Investment and financial constraints: Does analyst coverage matter?

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Abstract

The goal of the paper is to check whether analyst coverage of a firm relaxes its financial constraint. Using a data set that includes Small and Middle Enterprises (SME) from six European countries between 2000 and 2015, we check whether analyst following reduces the sensitivity of investment expenses to cash-flow. We show that firms with a large coverage are less sensitive to cash-flow. We also obtain that the favorable effect of coverage on investment sensitivity to cash-flow is stronger for low-capitalization firms. Our findings suggest that analyst coverage mitigates information asymmetries and relaxes firms' financial constraint, especially for SME.

Key words : analyst, coverage, financial constraint, investment, cash-flow

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1 Introduction

Financial analysts, notably so-called sell-side analysts (i.e., analysts who are employed by brokers), are crucial for the functioning of financial markets. By issuing recommendations or earnings par share (EPS) forecasts about firms, they alleviate information asymmetries between firms and investors, and improve the efficiency of fund allocation.

A large literature has focused on the role played by analyst coverage for firms' financial condition and decisions. A firm is considered as "covered" if it is followed by at least one analyst. Hence, the number of analyst who follow a firm provides a measure for the intensity of a firm's coverage. Many papers have shown that analyst coverage of a firm has a favorable impact on the liquidity of the stocks issued by the firm (Brennan and Subrahmanyam, 1995 ; Roulstone, 2003 ; Jiang et al., 2011 ; Kelly and Ljungqvist, 2011 ; Mola et al., 2013 ; Ellul and Panayides, 2018). Coverage also alleviates the conflicts of interest between a firm and outside investors (Jensen and Meckling, 1976 ; Chung and Jo, 1996 ; Chang et al., 2006 ; Chen et al., 2015). Moreover, coverage also increases external fund raising and firms' investment expenditures (Doukas et al., 2008 ; Derrien and Kecskés, 2013).

However, measuring the impact of coverage on the amount of external finance raised by a firm or the amount of its investment spending does not really account for the effect of analyst following on the *intensity* of firm financial constraints. Since the seminal paper by Fazzari et al., 1988, a large literature has developed around the idea that firms' financial constraints can be measured by the sensitivity of investment to free cash-flow. Hence, if analyst coverage mitigates information asymmetries and reduce firms' financial constraint, one should observe a weaker investment sensitivity to cash-flow for highly-covered firms. The goal of this paper is precisely to check for this assumption.

To do so, we make use of a data set provided by FactSet. Our sample includes Small and Middle Enterprises (SME) from several European countries (Belgium, France, Germany, Holland, Italy and Spain) between 2000 and 2015. In line with Fazzari et al. (1988), we capture the intensity of firm's financial constraint by regressing investment expenses on cash-flow and a set of control variables, among which investment opportunities and sales growth. We also include in our model a term that interacts cash-flow and a coverage indicator in order to whether analyst following mitigates the sensitivity of investment to cash-flow. We first show that the investment of firms with a large coverage is less sensitive to cash-flow. This suggests that, by producing information about a firm, analyst coverage relaxes financial constraint and improves its access to external funds. We also demonstrate that the favorable effect of coverage on investment sensitivity to cash-flow is stronger for SMEs, for which information opacity is likely to be stronger.

The contribution of our paper to the literature is twofold. First, although, a large literature has been dedicated to firms' financial constraint, as measured by the investment sensitivity to free cash-flow, there exists no paper about the impact of analyst coverage on the intensity of financial constraint. Symmetrically, while many papers have examined the impact of analyst coverage on firms' financial conditions and financial decisions, the effect of coverage on investment sensitivity to cash-flow has never been studied. Our paper fill this gap by checking the impact of coverage on firm financial constraint.

Second, while most of the literature on analyst coverage deals with US firms, our study focuses on the impact of analysts coverage on financial constraint in European countries, where financial markets globally play a weaker role in firm financing. Moreover, our paper sheds light on the crucial role of analyst coverage for SME's, for which information asymmetries are strong and the access to financial markets particularly difficult.

The paper is organized as follows. Section 2 presents the literature and the testable assumptions of our study. Our econometric investigation is presented in Section 3. Section 4 proposes some concluding remarks.

2 Literature and testable assumption

Our paper lies at the intersection of two strands of literature. We first address the literature on the sensitivity of investment to free cash-flow. We than present the literature on the impact of firms' coverage by financial analysts.

2.1 The effect of analyst coverage on firms' financial conditions and financial decisions

First, because they produce public information about firms, analysts alleviate information asymmetries between insiders and outsiders and play the role of informed firms on financial markets. For this reason, a larger analyst coverage of a firm should improve market participation and the liquidity of the stocks issued by this firm. Symmetrically, a reduction in coverage or coverage termination should reduce liquidity. Brennan and Subrahmanyam (1995) show that a larger number of analysts following a firm increases the firm stock's market depth, as measured by the inverse of the price impact of a marginal dollar of trade (Kyle, 1985). This result has been confirmed by several studies that propose alternative indicators for liquidity (or illiquidity), such as the stock' bid-ask spread, the Amihud (2002)'s illiquidity measures[1], the number of zero-return days or the trade volume (Kelly and Ljungqvist, 2011 ; Mola et al., 2013 ; Ellul and Panayides, 2018 ; Roulstone, 2003 ; Jiang et al., 2011). Moreover, Ellul and Panayides (2018) show that the unfavorable impact of coverage termination on a firm's stock liquidity is amplified when information asymmetries are strong, i.e. for firms with large insider holdings, without external funding and no issue earnings guidance. Finally, Irvine (2003) finds that the impact of coverage initiation on liquidity is larger than that of coverage continuation, suggesting that initial recommendations convey more information than those issued by analysts who already follow the firm.

