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Debt diversification and investments of European listed real estate companies

Abstract

Design/methodology/approach Employing a hand-collected sample of debt structures of 102 European public real estate companies, and using ECB bank lending standards survey as a proxy for bank credit availability, we test a conditional hypothesis on the relationship between investment rates and the use of public debt during period of constrained bank lending environment in Europe.

Purpose In this paper, we examine the relationship between the use of public debt and investment activity of European listed real estate companies.

Findings Our results show that ex-ante diversification of debt allows retaining higher investment rates when the main source of debt, bank lending, is shrinking. The effect is statistically and economically significant and increases during times of tight bank lending constraints. We find no support to debt capacity explanation of the effect. We neither find support of the higher investment rates to be indicative of overinvestment problem. The results are robust to alternative model specifications and estimators.

Research limitations/implications The empirical analysis is limited to Europe.

Practical implications Investments and the growth of real estate companies depend on their ability to seize value-increasing opportunities that arise in the competitive markets. This paper evaluates the role of a diversified debt structure in this context. Our results suggest that debt structure can have material importance for the investment activity of European listed real estate companies and issuance of public debt can help companies to counterbalance the negative effects of restricted bank loan supply on the investment levels.

Originality/value The paper extends the literature on debt structures of listed real estate firms by considering the effect of debt diversification on investments.

Keywords: Debt diversification, debt structure, European listed real estate, investments, capital structure

1 Introduction

Investments and the growth of real estate companies depend on their ability to seize value-increasing opportunities that arise in the competitive markets. Real estate investments have a large unit size and are typically partially financed through debt. Convenient availability of debt financing, through *e.g.* credit lines, may support higher investment rates (Hardin and Hill, 2011), and reductions in the availability of debt funding are associated with decreasing investment volumes in the asset markets. This relationship is very well illustrated in Figure 1, where the mean investment expenditures of European listed real estate companies are plotted against the net average bank lending standards. From the graph we observe that the peaks of increase in the net bank lending standards (*i.e.* increasing difficulty in acquiring new loans) are followed by falls in investment activity of European listed real estate companies. The correlation coefficients between the two variables is striking -0.41, and -0.65 if the lending standards are lagged by one year[1].

[Figure 1 here]

In addition to bank credit, real estate investment firms may also finance their activities through issuance of unsecured corporate bonds in public debt markets. In Europe, bank lending remains predominant source of corporate lending landscape (Kaya et al., 2014). The evidence from corporations in the U.S., however, shows that the use of public debt has been associated with multiple advantages, when combined with private bank lending. First, firms with diversified debt structure are less likely to suffer from credit rationing[2] (Stiglitz and Weiss, 1981; Faulkender and Petersen, 2005) by banks. Second, if one of the sources of debt, *i.e.* bank loans, is constrained, diversified debt structure simply suggests an ability of firms to compensate

1 The correlation does not on its own imply the casual relationship between investment and supply of bank credit, as the relationship is likely endogenous. The relationship is tested in empirical part and the endogeneity concerns are addressed in the robustness section. The figure, however, provides intuition for our research question.

2 Credit rationing is a situation in which either (a) among loan applicants who appear to be identical some receive a loan and others do not, and the rejected applicants would not receive a loan even if they offered to pay a higher interest rate; or (b) there are identifiable groups of applicants who, with a given supply of credit, are unable to obtain loans at any interest rate, even though with larger supply of credit, they would (Stiglitz and Weiss, 1981).

the shortage in supply of this source of debt with another[3]. Third, debt composition has been associated with the levels of leverage in both industrial and real estate firms, which, in turn, directly affect firms´ debt capacity for issuing additional debt (Uysal, 2011, and Almazan, de Motta, Titman and Uysal, 2010 on industrial firms; Riddiough and Steiner, 2018 on REITs)[4]. Finally, deviation from bank-only financing allows firms to decrease the so-called "bank hold-up effect" (Hale and Santos, 2009), which allows banks to charge higher interest rates for unwillingness of the borrowers to disclose private information to other parties, which is inevitable when accessing public debt markets.

Some of these benefits are pronounced during periods of constrained lending markets. Santos and Winton (2008) show that the spreads increase more for bank reliant firms than for firms with public debt markets access during economic downturn on the example of three economic recessions between 1987 and 2002. This would translate into lower profitability of new investment projects, and thus would decrease the pool of possible investment opportunities for bank-reliant firms. Becker and Ivashina (2014) study that captures two recessions between 1990 and 2010 suggest that bank rationing may accelerate when the supply of the credit from banks is decreased. Thus, bank-reliant firms that otherwise would be able to secure financing from banks, might be rationed, and thus would have to forgo possible investment opportunities. Becker and Ivashina, (2014) also show that substitution is more pronounced when bank lending is constrained. If a company is not able to substitute one source with another, and is reliant on the constrained debt source in financing its investments, it has to forgo value-increasing opportunities, if such opportunities exist in the investment market. This, however, is less relevant for real estate companies for a couple of reasons: first, property acquisitions are usually financed with private debt, at least initially, while public debt issuances may play a role in long-term financial policy (Massa and Zhang, 2013). Second, the substitution hypothesis ignores correlation between public and private debt markets that normally takes place (Brown and

[3] This proposition assumes independence of debt markets. In fact, Massa and Zhang (2013) suggest that debt markets are interconnected and shocks in bond market are propagated to bank lenders.
[4] Some studies (*e.g.* Bucă and Vermeulen, 2017), however, argue that the level of indebtedness per se is not what matters, but only the indebtedness with bank credit, which suggests that increasing debt from other sources would not hurt companies' flexibility.

Riddiough, 2003). In addition, substitution effect implies availability of value increasing investment opportunities, which is not always the case in real estate markets.

Apart from the benefits that debt composition may bring to the real estate firms in times of constrained lending environment, it may also exacerbate overinvestment problem, that is, the situation in which managers invest into value-decreasing projects. If companies invest when there are no value-increasing opportunities, companies with additional sources of finance may fall victims of overinvestment problem and continue investing into projects with suboptimal risk-return profile[5]. This might happen for example due to the decreased monitoring role of the public debt markets in comparison to the private debt markets or higher discretion of the managers over the available financing resources.

The evidence from the US markets, along with the observed decrease in investment levels that follow tightening of lending standards in Europe, allows hypothesizing the effects of debt composition on the investment activity of European real estate companies. In this paper, we investigate how the debt structure, and use of bond financing in particular, relates to the firm's dependence on debt availability in European real estate markets to finance investments. Our main hypothesis is that the share of public debt in a firm's debt structure has a positive effect on investment rates when the bank lending channel is tightening, *i.e.* it helps firms to counterbalance the average downturns in investment activity that follow the increases in bank lending constraints. We further test whether the amount of public debt is associated with leverage levels (*i.e.* test preserved debt capacity hypothesis), and repeat the analysis on two samples of firms with high and low growth options to test whether the effect can be indicative of overinvestment problem.

Our results show that companies with higher use of public debt have statistically higher investment ratios. This relationship is statistically and economically significant and more pronounced during times of tight

[5] With our data we cannot reliably identify overinvestment problem as such test would require estimations of optimal investment levels, a-priori and actual estimates of projects rates of return, and the effects of investments on firm valuations, which is out of the scope of this study. However, if overinvestment problem takes place, it is plausible to assume that debt diversification is associated with higher investment levels by firms with low growth options, which is discussed in detail in robustness section. .

bank lending constraints. An increase in the share of public debt in debt structure of European listed real estate companies is associated with 1.8 to nearly 5 percentage point higher investment ratios. This effect is economically significant as the mean investment ratio of our sample is 6%. We attribute the effect to likely be due to decreased credit rationing by banks, as we find no statistically significant relationship between the degree of public debt and leverage levels, *i.e.* finding no evidence to support debt capacity hypothesis, which is true for US REITs (Riddiough and Steiner, 2018). Additionally, our test for a possible sign of overinvestment problem did not support the notion of existence of such.

The article is structured as follows. In the next section, we present the data and the methodology followed by results and their discussion. We present our concluding remarks in the last section.

2 Empirical strategy and data

Our sample is an unbalanced panel of 102 European listed real estate companies included in the EPRA Developed Europe Index on 31.3.2017. The companies are liquidity, size and revenue screened, suggesting that they should face similar opportunities for accessing various debt instruments. We use yearly data from 2001 to 2016. We drop firm-year observations with less than three consecutive years of observations. As a result, our sample includes 85 companies with corresponding 764 firm-year observations of debt constituents and other variables that are required by our empirical models.

