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Uncertainty and Loan Pricing for Public and Private Firms: Evidence from the Brexit Referendum

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Abstract

We examine the impact of uncertainty on loan pricing for public and private firms in the UK, using the 2016 Brexit referendum as an exogenous shock of uncertainty. We find that uncertainty leads to a significantly higher cost of borrowing for private firms relative to public firms. However, firm-level foreign exposure, i.e., foreign sales and subsidiaries in the foreign markets, mitigates the adverse impact of uncertainty on loan prices more for private firms than public firms. Moreover, uncertainty increases the number of financial covenants in loans for public firms with high information transparency (i.e., constituents of FTSE 100/250). However, we observe a decline in the number of financial covenants in loans for private firms with low information transparency (i.e., private firms without institutional investors) under uncertainty. Overall, we provide novel evidence highlighting the differences in the design of syndicated loan contracts between public and private firms under uncertainty.

JEL Classification: G21, G28, G32

Keywords: Brexit, syndicated loan contracts, foreign exposure, private firms

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1. Introduction

On June 23rd, 2016, voters in the United Kingdom unexpectedly voted to leave the European Union in a referendum. The Brexit vote created considerable uncertainty surrounding the terms of the country's impending exit from the EU (e.g., Campello et al., 2022; Hassan et al. 2020; Kellard et al., 2022). Financial analysts predicted that the UK's vote to leave the EU would hit economic growth, cause bad loans to rise, and push up funding costs.[1] Under these circumstances, one important question would be the following: How did the uncertainty, which was driven by the Brexit vote, influence the design of syndicated loan contract terms for publicly held and privately held firms? [2]

Bank loans are a vital source of financing for firms, and the design of loan contracts directly influences firms' financing costs and incentives for their investment and operation strategies (e.g., Sufi, 2007). Like other countries, private companies in the UK represent a significant portion of the country's production base and comprise a major part of borrowers in the syndicated loan market (e.g., Saunders and Steffen, 2011; Ball and Shivakumar, 2005). [3] Therefore, it is crucial to improve our understanding of how uncertainty affects syndicated loan contracts for private firms as well as public firms and explore potential differences between them.[4]

Prior studies (e.g., Berg et al., 2021; Bloom et al., 2019; Julio and Yook, 2012; Bloom, 2009; Kellard et al., 2022) show that uncertainty shock can reduce the loan volume, investment,

[1] For instance, see '*Three Years of Uncertainty: Charting How Brexit Has Shaped U.K. Financial Markets'* https://www.wsj.com/articles/three-years-of-uncertainty-charting-how-brexit-has-shaped-u-k-financial-markets-11571917532. Also, see '*UK banks suffer big share drops after EU referendum result*' at https://www.ft.com/content/8750bc92-3a02-11e6-9a05-82a9b15a8ee7.

[2] For a good introduction of the background of Brexit, we refer readers to the Section II in Campello et al. (2022).

[3] According to the Companies House records, over 90% of registered UK companies are private (Ball and Shivakumar, 2005).

[4] In our sample of analysis, we observe that 42% of the loan facilities are issued to private firms. The substantial share of private firms in the UK syndicated loan market might not be surprising considering the recent trend of decline in the number of public firms in the UK and the US (Stulz, 2018).

and hiring as the real option value of waiting increases due to the lower predictability in the future course of the economy. Further, uncertainty can cause a decline in overall productivity and lead to a higher dispersion in the firms' productivity before uncertainty is resolved (Bloom, 2009). Such a change in the distribution of productivity could push more firms into the left tail of the distribution leading to an increase in default risk (Bloom, 2014; Brand et al., 2019). Consistent with these arguments, prior studies find that uncertainty is related to higher credit spreads for syndicated loans and corporate bonds in public firms (Francis et al., 2014; Ashraf and Shen, 2019; Kaviani et al., 2020). However, there has been no study on the effect of uncertainty on syndicated loan contracts for private firms. In this paper, we address this gap by examining how the effect of uncertainty on loan contracts varies depending on firms' public status. To our knowledge, our study is the first to investigate this important question.

Public firms and private firms differ in various ways, including ownership structure (e.g., the presence of institutional investors), disclosure requirements, access to capital markets, and corporate financial policies (Saunders and Steffen, 2011; Michaely and Roberts, 2012; Gao et al., 2013; Farre-Mensa, 2017; Schauer et al., 2019; Mortal et al., 2020; Mason and Stegemoller, 2022; Hillmann, 2023). Compared with private firms, public firms have less information asymmetry as they are subject to higher disclosure requirements and have higher coverage by financial analysts (e.g., Ball and Shivakumar, 2005; Minnis and Shroff, 2017; Mortal and Reisel, 2013). In addition, they are less likely to be financially constrained and have access to alternative sources of financing other than bank loans (e.g., Pagano et al., 1998; Gao et al., 2013; Mortal et al., 2020). Thus, public firms have higher bargaining power over bank lenders, and have more favourable contract terms (e.g., Saunders and Steffen, 2011). Consistent with these arguments, Saunders and Steffen (2011) find that private firms, on average pay higher prices on their loans in the syndicated loan markets due to the higher costs of information production and lower bargaining power.

We argue that the loan cost disadvantage for private firms can be exacerbated during a period of economic uncertainty. Nagar et al. (2019) find that economic policy uncertainty can increase investor information asymmetry. In addition, as uncertainty reduces the predictability of a firm's future outcomes, investors become more reluctant to provide financing and banks demand higher loan prices (e.g., Campello et al., 2010; Ivashina and Scharfstein, 2010; Gilchrist et al., 2014).[5] Given that private firms have a higher degree of information asymmetry and less bargaining power than public firms (e.g., Ball and Shivakumar, 2005; Saunders and Steffen, 2011; Mortal and Reisel, 2013), uncertainty is likely to amplify these disadvantages. Therefore, the discrepancy in the costs of loans between public and private firms is likely to be more pronounced during a period of uncertainty.

For our empirical analysis, we collect information on loan contracts from the Loan Pricing Corporation (LPC) Dealscan database, and firm-level information from the FAME database. We manually merge the two datasets based on borrowers' names, industries, and addresses. Our final sample consists of 402 loan facilities issued to 176 UK borrowers from 2014 to 2018. We conduct a difference-in-difference type of analysis with the private firms serving as the treated group while the public firms constitute the control group.

Our baseline results show that the cost of borrowing significantly increased following the 2016 Brexit referendum. Notably, the positive and significant impact of Brexit uncertainty on the costs of borrowing for UK firms is driven mainly by private firms. Specifically, we find that private firms, on average, have 69.6-bps higher increase than public firms in the loan spreads after the Brexit referendum, translating to a US$2.15 million increase in the cost of loans for them based on their average facility size of US$308.74 million. This finding is consistent with our prediction that uncertainty influences loan prices for private firms more

[5] Further, financial reporting quality, which could be measured as the usefulness of financial statements to investors and creditors, is lower for private firms compared to public firms (Ball and Shivakumar, 2005)

than those for public firms as private firms are likely to have higher information asymmetry and lower bargaining power. Our baseline results remain robust when we have a covariate balance between the two groups using the propensity score matching and entropy balancing methods. Further, our parallel trend test shows that the increase in the cost of borrowing for private firms indeed emerges after the Brexit referendum and there are no differences in trends in the loan prices between the two groups before the Brexit shock.

As argued above public and private firms differ in terms of information asymmetry and bargaining power. Prior studies argue that firm-specific characteristics, i.e., firms' foreign exposure, access to bond markets, ownership structure in terms of the number of reported shareholders, presence of institutional shareholders, relationship lending, and listing on FTSE100/250 indexes, can be related to information asymmetry and firms' bargaining power (Saunders and Steffen, 2011; Jang, 2017; Houston et al., 2017; Moshirian et al., 2021). Building on prior studies, we ask whether cross-sectional heterogeneities in these firm-specific characteristics might explain the different effects of uncertainty on loan prices for public and private firms.

We start our cross-sectional analysis by incorporating firms' foreign exposure, which is measured by the foreign sales and the foreign subsidiaries, into our regression model. Foreign exposure allows firms reduce their dependence on income from a single market (i.e., the UK). Therefore, firms can stabilize their operating performance and enhance their resilience against uncertainty (e.g., Hill et al., 2019). Foreign exposure can also improve firms' access to foreign capital markets, which can increase borrowers' bargaining power in loan negotiations (e.g., Jang, 2017). In addition, foreign operations can enhance information links between firms and foreign investors (Houston et al., 2017; Moshirian et al., 2021). Thus, one can argue that foreign exposure can mitigate the impact of uncertainty on the loan spread through reduced information

asymmetry faced by foreign lenders, and higher bargaining power of borrowers.[6] We predict that this effect might be more pronounced for private firms as they have lower bargaining power and higher information asymmetry. Consistent with our prediction, our results show that firm-level foreign exposure mitigates the positive impact of uncertainty on loan prices significantly more for private firms.

We also test whether firms' access to the bond market, ownership structure in terms of the number of reported shareholders, listing on FTSE100/250 indexes, and the presence of institutional investors as shareholders. As Saunders and Steffen (2011) argue, these factors can be related to information asymmetry and bargaining power. Therefore, they could influence the relationship between uncertainty and loan prices. We incorporate these characteristics into our analysis and find that private firms with institutional investors can have lower loan spreads than those without before the referendum but also have larger increase in their loan spreads following the shock. Yet, we do not find any significant impact of other factors, i.e., bond market access, number of reported shareholders, and listing on FTSE100/250 indexes, on the relation between uncertainty and loan prices.

