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ADBI Working Paper Series

ARE FINANCING CONDITIONS A THREAT TO SMES' PERFORMANCE, GROWTH, AND TRANSFORMATION?

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Abstract

Availability of internal and external financing sources has an impact on firms' investments and growth. Even profitable firms with sufficient financing sources in normal times can be affected by demand and supply shocks such as the COVID-19 lockdown, the energy crisis, or the recent tightening of financing conditions. This paper analyzes the impact of funding difficulties on firms' investment, performance, and growth during normal periods and periods of external shocks using a regression adjustment treatment effect approach. We differentiate among structural barriers of external financing and cyclical worsening of financing conditions, controlling for other major investment barriers. We use survey data collected from the first to the eighth vintage of the European Investment Survey (EIBIS). The empirical evidence shows that micro and small firms and leading innovators are particularly vulnerable to deteriorating funding conditions. Results indicate that firms' lagging in digitalization and green investments are facing more a structural rather than cyclical financing issue. Consequently, policy support should be oriented towards those structural financing impediments.

Keywords: SMEs, investment gap, external funding, internal funding, financing constraints, uncertainty, investment barriers, firm performance, growth, digital and green transition

JEL Classification: C83, D22, G32

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1. INTRODUCTION AND RESEARCH BACKGROUND

The growth of SMEs is much more conditioned by access to finance than that of large firms (Fouejieu, Ndoye, and Sydorenko 2020). As firms can grow if they invest and this often requires financial sources beyond their income and savings, SMEs are less likely to be able to obtain the additional external financing they need regardless of the potential of their investment projects. Their sources of funds are often limited to their internal funds and financial support from friends and family (Ardic et al. 2013). Their financing situation can be worsened in periods of external shocks, such as the sudden drop of sales caused by the COVID-19 lockdowns, the recent increases in production costs due to high energy prices, and the tightening of external financing conditions through interest rate hikes or stricter lending conditions.

The missed investment opportunities caused by the limited amount of funds are not only detrimental in the short term, especially in the present period of structural shifts towards digitalization and greening, but they might have longer-term implications for the growth, productivity, and competitiveness of the European economy. There is evidence also that the promising high growth enterprises that generates most of the employment growth in the economy face financing constraints and seek for alternative financing, additionally to the traditional bank loans (Ferrando, Pál, and Durante 2019). Moreover, the greening of the economy coincides with a similar race to adapt digital solutions at the firm level and these trends are mutually supportive. Survey-based analyses of European companies show that digital firms were more resilient during the COVID-19 pandemic, and they were less likely to reduce employment (Coad et al. 2023, EIB 2023). Furthermore, the poor degree of digitalization among SMEs and the digitalization gap between digital and nondigital firms widened for SMEs amid external shocks (Teruel et al. 2023). Without investments, such a digital divide might increase further.

This paper investigate how financing difficulties affect firms' investment decisions of different firm groups. We show that there is a greater risk of missed investment opportunities for small-sized and innovative firms than for large companies, due to their relatively higher vulnerability in periods of cyclical deterioration, which goes beyond the structurally high accumulated investment gap. With regard to the green and digital transformation, we also find evidence that those lagging behind in adopting digital solutions and those investing or planning to invest in green solutions are structurally facing more difficulties in accessing external financing. However, we do not find a significant difference in terms of financing deterioration during crises/tightening periods between transforming and nontransforming firms.

Moreover, we show that the financing conditions of firms strongly impact their investments and have a strong influence on the following two years' performance and growth.

There are several studies in the literature that tackle the impact of financial constraints on investment, employment, and innovation, e.g., Butler and Cornaggia (2011) and García-Posada (2019) show that firms operating in environments with lower financial constraints are able to invest more and increase production. Fernandes and Ferreira (2017) and Duygan-Bump, Levkov, and Montoriol-Garriga (2015) stress the negative effect of financial constraints on employment. Ferrando and Ruggieri (2018) find that lower financial constraints improve labor productivity, while Gorodnichenko and Schnitzer (2013) document the negative effect of financial constraints on a firm's innovation. By contrast, the paper of Bonanno, Ferrando, and Rossi (2023) highlights a different role of financial constraints on firms' behaviour. Looking at the interplay between firms' efficiency, innovation, and access to finance, the authors find that financially constrained firms tend to improve their efficiency to reduce their risk of failure and to maintain profits, regardless of the sectoral disaggregation. However, when financial constraints are binding, firms in low-tech sectors are induced to be more efficient than those in high-tech sectors to enhance their profitability.

The literature also shows that financial constraints can have amplified effects during cycles: Aghion et al. (2012) find that for credit-constrained firms, R&D investment plummets during recessions and investment does not increase proportionally back during upturns, while Musso and Schiavo (2008) find that in the presence of asymmetric information and financial constraints, even small shocks may amplify business cycle fluctuations.

Our paper is close to both trends of literature investigating the role of financing frictions during normal times and periods of economic downturn, as presented above, but we are able to analyse these two trends simultaneously. Moreover, in this paper, we provide deeper insights into the effect of internal and external funding conditions and types of firm characteristic s that it might improve or further deteriorate the investment trend amid the given funding condition. To analyze the investment behavior of firms in relation to funding difficulties, we cross-check alternative variables like a longer-term accumulated investment gap, of the dropping of investment projects recently, planned investment drops, and changes in the investment rate.

We also show that the presence of external finance difficulties considerably affects profitability and asset growth on average two years later. Interestingly, even firms with no accumulated investment gap or planned investment drop are affected in the long term by external funding conditions, resulting in lower performance and growth.

From a policy perspective, our analysis points to the importance of firm-level policy support both in normal times and in periods of crisis and transition, not only for short-term survival and stabilization but also for longer-term targets. Recently, it has been shown that firms that benefitted from the policy support during the COVID-19 pandemic tend to be more optimistic about their investment plans, especially those in digital technologies (Harasztosi et al. 2022). In this paper, we argue more generally that policy makers should provide special attention to SMEs and leading innovators not only due to their structurally higher external financial constraints but also because of the impact of cyclical deteriorations of financing conditions. With respect to the green and digital transformation, we found less evidence of the impact of crisis. This is in line with previous findings suggesting that recent crises might act as a push for digitalization, especially during the COVID-19 crisis, and for greening and increasing energy efficiency, especially during the energy price shock, as a strategy for survival. Nevertheless, we do find significant results indicating greater funding difficulties structurally across years among those firms lagging in digitalization and green investments.

