Determinants and Effects of Countries' External Capital Structure: A Firm-Level Analysis*

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Abstract

This paper examines how a firm's foreign liability composition affects crisis resilience and identifies the key factors shaping this composition. Using comprehensive firm-level data, we demonstrate that firms with a higher share of foreign equity in their total foreign liabilities were less affected by the Global Financial Crisis and experienced a faster recovery afterwards. The evidence suggests that intra-group financing is the primary mechanism—firms with higher foreign equity shares were able to draw more heavily on loans from their foreign parents when external capital markets were distressed and domestic credit was constrained. Additionally, these firms were also less likely to default during the crisis, highlighting the stabilising role of foreign equity and internal capital markets within multinational firms. Finally, we document that larger, more open, and more productive firms tend to exhibit higher foreign equity shares.

Keywords: External foreign liabilities, Foreign capital structure, FDI, Firm-level data, Financial crisis, Financial stability

JEL Codes: E44, F21, F23, F32, F34, F36

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1 Introduction

During the past decade, large and persistent current account imbalances have led to historic highs in countries' net international investment positions, raising concerns about the disorderly unwinding of these stock imbalances (International Monetary Fund, 2025). The rapid monetary tightening of advanced economies in 2022-23, combined with rising geopolitical and trade tensions, has led to a new period of potentially heightened financial and capital flow volatility. This poses significant challenges for policymakers and has revived concerns about countries' susceptibility to sudden capital flow reversals. Recent developments highlight the importance of understanding the factors that determine a country's external resilience when exposed to global shocks.

Previous research found that the composition of foreign liabilities—specifically the share of foreign direct investment (FDI), portfolio equity, and external debt in a country's gross foreign liabilities—is a key determinant in a country's vulnerability to external crises (see, e.g., Lane and Milesi-Ferretti (2000); Pistelli et al. (2007); Gourinchas and Obstfeld (2012); Catão and Milesi-Ferretti (2014); Cubeddu et al. (2023)). Given that liquidity crises are unlikely to be generated by sudden stops in equity flows but are often triggered by sudden stops in debt flows, a large share of equity in total liabilities can strengthen macroeconomic and financial stability during times of distress when debt markets may freeze or become prohibitively expensive.

This paper provides new evidence on these topics at the *micro-level*, using a comprehensive firm-level dataset for Slovenia. The data, which covers the whole population of *non-financial* corporate entities in Slovenia, contains detailed information on firm characteristics, their balance sheets, and, most importantly, information on the stock of firm liabilities vis-à-vis foreign residents. With this information, we construct a firm-level measure of the foreign equity share, which closely mirrors the measures used in the macroeconomic literature. Slovenia, a small open economy highly integrated into global trade and capital markets and part of a monetary union, offers a unique case for analysing the impact of firms' foreign liability composition on economic and financial resilience. Using the global financial crisis (GFC) as an external shock, we show that the composition of foreign liabilities at the firm level offers valuable insights into a country's vulnerability to external shocks. To address the potential endogeneity of the pre-crisis foreign equity share, we employ an instrumental variables (IV) strategy that uses the leave-one-out mean of peers' pre-crisis foreign equity exposure within the same sector as an instrument.

Our study presents four key findings. First, while the composition of the foreign capital structure is relatively stable at the aggregate level, it masks substantial heterogeneity across firms and over time. Second, firms with a higher pre-crisis foreign equity share experienced significantly smaller sales declines during the GFC and faster recoveries.

This result holds in both OLS and IV specifications, with the latter pointing to a causal effect of the foreign equity share on crisis resilience. We also shed light on the mechanism and show that firms with a higher equity share were able to draw more heavily on intra-group loans from foreign parents when external credit conditions tightened, highlighting the important stabilising role of internal capital markets within multinational firms. Third, we find that firms with higher foreign equity shares were less likely to default during the crisis, providing further evidence that foreign equity acts as a long-term commitment from investors, enhancing financial stability. Finally, we examine the factors that determine a firm's foreign liability structure. We find that larger, more open, and more productive firms tend to have a higher foreign equity share, whereas leverage and tangibility are negatively related. While previous studies have addressed this question from a cross-country perspective—examining factors such as institutional quality and financial market development—we complement the existing literature by demonstrating how firm-level characteristics influence the foreign equity share.[1]

Related literature. This paper contributes to the literature on the effects of firms' (foreign) capital structure on countries' vulnerabilities to external shocks. An active body of literature examines firms' capital structures and their impact on performance during the GFC. However, most of these studies typically focus on the *overall financing structure* of firms. For example, Clarke et al. (2012) investigate how country and firm characteristics affect financial constraints and the default probability of firms during a crisis episode. Medina (2012) uses cross-sectional data from 48 developed and developing countries to identify resilience and vulnerability factors in the aftermath of the GFC. Wu (2012) studies the effects of changes in external financing conditions on firm performance after the crisis, while Kalemli-Özcan et al. (2022) analyses the role of financial factors that have contributed to sluggish investment in Europe after the 2008–2009 crisis. In contrast to these studies, which mostly look at the *overall financial leverage* of firms, we focus on the composition of *foreign liabilities* as a determinant of firm performance during external shocks.

Another strand of literature focuses on access to *foreign debt financing* during the GFC (e.g., Ongena et al. (2015); Herman et al. (2025)). These studies find that foreign debt, whether bank or corporate, is an important driver of the transmission of external shocks. Moreover, Kim et al. (2015) and Kim (2016) examine the impact of *currency composition* on firms' balance sheets and their performance in the aftermath of the crisis.

The literature on multinational firms offers additional insights into the stabilising role of foreign equity. Alfaro and Chen (2012) show that multinational subsidiaries performed

[1] Faria et al. (2007), Faria and Mauro (2009), and Wei and Zhou (2018), among others, find that better institutions and more developed financial markets tend to increase the aggregate equity share in countries' total external liabilities. Harms et al. (2024), in turn, present evidence that higher income inequality is associated with a greater equity share in countries' external liabilities.

better than local firms after the GFC, whereas Desai et al. (2008) highlight that multinational firms benefiting from parent equity financing are more resilient during crises than their purely domestic counterparts. More recent firm-level evidence highlights the importance of internal capital markets and networks within multinational groups in cushioning liquidity shocks, supporting affiliate financing, and shaping crisis transmission (Cravino and Levchenko (2016); Santioni et al. (2019); Boehm et al. (2019)). We contribute to this literature by focusing specifically on the *foreign capital structure* and examining how the composition of foreign liabilities influences firm performance and resilience during the GFC, and by providing direct evidence that parent-provided financing served as a key stabilising channel during the crisis.[2]

Finally, our paper also relates to the extensive literature on the externalities of international capital flows that contribute to financial instability and recessions (e.g, Forbes et al. (2015); Erten et al. (2021)) as well as on how to select an appropriate policy mix for preserving macroeconomic and financial stability in the face of domestic and external shocks (International Monetary Fund, 2020).

The structure of this paper is as follows. Section 2 discusses the data used in our analysis. Section 3 presents stylised facts, the empirical strategy, and our main results. Section 4 concludes.

2 Data description

We use annual data from a merged firm-level database that contains both qualitative and quantitative information about all Slovenian firms. The database is compiled from two different data sources. The first is the Slovenian Business Register, which provides qualitative information about firms with their principal place of business in Slovenia. The second source is the Annual Reports of Corporate Entities (JOLP), which contains quantitative data, including firms' balance sheets (BS) and income statements (IS). By combining these datasets, we create a comprehensive dataset to analyse how firm characteristics and capital structures affect firms' performance.[3]

A unique feature of our dataset is that firms operating abroad must report BS and IS separately for their foreign operations and liability positions.[4] We can thus calculate a measure of the foreign equity share that closely resembles the measure used in the macroeconomic literature to analyse cross-country variation in foreign liability structures (e.g., Faria and Mauro (2009) or Wei and Zhou (2018)). In these studies, total equity com-

[2]By foreign financing, we refer to financing sources from abroad. Note that this differs from the typical dichotomy between firms' internal and external sources of financing, as typically discussed in the corporate finance literature. See also Section 3.1 for more details.

[3]For a detailed description of the data, see Herman et al. (2025) and Lenarčič and Papadopoulos (2020).

[4]This granular information is part of the raw data used to compile Slovenia's balance of payments (BOP) statistics.

prises FDI and portfolio equity, expressed as a percentage of total international liabilities, which include FDI, portfolio equity, and debt.[5]

We construct foreign equity shares at the firm level as the ratio of foreign equity to total foreign liabilities.[6] Ideally, to closely match the macroeconomic literature, we would require information on all relevant components for individual firms, including portfolio equity and tradable debt securities. However, firms typically do not have detailed data on the ultimate ownership of portfolio equity or tradable debt securities, so these items are not reported in our dataset. Despite this limitation, our measure is very close to the equity share derived from aggregate country statistics. First, publicly listed companies (PLCs) account for only about 1 percent of all firms in Slovenia, meaning that portfolio equity held by foreign residents is negligible for most firms. Second, debt securities issuance by Slovenian firms is minimal; firms predominantly rely on bank loans for financing (see, e.g., Bank of Slovenia (2017); Herman et al. (2025)). As a result, portfolio debt liabilities are likely to be negligibly small.[7]

We argue that all this makes Slovenia a particularly interesting case to study, given the literature's emphasis on the dichotomy between "debt vs. equity" or, more broadly, "stable vs. unstable" funding sources. FDI, widely considered the most stable form of foreign financing, plays a substantial role in Slovenia's economy. As of 2014, 2,899 Slovenian firms had inward FDI through direct affiliations. Foreign investors concentrated the majority of their investments in Slovenia's non-financial corporate sector, which accounted for 83 percent of the total value of inward FDI. Although firms with FDI liabilities comprised only about 5 percent of all Slovenian firms, their economic influence was disproportionately large. These firms accounted for 19 percent of the total capital in the corporate sector, 22 percent of all corporate assets, and employed 22 percent of the workforce in the corporate sector. Moreover, a significant share of FDI in Slovenia consists of new (greenfield) investments, which are typically associated with economic stability and growth. Of the 3,531 inward FDI projects recorded in Slovenia, 62 percent were actually greenfield investments (Bank of Slovenia, 2014).

For our analysis, we apply four sample restrictions to the data. First, we restrict our sample to the period from 2005 to 2014. Although data from earlier years are available, we start in 2005 to avoid potential confounding effects related to exchange rate changes.[8]

Second, we exclude firms in the financial, insurance, and government sectors due

[5] In the BOP statistics, debt is further divided into portfolio debt (e.g., bills, bonds, and similar instruments typically traded in the financial markets) and other investments, such as trade credits and bank loans.

[6] Put differently, it is the share of the firm's *foreign* liabilities that takes the form of equity. Note that this is not the share of the firm's total equity held by non-residents.

[7] Herman and Lozej (2021) document that for most Slovenian firms, financing from abroad takes the form of either FDI or loans intermediated by domestic banks.

