



Private financing, R&D, and export activity: Evidence from Portugal[☆]

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ABSTRACT

Using firm-level data for Portugal, 2006–2021, we investigate linkages between private financing — private equity (including venture capital) and private debt — and firms' exporting and innovation. Combining matching and regression procedures, we find that private financing is associated with exporting and R&D activity. Firms financed by private equity are more likely to export and to export a larger share of their sales. They also exhibit higher propensity to allocate employees and funds to R&D, and to channel a larger share of investment into it. Private debt is likewise positively related to innovation inputs and exports, but both effects are limited to the extensive margin.

1. Introduction

Mario Draghi's report on the future of European competitiveness (Draghi, 2024) highlights the European Union's lag in productivity and innovation relative to the USA, partly due to the limited ability of firms to access growth-oriented financing sources. While banks remain the dominant source of external finance in the EU, they are often ill-suited to funding innovative firms, given the challenges of valuing intangible assets (Draghi, 2024, p. 60).

A growing literature suggests that alternative sources of finance, such as venture capital, private equity, and private debt, may play an important role in supporting firm growth and innovation (e.g. Bernstein et al., 2016; Akcigit et al., 2022; Block et al., 2024). Other studies are more sceptical, pointing, for example, to limited productivity effects of leveraged buyouts (Kärnä and Myers, 2025) and concerns about financial stability risks from private debt (International Monetary Fund, 2024). The survey of venture capital's role in financing innovation by Lerner and Nanda (2020) provides a mixed view, highlighting its successful track record while also drawing attention to concerning developments, namely the narrow technological focus of venture capital,

the concentration of capital among a small set of investors, and the recent loosening of corporate governance standards.

On the export side, among others, the work of Manova (2013), Manova and Yu (2016) shows that financial frictions affect whether and how much firms export. Evidence on how private equity affects firms' export outcomes is comparatively scarce. Nevertheless, our work relates to Lavery et al. (2021). Using a matched difference-in-differences design for the UK, they find that private equity buyouts increase export entry and raise export intensity among targets.

We contribute to the literature on private financing, which traditionally focuses on the US, using data from Portugal, an EU member state. Portugal shares structural features with other European economies, namely, firms' high bank dependence and limited private finance penetration. These are two limitations on innovation and competitiveness in EU economies identified in Draghi's report.

Crucially, we are able to merge firm-level accounting data with financial market data from the Portuguese Securities Market Commission (see Section 2) on firms' external sources of finance. This enables us to explore the association between the use of private equity (which in

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our data also includes venture capital) or private debt and firm performance outcomes related to Draghi's concerns: exports, investment, and R&D. Our findings speak to the broader European landscape expanding beyond Portugal.

Following Kárná and Myers (2025), we employ a matching approach to construct control groups. We then estimate regression models on the matched samples. Across specifications, access to private equity and private debt is positively associated with firms' export activity and innovation effort. The associations we document are consistent with three channels discussed in the private finance literature: (i) a capital channel (relaxing constraints for covering fixed and working-capital costs of exporting and R&D), (ii) monitoring and expertise provided by private equity investors, and (iii) signaling of firm quality to other financiers and economic partners.

A limitation of our procedure is that matching only addresses selection on observables. Unobserved factors (e.g., managerial quality, growth opportunities and export readiness) may affect both access to private finance and export/innovation outcomes. Moreover, firms that already export or innovate may be more likely to attract private finance. Therefore, the evidence regarding the relationship between private financing and firms' R&D and export activity reported in this paper should be interpreted as associational rather than causal. Nonetheless, even if our findings primarily reflect private financiers selecting firms that are already exporters or R&D-active, this pattern would be consistent with a capital allocation that aligns with Draghi's argument that deepening EU capital markets, and thereby expanding firms' access to private finance, can foster growth, competitiveness, and innovation.

2. Data

We use Central Balance Sheet (CB) (BPLIM, 2024), a database provided by Banco de Portugal containing compulsory income statement and balance sheet records, as well as additional information such as age and sector of activity, for all Portuguese non-financial firms. CB has information on the amount of exports, the number of employees allocated to R&D activities, and investment expenditures in R&D (computed as net changes in R&D assets). All monetary variables are deflated using the consumer price index provided by Statistics Portugal.