Our data comprises of fundamental financial data on public real estate companies and their performance, data on bank lending standards as well as of data on debt structure. The financial statement data are retrieved from S&P Global Market Intelligence financial database. Table 1 presents the descriptive statistics of the variables used in the analysis, and Appendix 1 contains the sources of the underlying data, and formulas for their calculation. To avoid the effect of outliers on our results, we winsorize our data at the 99.7%.

[Table 1 here]

We measure the availability of bank credit with ECB Bank Lending Survey (BLS). The survey provides information on supply and demand conditions in the euro area credit markets and the lending policies of euro area banks that is otherwise unobservable from other quantitative data such as bank balance sheet data, loan volumes, bank lending rates or financial market data (Köhler-Ulbrich et al. 2016). BLS is advantageous to each of these individual variables as it allows to disentangle the effects of supply from demand for bank loans and other economic conditions that also affect these quantitative variables. The tightening or easing of the standards is influenced by some key factors, such as banks' cost of funds, balance sheet constraints, risk perceptions, competition, and banks' risk tolerance (Köhler-Ulbrich et al. 2016), which makes BLS measure a cumulative variable that proxies credit availability to enterprises. Relative importance of these factors also varies in times of net lending tightening and easing and is not constant over time which is picked up in the measure.

The survey is addressed to senior loan officers of euro area banks (see *e.g.* Köhler-Ulbrich et al. 2016). The measure is a "net percentage", which is the difference between the share of banks reporting that credit standards applied to loan approval have been tightened and the share of banks reporting that they have been eased. The higher the measure, the tighter credit lending has been in the period (Köhler-Ulbrich et al., 2016). As our proxy for bank credit availability, we employ the survey results on credit standards on loans to enterprises[6].

We acknowledge that our choice of measure of bank lending standards is a Euro-zone measure, and thus carries the implicit assumption that the bank lending standards are uniform within Euro-zone, and that the same lending standards apply to those European countries that are not part of the monetary union and operate under independent Central Banks. Our argument for using the ECB lending standards is the fact that many firms in our sample operate in several European countries. Thus, using the country-specific measures might induce an additional bias, as we cannot distinguish in our data in which country the firms

[6] For more information on ECB Bank Lending Survey, please see ECB (2018) and Köhler-Ulbrich et al. (2016).

issue debt. Further, the country-specific lending standards may not be totally methodologically harmonized, which would cause additional noise in the estimation. The ECB Annual Lending Standards are designed to serve as guidelines for Euro-zone monetary policy and should thus reflect the lending market conditions in the best manner. We will revisit the implicit assumption regarding non-Euro-zone countries in the robustness section.

The data on debt structure is collected manually from the annual reports of the companies and augmented by debt data from S&P Global Market Intelligence, where possible. We are able to distinguish the following debt types in our analysis: private borrowing (including bank loans, other bilateral loans, syndicated loans and private placement bonds, as well as obligations under capital leases[7]), and public debt (capital market borrowings including senior unsecured and secured bonds, convertible debt, and money market instruments). The debt types are mutually exclusive, *i.e.* once categorized into one of the category, the debt cannot fall into the other category.

[Table 2 here]

Table 2 reports the mean and percentile values of the employed variables by sample companies' debt types, as a proportion of total debt. Most of the debt is comprised of private borrowing, with a mean value of over 77%. The second most employed source of debt is bonds with a mean value of 15.6% followed by convertible debt, and money market instruments, whose mean shares are 3.2%, 2.1% respectively.

Effect of outstanding public debt on future investments

To test our hypothesis about the effect of the share of public debt on investment rate of the listed European real estate companies, we estimate the following model[8]:

[7] Our analysis includes obligations under capital leases as part of private debt, contributing to total debt figure, and thus affecting public debt figures. Excluding obligations under capital leases from total debt figure does not have material effect on the results of analysis.

[8] The aim of estimating the model is to identify a possible relationship between the use of public debt by European real estate companies and their investment activity, rather than predicting investment rates.

$$Investment\ rate_{i,t} = \alpha + \beta_1 Public\ debt_{i,t-1} + \beta_2 BLS_t + \beta_3 BLS_t \times Public\ debt_{i,t-1} + \Big(\beta_4 (Public\ debt_{i,t-1})^2 + \beta_5 BLS_t \times (Public\ debt_{i,t-1})^2 + \beta_6 Mean\ Tobin's Q_{c,t-1} + \beta_7 Real\ GDP\ growth_{c,t}\Big) + \beta X_{i,t-1} + \eta_i + \varepsilon_{i,t} \quad (1)$$

where $Investment\ rate_{i,t}$ is the ratio of company i's investment cash flow in year t to the value of total assets in year $t-1$. We find this measure most appropriate for the purpose of our analysis as it is less subjected to accounting choices and changes caused by revaluation of the properties than a figure derived from the initial and ending balances of assets (*e.g.* percentage growth in assets). Cash flow from investments includes investments in long-term assets, *i.e.* real estate.

Our variable of interest, $Public\ debt_{i,t-1}$ is the share of public debt in company's debt structure. BLS_t is the value of ECB's annual bank lending standards survey that proxies for the availability of bank lending in the euro area. $X_{i,t-1}$ is a vector of one year lagged time-varying control variables that can be associated with a company's investment activity and may inflate the effect of *Public debt*, if not included. The vector includes $Firm\ size_{i,t-1}$ (log of total assets) to account for differences in investment rates associated with variation in firm size, $Tobin's\ Q_{i,t-1}$ (ratio of the sum of market value of equity and book value of liabilities to the book value of total assets) to account for varying growth prospects, $Earnings_{i,t-1}$ (ratio of recurring EBITDA to the gross value of investment properties) to account for profitability and risk profile of a company, $Leverage_{i,t-1}$ (ratio of total debt to total assets) to account for the levels of indebtedness, and $Cash_{i,t-1}$ (ratio of reported cash and cash equivalents to total assets) to account for immediately available liquidity to fund investments. η_i are firm fixed effects that account for all of the time-invariant firm-specific characteristics that may have an effect on investment rates (e.g. a company's domicile or legal structure) and $\varepsilon_{i,t}$ is the error term.

We further augment the baseline model in the following manner. First, to account for the potential differences in investment market conditions across European countries, we include a country-specific measure of economic activity to account for possible heterogeneous effects of country environments not captured by fixed effects, namely, *Real GDP growth*$_{c,t}$ and a country-level measure of Tobin's Q, *Mean Tobin's* $Q_{c,t}$ as proxies for investment opportunities. Second, we add a quadratic term of the public debt measure and its interaction with *BLS* to account for possible non-linearity of the effect. The resulting model is our full specification and will further be scrutinised in the robustness analysis.

We estimate the regression using panel fixed effects estimator with varying specifications as described above. In the robustness section, we re-estimate the results of the full specification using panel Tobit, probit, IV-2SLS and panel fixed effects regressions with additional controls. Additionally, we test whether the observed effect can be attributed to preserved debt capacity, and whether it can be indicative of overinvestment problem.

3 Results

Table 3 reports our main estimation results using panel fixed effects estimator in columns 1 to 4. In all specifications, we are interested in the effect of *Public debt,* conditional on *BLS.* In column 1, we report the results of estimating the coefficients of the model without controlling for time variation across the countries. We cannot control for time-variation in the investment conditions with year fixed effects, as they are collinear with *BLS,* if added. To control for the time-variant changes in investment environment we include *Mean Tobin's Q* calculated by country and year, and *Real GDP growth* as control variables in Columns 2 and 3, respectively. *Mean Tobin's Q* proxies for varying investment opportunities across countries, and *Real GDP growth* for variation in macroeconomic cycles that might vary across the countries of our sample. Column 4 includes the quadratic term of public debt variable to account for possible non-linearity of the effect.