The paper proceeds as follows. The next two sections describe the data and the empirical methodology. Section 4 outlines the empirical results, while Section 5 concludes and presents some policy recommendations.

2. DATA

For our analysis, we rely on the pooled first to eighth vintages of the European Investment Bank Investment Survey (the EIBIS 2023), combined with Moody's ORBIS database. The EIBIS database contains information on more than 12,000 nonfinancial firms annually in the EU for the period 2016–2023. EIBIS is an EU-wide survey that gathers qualitative and quantitative information on investment activities by nonfinancial corporations, both SMEs (5–250 employees) and larger corporates (250+ employees), their financing requirements, and the difficulties they face when running their business. Using stratified sampling, EIBIS is intended to be representative across all 27 member states of the EU, within countries, four firm size classes (micro, small, medium, and large), and four sector groupings (manufacturing, services, construction, and infrastructure).¹ For each firm, the survey replies are linked to information derived from the annual financial statements obtained from Moody's ORBIS database.

More importantly for our analysis, the survey contains information about changes in internal and external financing conditions, difficulties in obtaining any external financing, long-term investment barriers, types of investment (ranging from fixed tangible assets to intangible assets and innovation types new to firms, new to companies, or new to the global markets), realized investments, accumulated investment gaps compared to their needs/opportunities, and investment plans for the near future. The alternative investment variables enable us to conduct a profound analysis of the financing-investment relationship. Moreover, in terms of the link to the financial statements of firms, we are able to check the performance and growth dynamics of firms.

Our main variables of interest are the encompassing indicators of external and internal financing difficulties. For the indicator of external funding difficulties, we also define separately the cyclical and the structural funding difficulties. The structural barriers of firms' access to finance are indicated by the level of the development of the financial sectors and other firm-specific characteristics, like their transparency, credibility, level of tangible assets, profitability, etc. To capture such elements on the supply side of financing, in this category we consider those viable firms that needed a loan but were either discouraged or rejected (fully constrained) or received less than they needed (quantity constraints) or it was too expensive (price constraints). We check viability by not registering losses for three consecutive years, to be certain that constraints are due to external financing conditions and not to the weak financial performance of the firm. To eliminate the time-varying cyclical component of this variable, we take the average value of the firm level variable across years. We capture separately the tightening financial cycles, regardless of the level of development and characteristics of the financial system and firms. For this, we consider the perception of firms regarding the changes in their external financing conditions. To eliminate internal (like the successfulness/viability of the business strategy) versus external drivers, we exclude from this category firms that register losses for three consecutive years (financially weak firms regardless of the cycle). The encompassing external funding difficulties indicator combines these two sources of structural and cyclical financing impasse. Figure 1 presents both the structural and cyclical external funding difficulties variables for the financial period 2015–2022 covered by the 2016–2023 EIBIS waves.

¹ EIBIS has been shown to be a reliable data source with no systematic sampling bias (Brutscher et al. 2020).

Figure 1: External Funding Difficulties – by Structural and Cyclical Components



Our second main variable, the *internal funding difficulties*, is defined as those viable firms declaring that their internal finance conditions have deteriorated. To exclude the impact of firms with financial problems (*zombie firms*), which are less probable to invest, we consider only those that do not register losses for three consecutive years.

Furthermore, our analysis relies on several variables from EIBIS 2016–2023 and Orbis 2015–2022 as described in Table 1 in the Appendix. We distinguish four different dependent variables:

- 1) investment gap;
- 2) drop in realized investment;
- 3) drop in planned investment;
- 4) net investment rate.

The first three variables are derived from the survey responses and are constructed as dummies. Each is equal to 1 if: (1) firms declare that investment over the last three years was too little to ensure the success of their business going forward (*investment gap*); (2) firms report less investment than in the previous year (*realized investment drop*); 3) the total investment spent in the current or next year is expected to be less than in the previous year (*planned investment drop*). The last variable is the *net investment rate*, which is defined as the difference in fixed assets between two subsequent years, over lagged fixed assets.

Table A1 also includes the definitions of several control variables, like size classes, sectors, and a set of financial ratios (leverage, profitability, cash holding), as well as several dummy variables on the obstacles to investment activities. We also control for digital and green investments. Table 1 displays several characteristics of the firms in our dataset. Around 14% of firms report having some external funding difficulties, while 12% say that these difficulties are related to cyclical conditions and around 5% to structural issues (some overlap is likely between the two variables). The percentage of firms signaling internal funding difficulties is slightly lower (12%). An investment gap is reported by 15% of firms, while the difference between the drop in realized investment (21%) and the drop in planned investment (27%) is 6 percentage points.

	Ν	Mean	Stand. Dev.	p10	p90
External funding difficulties (overall)	92,660	0.15	0.35	0	1
External funding difficulties – structural component	92,660	0.05	0.22	0	0
External funding difficulties – cyclical component	92,660	0.13	0.33	0	1
Internal funding difficulties	87,871	0.12	0.32	0	1
Investment gap	92,660	0.15	0.36	0	1
Planned investment drop	91,307	0.27	0.44	0	1
Realized investment drop	89,445	0.21	0.41	0	1
Net investment rate	68,574	0.10	0.56	-0.19	0.37
SMEs	92,660	0.52	0.50	0	1
Leading innovator	68,579	0.08	0.28	0	0
Digital	58,117	0.65	0.48	0	1
Green	46,156	0.71	0.46	0	1
Cash flow to TA	50,239	0.09	0.11	0.00	0.20
Capital ratio	67,358	0.42	0.23	0.12	0.75
Cash holding to TA	68,351	0.12	0.15	0.00	0.33
Financial leverage	58,158	0.20	0.22	0.00	0.49
ROA (in %)	62,793	4.15	10.40	-3.39	13.92
Firm growth	70,128	0.07	0.29	-0.12	0.26

Table 1: Descriptive Statistics of the Main Variables

3. ECONOMETRIC FRAMEWORK

Our empirical analysis is twofold. First, we focus on a specification that examines the impact of internal and external funding difficulties on (past and planned) investment decisions of firms based on a probit model.

