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Available online at www.sciencedirect.com

ScienceDirect

ISSN 1755-3091

Production and hosting by Elsevier
Radarweg 29, 1043 NX Amsterdam, The Netherlands

ISSN 1755-3091

© China Journal of Accounting Research

Founded by Sun Yat-sen University and City University of Hong Kong

Sponsored by:  Hong Kong Institute of
Certified Public Accountants
香港會計師公會

Published quarterly in March, June, September, and December

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China Journal of Accounting Research has been indexed by Emerging Sources Citation Index (ESCI), Cabell's Directory, Scopus, CNKI, Australian Business Deans Council (ABDC) Journal Quality List and Excellence in Research for Australia (ERA) Journal List.

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CHINA JOURNAL OF ACCOUNTING RESEARCH

Volume 11/1 (2018)

Available online at www.sciencedirect.com

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The effect of corporate culture on firm performance: Evidence from China



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ARTICLE INFO

Article history:

Received 11 May 2017

Accepted 11 January 2018

Available online 5 March 2018

Keywords:

Corporate culture promotion

Firm performance

China

ABSTRACT

This study examines whether corporate culture promotion affects firm performance in China in terms of firm market value, firm financial performance and innovation output. We find consistent evidence that corporate culture promotion is negatively related to firm market value, positively related to innovation output and not significantly related to firm financial performance. In addition, the negative effect of corporate culture promotion on firm market value is driven by small firms and firms located in less developed provinces. Furthermore, we find that some specific corporate culture promotions, such as innovation culture promotion and integrity culture promotion, are not related to firm value or financial performance. However, innovation culture promotion is positively associated with innovation output.

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1. Introduction

Corporate culture is “a set of norms and values that are widely shared and strongly held throughout the organization” (O’Reilly and Chatman, 1996; Guiso et al., 2015). In a controversial *New York Times* op-ed, former Goldman Sachs vice president Greg Smith attributes Goldman Sachs’s previous success to its good culture promoting teamwork, integrity and humility, and in his book he blames its transformation from a partnership into a publicly traded company for the disappearance of this culture (Guiso et al., 2015). In a recent survey of 1461 North American CEOs and CFOs, Graham et al. (2017) find that 91% of executives view culture as very important at their firms, and that 78% consider culture as one of the top 3 or 5 factors that

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affect their firms' value. The authors also point out that empirical evidence on whether and how corporate culture affects firm value and corporate decision making is underexplored.

In this paper, we study whether and to what extent corporate culture, as captured by the intensity of corporate culture promotion through the Internet, affects the firm performance of China's privately listed companies in terms of market performance, financial performance and innovation performance.¹ In China, state-owned companies are controlled by the government, and their cultures are shaped by the political climate. In contrast, privately listed companies are publicly owned and can nurture their own cultures as they wish according to their own characteristics and purposes. Thus, we focus on China's privately listed companies to study the impact of corporate culture on firm performance.

Aside from anecdotal evidence, prior studies find some empirical evidence that corporate culture affects corporate decision making and firm performance. For example, Ahern et al. (2015) find that the volume of cross-border mergers and the combined announcement returns are lower when countries are more culturally distant in terms of trust and individualism. Corporate culture can also affect corporate reporting behavior. For example, Braguinsky and Mityakov (2015) argue that firms from developed countries have a culture of transparency, and that foreign-owned companies in Moscow are less likely to misreport their employees' earnings due to this transparency. Overall, both anecdotal and empirical evidence shows the important role that corporate culture plays in corporate behavior and firm performance.

However, culture can take different forms. Firms usually choose to *promote* corporate culture according to their firm characteristics. For example, high-tech companies, such as Apple, promote a culture of innovation, while customer-oriented companies, such as Walmart, promote a culture of integrity. Although Apple and Walmart promote two different cultures, they each promote a culture tailored to their own purposes. It is difficult to say that innovation culture is superior to integrity culture, or vice versa. This is similar to cultures across different countries. Deshpandé and Farley (2004) find that although cultural components differ across countries, the differences of mean and slope for the effect of organizational culture on firm performance across countries are not significant. For example, Japan and the United States may have different types of organizational culture, but neither leads to better performance than the other.

In addition, it has been understood that the relationship between corporate culture and firm performance may be more than a simply direct association, and may be contingent on corporate strategies and environment changes (Sørensen, 2002; O'Reilly et al., 2014). For example, integrity may be identified as a firm's culture, but whether this integrity culture is associated with firm value depends on corporate strategies and specific circumstances (O'Reilly et al., 2014). For example, integrity culture may be important in terms of stock market valuation if the firm's competitors are known to be fraudulent (e.g., Greve et al., 2010). Thus, we argue that the strength of overall corporate culture is more important than what kinds of culture firms promote. However, one challenge for empirical studies is how to quantify the strength of corporate culture. It is reasonable to expect that if a firm more publicly promotes and emphasizes its corporate culture, the strength of its corporate culture will be higher. Therefore, in this paper, we try to answer the question of whether corporate culture matters by examining the relation between the corporate culture promotion level and firm performance.²

To capture the level of corporate culture promotion, we hand-collect data from Chinese companies' websites in 2014 and conduct a factor analysis. Words are worth nothing if they are not matched by actions; at the same time, good actions without marketing may be underestimated by the market. Thus, in this paper, we measure corporate culture promotion by both words and actions, considering CEO speeches, culture web-

¹ Two types of companies exist in China's stock trading market: privately listed companies and state-owned firms. Although state-owned firms can be traded in stock exchanges, they are subject to many trading constraints. Usually, only a small portion of shares of state-owned companies can be freely traded. In contrast, privately listed companies in China are closer to what are considered publicly traded firms in the United States. In contrast, most if not all shares of privately listed companies can be freely traded in China's stock exchanges. Therefore, privately listed companies are public-owned firms, as opposed to state-owned firms.

² To verify that the promotion of certain types of culture does not affect firms' performance in terms of Tobin's Q or return on assets (ROA), we test the effect of hand-collected specific cultural information, integrity and innovation culture indicated in firms' slogans on firm performance. We find the same results as Guiso et al. (2015): neither integrity culture promotion nor innovation culture promotion significantly affects firm performance. We discuss this in detail later in the paper.

pages, employee activities, social responsibility, honors earned, employee training programs, company news and media exposure.³

Using factor analysis to measure corporate culture promotion, we find that strong corporate culture promotion has a negative impact on firm value as captured by Tobin's Q, a positive impact on innovation output as captured by the number of patents and no significant impact on financial performance as captured by ROA. The negative impact of corporate culture promotion on firm value indicates that the capital market does not appreciate corporate culture promotion and regards it as an avoidable expense that firms could allocate to other investments that benefit shareholders. The positive relation between corporate culture promotion and innovation output seems consistent with the prior argument that corporate culture facilitates coordination and cooperation among employees and consequently improves innovation.

In further cross-sectional tests, we find that the negative impact of corporate culture promotion on firm value is driven by small firms and firms located in less developed provinces in China. The results indicate that the relation between corporate culture promotion and firm value is not homogeneous. Specifically, shareholders view corporate culture promotion negatively only for small firms and firms in less developed areas.

We conduct a series of sensitivity tests and find similar results. First, we test the effect of corporate culture promotion on firm performance using the culture page indicator alone instead of the common factor extracted from the eight culture promotion dimensions mentioned above. The culture page is directly related to the promotion of corporate culture because it is a webpage dedicated only to nurturing corporate culture. We find consistent results using this culture page indicator. Specifically, we continue to find that corporate culture promotion is negatively associated with firm value, positively associated with innovation output and insignificantly associated with financial performance. Second, we use the number of words on the culture page to proxy for the intensity of corporate culture promotion. More words on a firm's culture page indicate that the firm puts greater efforts into its culture promotion. We continue to find consistent results with this alternative measure of corporate culture promotion. Third, we aggregate the hand-collected culture indicators and regress firm performance on the natural logarithm of aggregated culture indicators, and find consistent results.

Our paper contributes to the corporate culture literature. To our knowledge, we are the only study besides Guiso et al. (2015) to use the *advertised* value on firms' websites to quantify corporate culture promotion. Corporate culture is an abstract concept and is difficult to measure. Firms' websites provide a possible way to transfer this abstract concept to a quantitative measurement. However, our paper differs from Guiso et al. (2015) in that we do not study one specific culture promotion, such as integrity culture. Instead, we study the overall level of corporate culture promotion, regardless of the specific culture promotion, because we believe corporate culture promotion is tailored to a firm's own purposes. Thus, we also contribute to the corporate culture literature by highlighting that in terms of firm performance, including firm value, financial performance and innovation output, a specific corporate culture does not matter as much as the commitment a firm makes to nurturing whatever corporate culture it chooses, assuming the firm promotes a corporate culture tailored to its needs.

The rest of the paper is organized as follows. Section 2 reviews the related literature. Section 3 describes the data and methodology. Empirical analyses are conducted in Section 4. Section 5 provides a discussion and concludes the paper.

2. Related literature and predictions

2.1. Definition of corporate culture

There is no universal definition of corporate culture. Smircich (1983) categorizes five groups of organizational cultures in her review. This paper does not attempt to resolve the subtle differences between those definitions, but instead attempts to further understand the relationship between corporate culture and firm performance. Thus, we use the same definition of culture as in Guiso et al. (2015): we define culture as "a set of norms and values that are widely shared and strongly held throughout the organization" (O'Reilly

³ The measurement of corporate culture promotion is described in detail in the research design section.

and Chatman, 1996; Guiso et al., 2015). This definition indicates that culture is not only verbally shared but also practically held with actions in a firm.

Similarly, Reichers and Schneider (1990) indicate that “culture implies there is a system of shared norms and values and a set of common practices in an organization.” House et al. (2004) define culture “as referring to both norms and practices.” Thus, when we measure culture, we use both marketed culture and practical actions to proxy for corporate culture. Schein (1991) emphasizes that organizational cultures “provide group members with a way of giving meaning to their daily lives, setting guidelines and rules for how to behave, and, most importantly, reducing and containing the anxiety of dealing with an unpredictable and uncertain environment”. This is consistent with the definition of corporate culture in this paper, which is behavioral consistency throughout the company, regardless of the behavioral guidance.

2.2. Corporate culture and firm performance

Corporate culture can benefit performance through three channels: “enhanced coordination and control within the firm, improved goal alignment between the firm and its members, and increased employee effort” (Sørensen, 2002).

First, corporate culture improves efficiency in an organization by enhancing coordination and control within the firm. Corporate culture helps employees to interact and engage with each other (Jacobs et al., 2013) and thus improves the efficiency of information sharing (Crèmer, 1993). For example, error management culture facilitates communication about errors and coordination of error handling and thus improves firm performance (Van Dyck et al., 2005). Without a control system, little would be done in the organization (O’Reilly, 1989). The incentive compensation contract is a traditional control system; however, not everything can be written in this contract *ex ante*. When a traditional control system fails to regulate employees, corporate culture plays a complementary role in directing employees (Guiso et al., 2015).

Second, corporate culture matters because it motivates employees to commit to common goals (e.g., Peters and Waterman, 1982; Deal and Kennedy, 1982; Kotter and Heskett, 1992; Sørensen, 2002) by complementing traditional incentive systems (Guiso et al., 2015). Corporate culture is closely related to corporate strategy. For example, a corporate strategy to compete on innovation as opposed to price implies a different corporate culture because it attracts different types of employees and establishes different norms to fulfill this goal (O’Reilly, 1989).

Third, corporate culture can develop employees’ commitment to firms by enhancing their bond with the firm (O’Reilly, 1989). For example, corporate culture may influence employees’ priorities and encourage them to protect consumers rather than only to seek efficiency (Jacobs et al., 2013).

Barney (1986) illustrates that corporate culture leads to a sustained competitive advantage and thus a sustained financial performance. He focuses on three aspects of corporate culture: valuable, rare and imperfectly imitable. This differs from our definition of corporate culture, as we focus on whether firms have a strong culture promotion regardless of whether their promoted cultures are valuable, rare or imperfectly imitable. In most cases, the promoted cultures we study here do not have any of these characteristics. In extreme cases, it is not necessarily a “good” culture that is promoted. For example, corruption can be a promoted corporate culture if it is “widely shared and strongly held throughout the organization” (O’Reilly and Chatman, 1996; Guiso et al., 2015). Sørensen (2002) uses the definition of organizational culture from O’Reilly and Chatman (1996) and investigates the relationship between strong corporate culture and variability of firm performance. He finds that performance variability increases in firms with a strong corporate culture as industry volatility increases. He attributes this result to a strong organizational culture codifying its beliefs and goals and thus forming its own routines, which facilitate internal organizational processes. However, when the environment changes, alternative routines are needed to overcome challenges; therefore, having strong routines becomes a disadvantage rather than an advantage.

Kotter and Heskett (1992) find that firms with strong corporate culture economically outperform those without a strong corporate culture by a large margin. It should be noted that firms with a strong corporate culture emphasize all key stakeholders, including shareholders, employees and customers, while our proxy for corporate culture focuses more on non-shareholder stakeholders, including employees and the community.