The results in columns 1-3 show that there is a positive relationship between the use of public debt and the investment rates, and that the relationship is conditional on the bank lending standards. The constitutive effect of *Public debt* – representing the coefficient when *BLS* are at its mean, is positive, but statistically different from zero only at 10%. We find that the interaction term of *Public debt* and *BLS* is positive, suggesting that the effect of the use of public debt is conditional of the level of lending standards. The statistical significance of the effect cannot, however, be evaluated based on the significance of the coefficients of the interaction term, but the joint significance of the coefficients must be evaluated through marginal effects (see *e.g.* Brambor et al., 2006). These marginal effects illustrated in Figure 2 for the specification in column 3. The graph shows that the effect of public debt is statistically significantly different from zero when the *BLS* are at least 0.3 standard deviations higher than the mean. The result is also economically significant as one standard deviation increase in *Public debt* is associated with 1.6-2.6 percentage point higher investment rates. This, given a mean value of investment ratios of 6%, is 26.6%-43.3% increase to the mean in relative terms.

[Table 3 here]

[Figure 2 here]

In column 4, we add a quadratic term to the model to account for potential non-linearity of the effect. In this specification, the effect of *Public debt* on investment rates is significant already when *BLS* is at its mean (as shown by the significant coefficient of *Public debt* in column 4). When lending standards are tighter (looser), the effect pronounces (reduces) correspondingly. Figure 3 depicts the marginal effect of public debt at mean value of public debt (standardized value of 0, *i.e.* 19% of total debt). We can observe that the effect pronounces when lending standards tighten: from 1.8 percentage points at mean *BLS* to 3.2 and 4.6 percentage points at *BLS* one and two standard deviations above the mean, respectively.

[Figure 3 here]

Figure 3 depicts the effect when public debt is at its mean. However, as our specification includes a quadratic term of *Public debt* that is interacted with *BLS*, the marginal effects of *Public debt* will vary across different levels of both *Public debt* and *BLS.* That is, the sensitivity of the investments to availability of bank debt varies between firms with different debt structures. This can be seen from Figure 4 where we plot predictive margins of *Public debt* for four different values of *BLS*. If the standards are the lowest (*i.e.* the bank lending standards are very loose), we see that the prediction of investment rate follows a slightly convex curve. The marginal increases in investment rates that are associated with public debt are lowest at the gradual part of the curve (lowest values of *BLS)*.

If *BLS* is at its mean, the graph is nearly linear. We can see that it is steeper than in the previous situation. If *BLS* is one or two standard deviations above the mean, the graphs become even steeper, which indicates larger marginal effects of public debt on investment rates. Unlike in the first two graphs, in graphs for *BLS* one and two standard deviations above the mean we can see a clear concave parabola with a maximum value at around 1.7 and 1.4 standard deviations of public debt, respectively. This corresponds to 63% and 55% of public debt of total debt, respectively. This means that above these points, the higher levels of public debt are associated with lower levels of investments. These points, therefore, can be considered optimal in maximising the investment rates.

[Figure 4 here]

For all of these models, F-test rejects the null hypothesis, i.e. all of the coefficients are jointly significant. Adjusted R^2 varies between 0.210 and 0.214, which indicates that nearly 80% of the variation in the investment rates remains unexplained by the models. This, however, should not be an impediment to the interpretation of the results as our goal is to show underlying relationships between debt composition and investment rates rather than modelling or predicting investments by listed real estate companies through identifying its driving forces.

To summarize, the estimations using panel fixed effects models indicate that the use of public debt is significantly related to higher investment rates when *BLS* is above its mean. The conditional relationship is non-linear, the optimal levels of public debt varying across different levels of *BLS*. These result support our main hypothesis and indicate that a-priori higher share of public debt is indeed associated with higher investment rates by listed European real estate companies when bank lending channel shrinks. As discussed earlier, this effect can be attributable to various sources, such as decreased rationing by banks, higher debt flexibility or decreased bank hold-up effect. The effect of public debt on investment rates persists even when the *BLS* is at its mean, which may be indicative of overinvestment problem if these investments are detrimental for a firm's value. If public debt markets' monitoring role is smaller than that of the private lenders, firms with a diversified debt structure are more likely to fall victims of overinvestment problem.

The full specification presented in column 4, including the quadratic interaction term and the full set of control variables will be scrutinized in the robustness analysis. For brevity and simplicity of interpretation, we do not report the figures that show predictive margins for the specifications with a quadratic term. However, we report the values of *BLS* at which the marginal effect becomes significant (at 5% level) and the effects at *BLS* one and two standard deviations above the mean. For figure 4 the reported *BLS* threshold is 0.00 and the marginal effects at *BLS* one and two standard deviations above the mean are 3.2 percentage points to 4.6 percentage points.

4 Robustness

4.1. Alternative estimators

In the main results, we employ panel fixed effects regression. This carries an implicit assumption that there is a continuous relationship between the use of public debt and investment. The discrete nature of real estate investments, however, could also be interpreted to be unobservable or latent at levels when investment does not happen, and observable only at positive values of investment. In fact, we have 242 observations where investment equals zero. In such case, the OLS estimator can be inconsistent and produce downward-biased slope estimates, and models for censored dependent variables might fit our data better. To demonstrate that

our results are consistent when taking into account these features of the data, we replicate estimation of the full specification (column 4 of Table 3) with panel Tobit and probit estimators.

The results of the Tobit estimation are reported in column 1 of Table 4. The results are similar to the ones with panel fixed effects estimator, the quadratic term providing a better fit to the data. The effect is already statistically significant and positive when *BLS* is at their mean, a one standard deviation increase in *Public debt* is associated with 1.9 percentage point higher *Investment rates*. The joint effects are of similar magnitude as in our baseline results.

Column 2 of the table reports results of the probit model. In the probit model, instead of the investment rate, we regress the dummy variable that equals one if a company makes a large investment in a certain year and zero otherwise. By doing so, we estimate the marginal effect of public debt on probability of making an investment. The challenge for the probit model lies in defining the threshold for what is considered investment. The corporate finance literature (see *e.g.* Almazan et al., 2010; Harford and Uysal, 2014) on industrial firms often focuses on M&A activities, which are clearly identifiable. Compared to these investments, the property investments of listed real estate companies are more heterogeneous in nature and are more arbitrary to define. In column 2 of Table 4 we report the results of an estimation where the dependent variable takes value of one if a company makes an investment representing more than 10% of its total assets at the beginning of the year, and zero otherwise. The results are robust to using a 5% or a 15% threshold. The results show that the relationship of the likelihood of companies to undertake large investments and use of public debt is conditional on the lending standards. The joint effect becomes statistically significant when *BLS* is 0.3 standard deviations above its mean. The marginal effect of public debt on probability of making a large investment increases along with *BLS*.

4.2. Alternative measure of investment

Our primary measure of investment only accounts for new investments in real estate assets. Listed real estate companies can, however, also undertake large investments that are not real estate transactions through property development. These capital expenditures would not be included in our primary measure

of investment. Therefore, we repeat our analysis that includes both acquisition of investment properties as well as capital expenditure in the investment rate ratio.

The results are presented in Table 5 and follow the order of our main results. The results are qualitatively similar to our main findings. The difference is that for this measure of investment rate the effect becomes statistically significant at a higher level of *BLS*, and its magnitude is smaller in size. This can be explained by the fact that capital expenditures are less volatile than investments in real estate assets, and often might not be requiring debt funding.

4.3. Bank Lending Standards

Our identification relies heavily on the reliability of *BLS* as a measure of lending constraints in Europe. In this section, we test the robustness of our results to two identifying assumptions related to *BLS*.

Our empirical setup implicitly assumes that the relationship between lending standards, public debt exposure and investment has remained stable throughout our observation period. This could be regarded as a strong assumption, as our observation period includes the Global Financial Crisis (GFC), which caused turbulence in both the real estate investment and debt markets. To confirm that the results are not driven by the GFC and the related banking crisis in Europe, we repeat our full model estimation in column 1 of table 6 with a sample that excludes all observations before 2012. The relationship between BLS and investment rates remains qualitatively unchanged, however, the adjusted R^2 of the model decreases to 0.128, which is indicative of higher explanatory power of the model in times of distress of the markets. This means that other factors that are not included into the model explain larger share of variation in investment rates during the time of less stressed economic environment. This is an expected result, as economic drivers that relate to both bank loan availability as well as other factors that drive economic activity have varying relative importance over time and economic cycle (Köhler-Ulbrich et al., 2016).

