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THE INFLUENCE OF FINANCIAL ANALYSTS ON THE UNDERINVESTMENT PROBLEM

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Abstract. *In this paper, we investigate whether more analyst coverage alleviates firm's financing and investment distortions. Using a sample of 44 countries, we find that analyst coverage is positively related to firm's financing constraints, in accord with the view that financial analysts' do not reduce information asymmetries between market participants and contribute to efficient capital allocation. Furthermore, our results also indicate that analysts' activities do not produce different effects depending on the country's home environment.*

Keywords: analyst coverage, firm's financing constraints, information asymmetry, market efficiency, investment-cash flow sensitivity, financial hierarchy

Introduction

Given that small investors lack both time and resources to perform detailed firms evaluations, there is keen interest in how security analysts' activities benefit the typical investor. Allegedly, analyst coverage is meant to reduce information asymmetries between market participants, thereby contributing to keep stock prices in line with firm fundamentals. However, widely heard, the rhetoric about security analysts is being questioned in the sense that it fails to clarify the true nature of their role in capital markets. In fact, subsequent to 2008 financial crisis, security analysts have come under considerable criticism. Allegations against financial institutions engaging in massive conflicts of interest, betting against their own clients, and assigning AAA ratings to high risk securities have severely shaken investors' confidence in the useful role of security analysts. Therefore, the purpose of this study is to examine whether financial analysts act as providers of firm-specific information or focus on serving their own interests (e.g., generate trading commissions) at the expense of other market participants.

Regarding the questionable amount of firm-specific information conveyed by financial analysts, recent empirical evidence suggests that it is not significant. With respect to the US market, Piotroski and Roulstone (2004) support the contention that analysts' activities decrease the amount of private information impounded in stock prices and increase stock return synchronicity (the extent to which market and industry factors explain variations in stock returns). Chan and Hameed (2006) provide similar evidence for emerging markets. These findings suggest that analysts are outsiders who have less access to firm-specific information. As

for us, we propose an intuitive approach that investigates whether firms can profit from analysts activities. The traditional approach, in the literature, is to examine whether investors can profit or not from analysts recommendations. On the other hand, the consequences of analyst following on corporate investment and external financing have received less attention. We try to address this deficiency by providing a valuable setting that directly examines the connection between analysts' activities and firm's financial constraints. The papers that are close in spirit to our research are Doukas et al. (2008) and Chang et al. (2006). Doukas et al. (2008) investigate whether excessive analyst coverage, motivated by investment-banking transactions and trading commissions, impacts companies external funding. Their evidence indicates that firms with excessive analyst following overinvest and realise lower future returns, in comparison to firms with low analyst coverage. While Doukas et al. (2008) tests yield a number of interesting findings, their study does not address whether analysts' activities allow firms, with good projects, to invest according to their growth opportunities and investors to distinguish between high quality firms and lemons, which is the focus of our study. Chang et al. (2006) examine the potential associations between firm's financing choices (debt versus equity issuance) and analysts' activities, using the number of analysts as a proxy for information asymmetry. In our approach, we consider the number of analysts' who issued one-year ahead forecasts as a proxy for the resources spent on gathering firm-specific information (Bhushan, 1989), but we do not necessarily view firms with high analyst coverage as facing less information asymmetry problems. In fact, contrary to Chang et al. (2006), we do not assume that high analyst coverage is associated with low asymmetric information because our research is motivated by the mounting evidence raising concerns about the informational role of analysts. Instead, we propose a different approach that investigates whether security analysts help disseminate firm-specific information into stock prices.

In this study, we develop and test the hypothesis that financial analysts can mitigate the Myers and Majluf underinvestment problem if they are able to assess firm value through their research activities. In 1984, Myers and Majluf show that asymmetric information between corporate managers and investors has adverse impacts on firm's ability to raise external capital. Under asymmetric information, outside investors are unable to distinguish between high quality firms and lemons. This, in turn, push investors to value all firms at the population average and impose a premium on high quality firms that offset losses related to funding lemons. As a consequence, firms with profitable investment opportunities are undervalued and managers of high quality firms will choose to forgo firm's investment opportunities. We argue that the underinvestment problem should «disappear» if security analysts generate and provide firm-specific information to outside investors. For instance, if analysts provide investors with valuable information, they might reduce the acquisition costs for investors, and in turn, lower the expected returns of securities. In the same vein, the potential increased transparency and exposure, linked to more analyst following, should attract more investors and broaden firm's investors' base (investor recognition hypothesis, Merton (1987)). As a result, risk should be more widely shared and investors should be more willing to commit capital to companies. In the same line of reasoning, if analysts can collect and disseminate private information, stocks that are covered by a high number of analysts should exhibit price convergence to firm's fundamentals. Hence, as stock prices reflect firm's fundamentals, we should expect them to serve as signals for efficient resource allocation and investment decision (Tobin, 1982; and Durnev et al. 2003).