In detail, we apply a regression adjustment treatment effect where the treatment refers to the external/internal funding difficulties while the outcome variable is the investment of the firm. The estimated potential outcome with or without the funding difficulties is based on the linear probit (in the case of binary variables) or linear regression (in the case of continuous variables) model.

The baseline equation of the treatment effect is:

$$Prob(Inv.)_{i,t} = \alpha_1 + \beta_1 Ext/Int \ Fin. \ Dif_{it-1} + \beta_2 Firms \ charact_{it-1} + \beta_3 Inv. \ barriers_{it-1} + \beta_3 Size_{it} + \beta_3 Sector_{it} + \beta_3 CountryG_{it},$$
(1)

where the dependent variable *Inv*. refers to the different investment variables described above. We estimate the average treatment effect on the treated (ATET, among firms with external/internal funding deterioration) and the potential outcome means (POmeans) from data when the treatment assignment is correlated with the potential outcome – that is, if no firms face funding difficulties.

In the probit model, we control for several firm characteristics, beyond size classes and sector, such as profitability; equity share; financial leverage; cash holdings; and innovativeness, and the main investment barriers encountered by firms when deciding to invest, such as economic uncertainty; a lack of availability of skilled staff; changes in market demand for products; and access to digital infrastructure. We split the sample to estimate the interaction of external funding issues with the internal funding difficulties and with potential internal financing buffers, like the cash holdings of firms. As a second step, we measure the *ex post* effects of external funding difficulties on future firm performance (ROA) and growth (the changes in total assets). Both variables of interest are defined as the average of the two years ahead to quantify whether and how much the external funding difficulties may affect firms. Also, we split the sample in two and estimate separately for firms with or without declared investment issues (accumulated investment gap or planned investment drop).

In this case our research question is quite straightforward: How much is the loss in the performance/growth of firms that experienced external funding difficulties and clearly stated they had investment problems? Furthermore, we check a second group of firms that reported external financing difficulties but no investment issues (indicating sufficient internal sources/buffer or alternative sources like loan/equity from existing shareholders, subsidies/grants, etc.). Besides the direct impact of funds availability, there are possible indirect effects of external financing, mainly from loans from financial institutions, that might also impact firms' performance and growth (like technical assistance, financial consultancy, networking capacity, visibility, or simply the availability of such financing options in the case of need).

The baseline equation of the treatment effect is:

$$Prob\left(\frac{Perform}{Growth}\right)_{i,t+2} = \alpha_1 + \beta_1 Ext Fin. Dif_{it-1} + \beta_2 Firms charact_{it-1} + \beta_3 Inv. barriers_{it-1} + \beta_3 Size_{it} + \beta_3 Sector_{it} + \beta_3 CountryG_{it}.$$
(2)

Our objective is to measure again the ATET (average treatment effect on the treated) group for firms that indicated external funding difficulties; that is, we want to measure the average difference that would be found if everyone in the treated group received treatment, compared with that if none of these firms in the treated group received treatment. For this calculation we use a propensity score matching estimator with the K-nearest neighbors algorithm (Rosenbaum and Rubin 1983, 1984; Li 2012). This estimator computes the ATET by selecting n comparison units, where propensity scores are nearest to the treated unit to be analyzed (Li 2012). In our case, the treatment variable is the presence of external funding difficulties, while the outcome variable is represented by the performance and growth variables, calculated as the difference between the parameters under investigation up to two years after the event.

The resulting propensity score is the conditional probability of a firm signaling external funding difficulties, given the value of the observed firms' characteristics. The dependent variable is the binary variables ($Ext Fin Dif_{.i,t}$) in the probit analysis, and the explanatory variables (lagged by one year) are those described above. What makes a variable relevant and appropriate is the extent to which it affects the probability of being subject to treatment. In addition, the set of explanatory variables chosen must satisfy the balancing property, which requires that after the matching, the distributions of the covariates and the propensity score between the treated and the control groups are similar.

We then employ the k-nearest neighbors matching algorithm and identify k = 3 matched (control) observations from the sample of firms that did not report external funding difficulties (untreated firms) for each treatment observation. The control observations are the untreated observations closest to the treated observations in terms of their propensity scores. The average treatment in the sample is estimated with the three matches equally weighted, using the nearest neighbor matching and controlling for heteroscedasticity (Abadie et al. 2001). The distance is measured in terms of the propensity score. Finally, the ATET takes the following form:

$$ATET = \frac{1}{N_1} \sum_{i \in \{T=1\}} (Y_{1,i} - \sum_{j \in \{C_i\}} h_{i,j} Y_{0,j}),$$
(3)

where N1 is the number of treated units, {T=1} is the treated group, {Ci} is the matched group for unit *i* (which includes only untreated units), and *hi,j* is a weight assigned to the untreated firm *j* when it is matched with firm *i*.

4. EMPIRICAL RESULTS

The first step is to investigate the extent to which external and internal financing difficulties affect the investment decisions of firms and to quantify to what degree they are related to missed investment opportunities. Table 2 reports the results of the average treatment effect among firms with external funding difficulties on their different investment decisions.

	(1) Investment	(2) Realized Drop	(3) Planned Drop	(4)
	Gap	in Inv.	in Inv.	Net Inv.
ATET				
Firms with external funding difficulties	0.067***	0.024*	0.073***	074*
relative to those without	(7.01)	(2.44)	(10.75)	(-1.79)
POmean				
Firms with no external funding difficulties	0.167***	0.223***	0.336***	0.217***
	(45.77)	(56.22)	(102.96)	(8.83)
Ν	15,449	15,449	37,808	12,858

 Table 2: Treatment Effect of External Funding Difficulties on Investments

Z statistics in parentheses.

= "* p < 0.10, ** p < 0.05, *** p < 0.01".

