is the total value of exports, measured in 1000s of euros. The second is a binary variable equal to one if the firm registers any exports. These variables, measured in the SCIE data, are recorded yearly, so we examine outcomes in the calendar year immediately following certification. We begin with our basic regression discontinuity approach.

Regression Discontinuity Evidence on Export Volume

Panel A of Table 3 shows that eligibility for certification leads to a sharp jump in export volumes. The first column, which employs the regression discontinuity approach using our comprehensive running variable, shows that firms that marginally exceeded the eligibility exported just over 60,000 euros more than those just below the threshold. The difference is statistically significant at the 1 percent level. Robust, bias-corrected confidence intervals do not contain 0. Similarly, the second column, which uses our simplified running variable shows similar—even slightly larger—estimates, indicating that eligible firms export roughly 150,000 euros more, on average. We find similar results when considering two further auxiliary running variables (first excluding equity

over assets and then additionally excluding the level of sales). Panels A and B of Figure 3 show these results graphically. For both the comprehensive and simplified versions of the running variable, we see sharp jumps in the total value of exports at the threshold. These regressions indicate that the access to credit provided by the government guarantee allows firms to significantly expand total exports.

Regression Discontinuity Evidence on Exporter Status

In Panel B of Table 3, we ask whether credit guarantees simply increase volume among active exporters, or whether they also impact the extensive margin export choice. The first column again uses the comprehensive running variables, and shows that eligible firms are significantly more likely to export. The point estimates suggest that eligibility increases the probability that a firm exports any good or service by roughly 8.5 percentage points. This is again significant at any conventional level. We see similar results, with slightly smaller point estimates, when considering the simplified running variable, as well as our two auxiliary measures. Smaller magnitudes are perhaps unsurprising, as the thresholds for these alternative measures correspond to smaller jumps in the probability of enrolling in the program. Panels C and D of Figure 3 show these results graphically. We see sharp jumps in the probability of exporting at the threshold for both versions of the running variable. These results indicate that credit access impacts the decision to export at all, consistent with theoretical models following Melitz (2003).

Regression Discontinuity Evidence on Destinations and Products

In Table 4 we show that the credit guarantee program also impacts that number of products exported and the set of destination countries a firm reaches. To do so, we repeat our regression discontinuity approach, but consider two new outcome variables. The first is the number of export destinations, measured as the number of countries that firm i exports to in year t. The second is the number of products exported across all countries. Where a product is defined as a unique 8 digit product code. Note that given this granular level, very similar products are given distinct codes, so a firm exporting an additional product might simply reflect a slight expansion of variety within a broader product class. Products and destinations are observed at the monthly level, so

for the purposes of these regressions we define a year as July-July (to reflect the 12 month period immediately following certification).

The first two columns of Table 4 indicate that eligibility for the program leads a firm to export to an additional 0.5-0.7 destination countries, depending on whether we consider the simplified or comprehensive criteria. These estimates are significant at the 1 percent level and provide further support for an expansion on the extensive margin. Eligible firms enter new export markets. Panels (A) and (B) of Figure 4 show plots that correspond to these regressions, again showing a meaningful and distinct jump at the threshold.

The remaining two columns of Table 4 indicate that eligibility for the program also leads a firm to export an additional 2-3.5 products (again depending on whether we consider the simplified or comprehensive criteria). Panels (A) and (B) of Figure 4 show plots that correspond to these regressions with visible discontinuities at the eligibility threshold. These results suggest that access to credit guarantees allow firms to expand the diversity of the products they offer, although this could reflect both vertical and horizontal differentiation.

Panel Evidence on Export Activity

Before turning to product quality, we consider our complementary panel regression strategy, which allows us to consider the relationship between program enrollment and export outcomes in a broader set of firms away from the eligibility threshold. We consider the four firm level outcomes studied above (Export volume, any export activity, the number of products and the number of destinations) using regressions covering the period 2009-2017 with firm and year fixed effects. Given the different approach, the coefficients we recover represent a slightly different impact than the ITT estimates in our regression discontinuity approach. Specifically, they capture the average impact of program enrollment (rather than eligibility) in a broader set of firms over a broader time period.

Despite these differences, our panel estimates (shown in Table 5) are consistent with our regression discontinuity approach. Across all four measures we see positive estimates that are significant at the one percent level. The point estimates are somewhat smaller, suggesting, for example, that program enrollment led to an increase in the number of products exported by 0.88. The discrep-

ancies are likely the result of the local nature of our regression discontinuity approach as well as the difference in sample period. As a while, these results confirm the implications of our regression discontinuity estimates. Access to (and enrollment in) the credit guarantee scheme leads to greater export activity on both the intensive and extensive margin, and increases the variety products exported.

4.4 Product Quality

We next consider the impact of the credit guarantee scheme on the quality of goods exported. We begin by describing evidence based on standard price and quantity based quality measures. We then consider alternative measures based on input prices and a handful of vertically differentiated goods.

Price and Quantity Based Quality Measures

Our two baseline quality measures are based on the prices and quantities of exports sold within narrow product$\times$ destination $\times$ year categories. The first is simple: unit prices. Specifically, we consider the deviation of the log price charged by firm i for good j in destination c and year t (p_{ijct}), relative to the average log price for the same product$\times$ destination $\times$ year. To construct this measure, we consider a dataset at the firm$\times$product$\times$ destination $\times$ year level. We focus on the residuals $\hat{\varepsilon}_{ijct}$ from the following regression:

$$Log(ExportPrice)_{ijct} = \delta_{jct} + \varepsilon_{ijct}.$$

The basic intuition is that differences in prices within narrow product categories should reflect differences in quality, all else equal.

Our second measure follows the approach in Khandelwal et al. (2013), and is based on the notion that, conditional on price, higher quality exporters should export greater quantities. The basic approach comes from the assumption of a CES demand system for goods ζ where consumers

value quality $\lambda(\zeta)$.[4] With an assumption on the elasticity of substitution σ we can run (for firm i/product j/country c):

$$ln(q_{ijct}) + \sigma ln(p_{ijct}) = \alpha_j + \eta_{ct} + \epsilon_{ijct}$$

And recover estimated quality:

$$ln(\hat{\lambda}) = \hat{\epsilon}_{ijct}/(\sigma - 1).$$

We follow the parameterization in Khandelwal et al. (2013) and set $\sigma = 4$ as a benchmark.

Regression Discontinuity Evidence Using Price and Quantity Based Quality Measures

Table 6 presents shows that program eligibility increases the quality of exported goods. We using our regression discontinuity approach and consider the two quality measures discussed above. We condition our sample on the set of firms that export the product in question to at least one country in 2007 (the year before the first year of our sample).

The first column, based on our comprehensive running variable, indicates that eligibility increases average unit prices charged by more than 5 percent. The second column shows similar results using our simplified running variable, indicating that eligibility increases unit prices by just over 3 percent. In both cases, robust, bias corrected confidence intervals do not include 0.