Relationship lending can be another important factor influencing loan spread under uncertainty as it can enable lenders to acquire valuable information and offer loans at lower prices to borrowers (e.g., Diamond, 1991; Berger and Udell, 1995). Since private firms are more informationally opaque (López-Espinosa et al., 2017; Berger et al., 2005) than public firms, relationship lending could be particularly helpful for private firms compared to public firms under uncertainty. Consistent with this expectation, we find that the length of relationship with a lender can mitigate the adverse impact of uncertainty on loan costs for private firms.

[6] In our sample, we observe that 80% of loan facilities offered to UK borrowers include non-UK lead arrangers.

Lenders may also manage uncertainty via non-pricing terms, e.g., financial covenants. Prior studies document that static contract terms like loan price cannot reflect new information after the loan originations, and this problem can be more severe during a period of uncertainty. Demerjian (2017) illustrates that lenders include contingent contract terms, i.e., financial covenants, to provide opportunities to renegotiate the contract terms as new information is revealed after loan initiation but before maturity. Such contingent contract terms can facilitate ex-post allocation of control and renegotiations, and strengthen contractual efficiency, especially under uncertainty (Demerjian, 2017; Roberts, 2015). We, therefore, predict that lenders demand more financial covenants in loan contracts as they face uncertainty following the Brexit referendum.

However, the effective use of financial covenants depends on information transparency and reliability of accounting metrics upon which covenants are written (Ball et al., 2015; Nikolaev, 2010; Costello and Wittenberg-Moerman, 2011; Dou, 2020; Griffin et al., 2021). Public and private firms differ in terms of information transparency, e.g., reliability and quality of their financial statements. For instance, Ball and Shivakumar (2005) show that timely loss recognition is substantially less prevalent in private firms than in public firms using a sample of public and private firms from the UK; Burgstahler et al. (2006) find that private firms exhibit higher degree of earnings management than public firms; Hope et al. (2013) find that public firms have higher accrual quality and report more conservatively than private firms. Therefore, we expect that lenders can differentiate between public and private firms in terms of how they use financial covenants in their loan contracts. Our results show that private firms have fewer financial covenants in their loan contracts after the referendum, relative to public firms. This result supports the view that private firms' accounting information is less informative, which can render the use of financial covenants inefficient during a period of uncertainty. Our finding

is also consistent with Ball and Shivakumar (2005), who find that a lack of timely loss recognition among private firms can make financial covenants less useful in loan contracts.

Next, we explore the heterogeneities in information transparency among the firms. We find that public firms that are listed in the FTSE100/250 indexes, arguably the most informationally transparent firms, have more financial covenants in their contracts following the Brexit referendum, i.e., uncertainty shock. This result is consistent with the view that information transparency can facilitate the use of financial covenants. Similarly, we find evidence that the decline in the use of financial covenants is more pronounced for private firms without institutional ownership, which might have a higher degree of information asymmetry.

Our study makes several contributions to the literature. First, we extend the literature on uncertainty and credit markets. Buch et al. (2015), Hu and Gong (2019), Alessandri and Bottero (2020), Wu and Suardi (2021) document that uncertainty has a negative impact on the supply of bank credit. In addition, Biswas and Zhai (2021) find that banks increase their cross-border lending when they face uncertainty in their domestic market. Regarding the contract design, Wu and Suardi (2021) find that loans have lower maturity and more collateral during times of uncertainty. Gong et al. (2022) provides empirical evidence on the negative impact of uncertainty on loan pricing and loan size. Different from these studies, we focus on the differences in loan pricing between public and private firms under uncertainty. Our study also complements Berg et al. (2021), who show that following the Brexit referendum, the syndicated loan issuance for UK firms dropped due to a decline in both supply and demand. They focus on the loan issuance following the Brexit referendum, while we examine the design of the loan contract terms during the same period. Notably, we find that firms' public status could influence their loan pricing under uncertainty triggered by the Brexit referendum.

Second, our study extends the literature on international diversification. Firms with foreign exposure can experience potential fluctuations as cross-border regulations and policies might change for various reasons (Boutchkova et al., 2012). However, foreign exposure can also provide diversification of income sources (e.g., Hill et al., 2019), facilitate international information flow (Houston et al., 2017), and improve firms' access to foreign capital markets (Jang, 2017). Building on prior studies, we provide novel evidence that foreign exposure can help firms during a period of uncertainty. Having foreign exposure, e.g., subsidiaries in foreign markets or foreign sales, can mitigate the impact of uncertainty on the cost of loans particularly for private firms when they face uncertainty.

Third, we contribute to the literature on the role of financial covenants in syndicated loan contracts (Rajan and Winton, 1995; Christensen and Nikolaev, 2012; Demerjian, 2017). For instance, Demerjian (2017) finds that covenant intensity increases with the level of uncertainty for public firms. To our knowledge, we are the first to show that there are differences between public and private firms in terms of how financial covenants are used in loan contracts under uncertainty. Fourth, our study extends the literature on the differences between public and private firms. Prior literature documents that public and private firms differ along several dimensions, including their access to external capital markets, loan contract terms (Saunders and Steffen, 2011), dividend pay-out (Michaely and Roberts, 2012), investment (Mortal and Reisel, 2013), innovation (Acharya and Xu, 2017), cash holding (Gao et al., 2013; Mortal et al., 2020), and environmental policy (Shive and Forster, 2020). Different from these studies, we focus on how uncertainty impacts loan contract terms depending on the public status of firms.

The remainder of the paper is organized as follows. Section 2 describes the data and construction of the sample while baseline regression model is presented in Section 3. Empirical results are in Section 5, whereas Section 6 is for conclusion.

2. Data and sample construction

We construct our sample using on several sources of data. Our data on loan contracts comes from the LPC DealScan database, which covers a comprehensive set of loan characteristics, including loan price, loan amount, maturity, financial covenants. We extract information for borrowing firm characteristics from the FAME database, which provides the accounting and financial information for both public and private firms that are registered in the UK market. For part of our analysis, we rely on the Refinitiv Deals database for information on bond issuances. DealScan and FAME do not share a common identifier; therefore, we manually merge the two sources of data. Specifically, we begin with all loan facilities whose country of syndication is the United Kingdom during the period from 2014 to 2018.[7] Our sample initially includes 3,659 loan facilities to 1,471 borrowers, among which 1,273 firms are UK firms. We manually search each UK firm's name in the FAME database and record a link whenever we are confident about its identity based on its name, industry classification, and address. We drop the firms whose information is too ambiguous to prove their identity.

After matching, we have 1,139 UK firms which can be identified in both DealScan and FAME databases. Some firms underwent changes in their names through the sample period, but FAME automatically traces those changes for consistency of firm-specific information. We then extract the financial information for the 1,139 UK firms from FAME, and we further exclude facilities issued to the financial service firms with SIC codes from 6000 to 6999. We also require the loan facilities to be either term loans or credit lines, and the loan spreads are not missing and are based on LIBOR. Our final sample includes 176 firms in the sample that have the non-missing financial information and loan contract information required in the analysis, corresponding to 402 loan facilities.

[7] Our sample period is like that of Berg et al. (2021), which also ends in 2018.

We further classify our sample into the sub-samples of public firms and private firms. We define a firm to be a public firm if its DealScan variable "PublicPrivate" has a value of "Public", and similarly for the private firms. However, this variable is static at the time when the data is collected; therefore, it does not account for the changes in the legal form through time. To address this issue, we check the changes in names and the listing status from 2014 to 2018. We note that among the 176 sample firms, 1 changed its status from private to public firm, while 29 changed it from public to private firms during our sample period.[8]

3. Baseline regression model

We conduct a difference-in-difference analysis using the Brexit referendum as an exogenous shock of uncertainty to the UK syndicated loan market. As it is an exogenous external shock, our difference-in-difference setting addresses the potential endogeneity concerns.[9] Prior studies document that the outcome of the Brexit referendum was largely unexpected and had considerable impact on the financial market and economy (Davies and Studnicka, 2018; Born et al., 2019; Bloom et al., 2019; Campello et al., 2022). For instance, Bell (2016) documents that the betting markets expect the probability of a "Brexit" to be around 30% prior to the referendum. In addition, we plot the time trend of the Economic Policy Uncertainty (EPU) Index proposed by Baker et al. (2016) in Figure 1. We find that the EPU

[8] For instance, Alent Plc was delisted and re-registered as a private firm in December 2015, with the new name Alent Limited. Therefore, it is labelled as a public firm before the date, and a private firm after the date. We denote a change from public firm to private firm if the name underwent a change from "PLC" and "Public Limited Company" to "Limited", "Ltd", and "LLP", with the firm underwent delisting during the same time. The firm is therefore re-classified as a public firm if the period is before the date of change. We further re-classify firms to be public firms if the firms were delisted and the period is before the delisting date. We denote a change from private firm to public firm if the name underwent a change from "Limited", "Ltd", and "LLP" to "PLC" and "Public Limited Company", and the firm is currently listed. We re-classify firms to be private firms if the period is before the date of change.

[9] In an untabulated analysis, we also focus on the firms that have not changed their public status since 2013 to mitigate the potential endogeneity concern that a firm's public status might be affected by the Brexit referendum. Our results remain consistent.

index has a drastic spike in the June of 2016, which confirms that economic uncertainty increases following the Brexit referendum.