These data are combined with information provided by the Portuguese Securities Market Commission (CMVM) to identify firms financed by private equity funds and firms financed through private debt issues registered with CMVM. The dataset contains a total of 1197 firms financed by private equity between 2012 and 2021 and 1891 firms financed by private debt between 2006 and 2021. In the CMVM records, the private equity category comprises both venture capital and later-stage private equity financing, while private debt refers mainly to commercial paper, i.e., debt issued by firms to cover short-term funding needs.

3. Empirical approach

In the Portuguese economy, firms with access to capital markets differ markedly in terms of scale when compared to the rest of the economy — they tend to have more employees and record substantially higher asset values. Figs. A.1 and A.2 in the Appendix illustrate these differences for firms with private debt and private equity.

We perform a matching exercise to build control groups for two treated groups: firms financed through private equity and firms financed through private debt, hereafter referred to as *treated observations*. We use the MatchIt (Ho et al., 2011) and overlapping (Pastore, 2018; Pastore and Calcagni, 2019) packages in R. We enforce exact matching on two-digit sector, year, and age range (up to 4 years, between 5 and 10, between 11 and 20, and more than 20 years). Each treated observation is then matched with its nearest neighbor — the untreated observation most similar in terms of employees and total assets, according to the Mahalanobis distance criterion. We apply

a caliper of 0.1 for assets and 5 for employees to strike a balance between the loss of treated observations and the quality of the match. A caliper of 0.1 for assets is required to ensure high match quality, whereas reducing the caliper for employees leads to a loss of treated observations without improving match quality.

Figs. A.3 to A.4 display the empirical distributions of the matched treated observations *vis-à-vis* the selected control observations. We find a match for 85.9% of the observations of firms financed by private equity and for 67.3% of those financed by private debt (these firms tend to be larger, which reduces the number of potential counterfactuals in the overall population).

Lastly, we compute and plot the average differences in the outcome variables between each treated group and its control group. These differences are captured by the parameter β in the following regression model:

$$y_{i,t} = \alpha + \lambda_t + \gamma_s + \eta_g + \beta X_{i,t} + \theta Z_{i,t} + \zeta W_{i,t} + \varepsilon_{i,t} \quad (1)$$

where α is a constant, λ_t , γ_s , and η_g are fixed effects for year, sector, and age group. $X_{i,t}$ is a dummy variable that identifies treatment status, while $Z_{i,t}$ controls for firms that have both sources of funding. Such firms represent about 1% of the observations in each treated group. All regressions include as additional controls the logarithm of assets and the logarithm of employees, represented by $W_{i,t}$ in Eq. (1). Outcome variables, $y_{i,t}$, are defined as follows: *Exporter* — dummy equal to 1 if the firm exports; *Exports/Sales* — ratio of exports to total sales (in %); *Employee R&D* — dummy equal to 1 if the firm reports at least one employee engaged in R&D activities; *Invests in R&D* — dummy equal to 1 if the firm reports positive R&D investment expenses; *Investment* — logarithm of total investment spending; *Investment in R&D* — logarithm of R&D investment expenses; *Investment R&D Share (in %)* — R&D investment expenses as a share of total investment expenses (in %).

For binary outcome variables, we estimate the probit specification derived from Eq. (1) and report average marginal effects. We use OLS when the outcome variables are *Exports/Sales*, *Investment R&D Share*, *Investment*, and *Investment in R&D*. For *Exports/Sales*, the sample is restricted to exporting firms; for investment-related outcomes, it is restricted to firms that invest in R&D.

4. Results

Fig. 1 shows that both firms financed with private equity and private debt display a higher propensity to export — about 5 percentage points relative to the respective control group. Also, conditional on exporting, firms financed with private equity display significantly higher values of exports relative to sales. Firms financed with private debt display no advantage in this regard.

We also find that firms financed with either private equity or private debt have a higher propensity to allocate employees to R&D activities and to report R&D investment expenditures (Fig. 1). In addition, conditional on reporting R&D expenditures, firms financed with private equity allocate a larger share of total investment to R&D (Fig. 1). Fig. 2 indicates that this result reflects higher absolute R&D expenditures rather than lower overall investment. By contrast, for firms financed with private debt, we find no statistically significant advantage at the intensive margin of R&D investment.