We base our empirical analysis on one of the most influential theories of firm's financing decisions (Pecking Order Theory). We estimate the association between investment and cash flow to test for the presence and importance of firm's financing and investment distortions. Many

authors (e.g., Fazzari et al. 1988) interpret high investment-cash flow sensitivity as evidence that firms are financially constrained. According to them, internal capital may impact corporate investment because of a financial hierarchy in which internal funds have a cost advantage over external funds. In fact, when the cost differential between internal and external capital is high, firms are considered as facing binding financial constraints and a value maximizing firm should issue new debt or shares only after it exhausts internal funding (Fazzari et al. 1988). These facts suggest that financially constrained firms should invest more when they have enough cash flow to do so, which will increase the sensitivity of investment to the availability of internal capital. In contrast, unconstrained firms have the possibility to increase their investment expenditures even when they do not have enough cash flow, because the cost differential between internal and external capital is small. Hence, unconstrained firms should exhibit low investment-cash flow sensitivity. To our knowledge, our paper is the first research that applies a traditional measure of firm's financing constraints (investment-cash flow sensitivity) in analyst coverage literature. In addition to our intuitive approach, we also contribute to the literature by using a large sample of firms and countries (44 countries) over the period 1995-2007. It is worth mentioning that most studies in the literature provide either US evidence or limited international evidence. Furthermore, we extend our tests to examine any cross-sectional differences in the role played by analysts in different economic and institutional environments. To test such hypothesis, we propose to classify firms according to financial markets development, the level of investors' protection and accounting standards; before estimating the association between analyst following and firm's financing constraints. Finally, we supplement our primary analysis with more robust specifications that control for potential endogeneity problems.

We find a positive and significant relation between our proxy of firm's financing constraints and analyst coverage, which indicates that analysts' activities are associated with less efficient capital allocation and investment decisions. Our evidence suggests that security analysts' seem to engage more in profitable investment-banking business rather than providing the market with valuable firm-specific information that could decrease the financing and investment distortions of the firm. Finally, we do not document any cross-sectional differences in the role played by security analysts around the world. In fact, our main findings prevail for countries with strong or weak institutions.

The remainder of the paper is organized as follows. Section 2 discusses the existing literature and the conceptual framework. In section 3, we present our methodology and our adopted proxy for firm's financing constraints. Section 4 describes the data and univariate results. In section 5, we discuss our main findings including robustness' tests results. Section 6 offers conclusions.

Literature Review and Hypotheses Development

Our paper relates to an ongoing debate about the useful role of security analysts in shaping efficient capital markets. One stream of research suggests that analysts' activities help mitigate information asymmetries between market participants and improve capital allocation (e.g., Gleason and Lee, 2003). Another strand of research assumes a different role for financial analysts, arguing that analyst coverage is motivated mainly by investment-banking business and trading commissions (e.g., Lin and McNichols, 1998 and Doukas et al. 2008).

A. Evidence of the useful role of analysts

An important empirical literature supports the beneficial and informative role of analysts. For instance, Barber et al. (2001, 2010) document that purchasing (short selling) stocks with the most (least) favorable consensus analysts' recommendations allows investors to earn positive abnormal returns. Knyazeva (2007) and Yu (2008) show that higher analyst coverage is associated with less earnings management. In the same line of reasoning, Barth and Hutton (2000) find that companies with high levels of analyst following incorporate more quickly information on accruals and cash flows, in comparison to companies with low analyst coverage. Moreover, Chung and Jo (1996) document a positive relation between analysts' activities and firm value, and attribute such association to the governance role of analyst coverage. The literature also shows that additional analyst coverage helps facilitate price discovery (e.g., Gleason and Lee, 2003).

B. Conflicting view

There is mounting evidence in the literature that points to a different role for security analysts. In 2001, Lim shows that analysts have incentive to issue earnings forecasts that tend to be upward biased, because optimistic forecasts can improve access to management and increase trading commissions. In the same line of reasoning, Hong and Kubik (2003) study suggests that brokerage houses reward optimistic analysts who promote stocks. As for Doukas et al. (2008), they show that excessive analyst coverage is associated with equity overvaluation, lower future returns and overinvestment. Other contributions (e.g., Jensen 2004, 2005) consider that analysts' optimistic bias puts pressure on firms' managers who, in some cases, will engage in managerial misconduct (e.g., Enron, Nortel and WorldCom) in order to meet analysts' unrealistic forecasts.