The remaining columns consider our estimate measure of quality, and show comparable (if slightly less precisely estimated) results. Point estimates are positive using both our comprehensive and simplified measures, and significant in the former case at the 10 percent level. As a whole, these estimates suggest that the access to credit generated by the scheme meaningfully improves the quality of exported products.

[4] With Dixit-Stiglitz preferences and product quality λ:

$$U = \left(\int_{\zeta \in \Omega} (\lambda(\zeta) q(\zeta))^{\sigma - 1/\sigma} d\zeta \right)^{\sigma/(\sigma-1)}.$$

We have demand for variety ζ

$$q_c(\zeta) = \lambda^{\sigma-1}(\zeta) p_c^{-\sigma}(\zeta) P_c^{\sigma-1} Y_c$$

Panel Evidence Using Price and Quantity Based Quality Measures

We next turn to panel estimates using the same quality measures.[5] All regressions are based on a panel that follows firm×product× destinations across years. For each quality measure, we consider three specifications with various levels of saturated fixed effects. The first includes firm fixed effects, the second firm× product fixed effects, and the third includes firm×product×country fixed effects. All include year fixed effects.

Across specifications, the panel regressions suggest a similar conclusion to our regression discontinuity approach: credit access improves export quality. We present our results in Table 7. The first three columns indicate that, regardless of the level of fixed effects, enrollment in the program is associated with an increase in unit prices of roughly 1.3 percent. The remaining columns show that, similarly, enrollment in the program is associated with an increase in estimated product quality of 1.3-1.9 percent.

4.5 Alternative Quality Measures

While the evidence above suggests that credit access improves product quality, there are several potential issues with our measures of quality. The first, and perhaps most serious, is that output quality may reflect factors other than product quality. Perhaps the most serious is mark-ups. If access to the credit guarantee scheme allows firms to increase markups, our approach would erroneously suggest that product quality was increasing. The second, which applies to our estimated quality measure is that differences in quantities exported (conditional on price) may reflect differences in supply constraints (e.g. credit-constraints) rather than differences in quality. To address this we consider two alternative approaches to measuring quality.

Input Quality

Our first approach, which is based in the logic of Kugler and Verhoogen (2011) and Bastos et al. (2018), looks at the input prices paid by exporters. The logic of the test is that, while higher output prices might reflect market power (or other sources of markups), this should also lead firms to pay

[5] In these specifications we use log(unit prices) directly, and include fixed effects within the regressions to focus on within × destination × year deviations.

lower prices in input markets. On the other hand, if higher quality outputs require higher quality inputs, we should expect high-quality exporters to pay more for inputs.

We consider survey data on input prices provided by IAPI for our sample of exporters between 2008-2014. Following the approach for export prices above, we residualize log input prices to consider deviations from the input category (or input category×year) average. We report our results in Table A5. Whether residualizing at the input or input×year level, and whether considering our comprehensive or simplified running variable the results are similar. Eligibility is associated with a roughly 8 to 10 percent increase in the price of inputs within narrow product categories (although these estimates are imprecise and not statistically significantly different from 0).

Vertically Differentiated Goods

Our second approach focuses on a set of major Portuguese exports—Wine, Olive Oil, and Cork—that have well established metrics of quality observable in our export data. For these products, we can directly observe differences in quality generated by the credit guarantee scheme.

For each of these products we define a binary measure of quality. For wine, we compare DOP (Denominaço de Origem Protegida) certified wine, the top quality certification, to all other exported wine.[6]. For olive oil we compare extra-virgin to virgin and refined oil. For cork, we compare natural versus agglomerated. In each, we identify these distinctions by comparing 8 digit product codes (which represent extra-virgin vs. virgin olive oil) within broader 6 digit codes (which might indicate olive oil generally). We focus on exports to high quality markets, specifically to North America.

Unfortunately, we do not have sufficient observations close to the threshold to estimate our regression discontinuity within these product categories. Consequently, we focus on our panel regressions including firm and year fixed effects. For each category, we consider a transaction level dataset and focus on a binary variable equal to one if the transaction is high quality. As such, our results can be interpreted as the increase in the fraction of transactions that are high quality within firm (weighted by the number of export transactions). Standard errors are clustered at the firm level.

We present our results in Table 9. Across measures, we find that certification is associated with

[6]Because this certification was introduced in 2010, we limit our sample to 2010-2017

an increase in product quality. For wine, obtaining a certification is associated with an increase in the probability a transaction if high quality of 2.4 percentage points. For olive oil, it is associated with an increase of 2.7 percentage points, and for cork, of 1 percentage point. While only the result for wine is statistically significant (given that there are substantially more observations), all confirm the main result of our analysis. Access to credit improves product quality.

5 Conclusion

In this paper we show that credit access is a meaningful driver of firms ability to export high quality output. We focus on the implementation of a unique credit guarantee scheme, the SME-Leader program for small and medium sized enterprises in Portugal between 2009-2017. We implement a multidimensional regression discontinuity design to compare firms that barely qualified for the program to similar firms that just failed to qualify. We supplement this with panel regressions that exploit the timing of program qualification.

We find that access to the credit guarantee scheme increases the quantity a firm exports, the probability of being an exporter, and the number of export destinations. Furthermore, access increases the variety of products a firm produces. This increase in product variety goes hand-in-hand with an increase in product quality. Firms that qualify for the scheme charge higher unit prices for narrowly defined goods, have higher measures of model based estimates of product quality, and appear to use higher quality inputs. Furthermore, we see direct increases in the quality of output produced in handful of vertically differentiated sectors in which quality is observable: wine, cork and olive oil. Given that the ability to export high quality goods is a key element in a countries success in export markets, our analysis identifies a meaningful and understudied link between financial development and economic growth.

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Tables

TABLE 1. Summary Statistics

Panel A: Unique Firm Characteristics	Mean	Std. Dev.	p25	p50	p75	p99	Obs.
Assets (€, in thousands)	2,004	2,359	485	1,084	2,519	11,204	34,889
Employees	24.14	16.61	13.00	18.00	29.00	84.00	36,654
Sales (€, in thousands)	2,049	2,327	523	1,125	2,597	10,828	35,658
Net Income (€, in thousands)	30.75	97.16	0.29	9.60	46.54	408.35	34,370
EBITDA (€, in thousands)	152	208	23	79	204	941	34,128
Net Income-to-Assets	0.01	0.06	0.00	0.01	0.04	0.16	34,816
Net Income-to-Equity	0.10	0.22	0.01	0.06	0.18	0.85	34,119
Equity-to-Assets	0.29	0.21	0.15	0.27	0.43	0.76	35,455
EBITDA-to-Assets	0.09	0.09	0.03	0.08	0.14	0.29	34,330
Debt-to-EBITDA	6.01	6.01	2.47	5.32	9.35	21.20	31,134
Sales growth	0.03	0.19	-0.09	0.01	0.13	0.56	35,164
EBITDA growth	-0.09	0.76	-0.42	-0.05	0.27	1.96	34,426