Although CMVM records do not distinguish between venture capital and later-stage private equity, we explore potential differences in outcomes between firms less than five years old, typically associated with venture capital, and firms at least five years old, usually linked to later-stage private equity. We find that: (1) the association between exporting and private equity finance is stronger for firms at least 5 years old on both the extensive and intensive margins; (2) marginal effects on the propensity to invest and to allocate at least one employee to R&D activities are similar across age groups; (3) conditional on investing in

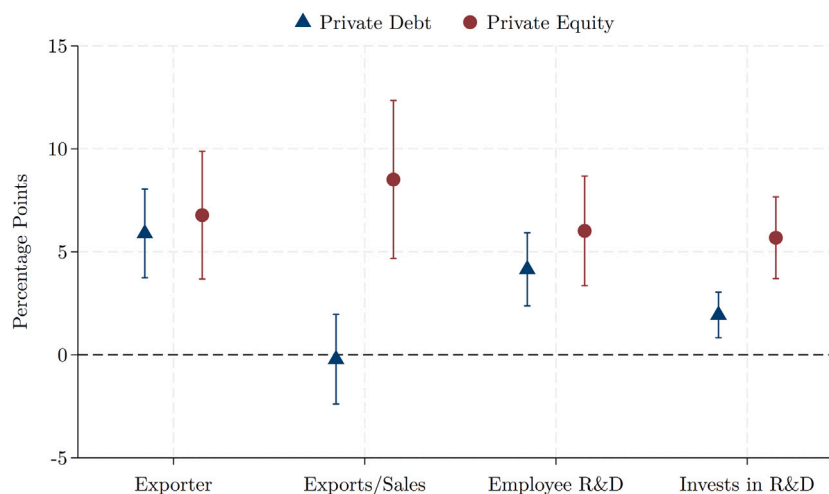


Fig. 1. Exporting and R&D propensity. The figure shows the estimated average differences in the selected outcomes for firms with private debt (blue triangles) and private equity (red circles), relative to the respective control groups. *Exporter* denotes the propensity to export; *Exports/Sales* the share of exports in total sales; *Employee R&D* the propensity to have at least one employee allocated to R&D activities; and *Invests in R&D* the propensity to report investment expenditures in R&D. Points report β estimates from Eq. (1) on the matched samples; vertical bars denote 95% confidence intervals. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

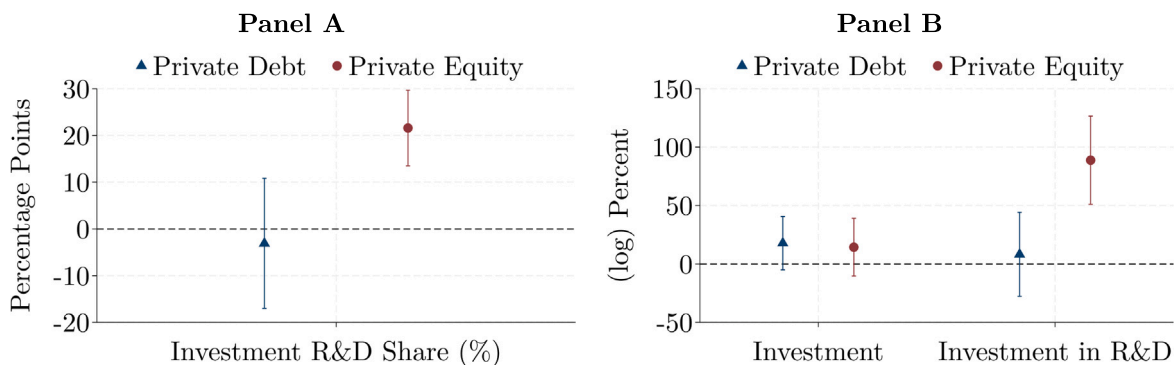


Fig. 2. R&D investment intensity. The figure reports the estimated average differences in the selected outcomes for firms with private equity (red circles) and private debt (blue triangles), relative to the respective control groups. In Panel A, *Investment R&D Share* denotes the share of investment expenditures allocated to R&D. In Panel B, *Investment* denotes the log of total investment expenditures; and *Investment in R&D* the log of investment expenditures in R&D. Points report β estimates from Eq. (1) on the matched samples; vertical bars denote 95% confidence intervals. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

R&D, the marginal effect of private equity financing on the share of total investment allocated to R&D is positive and higher for firms at least 5 years old. These results are broadly consistent with our main conclusions, although they suggest that the association between private equity financing and exports is mainly driven by later-stage private equity.

While our empirical approach does not allow us to identify mechanisms, the associations we document are consistent with three channels discussed in the private finance literature (e.g., Bernstein et al., 2016; Lerner and Nanda, 2020). One channel is selection and signaling: private finance providers screen firms seeking capital and fund those with (partly unobserved) characteristics associated with stronger subsequent performance. As a result, private finance backing may provide certification, reducing information frictions and facilitating access to external financing and other growth opportunities. A second channel is a treatment effect via capital: private finance may raise export and R&D activity by relaxing financial constraints, particularly for intangible and high-uncertainty investments. Finally, private finance providers may improve outcomes through active governance, including monitoring, incentive contracts, and managerial support, thereby strengthening execution and organizational effectiveness.