Second, analysts also provide monitoring and reduce the conflicts of interest that result from the separation between ownership and control (Jensen and Meckling, 1976). Chen et al. (2015) show that a reduction in analyst coverage amplifies agency problems between shareholders and managers and makes the use of control devices more necessary. Hence, when fewer analysts

[1]The Amihud (2002)'s illiquidity, which captures the price impact of transactions, is calculated as the average ratio of absolute daily stock return to volume.

follow a firm, its management is more likely to invest in value-destroying projects and to practice earnings management. By monitoring firm managers, analyst following also provides them an incentive to take firm value enhancing decisions. As shown by Chung and Jo (1996), this increases firms' market value. Moreover, an increase in conflicts of interest and information asymmetries between inside and outside shareholders, consecutively to a reduction in analyst coverage, also affects firms' security issuance. In line with the pecking order theory (Myers and Majluf, 1984), Chang et al. (2006) report that when a firm experiences a reduction in coverage, its is less likely to issue equity as opposed to debt.

Thirdly, by mitigating information asymmetries between firms and outsiders investors, analysts also increases capital cost and firms' access to external finance. Doukas et al. (2008) show that firms with larger coverage raise more external funds and have more investment expenses. This result is corroborated by Derrien and Kecskés (2013) who demonstrate that a reduction in coverage reduce firms' capital expenditures.

Finally, because analyst coverage strongly depends on firm characteristics (Chung and Jo, 1996 ; Das et al., 2006 ; Lee et al., 2017 ; Moyer et al., 1989), the literature addresses the potential endogeneity of analyst coverage (or coverage termination). Doukas et al. (2005, 2008) measure "excess coverage" and correct the number of analysts who follow a firm by "expected" or "imputed" coverage, i.e. the average coverage of firms belonging to the same size category and industry. Yu (2008) deals more explicitly with the endogeneity issue by using instrumental variable (IV) regressions and introduces the time-varying change in broker's size as an instrument for coverage. An alternative approach is to use a natural experiment to obtain a measure of coverage that is exogenous to firms characteristics. Following Hong and Kacperczyk (2010) and Kelly and Ljungqvist (2012), Derrien and Kecskés (2013) and Chen et al. (2015) consider broker mergers and closures as determinants of a reduction in analyst coverage. They estimate a difference-in-differences model in which the group of treatment is composed of the firms that faced a reduction in analyst following due to a broker closure or merger.[2]

2.2 Sensitivity of investment to free cash-flow

Since the seminal paper of Fazzari et al. (1988), regressing physical investment expenses on liquidity, measured by cash-flow, and investment opportunities, measured by Tobin Q has become the standard approach to account for the existence of the financial constraint faced by a firm.[3]

The literature also indicates that the sensitivity of investment expenses to cash-flow is amplified when the access to external finance is constrained, i.e., for firms with a high level of

[2]Ellul and Panayides (2018) use a quasi-natural experiment methodology. They estimate a probit model to predict coverage. The group of treatment firms includes the firms for which coverage termination cannot be explained by poor performance, ownership or trading characteristics.

[3]However, the Tobin Q may not perfectly capture markets' expectations about growth opportunities. The Euler equation approach, which is based on a structural model of investment decision, allows to circumvent this measurement issue (Bond and Meghir, 1994 ; Bond et al. 2002 ; Gilchrist and Himmelberg, 1995 ; Whited, 1992). For a discussion about the drawbacks of this approach, see Gilchrist and Himmelberg (1995), Kadapakkam et al. (1998), Fuss and Vermeulen (2006) and Mizen and Vermeulen (2006).

information asymmetries and financial frictions.[4][5] For example, investment expenses is shown to be more cash-flow sensitive for low-dividend-payout firms (Fazzari et al., 1988, Vogt, 1994, Calomiris and Hubbard, 1995) and equity-dependent firms (Baker et al., 2003). Similarly, young firms, which do not benefit from a strong reputation, also face a stronger financial constraint (Devereux and Schiantarelli, 1990 ; Oliner and Rudebush, 1992 ; Schaller, 1993). The same result is reached for firms with a low level of creditworthiness (i.e., with a low level of sales grow rate and of operating profits) (Mizen and Vermeulen, 2005) and firms with specific assets, that cannot be used as collateral (Vogt, 1994). Firms without any access to financial (commercial paper or bond) markets also exhibit a stronger investment sensitivity to internal funds (Gilchrist and Himmelberg, 1995). Finally, it is noteworthy that the impact of size on investment sensitivity to liquidity is more ambiguous. On the one hand, as mentioned by Mizen and Vermeulen (2005), small firms incur are usually younger, with more specific assets and less collateral. For these reasons, their investment expenses should be more sensitive to cash-flow. This idea is confirmed by the empirical contributions of Gertler and Gilchrist (1994) and Gilchrist and Himmelberg (1995). On the other hand,small firms are more likely to have A concentrated ownership structure, which should mitigate information asymmetries and agency costs, thus reducing investment sensitivity to cash-flow (Devereux and Schiantarelli, 1990, Hu and Schiantarelli, 1998). Using a sample of German firms, Audretsch and Elston (2002) provide evidence that small firms face a lower financial constraint than medium size-firms. They interpret their result as the evidence that the German bank-based financial system is particularly well suited for the financing of small firms. Inversely, investment expenses are more sensitive to internal funds on emerging markets as compared to developed markets (Lins et al., 2005).

