Does Analyst Coverage Promote or Impede Corporate Innovation: Evidence from an Emerging Market

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Abstract: How analyst coverage impacts firms' innovation remains unknown ex ante. Information hypothesis predicts the positive direction while and performance pressure hypothesis predicts the negative direction. In this paper, we examine this question in the context of China. Our baseline result shows that companies covered by abundant analysts generate more innovation. We validate the robustness of the result in an instrumental regression design. This study sheds light on the determinant of innovation in emerging market.

1. Introduction

Technological innovation has become a decisive factor in maintaining and driving sustainable economic development. Innovation not only plays a pivotal role in optimizing the production process, improving the production mode and enhancing the production efficiency (Hsiao, 2014), but also introducing new technologies and promoting the sustainable economic development (Romer, 1990). Among many innovation subjects, the innovation activities of enterprises not only have the highest efficiency and the lowest cost, but also have the most diverse innovation points. Therefore, how to improve the level of enterprise innovation, promoting innovation-driven development strategy, for the long-term sustainable development of the economy is crucial.

Previous studies have shown that there are many factors affecting enterprise innovation, including corporate governance structure (Chemmanur et al.,2014; Manso,2011) and other internal factors, including the regional protection system (Acharya et al., 2013) External factors such as financial market development (Hsu et al.,2014), and banking competition (Cornaggia et al.,2015). In this paper, we study another determinant of innovation, *analyst coverage*.

Ex-ante, whether analyst coverage increases or decreases innovation cannot be solely predicted by theory, so this is an empirical question. Theoretically, there are two opposing hypotheses on corporate innovation, namely, the information disclosure hypothesis and the performance pressure hypothesis. The information disclosure hypothesis holds that analyst coverage reduces the information asymmetry on innovation between managers and shareholders and therefore promotes enterprise innovation. Information analysts tend to disclose more information on enterprise value to the managers and decrease the degree of information asymmetry between management and outsiders. With the help of information analysts, entrepreneurs prefer to choose long-term investments with a positive net present value and innovate more, because analysts help them to reduce the financing costs and relieve some agency problems.

Another competing hypothesis, the performance pressure hypothesis holds that the attention of analysts will also increase short-term performance pressure of enterprise management. Due to fierce competition in professional manager market, managers may tend to reduce the risk investment after weighing risks and returns to meet the forecast performance predicted by financial analysts, since these behaviors will damage long-term's profitability.

Prior works of literature (He et al., (2013) have tested the impact of analyst coverage on enterprise innovation in the mature capital market, the US market. They find that analyst's attention hindered innovation, which in turn supported the performance-pressure hypothesis.

However, different from the U.S. capital market which is more mature and characterized with

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highly dispersed equity and high liquidity, China's capital market has its remarkable characteristics. First, the equity structure of listed companies in China is relatively concentrated, and the equity liquidity of major shareholders is relatively low. Aghion et al. (2013) pointed out that the presence of major shareholders would reduce the short-sighted behavior of management under market pressure.

Second, compared with the U.S. capital market where rule of law and the protection of property rights are complete and well-developed, China's capital market lack such elementary institutional foundation, despite that fact it has expanded rapidly over past decades. With the continuous expansion of the scale of securities brokers and analysts, analysts' attention to listed companies improves information transparency and the operational efficiency of the capital market in China.

Third, corporate governance and external factor markets are still imperfect in China. These characteristics determine that the applicability of the two competing assumptions of information disclosure and performance pressure in emerging capital markets may differ from the US, that is, the governance role of analysts may be greater than performance pressure. Therefore, it is theoretically and practically significant to study the relationship between Chinese analysts' attention and enterprise innovation.