5. Conclusion

We examine the relationship between firms’ access to private capital markets and their engagement in export and R&D activities. Our analysis shows that firms financed by private equity or private debt exhibit a higher likelihood of exporting, allocating employees to R&D, and recording R&D expenditures. At the intensive margin, firms financed by private equity export a larger share of their sales and allocate a greater proportion of their investment to R&D. Taken together, these results suggest a positive association between access to private financing and both innovation and international competitiveness.

Although our evidence is associational, our findings align with the financing dimension emphasized by Draghi (2024) and underscore the importance of increasing the depth and integration of the EU’s capital markets and reducing frictions in firms’ access to private financing. This points to the potential value of policies that lower fixed costs and information frictions in accessing private finance. For example, by streamlining and harmonizing issuance and disclosure frameworks for private financing instruments, and by deepening the EU investor base for private equity and private debt. Detailing and assessing the causal impact of such reforms remains an important avenue for future research.

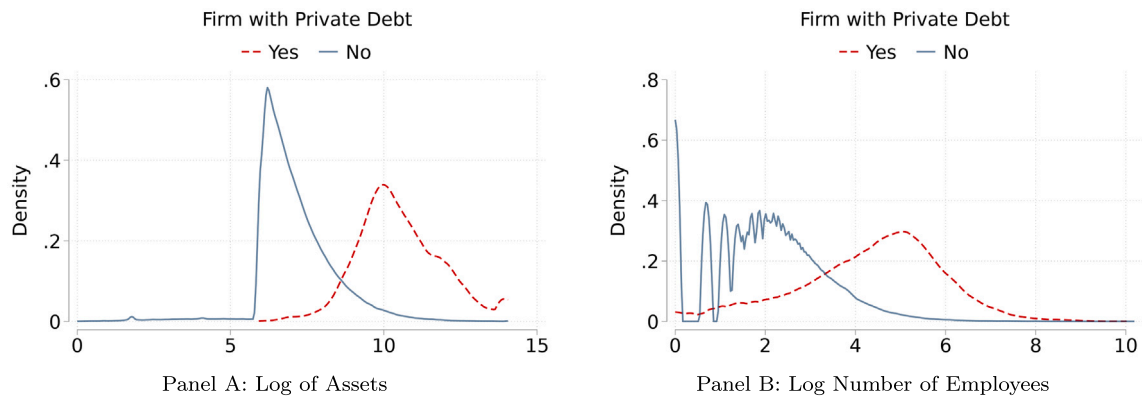


Fig. A.1. Private Debt. The figure plots the distribution of firms' Log Assets in thousands of Euros (in Panel A) and Log Number of Employees (in Panel B), distinguishing firms with Private Debt (dashed red line). The solid blue line represents firms without private debt. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

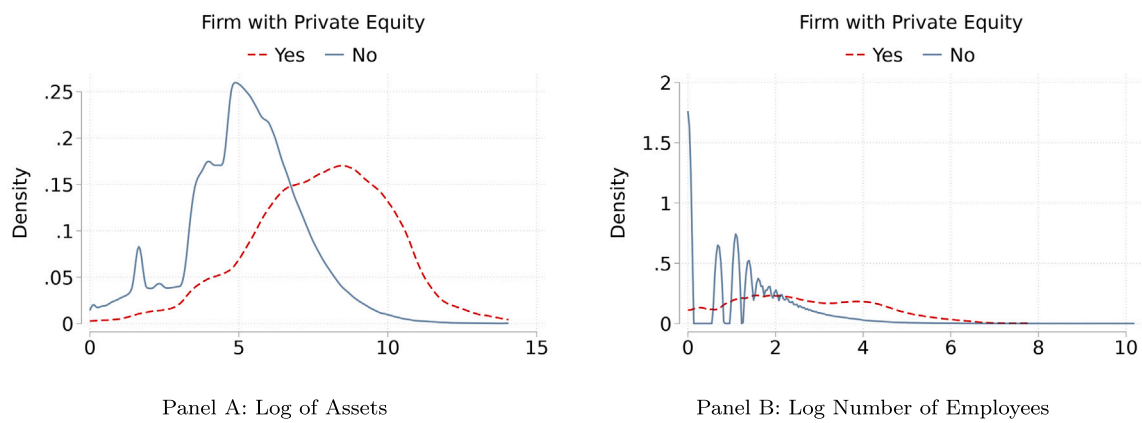


Fig. A.2. Private Equity. The figure plots the distribution of firms' Log Assets in thousands of Euros (in Panel A) and Log Number of Employees (in Panel B) distinguishing firms with Private Equity (dashed red line). The solid blue line represents firms without private equity. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