Second, we acknowledge that our choice of the measure of bank lending standards is a Euro-zone measure, and thus carries the implicit assumption that same lending standards would apply to those European

countries that are not part of the monetary union and operate under independent Central Banks. The assumption that non-Euro-zone countries would experience similar lending standards is based on the fact that European central banks tend to coordinate their monetary policy actions. However, to acknowledge that there could be other factors than monetary policy affecting bank lending standards in the non-Euro-zone countries, we investigate the effect of relaxing this assumption by repeating our analysis with a sample including only Euro-zone countries. The exclusion of all observations from UK, Norway, Sweden and Switzerland shrinks our sample considerably, to 323 observations. Despite of this, our results remain practically unchanged, suggesting that our results are not driven by omitted variables that could drive the non-Euro-zone lending standards and investment rates.

Third, instead of a continuous measure of *BLS*, we measure credit standards with our estimation with a *BLS dummy*, a dummy variable that equals one if the value of lending standards is higher than its mean over the examined period. The results are qualitatively the same: one standard deviation increase in public debt is associated with 3.1 percentage point increase in investment ratios.

4.3. Omitted variable bias

Next, we address omitted variables concerns. We begin this section be revisiting our main specification presented in column 4 of the main results.

One of the possible problems with our main specification is that we are only able to observe factual investment outcome, which is a function of demand and supply. We cannot estimate these separately with precision, and therefore, the observed effect might not be capturing the demand for the investments and the ability to pursue them (which is assumed to be realised demand in the main results), but a result of variation in supply. Low supply might cause low investment rates even when the demand and ability to make investments is high. In our main specification, in the absence of time fixed effects, we control for the time-varying country-specific investment conditions by *Mean Tobin's Q* and *Real GDP growth rate*. Neither of these variables has statistically significant coefficients nor add much to the explanatory power of the model. This might indicate that our specification does not control very well for the local investment trends that

might correlate with our variables of interest and the investment rate, thus potentially biasing the results. We address this concern in Table 7 column 1 by including a country-level investment rate (mean investment rate that is assumed to proxy the level of investment activity of a particular country in a particular year) as a control variable. The underlying assumption is that the measure proxies for country-level investment supply side of the investment opportunities. We do not add this control variable in our baseline specifications, as we have some countries in our sample with very few, or even just one, firm-year observation. The coefficients on our variables of interest remain practically unchanged.

A second concern related to omitted variables is that of available credit facilities. In our base specification we do not control for the existence of unused credit lines. However, Hardin and Hill (2011) find a positive and significant relation between credit line use and real estate investment. If the companies that use public debt have different approaches to using credit facilities, our results might be just demonstrating the importance of credit lines in executing investment strategy, and not the effect of debt diversification. The variable on undrawn credit facilities is part of the hand-collected data, and includes a value if the unused credit facilities had been disclosed in the reports. We include this variable interacted with *BLS* in column 2, to account for the fact that the effect of credit lines could be conditional on bank lending standards, as well. After controlling for the available credit facilities, the marginal effect of *Public debt* is significant already when *BLS* is 0.3 standard deviations below its mean. The marginal effect of undrawn credit facilities is not statistically different from 0.

Third, in column 3 of Table 7 we account for the fact that changes in *BLS* might also channel to investment through other variables other than public debt by interacting all of our control variables with *BLS*. This modification controls for possible conditionality of remaining set of controls. This inclusion improves explanatory power of the model but does not affect our coefficients of interest.

Finally, as the availability of public debt may vary by country as some of the European debt markets are more established than others, we account for the supply side of public debt availability by adding a *Mean*

public debt variable calculated by country and year. The results are reported in column 4 of Table 7. This addition does not change our findings significantly.

4.4. Endogeneity of public debt measure

Finally, we address possible endogeneity concerns associated with the public debt variable. For real estate companies it is common that both investment and financing decisions are made simultaneously, and they can be both driven by another factor. If both the investment rate and debt composition are affected by a third factor that is not included in the model, the inference about causal relationship does not hold. A common way to address this sort of endogeneity is to apply instrumental variables estimator. In our model, we account for firm-fixed effects, *i.e.* the remaining factors that could possibly affect both investment rates and share of public debt in the debt structure should be time-variant and distinct from the controls that are already included into the model. In this respect, access to public debt would serve as a good instrument as it is time-invariant (and thus is uncorrelated with potential time-variant endogeneity factor) while has a high correlation with our possible endogenous variable of interest. Therefore, in Table 8 we present results of both stages of 2SLS-IV regression with *Access to public debt* as an instrument for *Public debt*. *Access to public debt* is a dummy variable that equals one if a company has a non-zero value of public debt on its balance sheet and zero otherwise. From the results of the first stage in column 1 we can observe that the *Access to public debt* is statistically significant. In column 2 we report results of the second stage that we estimate using panel fixed effects regression. The marginal effect of instrumented variable conditional on *BLS* starts being statistically significant at *BLS* 0.3 standard deviations above the mean.

The chosen instrument, *Access to public debt*, might be endogenous itself when, for example, inability to invest is driven by the same factors as inability to access public debt market. To address this concern we repeat our estimation on a reduced sample: we exclude those companies that never issued public debt during the observed time period, assuming that their access to public debt markets is restricted and their ability to undertake investments is undermined by the same endogeneity factor. This exclusion leaves us with 55 companies and 567 observations. The results of a panel fixed effects regression are presented in column 3

of Table 8. The main findings are not affected by limiting the sample to the companies that have history of public debt issuance.

All of this evidence suggests that companies with diversified debt structures are more flexible in financing investment activity at times when supply of bank lending is tighter.

4.5. Preserved debt capacity or overinvestment?

In this section we test whether the discovered effect can be indicative of overinvestment problem. Additionally, as the literature that examined US market has found evidence for preserved debt capacity effect (Riddiough and Steiner, 2018), we test this effect on our sample.

First, we look into whether the effect can be thought of as a benefit or is indicative of overinvestment problem. We cannot directly test whether the companies that are more flexible in financing their projects through debt diversification are more prone to overinvest, because to estimate that we would need to have investment-level performance data, and assumptions about management's incentives to undertake or forgo an investment, as well as an estimate of optimal level of investment rate. This is challenging when having only ex-post data on realized real estate investments, which are discrete in nature and restricted by limited investment opportunities. Therefore, instead of testing overinvestment hypothesis directly, we look into whether the effect of debt diversification on investment rates is more pronounced for companies with low and high growth options. La Rocca et al. (2007) indicated that companies in mature industries with low growth prospects are more prone to overinvest. To see whether debt diversification causes higher than average investment rates for companies with low growth options, we rerun the analysis on the higher and lower terciles of our sample, sorted annually by Tobin's Qs (as proxies of growth opportunities. Such setting, along with the assumption that average investment rates are optimal, lets us determine whether debt diversification is associated with higher investment rates of low-growth prospects sample, which would be indicative of possible overinvestment problem.

The results of these estimations are reported in table 9 in column 1 for the companies with low growth options (first tercile), and in column 2 for the companies with high growth options (third tercile). We can see that the effect of public debt, conditional on *BLS*, only exists for companies with high growth options – suggesting that the effect we observe is more likely to be due to relaxation of financial constraints and related underinvestment, instead of overinvestment. Therefore, we can conclude that provided by debt diversification financial flexibility is used for the benefit of companies that have higher growth options.

Further, we test the debt capacity hypothesis by regressing leverage levels on the share of public debt and a set of other control variables-determinants of leverage. As public debt issuances contain clauses on the level of leverage, real estate companies with public debt are expected to have lower leverage than those with private debt only (Riddiough and Steiner, 2018). The results of this estimation are presented in column 1 of Table 10. The results show that there is no statistically significant relationship between leverage levels and the share of public debt. This suggests that the effect is not channeling through preserved debt capacity.

Therefore, we conclude that the share of public debt in the debt structure of European real estate companies has a positive effect on the investment rates of these companies in times of constrained bank lending environment. We find no evidence that the effect is indicative of overinvestment by these firms. We neither find support for the debt capacity hypothesis, leaving credit rationing and bank hold-up to be the most likely explanations of the discovered effect.

5 Concluding remarks

Access to debt is important to real estate investment companies and their ability to seize investment opportunities. In this context, also the debt composition and the level of debt diversification of a firm's debt portfolio could be of importance, if they channel into firm's abilities to issue debt throughout varying lending conditions.

In this paper we examine the relationship between debt diversification and investment by employing a hand-collected sample of debt structures of 102 European public real estate companies. Our measure of debt diversification is the share of public debt of the total debt in the firm's debt portfolio. We use BLS as a measure for credit availability, which allows to disentangle and quantify qualitative factors of the supply side of bank lending, which is otherwise unobservable from direct measures such as bank lending volumes, credit spreads and other quantitative measures that are a product of both supply and demand, and other economic macroeconomic variables.