This paper intends to examine whether analysts' attention can promote or inhibit enterprises' technological innovation in the emerging capital market like China. We collect listed companies in the non-financial industry in the year of 1999-2015 as a sample and collect the number of patent applications of the sample companies by hand. Using empirical analysis approach, we examine the effect of analyst coverage on firm innovation and test our hypothesis. We use the number of patent applications (and eventually granted) to measure the firm's innovation and use the number of analysts who issue profit forecasts of a firm to measure analyst's coverage. Our results showed that the higher the analyst's attention, the more patents the company produced in the later period. This suggests that analysts' attention promotes technological innovation.

This paper may make theoretical contributions from the following three aspects: first, there are few direct empirical studies on the technological innovation of enterprises on which Chinese analysts pay attention. The emergence of this paper enriches and expands the research on the influencing factors of enterprise innovation under the institutional environment of the emerging capital market. Second, it expands the research that analysts' governance effect in the emerging capital markets. At present, there is little literature examining the role of analysts in innovation in emerging capital markets. Using data from China's capital market, this paper finds that analysts' attention can promote enterprise innovation, which indicates that in emerging capital markets, analysts' attention can play an information governance role. Therefore, this paper expands the research on the economic consequences concerned by analysts in emerging markets from the perspective of enterprise innovation. This would help regulators understand that there are positive sides of analysts in China's capital markets and this would provide the theoretical basis and decision-making basis for government departments to make relevant policies.

2. Literature review& hypothesis development

Empirical evidence shows that many factors affect corporate innovation. For example, Subramanian, Baghai and Acharya (2013) indicate that the dismissal law can foster innovation and encourage companies to invest in risky but pioneering projects. In addition, Aghion, Reenen and Zingales (2013) suggest that greater institutional ownership leads to more innovation. The company might be more innovative when the company is under high debt pressure (Aghion et al.,2002). At the same time, they find that competition is a double-edged sword. It can increase the incremental profits brought about by innovation; on the other hand, competition can also reduce the innovation motivation of laggards. Further, overconfidence may help CEOs take advantage of innovative growth opportunities because they might focus more on innovation investment and can have a high possibility of achieving greater innovation success (Hirshleifer et al.,2011). Contrary to promoting innovation, Acharya and Subramanian (2009) argue that the creditor-friendly code will lead to a relatively low level of corporate innovation. When bankruptcy laws are creditor-friendly, excessive liquidation may lead to less innovation for leveraged companies (Acharya & Subramanian,2009) Moreover, the

synergy obtained by combining innovation capabilities might be a driving force for acquisitions (Bena & Li, 2012). Investors are also associated with innovation when making investment decisions. Tian and Wang (2011) find that IPO companies backed by more fault-tolerant venture capitalists are more innovative. Similarly, Nanda and Kropf (2012) argue that venture capitalists invest in riskier and more innovative startups in hot markets, while companies backed by corporate venture capital (CVC) are more innovative (Chemmanur et al.,2013). In addition, Acharya and Xu (2016) suggest that public companies in industries that rely on external finance spend more on R&D than private companies and produce a better patent portfolio.

According to the existing literature, analysts are information intermediaries by discovering information other than company disclosures and clarifying and confirming company disclosures (Huang et al.,2017). The reduction in coverage will have a negative effect on the quality of financial reports (Irani & Oesch.,2012). Similarly, Li in 2006 found that companies with lower income with annual reports that are more difficult to read while companies with easy-to-read annual reports usually had more permanent positive earnings, which indicates that managers may choose the readability of the annual report to hide unfavorable information from investors. Similarly, Derrien and Kecskes (2012) argue that compared with similar companies, a company that loses an analyst will reduce its investment by 1.9% of its total assets and its financing will reduce its total assets by 2.0%. This result is especially correct for companies that are relatively small and have a small coverage of analysts with severe information asymmetry and financial constraints. Moreover, If the company's operations are supervised by more analysts, the less the company could manage their earnings. The more experienced analysts have more obvious effects on earnings management (Yu,2007). Furthermore, Huang, Zang, and Zheng (2014) find that investors reacted more strongly when there was negative news, which shows that analysts play a significant role in spreading bad news. However, Asquith, Mikhail, and Au (2003) have shown through data analysis and research that there is no correlation between valuation methods and analyst accuracy or market reaction to the report. Two years later, Asquith, Mikhail and Au (2005) came to the same conclusion by investigating the correlation between market earnings and the content of security analyst reports with the results of no correlation between valuation methods and analyst accuracy.