[8] Slovenia entered the Exchange Rate Mechanism II in July 2004. Since then, until the Euro adoption in January 2007, its exchange rate has been fixed to the Euro.

to the distinct structure of their balance sheets, which differ significantly from those of firms in other sectors. It is important to note that our dataset, which is based on the JOLP, does *not* include banks or other deposit-taking institutions, as these report separately to the Bank of Slovenia under prudential reporting requirements. The few financial firms present in our dataset are therefore non-deposit-taking companies that may perform ancillary financial or project-finance functions. We exclude them to maintain comparability with non-financial corporations.

Third, to minimise the impact of extreme outliers on our results, we trim the top and bottom 0.1 percent of the dependent variable for each year.[9]

Lastly, since our focus is on the foreign capital structure of operating firms, we exclude firms that declared bankruptcy during the sample period.[10] This restriction raises the possibility of survivorship bias, as it limits the baseline sample to firms that remained active throughout 2005–2014. Conditioning on crisis survival can bias our estimates if survival is itself influenced by the pre-crisis foreign equity share. For example, if defaults were disproportionately concentrated among firms with a very low foreign equity share during the crisis, dropping all firms that defaulted between 2005 and 2014 could attenuate the crisis effects. To address this concern, Figure B.1 in the appendix shows the default rates among firms at risk by year, among firms with zero and positive foreign equity shares. We find that default risk is indeed concentrated among firms with no foreign equity, which likely attenuates our estimated effects (i.e., the true effect of foreign equity share on performance is larger, making our results conservative).

However, our sample could be affected by what is known as "fire-sale FDI", where crisis-driven asset price collapses make foreign acquisitions attractive despite ongoing turmoil and portfolio outflows Krugman (2000).[11] If crisis-period FDI inflows disproportionately target firms without prior foreign equity, they could improve those firms' performance (e.g., via liquidity, management, or technology transfer) and thus attenuate the estimated crisis effects. Two facts mitigate this concern. First, our foreign equity share is fixed at its pre-crisis level, and the instrument uses leave-one-out peer exposure from 2005–2008, so post-2009 entries do not change the exposure measure. Second, Figure B.2 in the appendix shows that switches in foreign equity status after 2008 are rare and stable over time, while aggregate data do not indicate any increase in FDI in Slovenia during the crisis.

Table 1 provides the summary statistics of the main variables used in our analysis. Panel (A) reports statistics for firms with a positive equity share, and Panel (B) reports statistics for all other firms. We further split the sample into a pre- and a crisis period,

[9] This is a very conservative approach and less restrictive than what is commonly done in the literature. For instance, other studies usually eliminate observations in the top and bottom 1 percent of the sample.

[10] In total, this applies to 5,106 firms in the whole sample.

[11] For example, Aguiar and Gopinath (2005) and Alquist et al. (2016) find that the number of foreign mergers and acquisitions in East Asia rose sharply during the 1997 Asian financial crisis.

where the cut-off year for the crisis period is 2009.[12] The table shows that firms with a positive equity share are, on average, larger, employ more workers, are more productive, and are more open. They are also younger, less leveraged, hold fewer tangible assets, and exhibit higher liquidity ratios. The share of publicly listed companies (PLC) is comparable across both subsamples.

Table 1: Summary Statistics

	A. Firms with Positive Foreign Equity				**B. Firms without Foreign Equity**			
	Pre-Crisis		Crisis		Pre-Crisis		Crisis	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Sales Growth (%)	18.32	10.24	9.73	1.77	15.15	9.73	3.57	0.10
Total Liabilities / TA (%)	67.74	61.52	74.61	59.38	77.14	70.48	82.25	68.37
Size - Assets (€, 1000)	11,542	551	10,072	384	3,872	459	3,663	451
Size - Employment	86.33	9.00	70.54	8.00	29.89	5.00	23.83	5.00
Firm Age (years)	7.97	7.00	8.49	6.00	11.17	13.00	12.62	13.00
Tangibility (%)	27.73	17.01	28.14	15.91	30.17	25.42	30.11	24.59
Firm Openness (%)	45.44	31.70	52.64	60.63	21.74	3.08	24.99	4.53
Productivity (%)	63.26	38.56	55.67	36.74	40.72	28.64	37.50	28.58
Liquidity Ratio (%)	160.00	96.97	1082.92	103.37	108.38	81.58	135.80	85.15
Capital Intensity (%)	2285.56	71.15	1031.65	76.06	532.51	75.84	500.42	81.91
PLC (%)	0.04	0.00	0.03	0.00	0.04	0.00	0.03	0.00
N	6,398		13,752		35,086		63,079	

Notes: Summary statistics are shown for firms with and without foreign equity before and after the crisis.

3 Empirical Analysis

This section begins with descriptive evidence on firms' foreign equity shares and clarifies key concepts used in the analysis. We then outline our empirical identification strategy and present the main results.

3.1 Some stylized facts

Before presenting stylised facts, we clarify the terminology used throughout the empirical analysis. The focus of this paper is on the firm's *Foreign Equity Share* (FES), which is calculated as the ratio of foreign equity to total foreign liabilities

$$\text{Foreign Equity Share} = \frac{\text{Equity}^{\text{Foreign}}}{\text{Equity}^{\text{Foreign}} + \text{Debt}^{\text{Foreign}}} \tag{1}$$

[12] More precisely, the last year in the pre-crisis period is 2008, and the first crisis year starts in 2009.

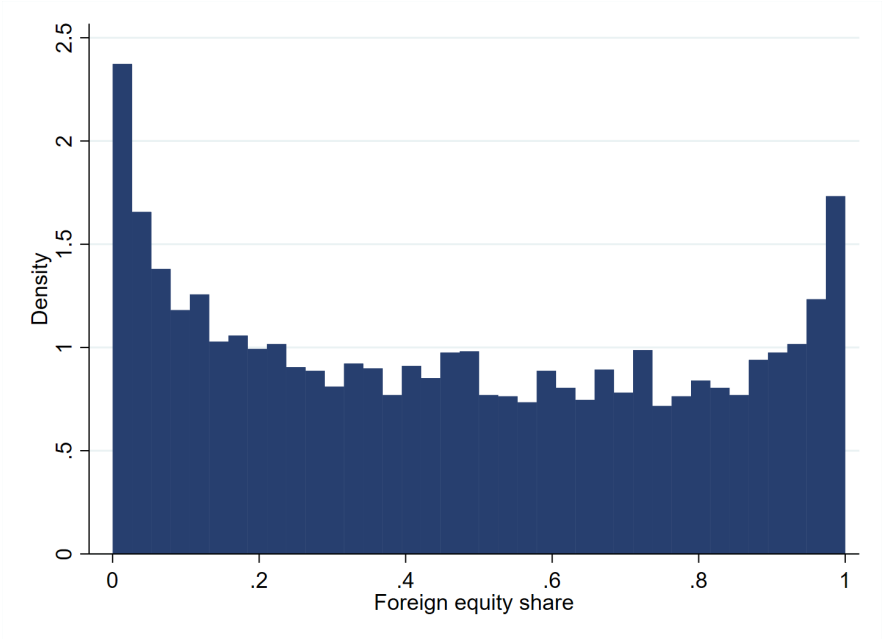
The Foreign Equity Share $\in [0,1]$ measures the proportion of a firm's total foreign liabilities that take the form of equity. This measure is conceptually distinct but closely related to the *Equity Share*, which reflects the overall capital structure of a firm-—the specific combination of debt and equity a company employs to finance its operations and facilitate growth. The Equity Share is calculated as the ratio of total equity, including both domestic and foreign equity, to total liabilities, including both domestic and foreign obligations

$$\text{Equity Share} = \frac{\text{Equity}^{\text{Home}} + \text{Equity}^{\text{Foreign}}}{\text{Equity}^{\text{Home}} + \text{Debt}^{\text{Home}} + \text{Equity}^{\text{Foreign}} + \text{Debt}^{\text{Foreign}}} \tag{2}$$

While one would expect these two concepts to be highly correlated, there is no particular reason why the two shares should be identical. For instance, if a firm decides to take out a loan from a domestic bank, its overall equity share in (2) would decrease, while the foreign equity share in (1) remains unchanged. Conversely, if the domestic owner of a firm sells equity to a foreign investor, the foreign equity share increases, but the overall financing structure of the firm remains unchanged. Indeed, in our data, the two ratios are highly correlated but not identical (see Figure B.3 in the appendix).

A firm's overall financing structure, i.e. the mix of debt and equity, is generally under its direct control. However, the extent to which the firm can influence the identity of its creditors, particularly foreign ones, is more limited. Since our primary interest lies in the composition of firms' total *foreign* liabilities, we account for the overall capital structure in our regression analysis. This approach allows us to isolate the variation in the *foreign* capital structure that is not explained by the firm's overall financing decisions.

Figure 1: Firm-Level Distribution of Foreign Equity Share



Notes: This histogram shows the distribution of firms' foreign equity share as a proportion of total foreign liabilities over the 2005–2014 period.

Let us now examine some stylised facts about the foreign equity share as defined in (1). Figure 1 displays the distribution of the individual firm's equity share in foreign liabilities among firms with any foreign liabilities. While the distribution appears relatively even across the middle range, there are noticeable spikes at both the upper and lower ends of the distribution.

Table 2: Summary Statistics for All Firms

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Firms with Foreign Liabilities (%)	23	23	23	22	22	22	22	22	22	21
of which: Equity Liabilities (%)	10	10	11	11	11	11	11	12	12	13
N	38,165	39,782	42,786	45,856	47,851	49,086	52,197	54,577	56,957	59,856

Notes: Percentages are shares of all firms unless noted. The equity row reports the percentage among firms with some foreign liabilities.

Table 2 presents summary statistics for the entire sample over the 2005 – 2014 period. The sample begins with 38,165 firms in 2005 and grows steadily to 59,856 firms by 2014. The share of firms with any foreign liabilities remains consistently around 22 percent throughout the period. Among these firms, approximately 10 percent have equity liabilities vis-à-vis foreign residents, a share that also shows little variation over time. The average number of firms in the sample with a positive equity share in their foreign liabilities is approximately 1,000, indicating that the analysis captures a substantial and diverse

portion of the corporate sector, rather than just a handful of often very large firms in the economy.

Table 3: Summary Statistics by Firm Size

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Firms with Foreign Liabilities (%)										
Below Median	7	7	7	7	7	7	7	7	7	6
Above Median	39	38	39	38	38	37	37	36	36	36
of which: Equity Liabilities (%)										
Below Median	7	9	8	9	10	9	10	12	14	16
Above Median	11	11	11	11	11	11	11	12	12	12
Mean Equity Share (%)										
Below Median	52	47	49	52	54	50	49	47	48	47
Above Median	48	49	48	50	52	51	51	50	49	50

Notes: Firms below the median are firms with assets below the median size, and firms above the median are firms with assets above the median size in each year. All statistics are in percentages.

Table 3 presents descriptive statistics for our key variable of interest, disaggregated by firm size, with firms categorised as either above or below the median based on their total assets. These conditional statistics highlight differences in the presence and composition of foreign liabilities across firm size.