Panel B: Exports SCIE	Mean	Std. Dev.	p25	p50	p75	p99	Obs.
Total Exports (€, in thousands)	642	2,752	0	0	160	11,824	298,643
Exports of goods (€, in thousands)	478	2,482	0	0	24	10,157	298,643
Exporting firm	0.47	0.50	0.00	0.00	1.00	1.00	298,643
Exporting firm (only goods)	0.34	0.47	0.00	0.00	1.00	1.00	298,643
Log(Total Exports)	4.98	2.63	3.26	5.32	6.93	9.79	139,426
Log(Exports of goods)	4.82	2.73	3.00	5.09	6.87	9.82	102,146

Panel C: Exports FTS	Mean	Std. Dev.	p25	p50	p75	p99	Obs.
Exports (€, in thousands)	595	2,661	0	0	47	11,294	242,691
Exports weight (Kg)	377	5,818	0	0	6	7,021	242,691
Number of export destinations	1.89	5.01	0.00	0.00	1.00	26.00	242,691
Number of export products	6.43	27.63	0.00	0.00	3.00	115.00	242,691

Panel D: Export Price	Mean	Std. Dev.	p25	p50	p75	p99	Obs.
Export Price (€)	113	7,664	3	10	33	486	8,001,369
Log(Export Price)	2.31	1.69	1.16	2.30	3.49	6.19	8,001,362

Panel E: Input Price	Mean	Std. Dev.	p25	p50	p75	p99	Obs.
Input Price (€)	92	3,047	1	2	5	830	78,675
Log(Input Price)	0.78	2.07	-0.34	0.61	1.63	6.72	78,675

This table displays summary statistics for the variables used in the paper. The time period considered is our full sample period (2008-2018), except for panels C and D, for which variables are only available until 2017. Panel A displays unique firm financial and operational characteristics for the first year the firm is present in our sample.

TABLE 2. Density Tests and the Impact of Eligibility on Certification

	Panel A: Density Tests			
	Comprehensive	Simplified	Excl. Equity/Assets	Excl. Sales
Conventional	37.052	.336	-.478	-.969
Robust	23.476	4.257	1.713	-.526

	Panel B: Impact on Certification			
	Comprehensive	Simplified	Excl. Equity/Assets	Excl. Sales
Program Eligibility	0.250***	0.107***	0.046***	-0.001
	(0.010)	(0.006)	(0.007)	(0.006)
Robust p-value	0.000	0.000	0.000	0.951
Bandwidth	0.164	0.386	0.184	0.528
Kernel Type	Triangular	Triangular	Triangular	Triangular

Panel A of this table shows Cattaneo et al. (2018) density tests around the threshold for the four running variables presented in section 4. Panel B shows the intention to treat estimates for the impact of firm certification on the program take-up, based on our regression discontinuity design. The *comprehensive* running variable incorporates all criteria. The *simplified* running variable only considers a set of four financial variables: the level of sales, sales growth, EBITDA growth, and equity/assets. In the two remaining running variables, we remove equity/assets and we further remove the level of sales, respectively. Both panels refer to the 2008-2014 period. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 3. Effect of Eligibility on Export Volume and Extensive Margin Export Choice

	Panel A: Export Volume			
	Comprehensive	Simplified	Excl. Equity/Assets	Excl. Sales
Program Eligibility	61.344***	147.292***	203.565***	139.552***
	(20.549)	(39.581)	(44.266)	(48.832)
Robust p-value	0.004	0.001	0.000	0.005
Bandwidth	0.337	0.617	0.419	0.558
Kernel Type	Triangular	Triangular	Triangular	Triangular

	Panel B: Extensive Margin Export Choice			
	Comprehensive	Simplified	Excl. Equity/Assets	Excl. Sales
Program Eligibility	0.084***	0.049***	0.074***	0.017**
	(0.011)	(0.008)	(0.007)	(0.008)
Robust p-value	0.000	0.000	0.000	0.027
Bandwidth	0.433	0.484	0.506	0.585
Kernel Type	Triangular	Triangular	Triangular	Triangular

Panel A and B of this table show the intention to treat estimates for the impact of firm certification on Export Volume and Extensive Margin Export Choice, respectively, based on our regression discontinuity design. The outcome variable in panel A (Export Volume) corresponds to the total value of exports of each firm by year (source: SCIE). The outcome variable in panel B (Extensive Margin Export Choice) is a binary variable that takes the value of 1 if a firm registered a positive value of exports in a given year, and 0 otherwise (source: SCIE). Both panels show estimates where the outcome variable is observed one year after the award (T+1). The *comprehensive* running variable incorporates all criteria. The *simplified* running variable only considers a set of four financial variables: the level of sales, sales growth, EBITDA growth, and equity/assets. In the two remaining running variables, we remove equity/assets and we further remove the level of sales, respectively. Both panels refer to the 2008-2014 period. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 4. Effect of Eligibility on Export Destinations and Number of Products

	Export Destinations		Number of Products	
	Comprehensive	Simplified	Comprehensive	Simplified
Program Eligibility	0.716***	0.556***	3.509***	2.114***
	(0.098)	(0.091)	(0.613)	(0.500)
Robust p-value	0.000	0.000	0.000	0.000
Bandwidth	0.329	0.445	0.324	0.552
Kernel Type	Triangular	Triangular	Triangular	Triangular

This table shows the intention to treat estimates for the impact of firm certification on the number of Export Destinations (columns 1-2) and the Number of Products Exported (columns 3-4), based on our regression discontinuity design. *Export Destinations* corresponds to the number of countries for which a firm exports, per year. *Number of Products* equals the number of products (eight-digit code) that each firm exports, per year. Both outcome variables are retrieved from the FTS database. This table shows estimates where the outcome variables are aggregated for the 12 months following the official certification announcement. The *comprehensive* running variable incorporates all criteria. The *simplified* running variable only considers a set of four financial variables: the level of sales, sales growth, EBITDA growth, and equity/assets. The estimates refer to the 2008-2014 period. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 5. Impacts of Certification on Export Activity: Panel Regressions

	Export Volume	Extensive Margin Export Choice	Export Destinations	Number of Products
Certified Firm	49.159***	0.010***	0.130***	0.881***
	(8.104)	(0.002)	(0.014)	(0.119)
Constant	652.524***	0.470***	1.829***	6.294***
	(2.570)	(0.001)	(0.004)	(0.036)
Observations	290480	290480	262978	262978
Adjusted R-Squared	0.842	0.723	0.870	0.720
Fixed Effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year