Financial analysts collect information from different sources and make predictions about firms' prospects. Equity holders by acquiring information from financial analyst to gain the same information as corporate insiders. Firms investing largely on innovation cause a huge degree of information asymmetry between managers and equity holders: due to the confidentiality obligation before any important information disclosed in the research and development process, managers usually make only fractional disclosure on the detail of the program and have acquired more information than equity holders. Meanwhile, they are acquainted with innovators' knowledge, skills, competencies and progress. However, due to the limitation of professional competence and knowledge, equity holders gain little about firm innovation. They are unable to make accurate estimation at the true value of innovation program, resulting in the firm be undervalued. Financial analysts usually use their special skills to collect, evaluate, send and forecast the potential long-term factor of innovation. If analysts could accurately deliver a firm's innovative activities to equity holders and mitigate information asymmetry to help them understand the true value of innovation, managers would invest more in innovation. Based on this logic, we make the following hypothesis:

Hypothesis 1a: financial analysts, by providing excessive information for equity holders, mitigate managerial myopia and encourage firm innovation.

Financial analysts often create excessive short-term pressure on managers, encouraging managers to choose short-term investment and reduce the investment on innovation. Innovation is a long-term, high-risk, huge expense and unpredictable investment. Therefore, outsider investors, either equity holders or debt holders, have much less knowledge of the long-term value of innovation to the firm than the insiders, the managers. If managers make an investment on innovation, the short-term expense would increase, which might not generate immediate financial returns. It may cause book value of the firm, earning per share, declines. When financial analysts make earnings forecasts, the firm would hard to meet or beat analyst forecasts due to decrease of earning per share. Existing

literature suggests that these are a negative signal of the whole market, causing a negative reaction in the stock market and decrease the value of the firm. In order to achieve financial analysts' earnings, forecast, managers prefer to choose some short-term, predictable investments, reducing the investment on innovation. Therefore, our second hypothesis argues that financial analysts, by making pressure on managers, lead managers to select some short-term, predictable investment, decreasing the investments on innovation. Based on this logic, we make the following hypothesis:

Hypothesis 1b: financial analysts create pressure on manages, resulting in less innovation.

3. Sample selection and summary statistics

The sample used in this study includes companies that were listed in China from 1999 to 2015. We find the necessary data from the CSMAR database, such as analyst coverage data and the latest version of the patent citation database to collect the company's annual patent and citation information. The following Table1 shows in detail the sample distribution during the observation period. The final sample selection process ended with the 27,585 company annual observations used in the baseline regression.

Table 1: Sample Distribution

Year	Frequency	Percentage
1999	902	3.27
2000	1037	3.759
2001	1106	4.009
2002	1155	4.187
2003	1216	4.408
2004	1307	4.738
2005	1311	4.753
2006	1339	4.854
2007	1401	5.079
2008	1517	5.499
2009	1622	5.88
2010	1946	7.055
2011	2221	8.051
2012	2382	8.635
2013	2360	8.555
2014	2402	8.708
2015	2361	8.559

3.1 Variable measurement

Based on previous research literature on innovation, 14 vectors of company and industry characteristics that may affect the company's future innovation productivity are introduced in this article. The 14 variables are as follows: 1. *LnPatent* 2. *LnAnalyst*; 3.*Firm size* (the natural logarithm of book value assets); 4. *Return on Assets* (ROA); 5. *Leverage*; 6. *Tangibility* (asset tangibility); 7. *Managers' Holding*; 8. *Tobin's Q* (growth opportunities); 9. *Loss*; 10. *Age of firm* (the number of years since the initial public offering (IPO) date); 11. *Current Ratio;* 12. *R&D Intensity*; 13. *Institutional Ownership*; 14. *Expected LnAnalyst*. The detailed variable definitions will be provided in Table 2.