Furthermore, by mitigating information asymmetries and financial constraint, the existence of a relation with a financial intermediary or an industrial group also reduces firms' investment sensitivity to cash-flow. The investment sensitivity to internal funds is lower for firms with a single bank as opposed to those with multiple banking relationships (Houston and James, 2001). Japanese firms that belong to a keiretsu exhibit a lower financial constraint than independent ones (Hoshi et al., 1991). Schaller (1993) obtains the same result for Canadian firms that are members of an industrial group. The literature obtain the same findings when considering firm ownership structure and its ability to reduce conflicts of interest. Georgen and Renneboog (2001) show that having a high level of ownership concentration reduces the sensitivity of investment expenses to cash-flow. In the same vein, Pindado et al. (2011) show that family firms have lower investment-cash flow sensitivities.

Finally, the literature also extends the basic framework by addressing other types of investment. Based on the idea that inventory demand should react to liquidity variations more strongly than physical investment, some papers check for the sensitivity of inventory investment to cash-flow (Carpenter et al., 1994). Similarly, because R&D activities are associated with strong information asymmetries and agency problems, R&D expenses are particularly sen-

[4]For a debate about the existence of a non-monotonic relationship between the investment sensibility to cash-flow and the degree of financial constraint, see Rajan and Zingales (1997), Cleary (1999) and Fazzari and al. (2000).

[5]The sensitivity of investment to internal funds is also amplified by poor investor protection (MacLean et al., 2012) and adverse macroeconomic conditions (MacLean and Zhao, 2014).

sitive to cash-flow (Himmelberg and Petersen, 1994 ; Brown and Petersen, 2009).

Taken together, the strands of literature presented above suggest that analyst coverage mitigates information asymmetries. This should improve firms' access to external finance, thus reducing the sensitivity of firms' investment expenses to free cash-flow. This allows us to infer the following testable assumption:

H1: Financial analyst coverage mitigates firms' financial constraint.

3 Econometric investigation

3.1 Data

The data we use in this paper are from FactSet. Compared to IBES or FirstCall databases, FactSet has a better coverage of European firms and especially European SMEs. We extract data for listed firms in Belgium, France, Germany, Holland, Italy and Spain, from 2000 to 2015. We have initially 1687 firms, which yields $1687 \times 16 = 26\ 992$ observations. The cleaning is as follows. We study non-financial agents and thus exclude financial firms (code 52 from NAICS classification). Following Baker et al. (2003) and McLean et al. (2012), we exclude firms which have no positive book value for at least one year. Arbitrarily, we require firms to have data for at least 5 years. Each firm then has between 5 to 16 years of observation. This leads to 26 764 firm-year observations. There are some missing data for some variables; the number of observations can thus be inferior to 26 764 when we use such variables.

We obtain the statistics in Table 1. A glance at websites from their respective market places shows that the number of listed firms in each country is close to these of our sample. We then group observations according to the size of firms. $SMALLCAP$ denotes firms for which market capitalization is inferior to 150 million euros, $MidCap$ is for firms with market capitalization between 150 millions and 1 billion euro, and $BigCap$ gathers firms for which capitalization is over 1 billion euros. Firms may move from one group to another across time. On average, the European market places in our sample have 20% of large firms, a quarter of middle ones, and a half of small ones. We confirm the fact that mid-sized firms are relatively important in Italy and Belgium. France and Germany appear to host the most of small firms.

Table 1: Distribution of firms by capitalization

Country	Nb. obs.	Nb. firms	% SmallCap	% MidCap	% BigCap
Belgium	1615	101	47.3	34.9	17.9
France	9229	583	60.3	20.9	18.8
Germany	9244	579	64.0	20.3	15.7
Italy	3190	201	48.3	30.2	21.5
Holland	1 472	93	39.3	27.6	33.1
Spain	2 014	130	37.2	30.9	32.0
Total	1 687	26 764	56.5	23.8	19.8

Table 2 indicates the mean, the 5th percentile, the median and the 95th percentile of the distribution of firms by total asset. The figures reported in Table 2 are consistent with market size. It shows that firms are on average larger in Holland or Spain compared to France or Germany. The lower median amount of total assets in France and Germany is due to the prevalence of the listing of small and mid-size firms in the stock markets of these countries.