C. Analyst coverage and firm's financing constraints

The conceptual framework of this research relates analysts' activities to traditional models of investment with financial constraints. We emphasize asymmetric information between firm's managers and outside investors to explain financing and investment distortions. Myers and Majluf (1984) show that asymmetric information problems represent an important reason why internal funding have a cost advantage over external funding. Asymmetric information can generate a significant cost differential between internal and external capital, which results in underinvestment and less efficient capital allocation. This cost differential exists because investors are unable to distinguish between good and bad projects, under asymmetric information. Theoretically, every issue is priced based on the average projects outcomes (Oliner and Rudebush, 1992). As a result, securities issued to back good projects should be undervalued. Such undervaluation implies that the cost of financing good projects with external capital exceeds the cost of funding the same projects with internal capital (lemon premium). We argue that when the cost differential between internal and external funds is high (binding financing constraints and severe asymmetric information problems), a value maximizing firm will issue new debt or shares only after it exhausts internal capital. Hence, we should expect that investment spending responds positively to an increase in internal capital for constrained firms. The investment-cash flow sensitivity is also linked to the collateral represented by the net worth of the firm. Gilchrist

and Himmelberg (1995) argue that a decrease in cash flow signals a reduction in firm's net worth and an increase in firm's financial risk. Hence, in periods when cash flow is low, financially constrained firms invest less because the cost of capital is high. On the other hand, when net worth rises (high cash flow), the cost of external capital should decrease and investment should respond more to cash flow innovation.

Theoretically, by collecting and reporting a wide range of firm-specific information to investors, financial analysts can reduce the information risk borne by investors and allow them to distinguish the quality of firms. Therefore, outside investors should not value all firms at the population average and demand a premium that offset losses related to funding lemons. As a result, new shareholders should commit more capital to firms with good projects and the cost of new equity issuance faced by managers of high quality firms should not differ from the cost of internal funding. Under these circumstances, investment opportunities for quality firms should not depend on the availability of internal capital (low investment-cash flow sensitivity) and managers will not choose to forgo such opportunities, because they will simply use external capital to smooth investment expenditures when internal cash flow fluctuates (Fazzari et al. 1988). Furthermore, in the presence of security analysts who mitigate asymmetric information problems, the cost of capital for lemons should be much higher than the cost of capital for quality firms, but the differential cost between internal and external capital should also be small for lemons. Following these arguments, when analysts can mitigate the adverse investment selection problem of Myers-Majluf, financial factors such as the availability of internal cash flow should be irrelevant to investment for both lemons and high quality firms given that external capital can be considered as a "perfect" substitute for internal capital. Instead, investment spending may simply depend on how much risk investors are willing to take for an expected return. As a consequence, we should expect low investment-cash flow sensitivity.

On the other hand, when analysts cannot discriminate between news related to firm's fundamentals and noise, it is possible that investors evaluate investments in stocks based on second-hand information rather than looking at quantitative and qualitative factors. Hence, a positive relation between analyst coverage and noise should affect adversely investors choices, contribute to worsen information asymmetries between market participants, add uncertainty to expected projects outcomes, and ultimately increase firm's financing constraints (investment-cash flow sensitivity). In fact, by increasing noise, financial analysts could, in the short term, issue unrealistic earnings forecasts (e.g., higher growth targets) and make investors feel like if they have valuable information. However, in the long term, analysts' unrealistic forecasts (which are considered by the market as relevant quantitative information) could exacerbate financing and investment distortions when firms could not be able to meet these forecasts. Under these circumstances, we should expect a positive relation between analyst coverage and firm's financing constraints when analysts cause stock prices to deviate from firm's fundamentals.

Empirical Methodology

Our proxy of firm's financing distortions is based on Fazzari et al. (1988). It is meant to measure the relation between firm's investment outlays and firm's internal capital. Therefore, in this paper, we regress corporate investment on cash flow to estimate firm's financing constraints:

$$(I/K)_{i,t} = \beta_0 + \beta_1 (CF/K)_{i,t} + \beta_2 (M/B)_{i,t-1} + \beta_3 Size_{i,t-1} + \varepsilon_{i,t} \qquad (1)$$

Where $I_{i,t}$ represents investment in plant and equipment for firm *i* during period *t*; K denotes the beginning-of-period value of total assets; CF is the sum of income before extraordinary items and depreciation net of cash dividends (for robustness, we also measure CF as : net income + depreciation and/or amortization + changes in deferred taxes); M/B denotes the market to book ratio, and Size denotes the natural logarithm of firm size. The market to book ratio is a proxy for investment opportunities and growth, while size variable controls for potential market imperfections related to firm size. Our main interest in equation (1) centers on β_1. This coefficient represents the investment-cash flow sensitivity (cash flow coefficient (CFC)). According to Fazzari et al. (1988), constrained firms exhibit high CFC.