This table shows firm fixed effects estimates for the effect of being certified as SME-Leader on Export Volume, Extensive Margin Export Choice, Export Destinations and Number of Products. *Export Volume* corresponds to the total value of exports of each firm by year (source: SCIE). *Extensive Margin Export Choice* is a binary variable that takes the value of 1 if a firm registered a positive value of exports in a given year, and 0 otherwise (source: SCIE). *Export Destinations* corresponds to the number of countries for which a firm exports, per year (source: FTS). *Number of Products* equals the number of products (eight-digit code) that each firm exports, per year (source: FTS). *Certified Firm* is a binary variable that takes the value of 1 if a firm was certified as SME-Leader in a given year, and 0 otherwise. Columns 1 and 2 show estimates where the outcome variable is observed one year after the award (T+1). Columns 3 and 4 show estimates where the outcome variables are aggregated for the 12 months following the official certification announcement. All regressions include firm and year fixed effects. For columns 1 and 2, the estimates refer to the 2008-2018 period. For columns 3 and 4, the time period considered is 2008-2017. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 6. Effect of Eligibility on Export Quality

	Log(Export Price)		Estimated Quality	
	Comprehensive	Simplified	Comprehensive	Simplified
Program Eligibility	0.056**	0.033*	0.134*	0.070
	(0.027)	(0.018)	(0.074)	(0.049)
Robust 95% CI	[.003 ; .122]	[0 ; .077]	[-.011 ; .32]	[-.026 ; .197]
Robust p-value	0.040	0.048	0.067	0.131
Bandwidth	0.655	0.429	0.800	0.502
Kernel Type	Triangular	Triangular	Triangular	Triangular

This table shows the intention to treat estimates for the impact of firm certification on Export Quality, based on our regression discontinuity design. We use two alternative measures of quality as outcome variables. In columns 1 and 2, the outcome variable equals the residuals of the following regression: $Log(Export\ Price)_{ijct} = \delta_{jct} + \epsilon_{ijct}$, where i, j, c and t represent firm, product, country and year indicators, respectively. Hence, the estimates presented correspond to within Product-Country-Year estimates. In columns 3 and 4, we estimate the product quality following Khandelwal et al. (2013), as explained in section 4. Both outcome variables are retrieved from the FTS database. This table shows estimates where the outcome variables are observed in the 12 months following the official certification announcement. The *comprehensive* running variable incorporates all criteria. The *simplified* running variable only considers a set of four financial variables: the level of sales, sales growth, EBITDA growth, and equity/assets. The estimates refer to the 2008-2014 period. Our sample is restricted to firms for which the minimum of the product-year combination equals 2007. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 7. Effect of Certification on Export Quality: Panel Regressions

	Log(Export Price)			Estimated Quality		
Certified Firm	0.012**	0.014***	0.013***	0.013	0.013*	0.019**
	(0.006)	(0.005)	(0.005)	(0.008)	(0.008)	(0.008)
Constant	2.315***	2.314***	2.311***	0.354***	0.361***	0.416***
	(0.003)	(0.003)	(0.002)	(0.004)	(0.004)	(0.004)
Observations	3610550	3597813	3516388	911160	894885	793495
Adjusted R-Squared	0.757	0.876	0.900	0.205	0.381	0.586
Fixed Effects	Firm & Year	Firm-Product & Year	Firm-Product-Country & Year	Firm & Year	Firm-Product & Year	Firm-Product-Country & Year

This table shows firm fixed effects estimates for the effect of being certified as SME-Leader on Export Quality. In columns 1 and 2, the outcome variable equals the natural logarithm of export price. In columns 3 and 4, we estimate the product quality following Khandelwal et al. (2013), as explained in section 4. Both outcome variables are retrieved from the FTS database. *Certified Firm* is a binary variable that takes the value of 1 if a firm was certified as SME-Leader in a given year, and 0 otherwise. In columns 1 and 4 we include Firm fixed effects. In columns 2 and 5 we include Firm-Product fixed effects. In columns 3 and 6 we include Firm-Product-Country fixed effects. All columns show estimates where the outcome variables are observed in the 12 months following the official certification announcement. All regressions include year fixed effects. For all, the time period considered is 2008-2017. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 8. Effect of Eligibility on Input Quality

	Log(Input Price)			
	Within Input		Within Input-Year	
	Comprehensive	Simplified	Comprehensive	Simplified
Program Eligibility	0.096	0.086	0.096	0.089
	(0.091)	(0.074)	(0.091)	(0.075)
Robust 95% CI	[-.108 ; .313]	[-.062 ; .278]	[-.107 ; .313]	[-.06 ; .281]
Robust p-value	0.339	0.214	0.336	0.203
Bandwidth	0.429	0.436	0.432	0.431
Kernel Type	Triangular	Triangular	Triangular	Triangular

This table shows the intention to treat estimates for the impact of firm certification on Input Quality, based on our regression discontinuity design. The outcome variable equals the natural logarithm of input price (source: IAPI). In columns 1 and 2, the estimates presented corresponds to within Input estimates. In columns 3 and 4, the estimates presented corresponds to within Input-Year estimates. This table shows estimates where the outcome variable is observed at the year after the award (T). The *comprehensive* running variable incorporates all criteria. The *simplified* running variable only considers a set of four financial variables: the level of sales, sales growth, EBITDA growth, and equity/assets. Our sample is restricted to firms for which the minimum of the input-year combination equals 2007. The estimates refer to the 2008-2014 period. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE 9. Effect of Certification on Export Quality: Wine, Olive Oil and Cork

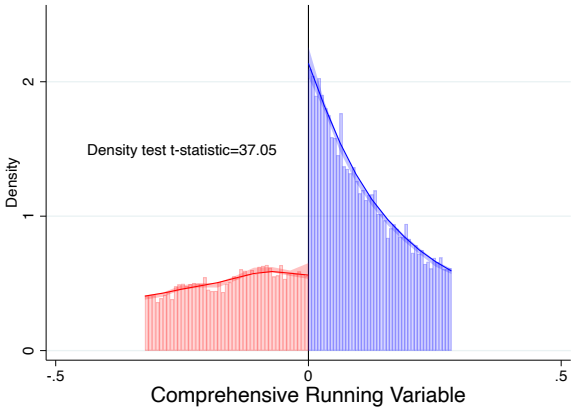
	DOP Wine	Virgin Olive Oil	Natural Corks
Certified Firm	0.024***	0.027	0.010
	(0.009)	(0.033)	(0.014)
Constant	0.550***	0.634***	0.746***
	(0.004)	(0.018)	(0.008)
Observations	23476	1228	5942
Adjusted R-Squared	0.425	0.235	0.519
Fixed Effects	Firm & Year	Firm & Year	Firm & Year