Note: z value in parenthesis, where higher than 2.5 shows significance at 95%.

The results show that external funding difficulties increase the likelihood of an investment gap by 6.7 percentage points and of a drop in investment by 2.4 percentage points during the last financial year and by 7.3 percentage points in the current or next year. Moreover, the net investment rate is expected to drop by 7.4 percentage points from the average mean net investment rate of 21.7% when there is no external financing deterioration.

The average treatment effect is also presented on an annual basis for the two variables with the highest effects: investment gap and planned investment drop. A positive and significant impact is confirmed across years (see Figure A3 in the Appendix). To illustrate further, we also estimate annually the expected probability of firms with an accumulated investment gap and those with a planned drop in investment based on Equation (1), conditional on external funding difficulties (Figure A4). The difference in investment between those with or without external funding difficulties is significant in all years, in both normal and crisis periods. We also see that some of our investment drop, while for others, the accumulated investment gap, which by definition covers a longer period of the previous three years, is less volatile across years. We should also note that the relatively lower gap values during crises reflects a drop in investment needs rather than availability, and not necessarily higher investments.

We perform the same exercise focusing on the impact of internal funding difficulties on investment decisions (Table 3). Also in this case, the average treatment effect among those with internal funding deterioration (ATET) on the different investment variables is significantly above the mean estimated potential outcome if no firms are facing financing deterioration (POmean).

The results show that internal funding difficulties increase the likelihood of an investment gap by 7.4 percentage points, while the probability of investment dropping during the previous financial year increases by 8.9 percentage points and by 18.3 percentage points in the current or next year. Moreover, the net investment rate is expected to drop by 15.6 percentage points from the average mean net investment rate of 25.3% when there is no external financing deterioration. We also present the average treatment effect of internal funding difficulties on the investment gap and planned investment drop on an annual basis (Figure A4). The positive and significant impact is reconfirmed on an annual basis. Furthermore, the expected probability of an investment gap and planned investment drop is estimated based on Equation (1), conditional on internal funding difficulties and plotted over years (Figure A6). There is a significant difference in investments between those with or without internal funding difficulties, also on an annual basis, in both normal and crisis periods.

	(1)	(2)	(3)	(4)
	Investment Gap	Realized Drop in Inv.	Planned Drop in Inv.	Net Inv.
ATET				
Firms with internal funding difficulties	0.074***	0.089***	0.183***	-0.156***
relative to those without	(7.72)	(8.64)	(25.56)	(-3.95)
POmean				
Firms with no internal funding difficulties	0.168***	0.211***	0.338***	0.253***
	-51.86	(60.52)	(100.940)	(7.25)
N	19,312	19,328	48,081	16,024

Table 3: Treatment Effect of Internal Funding Difficulties

Z statistics in parentheses.

= "* p < 0.10, ** p < 0.05, *** p < 0.01".

Figure 2 displays the percentages of firms reporting external and internal funding difficulties over time (Panel a and b, respectively). In the case of external funding difficulties, micro and small and highly innovative firms face an above-average level of difficulties in most of the years covered in the sample. The years 2020 and 2022 stand out as years with a significantly higher level of external funding difficulties. In particular, the jump between 2021 and 2022 is quite strong (from around 10% to 25%), reflecting the tightening cycle of monetary policy in most countries.

In Panel b, we show the percentages of firms signaling internal funding difficulties, which reached the peak during the COVID-19 pandemic. Indeed, the sudden halting of sales due to the lockdowns across countries had an immediate impact on profitability and on the generation of cash flows. On average, internal funding conditions improved in the subsequent year, but they deteriorated slightly again during the energy price increase/start of the tightening cycle in 2022.

Figure 2: External and Internal Funding Difficulties by Categories of Firms (for Further Details on Differences See Table A2 in the Appendix)



Source: EIBIS-Orbis 2016–2023.





Source: EIBIS-Orbis 2016–2023.

Figure 3 presents more details regarding the type of external funding difficulties, differentiating between structural (Panel a) and cyclical (Panel b) elements and adding two subcategories of firms: those firms with no digital solution at all (digital lagging) and those with no green investments or planned investments in green solutions. According to Panel a, micro and small firms, leading innovator, and green lagging firms face structurally higher difficulties in accessing external loans, while digitally lagging firms show an upward trend over time, reaching percentages above average in 2023. Panel b shows the relatively worse situation of micro and small, and leading innovator firms, while for digital and green lagging firms, there is a cyclical worsening but it is not above the firm average.

To further understand the impact of external funding conditions on the investment decisions of firms, we consider as a second exercise the conditional impact of the deterioration of external financing conditions for firms with and without internal funding difficulties and also for firms with low and high cash holdings. We would expect the presence of internal funds (annual profits) and the accumulated cash buffer (such as from accumulated profits or unspent grants/subsidized loans) to allow the investment projects to continue and to mitigate the increase in the investment gap or in the planned investment drop. As shown in Tables 4 and 5, this is indeed the case. Both the investment gap and the drop in planned investment are higher for low-cash firms and for firms that signal deteriorating internal financing. Moreover, the results from the conditional treatment effects show that the impact of worse external financing conditions on investments is intensified for firms with internal funding difficulties and with low cash holdings.

Table 4: Conditional Impact of External Funding Difficulties on Investment Gap

	(1)	(2)	(3)	(4)
	With Internal Funding Difficulties	Without Internal Funding Difficulties	Low Cash	High Cash
ATET				
Impact of lagged external funding difficulties	0.053**	0.044***	0.082***	0.046***
	(2.41)	(4.00)	(5.55)	(3.15)
PO mean				
Investment gap with no external funding	0.227***	0.155***	0.188***	0.144***
difficulties	(15.67)	(40.97)	(32.72)	(24.94)
Ν	1,715	13,269	6,825	5,722

Z statistics in parentheses.

= "* p < 0.10, ** p < 0.05, *** p < 0.01".