However, not all prior studies find a positive association between corporate culture and firm performance. “For example, Denison (1984) found associations between what he categorized as culture and firm ROI, but Gordon (1985) found no associations with either profitability or growth” (O’Reilly et al., 2014).

Corporate culture may motivate employees, but it may not be appreciated by other stakeholders, such as shareholders. For example, Bird et al. (2007) find that the market does not always appreciate firms’ corporate social responsibility (CSR) activities. In particular, they find that the market does not appreciate firms’ environmental investments, and it seems the market is not particularly concerned when firms’ activities are in conflict with the community. On the contrary, the market punishes firms with good CSR activities regarding the environment.

Izzo and di Donato (2012) find that corporate social performance relating to the environment, the community and employment has a negative impact on stock prices in Italy. They conclude that Italian shareholders consider this corporate social performance as an avoidable expense that reduces firm value and therefore discount the stock prices of these firms.

Not all corporate cultures are positive forces (O’Reilly, 1989). As we focus on the efforts of corporate culture promotion rather than any specific culture, we do not distinguish good culture, such as integrity, from bad culture, such as corruption. In addition, firms may promote corporate cultures that no longer fit their long-term goals. Many companies, such as Sears, Bank of America and General Motors, have experienced difficulties resulting from their corporate cultures (O’Reilly, 1989). Samsung recently decided to change its rigid corporate culture by focusing on converged products and profits rather than on growing its business any further because it had experienced low profit levels for several years (The Korea Times, 2015).⁴ In addition, difficulties in mergers and acquisitions are sometimes caused by corporate culture conflict; the failure to merge two cultures can result in a loss of talent and an inability to benefit from synergy (O’Reilly, 1989). When a bad culture is strong, corporate culture can be an obstacle to changing the environment, leading to poor firm performance (Sørensen, 2002).

Collectively, a promoted corporate culture motivates employees to work toward corporate goals and thus increases firm value and financial performance. However, shareholders may not value corporate culture promotion, regarding it as an avoidable expense, which can lead to decreased firm value. Furthermore, a bad culture can be an obstacle to reaping benefits for firms. Therefore, we do not hypothesize the relation between corporate culture and firm performance; rather, we leave it as an open question and empirically test it.

2.3. Corporate culture and innovation output

Innovation is widely regarded as one of the key mechanisms by which corporations sustain and drive business growth in today’s dynamic, globalized and changing technological landscape. For example, Hall et al. (2005) show that innovation is one of the major driving forces of firm value creation. Corporate culture promoting innovations increases creativity through the development of new products and finding new ways to do things. Many corporate cultures (see O’Reilly, 1989) nurture norms among employees, and these norms facilitate the innovation process (O’Reilly, 1989). In addition, corporate culture facilitates coordination and cooperation among employees. As discussed earlier, corporate culture facilitates employees in interacting and engaging with each other (Jacobs et al., 2013), and it therefore improves the efficiency of information sharing (Crèmer, 1993) and, consequently, firms’ innovation output. Thus, we predict that corporate culture is positively related to a firm’s innovation output.

3. Data and methodology

3.1. Data

We hand-collect data of privately listed companies listed on the Shanghai Stock Exchange and Shenzhen Stock Exchange in 2014 from the companies’ websites. There are 1483 companies as of December 31, 2013.

⁴ http://www.koreatimes.co.kr/www/news/tech/2015/10/133_187965.html4.

After deleting companies with missing values in any of the control variables, we are left with 1044 firms, and we start our website search with these. We categorize information on companies' websites into seven groups, as shown in Table 1: homepage, news, culture page, human resources, company structure, investors' relations and customer services.

The homepage usually includes a speech from the CEO and the company's history, organizational structure and honors earned. The news section usually includes company news, industry news and media exposure. The culture page mostly tells about the company's mission, vision, philosophy, core values, strategy, policy, employee activities, internal magazine and social responsibility. In many cases, social responsibility means charity activities. The human resources section includes the hiring philosophy, employee training programs, recruitment information and campus internships. The content of the company structure section varies according to the company's unique characteristics. The investors' relations section often includes stock price trends, company announcements, periodical reports, company performance and shareholders' rights. Many consumer-oriented firms also have a customer services section. A firm's website may not include every single category presented here, but the content of any firm's website can probably be grouped into one of these categories. In addition, we hand-collect a firm's core value as advertised on its website and construct two dummy variables, *Integrity* and *Innovation*. *Integrity* equals one if a firm's core value includes the word "integrity" or some other words with similar meanings and zero otherwise. *Innovation* equals one if a firm's core value includes the word "innovation" or other words with similar meanings and zero otherwise.

Other data sources include CSMAR, from which we obtain the firms' financial information, and CNKI.NET, from which we obtain the firms' patent information.

3.2. Variables

The content on companies' websites that we include in our corporate culture promotion proxy includes *CEO speech*, *culture page*, *employee activities*, *social responsibility*, *honors earned*, *employee training programs*, *company news* and *media exposure*. We construct a dummy variable, *Speech*, which equals one if there is a CEO speech section on a firm's website and zero otherwise. We choose CEO speech because firms choose their corporate culture and CEOs are likely to promote corporate culture from the top (Graham et al., 2017). CEO speech is a direct way for all stakeholders to understand a firm's promoted culture that the CEO sets for the company. The culture page is a direct way for a firm to show whether it emphasizes its corporate culture. We construct a dummy variable, *Culture Page*, which is equal to one if a firm has its own culture page on the website and zero otherwise.

Employee Training Programs not only improve employees' knowledge about the firm's operations but also ingrain the promoted corporate culture into employees. Employees can be major embodiments of a firm's promoted corporate culture. In employee training, the company mission and code of conduct are explicitly and implicitly communicated to employees so that they can follow them in performing their job tasks. Thus, we believe that employee training is a major part of corporate culture promotion. Furthermore, once the CEO sets the tone of the promoted corporate culture, it needs to be infused into employees so that they will embrace the culture; this will eventually facilitate employees' coordination and cooperation. *Employee Training Programs* are a channel for this; *Employee Activities* are another. *Employee Activities* is constructed to be equal to the number of employee activities on a firm's website.

Table 1
Companies' website content categories.

Categories	Examples
<i>Home Page</i>	Speech from CEO, company history, organizational structure, honors earned
<i>News</i>	Company news, industry news, media exposure
<i>Culture Page</i>	Company's mission, vision, philosophy, core values, strategy, policy, employee activities, internal magazine
<i>Human Resources</i>	Hiring philosophy, employee training programs, recruitment, campus internship
<i>Company Structure</i>	Varies with company's unique characteristics
<i>Investors' Relations</i>	Stock price trend, company announcement, periodical reports, company performance, shareholders' rights
<i>Customer Services</i>	Customer services

Table 2

Descriptive Statistics. This table presents the descriptive statistics of our sample, 1030 firm observations for 2014. *CEO Speech* is a dummy variable equal to one if a firm's CEO or Chairman publishes a speech on the firm's website and zero otherwise. *Culture Page* is a dummy variable equal to one if a firm has a corporate culture webpage and zero otherwise. *Employee Activities* is the number of employee activities shown on the website. *Charity* is the number of charity activities shown on the website. *Honor Earned* is the number of honors a firm earned shown on the website. *Employee Training Programs* is the number of employee training programs shown on the website. *Company News* is the number of company news stories shown on the website. *Media Exposure* is the number of media news stories that a firm is mentioned in and linked to from its own website. *Tobin's Q* is the market value of equity over total assets. *ROA* is net income scaled by assets. *Assets* is a firm's total assets. *Sales* is a firm's net sales. *Leverage* is the ratio of debt to assets. *High Tech* is a dummy variable equal to one if a firm is a high tech company and zero otherwise. We consider firms in the electronic industry, IT industry and biomedical industry as high tech companies. *Income Growth Rate* is the difference between this year's net income and last year's net income scaled by last year's net income.

Variables	N	Mean	Std. Dev.	Median	Minimum	25th Pctl.	75th Pctl.	Maximum
<i>CEO Speech</i>	1030	0.27	0.44	0.00	0.00	0.00	1.00	1.00
<i>Culture Page</i>	1030	0.71	0.45	1.00	0.00	0.00	1.00	1.00
<i>Employee Activities</i>	1030	2.89	13.22	0.00	0.00	0.00	0.00	250.00
<i>Charity</i>	1030	2.12	11.57	0.00	0.00	0.00	0.00	300.00
<i>Honor Earned</i>	1030	15.90	22.62	10.00	0.00	0.00	20.00	200.00
<i>Employee training programs</i>	1030	0.23	0.57	0.00	0.00	0.00	0.00	2.00
<i>Company news</i>	1030	115.53	192.91	50.00	0.00	5.00	137.00	1821.00
<i>Media exposure</i>	1030	16.10	86.51	0.00	0.00	0.00	1.00	1500.00
<i>Tobin's Q</i>	1030	2.00	1.09	1.63	0.96	1.35	2.22	7.29
<i>ROA</i>	1030	0.04	0.05	0.04	-0.12	0.02	0.07	0.18
<i>Assets (in millions RMB)</i>	1030	4457.25	8745.36	2198.01	51.49	1225.89	4090.49	94008.86
<i>Sales (in millions RMB)</i>	1030	2693.84	6085.65	1092.68	11.91	523.26	2470.38	108925.30
<i>Leverage</i>	1030	0.37	0.19	0.36	0.05	0.22	0.50	0.84
<i>High Tech</i>	1030	0.35	0.48	0.00	0.00	0.00	1.00	1.00
<i>Income Growth Rate</i>	1030	0.13	0.24	0.12	-0.49	-0.01	0.26	1.00

Another way to reflect a firm's promoted culture is to investigate whether it engages in charity activities. Doing so indicates that the firm cares for the community. Thus, we use the number of charity activities on the firm's website to capture this. Most of these charity activities are donations to the community. The variable constructed is *Charity*. *Honors Earned* is the number of honors a firm exhibits on its website. Examples of honors include "Excellent Company" awards granted by the city, province or state government and "Home for Workers" awards granted by the city, province or state labor unions. *Honors Earned* thus represents outside recognition of promoted corporate culture.

Company News is the number of news stories a firm reports on its website. This is the firm's self-reported news, which is reported to communicate with stakeholders. Thus, company news is a channel by which a company can broadcast its promoted culture to its stakeholders, including its employees. We conjecture that companies with strong culture promotion efforts are more likely to post news. *Media Exposure* is news about a firm reported by the media that the firm links to from its own website. This represents the media's impressions of the firm, which on the firm website will be positive, as a company can pick media news stories that praise its promoted corporate culture or related activities. When we use factor analysis⁵ to extract factors with these culture content indicators, we use their natural logarithms if they are not dummy variables.

Three aspects of firm performance are studied: firm market value, financial performance and innovation output. Firm value is captured by *Tobin's Q*, which is calculated with a firm's market value over total assets at the end of the 2014 fiscal year. Financial performance is captured by *Return on Assets (ROA)*, which is calculated as a firm's net income over total assets. A firm's innovation output is captured by *Log(Patent)*, the natural logarithm of the number of patents that a firm is granted in the fiscal year of 2014.

The control variables we use are *Log(Assets)*, *Log(Sales)*, *Leverage*, *High Tech* and *Income Growth Rate*. *Log(Assets)* is the natural logarithm of a firm's total assets in the 2014 fiscal year. *Log(Sales)* is the natural logarithm of a firm's net sales in the 2014 fiscal year. *Leverage* is the ratio of debt to total assets. *High Tech* is a

⁵ In untabulated results, we check the robustness of the factor analysis by excluding three factors, *Employee Training Programs*, *Company News* and *Media Exposure*, from the common factor extraction. We find results consistent with our baseline results.

Table 3

Factor analysis: corporate culture promotion and firm performance. This table presents the results of the factor analysis, where the dependent variables are proxies for firm performance, including *Tobin's Q*, *ROA* and *Log(Patent)*. *Factor* is the common factor extracted from eight indicators including *CEO Speech*, *Culture Page*, *Employee Activities*, *Social Responsibility*, *Honors Earned*, *Employee Training Programs*, *Company News* and *Media Exposure* using factor analysis. Detailed definitions of the control variables are included in Appendix A. Numbers in parentheses are t-statistics computed using robust standard errors. Industry dummies are included, but the coefficients are omitted for brevity.

Dependent variable	(1) Tobin's Q	(2) ROA	(3) Log(Patent)
<i>Factor</i>	-0.093** (-2.37)	0.002 (1.13)	0.222*** (2.94)
<i>Log(Assets)</i>	-0.251*** (-3.44)	-0.002 (-0.56)	-0.241* (-1.79)
<i>Log(Sales)</i>	-0.107* (-1.90)	0.019*** (8.74)	0.435*** (4.08)
<i>Leverage</i>	-0.476* (-1.80)	-0.122*** (-12.09)	-0.844** (-2.41)
<i>High Tech</i>	0.389*** (5.29)	0.005* (1.82)	0.595*** (5.21)
<i>Income Growth Rate</i>	0.289** (1.99)	0.017*** (2.80)	-0.334 (-1.45)
Constant	9.666*** (7.36)	-0.279*** (-6.38)	-0.518 (-0.30)
Industry FE	YES	YES	YES
Observations	1030	1030	1030
R-squared	0.239	0.307	0.220
Adj. R-squared	0.197	0.269	0.177

*** Significance at the 1% level.

** Significance at the 5% level.

* Significance at the 10% level.

dummy variable equal to one if a firm is in a high-tech industry and zero otherwise. *Income Growth Rate* is the difference between net income in 2014 and net income in 2013 scaled by net income in 2013. Summary statistics for all variables are given in Table 2.