Our results show that there is a statistically and economically significant, non-linear relationship between debt diversification and the investment activity of European listed real estate companies, the effect increasing when bank lending is constrained. Higher share of public debt in the debt structure of a European real estate company is associated with higher investment levels at times of constrained lending environment. The effect is not caused by debt capacity – firms with public debt in their debt structure do not have lower leverage in our sample, leaving the most likely explanation for the observed effect to be credit rationing – *i.e.* companies with public debt issues continue being financed by banks in their acquisitions even when lending environment is constrained. We also find no support of the higher investment rates to be indicative of overinvestment problem. The results are robust to alternative model specifications and estimators. Our results suggest that debt structure can have material importance for the investment activity of European listed real estate companies and issuance of public debt can help companies to counterbalance the negative effects of restricted bank loan supply on the investment levels.

This paper, therefore, extends the literature on the role of debt composition in the investment activity of listed real estate companies beyond credit lines (*e.g.* Campbell et al., 2008, Hardin and Hill, 2011). In fact, we do not find evidence of the relationship between unused credit facilities and investment rates in the European setting, conditional on the net lending standards. Further, it adds to the literature that looks into the effects of public debt on performance of public real estate companies (*e.g.* Allen and Ledtin (2015) on the relationship between equity returns and access to public debt markets; Riddiough and Steiner (2018) on the role of public debt in regulating manager-shareholder conflict) by looking at the relationship between

investment and diversification of debt structure. Finally, we use a sample of hand-collected data on debt composition of European real estate companies, which provides additional novelty. Most of the studies on the role of public debt for real estate companies are conducted in the U.S. setting. As the composition and maturity of European and US debt markets still differs considerably (Kaya et al., 2014), it adds to the literature that looks into the development of European public debt markets and potential benefits of further consolidation of European capital markets.

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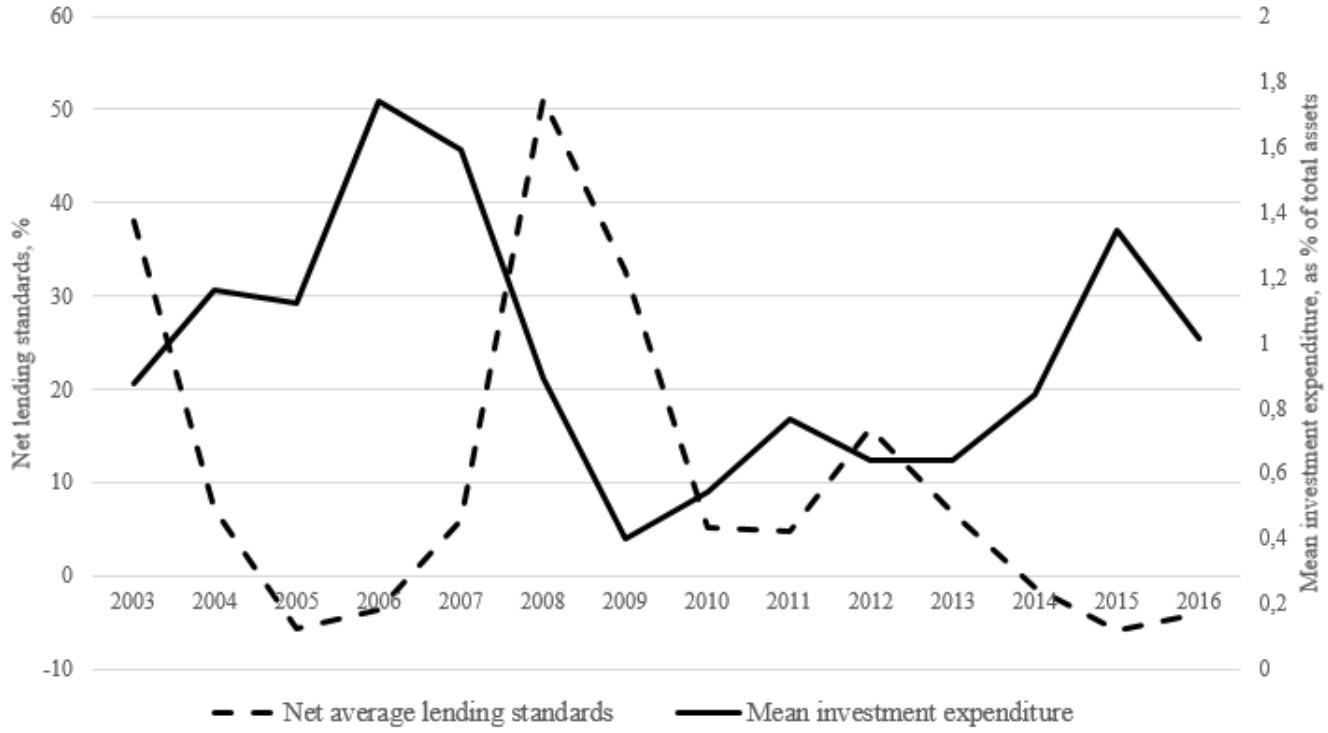

Figure 1 Mean investment expenditure of European listed real estate companies vs. net lending standards in Europe (Data source: ECB Bank Lending Survey; S&P Global Market Intelligence)

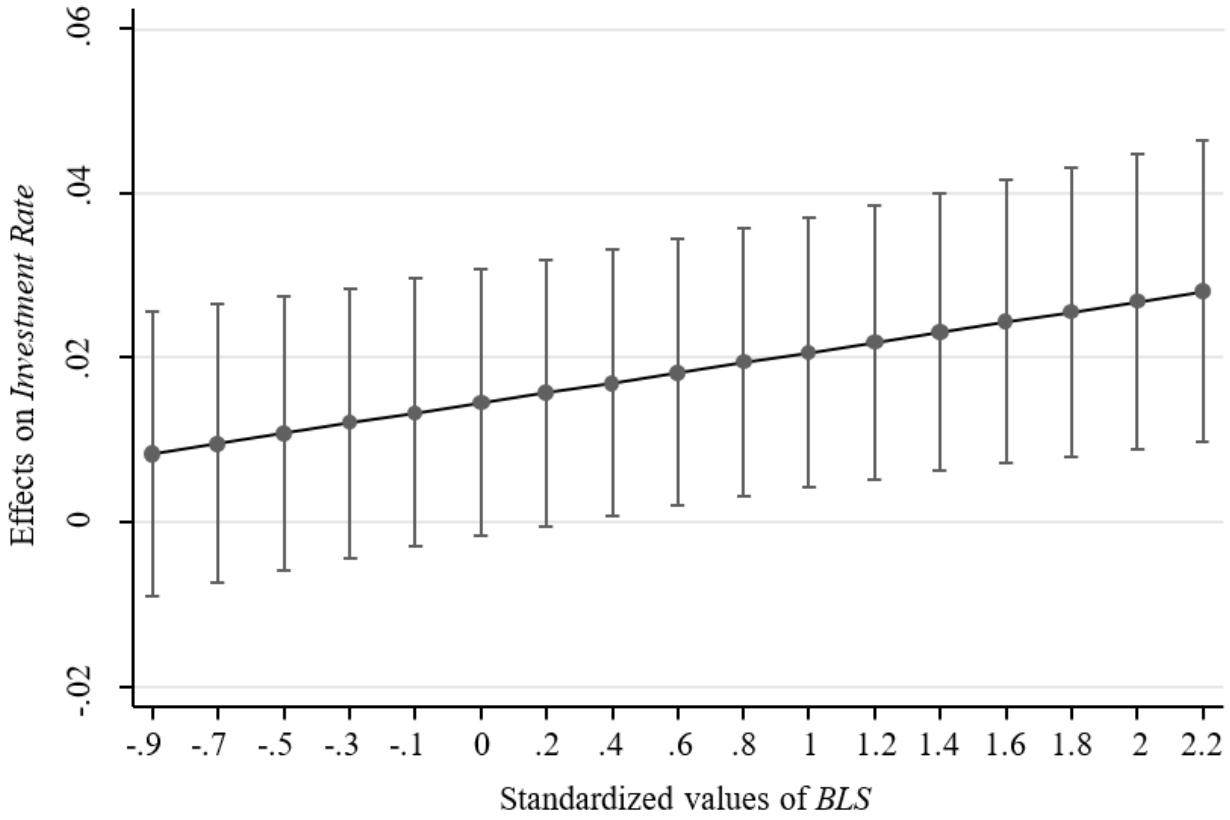

Figure 2 Marginal Effects of *Public debt* on *Investment rate* (Table 3, column 3)