Table 5: Conditional Impact of External Funding Difficulties on Planned Investment Drop

	(1) With Internal Funding Difficulties	(2) Without Internal Funding Difficulties	(3) Low Cash	(4) High Cash
ATET				
Impact of external funding difficulties	0.055***	0.036***	0.106***	0.085***
	(3.48)	(4.46)	(7.01)	(8.92)
PO mean				
Drop in planned inv. with no external funding	0.495***	0.292***	0.330***	0.307***
difficulties	(45.07)	(99.35)	(45.77)	(72.50)
Ν	4,268	32,221	13,936	17,851

Z statistics in parentheses

= "* p < 0.10, ** p < 0.05, *** p < 0.01".

The results from the treatment effects are also confirmed by the outcomes of the predicted probabilities of an investment gap and planned investment drop by estimating simultaneously the impact of internal and external funding difficulties, controlling for firm characteristics and main investment barriers (in Table 6). As expected, a worsening of internal funding and the increase in uncertainty, as an obstacle reported by firms, deteriorate the investment capacity of the firm. The impact of external funding remains significant, regardless of the investment variable to consider.

	(1)	(2)
Variables	Investment Gap	Planned Investment Drop
External funding difficulties (lag)	0.041***	0.032***
	(0.008)	(0.008)
Internal funding difficulties (lag)	0.058***	0.148***
	(0.009)	(0.009)
Cash holdings (lag)	-0.064***	-0.063***
	(0.023)	(0.020)
Profitability (lag)	-0.309***	-0.017
	(0.031)	(0.022)
Financial leverage (lag)	-0.003	0.100***
	(0.016)	(0.014)
leading_innovators1	-0.020	-0.034***
	(0.013)	(0.011)
Small	-0.019*	-0.044***
	(0.011)	(0.009)
Medium	-0.043***	-0.072***
	(0.011)	(0.009)
Large	-0.052***	-0.110***
	(0.011)	(0.010)
Construction	-0.026***	-0.025***
	(0.009)	(0.008)
Services	-0.027***	-0.012
	(0.008)	(0.008)
Infrastructure	0.003	-0.044***
	(0.008)	(0.007)
South	-0.084***	-0.018***
	(0.007)	(0.007)
West and North	-0.058***	0.017***
	(0.008)	(0.006)
D2020	-0.010	0.178***
	(0.009)	(0.008)
Obstacle – uncertainty (lag)	0.032***	0.052***
	(0.009)	(0.007)
Obstacle – lack of demand	0.012*	0.028***
	(0.007)	(0.006)
Obstacle – lack of skilled staff	0.020**	-0.021***
	(0.008)	(0.007)
Obstacle – digital infrastructure	0.007	-0.009
	(0.007)	(0.006)
Observations	15,000	30,967

Table 6: Determinants of Investment – Impact of External/Internal Funding Deterioration and Increase in Uncertainty, Marginal Effects

Standard errors in parentheses.

*** p < 0.01, ** p < 0.05, * p < 0.1.

With regard to firm characteristics, we find that firms with greater financial leverage are more likely to invest less, while cash savings and profitability clearly serve as a positive buffer for investments. Leading innovators are less likely to decrease their planned investments, despite the relatively worse external funding conditions. This can be explained by the strong reliance on internal or alternative sources as well as on the fact that R&D investments, once launched, are planned for a longer period of multiple years. Across size classes, larger-sized firms have a significantly lower accumulated investment gap than micro firms. Further, they are also less likely to drop their future investments than micro/small firms. Uncertainty, a lack of demand, and a lack of skilled staff are significant barriers to investments, thus accumulating investment gaps. Nevertheless, firms with a lack of skilled staff are more resilient in terms of investment plans. This is in line with the idea that a lack of skilled staff reported by firms as an obstacle to investment may be thought to incentivize other types of investments, for instance in digital or AI to substitute for skilled workers, rather than in trainings to enhance the skill of already employed workers. However, in other studies (EIB 2024) it is found that high-growth firms, which invest relatively more than average firms, are more often constrained by the unavailability of gualified workers.

In an additional exercise, we split the external funding difficulties into structural and cyclical components. As previously stated, among firms that show structural difficulties in obtaining external finance, we consider viable firms that needed a loan but were either discouraged, did not receive it, or received less than they needed. We group in the category of firms signaling cyclical difficulties those that, regardless of their current external financing possibilities, believe that external financing conditions are worsening.

In the econometric analysis presented in Table 7, the investment gap is likely to increase due to both structural and cyclical components, with a higher impact of the former (Column 1). The estimated drop in planned investment indicated in Column 2 is driven instead by the cyclical component, while the negative coefficient of the structural component tends to mitigate the overall impact. This we may explain by the fact that those firms that structurally face difficulties in accessing external financing rely more, or exclusively, on internal financing, so they are less indebted in general and consequently less impacted by tightening of the financing conditions.

Impact of External Financing Difficulties on Performance and Growth

In this section we present the results on the *ex post* effect of the presence of external funding difficulties on firm performance and growth. The propensity score is run using the specification described in Section 3. Table 8 shows the distribution of the sample across firms with external funding difficulties and investment gaps (Panel a) and drops in planned investment (Panel b).

	(1)	(2)
Variables	Invgap	Planned Inv Drop
Structural external financing difficulties	0.090***	-0.042***
	(0.010)	(0.010)
Cyclical external financing difficulties	0.035***	0.047***
	(0.009)	(0.009)
Internal funding deterioration (lag)	0.058***	0.146***
	(0.009)	(0.009)
Cash holdings (lag)	-0.066***	-0.060***
	(0.023)	(0.020)
Profitability (lag)	-0.297***	-0.022
	(0.031)	(0.022)
Financial leverage (lag)	-0.017	0.111***
	(0.017)	(0.014)
leading_innovators1	-0.022*	-0.033***
	(0.013)	(0.011)
Small	-0.017	-0.044***
	(0.011)	(0.009)
Medium	-0.040***	-0.073***
	(0.011)	(0.009)
Large	-0.048***	-0.111***
	(0.011)	(0.010)
Construction	-0.027***	-0.025***
	(0.009)	(0.008)
Services	-0.026***	-0.012
	(0.008)	(0.008)
Infrastructure	0.002	-0.043***
	(0.008)	(0.007)
South	-0.082***	-0.020***
	(0.007)	(0.007)
West and North	-0.053***	0.014**
	(0.008)	(0.006)
D2020	-0.009	0.176***
	(0.009)	(800.0)
Obstacle – uncertainty (lag)	0.031***	0.052***
	(0.009)	(0.007)
Obstacle – lack of demand	0.011	0.028***
	(0.007)	(0.006)
Obstacle – lack of skilled staff	0.021***	-0.021***
	(0.008)	(0.007)
Obstacle – digital infrastructure	0.008	-0.009
internal funding difficulties (lag)	(0.007)	(0.006)
Observations	14,992	30,944

Table 7: Determinants of Investment Gap/Planned Investment Drop to Identify the Impact of Structural External Financing Difficulties, Cyclical Funding Deterioration, and Internal Funding Deterioration

Standard errors in parentheses.