Table 2: Distribution of firms by total asset

Country	Nb. obs.	Mean	Q5	Median	Q95
Belgium	1 421.0	1 770.7	14.2	260.6	6 009.0
France	8 051.0	3 777.7	6.0	124.9	21 317.7
Germany	7 996.0	3 633.6	3.5	100.8	12 871.2
Italy	2 752.0	4 305.8	24.3	344.1	15 657.0
Holland	1 342.0	5 028.5	9.7	489.4	29 000.0
Spain	1 685.0	5 099.4	16.5	557.3	27 769.4
Total	23 247.0	3 836.0	6.0	168.3	17,828.0

3.2 Model

To test for assumption H1, We consider the traditional investment equation (Fazzari at al., 1988 ; 2000 ; Baker and al., 2003 ; Maclean and Zhao, 2014), augmented by our measure of analyst coverage and an interaction term:

$$\begin{aligned} Inv_{i,t} &= \alpha_0 + \alpha_1 Inv_{i,t-1} + \alpha_2 CF_{i,t-1} + +\alpha_3 Q_{i,t} + \alpha_4 Growth_{i,t-1} + \alpha_5 Size_{i,t-1} \\ &\quad +\alpha_6 Leverage_{i,t-1} + \alpha_7 COVER_{i,t-1} + \alpha_8 COVER_{i,t-1}.CF_{i,t-1} + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where the subscripts i and t represent firms and time, respectively. Furthermore, $\varepsilon_{i,t} = \nu_i + \psi_t + \mu_{i,t}$, where ν_i and ψ_t stand for an unobservable firm specific effects and time specific effects, while $\mu i, t$ is a random term.

Our dependent variable, $Inv_{i,t}$, stands for firms' investment. It is calculated as $Inv_{i,t} = \frac{I_{i,t}}{A_{i,t-1}}$, where $I_{i,t}$ is the percentage of capital expenditure of firm i at date t and $A_{i,t-1}$ total assets of firm i at date $t-1$.

We now turn to explanatory variables. Following recent studies that have amended the traditional static investment model by incorporating an autoregressive term (Carpenter and Guariglia, 2008 ; Brown and Carpenter, 2009 ; Pindado et al., 2011), we allow for dynamics in the investment process. Hence, equation (1) includes $Inv_{i,t-1}$, which captures the inertia in the investment dynamics. The expected sign of α_1 is positive.

Our model considers $CF_{i,t}$, which is a measure of firm's free cash-flow. It is computed as the sum of earnings and amortization expenses, as a percentage of total assets. As explained in Section 2, if firms are financially constrained, the sign of α_1 should be significant and positive.

Investment expenses also depends on investment opportunities, proxied by Tobin Q ($Q_{i,t}$). The closest measure to Kaldor's and Tobin's works would be $Q_{i,t} = \frac{MV_{i,t}}{BV_{i,t}}$, with $MV_{i,t}$ the market value of equity, and $BV_{i,t}$ the book value of equity. For the sake of comparability to other variables, and following Baker et al. (2003) and McLean and Zhao (2014), we choose to compute it as a percentage of the total asset and take its natural logarithm: $Q_{i,t} = ln\frac{(MV_{i,t} - BV_{i,t} + A_{i,t})}{A_{i,t}}$. Because investment expenditures should increase with investment opportunities, the expected sign of α_3 is positive.

We also consider sales growth, measured by $Growth_{i,t-1}$. This variable accounts for variation of the net sales logarithm ($S_{i,t}$): $Growth_{i,t-1} = lnS_{i,t-1} - lnS_{i,t-2}$. Investment should increase with the growth of demand. As a consequence, α_4 should be positive.

$Size_{i,t-1}$ is measured by the logarithm of total asset in million euros: $Size_{i,t-1} = lnA_{i,t-1}$. Because firm size is associated with financial dependance, the expected sign of α_5 is positive (MacLean et Zhao, 2014).

$Leverage_{i,t}$ is measured by $\frac{Debt_{i,t}}{A_{i,t}}$, where $Debt_{i,t}$ denotes firm's total debt (short term and long term). The expected impact of leverage on investment is ambiguous. On the one hand, because debt allows firms to invest, the expected sign of α_6 is positive. On the other hand, firms with a high level of leverage are more likely to be perceived by investors as risky. This may reduce their access to external finance and their ability to invest. For these reasons, the expected sign of α_6 is positive or negative.

Let us now consider our variable of interest, denoted by $COVER_{i,t-1}$, which is a set of three variables accounting for analyst coverage. First, because data for coverage is quarterly while accounting data are annual, we take the number of analysts following a firm for each quarter of a given year, and compute their yearly average. We label as $NbAnalyst_{i,t}$ this variable. As we loose some information by averaging data, we verified that our results were robust by considering also, as the yearly value: the first quarter value, the last quarter value, and the highest quarterly value. Now, as we will see below (Table 7), there is a great variance across firm: firms are followed by 4.3 analyst by quarter on average, with a maximum average at 52.7 analysts, and with many firms not covered ($NbAnalyst_{i,t} = 0$) for at least some years. Thus, for the sake of comparability, we hereafter measure $Coverage_{i,t}$ as the logarithm of one plus the number of analysts: $Coverage_{i,t} = ln(1 + NbAnalyst_{i,t}))$.

The second coverage indicator is denoted by $DCoverage_{i,t}$. It is a dummy variable that equals 1 if the number of analysts following the firm for a given year is larger than (or equal to) 1, 0 otherwise.

The third coverage indicator is based on the idea that coverage is endogenous. Indeed, larger and high-return on equity (ROE) firms are unsurprisingly more likely to be covered by analysts (Das et al., 2006 ; Lee and So, 2017). However, some firms are more covered than others even when controlling for size and ROE. To capture this notion of "excess" (or "abnormal") coverage, we consider coverage by at least one analyst for the four quarters $StableCoverage_{i,t}$. It equals 1 if the firm is covered, for a given year, by at least one analyst for each of the four quarters. Otherwise, the variable is the yearly mean of quarterly coverage.[6] Then, following Lee and So (2017), we design the variable $ExCoverage_{i,t}$ as the residual of the regression of

[6]As an example, suppose a firm which is followed by 5 analysts for the last quarter only, and 0 analysts for the first three quarters. For this firm in this year, the yearly average of the quarterly coverage is then 1.25 analyst ($NbAnalyst_{i,t} = 1.25$). Then, taking the logarithm of $1.25 + 1$, $Coverage_{i,t} = 0.22$. As there is at least one analyst covering the firm this year, $DCoverage_{i,t} = 1$. However there are no analyst following the firm for at least one quarter, hence $StableCoverage_{i,t} = 0$.