[Figure 1 about here]

To investigate the impact of the uncertainty triggered by Brexit referendum on loan spread for public and private firms, we estimate the following regression model:

$$AISD_l = \beta_1 \, Post\ Brexit_t + \beta_2 \, Private_i \times Post\ Brexit_t + \beta_3 \, Private_i + \gamma \times X_i + \\ + n_j + m_i + \epsilon_d \quad (1)$$

In the regression model (1), $AISD_l$ is the dependent variable, which is the loan spread on loan l.[10] *Post Brexit* is a dummy variable that equals one if a loan is originated after the Brexit referendum day on June 23rd, 2016, and before December 31st, 2018; it equals zero if a loan is originated after January 1st, 2014, and before June 23rd, 2016. *Private* is the indicator that equals one for a private firm and equals zero for a public firm, based on the time when the loan was originated. X is the vector of control variables including the firm-level characteristics and the contract features on the loan facility level.[11] Fixed effects include the industry fixed effects (n) based on the Fama-French 12 industries, and the loan purpose fixed effects (m). We estimate equation (1) using the OLS estimation, and the standard errors (ϵ) are clustered within each firm. [12]

[10] In addition, we also conduct regressions using loan amount as the dependent variable. Our result shows that there is no statistically significant effect of Brexit on loan amount.

[11] In an untabulated analysis, we also consider macroeconomic characteristics and lender characteristics. Following Berg et al. (2021), we include lagged change in GDP (data source: Organisation for Economic Co-operation and Development) and lagged change in foreign exchange rate (data source: Bank for International Settlement); following the other literature (Lim et al., 2014; Chu et al., 2019), we include lender size (logarithm of lender total assets), lender liquidity (lender cash reserve to total assets) and lender tier 1 capital ratio. Our data on lender characteristics is from Orbis, and within each facility, we rely on the information of the largest lender. Our results are qualitatively the same with these additional control variables.

[12] Based on the literature regarding the syndicated loan market (Saunders and Steffen 2011; Lim et al., 2014; Sikochi, 2020; Keil, 2023), we construct different measurements for contract terms. Specifically: 1) We take the logarithm of loan spreads; 2) We take the logarithm of loan maturity; 3) We use a dummy variable if a loan contains financial covenants; 4) We use a dummy variable if a loan contains general covenants. Using these alternative measures, our conclusions remain robust.

4. Empirical results

4.1. Summary statistics

We present the summary statistics in Table 1 for both the sub-samples of the public and private firm loans. Detailed variable definitions can be found in the Appendix Table A1. In Panel A, we present the mean and median values on the loan contract terms at the facility level and test their differences. The all-in-drawn spread is measured as the basis points over a certain base rate. We consider the loans whose base rate is LIBOR.

We find that facilities issued by private firms, on average, are statistically significantly more expensive in spreads, more likely to be term loans, smaller in size, and more likely to demand collaterals compared to those issued by public firms.

[Table 1 about here]

In Panel B, we compare the firm characteristics of public and private borrowers. We observe that private firms in our sample, on average, are statistically significantly smaller in size, riskier in terms of the leverage ratio, and have greater sales growth and tangibility ratio. The differences in profitability, cash holding, the logarithm of interest coverage ratio, and capital investments are not statistically significant. In addition, we find that public firms overall have a higher number of reported shareholders, are more likely to have institutional shareholders, and are more likely to issue bonds compared to private firms.

We use four proxies for firms' foreign exposure. The first proxy is a dummy variable based on a firm's foreign sales (Boutchkova et al., 2012; Bloom et al., 2019). For each year, we calculate the fraction of a firm's foreign sales over the total sales. We define a firm-year to have positive foreign sales if the fraction is greater than 1%. However, a firm's foreign sales can be affected by the Brexit referendum; to address this issue, we define a dummy variable,

Foreign Sales, that equals one if a firm had foreign sales before the Brexit referendum, in any year of 2013, 2014, and 2015. If a firm has missing information about its foreign sales in the FAME database, we manually check its annual report. Through manual checking, we identify additional 63 firms with their information on whether they had foreign sales from 2013 to 2015 and include them in the sample. In addition, to check the robustness of our results, we construct a second proxy which is the average fraction of foreign sales over the total sales, through the years of 2013 to 2015.[13]

Our third proxy is based on a firm's foreign subsidiaries. Prior studies show that the presence of assets in a foreign market can affect a firm's exposure to the Brexit referendum (Hill et al., 2019) and the interaction with foreign lenders (Houston et al., 2017). We extract the information on the firms' subsidiaries from the FAME database and construct a dummy variable *Foreign Subsidiary* that equals one if a UK firm has any subsidiary that is registered outside the UK around the world. Following the same idea, our fourth proxy is the logarithm of one plus the number of foreign countries where a firm has subsidiaries operating. This proxy not only captures the presence of foreign subsidiaries, but also the degree of international expansions.

Notably, we find that public firms and private firms differ in terms of their foreign exposure. For instance, 70.7% of public firms in the sample have positive foreign sales before the Brexit referendum, while only 31.3% of private firms have such sales. The ratio of foreign sales to total sales is also significantly higher for public firms. Similarly, we find that public firms are more likely to have foreign subsidiaries (83.6%) relative to private firms (49.3%). In addition, public firms on average have a larger number of foreign countries where they have

[13] For some firms, the financial reports mention that they have foreign sales, but do not provide detailed breakdown among countries. For instance, a firm would report sales for "Europe", while does not report how much is in the UK market.

subsidiaries. Our Wilcoxon test results also show that the two groups have statistically different medians among these measures. Therefore, our summary statistics show that the level of foreign engagement is another dimension among which public and private firms are different. In Section 4.4.1, we investigate whether such heterogeneity can influence public and private firms' access to loan markets under uncertainty.

4.2. Baseline regression results

Table 2 presents our regression results. In column (1), we estimate the regression model (1) with *Post Brexit* only while controlling for firm-level variables. We find that *Post Brexit* has a positive coefficient, and it is statistically significant at the 5% level. In column (2), we further include contract term controls, and the coefficient of *Post Brexit* becomes smaller in size, but it is still statistically significant. This result indicates that loan spreads, on average, are higher after the uncertainty shock, which is consistent with the notion that uncertainty triggers an increase in the default risk of borrowers and makes the assessment of borrowers' creditworthiness more difficult, which causes the lenders to demand higher premium.

[Table 2 about here]

In column (3), we include *Private* and its interaction with *Post Brexit*. By the construction, the stand-alone dummy variable *Post Brexit* captures the average change in loan spreads for the public firms after the referendum, and we find that it has a negative coefficient without any statistical significance. The coefficient on the interaction variable *Private* × *Post Brexit* is positive and statistically significant at 1%. This suggests that the increase in the cost of loans in column (1) is largely attributed to private firms. Given that the average loan spread for private firms is 339.8 bps, the 69.6-bps increase in the loan spreads accounts for an increase of 20.5% for private firms, translating to a US$2.15 million increase in the cost of loans relative to their average facility size. In column (4), we repeat the regression with industry-year fixed

effects and exclude the stand-alone *Post Brexit* indicator, and our result is consistent. Overall, our findings provide evidence that the effect of uncertainty on the cost of loans is more pronounced for private firms relative to public firms.[14]

Our results, therefore, are consistent with the view that private firms have some disadvantages, i.e., higher information asymmetry and lower bargaining power over lenders, compared with public firms (e.g., Ball and Shivakumar, 2005; Saunders and Steffen, 2011; Mortal and Reisel, 2013). Our findings show that these disadvantages could be amplified during a period of uncertainty, which exacerbates the loan cost disadvantage of private firms.

4.3. Robustness checks

4.3.1. Parallel trend test

The identification in the difference-in-difference analysis relies on the assumption that the treated group (private firms) and the control group (public firms) have similar trends in the pre-shock period. To test whether this assumption holds for our analysis, we divide our sample period into six sub-periods in Table 3, which are the pre-Brexit periods $BeforeBrexit^{2014}$, $BeforeBrexit^{2015}$, $BeforeBrexit^{2016\text{-}first\ half}$, and post-Brexit periods $AfterBrexit^{2016\text{-}second\ half}$, $AfterBrexit^{2017}$, *and* $AfterBrexit^{2018}$. $BeforeBrexit^{2016\text{-}first\ half}$ denotes the first half of 2016 which is before the Brexit referendum, while $AfterBrexit^{2016\text{-}second\ half}$ denotes the second half of 2016 which is after the Brexit referendum. We use these period indicators to replace the *Post Brexit* indicator in the regressions and include the interactions of each indicator with *Private*. $BeforeBrexit^{2014}$ and its interaction with *Private* are omitted from regressions due to multicollinearity. If the parallel trend assumption holds, we should only observe statistically significant coefficients for the interaction terms after the Brexit referendum.

[14] In an untabulated analysis, we also collect data for the firms in the continental European countries and conduct similar regressions. We do not observe a differential effect of Brexit between private and public firms.

We present our results in Table 3. In column (1), we include only the period indicators. We find that the only indicator which has a statistically significant coefficient is $AfterBrexit^{2016\text{-}second\ half}$, while the coefficients on $BeforeBrexit^{2015}$ and $BeforeBrexit^{2016\text{-}second\ half}$ are minimal and statistically insignificant. This result suggests that the loan spreads have been stable on average before the referendum, while immediately increasing following the referendum. In column (2), we further include the *Private* indicator together with its interactions with the period indicators. Again, we find that the only interaction term which has a statistically significant coefficient is $Private \times AfterBrexit^{2016\text{-}second\ half}$. The coefficients of $BeforeBrexit^{2015}$ and $BeforeBrexit^{2016\text{-}first\ half}$ remain statistically insignificant, as well as their interactions with the *Private* indicator. This result provides evidence that private and public firms do not have differential trends in the pre-shock loan spreads.[15]

[Table 3 about here]

In addition, we also plot the average loan spread for private and public firms in each quarter. We find that loans with different purposes and industries are distributed unevenly through the sample period, and these factors can confound our parallel trend graph. To overcome this, we conduct a regression of loan spreads on the industry and loan purpose fixed effects only. We then calculate the residuals, which should be net of the industry and loan purpose effects. We call the residuals 'the residual loan spreads' and plot the average residual loan spread for private and public firms in each quarter in Figure 2. Since they are the residuals from a regression, they can take negative values.