4. Multivariate model and results

4.1. Main results

We investigate the impact of corporate culture promotion on firm performance using factor analysis, and our results are shown in Table 3. Our baseline regression model is as follows:

$$Firm\ Performance_i = \alpha_0 + \alpha_1 CorpCulture_i + \sum \alpha_n Control_n + \alpha_{industry} \quad (1)$$

where

Firm Performance_{*i*} = Tobin's Q, ROA or Log(Patent);

CorpCulture_{*i*} = Corporate culture promotion captured with various methods;

$\alpha_{industry}$ = industry fixed-effects;

Control = Log(Assets)_{*i*}, Log(Sales)_{*i*}, Leverage_{*i*}, High Tech_{*i*}, Income Growth Rate_{*i*} (see Appendix A for detailed information).

We first examine the association between corporate culture promotion and *Tobin's Q* with factor analysis (Table 3, column 1). We find that the coefficient on corporate culture promotion, *Factor*, is -0.093 , which is statistically significant at the 5% level. Our finding is consistent with that of Bird et al. (2007), who document a significantly negative correlation between two-year excess returns and CSR strength on environmental issues in the United States. Hence, our result indicates that corporate culture promotion has a negative relationship with firm market value. Column 2 shows the results for the association between corporate culture promotion, *Factor* and financial performance captured by *ROA*. The coefficient is 0.002 , which is not significant, indicating that corporate culture promotion has no significant impact on a firm's profitability performance. This is consistent with Gordon (1985), who finds no association between corporate culture promotion and profitability.

We examine the association between corporate culture promotion, *Factor* and a firm's innovation output captured by the natural logarithm of the number of patents that a firm is granted in the year (column 3). The coefficient on corporate culture is 0.222 , which is significant at the 1% level, indicating that corporate culture promotion is positively associated with innovation output. The result in column 3 does not contradict our finding in column 1 because *Tobin's Q* captures firm market performance from investors' perspective, while patents capture the outcome of coordination and cooperation between employees within the firm.

4.2. Alternative measures for corporate culture promotion

We have documented a negative relationship between corporate culture promotion and firm value, a positive relation between corporate culture promotion and a firm's innovation output and an insignificant relation between corporate culture promotion and a firm's profitability. To ensure our results are not sensitive to the culture measure we use to conduct baseline tests, we conduct additional tests with alternative measures for corporate culture promotion.

First, we use the culture page indicator as an alternative proxy for corporate culture promotion. In the baseline model, we extract a common factor from eight aspects of a company's website, including the culture page indicator. We believe that all eight aspects capture corporate culture promotion to some degree, and the culture page is the most direct indicator because it is a webpage that a firm dedicates exclusively to corporate culture. We define *Culture Page* as equal to one if a firm has a separate webpage dedicated to its corporate culture and zero otherwise. Table 4 presents the results. We find that strong corporate culture promotion as measured by the culture page indicator continues to negatively affect firm value, positively affect a firm's innovation output and insignificantly affect a firm's profitability. Collectively, we find consistent results using the culture page indicator as our alternative measure of corporate culture promotion.

Second, we count the number of words on the culture webpage. A large number of words on the culture page indicates that firms put a great deal of effort into promoting their corporate culture. Thus, the number of words is also a direct way to measure a firm's culture promotion effort. We use both the continuous value of the number of words and the dummy value to repeat the baseline test. Specifically, we define $\ln(1 + \text{Words})$ as the natural logarithm of one plus the number of words shown on a firm's culture webpage. The number of words is equal to zero if a firm does not have a culture webpage. *Culture Words Dummy* is an indicator equal to one if the number of words on a firm's culture page is above its industry median and zero otherwise. Table 5 shows the results. Columns 1 and 2 report the results for firm value. The coefficients on both $\ln(1 + \text{Words})$ and *Culture Words Dummy* are negative and significant at the 5% level. Columns 3 and 4 report the results for *ROA*. We continue to find an insignificant relation between corporate culture promotion and firm profitability. Columns 5 and 6 report the results for innovation output. The coefficients on both $\ln(1 + \text{Words})$ and *Culture Words Dummy* are positive and significant. Collectively, the results remain consistent when we use the culture page length to proxy for corporate culture promotion.

Finally, we use simple counts of the number of culture promotion indicators instead of the factor analysis to investigate the relationship between corporate culture promotion and firm performance. The dependent variables are the same as in our baseline model, including *Tobin's Q*, *ROA* and $\ln(\text{Patent})$. The independent variable is the natural logarithm of the number of culture promotion indicators that a firm has, $\ln(\text{Culture})$. The results are shown in Table 6.

Table 4

Culture page and firm performance. This table presents the results from the OLS regressions, where the dependent variables are proxies for firm performance, including *Tobin's Q*, *ROA* and *Log(Patent)*. *Culture Page* is a dummy variable equal to one if a firm's website contains a page dedicated for culture and zero otherwise. The detailed definitions of control variables are included in Appendix A. Numbers in parentheses are *t*-statistics computed using robust standard errors. Industry dummies are included, but the coefficients are omitted for brevity.

Dependent variable	(1) Tobin's Q	(2) ROA	(3) Log(Patent)
<i>Culture Page</i>	−0.149** (−2.04)	−0.002 (−0.57)	0.290** (2.37)
<i>Log(Assets)</i>	−0.265*** (−3.64)	−0.001 (−0.43)	−0.207 (−1.55)
<i>Log(Sales)</i>	−0.108* (−1.92)	0.019*** (8.81)	0.439*** (4.12)
<i>Leverage</i>	−0.461* (−1.73)	−0.121*** (−12.13)	−0.876** (−2.48)
<i>High Tech</i>	0.373*** (5.15)	0.006** (2.02)	0.635*** (5.62)
<i>Income Growth Rate</i>	0.299** (2.06)	0.016*** (2.76)	−0.358 (−1.54)
Constant	10.084*** (7.65)	−0.290*** (−6.69)	−1.547 (−0.92)
Industry FE	YES	YES	YES
Observations	1030	1030	1030
R-squared	0.239	0.306	0.217
Adj. R-squared	0.197	0.268	0.174

*** Significance at the 1% level.

** Significance at the 5% level.

* Significance at the 10% level.

In column 1, the coefficient on *Log(Culture)* is -0.094 , and it is significant at the 10% level. This is consistent with our baseline result. Column 2 shows that there is no significant relation between *Log(Culture)* and *ROA*. This is consistent with our factor analysis. Column 3 shows a positive relation between *Log(Culture)* and *Log(Patent)*. The coefficient on *Log(Culture)* is 0.293 , and it is significant at the 1% level. Collectively, the results from the alternative measures of corporate culture promotion are consistent with our baseline results.

4.3. Cross-sectional tests

We further test whether there are cross-sectional differences in terms of the effect of corporate culture promotion. First, we test whether there is a size effect. We conjecture that promoted corporate culture facilitates collaboration and cooperation between employees. Thus, large firms may benefit more from strong corporate culture promotion efforts than small firms. In other words, we predict that the negative effect of corporate culture promotion may be driven by small firms. Small firms achieve efficient collaboration and cooperation more easily, but they do not enjoy the marginal benefit of corporate culture promotion through improved collaboration and cooperation. Given the relatively fewer economic resources of small firms, spending too much on corporate culture promotion could be viewed as wasting resources by shareholders, who may prefer small firms to spend their resources on investments with positive net present values (NPVs) to increase firm value.

Table 7 presents the results. We categorize firms as large (*Large*) if their size is above the median of the sample. In column (1), we find that the negative effect of strong corporate culture promotion is driven by small

Table 5

Culture page length and firm performance. This table presents the results from the OLS regressions, where the dependent variables are proxies for firm performance, including *Tobin's Q*, *ROA* and *Log(Patent)*. $\ln(1 + \text{Words})$ is the natural logarithm of one plus the number of words in a corporate culture page. *Culture Words Dummy* equals one if the number of words in a firm's culture webpage is above the industry median and zero otherwise. The detailed definitions of the control variables are included in Appendix A. Numbers in parentheses are *t*-statistics computed using robust standard errors. Industry dummies are included, but the coefficients are omitted for brevity.

Dependent variable	(1) Tobin's Q	(2) Tobin's Q	(3) ROA	(4) ROA	(5) Log(Patent)	(6) Log(Patent)
<i>Ln(1 + Words)</i>	-0.026** (-2.23)		-0.000 (-0.60)		0.048** (2.32)	
<i>Culture Words Dummy</i>		-0.120** (-2.00)		-0.003 (-1.17)		0.205* (1.89)
<i>Log(Assets)</i>	-0.263*** (-3.62)	-0.262*** (-3.60)	-0.001 (-0.43)	-0.001 (-0.40)	-0.209 (-1.57)	-0.210 (-1.57)
<i>Log(Sales)</i>	-0.107* (-1.90)	-0.108* (-1.93)	0.019*** (8.81)	0.019*** (8.87)	0.437*** (4.10)	0.441*** (4.14)
<i>Leverage</i>	-0.465* (-1.75)	-0.479* (-1.81)	-0.121*** (-12.14)	-0.122*** (-12.18)	-0.867** (-2.45)	-0.841** (-2.38)
<i>High Tech</i>	0.374*** (5.16)	0.372*** (5.12)	0.006** (2.02)	0.006** (2.03)	0.633*** (5.60)	0.638*** (5.64)
<i>Income Growth Rate</i>	0.297** (2.05)	0.291** (2.00)	0.016*** (2.76)	0.016*** (2.73)	-0.355 (-1.53)	-0.346 (-1.49)
Constant	10.025*** (7.63)	10.003*** (7.55)	-0.290*** (-6.70)	-0.293*** (-6.74)	-1.445 (-0.85)	-1.426 (-0.83)
Industry FE	YES	YES	YES	YES	YES	YES
Observations	1030	1030	1030	1030	1030	1030
R-squared	0.239	0.238	0.306	0.307	0.217	0.216
Adj. R-squared	0.197	0.196	0.268	0.268	0.174	0.172

*** Significance at the 1% level.

** Significance at the 5% level.

* Significance at the 10% level.

firms. Specifically, we find a negative coefficient on *Factor*, and it is significant at the 1% level. The coefficient on the interaction term between *Factor* and *Large* is positive and significant at the 5% level. The sum of the coefficient on *Factor* and the coefficient on the interaction term between *Factor* and *Large* is not significantly different from zero. The results indicate that corporate culture promotion negatively affects a small company's firm value but does not significantly affect a large company's firm value.

Column 2 shows that corporate culture promotion has no size effect on firm profitability. Column 3 reports a positive coefficient on *Factor* when innovation output is the dependent variable, and it is significant at the 1% level. However, the coefficient on the interaction term between *Factor* and *Large* is not significant. This indicates that strong corporate culture promotion positively affects a firm's innovation output regardless of a firm's size.

We also conjecture that there may be a cross-sectional difference in the effect of corporate culture promotion depending on where the firms are located. Firms located in less developed areas may have less access to capital to fund their projects. Thus, instead of using existing funding to promote corporate culture, shareholders may think that it is more important for firms to invest in more tangible projects with positive NPVs. Therefore, we predict that the negative impact of corporate culture promotion is driven by firms located in less developed areas.

We use a province-level market development index to separate firms in more developed areas from those in less developed areas. *High_Dev* is equal to one if a firm is located in a province with a market development level in the top tercile and zero otherwise. Table 8 presents the results. As shown in column 1, we find a negative coefficient on *Factor*, and it is significant at the 1% level. The coefficient on the interaction term between

Table 6

Sensitivity test: corporate culture promotion and firm performance. This table presents the results from the OLS regressions, where the dependent variables are proxies for firm performance, including *Tobin's Q*, *ROA* and *Log(Patent)*. *Log(Culture)* is natural logarithm of the number of culture indicators that a firm has. Culture indicators include (1) whether there is an executive's speech on a firm's website, (2) whether there is a culture webpage, (3) whether the number of a firm's employee activities is in the top quintile, (4) whether the number of a firm's charity activities is in the top quintile, (5) whether the number of a firm's honor certificates is in the top quintile, (6) whether the number of a firm's training programs is in the top quintile, (7) whether the number of a firm's company news stories on the website is in the top quintile and (8) whether the number of a firm's media news stories on the website is in the top quintile. The detailed definitions of control variables are included in Appendix A. Numbers in parentheses are *t*-statistics computed using robust standard errors. Industry dummies are included, but the coefficients are omitted for brevity.