$StableCoverage_{i,t}$ on $Size_{i,t-1}$) and $ROE_{i,t-1}$:[7]

$$StableCoverage_{i,t} = \alpha_i + \beta_1 ROE_{i,t-1} + \beta_2 Size_{i,t-1} + I.year_t + \varepsilon_{i,t} \quad (2)$$

Where $I.year_t$ are dummy variables for each year. With $ExCoverage_{i,t}$, we thus capture the impact of analyst coverage on investment, which is not driven by firm characteristics (or country and industry characteristics) on the investment sensibility to cash-flow and therefore on financing constraints. A large following of firms by analysts should mitigate information asymmetries and reduce capital cost, thus increasing firm investment. Hence, in line with Dukas et al. (2008) and Derrien and Kecskés (2013), α_7 should be positive.

Finally, the interaction term $COVER_{i,t-1}.CF_{i,t-1}$ accounts for the impact of analyst coverage on investment sensitivity to cash-flow. According to our testable assumption H1, firms with large analyst coverage should be less financially constrained, i.e., their investment should be less sensitive to free cash-flow. Hence, the expected sign of α_8 is negative.

Table 6 (in the Appendix) lists the regression variables and describes how they are computed.[8]

Table 7, in Appendix, provides summary statistics for each dependent and explanatory variable described above. Table 7 shows that the central 50% (between the 25th and 75th percentile) have an investment level that is between 1.7% and 7.3% of total asset. A negative Q means firms for which the book value is above the market value: these firms represent around 25% of the sample. Conversely, for the rest of the sample, the market value is superior to the book value, showing that these firm's stocks are worth being held. The cash flows are negative (-18.1% of total assets) for at least 5% of firms, and the central 50% of the sample has a cash-flow ratio between 3 and 12.3%. Remembering the size is in natural logarithm, one must not forget important gaps between the smallest (total assets of 1 million euros) and largest (87 billion euros) firms in sample. The leverage ratio shows an average of 23%, the central 50% exhibiting ratios between 6.8 to 35.7%. Sales growth are on average 5.8%, with a range from -4% to 14.9% for the central 50%. Table 7 also indicates that, for the half of observations, there is no coverage. Only the highest 25% of observations are covered by 4.3 analysts per quarter, and the top 5% by 21 analysts. Only 40% of firms are covered by at least one analyst in a year, and 40% have a coverage of at least one analyst each quarter. Finally, kurtosis and skewness coefficients reported in Table 7 show that most of our variables, including analyst coverage indicators, are not following a normal distribution around the mean. This will be taken into account in our econometric analysis.

3.3 Econometric methodology

The estimation of this model by Ordinary Least Squares (OLS) is subject to an endogeneity bias arising from two sides. First, it is well known that the dynamic nature of the model in parallel

[7] We use a simple linear model estimated by OLS. In this way, the residuals are centered on zero and easy to interpret (contrary to residuals from non-linear models). Note that the model incorporates time dummies, firm-specific fixed effects and time-varying industry and country fixed effects.

[8] We treat outliers by winsorising data at the 1% threshold.

with the demeaning operation induced by the inclusion of fixed effects generates correlation of the lagged dependent variable and the error term, which biased estimates of all the parameters (Nickell, 1981). Second, the estimates are very likely to be biased due to the endogenous nature of analyst's decision to cover a firm (O'Brien and Ravi, 1990 ; MacNichols and O'Brien, 1997 ; Das et al., 2006 ; Kelly and Ljungqvist, 2012 ; Irani and Oesch, 2013 ; Derrien and Kecskés, 2013). Indeed, firms with a high investment rate could attract more analysts to cover them (reverse causality issue).

We address these biases by using two different panel generalized method of moments (GMM) estimators. First, we use the first-differenced GMM estimator (Arellano and Bond, 1991) by taking the first-difference of the regression equation to remove the omitted variable bias created by the unobserved time invariant firm-specific effects. Then, we instrument the right-hand-side variables (in the differenced equation) using lagged level values of the regressors to obtain consistent estimates in presence of endogeneity (simultaneity). Second, we use the system GMM estimator (SYS-GMM) (Arenallo and Bover, 1995 ; Blundell and Bond, 1998), which uses a regression in differences with one in levels. This estimator improves efficiency and consistency of estimates when there is a small number of time-series observations and a high degree of persistent of the dependent variable or of endogenous variables (Alonso-Borrego and Arellano, 1999).[9] We conduct two tests to check for the consistency of our estimators. The first one is the Arellano-Bond test for AR(2), which tests the hypothesis of the absence of residual autocorrelation of order 2. The second test is the Hansen-Sargan test to examine the overall validity of instruments.

3.4 Results

Tables 3, 4 and 5 present regression results, each considering one coverage variable (*Coverage*, *DCoverage* and *ExCoverage* successively).