[Figure 2 about here]

[15] We have also conducted a placebo test, where the period is from January 1st, 2014, to June 23rd, 2016. The placebo "Brexit referendum" is denoted by *Post Brexit II*, which is a dummy variable that is equal to one if a facility is originated after June 23rd, 2015. We do not find a similar result on the interaction term, indicating that the effect of the uncertainty shock did not show up before the referendum.

In Figure 2, we find that the average residual loan spread for private firms remains stable before the date of the Brexit referendum, which is the second quarter of 2016 (2016q2), while a huge spike appears instantaneously following the Brexit referendum. On the contrary, the average residual loan spread for public firms remains stable through the whole sample period. Overall, both our regression results and figure provide evidence that the parallel trend assumption holds in our analysis.[16]

Table 3 and Figure 2 show that the effect of uncertainty concentrates within a short period of time after the Brexit referendum. Our result is consistent with the time trend of the EPU index in Figure 1, such that the index drops through the second half of 2016, which can explain why our results concentrate within a short period. We also use the quarterly-averaged EPU index as the measurement of uncertainty and find that most of our empirical results remain qualitatively similar. For brevity, we do not tabulate these results.

4.3.2 Matching analysis

One potential concern is that differences in firm characteristics between private and public firms may lead to biases in our baseline results because of model dependence (Ho et al., 2007; Hainmueller, 2012). To address this concern, we use the propensity score matching (PSM) method and entropy balancing method proposed by Hainmueller (2012). Ho et al. (2007) demonstrate that pre-processing the data in entropy balancing method to achieve covariate

[16] According to the figure, the residual loan spreads for private firms increased following the Brexit referendum and declined in the following quarters until 2017 Q4. This is likely to reflect that the uncertainty caused by the referendum was gradually resolved as the UK government started to take actions. For instance, the Brexit negotiations formally started in July 2017 and moved to the "Phase Two" in the early 2018. Compared with "Phase One" negotiations which focused on citizen rights, financial settlement, and Irish border, "Phase Two" focused more on the "future relationship" between the UK and EU, including but not restricted to future trade relations and a transitional period after the Brexit. Therefore, "Phase Two" negotiations are more relevant to the businesses of the firms and was likely to have triggered a second surge in uncertainty related to Brexit, leading to a re-surge in loan costs for private firms. For an overview of the Brexit negotiation process, see https://lordslibrary.parliament.uk/research-briefings/lln-2018-0085/.

balance can make the estimated treatment effect more robust to potential model misspecifications.

In PSM, we match private and public firms based on the firm-level control variables by implementing one-to-one nearest-neighbour matching with replacement. Panel A of Table 4 shows differences in mean values of the variables between the private and public firms for pre- and post-matching. The statistically insignificant post-matching mean value differences suggest that our PSM procedure is reliable. We also perform entropy balancing between private and public firms for the same firm-level control variables. Panel B of Table 4 shows that private and public firms are different among several factors with statistical significance before entropy balancing. We then obtain the weights from entropy balancing and apply the weights to the observations. After re-weighting, the factors are statistically identical between the two groups, suggesting that entropy balancing procedure is reliable.

[Table 4 about here]

Next, in Panels A and B of Table 5, we estimate the regression model (1) with the matched sample from PSM and re-weighted observations from entropy balancing, respectively. We find that our results qualitatively the same, suggesting that our baseline results are robust to potential misspecification in the functional form.

[Table 5 about here]

4.4. Mechanisms: cross-sectional tests

In this section we examine whether cross-sectional heterogeneities in the firm-specific characteristics, which are related to information asymmetry and bargaining power of borrowers, might drive the differential effects of uncertainty on loan prices for public and private firms.

Specifically, we consider firms' foreign exposure, bond market access, ownership structure, relationship lending, FTSE 100/250 Listings, and presence of institutional investors.[17]

4.4.1. Foreign exposure

In this section, we examine whether different effects of uncertainty on loan spreads for private and public firms could be due to differences in firms' foreign exposure. Following the previous studies (e.g., Houston et al., 2017; Moshirian et al., 2021), we use four proxies to measure foreign exposure as described previously. We modify the regression model (1), so that, for each proxy, we include its interaction with the *Post Brexit* and *Private* indicators.

We present our estimation results in Table 6. In column (1), the proxy of foreign exposure is *Foreign Sales,* that equals to one if a firm had positive foreign sales before the Brexit referendum, in the years of 2013, 2014, or 2015, and zero, otherwise. We find that the coefficient on the triple interaction term is negative and statistically significant at the 1% level. This result indicates that, having foreign sales can mitigate the effect of uncertainty. In column (2), we repeat our analysis using the *Fraction of Foreign Sales* as the proxy for foreign exposure and find consistent results.

[Table 6 about here]

In column (3), we proxy the foreign exposure with the dummy variable *Foreign Subsidiaries* that equals to one if a firm has any foreign subsidiary registered outside the UK, and zero, otherwise. The coefficient for the triple interaction term is negative, but not statistically significant. In column (4), we instead use the *Log (1+Number of Foreign Countries)* as a proxy for foreign exposure. We find that the coefficient for the triple interaction term is

[17] We also consider that different lender types may affect how uncertainty influences firms' loan prices. Following the prior literature (Lim et al., 2014), we define non-bank lead arrangers as those who do not belong any of the following lender types in DealScan: African Bank, Asia-Pacific Bank, East Europe/Russian Bank, Foreign Bank, Investment Bank, Middle Eastern Bank, Thrift/S&L, US Bank, and Western European Bank. We find that the presence of non-bank lead arrangers does not explain the differential impacts of Brexit uncertainty on loan prices for public and private firms.

negative and is statistically significant at the 5% level. This result again provides evidence that foreign exposure can mitigate the effect of uncertainty on loan spreads for private firms.

These results are consistent with the view that international diversification can help firms access debt markets at a lower cost relative to those firms without international diversification under uncertainty. In addition, foreign operations can facilitate information flow between domestic borrowers and foreign lenders, therefore reduce information asymmetry (Houston et al., 2017; Moshirian et al., 2021).[18] Hence, these firms can access foreign capital markets, which grants them higher bargaining power in loan negotiations. Overall, our results highlight that foreign exposure is an important factor that can explain the heterogeneous effects of uncertainty on loan spreads for private and public firms.

4.4.2. Bond market access

Our summary statistics in Table 1 show that public firms are more likely to have access to the bond market compared with private firms.[19] Access to the bond market can facilitate information flow and grant borrowers higher bargaining power against bank lenders, which can lead to lower cost of loans (Hale and Santos, 2009).

In column (1) of Table 7, our regression model includes *Bond*, which is a dummy variable indicating whether a firm has access to the bond market after 2009. The coefficient for *Bond* × *Private* × *Post Brexit* is not statistically significant, which suggests that access to bond markets does not influence the relation between firms' public status and cost of borrowing under uncertainty. However, we also observe that the coefficient on the interaction *Bond* × *Private* is negative and statistically significant, indicating that private firms tend to pay lower loan costs when they have access to the bond market. This result is consistent with prior

[18] As in our sample, 80% of loan facilities contain non-UK lead arrangers.
[19] We manually check each firm in our sample in the Refinitiv Deals database for information on bond issuances.

literature that access to bond market can facilitate information production and increase borrowers' bargaining power, leading to lower costs of loans (Hale and Santos, 2009; Saunders and Steffen, 2011), though this mechanism does not seem to be affected by the level of uncertainty in the economy.

[Table 7 about here]

4.4.3. Ownership structure

The ownership structure is another characteristic that public firms and private firms differ, as public firms generally have more diffused shareholder bases. We construct a variable *Log (1+number of shareholders),* which is the logarithm of one plus the number of reported shareholders in December 2015, including both direct and indirect shareholders.[20] Our summary statistics show that public firms, on average, have a significantly higher number of shareholders than private firms. Prior literature documents that ownership concentration is related to information asymmetry problems and agency conflicts between shareholders and creditors (e.g., Aslan and Kumar, 2012); therefore, ownership structure may influence the relationship between uncertainty and the loan contract terms.

In column (2) of Table 7, our regression model includes *Log (1+Number of Shareholders)*. The coefficient for the triple interaction *Log (1+Number of Shareholders)* × *Private* × *Post Brexit* is statistically insignificant. Therefore, we do not find any evidence that the number of reported shareholders can explain the differences in loan spreads for private and public firms following the uncertainty shock. Neither do we find that ownership structure can affect the cost of borrowing for private firms.

[20] This variable does not take unnamed minority shareholders into account. These shareholders are combined and labelled as "More than 100 shareholders". Most of this kind of shareholders are within public firms. Also, we consider the information by the end of 2015 to minimize the potential confounding effect of the Brexit.

4.4.4. Relationship lending

Relationship lending can influence loan contract terms. On the one hand, lenders may acquire valuable information about borrowers' quality through repeated lending, which can reduce information asymmetry and reduce cost of borrowing (Berger and Udell, 1995; Bharath et al., 2011; Bolton et al., 2016). On the other hand, the information acquired from the lending relationship may provide lenders with higher bargaining power over the borrowers, resulting in a hold-up problem (Rajan, 1992; Saunders and Steffen, 2011). Therefore, relationship lending can have a stronger impact on private firms than on public firms given the lower bargaining power of private firms.