Dependent variable	(1) Tobin's Q	(2) ROA	(3) Log(Patent)
<i>Log(Culture)</i>	-0.094* (-1.66)	0.002 (0.82)	0.293*** (2.94)
<i>Log(Assets)</i>	-0.260*** (-3.56)	-0.001 (-0.49)	-0.223* (-1.67)
<i>Log(Sales)</i>	-0.108* (-1.91)	0.019*** (8.72)	0.431*** (4.05)
<i>Leverage</i>	-0.465* (-1.74)	-0.122*** (-12.11)	-0.876** (-2.49)
<i>High Tech</i>	0.381*** (5.19)	0.005* (1.89)	0.605*** (5.31)
<i>Income Growth Rate</i>	0.294** (2.02)	0.017*** (2.78)	-0.341 (-1.48)
Constant	9.961*** (7.52)	-0.285*** (-6.56)	-1.088 (-0.64)
Industry FE	YES	YES	YES
Observations	1030	1030	1030
R-squared	0.238	0.306	0.220
Adj. R-squared	0.195	0.268	0.176

*** Significance at the 1% level.

** Significance at the 5% level.

* Significance at the 10% level.

Factor and *High_Dev* is positive and significant at the 1% level. In an untabulated result, we find that the sum of the coefficient on *Factor* and the coefficient on the interaction term between *Factor* and *High_Dev* is not statistically significantly different from zero. Thus, the results indicate that the negative effect of corporate culture promotion on firm value is driven by firms located in less developed provinces of China.

Column 2 shows that there is no cross-sectionally different effect of corporate culture promotion on firm profitability. Column 3 reports a positive coefficient on *Factor* when innovation output is the dependent variable, and it is significant at the 5% level. However, the coefficient on the interaction term between *Factor* and *High_Dev* is not statistically significant. This indicates that corporate culture promotion positively affects a firm's innovation output regardless of the firm's location.

4.4. Additional tests

To make our result comparable with those of Guiso et al. (2015), we create the dummy variables *Integrity* and *Innovation* to capture the specific perspectives of corporate culture promotion. The *Integrity* dummy is

Table 7

Cross-sectional test: size effect. This table presents the results from OLS regressions with factor analysis, where the dependent variables are proxies for firm performance, including *Tobin's Q*, *ROA* and *Log(Patent)*. *Factor* is the common factor extracted from eight indicators including *CEO Speech*, *Culture Page*, *Employee Activities*, *Social Responsibility*, *Honors Earned*, *Employee Training Programs*, *Company News* and *Media Exposure* using factor analysis. *Large* is a dummy variable equal to one if a firm's size is above the median of the sample and zero otherwise. The detailed definitions of the control variables are included in Appendix A. Numbers in parentheses are t-statistics computed using robust standard errors. Industry dummies are included, but the coefficients are omitted for brevity.

Dependent variable	(1) Tobin's Q	(2) ROA	(3) Log(Patent)
<i>Factor</i>	−0.187*** (−2.77)	0.005 (1.64)	0.285*** (2.85)
<i>Large</i>	0.076 (0.76)	0.008* (1.87)	0.083 (0.47)
<i>Factor * Large</i>	0.171** (2.10)	−0.005 (−1.44)	−0.112 (−0.77)
<i>Log(Assets)</i>	−0.281*** (−3.37)	−0.004 (−1.32)	−0.269* (−1.73)
<i>Log(Sales)</i>	−0.104* (−1.85)	0.019*** (8.54)	0.429*** (4.04)
<i>Leverage</i>	−0.492* (−1.89)	−0.122*** (−12.20)	−0.847** (−2.40)
<i>High Tech</i>	0.392*** (5.28)	0.005 (1.63)	0.588*** (5.11)
<i>Income Growth Rate</i>	0.293** (2.02)	0.016*** (2.74)	−0.341 (−1.48)
Constant	10.208*** (6.18)	−0.216*** (−4.13)	0.180 (0.08)
Industry FE	YES	YES	YES
Observations	1030	1030	1030
R-squared	0.243	0.311	0.221
Adj. R-squared	0.200	0.272	0.176

*** Significance at the 1% level.

** Significance at the 5% level.

* Significance at the 10% level.

equal to one if the core value of integrity is advertised on a firm's website and zero otherwise. Similarly, the *Innovation* dummy is equal to one if the core value of innovation is advertised on a firm's website and zero otherwise. Table 9 reports the results.

As shown in columns 1 and 2, consistent with Guiso et al. (2015), we find that neither *Integrity* nor *Innovation* is significantly associated with firm value, as captured by *Tobin's Q*, or with firm profitability, as captured by *ROA*. Guiso et al. (2015) attribute this result to the culture advertised targeting only customers, consisting of only talk and having no correlation with either firm value or financial performance. However, taking this analysis and our previous factor analysis together, the results indicate that what influences a firm's performance is not any specific culture promotion, but whether the firm makes a strong culture promotion effort. If the corporate culture advertised had no correlation with firm value, we would not find a significantly negative relation between our different proxies for corporate culture promotion and firm value. However, the negative association indicates that shareholders do not appreciate corporate culture promotion.

Table 8

Cross-sectional test: market development level. This table presents the results from the OLS regressions with factor analysis, where the dependent variables are proxies for firm performance, including *Tobin's Q*, *ROA* and *Log(Patent)*. *Factor* is the common factor extracted from eight indicators including *CEO Speech*, *Culture Page*, *Employee Activities*, *Social Responsibility*, *Honors Earned*, *Employee Training Programs*, *Company News* and *Media Exposure* using factor analysis. *High_Dev* is a dummy variable equal to one if a firm is located in a province with a top tercile market development level and zero otherwise. The detailed definitions of the control variables are included in Appendix A. Numbers in parentheses are *t*-statistics computed using robust standard errors. Industry dummies are included, but the coefficients are omitted for brevity.

Dependent variable	(1) Tobin's Q	(2) ROA	(3) Log(Patent)
<i>Factor</i>	-0.173*** (-3.51)	0.000 (0.15)	0.195** (2.11)
<i>High_Dev</i>	-0.134** (-2.02)	0.001 (0.27)	0.243** (2.04)
<i>Factor*High_Dev</i>	0.229*** (2.75)	0.005 (1.45)	0.134 (0.85)
<i>Log(Assets)</i>	-0.263*** (-3.64)	-0.002 (-0.55)	-0.222 (-1.63)
<i>Log(Sales)</i>	-0.085 (-1.53)	0.019*** (8.58)	0.415*** (3.85)
<i>Leverage</i>	-0.506* (-1.93)	-0.122*** (-12.24)	-0.841** (-2.41)
<i>High Tech</i>	0.383*** (5.20)	0.005* (1.83)	0.606*** (5.29)
<i>Income Growth Rate</i>	0.265* (1.84)	0.016*** (2.73)	-0.329 (-1.43)
Constant	9.536*** (7.35)	-0.282*** (-6.46)	-0.599 (-0.35)
Industry FE	YES	YES	YES
Observations	1030	1030	1030
R-squared	0.249	0.309	0.224
Adj. R-squared	0.205	0.269	0.180

*** Significance at the 1% level.

** Significance at the 5% level.

* Significance at the 10% level.

In column (3), we report a positive association between *Innovation* culture promotion and a firm's innovation output as captured by the natural logarithm of the number of patents the firm has in the year, and this association is significant at the 1% level. The result is consistent with our expectation that innovation culture promotes creativity.⁶ In addition, we find that the association between *Integrity* and a firm's innovation output is not statistically significant.

Finally, we explore whether corporate culture promotion is associated with other aspects of firm performance. Specifically, we investigate this from the perspectives of employee compensation, earnings manage-

⁶ However, the endogeneity is salient because firms make their decisions on culture promotion and are likely to tailor their promoted corporate culture to meet their operational needs. For example, firms in the high-tech industry are likely to compete based on innovation, and thus they are likely to choose innovation as their corporate culture. High-tech companies are also likely to have a high number of patents. Although we use the dummy variable *High-tech* to control this possibility, there may be other possibilities underlying the endogeneity that we did not consider.

Table 9

Integrity/innovation culture promotion and firm performance. This table presents the results from OLS regressions, where the dependent variables are proxies for firm performance, including *Tobin's Q*, *ROA* and *Log(Patent)*. *Integrity* is a dummy variable that equals one if integrity culture is advertised on the website and zero otherwise. *Innovation* is a dummy variable that equals one if innovation culture is advertised on the website and zero otherwise. The detailed definitions of the control variables are included in Appendix A. Numbers in parentheses are *t*-statistics computed using robust standard errors. Industry dummies are included, but the coefficients are omitted for brevity.

Dependent Variable	(1) Tobin's Q	(2) ROA	(3) Log(Patent)
<i>Integrity</i>	0.025 (0.28)	0.001 (0.42)	-0.065 (-0.42)
<i>Innovation</i>	-0.083 (-1.09)	0.003 (0.99)	0.397*** (2.76)
<i>Log(Assets)</i>	-0.271*** (-3.67)	-0.001 (-0.36)	-0.181 (-1.36)
<i>Log(Sales)</i>	-0.110* (-1.94)	0.019*** (8.65)	0.430*** (4.07)
<i>Leverage</i>	-0.476* (-1.78)	-0.122*** (-12.10)	-0.842** (-2.36)
<i>High Tech</i>	0.370*** (5.08)	0.005** (1.97)	0.635*** (5.61)
<i>Income Growth Rate</i>	0.302** (2.06)	0.016*** (2.78)	-0.367 (-1.58)
Constant	10.175*** (7.55)	-0.290*** (-6.63)	-1.802 (-1.06)
Industry FE	YES	YES	YES
Observations	1030	1030	1030
R-squared	0.236	0.307	0.219
Adj. R-squared	0.193	0.268	0.175

*** Significance at the 1% level.

** Significance at the 5% level.

* Significance at the 10% level.

ment and real earnings management. Employees' compensation level is captured by *Compensation*, a ratio of the total payment to employees in the cash flow statement over net income in the 2014 fiscal year. *EM* is calculated following Jones' model (Jones, 1991). Following Cohen et al. (2008), Dechow et al. (1998) and Roychowdhury (2006), we calculate *Real Earnings Management (Real EM)* as the abnormal production cost (*R_PROD*) minus abnormal operating cash flows (*R_CFO*) minus abnormal discretionary expenses (*R_DISX*).⁷

Table 10 presents the results. The dependent variables are *Compensation*, *EM* and *Real EM* in the three columns, respectively. The coefficients on *Factor* are insignificant in the first two columns but negative and significant at the 10% level in column 3. This suggests that culture promotion is not related to employee compensation or discretionary accruals but is negatively associated with real earnings management.

5. Discussion and conclusion

Corporate culture is an important topic and an under-studied area in accounting. In this paper, we use hand-collected data from the websites of China's privately listed firms to capture corporate culture promotion

⁷ See Cohen et al. (2008) for details on how to construct real earnings management.

Table 10

Factor analysis: corporate culture promotion and other firm performance. This table presents results from the OLS regressions with factor analysis, where the dependent variables are proxies for firm performance, including *Compensation*, *EM* and *Real EM*. *Factor* is the common factor extracted from eight indicators including *CEO Speech*, *Culture Page*, *Employee Activities*, *Social Responsibility*, *Honors Earned*, *Employee Training Programs*, *Company News* and *Media Exposure* using factor analysis. The detailed definitions of the control variables are included in Appendix A. Numbers in parentheses are t-statistics computed using robust standard errors. Industry dummies are included, but the coefficients are omitted for brevity.

Dependent Variable	(1) Compensation	(2) EM	(3) Real EM
<i>Factor</i>	−0.105 (−0.72)	−0.001 (−0.07)	−0.019* (−1.70)
<i>Log(Assets)</i>	0.839** (2.25)	0.030*** (4.16)	0.085*** (3.60)
<i>Log(Sales)</i>	−1.416*** (−3.08)	−0.017*** (−2.93)	−0.098*** (−4.70)
<i>Leverage</i>	1.082 (0.84)	−0.103*** (−4.53)	0.478*** (7.86)
<i>High Tech</i>	−0.004 (−0.02)	−0.004 (−0.60)	−0.092*** (−5.01)
<i>Income Growth Rate</i>	0.063 (0.20)	0.061*** (3.72)	0.084** (2.43)
Constant	13.013*** (3.83)	−0.222** (−2.51)	0.037 (0.14)
Industry FE	YES	YES	YES
Observations	1030	1030	1030
R-squared	0.134	0.093	0.218
Adj. (Pseudo) R-squared	0.0857	0.0425	0.175

*** Significance at the 1% level.

** Significance at the 5% level.

* Significance at the 10% level.

in terms of the culture webpage, the number of words and media news stories on the websites. We provide evidence that corporate culture promotion is significantly negatively related to firm value, which is consistent with Bird et al. (2007), indicating that shareholders do not value firms' commitment to employee relations and community. We also provide evidence that corporate culture promotion is significantly positively related to a firm's innovation output, indicating that corporate culture promotion facilitates coordination and cooperation between employees and consequently improves innovation.