Columns [1], [3] and [5] present the results for the whole sample and columns [2], [4] and [6] report the results for firms with a capitalization less than 1 billion euros. Variants [1]-[2] present the results obtained with two-step GMM robust standard errors for finite sample computed using the correction defined by Windmeijer (2005). Variants [3]-[4] report the results obtained with two-step first-difference GMM estimator. Variants [5]-[6] report the results obtained using the heteroskedasticity-consistent covariance matrix estimator of White (1980).

To start with, P-value Arellano-Bond test for AR(2) provided in Tables 3, 4 and 5 indicate that there is no residual autocorrelation or order two. Moreover, P-value for Hansen-Sargan test confirm the validity of the instruments. Hence, in all tables, GMM model specifications presented in variants [1]-[6] are consistent and estimated coefficients can be interpreted.

First, in all tables and variants, the coefficient for Inv_{t-1} is significant and positive. This suggests some inertia in the dynamics of investment. Except in variant [3] of Table 4, the coefficient for CF is also positive, indicating that firm investment is sensitive to free cash-flow.

[9] Bond et al. (2003) estimate a dynamic investment model for European countries. The estimated autoregressive coefficients are comprise between 0.2 and 0.5, which suggests that firm's investment series have a moderate persistence. Hence, the use of the first-differenced GMM estimator is relevant.

Table 3: Financial constraint and coverage: econometric results with $COVER$=$Coverage$

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Inv_{t-1}	0.199***	0.187***	0.121***	0.109***	0.179***	0.158***
	(0.022)	(0.023)	(0.021)	(0.022)	(0.018)	(0.019)
CF	0.081***	0.084***	0.042***	0.053***	0.080***	0.084***
	(0.013)	(0.012)	(0.016)	(0.014)	(0.013)	(0.012)
Q	0.894***	0.972***	1.456***	1.482***	1.529***	1.567***
	(0.202)	(0.225)	(0.336)	(0.361)	(0.249)	(0.274)
$Growth$	1.256***	1.111***	1.100***	0.997***	1.737***	1.589***
	(0.226)	(0.209)	(0.234)	(0.219)	(0.250)	(0.247)
$Size$	-0.211***	-0.272***	-4.251***	-4.215***	-1.735***	-1.525***
	(0.070)	(0.090)	(0.422)	(0.480)	(0.209)	(0.239)
$Leverage$	-0.005	-0.005	-0.089***	-0.089***	-0.061***	-0.064***
	(0.005)	(0.005)	(0.012)	(0.013)	(0.007)	(0.009)
$Coverage$	0.496***	0.567***	0.451**	0.579**	0.382***	0.330***
	(0.189)	(0.215)	(0.226)	(0.257)	(0.106)	(0.122)
$CF.Coverage$	-0.012	-0.022**	-0.016*	-0.031***	-0.020***	-0.027***
	(0.008)	(0.009)	(0.008)	(0.010)	(0.007)	(0.008)
α_0	4.405***	4.884***			15.244***	13.014***
	(0.327)	(0.408)			(1.184)	(1.169)
Nb. Obs.	14,976	11,329	13,198	9,819	14,976	11,329
Nb. firms	1,532	1,337	1,454	1,252	1,532	1,337
R^2					0.168	0.147
P-value Arellano-Bond test for AR(2)	0.508	0.325	0.654	0.172		
P-value Hansen-Sargan test	0.0659	0.334	0.0378	0.996		

1. Columns [1], [3] and [5]: whole sample.

2. Columns [2], [4] and [6]: firms with a capitalization less than 1 billion euros.

3. Columns [1]-[2]: two-step GMM with robust standard errors for finite sample computed using the correction defined by Windmeijer (2005).

4. Columns [3]-[4]: two-step first-difference GMM.

5. Columns [5]-[6]: heteroskedasticity-consistent covariance matrix estimator of White (1980).

6. Standard errors are in parentheses.

7. *, ** and *** denote significance respectively at the 10%, 5% and 1% level.

Table 4: Financial constraint and coverage: econometric results with $COVER$=$DCoverage$

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Inv_{t-1}	0.246***	0.228***	0.170***	0.166***	0.187***	0.168***
	(0.037)	(0.039)	(0.035)	(0.038)	(0.028)	(0.030)
CF	0.083***	0.103***	0.035	0.048**	0.084***	0.091***
	(0.025)	(0.025)	(0.024)	(0.023)	(0.024)	(0.021)
Q	0.890***	0.436	0.237	0.392	1.080***	1.046**
	(0.294)	(0.306)	(0.487)	(0.552)	(0.383)	(0.429)
$Growth$	0.728	0.807**	0.451	0.297	1.434***	1.267***
	(0.464)	(0.377)	(0.411)	(0.376)	(0.479)	(0.418)
$Size$	-0.062	-0.134	-4.586***	-4.021***	-1.933***	-1.775***
	(0.057)	(0.118)	(0.685)	(0.841)	(0.376)	(0.442)
$Leverage$	-0.009	-0.011	-0.107***	-0.117***	-0.068***	-0.072***
	(0.008)	(0.010)	(0.018)	(0.019)	(0.013)	(0.014)
$DCoverage$	-0.126	0.448	0.162	0.230	0.437**	0.524**
	(0.189)	(0.683)	(0.185)	(0.201)	(0.214)	(0.233)
$CF.DCoverage$	-0.019	-0.057**	-0.028	-0.031*	-0.040**	-0.055***
	(0.023)	(0.028)	(0.018)	(0.018)	(0.019)	(0.020)
α_0	4.149***	4.947***			15.382***	13.095***
	(0.546)	(0.602)			(1.982)	(1.974)
Nb. Obs.	5,518	4,289	4,864	3,726	5,518	4,289
Nb. firms	555	485	536	466	555	485
R^2					0.187	0.162
P-value Arellano-Bond test for AR(2)	0.992	0.808	0.350	0.170		
P-value Hansen-Sargan test	0.0670	0.653	0.176	0.169		