To study how analyst coverage can influence the investment-cash flow sensitivity, we estimate the following regression:

$$(I/K)_{i,t} = \beta_0 + \beta_1 (CF/K)_{i,t} + \beta_2 (M/B)_{i,t-1} + \beta_3 Size_{i,t-1} + \beta_4 \log(1+NA_{i,t}) + \beta_5 CF/K_{i,t} * \log(1+NA_{i,t}) + \varepsilon_{i,t} \quad (2)$$

Where $NA_{i,t}$ is the number of analysts who issued one year-ahead earnings forecasts for firm i during year t. In equation (2), we augment our primary regression (equation (1)) with analyst coverage and interaction of analyst coverage with firm's cash flow. The interaction term (CF/K*log(1+NA)) proxies for the impact of analyst coverage on the relation between investment spending and cash flow. For instance, a negative β_5 means that high analyst coverage decreases the investment-cash flow sensitivity (firm's financing constraints). A neutral coefficient suggests that analysts' activities have no impact on firm's financing constraints. Finally, if analyst coverage increases noise, we should expect positive coefficients because an increase in the number of analysts may add credibility to rumors and push investors to trade on second-hand news as if they were quantitative factors. Hence, stock prices movements should not reflect changes in firm's fundamentals.

We estimate equation (2) using country, industry, and year fixed effects. To choose between fixed or random effects estimation, we use the Hausman specification test. The latter rejects the null hypothesis ($H_{0:}$ group effects are uncorrelated with the regressors) in favour of the fixed effects estimation. In addition, standard errors in equation (2) are adjusted for heteroskedasticity and clustering at the firm level.

Data and Univariate Tests

In this paper, we use international data from 44 countries over the 1995-2007 period. Our data source on analyst coverage is the Institutional Brokers' Estimate System (I/B/E/S). Firm-level information is drawn from Datastream and Worldscope and country-level data from Djankov et al. (2008) and Doidge et al. (2004). We start by considering all firms included in the country list provided by Datastream from 1995-2007. The second step consists of matching firms from I/B/E/S and Datastream. Note our exclusion of financial and banking firms because the financial nature of their assets hinders accounting data comparisons with other firms. Furthermore, if I/B/E/S does not report an analyst forecast for firm i in year t, we assume that the number of analysts following the firm is zero as suggested by Piotroski and Roulstone (2004). Therefore, our main analysis includes firms with no earnings forecasts. In our robustness checks, we care to exclude such firms. Finally, to avoid drawing spurious inferences from extreme values, regression results are robust to outliers (observations are winsorised at 1%).

Given that our proxy of firm's financing constraints is measured by the association between investment and internal capital, we propose, in our univariate tests, to compute first the investment-cash flow sensitivity (CFC in Table 1) according to equation (1) before estimating the potential univariate relation between analyst coverage and firm's financing constraints. Table 1 presents descriptive statistics for our main variables. The mean of firm-level variables is calculated as the average across all industries and years. We do not measure the mean (median) across all firms because pooling years of data to calculate CFC for each firm may problematic. In fact, the result could be unreliable measures of CFC given that we should use few observations for our estimation purpose (maximum 13 observations for each firm: from 1995 to 2007). To avoid this limitation, we use a cross-section of similar firms.

Table 1: Descriptive statistics
This table presents descriptive statistics for the sample between years 1995 and 2007. Firm-level variables are constructed using two-digit SIC cross-industry approach. The latter is conducted by polling firms in a two-digit SIC industry to calculate the corresponding measures. The mean of firm-level variables are calculated as the average across all industries and years. The sample size is 24 two-digit code industries constructed using 14294 firms. The mean of country-level variables (anti-director rights index and accounting standards index) are calculated as the average across all countries and years.