Guiso et al. (2015) use a similar method to measure firms' advertised value to investigate the relation between corporate culture and firm performance for S&P 500 firms in the United States. They find little evidence on the relationship between advertised corporate culture and firm value, which they claim is because the advertised values on firms' websites are only talk. However, there are two other possibilities. First, firms included in the S&P 500 share similar characteristics, which makes them different from other firms. This shared similarity provides little variance between S&P 500 firms,⁸ leading to corporate culture's insignificant relationships with firm value and financial performance. Second, corporate culture promotion is a corporate decision determined according to each firm's unique characteristics and operations. For example, as a high-tech company, Apple chooses innovation as its corporate culture, while Walmart, as a consumer-oriented company, chooses integrity as its corporate culture. However, the difference in corporate culture does not nec-

⁸ For example, the mean of managerial integrity within the S&P 500 is 3.9 with a standard deviation of 0.25 in Guiso et al. (2015).

essarily make one firm's performance superior to another. Thus, it is not surprising that Guiso et al. (2015) do not find integrity or any other type of corporate culture to be associated with either firm value or financial performance.

We replicate the test of Guiso et al. (2015) with China's privately listed companies by constructing dummy variables, *Integrity* and *Innovation*, which are equal to one if the firm's advertised core value on its website includes integrity or innovation, respectively and zero otherwise. Consistent with Guiso et al. (2015), we find little evidence that specific corporate culture, either integrity or innovation, is associated with firm value or financial performance. However, when we investigate the relationship between overall corporate culture promotion effort and firm value, we consistently find a significant relation. This indicates that corporate culture promotion matters. It is any specific promoted corporate culture, such as integrity, that does not matter because firms choose their own corporate cultures according to their characteristics, and none is superior to another.

Finally, we acknowledge that our study is subject to some limitations. First, we hand-collect data for 2014, and therefore have only website data for investigated firms for the year of 2014. Thus, our test is cross-sectional and we are able to establish only an association, not causality, between corporate culture promotion and firm performance. In addition, because of data limitations, we are only able to test the relationship between corporate culture promotion and contemporary firm performance, and not long-term firm performance. Second, our paper suffers from potential self-selection bias. Corporate culture promotion is a firm's decision, and a firm's performance is also influenced by its decisions; thus, our study suffers from self-selection bias. Again, our study is only able to establish an association, not causality, between corporate culture promotion and firm performance. Future studies can work to resolve this endogeneity issue. Third, our website-search-based measure of corporate culture promotion may suffer from a measurement error problem. For example, if a firm does not have a dedicated culture webpage, this does not mean the firm has no corporate culture; every firm has its own culture regardless of whether the firm promotes it. In fact, firms with a weaker culture may be more likely to advertise their culture on their websites. Thus, our results could suffer from the measurement error problem. Fourth, Schein (1984, 2010) categorizes cultures on three different levels: the first level represents artifacts, such as physical manifestations of corporate culture; the second includes espoused values and beliefs or documented norms; and the third is the basic underlying assumptions by which the first two levels can be truly understood (Taylor, 2014). The corporate culture promotion proxy we use falls into the second level of corporate culture; as such, without understanding the underlying assumptions of culture from the third level, our results should be interpreted with caution.

Appendix A. Definitions of variables

<i>Variable</i>	<i>Description</i>
<i>CEO Speech</i>	A dummy variable equal to one if a firm's CEO or Chairman publishes a speech on the firm's website and zero otherwise
<i>Culture Page</i>	A dummy variable equal to one if a firm has a corporate culture webpage and zero otherwise
<i>Log(Employee Activities)</i>	Natural logarithm of the number of employee activities shown on the website
<i>Log(Charity)</i>	Natural logarithm of the number of charity activities shown on the website
<i>Log(Honor Earned)</i>	Natural logarithm of the number of honors that a firm earned and are shown on the website
<i>Log(Employee Training Programs)</i>	Natural logarithm of the number of employee training programs shown on the website
<i>Log(Company News)</i>	Natural logarithm of the number of company news stories shown on the website
<i>Log(Media Exposure)</i>	Natural logarithm of the number of media news stories that a firm is involved in and linking to from its own website
<i>Ln(1 + Words)</i>	Natural logarithm of one plus the number of words on a firm's culture webpage

<i>Culture Words Dummy</i>	An indicator equal to one if the number of words on a firm's culture webpage is above its industry median and zero otherwise
<i>Tobin's Q</i>	Market value of a firm's stocks divided by total assets
<i>ROA</i>	Net income divided by total assets
<i>Log(Patent)</i>	Natural logarithm of the number of patents that a firm has in the year
<i>Log(Assets)</i>	Natural logarithm of a firm's total assets
<i>Log(Sales)</i>	Natural logarithm of a firm's net sales
<i>Leverage</i>	The ratio of debt to assets
<i>High Tech</i>	A dummy variable equal to one if a firm is a high tech company and zero otherwise. We consider firms in the electronic industry, IT industry and biomedical industry to be high tech companies
<i>Income Growth Rate</i>	The difference between this year's net income and last year's net income scaled by last year's net income

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China Journal of Accounting Research

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The effect of non-recurring items on analysts' earnings forecasts



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ARTICLE INFO

Article history:

Received 21 January 2016

Accepted 26 October 2017

Available online 21 November 2017

Keywords:

Non-recurring items

Earnings forecasts

Revisions

ABSTRACT

This article discusses the effects of non-recurring profits and losses on statement users' decision-making processes from the perspective of securities analysts. We examine the relationship between analysts' forecast revisions and firms' non-recurring earnings. We find that 1) non-recurring gains and losses can influence analysts' earnings forecast revision; 2) compared with non-recurring items resulting from policy changes, analysts are more concerned about those attributed to changes in business scope; 3) if listed companies use non-recurring items to turn losses into gains during earnings management, it will weaken the effects of non-recurring items on analysts' earnings forecast revision. The results suggest that non-recurring items that result from changes in business scope incorporate information that users need for the future operation of the business. This article verifies the information relevance of non-recurring items and provides evidence for the necessity of non-recurring item disclosure.

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1. Introduction

This paper examines the effect of the disclosure of non-recurring items and their characteristics on analysts' forecast revisions. Unlike earnings generated from continuous operation, non-recurring items are one-time and contingent. The CSRC announcement "Explanatory Announcement No. 1 of Corporate Information Disclosure on Public Issuance of Securities - Non-recurring items (2008)" defines non-recurring items as

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“earnings from transactions and events which are not directly related to normal business, or related to normal business but influence statement users’ decisions in the corporation’s business performance and profitability due to its special nature and contingency.” Questions arise from this: do the non-recurring items influence statement users’ value judgments, and if so, how?

The literature has mainly focused on whether non-recurring items can be used to manipulate corporate earnings (Jaggi and Baydoun, 2001; McVay, 2006). In terms of the role non-recurring items played in statement users’ decisions, research has mainly focused on the correlation between non-recurring items and stock price. Some researchers hold the view that the information involved lacks consistency. In that case, non-recurring items have no incremental information for the capital market (Nichols, 1973; Ramakrishnan and Thomas, 1998; Castagna and Matolcsy, 1989). Yang (2008) and Cready (2010) discovered that various non-recurring items differed in consistency, which brought differences in value relevance.

Using analysts’ forecast revisions as proxy for the information process outcome, this paper investigates the effect of non-recurring items on statement users’ decision-making processes. As a group of statement users who possess professional knowledge, securities analysts predict the corporation’s future earnings level and provide investment advice. If non-recurring items are one-time, contingent and have no influence on the corporation’s future profitability, analysts will not revise future earnings forecasts. However, if non-recurring items contain information about the corporation’s future earnings changes, the analyst will revise earnings forecasts accordingly.

This paper uses Chinese A-stock companies in the Shenzhen and Shanghai security markets from 2009 to 2013 as a research sample to investigate the relationship between non-recurring items and analysts’ forecast revisions. The empirical results suggest the following. (1) Analysts revise earnings forecast upwards when non-recurring gains occur, and do not revise earnings forecasts when non-recurring losses occur. The revision is asymmetric. (2) Due to changes in business scope, non-recurring items incorporate more information for analysts to revise earnings forecasts than other items. (3) When listed companies use non-recurring items to turn losses into gains for earnings management, analysts can see through this manipulation and revise the forecasts downward.

We conclude that non-recurring items incorporate information about corporate future earnings, but non-recurring items of different types and from different sources have different effects on analysts’ earnings forecast revision. Therefore, disclosure of non-recurring items is consistent with the requirements of statement users. This paper also provides empirical evidence for the further improvement of methods for disclosing non-recurring items.

The remainder of the paper is organized as follows. Section 2 provides the institutional background, literature review and development of hypotheses. Section 3 describes our data and empirical methodology. Section 4 reports the empirical results and analyses. Section 5 concludes the paper.

2. Institutional background and theoretical analysis

2.1. Institutional background

Accounting theory holds that there are differences between recurring items and non-recurring items, and countries disagree on how to disclose non-recurring items. The U.S. Financial Accounting Standards Board (FASB) requires companies to recognize non-recurring items based on their business scope. In contrast, the accounting standard for non-recurring items in China is more standardized and consistent. In 1999, the CSRC clarified the concept and disclosure requirements of non-recurring items for the first time, and it has subsequently adjusted the definition of non-recurring items and disclosure requirements for several items.

In terms of items included, the CSRC first defined specific items of non-recurring gains and losses in 2001, which were divided into identified items and presumed items. In 2004, the CSRC canceled the classification and adjusted the specific items of non-recurring gains and losses. In 2007, the CSRC removed three obsolete items and added certain items such as net profit of subsidiaries under common control for the current period from the beginning to the merger date, restructuring costs such as employee resettlement expenses and integration costs, and gains and losses arising from estimated liabilities unrelated to the company’s main business. Meanwhile, the CSRC adjusted the scope of items such as asset disposal income, government subsidies, asset

consumption, non-monetary exchange profit and loss and other items. In 2008, further items were defined as non-recurring items, including gains and losses from financial assets or liabilities held for trading, and gains and losses on disposal of financial assets or liabilities held for trading and financial assets held for sale.

Although items included in non-recurring profits or losses can vary according to regulations, listed company disclosures of non-recurring items are highly comparable within the same accounting period and there is little possibility of manual adjustment. Information disclosure of endogenous issues can be well controlled in an investigation of the economic consequences of non-recurring items.

2.2. Literature review

A considerable body of research focuses on whether non-recurring items (as part of earnings) are a means of earnings management. According to Craig and Walsh (1989), Beattie and Brown (1994), Lin and wei (2000) and McVay (2006), non-recurring items are an effective means of earnings management. This practice is more common in unprofitable and low-profit companies that are eager to turn losses into gains (Wang and Jiawei, 2008; Meng and Wang, 2010).

However, there is no consensus on whether non-recurring items have value-relevance. Some researchers have suggested that non-recurring items have low value relevance because they provide non-continuous information and little incremental information for capital markets (Ramakrishnan and Thomas, 1998; Castagna and Matolcsy, 1989; Strong and Walker, 1993). Cready (2010) found that frequently occurring non-recurring items have a certain degree of continuity and value relevance. As disclosure frequency of non-recurring items in previous quarters increases, the continuity and value relevance increases. The value relevance of non-recurring items will decrease with the decline in continuity, while the quality of accounting information will be improved and earnings management will be curbed if regulators expand the definition of non-recurring items (Mu, 2005). In addition, the market reacts differently to non-recurring items, which means that investors exploit information incorporated in non-recurring items when they make decisions (Meng and Wang, 2010).

Although stock price is an important index of value relevance in accounting information research, as a synthetic index it is affected by profitability and earnings volatility. One-time and contingent non-recurring items affect the level and volatility of earnings. The direction and magnitude of its effect on stock prices are unknown. Therefore, it is not necessarily reasonable to evaluate the decision usefulness of non-recurring items in terms of stock price relevance.

2.3. Theoretical analysis

Securities analysts provide investment advice on stocks based on their forecast of company profitability. Compared to with normal investors, securities analysts place more emphasis on the company's future profitability and underlying business reasons. Accounting information quality affects an analyst's earnings forecast, including earnings forecast error, volatility and revision (Gleason and Lee, 2003; Ivkovic and Jegadeesh, 2004; Beyer, 2008; Brown and Rozeff, 1979; Downen, 1989; Clement et al., 2011). It is difficult for analysts to predict companies' non-recurring items, but the question of whether analysts care about the disclosure of non-recurring items and make revisions accordingly requires further study.

Non-recurring items are one-time and contingent. Analysts mainly base their earnings forecasts on the company's continuous business, so it is difficult to effectively forecast future non-recurring items in advance. Given the features of non-recurring items (there is no relationship between the effect on current net profit and on future company profitability), even a large number of non-recurring items that leads to significant deviation in analysts' earnings forecasts will not change analysts' judgments of companies' future operating ability and profitability. Therefore, there is no relationship between non-recurring items and analysts' earnings forecasts. We thus have an irrelevance hypothesis.

However, non-recurring items arising from part of the business are not entirely contingent or one-time. Unlike continuing business, non-recurring items do not have long-term effects, but some non-recurring items such as those arising from corporate restructuring could have a relatively longer period of influence than actual contingent events. The influence of restructuring on book earnings is one-time, but restructuring might

lead to a change in the nature of the business, which probably causes long-term effects on future earnings. When forecasting future earnings, analysts need to take business transformation and modification into consideration and revise earnings forecasts accordingly. If companies obtain positive non-recurring items through such business, this will lead to an increase in future earnings (asset restructuring, government subsidies, tax preferences and so on) or a reduction in future costs (gains on debt restructuring), which improves companies' future profitability and operating cash flow, thus increasing future earnings.