Panel A: Investment Gan

		Investment Gap		
		0	1	Total
External funding difficulties	0	68%	14%	82%
	1	13%	4%	18%
	Total	81%	19%	100%
Panel b: Planned Investment Drop				
		Planned Inves	stment Drop	
		0	1	Total
External funding difficulties	0	60%	22%	82%
	1	11%	6%	18%
	Total	71%	29%	100%

 Table 8: Sample Distribution of Firms with External Financing Difficulties

 and Investment Issues

We estimate the propensity score, which results from the conditional probability of a firm signaling external funding difficulties, given the value of the observed firms' characteristics and different subsamples of with or without investment difficulties (investment gap or planned investment drop). The set of explanatory variables chosen must satisfy the balancing property, which requires that after the matching, the distributions of the covariates and the propensity score between the treated and the control groups are similar. Figure 4 confirms that the propensity score distribution after the matching is similar for the treated and control groups.





Source: EIBIS-Orbis 2016–2023.

Table 9 displays our main findings on the (*ex post*) effect of access to external finance on a firm's growth based on the propensity score analysis. From Column 1 of Table 9, we see that the presence of external funding difficulties has a negative and statistically significant impact on the subsequent profitability and growth. Firms that faced difficulties in obtaining external financing were less profitable (-1.26 percentage points) and grew relatively less (1.1%) than firms that did not face this kind of problem. In the fifth column we see that the losses in terms of profitability are even higher among the subgroup of firms that report having had some investment gaps in the past (-1.74percentage points). By contrast, the distinction between firms with and without future plans to drop investment does not add any further additional information on future performance. We should bear in mind that there is a gap between planned and realized investment gaps; firms tend to be more pessimistic when declaring their plans.

In terms of future asset growth, the loss is lower for firms that, on top of financial problems, also signaled no past investment gap (Column 3). This finding supports the idea that these firms, having already expanded according to their business needs in the previous years, might hold back from investing further when external finance is not easily available. Results might also suggest that besides the direct impact of funds availability for investments, there is a significant negative impact of external financing difficulties on performance and growth. Nevertheless, the coefficient of this second group is not significant, given the low sample size (4% and 6% of the total sample, respectively).

Table 9: Differential Growth Rates of Firms With Funding Gap Versus FirmsWith No Funding Gap by Investment Decisions – Propensity Score Results
(for More Details See Table A3 in the Appendix)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2-year Average Growth Rate	All Firms	T-stat	No Investment Gap	T-stat	With Investment Gap	T-stat	No Planned Investment Drop	T-stat	Planned Investment Drop	T-stat
ROA	-1.26	-6.14	-1.23	5.1	-1.74	3.53	-1.214	4.4	-1.206	3.52
Total Assets	011	-2.56	-0.02	2.83	-0.01	1.28	-0.02	2.3	-0.01	1.52

5. CONCLUSION AND POLICY IMPLICATIONS

In this paper we provide novel evidence of the negative impact of internal and external funding conditions on firms' investments and growth. We document that micro and small firms and leading innovators are more likely to face both internal and external funding difficulties, especially in cyclically worsening periods.

We show that the presence of external funding difficulties has a long-term impact on future firms' performance and growth. Firms indeed have more difficulties generating additional financial flows in their investment in total assets in the subsequent two years when they had previous difficulties collecting external finance. The losses are even higher when the same firms had also signaled some investment gaps in the past.

We argue that policy support should focus on firms that are more vulnerable to tightening and deteriorating funding conditions, especially if internal and external funding conditions are deteriorating simultaneously, which has been the case recently for many micro and small firms. Viable firms, even with high growth potential, and leading innovators might be forced to stagnate by canceling their investments due to a lack of, or unaffordable, funding. Increasing the alternative financing solutions would fit particularly the financing need of small and innovative firms, especially those with high potential to grow.

In the current period of structural shifts towards digitalization and greening, financing conditions might play an important role in transforming European firms. Results indicate more of a structural rather than a cyclical financing issue among firms that are lagging in digitalization and green investments. Consequently, policy support should be oriented towards those structural impediments that prevent firms from transforming. Targeted policy support of these specific investments is needed to close the digitalization and greening gap among EU firms, thereby accelerating the green and fair transition.