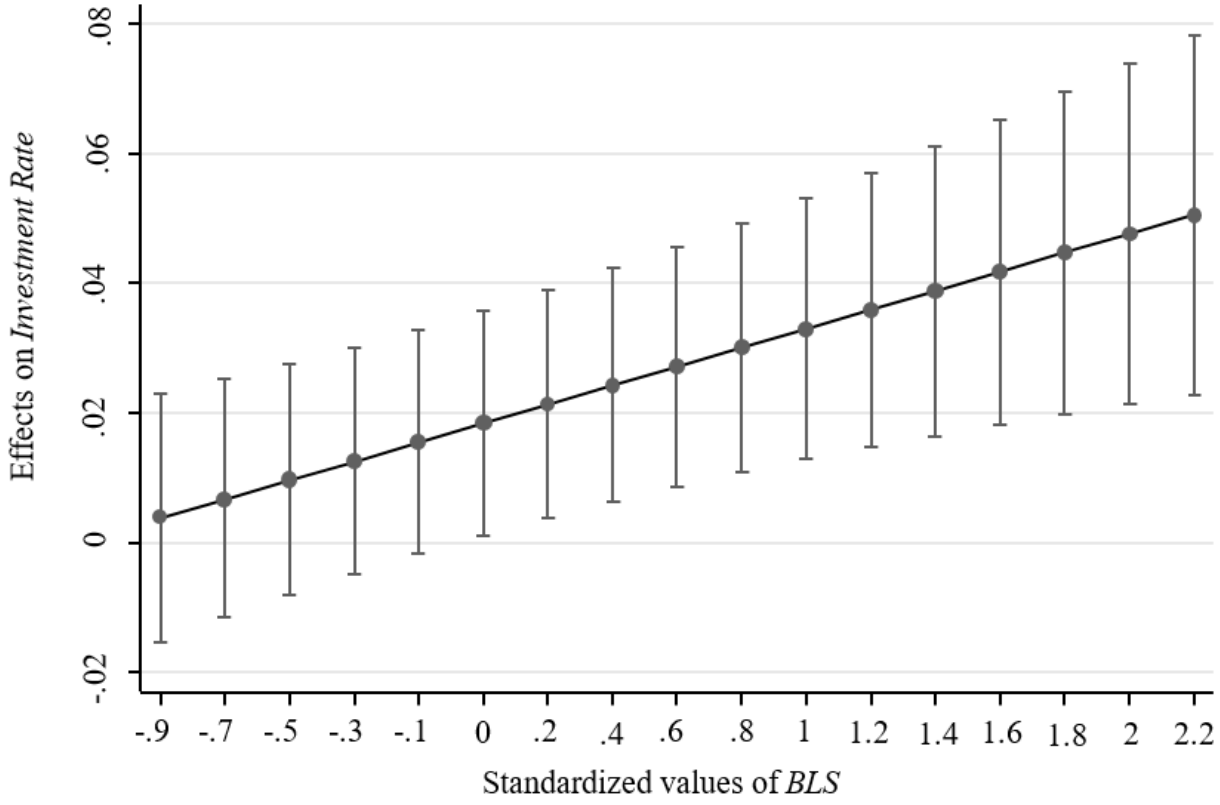

Figure 3 Marginal Effects of *Public debt* on *Investment rate* (Table 3, column 4)

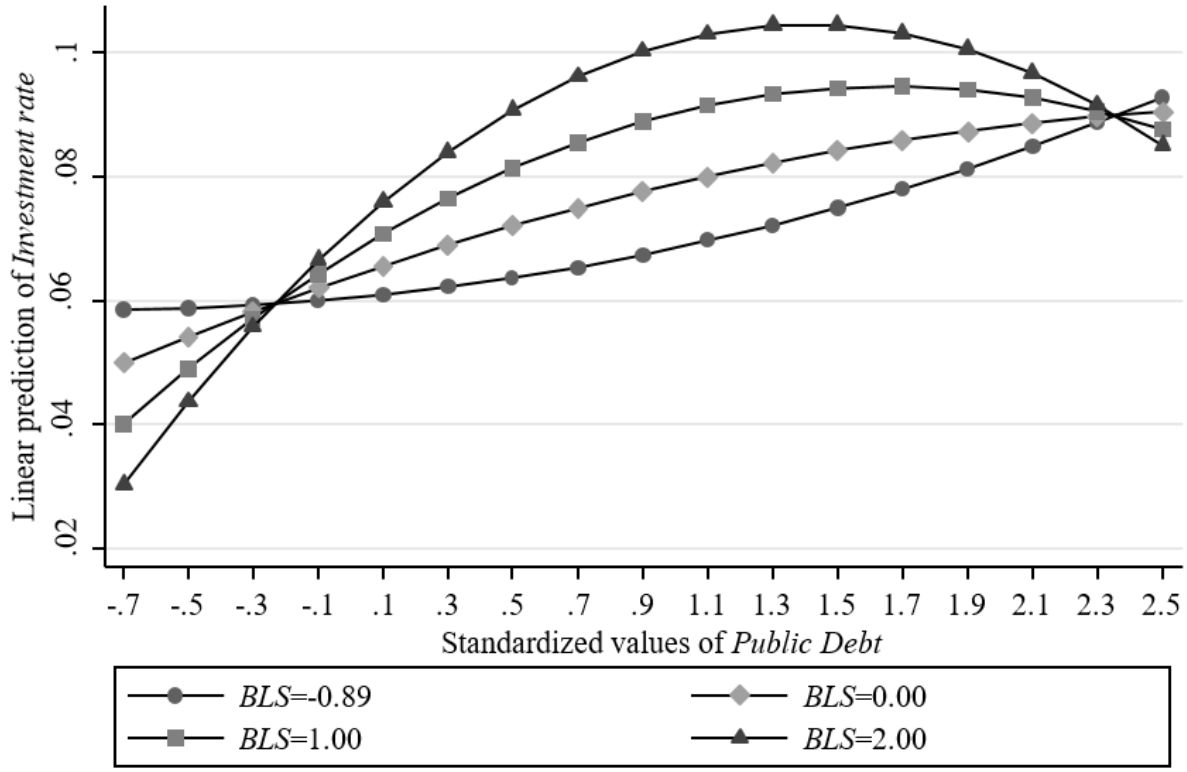

Figure 4 Predictive margins of *Public debt* on *Investment rate* (Table 3, column 4)

Table 1 Summary statistics of the control variables

This table presents summary statistics for the variables employed in the empirical section of the study. The table reports mean, standard deviations, minimum and maximum values, as well as 10^{th}, 50^{th} and 90^{th} percentiles. The statistics are reported for the sample of 84 listed real estate investment companies. The values are calculated after winsorizing the variables at 99.7%.

	count	mean	sd	min	p10	p50	p90	max
Investment rate	764	.0605	.0918	0	0	.02846	.1564	.4621
Public debt	764	.1901	.2561	0	0	.0517	.6471	.8411
Leverage ratio	764	.4426	.1352	.1491	.2487	.4563	.6128	.6882
Firm size	764	14.4990	1.0706	12.2164	13.1453	14.4851	16.1010	16.5681
Tobin's Q	764	1.0097	.1354	.7446	.8359	1.007	1.1784	1.3379
Cash holdings	764	.0303	.0372	.0001	.0012	.0155	.0829	.1498
Real GDP growth	764	-.0784	.9715	-4.5134	-1.0604	.1185	.8503	2.0416
Profitability	764	.0914	.0857	-.0761	.0012	.0771	.2030	.3542
BLS	764	9.6524	16.4966	-5.81	-5.6375	5.1825	38.1	51.15

Table 2 Summary statistics for debt type usage

This table presents summary statistics for the various types of debt employed by the companies in our sample. The table reports mean, standard deviations, minimum and maximum values, as well as 10th, 50th and 90th percentiles. The sample consists 84 European listed real estate companies and the data in hand collected from the annual reports of the companies.

	count	mean	sd	min	p10	p50	p90	max
Public debt								
Bonds	764	.1559	.2497	0	0	0	.6149	1
Money market instruments	764	.0210	.0615	0	0	0	.0899	.6730
Convertible debt	764	.0317	.0784	0	0	0	.1270	.6605
Private debt & capital leases								
Private debt	764	.7754	.2720	0	.2936	.8853	1	1
Capital leases	764	.0159	.0700	0	0	0	.0301	.9998

Table 3 Main results

The table reports the results of the estimation of equation (1). The estimations are conducted using panel fixed effects regressions. All variables are winsorized at 99.7%. Continuous explanatory variables are also standardized. The dependent variable is *Investment rate*. F stand for firm fixed effects (omitted from the table). Standard errors are clustered at the firm level and reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% level, respectively.