We emphasize that non-recurring items will not affect analysts' earnings forecasts and revisions if analysts are not concerned about them. However, if analysts do care about non-recurring items, even though they usually just need to arrive at the total net profit, they will revise earnings forecasts accordingly based on the sustainable effects of the non-recurring items. Therefore, analysts will revise earnings forecasts upward when there is a larger amount of non-recurring items, so we arrive at an effective attention hypothesis. We thus propose a pair of competitive hypotheses as follows.

H1a. There is no relationship between non-recurring items and analysts' earnings forecasts. (Irrelevance Hypothesis)

H1b. The higher the non-recurring profits or losses, the higher the likelihood and degree that analysts will revise earnings forecast upwards (Effective Attention Hypothesis). Furthermore, non-recurring items resulting from changes in business scope will have greater influence on analysts' earnings forecast revisions than other items.

As noted earlier, non-recurring items are an important means for low profit companies to manage earnings (Jaggi and Baydoun, 2001; McVay, 2006). If analysts believe that non-recurring items have no effect on companies' future earnings, they will not revise earnings forecasts even if companies use non-recurring items to turn losses into gains. If analysts think that non-recurring items will change companies' future earnings levels, but at the same time are not interested in the non-recurring items' implications for potential earnings management, they will just revise earnings forecasts mechanically. In that case, the issue of whether non-recurring items change companies' profits will not cause changes to analysts' earnings forecast revision.

If analysts pay attention to the number of non-recurring items and also analyze whether management manipulates non-recurring items to embellish their financial statements, then the higher the likelihood of earnings management in non-recurring items, the lower the likelihood that non-recurring gains or losses affect analysts' future earnings forecasts. When listed companies use non-recurring items to turn losses into gains, due to information asymmetry analysts might not be able to effectively identify which non-recurring items are relatively persistent. The result of "adverse selection" is that analysts will pay little attention to non-recurring items used to turn losses into gains when revising earnings forecasts, which will reduce the effect of non-recurring items on their earnings forecast revision. Based on the discussion above, we propose the following hypotheses:

H2a. There is no correlation between non-recurring items used to turn losses into gains and analysts' earnings forecast revisions (Irrelevance Hypothesis and Mechanicalness Hypothesis).

H2b. The higher the volume of non-recurring items used to turn losses into gains, the lower the upward revision of analysts' earnings forecasts (Efficient Attention Hypothesis).

3. Research design

3.1. Sample and data

We select A-share listed companies in the Shenzhen and Shanghai stock markets from 2009 to 2013 as the sample. Analysts' earnings forecast revision data is obtained from the iFind database, and financial data is obtained from the Wind and CSMAR databases. Out of the total of 4563 firm-year observations that are available, we exclude extreme observations and those with missing values. We winsorize continuous variables at the 1% level to reduce the influence of outliers.

3.2. Models and variables

To begin, this paper examines whether non-recurring items have value relevance and whether they affect analysts' earnings forecast revision. Furthermore, we study whether analysts pay equal attention to non-recurring gains and losses, and the extent to which different components of non-recurring items affect analysts' earnings forecast revision. In addition, we examine whether analysts can see through the manipulation of non-recurring items to turn losses into gains and revise their forecasts accordingly.

To examine the relationship between non-recurring items and analysts' earnings forecast revision, model (1) is used to test Hypothesis 1:

$$\begin{aligned} \text{Fr_EPS1}_{it}/\text{Fr_EPS2}_{it} = & \alpha_0 + \alpha_1\text{NRC_PS}_{it} + \alpha_2\text{Size}_{it} + \alpha_3\text{DA}_{it} + \alpha_4\text{Growth}_{it} + \alpha_5\text{Fundhold}_{it} \\ & + \alpha_6\text{P/B}_{it} + \alpha_7\text{Risk}_{it} + \alpha_8\text{CHG_EPS}_{it} + \alpha_9\text{RPL}_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

Fr_EPS1 and Fr_EPS2 are dependent variables in model (1). Fr_EPS1 refers to one-year analysts' earnings forecast revision, which equals analysts' forecasts for EPS in the next fiscal year after the annual report, less analysts' forecasts for EPS in the next fiscal year before the annual report, and then divided by the absolute value of analysts' forecasts for EPS in the next fiscal year before the annual report. Fr_EPS2 refers to two-year analysts' earnings forecast revision, which equals analysts' forecasts for EPS in the next two fiscal years after the annual report, less analysts' forecasts for EPS in the next two fiscal years before the annual report, and then divided by the absolute value of analysts' forecasts for EPS in the next two fiscal years before the annual report. By using absolute value in the denominator, we can identify whether analysts revise earnings forecasts upward or downward. The independent variable NRC_PS represents non-recurring items per share, which equals non-recurring items disclosed in the annual report divided by net assets at the end of fiscal year. The following variables are controlled in the model. Size refers to scale of assets, DA refers to the level of earnings management, Growth is firm growth, Fundhold represents the proportion of fund holdings, PB is price-book ratio, Risk refers to stock return volatility in the previous year, CHG_EPS is change in profitability, and RPL (recurrent profit and loss) refers to recurring items.

Model (2) further analyzes the value relevance of non-recurring items by differentiating non-recurring items into non-recurring profits and non-recurring losses and then examining whether analysts' concern for non-recurring profits and losses is symmetrical.

$$\begin{aligned} \text{Fr_EPS1}_{it}/\text{Fr_EPS2}_{it} = & \alpha_0 + \alpha_1\text{NEG_NRC}_{it} + \alpha_2\text{POS_NRC}_{it} + \alpha_3\text{Size}_{it} + \alpha_4\text{DA}_{it} + \alpha_5\text{Growth}_{it} \\ & + \alpha_6\text{Fundhold}_{it} + \alpha_7\text{P/B}_{it} + \alpha_8\text{Risk}_{it} + \alpha_9\text{CHG_EPS}_{it} + \alpha_{10}\text{RPL}_{it} + \varepsilon_{it} \end{aligned} \quad (2)$$

The definitions of the dependent variables are the same as above. The independent variables are NEG_NRC and POS_NRC. NEG_NRC refers to non-recurring losses per share. When non-recurring items per share (NRC_PS) is negative, NEG_NRC is the same as NRC_PS, otherwise NEG_NRC is 0. POS_NRC refers to non-recurring profits per share. When non-recurring items per share (NRC_PS) is positive, POS_NRC is the same as NRC_PS, otherwise POS_NRC is 0. Control variables are the same as above.

Model (3) examines whether different components of non-recurring items incorporate different information, which affects analysts' earnings forecast revision differently. Non-recurring items are divided into three categories to examine the relationship between each category and analysts' earnings forecast revision: non-recurring items due to business scope changes, non-recurring items due to government policies, and other non-recurring items.

$$\begin{aligned} \text{Fr_EPS1}_{it}/\text{Fr_EPS2}_{it} = & \alpha_0 + \alpha_1\text{Scope}_{it} + \alpha_2\text{Govern}_{it} + \alpha_3\text{Other}_{it} + \alpha_4\text{Size}_{it} + \alpha_5\text{DA}_{it} + \alpha_6\text{Growth}_{it} \\ & + \alpha_7\text{Fundhold}_{it} + \alpha_8\text{P/B}_{it} + \alpha_9\text{Risk}_{it} + \alpha_{10}\text{CHG_EPS}_{it} + \alpha_{11}\text{RPL}_{it} + \varepsilon_{it} \end{aligned} \quad (3)$$

Table 1
Variable definitions.

	Variables	Descriptions
Dependent variables	Fr_EPS1	(Analysts' forecasts for EPS in the next fiscal year after the annual report – analysts' forecasts for EPS in the next fiscal year before the annual report)/ The absolute value of analysts' forecasts for EPS in the next fiscal year
	Fr_EPS2	(Analysts' forecasts for EPS in the next two fiscal years after the annual report - analysts' forecasts for EPS in the next two fiscal years before the annual report) The absolute value of analysts' forecasts for EPS in the next two fiscal years before the annual report
Independent variables	NRC_PS	Non-recurring items disclosed in the annual report/net assets at the end of the fiscal year
	NEG_NRC	When non-recurring items per share (NRC_PS) is negative, NEG_NRC is the same as NRC_PS, otherwise NEG_NRC is 0
	POS_NRC	When non-recurring items per share (NRC_PS) is positive, POS_NRC is the same as NRC_PS, otherwise POS_NRC is 0
	N2P	Assuming that companies' net profit is negative before deducting non-recurring items, if net profit becomes positive after deducting non-recurring items, N2P is 1, otherwise N2P is 0
	Scope	Item 5 + item 9 + item 12 in non-recurring items/net assets at the end of the fiscal year
Control variables	Govern	Item 2 + item 3/net assets at the end of fiscal year
	Other	The sum of items other than those mentioned above/net assets at the end of the fiscal year
	Size	The natural logarithm of asset balance at the end of the fiscal year
	DA	Derived from the Jones Model
	Growth	Growth in sales compared to the previous year
	Fundhold	Fund shareholding ratio
	PB	Share price/net assets
Risk	Stock return volatility of the previous year	
	CHG_EPS	[Sales in year t/ sales in year (t-1)] – 1

The dependent variables in Model (3) are defined in the same way. Scope, the independent variable, refers to non-recurring items due to changes in business scope, which equals the sum of item 5, item 9 and item 12 in non-recurring items.¹ Govern represents non-recurring items that result from government policies, which equals the sum of item 2 and item 3. Other refers to other non-recurring items, which is equal to the sum of those items not mentioned above. Control variables are the same as those in Model (1).

Model (4) is used to test Hypothesis 2—that is, whether analysts can see through the manipulation and then revise the forecasts downward when companies use non-recurring items to turn losses into gains. In Model (4), we add the interaction variable between extraordinary profit (or loss) and the dummy variable N2P to capture the weakening effect.

$$\begin{aligned}
 \text{Fr_EPS1}_{it}/\text{Fr_EPS2}_{it} = & \alpha_0 + \alpha_1 \text{NRC_PS}_{it} + \alpha_2 \text{N2P}_{it} + \alpha_3 \text{NRC_PS}_{it} \times \text{N2P}_{it} + \alpha_4 \text{Size}_{it} + \alpha_5 \text{DA}_{it} \\
 & + \alpha_6 \text{Growth}_{it} + \alpha_7 \text{Fundhold}_{it} + \alpha_8 \text{P/B}_{it} + \alpha_9 \text{Risk}_{it} + \alpha_{10} \text{CHG_EPS}_{it} \\
 & + \alpha_{11} \text{RPL}_{it} + \varepsilon_{it}
 \end{aligned} \tag{4}$$

The definitions of the dependent variables in Model (4) are the same as above. N2P is a dummy variable that equals one if the company just turns the negative earnings to positive and equals zero otherwise. Assuming that companies' net profit is negative before deducting non-recurring items, if net profit becomes positive after deducting non-recurring items, N2P is 1 or 0. NRC_PS represents non-recurring items per share, which equals non-recurring items disclosed in the annual report divided by net assets at the end of the fiscal year. All variables except N2P are divided by net assets at the end of the fiscal year. Control variables are the same as those in Model (1).

All of the variable definitions are summarized in Table 1.

¹ This definition of non-recurring items is from the China Securities Regulatory Commission Announcement [2008] No. 43), Explanatory Announcement No. 1 on Information Disclosure for Companies Offering Their Securities to the Public. Item classification numbers are derived from the Wind database classification of non-recurring items of profit and loss.

4. Empirical results

4.1. Descriptive statistics

Table 2 provides descriptive statistics for the variables used in the regression analysis. It shows that one-year analysts' earnings forecast revision (Fr_EPS1) has a mean (median) of -0.284 (-0.013), which means that analysts' overall earnings forecast revisions are downward. Two-year analysts' earnings forecast revision (Fr_EPS2) has a mean (median) of -0.495 (-0.013), indicating that a downward trend exists in analysts' two-year earnings forecast revision and there are considerable differences between analysts' one-year earnings forecast revision (Fr_EPS1) and analysts' two-year earnings forecast revision (Fr_EPS2).

In addition, NRC_PS has a mean of -0.4951 , which means that overall net extraordinary profit is positive and accounts for 6.48% of net assets. POS_NRC has a mean of 0.0676 and NEG_NRC has a mean of -0.0023 , indicating that in listed companies, average extraordinary gains are much larger than average extraordinary losses.

For each kind of non-recurring items, Scope has a mean of 0.03, which means that non-recurring items due to changes in business scope account for 3% of equity, while Govern has a mean of 0.0374, indicating that non-recurring items that result from government policies account for 3.74%. Of the two scenarios where non-recurring items change companies' earnings (from negative to positive, or positive to negative), the latter rarely happens, while 7% of companies use non-recurring items to turn losses into gains. For control variables, earnings management has a large variance, suggesting that earnings management of listed companies is different in scale. Variances of the remaining control variables are low, indicating that those control variables are less discrete in the sample.

4.2. Empirical results

Table 3 shows regression results for Hypothesis 1, where Fr_EPS1 is analysts' one-year earnings forecast revision and Fr_EPS2 is analysts' two-year earnings forecast revision. The independent variable NRC_PS measures non-recurring gains or losses per share and heteroscedasticity is controlled during the regression process. If the coefficient of NRC_PS is positive, then there is relevance between disclosure of non-recurring items and analysts' earnings forecast revision: non-recurring items incorporate incremental information and analysts absorb it.