Variables	Mean	median	5th Pctl.	95th Pctl.	Std dev	N
CFC	0.651	0.568	-0.020	1.603	0.611	300
NA	2.059	1.900	0.973	3.635	0.841	300
Log(1+NA)	0.551	0.533	0.317	0.829	0.161	300
NAbis	5.451	5.157	3.353	8.350	1.588	300
Log(1+NAbis)	1.696	1.685	1.269	2.094	0.244	300
Dividend-payout (Divp)	0.232	0.166	0.032	0.733	0.426	294
Leverage (Lev)	0.305	0.259	0.181	0.435	0.360	300
Size	11.843	11.840	10.592	13.314	0.991	300
Market-to-Book (M/B)	2.578	2.073	1.083	5.404	2.041	289
Anti-director rights index	0.516	0.46	0.21	0.95	0.238	572
Accounting standards index	66.770	65	54	78	9.346	468

In term of investment-cash flow sensitivity, our estimation shows large CFC (average CFC of 0.651 and median of 0.568) which suggests that corporate investment is highly sensitive to the availability of internal capital. This is consistent with the existence of a financial hierarchy. Furthermore, given the large proportion of firms with zero analyst coverage, we perform our tests both with and without these firms. A potential concern is that our findings can be influenced by these observations. In fact, as suggested by Chan and Hameed (2006), the presence of zero analyst coverage could mean that there is no analyst coverage or that the data for the firm were not captured by I/B/E/S. The average number of analysts covering our sample firms is 2.059 (median of 1.90). On the other hand, when we drop observations with zero analyst activity, the average number of financial analysts (NAbis) becomes 5.451 (median of 5.157). To test any cross-sectional differences in the role played by analysts based on institutional factors, we also propose to classify firms according to a variety of country-level variables related to legal environment and accounting standards; before estimating the relation between analyst coverage and firm's financing constraints. Our proxy of legal environment is the anti-director rights index from Djankov et al. (2008) that measures the level of minority investors' protection. This index ranges from zero to one and high scores indicate strong protection of investors. As suggested by Morck et al. (2000), the weak property rights in some countries may discourage arbitrage based

on private information, so that there will be fewer benefits for analysts to gather firm-specific information. In these countries, it's also possible that security analysts have less informational advantage over insiders. Hence, analysts' activities should not reduce information asymmetries between market participants in countries where investors are less protected. We also consider an index that rates countries accounting standards. The scores of such index range from zero to ninety with ninety as the highest standard. The average estimates of the anti-director rights index and the accounting standards index are 0.516 and 66.77 respectively.

Table 2: Pearson Correlations (p-values):
This table presents the correlations between variables. The sample period is from 1995 to 2007.

	CFC	NA	Log(1+NA)	NAbis	Log (1+NAbis)	Divp	Lev	Size
CFC	1.0000	-0.0366 (0.4248)	-0.0587 (0.2009)	0.0468 (0.3077)	0.0424 (0.3554)	-0.0043 (0.9272)	0.0180 (0.7008)	0.1384 (0.0029)
NA	-0.0366 (0.4248)	1.0000	0.9275 (0.0001)	0.7892 (0.0001)	0.7404 (0.0001)	-0.0438 (0.3513)	0.0625 (0.1796)	0.4384 (0.0001)
Log(1+NA)	-0.0587 (0.2009)	0.9275 (0.0001)	1.0000	0.5876 (0.0001)	0.6162 (0.0001)	-0.0249 (0.5965)	0.0608 (0.1919)	0.4446 (0.0001)
NAbis	0.0468 (0.3077)	0.7892 (0.0001)	0.5876 (0.0001)	1.0000	0.9310 (0.0001)	-0.0434 (0.3551)	0.0206 (0.6591)	0.3366 (0.0001)
Log (1+NAbis)	0.0424 (0.3554)	0.7404 (0.0001)	0.6162 (0.0001)	0.9310 (0.0001)	1.0000	-0.0415 (0.3769)	0.0316 (0.4985)	0.3388 (0.0001)
Divp	-0.0043 (0.9272)	-0.0438 (0.3513)	-0.0249 (0.5965)	-0.0434 (0.3551)	-0.0415 (0.3769)	1.0000	-0.0698 (0.1382)	0.0452 (0.3350)
Lev	0.0180 (0.7008)	0.0625 (0.1796)	0.0608 (0.1919)	0.0206 (0.6591)	0.0316 (0.4985)	-0.0698 (0.1382)	1.0000	-0.0911 (0.0503)
Size	0.1384 (0.0029)	0.4384 (0.0001)	0.4446 (0.0001)	0.3366 (0.0001)	0.3388 (0.0001)	0.0452 (0.3350)	-0.0911 (0.0503)	1.0000