We construct a variable, *Relationship Length*, which is the difference between the current year-quarter and the earliest year-quarter when a borrower contracts with a lead arranger (Petersen and Rajan, 1994). In column (3) of Table 7, we include *Relationship Length* in our regression model. Firstly, we find that the coefficient for *Relationship Length* × *Private* is positive and statistically significant, indicating that private firms pay higher loan spreads to lenders with longer relationship. This is consistent with Saunders and Steffen (2011) showing that private firms have less bargaining power and higher cost of borrowing even when they borrow from relationship lenders. However, we observe that the coefficient on *Relationship Length* × *Private* × *Post Brexit* is negative and statistically significant, suggesting that lending relationship can mitigate the impact of uncertainty on cost of borrowing for private firms. This is consistent with the prior literature that lending relationship can reduce information asymmetry (Berger and Udell, 1995; Bharath et al., 2011; Bolton et al., 2016).

4.4.5. FTSE 100/250 listing

Public firms that are listed in the indices FTSE100 and FTSE250 have more information transparency than other public firms due to more strict listing requirements

involved in being listed on these indices. Accordingly, Saunders and Steffen (2011) find that public firms listed in the indexes FTSE100 and FTSE250 have lower costs of borrowing. The level of information transparency may influence loan pricing for firms under uncertainty. In column (4) of Table 7, we include *FTSE100/250 Public,* which is a dummy variable indicating whether a firm is a public firm and is listed in FTSE100/250, in our regression model. The base group in the regression is therefore the public firms that are not listed in FTSE100/250. We find that the coefficient for *FTSE100/250 Public* × *Post Brexit* is not statistically significant, indicating that FTSE100/250 listing does not explain the heterogeneous effect of uncertainty on loan spreads.

4.4.6. Institutional ownership

Institutional ownership is another aspect that public firms and private firms can differ. We construct a dummy variable that is equal to one if a firm has institutional investors as shareholders.[21] Our summary statistics show that 98.8% of public firms have institutional investors as shareholders, while it is 19.2% of private firms.

The presence of institutional investors can be related to agency problems within a firm. On the one hand, institutional investors can provide strong monitoring and governance, which can reduce managerial risk-taking and the likelihood of financial distress (e.g., McCahery et al., 2016; Ward et al., 2018). On the other hand, institutional investors with limited investment horizons may pressure the management to engage in myopic activities, which may exacerbate agency conflicts between shareholders and creditors (Kim et al., 2019). If agency conflicts are more pronounced during a time of uncertainty, institutional ownership may lead to an increase in loan spreads under uncertainty. On the contrary, Boone and White (2015) show that firms with high institutional ownership have greater management disclosure, analyst following, and

[21] In our analysis, we consider both direct and indirect share ownership reported in FAME database.

liquidity. Therefore, these firms have higher informational transparency, which can mitigate the impact of uncertainty.

In column (5) of Table 7, we test whether the presence of institutional investors as shareholders influences private firms' loan prices. We find that the coefficient for *Private with IO* is negative and statistically significant at 10% level. This result indicates that private firms with institutional ownership can obtain cheaper loans during periods of low uncertainty, which is consistent with the view that institutional ownership can provide monitoring and facilitate information disclosure, reducing information asymmetry. However, we also observe that the coefficient on the interaction *Private with IO* × *Post Brexit* is positive and statistically significant at a 1% level. This result indicates that, during periods of uncertainty, presence of institutional investors can exacerbate agency conflicts between shareholders and creditors. Overall, we do not find evidence that institutional ownership can mitigate the effect of uncertainty on loan spreads.

4.5. Non-pricing contract terms: financial covenants for private and public firms under uncertainty

In this section, we investigate whether uncertainty has an impact on the use of financial covenants as a type of contingent contract term for public and private firms under uncertainty. Financial covenants can specify the actions required by the lenders when additional information arrives after the contract has been determined; therefore, they can enhance contractual efficiency, especially during the period when borrowers' future outcomes are less predictable (Demerjian, 2017).

Table 8 presents our estimation results. We estimate our regression model on the deal level with the number of financial covenants as the dependent variable. In column (1), we include only the *Post Brexit* indicator and the control variables. The coefficient for *Post Brexit*

is not statistically significant, indicating that the use of financial covenants does not change after the Brexit referendum. In column (2), we include the *Private* indicator and its interaction with the *Post Brexit* indicator. The coefficient for *Post Brexit* is not statistically significant showing that the use of financial covenants does not change for public firms after Brexit. The interaction *Private* × *Post Brexit*, however, has a negative coefficient and it is statistically significant at a 5% level. This result indicates that private firms have fewer financial covenants after the Brexit referendum compared to public firms. Taken together with our previous results on the loan price, private firms experience an increase in the cost of borrowing, but they have a lower number of financial covenants following the Brexit referendum. One potential explanation is that private firms are likely to have limited contractibility on their accounting information compared to public firms, which can deter the use of financial covenants, especially during a period of uncertainty.

[Table 8 about here]

To investigate whether information transparency can explain the heterogeneous effect of uncertainty on the use of financial covenants, we consider whether a public firm is listed in the indexes FTSE100 or FTSE250 as a measure of information transparency (Saunders and Steffen, 2011). Additionally, we consider whether a private firm has institutional investors as shareholders, which could be an alternative measure for information transparency as they demand information disclosure (Boone and White, 2015). We present our regression results in Table 9.

[Table 9 about here]

In column (1), the coefficient for *Post Brexit* is negative coefficient but it is not statistically significant. *Private* × *Post Brexit* has a negative and statistically insignificant coefficient, which indicates that the use of financial covenants for private firms is not different

from that for non-FTSE100/250 public firms after the Brexit referendum. The absolute change for private firms, which is represented by *Private* × *Post Brexit* + *Post Brexit*, is still statistically significant at 5% level. Notably, we find that the interaction *FTSE100/250 Public* × *Post Brexit* has a positive coefficient, and it is statistically significant at 5% level. This result indicates that, compared with private firms and public firms that are not listed in FTSE100/250, the public firms listed in FTSE100/250 have more financial covenants after the Brexit referendum. FTSE100/250 public firms are arguably the most informationally transparent firms, and therefore, this result provides evidence that information transparency can facilitate the use of financial covenants under uncertainty. Our results suggest that public firms are not totally immune to the uncertainty shock triggered by the Brexit referendum, but rather their contract design is affected differently, such that public firms with more information transparency (i.e., constituents of FTSE 100/250) accept more financial covenants in their contracts during the time when uncertainty increases instead of an increase in the cost of loans.

In column (2), we find that the post-Brexit decline in the use of financial covenants concentrates in the private firms without institutional ownership, as *Private without IO* × *Post Brexit* has a negative coefficient that is statistically significant at a 5% level. On the contrary, the coefficient for *Private with IO* × *Post Brexit* is negative but not statistically significant. These results again provide evidence that information asymmetry can deter the use of financial covenants.

Our results are consistent with the prior literature that the effective use of financial covenants depends on the quality of accounting metrics (Ball et al., 2015; Nikolaev, 2010; Costello and Wittenberg-Moerman, 2011; Dou, 2020; Griffin et al., 2021). Given that the accounting information from private firms can be less informative, this informational disadvantage can be exacerbated during a period of uncertainty (Ball and Shivakumar, 2005;

Burgstahler et al., 2006; Hope et al., 2013). Therefore, our results suggest that financial covenants can help to resolve uncertainty, but the effectiveness depends on the information transparency of borrowers. For public firms with higher transparency, financial covenants can be effective in resolving uncertainty. However, for private firms with less reliable accounting information, the effectiveness of financial covenants in resolving uncertainty may be limited.

5. Conclusion

This study investigates how uncertainty influences the design of syndicated loan contracts for private and public firms. Our results show that uncertainty makes it harder for private firms to access syndicated loan markets as they experience an increase in their cost of borrowing while there is no such significant impact on public firms. This finding is consistent with the view private firms' access to debt markets become more limited under uncertainty than public firms' as private firms have higher information asymmetry and lower bargaining power.

In addition, we find that borrowers' foreign exposure, proxied by foreign sales or the number of countries where they have foreign subsidiaries, can mitigate the impact of the uncertainty on private firms. Considering non-price contract terms, we find that uncertainty increases the number of financial covenants in loans for public firms with high information transparency (i.e., constituents of FTSE 100/250). However, we observe a decline in the number of financial covenants in loans for private firms with low information transparency (i.e., private firms without institutional investors) under uncertainty. This finding is consistent with the view that private firms' accounting information does not facilitate the use of financial covenants as it might be less informative than that of public firms (e.g., Ball and Shivakumar, 2005).

Overall, our findings provide important insights for policymakers into how the impact of uncertainty on firms' access to syndicated loan markets varies depending on their public status. Considering the potential difficulties that private firms experience in accessing funding through syndicated loan markets under uncertainty, it might be important for governments to provide support for these firms to enhance economic growth, including tax incentives and government-backed loans. At the corporate level, private firms may diversify their funding sources to mitigate potential disruptions caused by uncertainty. In addition, the potential benefits from international diversification during uncertainty periods provide a rationale for private firms to engage in international operations.

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Fig. 1: Economic policy uncertainty index

In this figure we plot the Economic Policy Uncertainty Index around the Brexit referendum (in June 2016, represented by the vertical line).