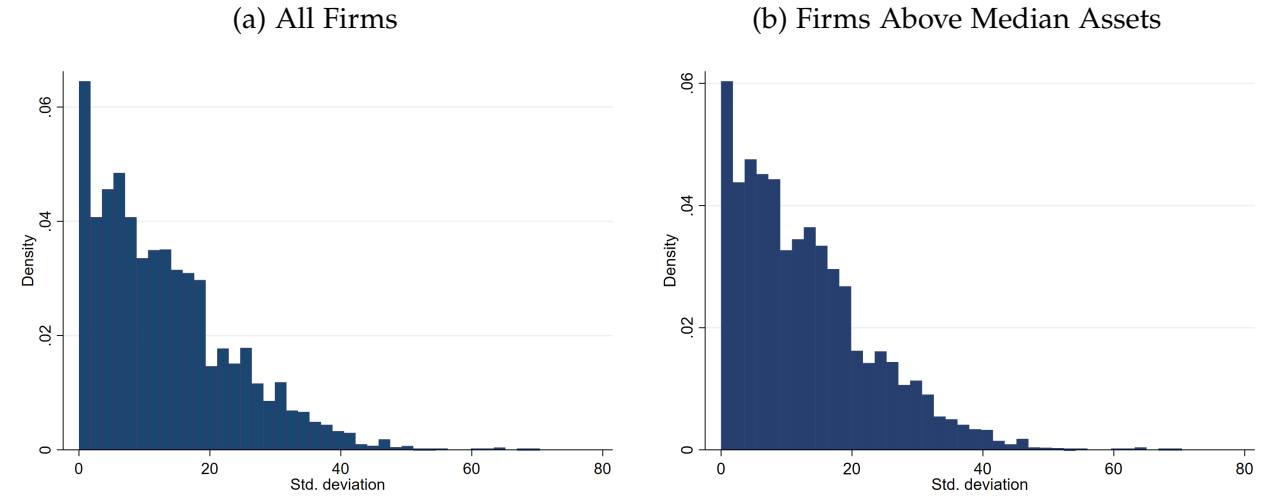
The top panel shows that larger firms (those above the median) are significantly more likely to hold foreign liabilities. On average, 38 percent of large firms report foreign debt or equity exposure, compared to just 7 percent of smaller firms, and these proportions remain stable over the sample period.

The middle panel shows that among firms with foreign liabilities, the fraction holding foreign equity liabilities remains consistently similar over time. However, smaller firms exhibit a gradual increase in this fraction, from 7 percent in 2005 to 16 percent in 2014. In contrast, the fraction for larger firms remains stable, hovering around 11–12 percent.

Finally, the bottom panel indicates that the mean equity share in foreign liabilities is remarkably stable, averaging close to 50 percent across both size groups. This suggests that, while larger firms are more likely to have foreign liabilities overall, the composition of these liabilities (in terms of equity shares) is similar for both small and large firms.

Figure 2 shows the distribution of the firm-specific standard deviation of the foreign equity share over the sample period. As can be seen, the share of equity in their foreign liabilities varies considerably over time. Notably, this variability is not predominantly driven by larger firms, as shown in panel (b).

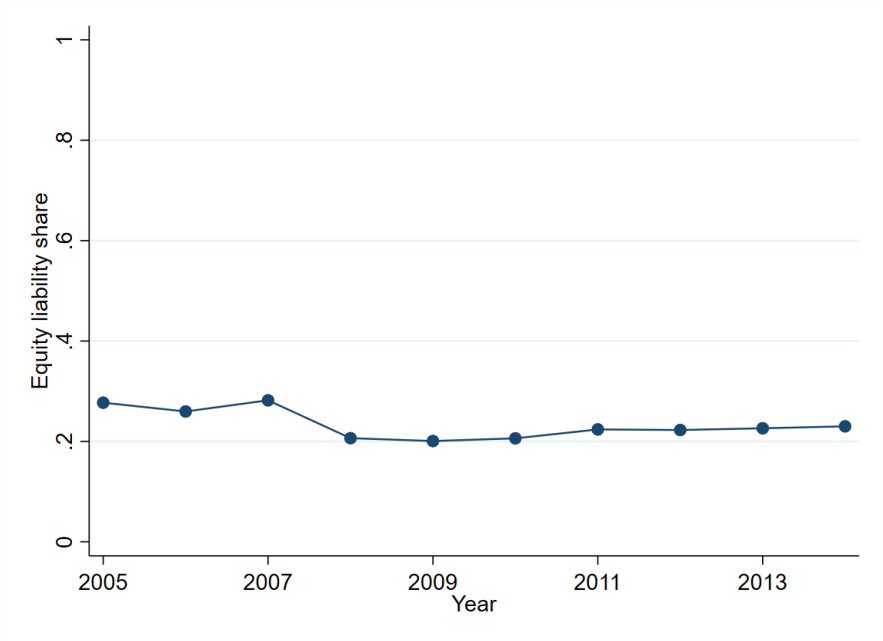
Figure 2: Firm-Level Standard Deviation of Foreign Equity Share



Notes: The histograms show the firm-level standard deviation of foreign equity share over the 2005–2014 period. Panel (a) includes all firms in the dataset, while Panel (b) includes only firms with assets above the median in each year.

The statistics presented so far suggest that the aggregate equity share in foreign liabilities remains relatively stable over time. This observation is confirmed by Figure 3, which displays the equity share in foreign liabilities for the whole Slovenian economy using the *External Wealth of Nations* database developed by Lane and Milesi-Ferretti (2018). In fact, the macroeconomic literature often describes the composition of liability stocks as a fundamental, slow-moving variable (see, for instance, Faria and Mauro (2009)). However, while aggregate figures appear stable, our analysis reveals substantial variation at the micro-level, highlighting the relevance of firm-level dynamics in understanding broader economic trends.

Figure 3: Slovenia's Aggregate Foreign Equity Share



Notes: The total equity share of Slovenia's external liabilities is constructed as the sum of FDI and portfolio equity expressed as a ratio to total liabilities using the dataset created by Lane and Milesi-Ferretti (2018).

3.2 Firms' crisis vulnerability and foreign equity share

This section examines whether the mix of foreign equity and foreign debt in firms' external liabilities before the crisis shaped their resilience during the GFC. We focus on the pre-crisis foreign equity share and its effect on firm performance between 2009–2014.[13] We do this in two steps. First, we establish a baseline association using a difference-in-differences (DiD) framework. Second, to address endogeneity, we employ an instrumental-variables (IV) strategy to identify causal effects.

3.2.1 Difference-in-Differences

OLS specification. We estimate a DiD model that compares firms with different pre-crisis foreign equity exposure before and during the crisis. We define foreign equity exposure (FEE_i) as the pre-crisis foreign equity share ($FES_i \in [0,1]$), measured in 2008 (or the latest pre-2009 year if 2008 is missing) and rescaled so that one unit equals a

[13]Note that our sample covers non-financial corporate entities only. As discussed in Section 2, banks and other deposit-taking financial institutions are not part of our dataset, as their reporting and balance sheet structures differ from those of non-financial firms. Consequently, our results speak to the behaviour of non-financial firms. McCauley et al. (2019) document that European banks played an important role in the post-GFC retrenchment of international lending, highlighting dynamics in the financial sector that are distinct from those examined here.

10 percentage points (pp) increase. Following Alfaro and Chen (2012), the dependent variable is sales growth (annual percent change in sales). Our baseline specification is

$$Y_{it} = \alpha_i \; + \; \gamma_{gt} \; + \; \beta \left(\text{Crisis}_t \times \text{FEE}_i \right) \; + \; X'_{it}\,\delta \; + \; \varepsilon_{it} \; , \tag{3}$$

where α_i are firm fixed effects, γ_{gt} are 5-digit sector$\times$year fixed effects absorbing time-varying sector-specific shocks. $\text{Crisis}_t = \mathbb{1}\{t \geq 2009\}$ indicates the crisis period. The vector of firm-level controls X_{it} includes size, liquidity, leverage, productivity, tangible assets, openness, age, age^2, and being a publicly listed company (PLC). The coefficient of interest, β, measures the change in sales growth after 2008 associated with a 10 pp higher pre-crisis foreign equity exposure.

OLS event study. Next, to assess dynamics and test for parallel pre-trends, we estimate

$$Y_{it} = \alpha_i \; + \; \gamma_{gt} \; + \; \sum_{\tau \neq 2008} \beta_\tau \left(\mathbb{1}\{t = \tau\} \times \text{FEE}_i \right) \; + \; X'_{it}\,\delta \; + \; \varepsilon_{it} \; , \tag{4}$$

where the interaction $\mathbb{1}\{t = \tau\} \times \text{FEE}_i$ allows the effect of pre-crisis foreign equity exposure on sales growth to vary by year. Here, each β_τ is the difference in sales growth in year τ, relative to 2008, associated with a 10 pp higher pre-crisis foreign equity exposure. As before, we include firm fixed effects, 5-digit sector$\times$year fixed effects, and the same firm-level controls.

Endogeneity of the foreign equity share. Three considerations could lead to endogeneity of the foreign equity share, thereby compromising identification and biasing the OLS estimates. First, foreign investors may ex ante select firms with superior growth prospects, management skills, or governance, leading to a selection bias as the same factors also increase firms' crisis resilience. As a result, estimated effects would reflect selection rather than access to stable external funding. Second, a time-varying exposure to shocks might not be fully captured by the fixed effects. While our fixed effects remove time-invariant heterogeneity and common sector shocks, firms with high foreign equity shares may experience different post-2008 shocks. For example, if these firms are systematically owned by parents headquartered in countries more severely affected by the GFC (e.g., due to tighter financial conditions), those shocks might correlate with the foreign equity share and sales growth, biasing OLS estimates. Third, if firms with high foreign equity shares were more likely to survive into the first year of the crisis, this would lead to a survivorship bias.

3.2.2 IV–DiD

IV construction. To address the endogeneity concerns above, we instrument the interaction term ($\text{Crisis}_t \times FEE_i$) with a predetermined, leave-one-out peer exposure at the 5-digit sector level. For firm i in sector g, we define the leave-one-out average of peers' pre-crisis (2005–2008) foreign equity exposure as

$$\text{FEE}_{ig}^{Peer} = \frac{1}{N_g - 1} \sum_{j \in g, j \neq i} \overline{FEE}_{j,2005\text{–}2008} \,. \tag{5}$$

We rescale this measure as

$$Z_{ig}^{\text{base}} \equiv 10 \times \text{FEE}_{ig}^{\text{Peer}} \,, \tag{6}$$

so that one unit corresponds to a 10 pp increase in peer exposure. The crisis instrument is then constructed as

$$Z_{igt}^{\text{crisis}} = Z_{ig}^{\text{base}} \times \text{Crisis}_t \,, \tag{7}$$

which is based exclusively on pre-crisis information, excludes firm i by construction, and varies only in crisis years.

Relevance and exclusion restrictions. Foreign equity tends to cluster within narrowly defined industries because foreign investors are likely to target sectors with specific technologies, supply chains, and regulatory environments that align with their interests. For instance, Alfaro and Charlton (2009) show that FDI is disproportionately vertical and concentrated in high-productivity and technologically advanced sub-sectors. Firms in a sector where foreign ownership was already prevalent before the crisis are therefore also more likely to exhibit higher own exposure. As explained above, we exploit this by using the pre-crisis, leave-one-out peer foreign equity exposure at the 5-digit level, which is then interacted with the crisis indicator. We argue that our instrument is both (i) *relevant*, due to documented foreign-ownership clustering, and (ii) *plausibly exogenous*, as it averages over the pre-crisis period, excludes firm i, and is switched on only in crisis years, such that conditional on firm- and sector×year fixed effects, it does not capture firm-specific shocks or contemporaneous responses.[14] Conditional on these fixed effects, the remaining channel by which variation in peer foreign-equity intensity can affect post-crisis outcomes is primarily through the firm's own pre-crisis foreign equity exposure.