Table 2: Variable definition

Variable	Definition
LnPatent	Natural logarithm of one plus firm i's total number of patents filed (and eventually granted) in year t
LnAnalyst	Natural logarithm of the 12 monthly numbers of earnings forecasts for firm i extracted from the Institutional Brokers' Estimate System summary file over fiscal year t
Ln Expected Analyst	Natural logarithm of the sum of expected analyst coverage from all brokers covering firm i in year t, where the expected coverage from broker j is the product of the analyst coverage from broker j for firm i in year 0 and the ratio of broker j's size (total number of analysts employed by the broker) in year t to broker j's size in year 0

Table 3: Summary Statistics for Main Regression

	N	Mean	St.Dev	p25	Median	p75
LnPatent	27585.000	1.652	1.800	0.000	1.099	3.045
LnAnalyst	27585.000	0.807	1.040	0.000	0.000	1.609
Firm Size	27585.000	21.571	1.241	20.727	21.411	22.229
ROA	27585.000	0.031	0.076	0.012	0.035	0.062
Leverage	27585.000	0.472	0.268	0.302	0.462	0.618
Tangibility	27585.000	0.420	0.185	0.285	0.415	0.553
Managers' Holding	27585.000	0.747	0.435	0.000	1.000	1.000
Tobin's Q	27585.000	2.148	1.999	0.894	1.579	2.700
Loss	27585.000	0.110	0.312	0.000	0.000	0.000
Age of Firm	27585.000	11.921	5.549	8.000	12.000	16.000
Current Ratio	27585.000	2.208	2.836	0.980	1.418	2.251
R&D Intensity	27585.000	0.008	0.014	0.000	0.000	0.012
Institutional Ownership	27585.000	25.217	24.948	1.345	17.758	44.926
LnExpected Analyst	27585.000	0.768	1.008	0.000	0.000	1.595

Table3 provides summary statistics for the main regression. To minimize the influence of outliers, we have adjusted all the independent variables of the 1st and 99th percentile.

On average, a firm obtains 1.65 patents per year with an average *LnAnalyst* of 0.8 according to our sample statistics. In addition, by analyzing other variables in table3, we also find that on average a company's *Firm size* is 21.5, Return on Assets (ROA)is 3.1%, *leverage* ratio is 47.2%, *Tangibility* is 42%, *Managers' Holding* is 74.7%, *Tobin's Q* is 2.148, *Loss* is 11%, *Current Ratio* is 2.2, *R&D Intensity* is 0.8%, and *Institutional Ownership* is 25.2. Besides, the sample companies have an average history of 11.9 years from the date of the initial public offering.

4. Model, Main Regression & IV Regression

4.1 Model & Main Regression

We are exploring the effect of the analyst coverage on the firm's innovation. We speculate different factors using the ordinary least square (OLS) and the model is showed as follows:

$$LnPatent_{i,t+3} = \alpha + \beta LnCoverage_{i,t} + \gamma Z_{i,t} + Firm_i + Industry_i + Year_i + \epsilon_{i,t}$$

Where *i* indexes the firm *i* and *t* indexes time. In this model, *LnPatent* is the dependent variables, we use it as the proxy variables for innovation. To speak specifically, *LnPatent* is equal to the natural logarithm of one plus the number of patents applications and then eventually granted. Since the patent applications, or in other words, innovation, is a relatively long process, the effects of the current analyst's attention are likely to be gradually reflected in the next few years. Therefore, in the model, we take the dependent variables 3 periods ahead of other variables. *LnCoverage* is the main explanatory variable in this article. It represents the degree to which company *i* received analyst

attention in period *t*. It is equal to the natural logarithm of the 12 monthly numbers of earnings forecasts for the firm *i* over the fiscal year *t*. The higher value of *LnCoverage* indicates the more attention of the company receives from analysts.