1. Columns [1], [3] and [5]: whole sample.
2. Columns [2], [4] and [6]: firms with a capitalization less than 1 billion euros.
3. Columns [1]-[2]: two-step GMM with robust standard errors for finite sample computed using the correction defined by Windmeijer (2005).
4. Columns [3]-[4]: two-step first-difference GMM.
5. Columns [5]-[6]: heteroskedasticity-consistent covariance matrix estimator of White (1980).
6. Standard errors are in parentheses.
7. *, ** and *** denote significance respectively at the 10%, 5% and 1% level.

Table 5: Financial constraint and coverage: econometric results with $COVER$=$ExCoverage$

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Inv_{t-1}	0.192***	0.183***	0.099***	0.101***	0.177***	0.177***
	(0.021)	(0.023)	(0.023)	(0.024)	(0.018)	(0.018)
CF	0.078***	0.073***	0.031***	0.029***	0.061***	0.061***
	(0.009)	(0.007)	(0.011)	(0.009)	(0.009)	(0.009)
Q	0.888***	0.879***	0.942***	1.050***	1.524***	1.524***
	(0.196)	(0.229)	(0.341)	(0.374)	(0.245)	(0.245)
$Growth$	1.167***	0.979***	0.983***	0.815***	1.731***	1.731***
	(0.229)	(0.215)	(0.231)	(0.222)	(0.250)	(0.250)
$Size$	-0.114***	-0.169**	-4.173***	-4.109***	-1.669***	-1.669***
	(0.039)	(0.066)	(0.402)	(0.479)	(0.199)	(0.199)
$Leverage$	-0.005	-0.005	-0.085***	-0.086***	-0.060***	-0.060***
	(0.004)	(0.005)	(0.012)	(0.013)	(0.007)	(0.007)
$ExCoverage$	0.717***	0.650**	0.659***	0.703**	0.468***	0.468***
	(0.252)	(0.279)	(0.245)	(0.276)	(0.113)	(0.113)
$CF.ExCoverage$	-0.042***	-0.045***	-0.034***	-0.040***	-0.030***	-0.030***
	(0.012)	(0.013)	(0.012)	(0.012)	(0.010)	(0.010)
α_0	0.000	4.954***			15.319***	15.319***
	(0.000)	(0.444)			(1.175)	(1.175)
Nb. Obs.	14,976	11,329	13,198	9,819	14,976	14,976
Nb. firms	1,532	1,337	1,454	1,252	1,532	1,532
R^2					0.168	0.168
P-value Arellano-Bond test for AR(2)	0.503	0.320	0.127	0.265		
P-value Hansen-Sargan test	0.181	0.469	0.441	0.952		

1. Columns [1], [3] and [5]: whole sample.

2. Columns [2], [4] and [6]: firms with a capitalization less than 1 billion euros.

3. Columns [1]-[2]: two-step GMM with robust standard errors for finite sample computed using the correction defined by Windmeijer (2005).

4. Columns [3]-[4]: two-step first-difference GMM.

5. Columns [5]-[6]: heteroskedasticity-consistent covariance matrix estimator of White (1980).

6. Standard errors are in parentheses.

7. *, ** and *** denote significance respectively at the 10%, 5% and 1% level.

In line with the literature (Fazzari et al., 1988 ; 2000 ; Devereux and Schiantarelli, 1990 ; Gilchrist, 1991 ; Oliner and Rudebush, 1992 ; Calomiris and Hubbard, 1995) this highlights the existence of a financial constraint for firms. As expected, investment expenses also increase with investment opportunities (Q) and sales growth ($Growth$) in a very large number of variants. It is noteworthy, however, that when $COVER$ is measured by the dummy variable $DCoverage$, the coefficient for Q and $Growth$ are not always significant. Except in variants [1]-[2] in Tables 3, 4 and 5, the coefficient for $Leverage$ is significant and negative. This suggests that a high leverage reduces firm's access to external funds, thus reducing their ability to invest. Surprisingly, in a very large number variants, the coefficient for $Size$ is negative, indicating that large firms invest less.

Let us now turn to our variable of interest, i.e., analyst coverage. In nearly all variants, the coefficient for $COVER$ is significant and positive. In line with Doukas et al. (2008) and Derrien and Kecskés (2013), this finding suggests that by mitigating conflicts of interest and information asymmetries, analyst coverage reduces firms' capital cost and increase investment expenditures. This finding is also consistent with the results of the literature according to which investment is less sensitive to cash-flow for firms with having a long term relationship with a financial intermediary or an industrial group (Hoshi et al. 1991 ; Schaller 1993 ; Houston and James, 2001) or with a concentrated ownership structure (Georgen and Renneboog, 2001 ; Pindado et al., 2011).