A potential concern is that foreign investors may be strategically supporting non-affiliated firms within the same sector. However, we regard this as unlikely, since intra-group support is much more likely to target its own subsidiaries rather than unrelated competitors. As we show below, consistent with our identifying assumptions, our IV

[14] Firm fixed effects absorb all time-invariant unobservable differences across firms, while sector-by-year absorb shocks common to all firms in the same 5-digit sector in a given year (e.g., sector-specific demand shifts, credit conditions, or policy changes).

event study shows no differential pre-trends, and pre-crisis placebo regressions yield no statistically significant effects. Together, these patterns support the relevance of the instrument and the validity of the exclusion restriction.

IV specification. We next estimate a two-stage least squares (2SLS) specification in which the interaction between pre-crisis foreign equity exposure and the crisis indicator is instrumented with the peer-based measure:

$$\textit{First stage:} \quad \text{Crisis}_t \times FEE_i = \phi\, Z_{igt}^{\text{crisis}} \;+\; X_{it}'\Gamma \;+\; \alpha_i \;+\; \gamma_{gt} \;+\; u_{it}\,, \tag{8}$$

$$\textit{Second stage:} \quad Y_{it} = \alpha_i \;+\; \gamma_{gt} \;+\; \beta\,(\widehat{\text{Crisis}_t \times FEE_i}) \;+\; X_{it}'\delta \;+\; \varepsilon_{it}\,, \tag{9}$$

where α_i are firm fixed effects, γ_{gt} are 5-digit sector×year fixed effects, X_{it} matches the OLS controls, and $\text{Crisis}_t = \mathbb{1}\{t \geq 2009\}$. The coefficient β captures the change in sales growth during the crisis resulting from a 10 pp increase in the firm's pre-crisis foreign equity exposure.

IV event study. To study dynamics and pre-trends, we instrument the year-specific interactions $\mathbb{1}\{t = \tau\} \times FEE_i$ for $\tau \in \{2005, \ldots, 2014\} \setminus \{2008\}$ with $\mathbb{1}\{t = \tau\} \times Z_{ig}^{\text{base}}$

$$\textit{First stage:} \quad \mathbb{1}\{t = \tau\} \times FEE_i = \phi_\tau \left(\mathbb{1}\{t = \tau\} \times Z_{ig}^{\text{base}}\right) \;+\; X_{it}'\,\Gamma_\tau \;+\; \alpha_i \;+\; \gamma_{gt} \;+\; u_{it}, \tag{10}$$

$$\textit{Second stage:} \quad Y_{it} = \alpha_i \;+\; \gamma_{gt} \;+\; \sum_{\tau \neq 2008} \beta_\tau \left(\widehat{\mathbb{1}\{t = \tau\} \times FEE_i}\right) \;+\; X_{it}'\,\delta \;+\; \varepsilon_{it}. \tag{11}$$

Here, each β_τ is the causal effect on sales growth in year τ, relative to 2008, of a 10 pp higher pre-crisis foreign equity exposure.

3.2.3 Results

Table 4: OLS vs IV

	(1) OLS	(2) IV
Crisis × FEE	0.729***	0.985***
	(0.208)	(0.359)
N	63,402	63,402
Clusters	8,195	8,195
R^2	0.332	
Under-ID p (KP LM)		0.000
Weak-ID F (KP rk)		369.7
AR p (weak-ID robust)		0.006

Notes: Dependent variable is annual sales growth. Both columns use the same sample, firm fixed effects, and 5-digit sector×year fixed effects. Controls include leverage, liquidity ratio, productivity, log size, tangible assets, openness, age, age^2, and PLC indicator. Standard errors are clustered at the firm-level. Column (1) reports OLS. Column (2) reports 2SLS where *Crisis* × *FEE* is instrumented with the 5-digit peer leave-one-out mean of firms' pre-crisis foreign equity exposure (2005–2008) interacted with the Crisis indicator. Both the endogenous regressor and instrument are scaled by 10 pp. We report the cluster-robust Kleibergen–Paap LM, the rk Wald F statistics, and the Anderson–Rubin (AR) p-value.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

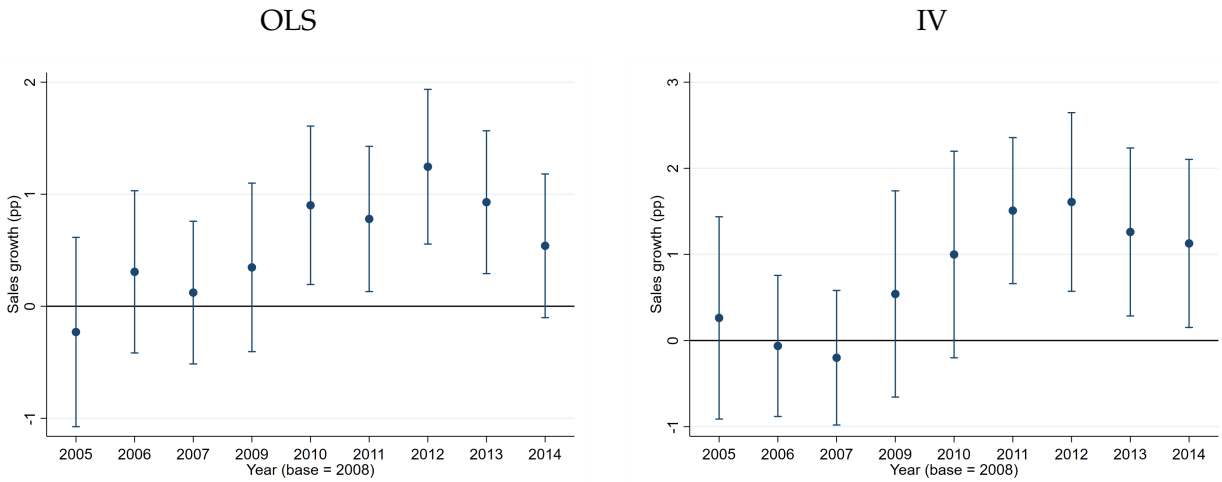
Table 4 compares OLS and IV estimates using the same sample, controls, and fixed effects. In both cases, the estimated effect of foreign equity exposure is positive and statistically significant. Quantitatively, a 10 pp higher pre-crisis foreign equity exposure is associated with approximately 0.7 pp higher sales growth in the crisis period in OLS, while the IV estimate implies an increase of about 1 pp. The first stage results suggest that our IV is very strong, with the (Kleibergen–Paap rk Wald) F-statistics of about 370, which is well above conventional thresholds. Moreover, the Anderson–Rubin test rejects the null that our endogenous regressor has no effect, even in the presence of weak instruments.

The larger IV estimate relative to OLS is consistent with classical measurement error in the pre-crisis exposure, which attenuates OLS toward zero. In addition, the IV identifies an effect for firms whose foreign equity exposure was more responsive to peers' pre-

crisis exposure, and who are more likely to be integrated into multinational networks, thus benefiting more from internal capital markets or preferential demand.

Dynamic event-study results in Figure 4 show that both OLS and IV effects emerge after 2009, peak in the following years, and then fade, indicating that the resilience effect was concentrated in the immediate aftermath of the shock. Pre-crisis coefficients (2005–2008) are insignificant, supporting the parallel pre-trend assumptions.

Figure 4: Event study: OLS vs IV



Notes: Point estimates by year relative to 2008 with 95% CIs. Both panels use identical samples, firm FE and 5-digit sector×year fixed effects, and the same controls as Table 4. Standard errors are clustered at the firm-level. The IV panel instruments each crisis-year exposure with the corresponding 5-digit peer leave-one-out measure. All effects are per 10 pp higher pre-crisis foreign equity exposure.

Taken together, the evidence supports a causal interpretation: firms with higher pre-crisis foreign equity exposure experienced greater resilience during the GFC. These results align with the findings of Alfaro and Chen (2012), who study the role of FDI on a firm's performance during the GFC and find that firms with FDI performed better than local firms with similar characteristics but without FDI.

Robustness. We conduct several robustness checks to validate our approach. First, we redo our analysis, including firms in the financial and insurance sector, and the results are almost identical.[15]

Second, a potential concern is that multinational parents reallocated demand toward their affiliates during the crisis ("preferential demand channel"), which could drive our results.[16] We address this in two ways. First, our baseline specifications already control for firm openness, measured as the share of sales outside the domestic market. Second, when we estimate the baseline separately for domestic and foreign sales growth, the

[15] See Table D.2 in the appendix.

[16] We thank an anonymous referee for this comment.

effect is concentrated in domestic sales with no corresponding increase in foreign sales (see Table D.3 in the appendix). Our results suggest that the crisis resilience of firms with higher pre-crisis foreign equity exposure was not primarily driven by stronger foreign demand but rather by their ability to sustain domestic operations during the downturn. While we cannot directly test whether parents reallocated demand toward their affiliates, the concentration of the effect in domestic sales makes that channel less likely to be the primary driver.[17] At the same time, the evidence is consistent with multiple channels contributing to resilience, which we analyse in more detail in the next section.

Third, restricting the sample to a balanced panel of firms observed both before and after 2009 leaves the estimates essentially unchanged. Fourth, we estimate a reduced form that regresses the outcome on the leave-one-out peer exposure directly, and the signs and magnitudes mirror the IV pattern. Fifth, we test for an anticipation effect already in 2007–2008 using a lead specification. Sixth, placebo treatments that shift the crisis period to 2007-2008 or 2006-2007 yield null effects. Finally, we validate inference with a wild-cluster bootstrap at the 5-digit peer level. Overall, our estimates remain stable in terms of direction, timing, and magnitude.[18]

3.2.4 Channels and mechanisms

A range of channels may help explain why firms with higher foreign equity exposure weathered the crisis more successfully. One possibility is that foreign-owned firms benefit from preferential access to internal capital within multinational networks, allowing parents to reallocate liquidity toward affiliates when external markets tighten. A growing literature has documented the stabilising role of such internal capital markets. For example, Cravino and Levchenko (2016) use firm-level data with cross-border ownership information to show how shocks propagate through multinational networks via both internal financing and production linkages. The study by Alfaro and Chen (2012), which is closest to our setting, also finds that internal capital markets played a key role in explaining why firms with foreign ownership performed better during the GFC than otherwise similar domestic firms.[19]

Beyond internal liquidity provision, other mechanisms may operate. As previously mentioned, foreign-owned firms may enjoy preferential demand from parent firms or sister affiliates, which could help sustain production when external demand collapses. Boehm et al. (2019) provide evidence of potential shock propagation through preferential

[17] We cannot directly test preferential-demand effects due to limited asset-side data. While the liability side provides sufficient detail to study financing channels, the available information on related-party claims is too sparse to permit a systematic analysis.