Table 2
Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Q1	Median	Q3	Max
Fr_EPS1	4306	-0.284	0.134	-0.480	-0.070	-0.013	0.005	0.583
Fr_EPS2	4306	-0.495	0.145	-0.495	-0.086	-0.013	0.009	0.613
NRC_PS	4306	0.065	0.101	-0.082	0.009	0.032	0.079	0.559
POS_NRC	4306	0.068	0.102	0.000	0.009	0.032	0.079	0.559
NEG_NRC	4306	-0.002	0.011	-0.089	0.000	0.000	0.000	0.000
N2P	4306	0.071	0.255	0.000	0.000	0.000	0.000	1.000
Scope	4306	0.030	0.014	-0.006	0.000	0.000	0.000	0.118
Govern	4306	0.037	0.050	0.000	0.006	0.020	0.046	0.282
Other	4306	0.020	0.065	-0.164	-0.004	0.002	0.022	0.513
DA	4306	-0.001	0.078	-0.204	-0.045	-0.004	0.036	0.293
Size	4306	22.444	1.267	19.894	21.536	22.268	23.311	26.027
Growth	4306	18.742	28.397	-48.872	2.779	15.047	30.299	128.037
Fundhold	4306	8.313	11.943	0.000	0.719	3.001	11.451	51.516
P/B	4306	3.042	2.332	0.000	1.546	2.351	3.734	15.260
Risk	4306	2.709	0.612	1.392	2.266	2.691	3.126	5.272
CHG_EPS	4306	-0.012	0.359	-1.277	-0.139	0.005	0.130	1.244
RPL	4306	0.369	0.469	-0.778	0.093	0.274	0.541	2.252

Table 3
Regression results for Hypothesis 1.

Variables	(1) Fr_EPS1	(2) Fr_EPS2	(3) Fr_EPS1	(4) Fr_EPS2	(5) Fr_EPS1	(6) Fr_EPS2
NRC_PS	0.0674*** (3.15)	0.0548** (2.27)				
POS_NRC			0.0684*** (3.12)	0.0660*** (2.67)		
NEG_NRC			0.0296 (0.15)	−0.3817* (−1.76)		
Scope					0.1328 (1.55)	0.2718*** (2.87)
Govern					0.0442 (1.08)	0.0265 (0.58)
Other					0.0306 (1.16)	−0.0147 (−0.48)
DA	−0.0344 (−1.29)	−0.0668** (−2.23)	−0.0340 (−1.27)	−0.0630** (−2.10)	−0.0272 (−1.02)	−0.0557* (−1.85)
Size	−0.0054*** (−2.58)	−0.0023 (−0.98)	−0.0054*** (−2.59)	−0.0026 (−1.11)	−0.0050** (−2.41)	−0.0018 (−0.78)
Growth	0.0002** (2.54)	0.0004*** (3.88)	0.0002** (2.54)	0.0004*** (3.94)	0.0002** (2.39)	0.0003*** (3.71)
Fundhold	0.0001 (0.64)	0.0002 (0.82)	0.0001 (0.65)	0.0002 (0.90)	0.0001 (0.65)	0.0002 (0.83)
P/B	0.0007 (0.57)	0.0019 (1.40)	0.0007 (0.57)	0.0018 (1.33)	0.0006 (0.52)	0.0018 (1.34)
Risk	−0.0088* (−1.74)	0.0007 (0.13)	−0.0089* (−1.75)	0.0001 (0.01)	−0.0084* (−1.65)	0.0016 (0.27)
CHG_EPS	0.0294*** (4.53)	0.0246*** (3.40)	0.0294*** (4.53)	0.0246*** (3.39)	0.0314*** (4.84)	0.0263*** (3.62)
RPL	0.0140*** (2.61)	0.0148** (2.49)	0.0139*** (2.59)	0.0138** (2.33)	0.0124** (2.30)	0.0126** (2.12)
Constant	0.0959 (1.72)	0.0211 (3.33)	0.0963* (1.73)	0.0278 (0.44)	0.0892 (1.60)	0.0115 (0.18)
Year	Control	Control	Control	Control	Control	Control
Industry	Control	Control	Control	Control	Control	Control
N	4306	3909	4306	3909	4306	3909
R-squared	0.042	0.064	0.042	0.065	0.041	0.065
F	6.30	8.89	6.09	8.75	5.74	8.45

t-statistics in parentheses.

*** p < .01.

** p < .05.

* p < .1.

Columns (1) and (2) of Table 3 show that the coefficient of NRC_PS is positive and significant at the 1% (5%) level when the dependent variable is analysts' one-year (two-year) earnings forecast revision. This indicates that non-recurring items have value relevance and affect analysts' earnings forecast revision. The higher the volume of non-recurring items, the greater the likelihood and degree of analyst earnings forecast revision, which supports Hypothesis 1b. As control variables, the coefficient of Size (Risk) is negative and significant at the 1% (10%) level when the dependent variable is Fr_EPS1. It is not significant when the dependent variable is Fr_EPS2, which suggests that analysts will revise one-year earnings forecasts downward with the increase in Size (Risk), but will not revise two-year earnings forecasts. The coefficients of Growth, CHG_EPS and RPL are significantly positive, which indicates that analysts will pay special attention to sales growth, changes in profitability and recurring items and revise their one-year (two-year) earnings forecast accordingly. The revision will be greater with the increase in Growth, CHG_EPS and RPL. The coefficient of DA is significantly negative if the dependent variable is Fr_EPS2 but not significant if the dependent variable is Fr_EPS1, indicating that analysts will revise two-year earnings forecasts downward but will not revise the one-year earnings

forecast. The coefficients of P/B and Fundhold are not significant, which indicates that analysts will not revise earnings forecasts with changes in P/B ratio or Fundhold.

Columns (3) and (4) show that the coefficient of POS_NRC is positive (significant at 1%), meaning that analysts will revise earnings forecasts as non-recurring gains increase. However, the coefficient of NEG_NRC is not significant when the dependent variable is Fr_EPS1, indicating that the revision is asymmetric in one-year earnings forecasts. The coefficient of NEG_NRC is negative (significant at 10%) if the dependent variable is Fr_EPS2, which indicates that non-recurring items could be a means for earnings management. When the company uses non-recurring items to lower earnings, analysts will see through this manipulation and revise earnings forecasts for the second year.

In the columns (5) and (6) of Table 3, only the coefficient of Scope is positive (significant at 1%), which indicates that Scope, Govern and Other are non-recurring items with different information implications, and affect analysts' earnings forecasts differently. Analysts focus on items 5, item 9 and item 12, which are non-recurring items resulting from changes in the business scope. Those caused by changes in government policies and other contingent, one-off items will not significantly influence analysts' revision.

To sum up, analysts mainly care about items 5, 9 and 12. Specifically, item 5 of non-recurring items is the difference between the investment cost of obtaining subsidiary incorporation, affiliated businesses and joint ventures and the gains generated from the fair value of identifiable net assets in the invested company. Item 9 is the profits or losses of restructuring. Item 12 is current profits and losses of a subsidiary generated by busi-

Table 4
Regression results for Hypothesis 2.

Variables	(1) Fr_EPS1	(2) Fr_EPS2
NRC_PS	0.0903*** (3.79)	0.0997*** (3.75)
N2P	-0.0205* (-1.93)	0.0104 (0.82)
NRC_PS*N2P	-0.0220 (-0.64)	-0.1521*** (-3.79)
DA	-0.0334 (-1.25)	-0.0663** (-2.21)
Size	-0.0050** (-2.39)	-0.0020 (-0.84)
Growth	0.0002** (2.33)	0.0003*** (3.68)
Fundhold	0.0001 (0.52)	0.0002 (0.87)
P/B	0.0009 (0.73)	0.0020 (1.52)
Risk	-0.0085* (-1.68)	0.0009 (0.15)
CHG_EPS	0.0313*** (4.78)	0.0281*** (3.86)
RPL	0.0102* (1.85)	0.0102* (1.68)
Constant	0.0884 (1.59)	0.0133 (0.21)
Year	Control	Control
Industry	Control	Control
N	4306	3909
Adjusted R-squared	0.044	0.068
F	6.16	8.90

t-statistics in parentheses.

*** p < .01.

** p < .05.

* p < .1.

ness combination under common control from the beginning of the fiscal year to the merger date. The items above are usually caused by changes in a company's business operating scope. Compared to non-recurring items caused by political reasons or other contingent events, the items above draw much more attention from analysts.

Table 4 shows the empirical results from the examination of Hypothesis 2. The coefficient of the interaction NRC_PS^*N2P is not significant in the first column but is significant at 1% level in the second column. This indicates that when companies use non-recurring items to turn losses into gains, analysts can see through this manipulation and then revise the forecasts downward, which is mainly reflected in analysts' two-year earnings forecast revision. When the dependent variable is Fr_EPS2 , the sum of the coefficient of NRC_PS and that of NRC_PS^*N2P is negative, which indicates that analysts will consider it as a bad performance signal and revise the forecasts downward if there is a comparative likelihood that management uses non-recurring items to turn losses into gains.

5. Conclusion

Decision usefulness is an important feature of accounting information. The question of whether decision makers can use accounting information to judge revision is an important measure of the quality of that information. Non-recurring items are an important part of accounting information. In a context of continuous reform and perfection of regulations and requirements on the disclosure of non-recurring items, this paper explores the effect of non-recurring items on statement users and specific expected changes. This knowledge can enhance discussions on decision usefulness, improve information disclosure and promote a healthy development of capital market.

Prior literature on non-recurring items focuses on earnings management, value relevance and so on. No consensus has been reached on whether non-recurring items incorporate information and how they influence financial statement users. However, we do not use stock price to examine the value relevance of non-recurring items. Due to the characteristics of non-recurring items, there is inevitably a large amount of noise, making it difficult for us to test whether non-recurring items provide incremental information. This paper tries to avoid pricing noise in the stock market and directly examines the effect of disclosing non-recurring items on economic behavior of certain information users, analyzing the relevance between analysts' earnings forecast revision and the information provided by non-recurring items.

Using the sample of A-share listed companies in the Shenzhen and Shanghai stock markets between 2009 and 2013, this paper discusses the direction, magnitude and range of analysts' earnings forecast revision upon disclosure of non-recurring items. Empirical results show that analysts revise earnings forecasts according to the disclosure of non-recurring items in the annual report, but the revision is asymmetric. Analysts revise earnings forecasts upward when net non-recurring profits occur, and the revision increases with the amount of net non-recurring gains. However, they will not revise earnings forecast downward when net non-recurring losses occur. This indicates that non-recurring items incorporate information increment. Moreover, analysts tend to be optimistic. They tend to revise their forecasts as a result of good news and respond less to bad news. In addition, this paper discovers that analysts will only revise earnings forecasts according to non-recurring items due to change in company business scope, which means that only those non-recurring items that can cause long-term business changes will influence financial statement users' decisions. Analysts will not revise earnings forecast for occasional, one-off items that do not provide long-term business information for the future. Analysts can also see through the ways that management turn losses into gains by manipulating non-recurring items, and accordingly revise their forecasts downward.

This paper indicates that non-recurring items incorporate information on future earnings, which will affect statement users' judgment of firm value. Furthermore, non-recurring items from different sources provide different levels of incremental information. As key players in the information intermediary, analysts are able to interpret information on non-recurring items in financial statements. Full disclosure of non-recurring items can improve the quality of corporate financial reporting and help capital market investors to make decisions. Our research has reference value for regulators and investors. Disclosure of non-recurring items should be better regulated, especially the disclosure of non-recurring items that reflect companies' normal business. This is

of great importance if we are to improve China's information disclosure system, curb earnings manipulation by management, protect the interests of investors and promote healthy capital market development.

Acknowledgments

The authors thank the anonymous referees and the editor for their constructive suggestions. Any errors are the sole responsibility of the authors. This study is supported by the National Natural Science Foundation of China (Project No. 71272008 and No. 71632006), Social Sciences Major Issue Research Projects of The Ministry of Education of China (Project No. 11JJD790008 and No. 14JJD630005) and the Subject of Shanghai Education Committee (Project No. 2014111143).

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Identifying M&A targets and the information content of VC/PEs



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ARTICLE INFO

Article history:

Received 29 September 2015

Accepted 9 August 2016

Available online 6 September 2016

Keywords:

M&A

Certification

VC/PEs

Information content

ABSTRACT

The information gap in the M&A market hinders acquirers from effectively identifying high-quality targets. We examine whether VC/PEs convey information content in the M&A market and whether acquirers can use such information to identify high-quality targets. We show that VC/PEs have significant information content and can signal high-quality target companies via “certification”. When acquirers lack acquisition experience and targets are located in inferior information environments, VC/PE “certification” is more significant. The better reputation a VC/PE has, the more information it conveys. Syndicate VC/PEs convey stronger information than independent VC/PEs. We also find that acquirers do not pay higher premiums for high-quality targets. Overall, our results suggest that VC/PEs have value relevance in the M&A market, confirming their “certification” role. We present means for acquirers to select high-quality targets and investors to build efficient portfolios.