We can note that, as above, the coefficient for $DCoverage$ is not significant in 4 variants ([1]-[4]) of Table 4. This suggest that the *intensity* of analyst coverage is more important for investment than being covered or not. Focusing on the magnitude of the impact of coverage on investment, we note that the coefficient reported in column [1] of Table 3 is 0.496. This means that an increase in $Coverage$ by 100% implies an increase in Inv by 0.496. Compared to the mean value of Inv, which equals 6, this variation is not negligible.

Finally, except in variants [1] in Table 3 and in variants [1] and [3] in Table 4, the coefficient associated with the interaction term is significant and negative . This provides large support to H1 according to which, by alleviating information asymmetries and conflicts of interest, analyst coverage relaxes firm financial constraint. It is noteworthy that when $COVER$ is measured by $ExCoverage$, we globally obtain the same results as with the two other analyst indicators. This indicates that our findings are robust to the endogeneneity of analyst coverage.

Moreover, comparing variants [1] and [2] in Tables 3 and 4 indicate that the coefficient for the interaction term is significant and negative for firms with a capitalization less than 1 billion euros while it is not significant on the whole sample. This suggests that the favorable effect of analyst coverage is stronger for small and medium sized firms, characterized by strong financial frictions and a weak accessto external finance. The comparison between variants [3] and [4] in Table 4 can be interpreted in the same way.

4 Conclusion

The goal of this paper was to check whether analyst coverage of a firm relaxes its financial constraint. Using a data set that includes Small and Middle Enterprises (SME) from several European countries between 2000 and 2015, we have In line with Fazzari et al. (1988), we account for firm's financial constraint by regressing investment expenses on cash-flow and a set of control variables (notably, investment opportunities and sales growth) and a term which interacts cash-flow and a coverage indicator. First, our results indicate that coverage increases investment expenses and that the *intensity* of analyst coverage is more important for investment than being covered or not. Second, we show that firms with a large coverage not only invest more by are also less sensitive to cash-flow. Third, the favorable effect of coverage on investment sensitivity to cash-flow is stronger for SMEs. Finally, our findings are unchanged when we consider a coverage measure that is not driven by firm characteristics. Hence, the favorable impact of coverage in the sensitivity of investment to cash-flow is robust to the endogeneity of the coverage indicator.

From a normative point of view, our results appear all the more interesting as SMEs have a weak access to external funds, especially since the 2007-2008 financial crisis. The creation by Euler Hermes Rating of a new rating service specifically dedicated to mid- and small-capitalization firms may contribute to improve SME's ability to raise external funds. Our paper shows that SMEs' financial constraint may be also alleviated by increasing their following by financial analysts. Hence, our paper provides some support to projects that would aim to promote the coverage of firms when they become publicly traded.

Appendix

Table 6: List of variables

DEPENDENT VARIABLE	
$Inv_{i,t}$	Percentage of capital expenditure of firm i at date t over total asset of firm i at date $t-1$
EXPLANATORY VARIABLES	
$Q_{i,t}$	Logarithm of (market value + total asset + book value of firm i at date t) over total asset
$CF_{i,t}$	Ratio of earnings and amortization expenses of firm i at date t over total asset
$Size_{i,t}$	Logarithm of total asset in million euros
$Leverage_{i,t}$	Ratio of short term and long term debt of firm i at date t over total asset
$Growth_{i,t}$	Logarithm of net sales of firm i at date t - logarithm of net sales at date $t-1$
$Coverage_{i,t}$	Logarithm of 1 + the yearly average number of analysts following a firm for each quarter of year t
$DCoverage_{i,t}$	Dummy variable that equals 1 if the number of analysts following firm i during year t is larger than (or equal to) 1, 0 otherwise
$StableCoverage_{i,t}$	Equals 1 if the firm is covered by at least one analyst for each of the four quarters at year t, the yearly mean of quarterly coverage otherwise
$ExCoverage_{i,t}$	Residual of the regression of $StableCoverage_{i,t}$ on firm i's size at t and return on asset at $t-1$

Table 7: Summary statistics

Variables	Nb. obs.	Mean	Sd	Variance	Skewness	Kurtosis	Min	Q5	Q25	Q50	Q75	Q95	Max
Inv	20 904	6.00	7.47	55.81	3.24	16.28	0.0	0.1	1.7	3.9	7.3	19.1	48.7
Q	20 983	0.27	0.45	0.21	1.22	4.92	-0.6	-0.3	-0.0	0.2	0.5	1.2	1.9
CF	18 226	6.46	14.55	211.63	-1.39	9.90	-62.1	-18.1	3.0	7.5	12.3	25.0	51.8
$Size$	23 243	5.33	2.42	5.85	0.23	3.40	-14.1	1.8	3.6	5.1	6.9	9.8	12.9
$Leverage$	23 208	23.67	19.75	389.95	0.87	3.50	0.0	0.0	6.8	21.0	35.7	60.1	89.1
$Growth$	21 260	5.83	34.16	1 167.09	0.28	10.48	-134.5	-39.8	-4.0	4.7	14.9	54.5	156.1
$Coverage$	17 488	1.26	1.09	1.19	0.43	1.95	0	0	0.22	1.09	2.15	3.20	3.98
$DCoverage$	18 171	0.62	0.48	0.23	-0.50	1.25	0	1	0	1	1	1	1
$ExCoverage$	17 448	0.02	0.66	0.44	0.01	2.92	-2.72	-1.01	-0.49	0.06	0.53	1.01	3.19

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