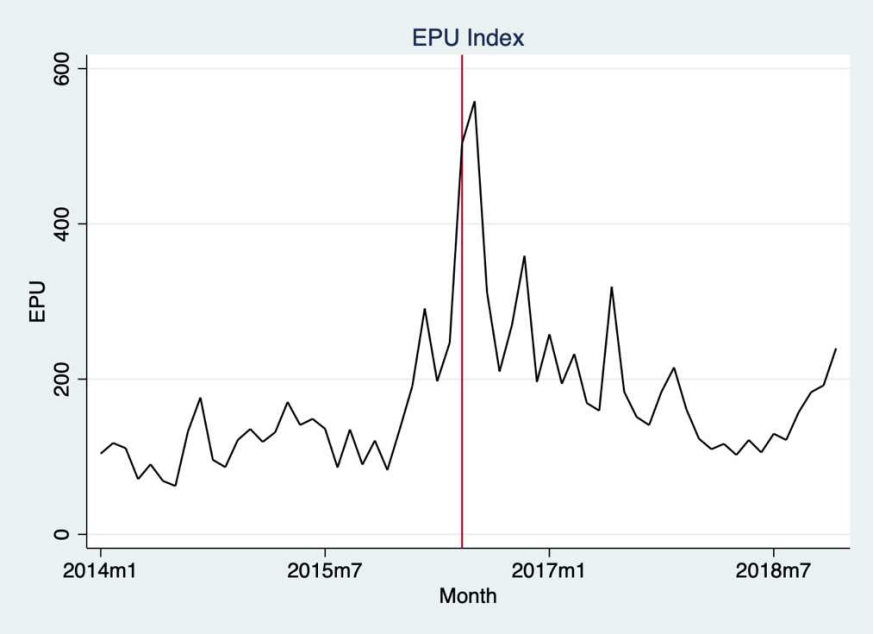
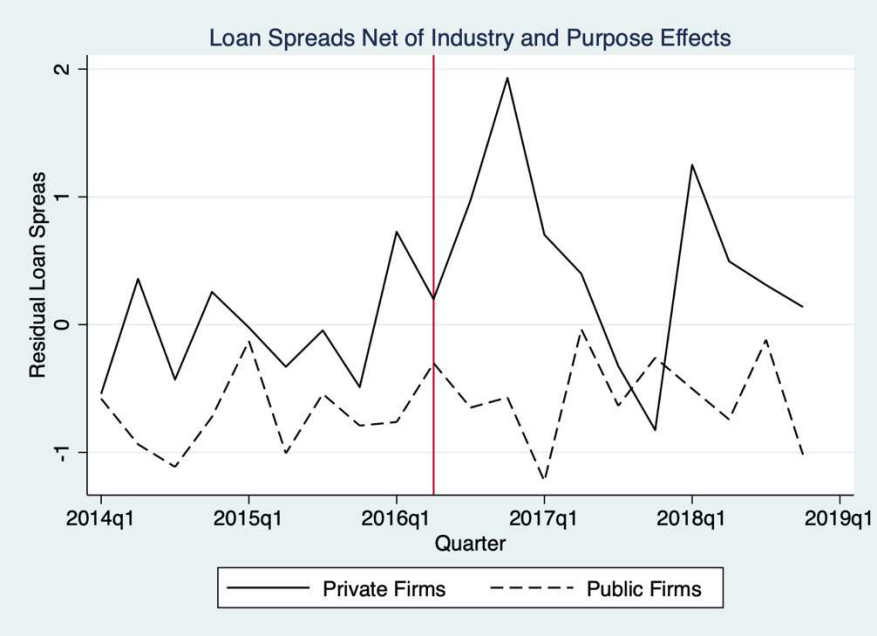


Fig. 2: Parallel trends

In this figure we plot the quarterly average loan spread net of industry and purpose effects for private and public firms around the Brexit referendum (in June 2016, represented by the vertical line). A borrower falls in the treatment sample (solid line) if it is a private firm. The control sample (dashed line) is made up of public firms during the same period.



Appendix

Table A1: Variable definitions

Contract Terms:

All-In-Drawn: "The amount the borrower pays in basis points over LIBOR for each dollar drawn down. It adds the spread of the loan with any annual (or facility) fee paid to the bank group." (According to DealScan). We scale the variable to the percentage term. *Source: DealScan*

Term Loan: A dummy variable that is equal to one if the facility is a term loan and zero, otherwise. *Source: DealScan*

Credit Line: A dummy variable that is equal to one if the facility is a credit line and zero, otherwise. *Source: DealScan*

Maturity: The loan maturity in months. *Source: DealScan*

Log (Loan Size): The logarithm of one plus loan amount in million dollars. *Source: DealScan*

Financial Covenants: The number of financial covenants. *Source: DealScan*

General Covenants: The number of general covenants, which include equity issuance sweep, excess cash flow sweep, asset sales sweep, debt issuance sweep, insurance proceeds sweep, dividend restrictions, and a clause which requires lenders to hold a certain amount of commitments to approve any modifications to the deal. *Source: DealScan*

Secured: A dummy variable that is equal to one if the facility contains collaterals and zero, otherwise. *Source: DealScan*

Refinance: A dummy variable that is equal to one if the facility is a refinance loan and zero, otherwise. *Source: DealScan*

Investment Grade: A dummy variable that is equal to one if the facility is investment grade and zero, otherwise. *Source: DealScan*

Not Rated: A dummy variable that is equal to one if the facility is not rated and zero, otherwise. *Source: DealScan*

Relationship Length: The difference between the current year-quarter and the earliest year-quarter when a borrower contracts with a lead arranger; if there are multiple lead arrangers within the same facility, we take the maximum. *Source: DealScan*

Log (Deal Size): The logarithm of one plus the deal amount in million dollars. *Source: DealScan*

Firm Characteristics:

EBITDA: The ratio of EBITDA over total sales. *Source: FAME*

Sales Growth: The ratio of the current year's sales over the previous year's sales. *Source: FAME*

Leverage: The ratio of long-term debt plus short-term debt over total assets. *Source: FAME*

Cash: The ratio of bank deposits to total assets. *Source: FAME*

Size: The logarithm of total assets. *Source: FAME*

Tangibility: The ratio of tangible assets to total assets. *Source: FAME*

Log (Age): The logarithm of firm age in years. *Source: FAME*

Log (1+Interest Coverage): The logarithm of one plus the interest coverage ratio. *Source: FAME*

Capital Investment: The difference between the current year's fixed assets and the previous year's fixed assets. *Source: FAME*

Foreign Sales: A dummy variable that is equal to one if a firm ever had positive foreign sales during the years of 2013, 2014, and 2015. *Source: FAME*

Fraction of Foreign Sales: The average fraction of foreign sales over the total sales for the years of 2013, 2014, and 2015. *Source: FAME*

Foreign Subsidiary: A dummy variable that is equal to one if a firm has any foreign subsidiary that is registered outside the UK. *Source: FAME*

Log (1+Number of Foreign Countries): The logarithm of one plus the number of foreign countries where a firm has subsidiaries. *Source: FAME*

FTSE100/250: A dummy variable that is equal to one if a firm is listed in FTSE 100/250 indexes. *Source: FAME*

Institutional Ownership: A dummy variable that is equal to one if a firm has institutional investors as shareholders in the year of 2015. *Source: FAME*

Log (1+Number of Shareholders): The logarithm of one plus the number of reported shareholders in the year of 2015. This does not account for unnamed individual shareholders. *Source: FAME*

Bond: A dummy variable that is equal to one if a firm ever issued bonds since the year 2009. *Source: Refinitiv*

Table 1: Summary statistics

This table reports the summary statistics of key variables in the sub-samples of public firms and private firms. We winsorize firm level data at the 1st and 99th percentiles. We perform two-sample t-test for the difference in means, and Wilcoxon rank-sum test for the difference in medians. *, ** and *** denote statistical significance at the level of 10%, 5% and 1%, respectively.

Panel A. Contract terms

	Public firm sub-sample				Private firm sub-sample				Private - Public	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(6) - (2)	(7) - (3)
Variable:	N	Mean	Median	SD	N	Mean	Median	SD	t-statistics	Wilcoxon Z-statistics
All-In-Drawn	256	1.977	1.750	1.273	146	3.398	3.750	1.686	8.842***	8.415***
Term Loan	256	0.27	0.000	0.445	146	0.562	1.000	0.498	5.878***	5.809***
Credit Line	256	0.73	1.000	0.445	146	0.438	0.000	0.498	-5.878***	-5.809***
Maturity	256	54.254	60.000	19.730	146	68.836	62.000	29.129	5.385***	7.781***
Log (Loan Size)	256	5.5	5.442	1.319	146	5.201	5.464	1.173	-2.346**	-1.690*
Financial Covenants	256	0.234	0.000	0.626	146	0.171	0.000	0.489	-1.121	-0.292
General Covenants	256	0.055	0.000	0.275	146	0.041	0.000	0.369	-0.388	-1.566
Secured	256	0.23	0.000	0.422	146	0.76	1.000	0.428	11.990***	10.328***
Refinance	256	0.664	1.000	0.473	146	0.623	1.000	0.486	-0.816	-0.823
Investment Grade	256	0.645	1.000	0.480	146	0.178	0.000	0.384	-10.679***	-8.995***
Not Rated	256	0.285	0.000	0.452	146	0.712	1.000	0.454	9.081***	8.287***
Relationship Loan	256	0.742	1.000	0.438	146	0.63	1.000	0.484	-2.308**	-2.358**