This table shows firm fixed effects estimates for the effect of being certified as SME-Leader on Export Quality, for three different product categories. In column 1, we focus on the Portuguese wines that are exported by Portuguese firms and build the variable *DOP Wine*, a binary variable that takes the value of 1 if the exported wine has the DOP certification and 0 otherwise. In column 2, we focus on the olive oil exports, and define *Virgin Olive Oil*, a binary variable that takes the value of 1 if the exported olive oil is virgin and 0 otherwise. In column 3, we focus on the exports of corks, and define *Natural Corks*, a binary variable that takes the value of 1 if the exported corks are produced from natural cork and 0 otherwise. All columns show estimates where the outcome variables are aggregated for the 12 months following the official certification announcement. All regressions include firm and year fixed effects. For all, the time period considered is 2010-2017. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

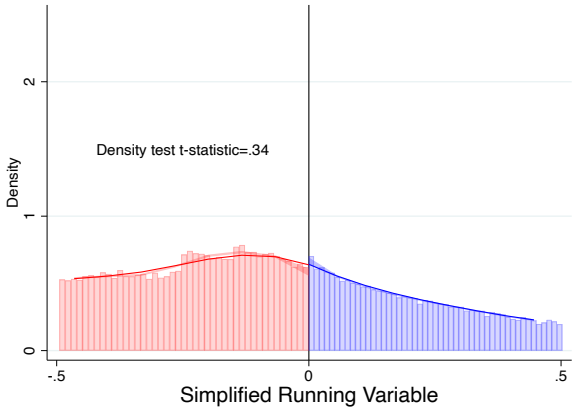
Figures

FIGURE 1: Density Tests for Multivariate Scores

(a) Comprehensive



(b) Simplified



(c) Excl. Equity/Assets

(d) Excl. Sales

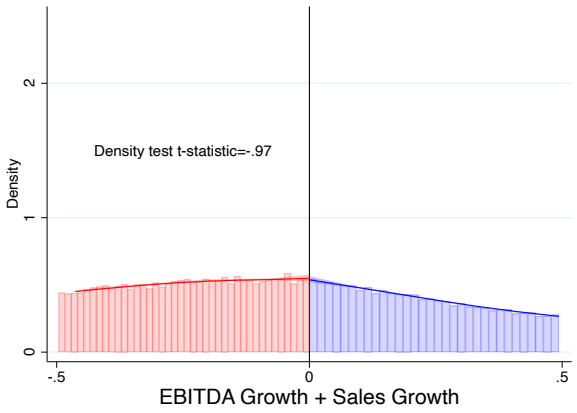
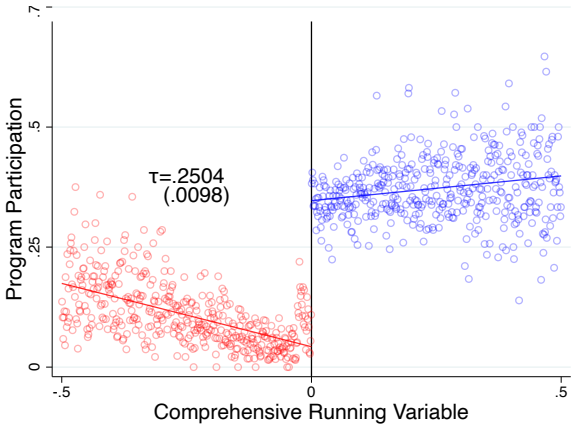
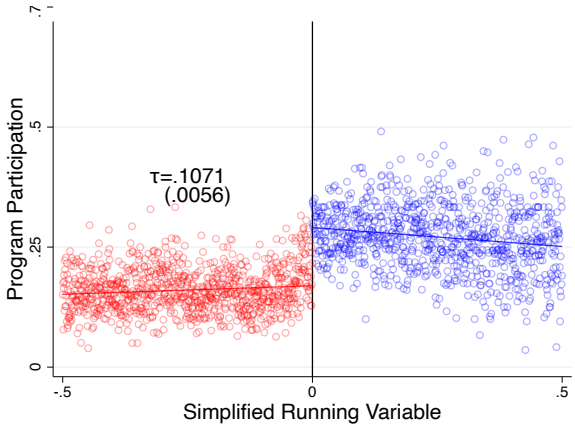


FIGURE 2: Impact on Certification

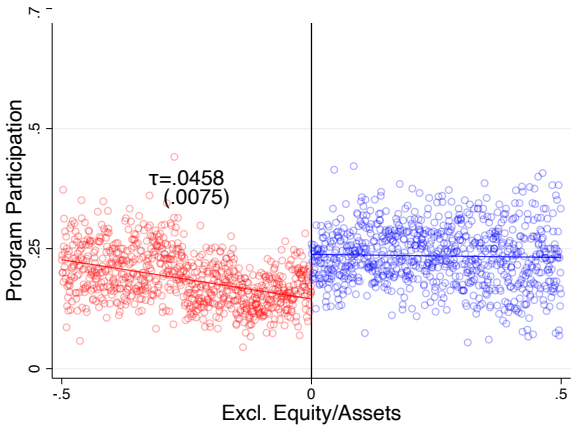
(a) Comprehensive



(b) Simplified



(c) Excl. Equity/Assets



(d) Excl. Sales

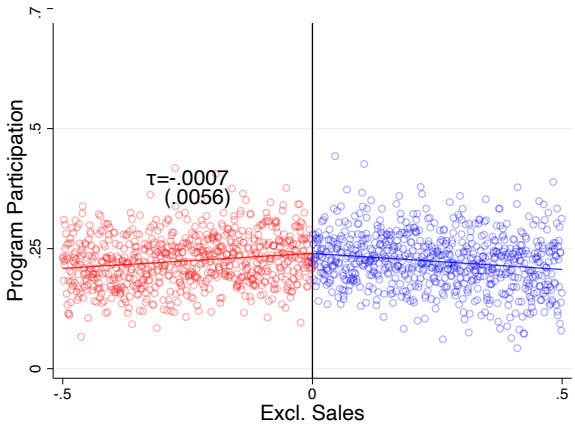
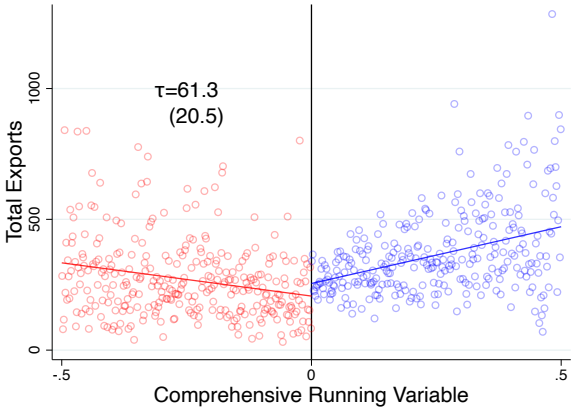
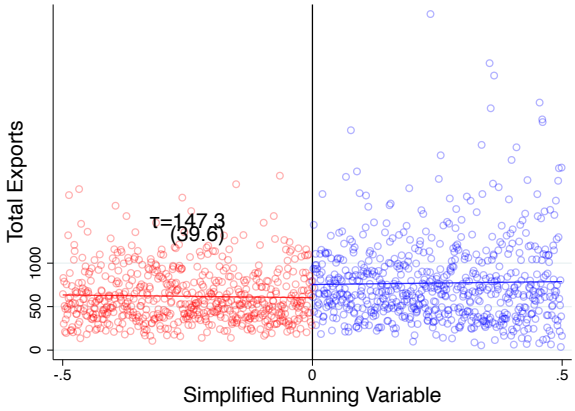