Z is a vector and consist of all control variables that may affect the innovation of the enterprise, including firm and industry characteristics, which are lists in table2. Controlling these variables is more conducive to obtaining correct conclusions, so as to avoid the endogeneity caused by missing variables as much as possible problems. In addition to that, referring to the common practice in related literature, we also control the company fixed effect, the industry fixed effect and the year fixed effect in the model. Finally, the standard error of the regression has been adjusted by clustering at the company level. Based on our previous analysis, we consider that analyst attention will effectively promote corporate innovation, so we expect the value of β to be positive.

Table 4: The Effect of Analyst Coverage on Innovation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep var. =				LnPatent			
LnAnalyst	**0.471*** (18.17)**	**0.431*** (21.93)**	**0.164*** (9.59)**	**0.100*** (6.04)**	**0.121*** (8.48)**	**0.050*** (3.60)**	**0.037*** (2.72)**
Firm Size			0.472***	0.474***		0.263***	0.252***
			(21.34)	(21.38)		(10.78)	(10.44)
ROA			0.747***	0.556***		0.068	0.066
			(3.82)	(3.00)		(0.50)	(0.49)
Leverage			-0.146**	-0.100		-0.019	-0.014
			(-1.99)	(-1.44)		(-0.36)	(-0.26)
Tangibility			-0.295***	-0.299***		-0.055	-0.057
			(-3.30)	(-3.45)		(-0.74)	(-0.79)
Tobin's Q			0.048***	0.041***		0.043***	0.040***
			(5.61)	(4.79)		(6.61)	(6.21)
Loss			-0.072*	-0.071**		0.008	0.006
			(-1.96)	(-1.97)		(0.29)	(0.21)
Age of Firm			-0.015***	-0.010**		0.024	0.014
			(-3.57)	(-2.48)		(0.22)	(0.13)
Current Ratio			-0.019***	-0.020***		-0.004	-0.002
			(-3.79)	(-4.11)		(-0.98)	(-0.49)
R&D Intensity				19.216***			5.470***
				(15.49)			(4.71)
Managers' Holding				0.129***			0.119***
				(3.73)			(3.84)
Institutional Ownership				0.003***			0.002***
				(4.08)			(3.12)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	/	Yes	Yes	Yes	/	/	/
Firm FE	/	/	/	/	Yes	Yes	Yes
Observations	27,585	27,585	27,585	27,585	27,585	27,585	27,585
Adj. R-Square	0.280	0.467	0.527	0.541	0.721	0.725	0.726

As shown in Table 4, we have run seven regressions. In each regression, we added different control variables or controlled different fixed effects. This will help us to obtain more accurate conclusions and to the maximum extent to avoid the problem of spurious regression.

To speak specifically, in regression (1) and regression (2), we only added the main explanatory variable *LnCoverage*. The difference of regression (1) and regression (2) is that, in regression (1), we only controlled the year fixed effect, while in regression (2), we controlled the year fixed effect and the industry fixed effect both by adding industry dummy variables. In column (1) and column (2) of table 4, the value of *LnCoverage* is 0.471 (with t-value=18.17) and 0.431 (with t-value=21.93) respectively, which are both significantly positive at the 1% significance level. It verified our previous hypothesis that analyst coverage has a significant positive effect on corporate innovation. The higher

the analyst attention, the stronger the innovation. To make more accurate results, we added some control variables into the regression that characterize corporate financial information and that characterizes corporate R&D investment, shareholder holdings, and institutional investor holdings based on regression (1) and regression (2) and control the year fixed effect and industry fixed effect at the same time, finally get the results of column (3) and column (4) In column (3) and column (4), the coefficients of *LnCoverage* are 0.164 (t-value=9.59) and 0.100 (t-value=6.04), which are also significant at the 1% significance level, indicating that the after controlling other variables that affect corporate innovation, analysts' coverage still has a positive effect in promoting corporate innovation capabilities.