Panel B. Firm characteristics

	Public firms				Private firms				Private – Public differences	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(6) - (2)	(7) - (3)
Variable:	N	Mean	Median	SD	N	Mean	Median	SD	t-statistics	Wilcoxon Z-statistics
Profitability	256	0.220	0.163	0.211	146	0.209	0.132	0.365	-0.350	-1.130
Sales Growth	256	1.125	1.077	0.285	146	1.263	1.066	0.727	2.189**	0.609
Leverage	256	0.246	0.252	0.140	146	0.456	0.430	0.285	8.352***	7.599***
Cash	256	0.072	0.054	0.075	146	0.066	0.047	0.070	-0.877	-1.153
Size	256	6.990	6.823	1.652	146	6.472	6.646	1.394	-3.344***	-2.558**
Tangibility	256	0.217	0.162	0.236	146	0.302	0.106	0.327	2.760***	1.295
Log (Age)	256	3.101	2.944	0.970	146	2.866	2.890	0.765	-2.679***	-1.888*
Log (1+Interest Coverage)	256	2.072	1.934	0.992	146	1.929	1.549	1.333	-1.127	-2.607***
Capital Investment	256	0.044	0.019	0.115	146	0.047	0.015	0.136	0.189	-0.364
Foreign Sales	246	0.707	1.000	0.456	115	0.313	0.000	0.466	-7.544***	-7.066***
Fraction of Foreign Sales	236	0.428	0.357	0.402	112	0.115	0.000	0.274	-8.485***	-7.178***
Foreign Subsidiary	256	0.836	1.000	0.371	146	0.493	0.000	0.502	-7.208***	-7.286***
Log (1+Number of Foreign Countries)	256	1.987	2.197	1.324	146	0.529	0.000	0.660	-14.712***	-10.527***
FTSE100/250	256	0.445	0.000	0.498						
Institutional Ownership	256	0.988	1.000	0.108	146	0.192	0.000	0.395	-23.860***	-16.723***
Log (1+number of shareholders)	256	4.301	4.477	0.646	138	1.222	1.099	0.896	-35.693***	-15.378***
Bond	256	0.309	0.000	0.463	146	0.110	0.000	0.313	-5.122***	-4.511***

Table 2: Loan prices for public and private firms under uncertainty

This table presents the results for loan prices around the Brexit referendum. The dependent variable is the all-in-drawn spread divided by 100. We measure uncertainty by the *Post Brexit* indicator, which is equal to one if a facility is issued after the referendum date on June 23rd, 2016, and zero, otherwise. *Private* is a dummy variable, which is equal to one if the borrower is a private firm at the time of loan issuance, and zero, otherwise. Loan purpose fixed effects, and Fama-French 12 industries fixed effects are included in the regressions (1) to (3); industry-year fixed effects are included in regression (4). *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote statistical significance at the level of 10%, 5% and 1%, respectively.

	(1)	(2)	(3)	(4)
Post Brexit	0.409**	0.225**	-0.015	
	(2.55)	(2.06)	(-0.15)	
Private × Post Brexit			0.696***	0.646**
			(2.81)	(2.26)
Private			0.086	0.120
			(0.43)	(0.53)
Profitability	-0.626**	-0.827***	-0.752***	-0.736***
	(-2.59)	(-3.76)	(-3.54)	(-3.36)
Sales Growth	0.194	-0.063	-0.129	-0.076
	(1.55)	(-0.78)	(-1.60)	(-0.89)
Leverage	0.972**	0.049	-0.052	-0.077
	(2.08)	(0.14)	(-0.15)	(-0.21)
Cash	0.204	0.648	0.854	0.892
	(0.16)	(0.89)	(1.20)	(1.22)
Size	-0.211***	-0.175***	-0.174***	-0.171***
	(-3.55)	(-3.35)	(-3.45)	(-3.08)
Tangibility	0.370	-0.014	-0.104	-0.110
	(1.11)	(-0.05)	(-0.39)	(-0.37)
Log (Age)	-0.138	0.011	0.019	0.019
	(-1.44)	(0.16)	(0.33)	(0.27)
Log (1+Interest Coverage)	-0.109	-0.100**	-0.116**	-0.130***
	(-1.46)	(-1.99)	(-2.46)	(-2.66)
Capital Investments	-0.334	-0.212	-0.206	-0.161
	(-0.56)	(-0.47)	(-0.51)	(-0.33)
Maturity		0.002	0.002	0.001
		(0.66)	(0.79)	(0.39)
Log (Loan Size)		0.024	0.036	0.041
		(0.47)	(0.73)	(0.78)
Financial Covenants		0.085	0.118	0.092
		(1.15)	(1.61)	(1.15)
General Covenants		-0.131	-0.169	-0.199
		(-0.88)	(-1.38)	(-1.45)
Refinance		0.396	0.362	0.289
		(1.42)	(1.30)	(0.98)
Term Loan		0.544***	0.494***	0.476***
		(5.05)	(4.85)	(4.64)
Secured		0.328*	0.234	0.160
		(1.93)	(1.34)	(0.78)

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Table 2 *(continued)*

Investment Grade		-1.375***	-1.340***	-1.364***
		(-4.92)	(-5.48)	(-4.68)
Not rated		0.021	0.025	0.014
		(0.08)	(0.10)	(0.05)
Constant	3.699***	4.086***	4.134***	4.568***
	(5.25)	(7.35)	(7.98)	(7.93)
Loan purpose fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	No	No	No	Yes
Observations	408	402	402	402
Adjusted R-squared	0.549	0.757	0.772	0.768

Table 3: Parallel trend test

This table presents the results for loan prices around the Brexit referendum. The dependent variable is the all-in-drawn spread divided by 100. The dummy variables *BeforeBrexit*^{2015} and *BeforeBrexit*$^{2016\text{-}first\ half}$ equal one if a loan is issued in the pre-Brexit years 2015 and the first half of 2016, respectively. Similarly, the dummy variables *AfterBrexit*$^{2016\text{-}second\ half}$, *AfterBrexit*^{2017}, and *AfterBrexit*^{2018} equal one if a loan is used in the post-Brexit years the second half of 2016, 2017, and 2018, respectively. *Private* is a dummy variable, which is equal to one if the borrower is a private firm at the time of loan issuance, and zero, otherwise. Loan purpose fixed effects and Fama-French 12 industries fixed effects are included according to the regressions. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote statistical significance at the level of 10%, 5% and 1%, respectively.

	(1)	(2)
AfterBrexit^{2018}	0.135	-0.003
	(0.90)	(-0.02)
AfterBrexit^{2017}	0.171	0.109
	(1.06)	(0.66)
AfterBrexit$^{2016\text{-}second\ half}$	0.597**	-0.141
	(2.06)	(-0.55)
BeforeBrexit$^{2016\text{-}first\ half}$	-0.060	-0.249
	(-0.30)	(-1.32)
BeforeBrexit^{2015}	0.049	0.151
	(0.31)	(1.14)
Private × *AfterBrexit*^{2018}		0.557
		(1.62)
Private × *AfterBrexit*^{2017}		0.275
		(0.86)
Private × *AfterBrexit*$^{2016\text{-}second\ half}$		1.307***
		(2.97)
Private × *BeforeBrexit*$^{2016\text{-}first\ half}$		0.603
		(1.31)
Private × *BeforeBrexit*^{2015}		-0.433
		(-1.15)
Private		0.165
		(0.61)
Constant	4.126***	4.105***
	(7.07)	(7.81)
Controls	Yes	Yes
Loan purpose fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	0.758	0.765
Adjusted R-squared	0.758	0.765

Table 4: Matching analysis - test for balance

This table presents the test of mean value differences in the pre- and post-matched variables between public and private firms in Propensity Score Matching (PSM) in Panel A and the entropy balancing in Panel B. In Panel A for PSM, we use one-to-one nearest-neighbour matching with replacement. In Panel B, the weights calculated from the entropy balancing are applied to the regressions after the entropy balancing. *, ** and *** denote significance at the 10%, 5% and 1% levels.

Panel A: Test for mean value differences of the variables in propensity score matched sample

	Differences in Mean Values	
Variable:	Pre-match	After-match
Profitability	0.172***	0.080
Sales Growth	-0.007	-0.027
Leverage	0.144***	-0.015
Cash	0.167***	0.046
Size	-0.02***	-0.007
Tangibility	-0.383***	-0.091
Log (Age)	0.145***	0.032
Log (1+Interest Coverage)	-0.241***	0.193
Capital Investment	-0.102	-0.080

Panel B: Test for mean value differences of the variables in entropy balancing

	Differences in Mean Values	
Variable:	Pre-match	After-match
Profitability	-0.012	0
Sales Growth	0.137***	0
Leverage	0.210***	0
Cash	-0.007	0
Size	-0.518***	0
Tangibility	0.085***	0
Log (Age)	-0.235**	0
Log (1+Interest Coverage)	-0.143	0
Capital Investment	0.003	0

Table 5: Matching analysis in loan prices for public and private firms under uncertainty
This table presents the results for loan prices around the Brexit referendum using the covariates in Propensity Score Matched (PSM) sample in Panel A and entropy balanced sample in Panel B. In PSM, we use one-to-one nearest-neighbour matching with replacement. The dependent variable is the all-in-drawn spread divided by 100. We measure uncertainty by the *Post Brexit* indicator, which is equal to one if a facility is issued after the referendum date on June 23rd, 2016, and zero, otherwise. *Private* is a dummy variable, which is equal to one if the borrower is a private firm at the time of loan issuance, and zero, otherwise. Loan purpose fixed effects and Fama-French 12 industries fixed effects are included according to the regressions. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote statistical significance at the level of 10%, 5% and 1%, respectively.