FIGURE 3: Effect of Eligibility on Export Volume and Extensive Margin Export Choice

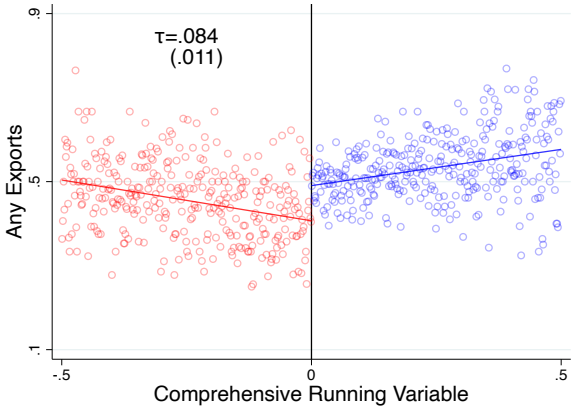
(a) Comprehensive



(b) Simplified



(c) Comprehensive



(d) Simplified

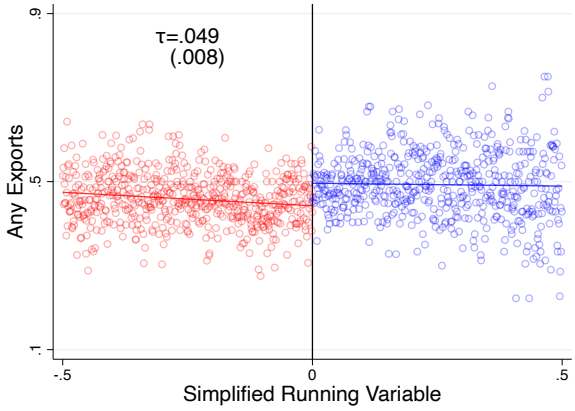
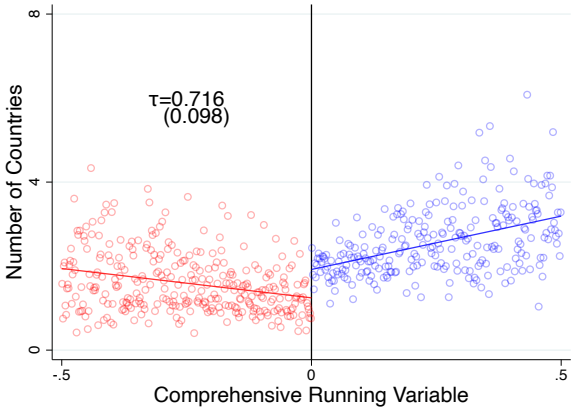
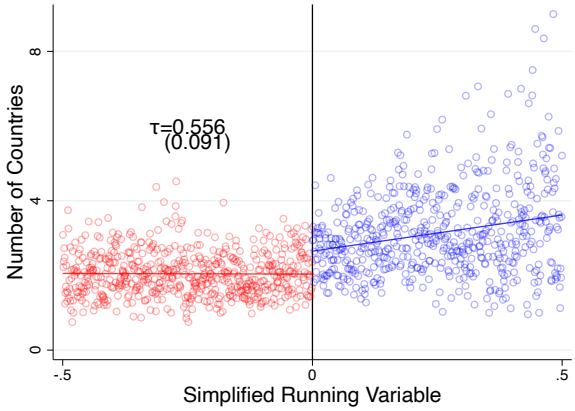


FIGURE 4: Effect of Eligibility on Export Destinations and Number of Products

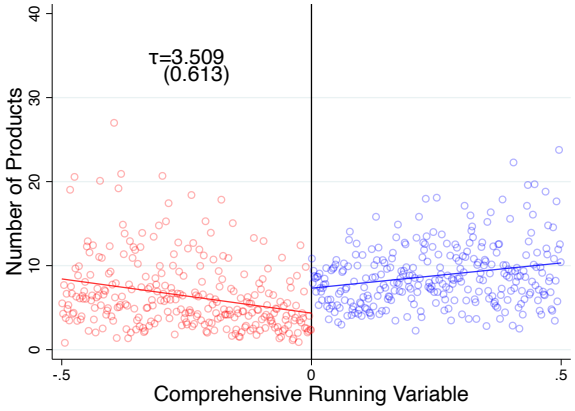
(a) Comprehensive



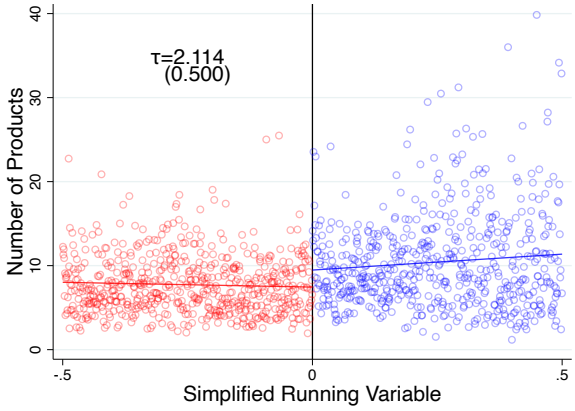
(b) Simplified



(c) Comprehensive



(d) Simplified



A Appendix Tables

TABLE A1. Density Tests and the Impact of Eligibility on Certification

	Panel A: Density Tests			
	Comprehensive	Simplified	Excl. Equity/Assets	Excl. Sales
Conventional	36.511	6.944	4.256	-.969
Robust	23.463	4.468	3.981	-.526

	Panel B: Impact on Certification			
	Comprehensive	Simplified	Excl. Equity/Assets	Excl. Sales
Program Eligibility	0.291***	0.220***	0.144***	-0.001
	(0.011)	(0.007)	(0.007)	(0.006)
Robust p-value	0.000	0.000	0.000	0.951
Bandwidth	0.102	0.160	0.132	0.528
Kernel Type	Triangular	Triangular	Triangular	Triangular

Panel A of this table shows the Cattaneo et al. (2018) density tests around the threshold for the four running variables presented in section 4. Panel B shows the intention to treat estimates for the impact of firm certification on the program take-up, based on our regression discontinuity design. The *comprehensive* running variable incorporates all criteria. The *simplified* running variable only considers a set of four financial variables: the level of sales, sales growth, EBITDA growth, and equity/assets. In the two remaining running variables, we remove equity/assets and we further remove the level of sales, respectively. Both panels refer to the 2008-2018 period. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE A2. Effect of Eligibility on Export Volume and Extensive Margin Export Choice