[18] Table D.4 in the appendix summarises balanced sample, reduced form, lead, placebos, and wild-cluster-bootstrap robustness checks.

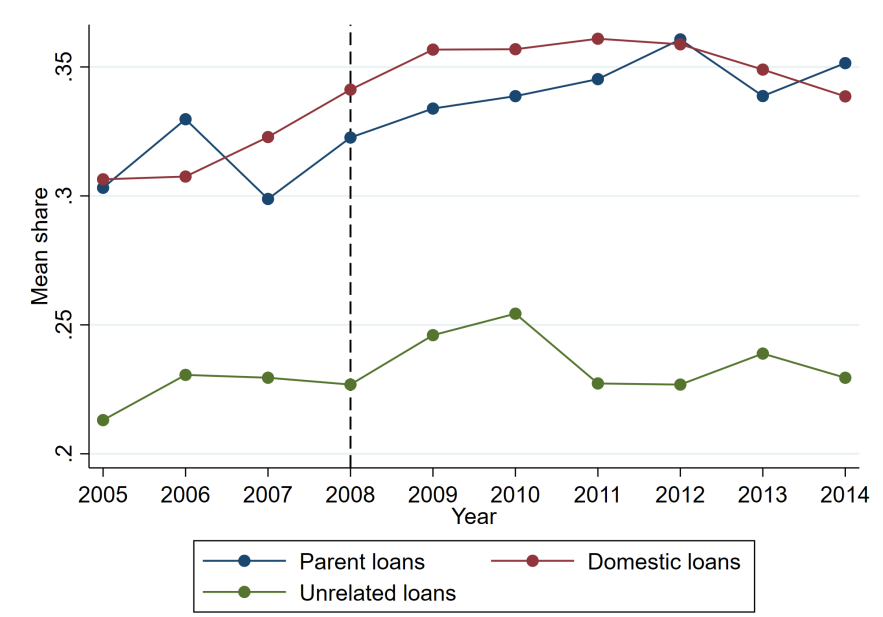
[19] Similarly, Santioni et al. (2019) document that intra-group capital markets played a stabilising role for Italian firms during the crisis period.

demand and input-linkages within MNE networks. Moreover, trade credit could serve as an important buffer, particularly for financially constrained firms, consistent with the findings of Garcia-Appendini and Montoriol-Garriga (2013) and Murfin and Njoroge (2014). Relatedly, domestic financial conditions deteriorated sharply during the GFC, and firm-level studies such as Cingano et al. (2016) highlight the importance of credit frictions and the bank-lending channel in shaping firms' investment and performance during crises.

In the empirical analysis that follows, our focus is on shedding light on some of these channels, subject to the limits of available data, which constrain how directly we can quantify the role of such intra-group credit channels. More specifically, our dataset lacks sufficiently detailed information on short-term trade credit for a broad sample of firms, making a systematic estimation of this channel impossible.[20] By contrast, we observe relatively rich information on firms' borrowing structure, distinguishing between loans from foreign parents, domestic lenders (including banks), and unrelated creditors. This data provides a valuable window into the other financial channels through which foreign ownership may have supported firm resilience.

To illustrate the potential role of internal financing, Figure 5 plots the evolution of average shares of parent (intra-group), domestic, and unrelated (foreign, non-affiliated) loans in total liabilities from 2005 to 2014. Shares were relatively stable before 2008 and increased around the time of the crisis, with the parent-loan share remaining elevated thereafter.

Figure 5: Loan Components in Total Liabilities



[20]Most available trade credit data refer to "long-term" claims, which are not directly relevant to the short-term liquidity channels of interest here.

While the descriptive trends are informative, they do not show how each loan component contributed to resilience, nor whether parent-provided liquidity played a distinctive role when funding tightened. To shed some light on this, we use firm-level IV regressions and proceed in two steps. First, in the channel stage, we test whether firms with higher pre-crisis foreign equity exposure shifted their borrowing across different sources during the crisis. Second, in the mechanism stage, we assess whether those shifts translated into stronger crisis performance.

Table 5 presents the first set of results on the composition of firm borrowing. Using the same IV framework, we estimate the effect of pre-crisis foreign equity exposure on loan outcomes, distinguishing among (i) loans from foreign parents, (ii) loans from domestic lenders, and (iii) loans from unrelated lenders (foreign, non-affiliated).[21]

Table 5: Channels across loan outcomes

	(1) Parent/Total	(2) Parent level	(3) Parent/Foreign	(4) Domestic/Total	(5) Domestic level	(6) Unrelated/Total
Crisis × FEE	0.506**	0.243	0.293	-0.054	-0.029	0.008
	(0.245)	(0.147)	(0.324)	(0.033)	(0.023)	(0.058)
N	476	476	476	39,495	39,495	1,127
Clusters	35	35	35	369	369	65
Under-ID p (KP LM)	0.023	0.023	0.023	0.000	0.000	0.028
Weak-ID F (KP rk)	99.9	99.9	99.9	75.7	75.7	24.7
AR p (weak-ID robust)	0.058	0.124	0.384	0.107	0.199	0.892
Wild p (Webb)	0.227	0.263	0.605			

Notes: IV estimates with firm and 5-digit sector×year fixed effects. Cluster-robust standard errors at the 5-digit sector level. All effects are per 10 pp increase in the peer leave-one-out foreign equity exposure. Share outcomes are expressed in percentage points, while level outcomes use the inverse hyperbolic sine (asinh) scale. Wild p-values (Webb) are reported only when the number of clusters is < 50. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

The results show that firms with higher pre-crisis foreign equity exposure increased reliance on parent loans during the crisis (columns 1–3), while domestic or unrelated foreign loans did not rise significantly (columns 4–6). The positive coefficients on parent-loan measures indicate that foreign-owned firms were able to draw on internal credit channels when external credit markets contracted. By contrast, the absence of a corresponding increase in domestic or unrelated borrowing suggests that domestic credit conditions remained tight and that access to internal funding was a distinctive advantage for firms with foreign ownership ties.

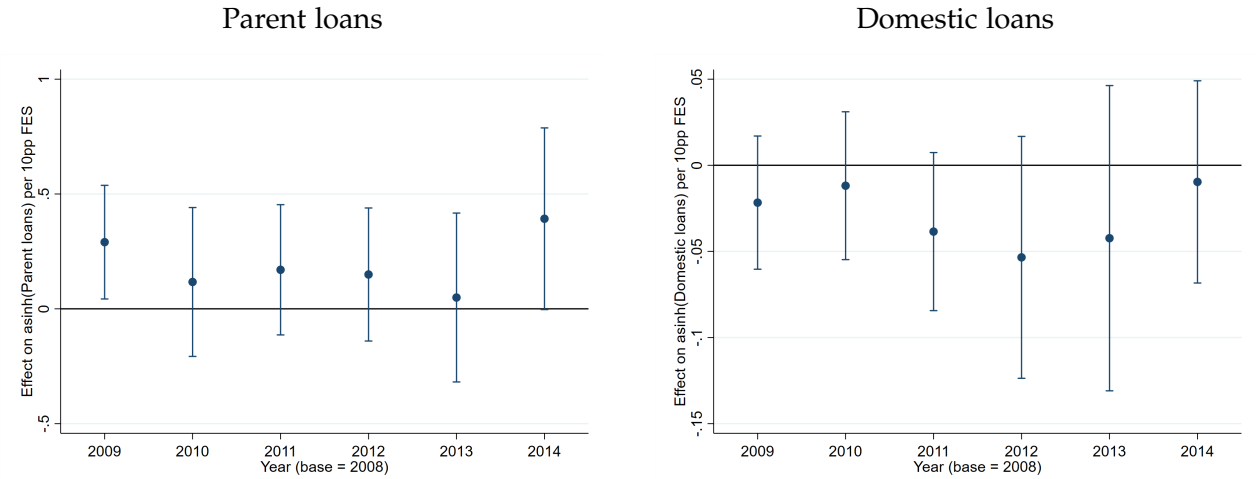
To visualise these dynamics, Figure 6 plots IV coefficients by year (relative to 2008) for domestic and parent loans.[22] During the crisis, firms with higher pre-crisis foreign equity exposure drew more on parent loans, with the increase most pronounced at the onset,

[21] As in the baseline, all specifications include firm and 5-digit sector×year fixed effects and controls for leverage, liquidity, productivity, size, openness, and age.

[22] In Figure C.5 in the Appendix, we also show parent and domestic loans as a share of total liabilities. Results are qualitatively unchanged. We opt for levels, since they are less sensitive to crisis-induced mechanical swings in total liabilities.

while domestic loan levels remained flat (and decreased if anything). Although the yearly estimates are relatively imprecise, the pattern is consistent with the idea that internal credit channels played a stabilising role when domestic financial conditions tightened.

Figure 6: Parent vs Domestic Loan Levels



Notes: This figure plots IV point estimates by year (relative to 2008), together with 95% confidence intervals. Loan levels are shown on the inverse-hyperbolic-sine (asinh) scale. Effects are per 10 pp increase in the peer leave-one-out foreign equity exposure.

Next, we investigate whether internal funding translated into improved performance during the GFC. In other words, we move from identifying channels to analysing the mechanism that connects crisis-period financing adjustments to subsequent resilience.

Table 6 reports IV estimates where the crisis-period effect of foreign equity exposure is allowed to vary with firms' pre-crisis reliance on alternative loan channels. The coefficients indicate a clear asymmetry: firms with stronger parent-financing links experienced larger gains during the crisis, while the effect declines with increasing reliance on domestic banks. In column (1), the positive and statistically significant interaction term is consistent with intra-group credit relationships mitigating the shock. In column (2), the (negative) interaction for domestic loans implies that heavier exposure to local credit markets offered limited protection once domestic financial conditions weakened. We find no significant effect for unrelated foreign loans.

Table 6: IV — Loan Levels

	(1) Parent	(2) Domestic	(3) Unrelated
Crisis × FEE (per 10 pp)	1.136	3.037**	2.265
	(1.131)	(1.434)	(3.253)
Crisis × Pre-mechanism (per +1 SD)	2.563**	-2.373	0.561
	(1.301)	(1.451)	(2.641)
Crisis × Missing	-0.307	-2.500	-1.496
	(1.332)	(2.083)	(3.575)
N	63,402	63,402	63,402
Clusters	8,195	8,195	8,195
Under-ID p (KP LM)	0.000	0.000	0.000
Weak-ID F (KP rk)	111.4	16.7	9.5
AR p (weak-ID robust)	0.010	0.020	0.036

Notes: The pre-mechanism is the firm's 2005–2008 average level of the loan channel, transformed with asinh and standardised to 1 SD on the estimation sample. "Missing" indicates firms for which this pre-crisis mean cannot be computed because the loan channel is never observed in 2005–2008. All coefficients scale with a 10 pp increase in the peer leave-one-out foreign equity exposure. Firm and sector-year fixed effects included. Standard errors are clustered by firm. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

To assess the magnitudes, Table 7 reports the estimated marginal impacts of Crisis at the mean, at ± 1 SD, and across the distribution of the standardised mechanism. For parent loans, the effect rises from 1.14 at the mean to 3.7 at +1 SD. For domestic loans, the effect declines with reliance, from 3.04 at the mean to 0.7 at +1 SD. Unrelated foreign loans show no pattern. Taken together, the heterogeneity suggests that intra-group liquidity, rather than domestic credit expansion, was the channel behind the stronger crisis performance of firms with a higher foreign equity exposure.