	Panel FE			
	(1)	(2)	(3)	(4)
Public $debt_{t-1}$	0.0148*	0.0143*	0.0143*	0.0179**
	(0.0084)	(0.0082)	(0.0082)	(0.0087)
BLS_t	-0.0039	-0.0025	-0.0031	0.0043
	(0.0026)	(0.0029)	(0.0032)	(0.0046)
Public $debt_{t-1}$#BLS_t	0.0067***	0.0060**	0.0061**	0.0142***
	(0.0023)	(0.0024)	(0.0024)	(0.0046)
Public $debt_{t-1}^2$				-0.0030
				(0.0051)
Public $debt_{t-1}^2$#BLS_t				-0.0070**
				(0.0028)
Cash $holdings_{t-1}$	0.0081	0.0078	0.0078	0.0077
	(0.0065)	(0.0064)	(0.0064)	(0.0063)
Tobin's Q_{t-1}	0.0195***	0.0152**	0.0151**	0.0157**
	(0.0050)	(0.0063)	(0.0064)	(0.0064)
$Profitability_{t-1}$	0.0082*	0.0073*	0.0075*	0.0068
	(0.0043)	(0.0043)	(0.0043)	(0.0043)
Firm $size_{t-1}$	-0.0743***	-0.0740***	-0.0745***	-0.0747***
	(0.0104)	(0.0104)	(0.0105)	(0.0102)
Leverage $ratio_{t-1}$	-0.0184**	-0.0172*	-0.0171*	-0.0180**
	(0.0087)	(0.0088)	(0.0088)	(0.0087)
Mean Tobin's Q_{t-1}		0.0066	0.0071	0.0072
		(0.0057)	(0.0061)	(0.0061)
Real GDP $growth_t$			-0.0013	-0.0013
			(0.0028)	(0.0029)
_cons	0.0615***	0.0614***	0.0613***	0.0646***
	(0.0003)	(0.0003)	(0.0003)	(0.0052)
Fixed effects	F	F	F	F
N	764	764	764	764
R^2	0.219	0.221	0.221	0.226
adj. R^2	0.210	0.212	0.211	0.214
Threshold for BLS when public debt=0	0.3	0.3	0.3	0.0
Marginal effect at the threshold	1.7	1.6	1.6	1.8
Marginal effect at BLS=1	2.1	2.0	2.0	3.2
Marginal effect ar BLS=2	2.8	2.6	2.6	4.6

Table 4 Results of Tobit and probit model estimations

The table reports the results of the estimation of equation (1) using panel Tobit and probit models in columns 1 and 2, respectively. In column 1 the dependent variable is *Investment rate*. The variable is assumed to be censored at value 0. In column 2 the dependent variable is *Investment dummy,* which equals one if a company makes an investment that is equal or larger than 10% of its total assets and zero otherwise. All variables are winsorized at 99.7%. Continuous explanatory variables are also standardized. Standard errors are bootstrapped for Tobit model (200 repetitions). Standard errors are clustered in the probit model estimation. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% level, respectively. σ_v and σ_ε are panel level and overall variance components, ρ is the percent contribution to the total variance of the panel-level variance component.

	Tobit	Probit
	(1)	(2)
Public $debt_{t-1}$	0.0208**	0.2143
	(0.0094)	(0.1390)
BLS_t	0.0112**	0.2274**
	(0.0055)	(0.1140)
Public $debt_{t-1}$#BLS_t	0.0164***	0.2566**
	(0.0058)	(0.1137)
Public $debt_{t-1}^2$	-0.0050	-0.1095
	(0.0056)	(0.0966)
Public $debt_{t-1}^2$#BLS_t	-0.0107***	-0.2485**
	(0.0037)	(0.1065)
Controls	Y	Y
Fixed effects	-	-
N	764	764
σ_v	0.0565***	0.3563
	(0.0111)	(0.1084)
σ_ε	0.0894***	
	(0.0071)	
$\ln(\sigma_v^2)$		-2.0639***
		(0.6086)
ρ	0.2853	0.1127
	(0.0917)	(0.0608)
Threshold for BLS when public debt=0	-0.1	0.3
Marginal effect at the threshold	1.9	7.6
Marginal effect at BLS=1	3.7	12.8
Marginal effect ar BLS=2	5.4	20

Table 5 Alternative measure of investment

The table reports the results of the estimation of equation (1). The estimations are conducted using panel fixed effects regressions. All variables are winsorized at 99.7%. Continuous explanatory variables are also standardized within the new sample. The dependent variable is the alternative measure of *Investment rate* that also accounts for other capital expenditures than acquisitions. F stand for firm fixed effects (omitted from the table). Standard errors are clustered at the firm level and reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% level, respectively.

	Panel FE			
	(1)	(2)	(3)	(4)
Public $Debt_{t-1}$	0.0084	0.0083	0.0082	0.0089
	(0.0070)	(0.0070)	(0.0071)	(0.0087)
BLS_t	-0.0076***	-0.0071***	-0.0074**	-0.0027
	(0.0025)	(0.0027)	(0.0029)	(0.0048)
Public $debt_{t-1}$#BLS_t	0.0070***	0.0068***	0.0068***	0.0122***
	(0.0018)	(0.0018)	(0.0018)	(0.0046)
Public $debt_{t-1}^2$				-0.0004
				(0.0055)
Public $debt_{t-1}^2$#BLS_t				-0.0044
				(0.0030)
Controls	Y	Y	Y	Y
Fixed effects	F	F	F	F
N	757	757	757	757
R^2	0.239	0.239	0.239	0.241
adj. R^2	0.230	0.230	0.229	0.229
Threshold for BLS when public debt=0	0.8	0.8	0.8	0.8
Marginal effect at the threshold	1.4	1.4	1.4	1.8
Marginal effect at BLS=1	1.5	1.5	1.5	2.1
Marginal effect ar BLS=2	2.2	2.2	2.2	3.3

Table 6 BLS robustness

The table reports the results of the estimation of equation (1) using reduced samples in columns 1 and 2 and an alternative measure of BLS in column 3. In column 1 we use panel fixed regressions to estimate coefficients of equation (1) on a sample starting in 2012. In column 2 we estimate equation (1) only for companies within euro-area (excluding the UK, Sweden, Norway and Switzerland. In column 3 we use *BLS dummy* to proxy lending standards. *BLS dummy* equals one if *BLS* are higher than their mean and zero otherwise. The estimations are conducted using panel fixed effects regressions. All variables are winsorized at 99.7%. Continuous explanatory variables are also standardized within the corresponding samples. The dependent variable is *Investment rate*. F and T stand for firm and time fixed effects, respectively (omitted from the table). Standard errors are clustered at the firm level and reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% level, respectively.

	Panel FE		
	(1)	(2)	(3)
	Post-2011	Only euro-area	BLS dummy
Public $debt_{t-1}$	0.0236**	0.0217*	0.0023
	(0.0117)	(0.0111)	(0.0089)
BLS_t	-0.0020	-0.0038	-0.0357
	(0.0163)	(0.0073)	(0.0266)
Public $debt_{t-1}$#BLS_t	0.0231*	0.0155**	0.0285***
	(0.0123)	(0.0069)	(0.0090)
Public $debt_{t-1}^2$	-0.0054	0.0135**	0.0025
	(0.0077)	(0.0061)	(0.0054)
Public $debt_{t-1}^2$#BLS_t	-0.0195**	-0.0111**	-0.0130**
	(0.0090)	(0.0043)	(0.0049)
Controls	Y	Y	Y
Fixed effects	F	F	F, T
N	340	323	764
R^2	0.159	0.291	0.243
adj. R^2	0.128	0.263	0.218
Threshold for BLS when public debt=0	0.00	0.00	na
Marginal effect at the threshold	2.2	2.3	3.1
Marginal effect at BLS=1	3.5	4.7	
Marginal effect ar BLS=2	4.9	7.0	

Table 7 Omitted variables

The table reports the results of the estimation of equation (1) using panel fixed effects regressions. In column 1 the model includes mean investment rate to account for variation in investment environments across countries. In column 2 the model includes *Undrawn credit facilities* and their interaction with *BLS*. In column 3 the model includes interactions of all of the controls with *BLS*. In column 4 the model includes mean public debt to account for country-level institutional differences. All variables are winsorized at 99.7%. Continuous explanatory variables are also standardized within the corresponding samples. The dependent variable is *Investment rate*. F stands for firm fixed effects. Standard errors are clustered at the firm level and reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% level, respectively.