	Panel A: Export Volume			
	Comprehensive	Simplified	Excl. Equity/Assets	Excl. Sales
Program Eligibility	31.961**	139.871***	50.624	98.575**
	(14.787)	(36.662)	(32.254)	(39.417)
Robust p-value	0.104	0.002	0.301	0.026
Bandwidth	0.343	0.313	0.220	0.692
Kernel Type	Triangular	Triangular	Triangular	Triangular

	Panel B: Extensive Margin Export Choice			
	Comprehensive	Simplified	Excl. Equity/Assets	Excl. Sales
Program Eligibility	−0.000	0.022***	0.014	0.017**
	(0.011)	(0.008)	(0.008)	(0.007)
Robust p-value	0.667	0.023	0.259	0.016
Bandwidth	0.206	0.235	0.181	0.660
Kernel Type	Triangular	Triangular	Triangular	Triangular

Panel A and B of this table show the intention to treat estimates for the impact of firm certification on Export Volume and Extensive Margin Export Choice, respectively, based on our regression discontinuity design. The outcome variable in panel A (Export Volume) corresponds to the total value of exports of each firm by year (source: SCIE). The outcome variable in panel B (Extensive Margin Export Choice) is a binary variable that takes the value of 1 if a firm registered a positive value of exports in a given year, and 0 otherwise (source: SCIE). Both panels show estimates where the outcome variable is observed one year after the award (T+1). The *comprehensive* running variable incorporates all criteria. The *simplified* running variable only considers a set of four financial variables: the level of sales, sales growth, EBITDA growth, and equity/assets. In the two remaining running variables, we remove equity/assets and we further remove the level of sales, respectively. Both panels refer to the 2008-2018 period. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE A3. Effect of Eligibility on Export Destinations and Number of Products

	Export Destinations		Number of Products	
	Comprehensive	Simplified	Comprehensive	Simplified
Program Eligibility	0.406***	0.294***	2.250***	1.185***
	(0.085)	(0.098)	(0.413)	(0.385)
Robust p-value	0.000	0.016	0.000	0.019
Bandwidth	0.327	0.186	0.359	0.408
Kernel Type	Triangular	Triangular	Triangular	Triangular

This table shows the intention to treat estimates for the impact of firm certification on the number of Export Destinations (columns 1-2) and the Number of Products Exported (columns 3-4), based on our regression discontinuity design. *Export Destinations* corresponds to the number of countries for which a firm exports, per year. *Number of Products* equals the number of products (eight-digit code) that each firm exports, per year. Both outcome variables are retrieved from the FTS database. This table shows estimates where the outcome variables are aggregated for the 12 months following the official certification announcement. The *comprehensive* running variable incorporates all criteria. The *simplified* running variable only considers a set of four financial variables: the level of sales, sales growth, EBITDA growth, and equity/assets. The estimates refer to the 2008-2017 period. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE A4. Effect of Eligibility on Export Quality

	Log(Export Price)		Estimated Quality	
	Comprehensive	Simplified	Comprehensive	Simplified
Program Eligibility	0.054**	0.032**	0.159***	0.040
	(0.024)	(0.016)	(0.052)	(0.034)
Robust 95% CI	[.003 ; .113]	[.001 ; .071]	[.047 ; .282]	[-.032 ; .127]
Robust p-value	0.038	0.042	0.006	0.238
Bandwidth	0.589	0.449	0.660	0.689
Kernel Type	Triangular	Triangular	Triangular	Triangular

This table shows the intention to treat estimates for the impact of firm certification on Export Quality, based on our regression discontinuity design. We use two alternative measures of quality as outcome variables. In columns 1 and 2, the outcome variable equals the residuals of the following regression: $Log(Export\ Price)_{ijct} = \delta_{jct} + \epsilon_{ijct}$, where i, j, c and t represent firm, product, country and year indicators, respectively. Hence, the estimates presented correspond to within Product-Country-Year estimates. In columns 3 and 4, we estimate the product quality following Khandelwal et al. (2013), as explained in section 4. Both outcome variables are retrieved from the FTS database. This table shows estimates where the outcome variables are observed in the 12 months following the official certification announcement. The *comprehensive* running variable incorporates all criteria. The *simplified* running variable only considers a set of four financial variables: the level of sales, sales growth, EBITDA growth, and equity/assets. The estimates refer to the 2008-2017 period. Our sample is restricted to firms for which the minimum of the product-year combination equals 2007. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE A5. Effect of Eligibility on Input Quality (for exporting firms only)

	Log(Input Price)			
	Within Input		Within Input-Year	
	Comprehensive	Simplified	Comprehensive	Simplified
Program Eligibility	0.096	0.084	0.096	0.085
	(0.091)	(0.071)	(0.091)	(0.071)
Robust 95% CI	[-.108 ; .313]	[-.057 ; .264]	[-.107 ; .313]	[-.055 ; .266]
Robust p-value	0.339	0.206	0.336	0.199
Bandwidth	0.429	0.487	0.432	0.480
Kernel Type	Triangular	Triangular	Triangular	Triangular

This table shows the intention to treat estimates for the impact of firm certification on Input Quality, based on our regression discontinuity design. The outcome variable equals the natural logarithm of input price (source: IAPI). In columns 1 and 2, the estimates presented corresponds to within Input estimates. In columns 3 and 4, the estimates presented corresponds to within Input-Year estimates. This table shows estimates where the outcome variable is observed at the year after the award (T). The *comprehensive* running variable incorporates all criteria. The *simplified* running variable only considers a set of four financial variables: the level of sales, sales growth, EBITDA growth, and equity/assets. Our sample is restricted to exporting firms for which the minimum of the input-year combination equals 2007 The estimates refer to the 2008-2014 period. Standard errors are reported in parentheses. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

B Description of Program Criteria

TABLE B1. Program

This table summarizes the eligibility for SME-Leader and SME-Excellence for the years between 2008 and 2018. *Regularized status with fiscal authority, social security and IAPMEI* means that the firm does not have an irregular situation (for instance overdue debt) with any of these institutions. *Credit rating* is credit rating attributed by the sponsor bank to the company that is not publicly available. *SME certification* is based on European Union size for SMEs and it is obtained electronically through IAPMEI website.