Table 7: Marginal Effects of Crisis at Selected Percentiles of the Pre-Mechanism

	(1) Parent	(2) Domestic	(3) Unrelated
Mean (Crisis at mean mechanism)	1.136	3.037**	2.265
	(1.131)	(1.434)	(3.253)
Effect at −1 SD	-1.427	5.410*	1.704
	(2.050)	(2.764)	(5.495)
Effect at +1 SD	3.698***	0.664	2.827
	(1.318)	(0.828)	(2.218)
P25	-0.562	4.639**	1.887
	(1.684)	(2.316)	(4.718)
Median	1.315	3.135**	2.212
	(1.096)	(1.485)	(3.443)
P75	3.000***	1.542*	2.627
	(1.130)	(0.839)	(2.310)
Slope: P75 – P25	3.563**	-3.097	0.740
	(1.808)	(1.893)	(3.481)
N	63,402	63,402	63,402

Notes: Effects are IV estimates of the impact of Crisis evaluated at selected percentiles of the standardised pre-mechanism (asinh of the 2005–2008 mean loan level, standardised to 1 SD on the estimation sample). Percentiles are computed among observations with non-missing mechanisms. Mean equals the coefficient on Crisis. Firm and sector-year fixed effects included. Standard errors clustered by firm. All effects scale with a 10 pp increase in the peer leave-one-out foreign equity exposure. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Finally, Table 8 examines the joint and relative importance of parent and domestic loans. Column (1) estimates a "tilt" specification (defined as the standardised parent loan measure minus the standardised domestic loan measure), so a +1 SD tilt corresponds to a one-SD reallocation from domestic to parent loans. The coefficient on *Crisis* × *Tilt* is the change in the crisis-period effect per +1 SD tilt. Column (2) includes both channels simultaneously, allowing separate slopes for parent and domestic loans and reporting tests of (i) whether the parent slope exceeds the domestic slope and (ii) the combined effect of +1 SD parent with −1 SD domestic.

The results show that shifting financing toward parent loans substantially strengthens the positive performance effect of foreign equity, while greater reliance on domestic loans provides no comparable benefit. Quantitatively, a 1 SD increase toward parent (and away

Table 8: Relative reliance vs Joint Mechanisms (IV): Parent and Domestic Loans

	(1) Relative reliance (Parent - Domestic)	(2) Joint specification Parent & Domestic
Crisis × Baseline foreign exposure (per 10 pp)	3.265***	2.767*
	(1.235)	(1.467)
Tilt specification		
Crisis × Tilt to Parent (per +1 SD)	2.343**	
	(1.163)	
Crisis × (Tilt missing)	−1.499	
	(1.246)	
Joint specification		
Crisis × Parent (per +1 SD)		3.597**
		(1.431)
Crisis × (Parent missing)		0.401
		(1.481)
Crisis × Domestic (per +1 SD)		−2.610*
		(1.543)
Crisis × (Domestic missing)		−2.663
		(2.196)
Marginal effects		
Effect: +1 SD tilt to Parent	5.608***	
p-value	0.005	
Effect: −1 SD tilt to Domestic	0.922	
p-value	0.482	
Parent slope − Domestic slope		6.206**
p-value		0.017
Effect: +1 SD Parent & −1 SD Domestic		8.974***
p-value		0.009
Effect: −1 SD Parent & +1 SD Domestic		−3.439
p-value		0.161
N	63,402	63,402
Clusters	8,195	8,195
Under-ID p (KP LM)	0.000	0.000
Weak-ID F (KP rk)	21.0	9.2
AR p (weak-ID robust)	0.004	0.014

Notes: Standard errors in parentheses. *Tilt* = standardised parent loans − standardised domestic loans (positive = greater reliance on parent loans). A +1 SD tilt means one SD more parent and one SD fewer domestic loans. Tilt missing" equals one if either parent or domestic pre-crisis loan levels are missing, so that the tilt cannot be constructed. "Parent missing" ("Domestic missing") equals one when the firm has no non-missing observations for parent (domestic) loans in 2005–2008. All effects are per 10 pp increase in the peer leave-one-out foreign equity exposure. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

from domestic) borrowing raises crisis sales growth by about 5–9 pp per 10 pp increase in foreign equity exposure.[23] These findings align with the view that internal capital markets within multinational groups, rather than domestic credit channels, served as the primary mechanism through which foreign ownership enhanced firm resilience during the GFC.

3.3 Did firms with higher pre-crisis foreign equity exposure default less during the crisis?

The previous section showed that firms with higher foreign equity exposure performed better during the crisis. We now examine whether pre-crisis exposure also predicts survival—were firms with higher foreign equity exposure less likely to default during the GFC?

To test whether pre-crisis foreign equity predicts survival, we estimate complementary log–log (CLL) default models on firms that are active (operating) and did not default by the end of 2008, for years $t = 2009, \ldots, 2014$. Let $\text{Default}_{it} \in \{0, 1\}$ indicate a firm's default in year t. Our baseline specification is

$$\Pr\big(\text{Default}_{it} = 1 \mid \text{active at } t-1\big) = 1 - \exp\Big\{ -\exp\big(\phi_s + \lambda_t + \delta\, FEE_i + \beta' X_{i,t-1}\big)\Big\}, \quad (12)$$

where λ_t are year fixed effects, ϕ_s are broad sector fixed effects, and $X_{i,t-1}$ are lagged controls (size, leverage, liquidity, productivity, tangible assets, openness, age and age^2, PLC).[24] We exclude firms that defaulted before 2009 and drop the post-default years, so each firm contributes up to its first year of default.

As a robustness check, we also estimate a logit model with the same set of controls

$$\text{logit}\Big(\Pr\big(\text{Default}_{it} = 1 \mid \text{active at } t-1\big)\Big) = \phi_s + \lambda_t + \delta\, FEE_i + \beta' X_{i,t-1}\,. \quad (13)$$

Table 9 reports estimates for the baseline CLL model and the logit. Pre-crisis foreign equity exposure is a strong predictor of survival. A 10 pp higher exposure before the crisis is associated with a lower default risk. The CLL coefficient of -0.1 implies a hazard ratio of approximately 0.905 (i.e., about a 9.5 percent lower annual default hazard per 10 pp), while the logit coefficient of -0.0975 implies about a 9.29 percent lower odds per 10 pp higher exposure before the crisis.

[23] In the joint IV specification (column 2), the Kleibergen–Paap rk Wald F-statistic is 9.2, which is just below conventional thresholds for strong instruments. The results should therefore be interpreted with some caution, although the Anderson–Rubin test still rejects the joint null that the IV coefficients are zero under weak identification.

[24] We use broad (2-digit) sector fixed effects because defaults are rare in our sample and narrower sectors lead to sparse cells and perfect predictions.

Table 9: Default Risk After the Crisis: Discrete-Time Hazard (CLL) and Logit

	(1) CLL	(2) Logit
FES (per 10 pp)	-0.1000^{***}	-0.0975^{***}
	(0.0238)	(0.0241)
Leverage_{t-1}	0.0008^{***}	0.0009^{***}
	(0.0001)	(0.0002)
$\text{Liquidity ratio}_{t-1}$	-0.0222^{***}	-0.0225^{***}
	(0.0029)	(0.0029)
$\text{Productivity}_{t-1}$	-0.0008^{***}	-0.0009^{**}
	(0.0002)	(0.0003)
$\log(\text{Assets})_{t-1}$	0.6957^{***}	0.7151^{***}
	(0.0418)	(0.0435)
$\text{Tangible assets}_{t-1}$	-0.0034	-0.0035
	(0.0036)	(0.0037)
Openness_{t-1}	-0.0124^{***}	-0.0129^{***}
	(0.0034)	(0.0035)
Age_{t-1}	-0.0006	-0.0036
	(0.0305)	(0.0315)
Age^2_{t-1}	-0.0001	-0.0000
	(0.0007)	(0.0007)
PLC_{t-1}	-0.3118	-0.3026
	(0.3078)	(0.3149)
Observations	86,839	86,839
Number of defaults	154	154
Year fixed effects	Yes	Yes
Broad sector fixed effects	Yes	Yes
Log (pseudo)likelihood	-827.18	-826.34
Pseudo R^2		0.268

Notes: Coefficients are reported on the log scale. CLL entries are *log hazard ratios*, and Logit entries are *log odds ratios*. Robust standard errors clustered at the firm level in parentheses. Models include year and broad (2-digit) sector fixed effects. The sample consists of operating and non-defaulted firms at the end of 2008, followed over 2009–2014. The dependent variable equals 1 in the first year of default and 0 otherwise. Post-default observations are excluded. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

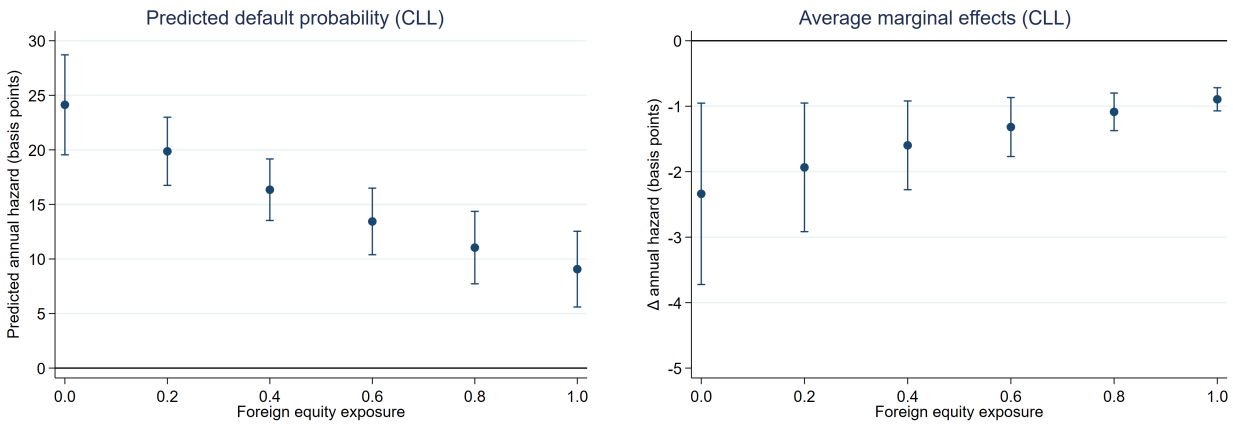
Among other covariates, productivity, the liquidity ratio, and openness are negatively correlated with default risk, while leverage is positively and strongly correlated with it.

Similarly, firm size is also positively and significantly related to default probabilities, even when controlling for leverage. Tangible assets, age, and being a PLC are not statistically different from zero. Overall, signs are consistent across the CLL and logit specifications.

The left panel of Figure 7 plots the implied annual default hazard against the pre-crisis foreign equity exposure. Predicted hazard declines from about 24 basis points (bp) at zero exposure to roughly 9 basis points at full exposure. The right panel shows the average marginal effects of a 10 percentage point increase in foreign equity exposure. The annual hazard falls by about 2.3 bp at zero exposure, by between 2 and 1 bp at mid exposures, and by about 0.9 bp at high exposure. Logit estimates (Figure C.6 in the appendix) show a similar pattern.