At the same time, in columns (3) and (4), we find that the coefficients of the two variables *Firm Size* and *ROA* are also significantly positive at the 1% significance level, indicating that firms with larger size and stronger profitability are more innovative. And the coefficients of *Leverage*, *Loss* and *Age of Firm* are significantly negative, indicating that firms which operate long and with high debt ratio and serious loss, have a low possibility to make innovations. The above research results are consistent with the research of He & Tian (2013), Subramanian, Baghai and Acharya (2013), Acharya and Xu (2016).

In regressions (5), (6), and (7), we repeated the previous experiments. The difference is that we replaced industry fixed effects with firm fixed effects. Including firm fixed effects removes the effects of time-invariant omitted variables. The results obtained are shown in columns (5), (6), (7) in Table 4. As is demonstrated in Table 4, the coefficients of some control variables are no longer significant, but the coefficients of the main explanatory variable of our main interest, *LnCoverage* are still significantly positive. The results strengthen the robustness of our finding.

Overall, our analysis suggests that the influence of analyst coverage on corporate innovation is positive.

4.2 Endogeneity Problem and IV regression

4.2.1 Endogeneity problem

The endogeneity concern of reverse causality exists in that a firm's increased innovation could attract more financial analysts to cover this firm. Therefore, the positive relationship between *LnPatent* and *LnAnalyst* does not necessarily come from the theoretical analysis that we propose. And both other variable and our regression method could create endogeneity problems, so in order to make our regression more precisely, we construct two instrumental variables for *LnAnalyst* and use the 2SLS model to correct the potential bias.

According to Yu's (2008) research, we capture the expected coverage. Yu's research proved that a larger broker can cover more company, and they use brokers to measure the broker's scale. We use the same calculation to estimate the expected broker coverage, the formula just as below:

$$LnExpected\ Broker\ Coverage_{itj} = \left(Brokersize_{jt}/Brokersize_{j0}\right) * Broker\ Coverage_{ij0}$$

and

$$LnExpected\ Broker\ Coverage_{it} = \sum_{j=1}^{n} Expected\ Broker\ Coverage_{itj}$$

$Brokersize_{j,t}$ measured by the number of hired analysts at the time *t* of $Broker_j$. $Brokersize_{jt}/Brokersize_{j0}$ measures the change of the broker's size, whether it is expansion or contraction compared to the base year. $Broker\ Coverage_{i0}$ is a dummy variable to measure whether firm *i* is tracked by broker *j* in the base year. $\text{LnExpected Broker Coverage}_{itj}$ measures how many coverage firm *i* get from broker *j* in year *t*. $LnExpected\ Broker\ Coverage_{itj}$ means the whole expected coverage of firm *i* get from all brokers in year *t*.

After defining the expected broker coverage, we then use the 2SLS regression model to test the effect of broker coverage. The 2SLS regression model could separate into two-stage as below:

$$LnCoverage_{it} = \phi_1 IV_{it} + \ + \phi_4 Controls_{it} + \eta_{it}$$

$$Ln\ Patent_{it} = \beta_1 \widehat{LnCoverage}_{it} + \beta_4 Controls_{it} + \varepsilon_{it}$$

As the name implies, the 2SLS estimation method is divided into two steps. In the first step, we use the above method to construct an instrumental variable (IV), and use the instrumental variable and other control variables as explanatory variables, and use *LnCoverage*, which is defined in the previous part, as the explained variable to make the first-stage regression. After we get the value of beta, we use them to estimate the predicted value of *LnCoverage*. In the second step, we use the *LnCoverage* which is predicted in the first step as the independent variable, and *Lnpatent* as to the dependent variable, to run another regression. Then we can get the value of beta that ruled out the potential endogenous. Using this method to exclude endogeneity is a common practice in the literature.