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ANNEX

Variable	Description
Main dependent variab	les
Investment gap	Firms declaring that investment over the last three years was too little to ensure the success of their business going forward
Realized investment drop	Firms with less investment than in the previous year
Planned investment drop	Firms for which total investment expected for the current or next year is expected to be less than in the previous year
Net investment rate	Difference of fixed assets between two subsequent years, over previous fixed assets
Main variables	
External funding difficulties	Firms with either structural or cyclical funding difficulties
structural	Those viable firms that needed a loan but were either discouraged, did not receive it, or received less than they needed. Not registering losses for three consecutive years
cyclical	Firms expecting their external financing conditions to deteriorate. Not registering losses for three consecutive years
Internal funding difficulties	Firms declaring that their internal finance conditions have deteriorated. Not registering losses for three consecutive years.
Main control variables	
Firm size	Four size classes: micro (23% of observations), small (34% of obs), medium (29% of obs), and large (15% of obs)
Sector	Broad sector groups (dummy variables): manufacturing (28% of observations), construction (22% of obs), services (26% of obs), and infrastructure (23% of obs)
Country group	Countries are clustered into three groups: "Center and East," "South," and "Northwest." "Center and East": BG, CZ, HR, HU, LT, LV, PL, RO, SI, SK; "South": CY, ES, FR, GR, IT, MT, PT; "Northwest": AT, BE, DE, DK, EE, FI, IE, LU, NL, SE
Profitability	Cash flow (profit plus depreciation) over average of total assets (current and preceding year)
Financial leverage	Sum of loans and long-term debt over total assets
Cash holdings	Amount of cash and cash equivalents over total assets
Cash flow	Net income minus changes in working capital over total assets
ROA	ROA is calculated by dividing a firm's net income by the average of its total assets, multiplied by 100
Firms' growth	Difference of total assets between two subsequent years, over previous total assets
Labour productivity	Labor productivity is calculated by dividing the total output by the total number of employees
Obstacle – uncertainty	The extent to which uncertainty about the future is an obstacle to investment activities
Obstacle – lack of demand	The extent to which demand for product and services is an obstacle to investment activities
Obstacle – lack of skilled staff	The extent to which availability of staff with the right skills is an obstacle to investment activities
Obstacle – digital infrastructure	The extent to which access to digital infrastructure is an obstacle to investment activities
Leading innovators	Firms with (substantial) R&D and products new to the country or the global market
Digital	Firms that have implemented digital technology in parts of their business or organized their entire business around it
Green	Already invested or plan to invest to tackle the impact of weather events or carbon emissions

Table A1: Descriptions and Definitions of the Main Variables



Figure A1: Investment Trends – Computed with ORBIS Data

Source: Orbis 2015-2023.





Source: EIBIS 2016-2023.



Figure A3: External Funding Difficulties and their Impact on Investments – Annually

Note: Bars represent confidence interval at 95% level. Source: EIBIS-Orbis 2023.





Note: Bars represent confidence interval at 95% level. Source: EIBIS-Orbis 2023.



Figure A5: Internal Funding Difficulties and their Impact on Investments – Annually

Note: Bars represent confidence interval at 95% level. Source: EIBIS-Orbis 2023.





Note: Bars represent confidence interval at 95% level. Source: EIBIS-Orbis 2023.

Table A2: Difference in External Funding Difficulties Among Different Firm Groups

T-test external funding	g difficulties	s by firm :	size				
Group	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]	
Large	14,298	0.133	0.003	0.340	0.127	0.139	
Sme	81,088	0.182	0.001	0.386	0.180	0.185	
Combined	95,386	0.175	0.001	0.380	0.173	0.177	
Diff		-0.049	0.003		-0.056	-0.043	
diff = mean (large) – mean	(sme)				t =	-14.3412	
H0: diff = 0					Degrees of freedom =	95,384	
Ha: diff < 0			Ha: diff ! = 0		Ha: diff > 0		
Pr(T < t) = 0.0000			Pr(T > t) = 0.0000		Pr(T > t) = 1.0000		
T-test structural extern	nal funding	difficultie	es by firm size				
Group	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]	
	14.298	0.133	0.003	0.340	0.127	0.139	
Sme	81 088	0 182	0.001	0.386	0.180	0.185	
Combined	95 386	0 175	0.001	0.380	0.173	0.100	
Diff	33,300	_0.0/0	0.001	0.500	_0.056	_0.043	
diff = moon (largo) moon	(cmo)	-0.043	0.005		+ -	14 1677	
$u_{\text{III}} = \text{Ineall}(\text{large}) = \text{Ineall}$	(sine)				l - Degrees of freedom -	-14.1077	
					Degrees of freedom =	95,364	
					Ha: $\dim \geq 0$		
Pr(1 < t) = 0.0000			Pr(1 > t) = 0.0000		Pr(1 > t) = 1.0000		
		6 141					
I-test cyclical externa	I funding di	fficulties	by firm size				
Group	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]	
Large	14,298	0.112	0.003	0.315	0.106	0.117	
Sme	81,088	0.148	0.001	0.355	0.145	0.150	
Combined	95,386	0.142	0.001	0.349	0.140	0.145	
Diff		-0.036	0.003		-0.042	-0.030	
diff = mean (large) – mean	(sme)				t =	-11.4161	
H0: diff = 0					Degrees of freedom =	95,384	
Ha: diff < 0			Ha: diff ! = 0		Ha: diff > 0		
Pr(T < t) = 0.0000			Pr(T > t) = 0.0000		Pr(T > t) = 1.0000		
T-test external funding	g difficulties	s by leadi	ng innovativeness				
Group	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]	
Not Leading Innovators	64,987	0.176	0.001	0.381	0.173	0.179	
Leading innovators	4,742	0.206	0.006	0.405	0.195	0.218	
Combined	69,729	0.178	0.001	0.383	0.176	0.181	
Diff	,	-0.030	0.006		-0.041	-0.019	
diff = mean (Not Leading I	nnov.) – mean	(Leading	nnov.)		t =	-5.1987	
H0: diff = 0	,	(Degrees of freedom =	69.727	
Ha: diff < 0			Ha: diff I = 0		Hat diff > 0	00,121	
Pr(T < t) = 0.0000			Pr(T > t) = 0.0000		Pr(T > t) = 1.0000		
11(1 (1) = 0.0000			11(11 × 11) = 0.0000		11(1 × t) = 1.0000		
T-test structural exter	nal funding	difficulti	es hy leading innova	tivonoss			
Group	Obs	Moon	Std Err	Std Dov	105% Conf	Intonvall	
Not Leading Innovatora	6/ 027	0 082	0.001	0.276	0.091		
	04,301 1 715	0.003	0.001	0.210	0.001	0.000	
	4,740	0.100	0.003	0.311	0.099	0.007	
	09,132	0.005	0.001	0.270	0.000	0.047	
		-0.025	0.004		-0.033	-0.017	
uiir = mean (Not Leading Ii	mov.) – mean	(Leading I	nnov.)		l =	-0.0112	
					Degrees of freedom =	69,730	
Ha: diff < 0			Ha: diff ! = 0		Ha: diff > 0		
Pr(T < t) = 0.0000			Pr(T > t) = 0.0000		Pr(T > t) = 1.0000		

continued on next page

Table A2 continued

T-test cyclical external funding difficulties by leading innovativeness Std. Err. [95% Conf. Std. Dev. Group Obs. Mean Interval] 0.001 0.146 Not Leading Innovators 64,987 0.143 0.350 0.140 4,745 0.005 0.376 0.160 0.181 Leading innovators 0.170 Combined 69,732 0.352 0.147 0.145 0.001 0.142 Diff -0.027 0.005 -0.038 -0.017 diff = mean (Not Leading Innov.) - mean (Leading Innov.) t = -5.1565 H0: diff = 0 Degrees of freedom = 69,730 Ha: diff < 0 Ha: diff ! = 0 Ha: diff > 0 Pr(T < t) = 0.0000Pr(|T| > |t|) = 0.0000 Pr(T > t) = 1.0000