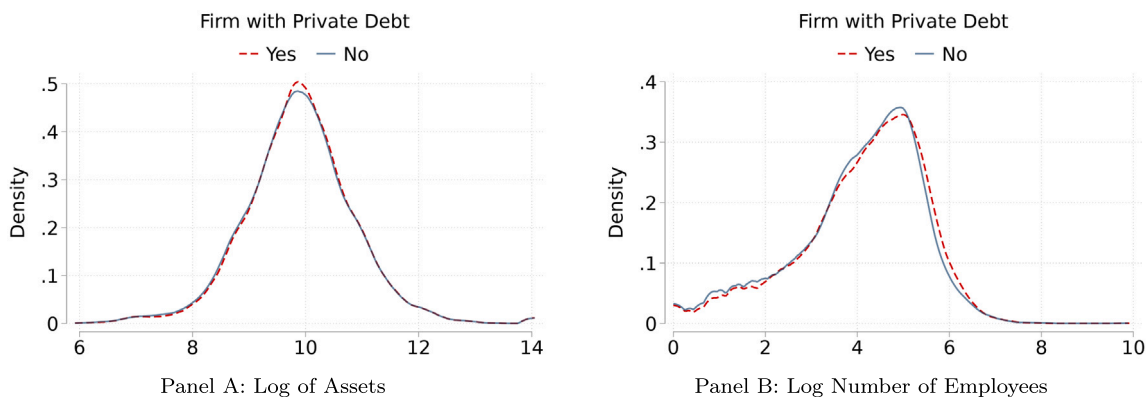


Fig. A.3. Private Debt. The figure plots the distribution of firms' Log Assets in thousands of Euros (in Panel A) and Log Number of Employees (in Panel B) distinguishing firms with Private Debt (dashed red line) and the matched control group (solid blue line). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

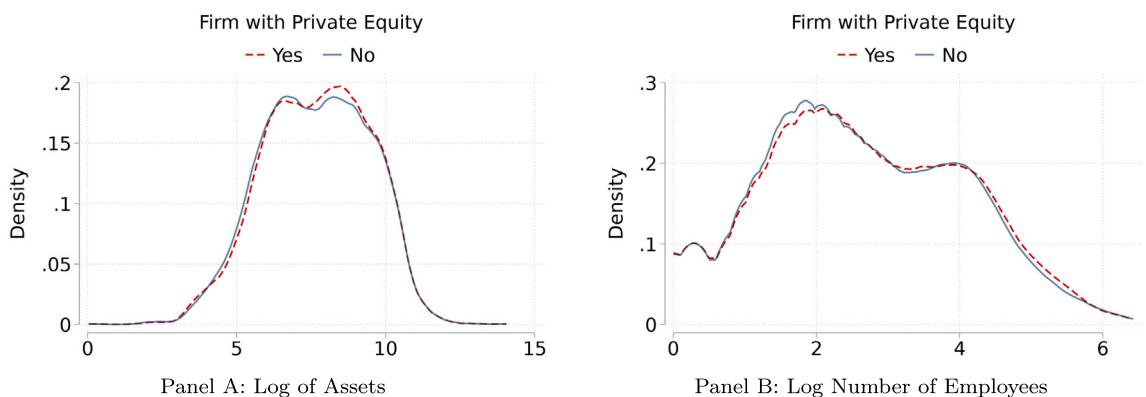


Fig. A.4. Private Equity. The figure plots the distribution of firms' Log Assets in thousands of Euros (in Panel A) and Log Number of Employees (in Panel B) distinguishing firms with Private Equity (dashed red line) and the matched control group (solid blue line). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Appendix A. Pre- and post-match distributions

A.1. Pre-match distributions

See Figs. A.1 and A.2.

A.2. Post-match distributions

See Figs. A.3 and A.4.

Appendix B. Supplementary data

Supplementary material related to this article can be found online at <https://doi.org/10.1016/j.econlet.2026.112876>.

Data availability

The data that has been used is confidential.

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