In line with our earlier findings on internal financing, the largest survival gains occur at low values of foreign equity exposure, as moving from zero to even a small foreign exposure shifts firms from having no intra-group backstop to having one. This unlocks internal funding precisely when external sources are scarce, which significantly reduces default risk.

Figure 7: Default Hazard and Foreign Equity Exposure (CLL)



Notes: Point estimates with 95% confidence intervals. The left panel reports the predicted annual default hazard. The right panel shows the average marginal effect of a 10 pp increase in FEE on the annual default hazard. Standard errors are robust and clustered at the firm-level.

3.4 Determinants of a firm's foreign capital structure

3.4.1 Empirical specification

The analysis above documents sizeable effects of pre-crisis foreign exposure on firm performance and survival. Now, we ask the related question: What factors determine a firm's exposure in the first place? To do this, we study the determinants of firms' exposure using a pre-crisis cross-section, averaging both the dependent variable and covariates over 2005–2008. We focus on the pre-crisis period to identify the underlying deter-

minants of foreign equity, i.e., which firms had higher foreign equity exposure before the GFC, rather than crisis-induced changes observed afterwards. This cross-sectional design is equivalent to a between-firm regression over the pre-crisis window (see, e.g., Faria and Mauro (2009)). Following the literature Varela and Salomao (2018), we analyse both the extensive margin (any foreign equity using logit) and the intensive margin (foreign equity exposure using fractional logit), controlling for broad sector fixed effects.

Our choice of explanatory variables follows the corporate finance literature on capital-structure determinants (see, among others, Harris and Raviv (1991), Rajan and Zingales (1995), Lemmon et al. (2008), and Frank and Goyal (2009)). Our controls include firm size, leverage, productivity, liquidity, asset tangibility, and firm age. We also include variables such as openness, which may be relevant for explaining the composition of foreign liabilities, and an indicator for publicly listed companies (PLC).

3.4.2 Results

Column (1) of Table 10 reports the average marginal effects (AME) from a logit model, where the dependent variable equals one if a firm has any foreign equity within total foreign liabilities during the pre-crisis period. We find that larger firms, those that are more open, more productive, and have more liquid assets, are more likely to have some foreign equity. At the same time, tangibility and age are negatively related to the extensive margin. Leverage and PLC are not statistically different from zero.

Column (2) shows AMEs from a fractional logit for the foreign equity exposure. Results are similar to those on the extensive margin, where firm size, openness, liquidity, and productivity increase the exposure, whereas leverage, tangibility, and age decrease it. PLC status is associated with a lower exposure.

In terms of magnitudes, a 10 pp increase in leverage is associated with about a 1 pp decrease in the foreign equity exposure. Moreover, a 10 pp increase in openness is associated with 1.1 pp higher probability and 0.5 pp higher exposure. Liquidity is associated with a small positive effect on the probability, 0.1 pp per 10 pp. Productivity has a small and positive effect on both margins, at 0.4 pp on the probability and 0.1 pp on the exposure. Firm size also matters—a 10 percent increase in assets is associated with about 0.33 pp higher probability and 0.13 pp higher exposure. Because the estimate for age is negative, being a decade younger is associated with a 7.5 pp higher probability of any foreign equity and a 3.3 pp higher exposure. A 10 pp increase in tangible assets is associated with a 1.2 pp lower probability and a 0.4 pp lower exposure. Being a PLC firm is associated with a 2.2 pp lower foreign equity exposure.

Table 10: Cross-Sectional Determinants of Foreign Equity (Pre-crisis Averages)

	(1) Any FEE > 0 (Logit)	(2) FEE exposure (Fractional logit)
Log size (assets)	0.035***	0.014***
	(0.004)	(0.002)
Leverage (+10 pp)	-0.002	-0.009***
	(0.001)	(0.002)
Liquidity (+10 pp)	0.001***	0.000
	(0.000)	(0.000)
Productivity (+10 pp)	0.004***	0.001***
	(0.001)	(0.000)
Tangible assets (+10 pp)	-0.012***	-0.004***
	(0.003)	(0.001)
Openness (+10 pp)	0.011***	0.005***
	(0.004)	(0.002)
Age (+10 years)	-0.075***	-0.033***
	(0.010)	(0.004)
PLC	-0.008	-0.022***
	(0.009)	(0.005)
N	10,362	10,362

Notes: This table reports average marginal effects (AMEs). Regressors labelled "(+10 pp)" are scaled by 10 percentage points, age is per +10 years, and log size is per +1 in ln(assets). FEE in column (2) is on the 0–1 scale and estimated via fractional logit using pre-crisis firm averages (2005–2008). Robust SEs clustered by broad (2-digit) sector in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

A potential concern is that our results might partly reflect firms' foreign-currency borrowing rather than differences in foreign equity exposure. For example, Maggiori et al. (2020) and Salomao and Varela (2022) show that firm size and productivity tend to be relevant for a firm's decision to borrow in (short-term) foreign currency debt. Because larger and more open firms are also more likely to have foreign equity, one might worry that our estimates pick up balance-sheet currency effects rather than a foreign equity channel. Three observations mitigate this concern. First, all specifications control directly for size, productivity, openness, leverage, tangibility, and age, and the foreign equity coefficients remain economically large and statistically significant. Second, Slovenia joined the European Exchange Rate Mechanism (ERM II) in 2004 and adopted the euro in 2007. Aggregate data show that, following adoption, the share of external debt de-

nominated in non-euro foreign currencies is negligible (see Appendix Figure B.4), which makes the currency-mismatch mechanism unlikely.[25] Third, if foreign-currency borrowing were the key mechanism, distress in financial markets during the GFC should have raised default risk. Instead, we find that a higher foreign equity exposure is associated with lower default hazards, consistent with an internal-finance channel rather than a currency-mismatch mechanism. Taken together, this suggests that our estimates are not primarily driven by foreign-currency borrowing.

4 Conclusion

The composition of countries' external liabilities is a key predictor of balance of payments crises, with equity providing a more stable source of financing than debt. This study confirms at the micro-level that firms with higher foreign equity shares in the pre-crisis period were more resilient to the GFC shock. These firms experienced milder sales declines, recovered more quickly, and exhibited higher survival rates. Using an instrumental-variables approach, we provide evidence consistent with a causal effect that operates through internal capital markets. During the crisis, firms with higher foreign equity exposure were able to draw more heavily on intra-group loans when external credit conditions tightened.

We also document that larger, more open, and more productive firms are more likely to hold higher equity shares in their foreign liabilities. These findings complement macroeconomic evidence by showing how firm-level characteristics shape external capital structures and, in turn, financial resilience.

From a policy perspective, our results highlight the importance of fostering stable, equity-based foreign investment and reducing reliance on more volatile forms of cross-border debt. Policies that enhance transparency and lower barriers to equity financing, particularly for small and medium-sized firms, can strengthen a country's financial resilience and mitigate the impact of adverse external shocks.

Finally, when assessing a country's vulnerability to external shocks, policymakers could integrate firm-level characteristics into their early-warning frameworks. Even when granular data on foreign liabilities are unavailable, macro indicators of the corporate sector's openness, size distribution, and productivity can serve as useful proxies. Integrating such information with aggregate measures of countries' net foreign asset positions may help policymakers better anticipate and buffer against sudden shifts in financial flows.

[25] As also shown in Figure B.4, even before the adoption, the vast majority of foreign borrowing was Euro-denominated.

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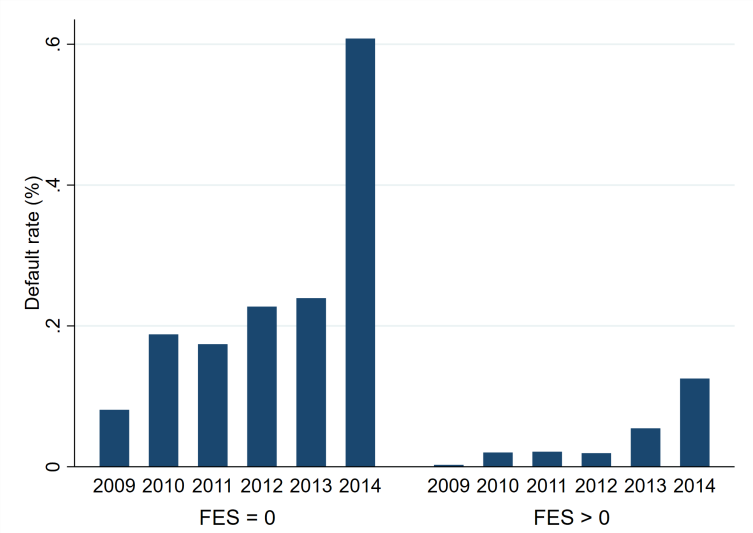
A Definition of the variables

Table A.1: Variables description

Variable	**Definition**
Sales growth	Annual sales growth, measured as the year-over-year change in the log of net sales.
Foreign equity share	The share of foreign equity in total foreign liabilities.
EBIT (Earnings before interest and taxes)	EBIT is constructed as operating profit adjusted for operating loss, which is the definition of the Agency of the Republic of Slovenia for Public Legal Records and Related Services.
Size	Logarithm of total assets. In some specifications, size is measured as the logarithm of employment (average number of employees based on the number of work hours in the period). In Table 1 in the main text, assets and employment are expressed in levels.
Openness	Net sales outside the domestic market divided by total net sales.
Productivity	Real value added per full-time equivalent (FTE) employee.
Tangible assets	Tangible fixed assets (plant, property, and equipment) divided by total assets
Capital intensity	Total assets divided by total sales.
Age	The variable age corresponds to the number of years since the firm's foundation.
Leverage	(Short-term + long-term) financial liabilities divided by total assets.
Liquidity ratio	Current assets minus inventories divided by short-term liabilities.
PLC	Indicator equal to one if the firm is a publicly listed company (PLC).
Intra-firm trade credit	Trade and consumption loans from foreign-related firms (foreign ownership $\geq$ 10%).
Intra-firm loans	Short- and long-term loans from foreign-related firms (foreign ownership $\geq$ 10%).