4.2.2 IV regression.

Table 5 reports the 2SLS regressions of the innovation outcome variables (three-year-ahead number of patents) on *LnAnalyst*, with *expected analyst coverage* (*ExpCoverage*) as the instrumental variable. The first-stage regression generates the fitted (instrumented) value of *LnCoverage* for use in the second-stage regression (as is shown in the column (1)). Each regression includes the year and firm effects. Robust standard errors clustered by firm displayed in parentheses. The adjusted R-square for the first-stage regressions is a pooled one, and the reported R-square for the second-stage regression is a within-firm one. The results in the table below tell us that our previous results are robust, analysts' coverage promotes effectively corporate innovation activities.

Table 5: IV Regression: The Effect of Analyst Coverage on Innovation

	(1) Ln Analyst	(2) Ln Patent
(Instrumented) Ln Analyst		**0.044***** **(3.18)**
Ln Expected Analyst	**1.026***** **(1,076.10)**	
Firm Size	0.005*** (4.32)	0.260*** (10.76)
ROA	0.021** (2.21)	0.084 (0.62)
Leverage	-0.016*** (-4.90)	-0.011 (-0.22)
Tangibility	0.008* (1.85)	-0.056 (-0.77)
Managers' Holding	-0.004** (-2.00)	0.121*** (3.90)
Tobin's Q	0.004*** (8.35)	0.042*** (6.45)
Loss	-0.000 (-0.02)	0.006 (0.23)
Age of Firm	0.007 (0.94)	0.018 (0.18)
Current Ratio	-0.001*** (-4.14)	-0.002 (-0.60)
R&D Intensity	-0.300*** (-4.15)	5.461*** (4.69)
Year FE	Yes	Yes
Firm FE	Yes	Yes
Observations	27,585	27,585
Adj. R-Square	0.994	0.023

5. Conclusion

In this paper, we take listed companies in the non-financial industry in the year of 1999-2015 as a sample and collect the number of patent applications of the sample companies by hand.

By using an empirical analysis approach, we examine the effect of *analyst coverage* on firm innovation and test our hypothesis. We refer to related documents and use the number of patent applications of enterprises to measure the innovation strength and innovation ability of a corporate, Also, we use the number of analysts who publish profit forecasts to measure the degree of analyst attention, by using the least square method to test our hypothesis.

We find that firms covered by a larger number of analysts generate more patents. In other words, Companies that paid more attention to security analysts have stronger innovation capabilities and produce more output.

To control potential endogeneity, we construct an instrument for *LnAnalyst* and use the 2SLS approach to correct for the potential bias due to endogeneity in *LnAnalyst.* The instrument we use is expected coverage, introduced by Yu (2008) and Jie et al. (2013), which captures the change of brokerage house size. The exclusion restriction holds because the size of a brokerage house, usually depends on the change of the brokerage's revenue and is unlikely to be related to the innovation output of firms that it covers. Accordingly, the change of coverage that is driven by the change of brokerage house size causes plausibly exogenous variation that helps us to identify the direction of causality.

When we use the instrumental variable (IV) and 2SLS regression approach to re-estimate previous results, we find that the main results remained the same. Compared with other companies, the innovation ability of companies that are followed by abundant security analysts is stronger. Especially for small and medium-sized enterprises and private enterprises, analysts' attention has significantly relieved the financing constraints of innovative activities. This promotes corporate innovation.

Innovation is one of the most important driving forces of economic growth. The results of this paper show that in such emerging capital markets as China, analysts' coverage can alleviate capital market information asymmetry, reveal the value of corporate innovation activities, and enable management in the firm to invest more in long-term risky projects, thereby promoting firm's innovation output. As a result, the construction of professional financial intermediaries, which is an essential part of a developed financial market, contributes to promoting corporate innovation and spurring economic growth. In this sense, our conclusion not only appeals to the analysts' attention and the research of corporate innovation but also help regulators to understand the active role of analysts in emerging capital markets.

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