2008

	SME-Leader	*SME-Excellence*
Formal	- SME certification - Credit rating: AAA, AA and A	
Accounting	- Positive growth in business turnover - Equity/Net assets $>$ 20%	

2009

	SME-Leader	*SME-Excellence*
Formal	- SME certification - Credit rating: AAA, AA and A - Regularized status with the fiscal authority, social security and IAPMEI	- Credit rating: AAA and AA
Accounting	- Net income $>$ 0 **or** positive growth in business turnover - Equity/Net assets $>$ 15%	- Equity/Assets $\geq$ 35% - Growth in business turnover $\geq$ 5% - Net income/Equity $\geq$ 10% - Net income/Net assets $\geq$ 3%

2010

	SME-Leader	*SME-Excellence*
Formal	- SME certification - Financial reports available for 1 fiscal year - Credit rating: AAA, AA and A - Regularized status with the fiscal authority, social security and IAPMEI	- Credit rating: AAA and AA
Accounting	- Net income > 0 **or** positive growth in business turnover - Equity/Net assets $> 15\%$	- Equity/Assets $\geq 35\%$ - Growth in business turnover $\geq 5\%$ - Net income/Equity $\geq 10\%$ - Net income/Net assets $\geq 3\%$

2011

	SME-Leader	*SME-Excellence*
Formal	- SME certification - Financial reports available for 3 fiscal years - Credit rating: AAA, AA and A - Regularized status with the fiscal authority, social security and IAPMEI	- Credit rating: AAA and AA
Accounting	- Net income > 0 - Positive growth in business turnover **or** EBITDA - Equity/Net assets $\geq 20\%$ - Business turnover $\geq 500{,}000$ - No. of employees (AWU) ≥ 5	- Equity/Assets $\geq 35\%$ - Growth in business turnover $\geq 5\%$ - Net income/Equity $\geq 10\%$ - Net income/Net assets $\geq 3\%$

2012

	SME-Leader	*SME-Excellence*
Formal	- SME certification - Financial reports available for 3 fiscal years - Credit rating: AAA, AA and A - Regularized status with the fiscal authority, social security and IAPMEI	- Credit rating: AAA and AA
Accounting	- Net income > 0 - Positive growth in business turnover **or** EBITDA - Equity/Net assets $\geq 20\%$ - Business turnover $\geq 500{,}000$ - No. of employees (AWU) ≥ 5	- Equity/Assets $\geq 35\%$ - Growth in business turnover $\geq 5\%$ - Net income/Equity $\geq 10\%$ - Net income/Net assets $\geq 3\%$

2013

	SME-Leader	*SME-Excellence*
Formal	- SME certification - Financial reports available for 3 fiscal years - Credit rating: AAA, AA and A - Regularized status with the fiscal authority, social security and IAPMEI	- Credit rating: AAA and AA
Accounting	- Net income > 0 **or** positive growth in business turnover **or** EBITDA (with positive EBITDA in 2011 and 2012) - Equity/Net assets $\geq 25\%$ - Business turnover $\geq 750{,}000$ - No. of employees (AWU) ≥ 10	- Equity/Assets $\geq 35\%$ - Growth in business turnover $\geq 5\%$ - Net income/Equity $\geq 10\%$ - Net income/Net assets $\geq 3\%$

2014

	SME-Leader	*SME-Excellence*
Formal	- SME certification - Financial reports available for 3 fiscal years - Credit rating: AAA, AA and A - Regularized status with the fiscal authority, social security and IAPMEI	- Credit rating: AAA and AA
Accounting	- Net income > 0 **or** positive growth in business turnover **or** EBITDA (with positive EBITDA in 2012 and 2013) - Equity/Net assets $\geq 25\%$ - Business turnover $\geq 750{,}000$ - No. of employees (AWU) ≥ 10	- Equity/Assets $\geq 35\%$ - Growth in business turnover $\geq 5\%$ - Net income/Equity $\geq 10\%$ - Net income/Net assets $\geq 3\%$

2015

	SME-Leader	*SME-Excellence*
Formal	- SME certification - Financial reports available for 3 fiscal years - Credit rating: 1, 2, 3, 4 and 5 - Regularized status with the fiscal authority, social security and IAPMEI	- Credit rating: 1, 2 and 3
Accounting	- Net income > 0 - Positive EBITDA in 2013 and 2014 - Equity/Net assets $\geq 30\%$ - Business turnover $\geq 1{,}000{,}000$ - No. of employees (AWU) ≥ 8	- Equity/Assets $\geq 35\%$ - Positive growth in business turnover - Net income/Equity $\geq 10\%$ - Net income/Net assets $\geq 3\%$

2016

	SME-Leader	*SME-Excellence*
Formal	- SME certification - Financial reports available for 3 fiscal years - 2015 accounts closed and reported - Regularized status with the fiscal authority, social security and IAPMEI - Adequate risk profile (selected by the partner bank)	
Accounting	- Net income > 0 - Positive EBITDA in 2014 and 2015 - Equity/Net assets $\geq 30\%$ - Net income/Equity $\geq 1\%$ - EBITDA/Assets $\geq 1\%$ - EBITDA/Turnover $\geq 1\%$ - Net debt/EBITDA ≤ 5 - Business turnover $\geq$ 1,000,000 - No. of employees (AWU) ≥ 8	- Equity/Assets $\geq 37.5\%$ - Positive growth in business turnover - Net income/Equity $\geq 12.5\%$ - EBITDA/Assets $\geq 10\%$ - EBITDA/Turnover $\geq 7.5\%$ - Net debt/EBITDA ≤ 2.5

2017

	SME-Leader	*SME-Excellence*
Formal	- SME certification - Financial reports available for 3 fiscal years - 2016 accounts closed and reported - Regularized status with the fiscal authority, social security and IAPMEI - Credit rating: 1, 2, 3, 4, 5, 6 and 7	- Credit rating: 1, 2, 3, 4 and 5
Accounting	- Net income > 0 - Positive EBITDA in 2015 and 2016 - Equity/Net assets $\geq 30\%$ - Net income/Equity $\geq 2\%$ - EBITDA/Assets $\geq 2\%$ - EBITDA/Turnover $\geq 2\%$ - Net debt/EBITDA ≤ 4.5 - Business turnover $\geq$ 1,000,000 - No. of employees (AWU) ≥ 8	- Equity/Assets $\geq 37.5\%$ - Positive growth in business turnover - Net income/Equity $\geq 12.5\%$ - EBITDA/Assets $\geq 10\%$ - EBITDA/Turnover $\geq 7.5\%$ - Net debt/EBITDA ≤ 2.5

2018

	SME-Leader	*SME-Excellence*
Formal	- SME certification - Financial reports available for 3 fiscal years - 2017 accounts closed and reported - Regularized status with the fiscal authority, social security and IAPMEI - Credit rating: 1, 2, 3, 4, 5, 6 and 7	- Credit rating: 1, 2, 3, 4 and 5
Accounting	- Net income > 0 - Positive EBITDA in 2016 and 2017 - Equity/Net assets $\geq 30\%$ - Net income/Equity $\geq 2\%$ - EBITDA/Assets $\geq 2\%$ - EBITDA/Turnover $\geq 2\%$ - Net debt/EBITDA ≤ 4.5 - Business turnover $\geq$ 1,000,000 - No. of employees (AWU) ≥ 8	- Equity/Assets $\geq 37.5\%$ - Positive growth in business turnover - Net income/Equity $\geq 12.5\%$ - EBITDA/Assets $\geq 10\%$ - EBITDA/Turnover $\geq 7.5\%$ - Net debt/EBITDA ≤ 2.5