In table 2, we present the matrix of correlations between our key variables. If analysts' forecasting activities reduce information asymmetries, we should expect a negative and significant correlation between analyst coverage and firm's financing constraints (CFC). Several key relations are apparent in Table 2. First, CFC and analyst coverage display an insignificant negative correlation. Second, when we remove firms with zero analyst coverage, CFC and analyst following continue to have an insignificant correlation. Third, as expected, we find a positive correlation between CFC and leverage, and a negative correlation between the dividend payout ratio and CFC. Leverage is the ratio of long term debt to total assets and dividend payout is the ratio of dividends to EBIT. We include dividend payout because many authors (Fazzari et al. 1988, and Kaplan and Zingales, 1997) consider firms with high dividend payout ratios (dividends/EBIT) as unconstrained and firms with low dividend payout ratios as financially constrained. According to Fazzari et al. (1988), one reason why firms might retain an important portion of their internal cash flow is that they have investment spending that exceeds their cash flow. This is a value maximizing behaviour when the cost disadvantage of external finance is large (binding financial constraints). Finally, the positive and significant correlation between analyst coverage and firm size indicates that large companies tend to attract more analysts. According to our univariate findings, the relation between analyst coverage and CFC is not significant, which is consistent with the fact that analysts' activities do not alleviate firm's financing constraints. However, it's worth mentioning that these preliminary results only

represent a univariate data analysis. Our tests are best performed using multivariate regression analysis, because the above conclusions do not account for the potential interrelationships among our main variables.

Multivariate Regression Results

Table 3 reports the coefficient estimates of equation (2). Model 1 in Table 3 serves as our starting point in that we use the logarithm of the number of analysts (log (1+NA)) as a proxy of analyst coverage. In model 2, we use the number of analysts instead of the logarithm of the realisation of that proxy. Furthermore, in models 1 and 2, all observations including those with zero analyst following are used in the estimation. For robustness, we propose to drop observations with zero analyst coverage in model 3 and model 4. In Table 3, the interaction variable (CF/K*log (1+NA)) coefficients are positive and significant (at 1% level) for all models (e.g., coefficient of 0.123 with a p-value of 0.001 in the case of model 1 estimation); suggesting that enhanced analyst coverage positively impacts the association between investment and cash flow. Such evidence indicates that firms with more analyst coverage exhibit high investment-cash flow sensitivity and binding financing constraints. In other words, our findings suggest that analysts do not mitigate the underinvestment problem.

Table 3**:** Firm's financing constraints and analyst coverage: Primary results
This table presents the results of the following regression:

$$(I/K)_{i,t} = \beta_0 + \beta_1 (CF/K)_{i,t} + \beta_2 (M/B)_{i,t-1} + \beta_3 (Size)_{i,t-1} + \beta_4 NA_{i,t} + \beta_5 (CF/K)_{i,t} * NA_{i,t} + \varepsilon_{i,t}$$

Investment spending divided by total assets (I/K) is the dependent variable. Cash flow/total assets (CF/K), firm's market-to-book ratio (M/B), firm's size, analyst coverage and interaction of analyst coverage with firm's cash flow are the independent variables. In model (1), we use the logarithm of the number of analysts (log (1+NA)) as a proxy of analyst coverage. In model (2), we use the number of analysts as a proxy of analyst coverage instead of the logarithm of the realisation of that proxy. Models (1) and (2) include observations with zero analyst coverage. For robustness, we propose to drop these observations in models (3) and (4). We use log(1+NAbis) and NAbis as proxies for analyst coverage in models (3) and (4) respectively. Standard errors are adjusted for heteroskedasticity and clustering at the firm level. P-values for two-tailed tests are in parentheses. One, two or three asterisks denote significance at the 10%, 5% and 1% levels, respectively. Country, industry and year dummy variables are included but not reported

Independent Variables	Regressions including observations with zero analyst coverage		Regressions without zero analyst coverage observations	
	Model 1	***Model 2***	***Model 3***	***Model 4***
Intercept	-0.401	-0.481	-0.635	-0.811
	(0.001) ***	(0.001) ***	(0.001) ***	(0.001) ***
Cash Flow	0.271	0.351	0.379	0.448
	(0.001) ***	(0.001) ***	(0.001) ***	(0.001) ***
Market-to-Book	-0.000	-0.000	-0.000	-0.000
	(0.684)	(0.672)	(0.530)	(0.426)
Size	0.044	0.053	0.061	0.076
	(0.001) ***	(0.001) ***	(0.001) ***	(0.001) ***
NA	-0.035	-0.009	-0.037	-0.010
	(0.001) ***	(0.001) ***	(0.001) ***	(0.001) ***
Cash Flow*NA	**0.123**	**0.015**	**0.057**	**0.006**
	(0.001) ***	**0.001)** ***	**(0.001)** ***	**0.001)** ***

Country dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Adjusted R^2	0.5521	0.5397	0.5795	0.5798
N	81 939	81 939	43 673	43 673

In our primary analysis, a remaining concern is endogeneity because not all firms in our sample have analyst coverage. In fact, security analysts could self-select the firms they cover based on their financial status which will introduce a selection bias. The econometric concern here is that the residual errors in our regressions may correlate with the independent variable log(1+NA) and the interaction variable (CF/K*log(1+NA)). To mitigate this potential endogeneity problem, a Heckman model can identify the existence of this bias and address it.