Panel A: Results in propensity score matched sample		
	(1)	(2)
Post Brexit	0.312*	-0.224
	(1.89)	(-0.82)
Private × Post Brexit		0.762**
		(2.26)
Private		0.191
		(0.74)
Constant	5.231***	5.618***
	(4.18)	(4.7)
Controls	Yes	Yes
Loan purpose fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	148	148
Adjusted R-squared	0.781	0.801

Panel B: Results in entropy balanced sample		
	(1)	(2)
Post Brexit	0.380***	-0.010
	(2.64)	(-0.07)
Private × Post Brexit		0.667**
		(2.40)
Private		0.160
		(0.66)
Constant	3.953***	4.019***
	(4.90)	(5.00)
Controls	Yes	Yes
Loan purpose fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	402	402
Adjusted R-squared	0.786	0.802

Table 6: Foreign exposure

This table presents the results for loan prices around the Brexit referendum, considering the effects of foreign exposure. The dependent variable is the all-in-drawn spread divided by 100. We measure uncertainty by the *Post Brexit* indicator, which is equal to one if a facility is issued after the referendum date on June 23rd, 2016, and zero, otherwise. *Private* is a dummy variable, which is equal to one if the borrower is a private firm at the time of loan issuance, and zero, otherwise. *Foreign Sales* is a dummy variable, which is equal to one if a firm has foreign sales during any year of 2013 to 2015, and zero, otherwise. *Fraction of Foreign Sales* is the ratio of foreign sales over total sales averaged over 2013 to 2015. *Foreign Subsidiaries* is a dummy variable, which is equal to one if a firm has subsidiaries outside the UK, and zero, otherwise. *Log (1+Number of Foreign Countries)* is the logarithm of one plus number of countries outside the UK where a firm has subsidiaries. Loan purpose fixed effects and Fama-French 12 industries fixed effects are included according to the regressions. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote statistical significance at the level of 10%, 5% and 1%, respectively.

	(1)	(2)	(3)	(4)
Post Brexit	0.284*	0.230	0.434	0.375**
	(1.67)	(1.56)	(1.59)	(2.35)
Private × Post Brexit	1.050***	0.742**	0.649	0.668**
	(3.33)	(2.27)	(1.62)	(2.10)
Private	-0.374	-0.018	-0.107	-0.129
	(-1.60)	(-0.07)	(-0.34)	(-0.52)
Foreign Sales × Private × Post Brexit	-1.438***			
	(-3.35)			
Foreign Sales × Post Brexit	-0.397*			
	(-1.91)			
Foreign Sales × Private	1.239***			
	(4.21)			
Foreign Sales	-0.129			
	(-0.87)			
Fraction of Foreign Sales × Private × Post Brexit		-1.205*		
		(-1.87)		
Fraction of Foreign Sales × Post Brexit		-0.545**		
		(-2.15)		

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Table 6 *(continued)*

Fraction of Foreign Sales × Private		1.164***		
		(2.77)		
Fraction of Foreign Sales		-0.233		
		(-1.15)		
Foreign Subsidiaries × Private × Post Brexit			-0.350	
			(-0.72)	
Foreign Subsidiaries × Post Brexit			-0.503*	
			(-1.67)	
Foreign Subsidiaries × Private			0.485	
			(1.37)	
Foreign Subsidiaries			-0.047	
			(-0.22)	
Log (1+Number of Foreign Countries) × Private × Post Brexit				-0.610**
				(-2.36)
Log (1+Number of Foreign Countries) × Post Brexit				-0.171***
				(-2.61)
Log (1+Number of Foreign Countries) × Private				0.398**
				(2.23)
Log (1+Number of Foreign Countries)				-0.087
				(-1.64)
Constant	3.958***	3.893***	4.284***	4.174***
	(6.31)	(5.63)	(8.36)	(8.68)
Controls	Yes	Yes	Yes	Yes
Loan purpose fixed effects	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes
Observations	361	348	402	402
Adjusted R-squared	0.800	0.782	0.777	0.785

Table 7: Other differences between private and public firms

This table presents the results for loan prices around the Brexit referendum, considering the effects of different heterogeneities between private and public firms. The dependent variable is the all-in-drawn spread divided by 100. We measure uncertainty by the *Post Brexit* indicator, which is equal to one if a facility is issued after the referendum date on June 23rd, 2016, and zero, otherwise. *Private* is a dummy variable, which is equal to one if the borrower is a private firm at the time of loan issuance, and zero, otherwise. *Bond* is a dummy variable, which is equal to one if a firm ever issued bonds since the year of 2009, and zero, otherwise. *Log (1+Number of Shareholders)* is the logarithm of one plus the number of reported shareholders in the year of 2015. *Relationship Length* is the difference between the current year-quarter and the earliest year-quarter when a borrower contracts with a lead arranger; if there are multiple lead arrangers within the same facility, we take the maximum. *FTSE100/250 Public* is a dummy variable if a firm is a public firm and is listed in FTSE100 or FTSE250, and zero, otherwise. *Private with IO* is a dummy variable that is equal to one if a firm is a private firm and had institutional ownership in 2015, and zero, otherwise. *Private without IO* is a dummy variable that is equal to one if a firm is a private firm and did not have institutional ownership in 2015, and zero, otherwise. Loan purpose fixed effects and Fama-French 12 industries fixed effects are included according to the regressions. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote statistical significance at the level of 10%, 5% and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
Post Brexit	-0.043	0.139	-0.289	0.046	-0.013
	(-0.36)	(0.17)	(-1.09)	(0.30)	(-0.13)
Private × Post Brexit	0.625**	0.468	1.111**	0.614**	
	(2.38)	(0.51)	(2.29)	(2.21)	
Private	0.240	-0.762	-0.084	0.030	
	(1.14)	(-1.30)	(-0.26)	(0.15)	
Bond × Private × Post Brexit	0.608				
	(0.99)				
Bond × Post Brexit	0.028				
	(0.13)				
Bond × Private	-1.003**				
	(-1.98)				
Bond	0.097				
	(0.70)				
Log (1+Number of Shareholders) × Private × Post Brexit		0.048			
		(0.18)			
Log (1+Number of Shareholders) × Post Brexit		-0.040			

(Continued on next page)

Table 7 *(continued)*

		(-0.22)			
Log (1+Number of Shareholders) × Private		0.275			
		(1.53)			
Log (1+Number of Shareholders)		-0.183			
		(-1.44)			
Relationship Length × Private × Post Brexit			-0.032***		
			(-2.85)		
Relationship Length × Post Brexit			-0.000		
			(-0.09)		
Relationship Length × Private			0.013*		
			(1.84)		
Relationship Length			-0.001		
			(-0.43)		
FTSE100/250 Public × Post Brexit				-0.049	
				(-0.23)	
FTSE100/250 Public				-0.211	
				(-1.38)	
Private with IO × Post Brexit					1.188***
					(3.35)
Private without IO × Post Brexit					0.548*
					(1.91)
Private with IO					-0.615*
					(-1.81)
Private without IO					0.273
					(1.24)
Constant	4.003***	4.617***	4.125***	3.942***	4.083***
	(8.44)	(8.15)	(8.35)	(7.09)	(7.59)
Controls	Yes	Yes	Yes	Yes	Yes
Loan purpose fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	402	394	402	402	402
Adjusted R-squared	0.776	0.770	0.777	0.773	0.779

Table 8: Financial covenants

This table presents the results for the use of financial covenants around the Brexit referendum. The dependent variable is the number of financial covenants. We measure uncertainty by the *Post Brexit* indicator, which is equal to one if a facility is issued after the referendum date on June 23rd, 2016, and zero, otherwise. *Private* is a dummy variable, which is equal to one if the borrower is a private firm at the time of loan issuance, and zero, otherwise. Deal purpose fixed effects, and Fama-French 12 industries fixed effects are included in the regressions. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote statistical significance at the level of 10%, 5% and 1%, respectively.

	(1)	(2)
Post Brexit	-0.036	0.073
	(-0.58)	(0.87)
Private × Post Brexit		-0.338**
		(-1.98)
Private		0.034
		(0.18)
Constant	0.768	0.571
	(0.99)	(0.75)
Controls	Yes	Yes
Deal purpose fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	267	267
Adjusted R-squared	0.005	0.014

Table 9: Financial covenants and information transparency

This table presents the results for the use of financial covenants around the Brexit referendum. The dependent variable is the number of financial covenants. We measure uncertainty by the *Post Brexit* indicator, which is equal to one if a facility is issued after the referendum date on June 23rd, 2016, and zero, otherwise. *Private* is a dummy variable, which is equal to one if the borrower is a private firm at the time of loan issuance, and zero, otherwise. *FTSE100/250 Public* is a dummy variable if a firm is a public firm and is listed in FTSE100 or FTSE250, and zero, otherwise. *Private with IO* is a dummy variable that is equal to one if a firm is a private firm and had institutional ownership in 2015, and zero, otherwise. *Private without IO* is a dummy variable that is equal to one if a firm is a private firm and did not have institutional ownership in 2015, and zero, otherwise. Deal purpose fixed effects, and Fama-French 12 industries fixed effects are included in the regressions. *t-statistics* are based on robust standard errors clustered at the firm level. *, ** and *** denote statistical significance at the level of 10%, 5% and 1%, respectively.

	(1)	(2)
Post Brexit	-0.149	0.071
	(-0.97)	(0.85)
Private × Post Brexit	-0.111	
	(-0.49)	
FTSE100/250 Public × Post Brexit	0.432**	
	(2.13)	
FTSE100/250 Public	-0.106	
	(-0.56)	
Private with IO × Post Brexit		-0.168
		(-0.93)
Private without IO × Post Brexit		-0.382**
		(-2.03)
Private with IO		-0.005
		(-0.03)
Private without IO		0.049
		(0.22)
Constant	0.516	0.591
	(0.65)	(0.76)
Controls	Yes	Yes
Deal purpose fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	267	267
Adjusted R-squared	0.023	0.007