T-test structural external funding difficulties by green investors

Group	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]	
No green inv	20,127	0.090	0.002	0.286	0.086	0.094	
Green inv	27,322	0.077	0.002	0.267	0.074	0.080	
Combined	47,449	0.083	0.001	0.275	0.080	0.085	
Diff		0.013	0.003		0.008	0.018	
diff = mean (No Green inv) -	- mean(Gree	en inv)			t =	-5.1032	
H0: diff = 0					Degrees of freedom =	47,447	
Ha: diff < 0		Ha: diff ! = 0			Ha: diff > 0		
Pr(T < t) = 1.0000			Pr(T > t) = 0.0000		Pr(T > t) = 0.0000		

T-test cyclical external funding difficulties by green investors

Group	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]	
No green inv	0.205	0.003	0.403	0.199	0.210	
Green inv	0.212	0.002	0.408	0.207	0.217	
Combined	0.209	0.002	0.406	0.205	0.212	
Diff	-0.007	0.004		-0.015	0.000	
diff = mean (No Green inv) - mean(G	reen inv)			t =	-1.8837	
H0: diff = 0				Degrees of freedom =	47,447	
Ha: diff < 0	Ha: diff ! = 0			Ha: diff > 0		
Pr(T < t) = 0.0298		Pr(T > t) = 0.0596		Pr(T > t) = 0.9702		

T-test structural external funding difficulties by digitalization

Group	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Nondigital	26,821	0.085	0.002	0.279	0.082	0.089
Digital	32,921	0.076	0.001	0.266	0.074	0.079
Combined	59,742	0.080	0.001	0.272	0.078	0.083
Diff		0.009	0.002		0.004	0.013
diff = mean (Non digital) -	- mean(Digital)				t =	3.9545
H0: diff = 0					Degrees of freedom =	59,740
Ha: diff < 0			Ha: diff ! = 0		Ha: diff > 0	
Pr(T < t) = 1.0000			Pr(T > t) = 0.0001		Pr(T > t) = 0.0000	

T-test cyclical external funding difficulties by digitalization

Group	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Nondigital	0.182	0.002	0.386	0.178	0.187
Digital	0.186	0.002	0.389	0.182	0.190
Combined	0.184	0.002	0.388	0.181	0.187
Diff					-0.004
diff = mean (Non digital) - mean(Digital)				t =	-1.2123
H0: diff = 0				Degrees of freedom =	59,740
Ha: diff < 0		Ha: diff ! = 0		Ha: diff > 0	
Pr(T < t) = 0.1127		Pr(T > t) = 0.2254		Pr(T > t) = 0.8873	

Table A3: Impact of External Financing Difficulties on Performance and Growth

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Average ROA	Unmatched	2.669	4.968	-2.299	0.169	-13.63
	ATT	2.672	3.927	-1.255	0.204	-6.14

impact of external mancing difficulties on performance (average ROA for the next two years)								
Variable	Sample	Treated	Controls	Difference	S.E.	T-stat		
Firms' growth	Unmatched	0.051	0.070	-0.020	0.004	-5.26		
	ATT	0.050	0.062	-0.011	0.004	-2.56		

Impact of external financing difficulties on performance (average ROA for the next two years) when there is no investment gap

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Average ROA	Unmatched	3.799516	5.134291	-1.33478	0.206745	6.46
	ATT	3.799516	5.030291	-1.23077	0.241451	5.1

Impact of external financing difficulties on performance (average ROA for the next two years) when there is an investment gap

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Average ROA	Unmatched	1.473463	2.942958	-1.4695	0.41623	3.53
	ATT	1.475632	3.219615	-1.74398	0.493656	3.53

Impact of external financing difficulties on performance (average ROA for the next two years) when there is no planned investment drop

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Average ROA	Unmatched	3.814995	5.117169	-1.30217	0.240583	5.41
	ATT	3.814995	5.028994	-1.214	0.275744	4.4

Impact of external financing difficulties on performance (average ROA for the next two years) when there is a planned investment drop

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Average ROA	Unmatched	2.584484	4.042739	-1.45825	0.297214	4.91
	ATT	2.584484	3.790406	-1.20592	0.342256	3.52

Impact of external financing difficulties on firms' growth (average total assets growth for the next two years) when there is no investment gap

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Firms' growth	Unmatched	0.053683	0.07256	-0.01888	0.004695	4.02
	ATT	0.053706	0.070255	-0.01655	0.005838	2.83

Impact of external financing difficulties on firms' growth (average total assets growth for the next two years) when there is an investment gap

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Firms' growth	Unmatched	0.03581	0.053853	-0.01804	0.008507	2.12
	ATT	0.036033	0.049824	-0.01379	0.010766	1.28

Impact of external financing difficulties on firms' growth (average total assets growth for the next two years) when there is no planned investment drop

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Firms' growth	Unmatched	0.065641	0.081411	-0.01577	0.005717	2.76
	ATT	0.065641	0.082377	-0.01674	0.007264	2.3

Impact of external financing difficulties on firms' growth (average total assets growth for the next two years) when there is a planned investment drop

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
Firms' growth	Unmatched	0.02887	0.043262	-0.01439	0.005641	2.55
	ATT	0.02887	0.03956	-0.01069	0.007054	1.52