Table 4: Firm's financing constraints and analyst coverage: Self-selection bias estimation
This table reports the results of the Heckman (1979) two-stage procedure. In the first stage, we specify a model of the choice of covering a firm (probit model). In the second stage we estimate equation (2). In our analysis, we use the logarithm of the number of analysts (log (1+NA)) and observations with zero analyst coverage. Regressions include country, industry, and year fixed effects. P-values for two-tailed tests are in parentheses. One, two or three asterisks denote significance at the 10%, 5% and 1% levels, respectively.

Probit model Dependent variable (Coverage)	coefficients (p-values)
Intercept	0.491 (0.001) ***
Size	0.542 (0.001) ***
RV	-0.000 (0.807)
EV	-0.003 (0.498)
TV	-0.017 (0.031) **
O	-0.005 (0.001) ***
N	27 918
Dependent variable (Investment)	
Intercept	-0.085 (0.632)
Cash Flow	0.085 (0.006) ***
Market-to-Book	-0.018 (0.073)
Size	0.177 (0.001) ***
NA	-0.099 (0.003) ***
Cash Flow * NA	-0.004 (0.632)
λ	0.252 (0.352)

N	27 918

For the Heckman's (1979) two-step estimation, we need, in the first stage, to model the choice of covering a firm through a probit model. We assume that analyst coverage is affected by the following variables: firm size, return volatility, earnings volatility, trading volume and ownership (Bhushan, 1989; Barth et al. 2001; and Chan and Hameed, 2006).

$$U_i = W_i \gamma + \upsilon_i \quad \text{(coverage decision equation)} \qquad (3)$$
$$\text{Coverage}_i = 1 \text{ if } U_i > 0 \text{ ; 0 otherwise}$$

Where U_i is an unobserved latent variable (utility of analyst i to cover a firm) and W_i is a set of variables that affect the decision of analysts to cover a firm. We don't observe U_i. All we observe is a dichotomous variable *Coverage*$_i$ with the value of one if the firm has analysts that follow its activities ($U_i > 0$) and 0 otherwise. Table 4 reports the results of the Heckman (1979) model. In the second stage estimation, the coefficient of the interaction variable (CF/K*log (1+NA)) is negative and non significant (-0.004 with a p-value of 0.632) suggesting that our primary conclusions are robust to self-selection.

Another source of endogeneity is omitted variables bias. Therefore, we propose to examine the robustness of the findings presented so far with respect to changes in model specification. We add lagged values of investment in equation (2) because prior year investment (I_{t-1}) may have explanatory power for current investment (I_t) when investment spending is not completed in one year (multi-year project). Further, as suggested by Cleary and Booth (2008), we also include lagged values of cash. The latter may have explanatory power for investment when firms build up financial slack in order to use it as a buffer against binding financing constraints. In all models (results not tabulated), the interaction variable (CF/K*log (1+NA)) coefficients are positive indicating that our conclusions are robust to endogeneity.

Further, we re-estimate our equation (2) using fixed firm and year effects. Fixed firm effects models account for time-invariant firm characteristics that are unobservable or at least difficult to measure and fixed time effects are included to capture aggregate business-cycle influences. Table 5 reports estimates of this alternative methodology. The reported firm-fixed effects estimates are obtained by demeaning the observations with respect to the firm average for each variable. Year dummies are included but not reported. Again, our primary findings remain unchanged when we re-estimate our main equation using fixed firm and year effects models instead of country and industry fixed effects models.

Table 5: Firm's financing constraints and analyst coverage: fixed firm and year effects estimation
This table presents the results of the following regression:

$$(I/K)_{i,t} = \beta_0 + \beta_1 (CF/K)_{i,t} + \beta_2 (M/B)_{i,t-1} + \beta_3 (Size)_{i,t-1} + \beta_4 NA_{i,t} + \beta_5 (CF/K)_{i,t} * NA_{i,t} + \varepsilon_{i,t}$$

Investment spending divided by total assets (I/K) is the dependent variable. Cash flow/total assets (CF/K), firm's market-to-book ratio (M/B), firm's size, analyst coverage and interaction of analyst coverage with firm's cash flow are the independent variables.
In model (1), we use the logarithm of the number of analysts (log (1+NA)) as a proxy of analyst coverage. In model (2), we use the number of analysts as a proxy of analyst coverage instead of the logarithm of the realisation of that

proxy. Models (1) and (2) include observations with zero analyst coverage. For robustness, we propose to drop these observations in models (3) and (4). All regressions include firm fixed effects and year fixed effects. Fixed firm effects account for unobserved time-invariant relations between our explanatory variables and investment spending. Year dummies are include but not reported. P-values for two-tailed tests are in parentheses. One, two or three asterisks denote significance at the 10%, 5% and 1% levels, respectively.