	Panel FE			
	(1) Including mean investment rate	(2) Including undrawn credit facilities	(3) All control variables interacted with BLS	(4) Including mean public debt
Public $debt_{t-1}$	0.0166*	0.0182**	0.0178**	0.0182*
	(0.0086)	(0.0079)	(0.0089)	(0.0100)
BLS_t	0.0051	0.0045	0.0030	0.0043
	(0.0046)	(0.0059)	(0.0053)	(0.0046)
Public $debt_{t-1}$#BLS_t	0.0114**	0.0104*	0.0091*	0.0142***
	(0.0047)	(0.0060)	(0.0053)	(0.0046)
Public $debt_{t-1}^2$	-0.0031	-0.0049	-0.0028	-0.0030
	(0.0048)	(0.0045)	(0.0049)	(0.0051)
Public $debt_{t-1}^2$#BLS_t	-0.0056**	-0.0052	-0.0056*	-0.0070**
	(0.0028)	(0.0036)	(0.0030)	(0.0028)
Mean investment $rate_t$	0.2696***			
	(0.0706)			
Mean public $debt_{t-1}$				-0.0003
				(0.0048)
Undrawn credit $facilities_{t-1}$		0.0068		
		(0.0074)		
Undrawn credit $facilities_{t-1}$#BLS_t		0.0017		
		(0.0029)		
Controls	Y	Y	Y	Y
Fixed effects	F	F	F	F
N	764	604	764	764
R^2	0.288	0.162	0.231	0.226
adj. R^2	0.275	0.142	0.211	0.213
Threshold for BLS when public debt=0	0.0	-0.3	0.0	0.2
Marginal effect at threshold	1.9	1.5	1.8	2.1
Marginal effect at BLS=1	3.2	2.8	2.7	3.2
Marginal effect at BLS=2	4.6	3.8	3.6	4.6

Table 8 IV-2SLS estimation and a panel FE estimation on a reduced sample

The table reports the results of the estimation of equation (1) using IV-2SLS estimators in columns 1 and 2. Column 3 reports results of a panel fixed effects regression on a reduced sample of companies that had at least one non-zero observation in the observed time period. All variables are winsorized at 99.7%. Continuous explanatory variables are also standardized within the corresponding samples. The dependent variable is *Investment rate*. F stands for firm fixed effects. First-stage standard errors are clustered at the firm level. Second-stage standard errors are bootstrapped with 200 repetitions and reported in parentheses. ***, **, and * denote significance at the 1%, 5% and 10% level, respectively.

	(1) 1st stage Public $Debt_{t-1}$	(2) 2d stage Panel FE Investment Rate	(3) Panel fixed effects on a reduced sample
Public $debt_{t-1}$		0.0238*	0.0132
		(0.0143)	(0.0083)
BLS_t	-0.0636***	0.0057	0.0069
	(0.0194)	(0.0079)	(0.0053)
Public $debt_{t-1}$#BLS_t		0.0110	0.0133***
		(0.0072)	(0.0042)
Public $debt_{t-1}^2$		-0.0121	-0.0015
		(0.0294)	(0.0055)
Public $debt_{t-1}^2$#BLS_t		-0.0155	-0.0085**
		(0.0180)	(0.0033)
Public debt market $access_t$	1.1713***		
	(0.1143)		
Controls	Y	Y	Y
Fixed effects	F	F	F
N	764	764	567
R^2	0.572	0.332	0.264
adj. R^2	0.567	0.322	0.248
F-statistic	19.08	6.37	
Threshold for BLS when public debt=0		0.3	0.3
Marginal effect at threshold		2.7	1.7
Marginal effect at BLS=1		3.5	2.6
Marginal effect at BLS=2		4.6	3.9

Table 9 Low and high growth prospects subsamples

The table reports results of estimation of the main specification on two subsamples: firms with low (column 1) and high growth options (column 2), measured by Tobin's Q for each year. A company falls into the first category if its Tobin's Q is in the lowest tercile when all of the companies are ranked by Tobin's Q in a particular year and to the second if a company fall into the highest tercile. All variables are winsorized at 99.7%. Continuous explanatory variables are also standardized within the corresponding samples. The dependent variable is *Investment rate*. F stands for firm fixed effects. ***, **, and * denote significance at the 1%, 5% and 10% level, respectively.

	(1) Low-growth sample	(2) High-growth sample
Public $debt_{t-1}$	0.0133	0.0214
	(0.0140)	(0.0175)
Public $debt_{t-1}^2$	-0.0134**	0.0265
	(0.0060)	(0.0186)
BLS_t	-0.0102	0.0222**
	(0.0096)	(0.0106)
Public $debt_{t-1}$#BLS_t	0.0042	0.0293***
	(0.0089)	(0.0075)
Public $debt_{t-1}^2$#BLS_t	-0.0007	-0.0306*
	(0.0056)	(0.0166)
Controls	Y	Y
Fixed effects	F	F
N	259	251
R^2	0.148	0.428
adj. R^2	0.106	0.400
Threshold for BLS when public debt=0	-	0.7
Marginal effect at threshold	-	4.0
Marginal effect at BLS=1	-	5.2
Marginal effect at BLS=2	-	9.4

Table 10 Debt capacity effect

The table reports the results of a panel fixed effects regression of leverage ratio on its determinants. All variables are winsorized at 99.7%. Continuous explanatory variables are also standardized within the corresponding samples. F stands for firm fixed effects. ***, **, and * denote significance at the 1%, 5% and 10% level, respectively.

	(1) (Panel FE) Leverage ratio
Public $debt_{t-1}$	0.0112
	(0.0125)
BLS_t	0.0197*
	(0.0113)
Public $debt_{t-1}$#BLS_t	0.0010
	(0.0032)
$Cash_{t-1}$	-0.0074
	(0.0067)
Tobin'sQ_{t-1}	0.0006
	(0.0051)
$Profitability_{t-1}$	0.0037
	(0.0078)
Firm $size_{t-1}$	0.0047
	(0.0172)
$Tangibility_{t-1}$	0.0078
	(0.0100)
Coverage $ratio_{t-1}$	-0.0484***
	(0.0156)
_cons	0.4266***
	(0.0069)
Fixed effects	F
N	736
R^2	0.282
adj. R^2	0.261

Appendix 1

The table reports the sources of the underlying data and formulas for calculation of the variables used in the analysis. The following data sources were used to calculate the variables: 1. S&P Global Market Intelligence, 2. Hand collected data from financial statement reports, 3. ECB euro reference exchange rate, 4. World Bank national accounts data, and OECD national accounts data files, 5. ECB Bank lending survey.

	Data source	Formula
Investment rate	1	=Cashflow from investing activity$_t$ /Total assets reported$_{t-1}$
Public debt	1, 2	=(Bonds$_t$ + Convertible bonds$_t$ + Money market instruments$_t$)/Total debt reported$_t$
Leverage ratio	1	=Total debt reported$_t$/Total assets reported$_t$
Firm size	1, 3	=ln(Total assets reported$_t$ in EUR)
Tobin's Q	1	=(Market capitalization reported$_t$ + Total assets reported$_t$ - Ordinary equity reported$_t$)/ Total assets reported$_t$
Cash holdings	1	=Cash and cash equivalents reported$_t$/Total assets reported$_t$
Real GDP growth	4	=GDP$_t$ (constant LCU)/GDP$_{t-1}$ (constant LCU)
Profitability	1	=Recurring EBITDA reported$_t$/(Net investment properties reported$_t$+ Depreciation and amortization reported$_t$)
BLS	5	=average value of the net percentage of banks reporting a tightening of credit standards for loans or credit lines to firms in a year