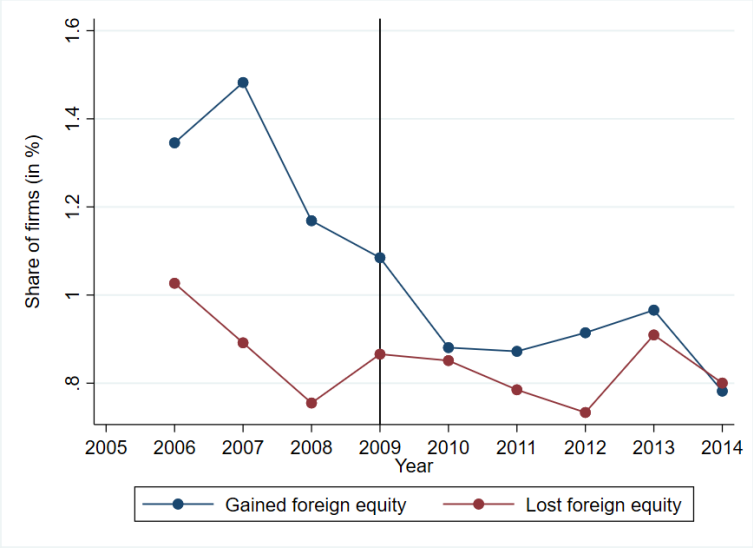
B Additional graphs

Figure B.1: Default Rates



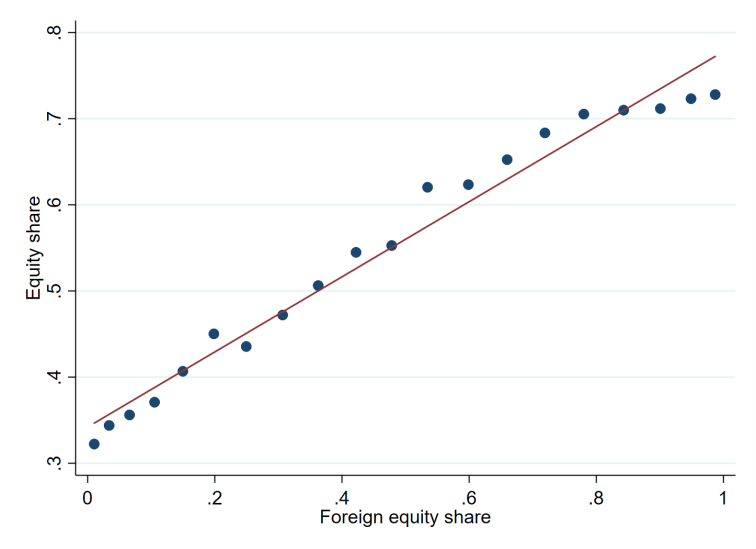
Notes: The default rate is the number of defaults divided by the number of firms at risk (i.e., firms that have not yet defaulted) in each year. The two groups are defined on the pre-crisis foreign equity share.

Figure B.2: Changes in Firms' Foreign Equity Status Over Time



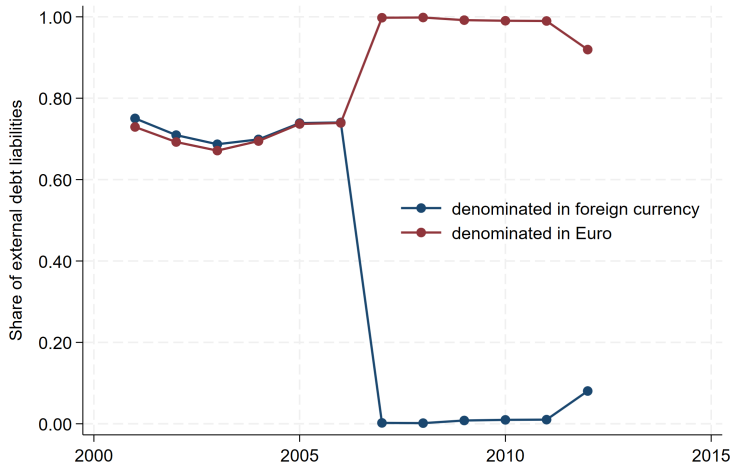
Notes: This figure shows the share of firms that changed their foreign equity status over time. Firms gaining a positive foreign equity share are represented in blue, while those losing their positive foreign equity share are shown in red. The vertical line denotes the year when the GFC hit Slovenia.

Figure B.3: Relationship Between Firm's Foreign Equity Share and Overall Equity Share



Notes: This binned scatter plot of firms' foreign equity share in total foreign liabilities and their overall equity share in total liabilities, using the sample from 2005 to 2014.

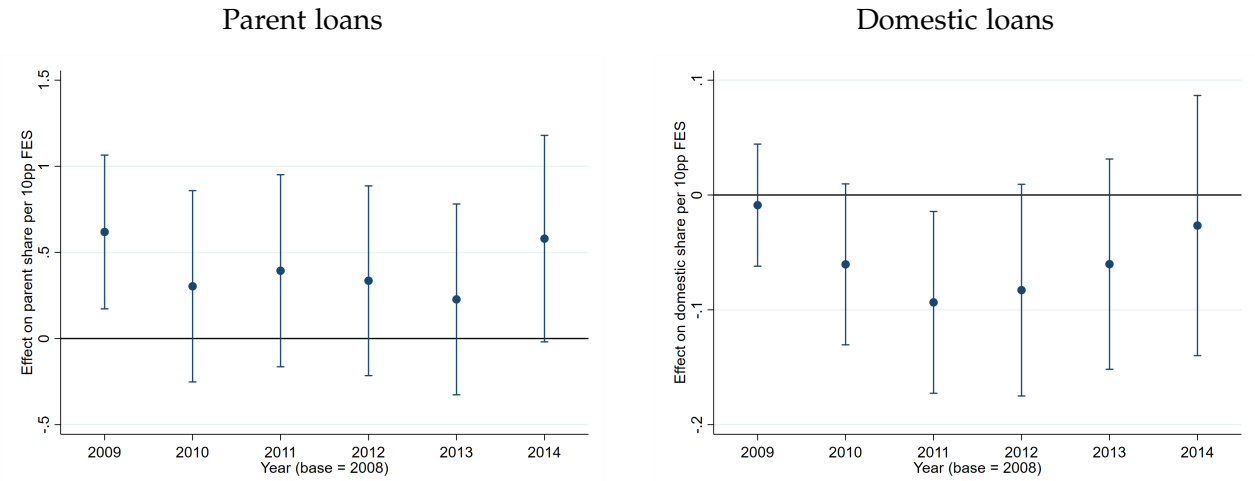
Figure B.4: Currency Composition of the International Investment Position



Notes: The graph shows the share of external debt liabilities denominated in foreign currency and Euro, respectively, as reported in Bénétrix et al. (2015).

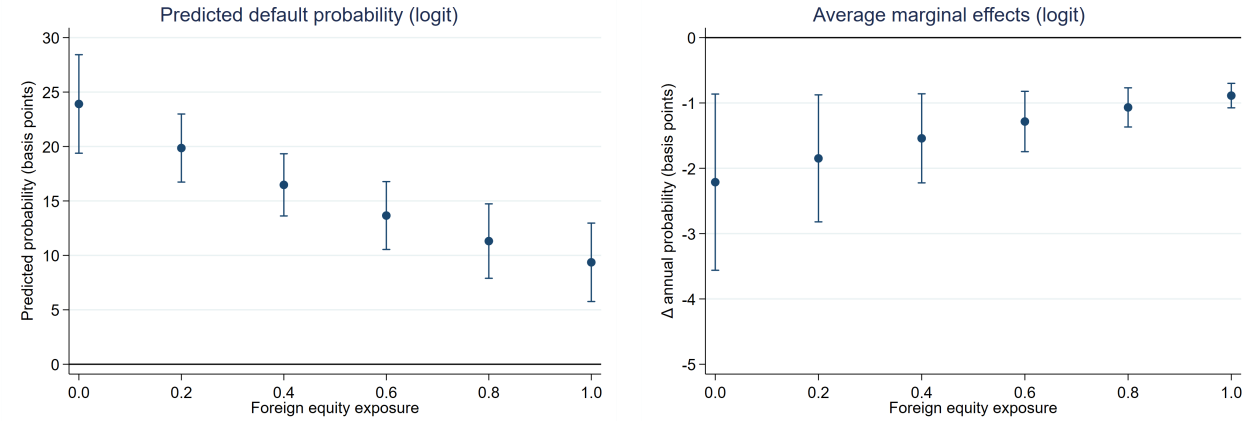
C Additional results

Figure C.5: Parent vs Domestic Loan Shares



Notes: This figure plots IV point estimates by year (relative to 2008), together with 95% confidence intervals. Outcomes are shares of total liabilities (percentage points). Effects are per 10 pp increase in the peer leave-one-out foreign equity exposure.

Figure C.6: Default Hazard



Notes: Point estimates with 95% confidence intervals. The left panel displays the predicted annual default hazard at various values of the foreign equity share. The right panel shows the marginal effect of a 10 pp increase in foreign equity share on the annual default hazard. Standard errors are robust and clustered at the firm-level.

D Robustness

Table D.2: OLS vs IV (including firms operating in the Financial and Insurance sector)

	(1) OLS	(2) IV
Crisis × Baseline foreign exposure	0.725***	0.982***
	(0.208)	(0.357)
N	63,459	63,459
Clusters	8,204	8,204
R^2	0.332	
Under-ID p (KP LM)		0.000
Weak-ID F (KP rk)		369.7
AR p (weak-ID robust)		0.005

Notes: Dependent variable is annual sales growth. Both columns use the same sample, firm fixed effects, and 5-digit sector×year fixed effects. Controls include leverage, liquidity ratio, productivity, log size, tangible assets, openness, age, age^2, and PLC indicator. Standard errors are clustered at the firm-level. Column (1) reports OLS. Column (2) reports 2SLS where *Crisis* × *FEE* is instrumented with the 5-digit peer leave-one-out mean of firms' pre-crisis foreign equity exposure (2005–2008) interacted with the Crisis indicator. Both the endogenous regressor and instrument are scaled by 10 pp. We report the cluster-robust Kleibergen–Paap LM, the rk Wald F statistics, and the Anderson–Rubin p-value.
$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table D.3: Domestic vs Foreign Sales Growth

	(1) Domestic	(2) Foreign
Crisis × FEE	1.158**	0.870
	(0.474)	(0.771)
N	56,409	36,704
Clusters	7,871	5,701
Under-ID p (KP LM)	0.000	0.000
Weak-ID F (KP rk)	347.4	312.2
AR p (weak-ID robust)	0.012	0.244

Notes: Dependent variable is annual sales growth. Both specifications include firm fixed effects and 5-digit sector×year fixed effects. Controls: leverage, liquidity ratio, productivity, log size, tangible assets, and age^2. We omit openness to avoid endogeneity with the dependent variable. Standard errors are clustered at the firm level. Columns (1) and (2) report 2SLS where *Crisis* × *FEE* is instrumented with the 5-digit peer leave-one-out mean of firms' pre-crisis foreign equity exposure (2005–2008) interacted with the Crisis indicator. Both the endogenous regressor and instrument are scaled by 10 pp. We report the cluster-robust Kleibergen–Paap LM p-value, the rk Wald F statistic, and the Anderson–Rubin p-value. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table D.4: Robustness checks (per 10 pp exposure)

Specification	Coef.	SE	p-value	N	Clusters	KP rk F	Notes
Balanced pre & crisis	0.98	0.36	0.006	62,768	7,965	370	Same sample pre & crisis
Reduced form	-14.33	5.17	0.006	63,402	8,195		Regressing Y on IV
Lead (2007-2008)	0.11	0.45	0.803	60,714	7,867	179	Anticipation effect
Placebo post in 2006–2007	0.17	0.90	0.848	17,826	6,241	328	
Placebo post in 2007–2008	0.47	0.44	0.289	24,324	6,659	340	
Wild-cluster bootstrap	0.98		0.021	63,402	5-digit sector		Webb weights, 999 repl.