Independent Variables	Regressions including observations with zero analyst coverage		Regressions without zero analyst coverage observations	
	Model 1	***Model 2***	***Model 3***	***Model 4***
Intercept	-0.378 (0.001) ***	-0.386 (0.001) ***	-0.600 (0.001) ***	-0.589 (0.001) ***
Cash Flow	0.057 (0.001) ***	0.065 (0.001) ***	0.065 (0.001) ***	0.058 (0.001) ***
Market-to-Book	-0.000 (0.785)	-0.000 (0.795)	0.000 (0.982)	0.000 (0.951)
Size	0.049 (0.001) ***	0.051 (0.001) ***	0.073 (0.001) ***	0.072 (0.001) ***
NA	0.007 (0.015) **	0.000 (0.434)	-0.006 (0.207)	-0.000 (0.269)
Cash Flow*NA	**0.031 (0.001)** ***	**0.006 (0.001)** ***	**0.016 (0.001)** ***	**0.005 (0.001)** ***
Year dummies	Yes	Yes	Yes	Yes
Adjusted R^2	0.3522	0.3324	0.3477	0.3295
N	81 939	81 939	43 673	43 673

Next, we argue that it is important to ensure that our results prevail for all countries. As suggested earlier, in countries with weak governance structures and enforcement laws, it is easier for controlling shareholders and firm managers to extract private benefits from outside investors. However, in these countries, it is not clear whether security analysts stand at a disadvantage or not over insiders in accessing firm-specific information. Hence, it is plausible that our primary results may be driven by countries with weaker financial markets and governance rules. To test this argument, we partition our sample according to the level of financial markets development before estimating equation (2). The findings (not tabulated) do not support the hypothesis of a differential effect across these two markets. For instance, in the case of developed markets, the coefficients of the interaction between analyst coverage and firm's cash flow become negative and non significant while the same coefficients remain positive and significant for emerging markets. Based on these findings, it seems that financial analysts have a neutral impact on financing and investment distortions for firms originating from developed markets. On the other hand, analyst coverage seems to increase firm's financing constraints in emerging countries. In sum, these additional results indicate that analysts do not alleviate firm's financing constraints in both developed and emerging markets. We also classify firms according to their country legal status and accounting standards. As suggested earlier, our measures of legal status and accounting standards are, respectively, the anti-director rights index from Djankov et al. (2008) and an accounting index that rates companies annual reports for their inclusion or exclusion of 90 items (see Doidge et al. 2004 for a discussion). Countries with scores above the median for both

indexes fall into the category with strong protection of minority investors and strong disclosure rules.

Again, analyst activities do not produce different effects between countries with strong legal institutions and countries with weak legal institutions (results not tabulated). The same conclusion holds when we partition our sample into subsamples arranged by accounting standards.

Conclusion

This paper examines how analysts' activities impact firm's financing constraints. If security analysts primarily facilitate the incorporation of firm-level information into stock prices, we should expect a reduction in informational asymmetries between market participants, which will contributes to relax firm's financial constraints. Our analysis is based on models of capital market imperfections that show that information asymmetry increases the sensitivity of investment to fluctuations in internal cash flow. In particular, we use the relation between investment and cash flow to test the presence and extent of firm's financing constraints. According to Fazzari et al. (1988), when the wedge between internal and external cost of capital is large, firms are considered as financially constrained because they are effectively rationed in their access to external funding. As a result, internal capital will impact investment and we can interpret greater investment-cash flow sensitivity as evidence that firms are facing binding financial constraints.

We document two main findings. First, the relation between our proxy of firm's financing constraints and analyst coverage is positive and significant in most cases (in some cases, the association is non significant), suggesting that analysts' activities do not allow outside investors to better assess firm's investment opportunities. This result is robust to many aspects of our methodology. Second, additional analysis provides evidence indicating that analysts' activities do not produce different impacts depending on the country's institutional environment. In fact, the positive or neutral associations between analyst coverage and firm's financing constraints prevail for countries with strong or weak institutions. Our results support the findings of Piotroski and Roulstone (2004), Chan and Hameed (2006), and Doukas et al. (2008). In summary, the main conclusion of this paper is consistent with the view that companies do not profit from analysts' activities.

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