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1. Introduction

As newly revised regulations that encourage mergers and acquisitions (M&As) (e.g., “Measures for the Administration of Material Asset Reorganization of Listed Companies” and “Administrative Rules on Acquisition of Listed Companies”) are implemented, an increasing number of listed companies are striving to achieve rapid transformation and enhance core competitiveness through M&As. Thus, identifying high-quality targets has become a crucial issue for listed companies.

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Although some companies possess innovative technologies, heterogeneous resources and new business models, they also face many challenges in the growth process, including a lack of funds, limited product development capability and restricted market expansion potential. These issues largely restrict the future growth of the companies (Zhu and Fei, 2010). As a result, when companies are unable to solve bottlenecks, they tend to seek help from more “well-off” companies. For the acquirers, these candidates can generate synergistic effects through resource complementation or enhancement, bring new profit growth and strengthen the acquirers’ core competitiveness. Hence, they are considered high-quality targets. Nevertheless, capturing useful information to identify these targets can be a difficult task, as many growing companies, especially startups, exhibit problems such as low information transparency, limited records of past transactions and the uncertainty of new product development (Elfring and Hulsink, 2003). In particular, due to confidentiality, target companies are often reluctant to disclose detailed information about core technologies and resources before confirming M&A transactions. Consequently, the information gap that arises during M&As poses a great challenge to acquirers when searching for high-quality targets. Research has found that venture capitalists (VCs) and private equity firms (PEs) can decrease the information asymmetry between companies and investors at the time of initial public offering (IPO) by providing “certification” (Megginson and Weiss, 1991). Can VC/PEs also decrease the information gap and play the role of “certification” during M&A transactions?

In the recent years, due to the reform of the IPO system by Chinese regulators and the “Barrier Lake Effect,” the exit channel for VC/PEs has changed and M&As have gradually become an important exit channel. According to Wind, there were only seven cases of VC/PE exit through M&As in 2004 and an average of thirty-one cases per year until 2012. However, in 2013 and 2014, the number of exit cases through M&As jumped tremendously to 120 and 560, with total amounts of RMB12.835 billion and RMB68.562 billion, respectively. The difference in book returns between IPO exit and M&A exit is shrinking. Therefore, M&As are becoming one of the main ways for VC/PEs to exit and are expected to become the “new norm” in the near future. This offers us the opportunity to investigate whether VC/PEs have information content in the Chinese M&A market. When VC/PEs send positive signals to the market, this indicates that VC/PEs play a “certification” role in the M&A market. This also decreases the information gap in the M&A process and provides practical guidance for acquirers to identify high-quality targets.

In this paper, we use Chinese A-share listed companies engaged in M&A transactions during 2013–2014 as our initial research sample and manually collect information about the transaction sellers backed by VC/PEs. Our main results are as follows. First, VC/PEs have strong information content in the M&A market and deliver positive signals to the market. Investors react positively to M&A transactions with VC/PE-backed target firms, which supports the finding that VC/PEs play a “certification” role in the M&A market. Second, when acquirers lack acquisition experience and targets are located in a poor information environment, the “certification” role of VC/PEs is more significant. Third, the better the reputation a VC/PE has and the more VC/PEs a target firm has, the stronger the information content is and the more favorably the market reacts. Fourth, after examining whether acquirers pay higher prices when acquiring VC/PE-backed targets, we find that acquirers obtain high-quality targets without having to pay higher premiums.

Our study makes several contributions. First, from the perspective of non-financial information, we examine the effect of the information embedded in VC/PEs on the value of targets during M&As. The literature related to the effect of target-related information on M&A value focuses mainly on the effect of financial information quality on M&As (Raman et al., 2013; Pan and Yu, 2014; McNichols and Stubben, 2015) rather than how non-financial information affects M&A value. Masulis and Nahata (2011) find that acquiring VC-backed target firms yield higher cumulative abnormal returns (CARs), as the agency conflict between VCs and other stockholders can lead to lower target pricing. Different from Masulis and Nahata (2011), we emphasize the VC/PE signaling mechanism in the M&A market. We find that VC/PEs have significant information content in the Chinese M&A market and can signal the high quality of target companies. Our findings also differ from those of Gompers and Xuan (2012), who find that acquiring VC-backed targets presents lower CARs based on U.S. data.

Second, from the M&A perspective, we provide evidence that VC/PEs perform a “certification” function. Since Barry et al. (1990) and Sahlman (1990) proposed the VC/PE “certification/supervision model”, a large

number of studies have empirically examined it in the IPO setting and found support for it using European and American data (Barry et al., 1990; Megginson and Weiss, 1991; Brav and Gompers, 1997). Bertoni et al. (2015) discover that VC/PEs also play a “certification” role in the financing activities of many young companies. We conduct this study in the setting of Chinese M&A transactions with Chinese listed companies as acquirers and non-listed companies as targets and find that VC/PEs also perform quality “certification” in the M&A field. That is, we extend the “certification” function of VC/PEs from the IPO setting to the M&A setting.

The conclusions of this study have important practical implications. First, we conclude that M&As have become an important means to solve problems during the transformation and upgrading of Chinese companies. The research has unfortunately done little to identify high-quality targets, which are necessary prerequisites for M&A transactions to achieve a synergistic effect. Therefore, how to identify high-quality targets is a core research question with both practical guidance and academic value and comprises the research value of our study. According to our study, acquiring VC/PE-backed targets can bring a higher value to listed companies. This finding provides useful guidance for listed companies when choosing M&A targets. Second, we conclude that the “certification/supervision” hypothesis of VC/PEs is often tested using the IPO setting in China. Most studies have concluded that VC/PEs do not possess a “certification/supervision” function and have further claimed that VC/PEs cannot screen out or help to develop high-quality firms (Yang et al., 2015). We think that this conclusion is inconsistent with the contribution made by VC/PEs in reality, as relying solely on IPO scenarios does not fully reflect the role of VC/PEs. Thus, motivated by VC/PEs exiting through M&As in reality, we consider the setting in which listed companies acquire non-listed target firms and find that VC/PEs also play a “certification” role. This finding allows us to better understand and evaluate the function of VC/PEs in China.

2. Theoretical analysis and hypotheses

Due to the information asymmetry in the M&A market and the large number of potential targets, acquirers are often faced with a serious information gap when selecting target firms. Such an information gap is particularly problematic when acquiring entrepreneurial firms due to the certain characteristics that entrepreneurial firms usually exhibit. First, these firms have low corporate information transparency (Hyytinen and Pajarinen, 2008). As a result of their relatively short history, entrepreneurial firms lack detailed trackable business records, and their financial information is insufficient to reflect the firms’ future value. Second, these firms have low proportions of fixed assets, with R&D resources, patent technology and other intangible assets taking up higher percentages (Qian and Zhang, 2007). This creates great difficulties when conducting firm evaluations. Finally, entrepreneurial firms experience high growth and high risk (Qian and Zhang, 2007). In terms of technology, they are quite capable of making breakthroughs in the market and developing new products. From the business model perspective, entrepreneurial firms may also offer business model innovations that lead future development trends. However, the risk persists that the market will not recognize these new technologies, products and business models.

The preceding arguments reveal that in the M&A process firms encounter an information gap in at least two aspects: target identification and evaluation. First, when screening out targets, acquirers often lack an in-depth understanding of target firms’ private information, such as their core technology resources or business models. Second, when determining the price of M&As, not enough information is provided to effectively evaluate the target firms. As this information is related to target firms’ value creation in the future and has the characteristics of private information, it constitutes the content of the information gap for acquirers. In this case, although the target firms present their financial information, the public information is still not enough for acquirers to identify and evaluate future targets. This leads us to wonder whether VC/PEs can make up for the information gap in the M&A market by conveying information about target firms.

In the IPO market, the “certification/supervision model” states that high-quality firms are more likely to attract VC/PEs. When the market lacks an effective way to reflect firms’ true value, VC/PE holdings can be used as an IPO firm’s “certification,” which investors perceive as a signal that the firm has a promising future. This

subsequently decreases the information asymmetry and the issue price of the IPO (Barry et al., 1990; Sahlman, 1990). In the M&A market, a similar information asymmetry exists between acquirers and targets. The information gap hinders acquirers from effectively identifying high-quality targets. VC/PEs can perform effective *ex ante* screening and provide value-added *ex post* services, which help to send the signal of high-quality targets to the market. These target firms usually have rich technology resources, abundant intellectual property and positive development prospects (Gompers and Xuan, 2012). Therefore, VC/PEs transmit signals that make up for the information gap and play the role of quality “certification” in the M&A process.

First, *ex ante*, VC/PEs can screen out high-quality targets. VC/PEs involve equity capital investment in emerging, fast-growing and potentially competitive firms (American Venture Capital Association). They are invested in by professional fund managers and characterized by high risks and large profits. As active investors with keen insights (Bottazzi et al., 2008), VC/PEs specialize in collecting information about, screening and evaluating investment projects. They rely on professional judgment and social networks to identify target firms with potential investment value in the market.

In general, how do VC/PEs identify target firms? When VC/PEs make investment decisions, they go through four phases: project search, project screening, project evaluation and contract signing. They focus mainly on a firm’s outlook, the quality of its entrepreneurs and its expected rate of return (Fried and Hisrich, 1994). MacMillan et al. (1985) study U.S. venture capitalists and find that they consider six factors when making investments, including entrepreneurs’ personality, entrepreneurs’ experience, the overall quality of the entrepreneurial teams, the innovation of the firm’s products, the market competition structure and the firm’s financial situation. The first two factors are the most important. In addition, VC/PEs pay great attention to firms’ social networks, human capital, patents and other factors (Baum and Silverman, 2004). Using their professionalism, experience and network resources, VC/PEs try their utmost to identify high-quality target firms. Chemmanur et al. (2011) and Guo and Jiang (2013) provide evidence that *ex ante* VC/PEs can select outstanding firms with higher labor productivity, R&D capabilities and sales growth. In fact, in an early study, Sahlman (1990) points out that VC/PEs are agencies that screen (and supervise) projects. Therefore, for acquirers, VC/PEs’ selection activities serve as an alternative to acquirers’ selection and screening of high-quality targets.

Second, VC/PEs enhance the quality of firms by providing *ex post* value-added services. After VC/PEs invest in the firms, they provide a series of value-added services to further increase the firms’ value. These services have three effects. First, they promote firms’ innovation. VC/PEs mostly invest in high-growth firms, which often possess more advanced R&D technology resources (Megginson and Weiss, 1991; Guo and Jiang, 2013). Consequently, the entry of a VC/PE can encourage them to develop more patents (Kortum and Lerner, 2000) and new products (Hellmann and Puri, 2002). After M&A, these innovative resources accelerate acquirers’ upgrading and transforming processes. Second, the *ex post* services can improve corporate governance. Following the investment of a VC/PE, directors are often appointed to the firms. These directors take on supervision and management responsibilities, optimize the compensation structure, enhance the corporate governance structure and standardize the firm’s management system (Bloom et al., 2015). Thus, when a firm’s operations are more standardized, it can help to decrease the difficulty in integration during M&As. Finally, the services help target firms recruit talent. High-quality talent guarantees a firm’s overall quality, especially for start-ups. High-quality talent with rich experience plays a key role in the success of technology commercialization (Dertouzos et al., 1988). Hellmann and Puri (2002) find that VC/PEs use their own networks to help target firms recruit senior management. Bottazzi et al. (2008) also find that the more experience venture capitalists have, the more likely they are to help start-ups recruit managers and directors. The high-quality talents become a valuable asset if they decide to stay with the acquirers after M&As. Therefore, the value-added services from VC/PEs exert a positive effect on firm quality, especially in their improvement of innovation capability, corporate governance enhancement and talent recruitment.

To summarize, VC/PEs can effectively identify high-quality targets *ex ante*, and can also further increase firm value by providing effective supervision and value-added services *ex post* (Chemmanur et al., 2011; Guo and Jiang, 2013). Hence, compared with firms without VC/PE holdings, those with VC/PE shares can ensure that they themselves are more premium targets and therefore send the signal that they are high quality in the M&A market. Based on this, we develop the following hypothesis.

Hypothesis 1. VC/PEs are a signal that target firms are high quality, and the stock market reacts positively to M&A transactions with VC/PE-backed target firms.

Reputation is a valuable intangible asset gradually accumulated through firms' past experience and satisfactory performance, and it is an important mechanism to alleviate information asymmetry (Hsu, 2004). In the absence of credible and sufficient firm information, outsiders rely more on the "certification" of firms from third-party agencies (Nahata, 2008), and the reputation of the agencies essentially determines the degree of credibility of the "certification". As they are in an industry with many competitors and relatively scattered markets, most VC/PEs adopt a differentiation strategy that focuses on specialized market segments. In these market segments, information asymmetry still exists between the firms and VC/PEs. Thus, the role of reputation is particularly important (Shu et al., 2011). A good reputation is a fundamental element in gaining a competitive advantage for VC/PEs. VC/PEs with a better reputation not only enter target firms at a lower cost (Hsu, 2004), but also are more favored by well-qualified targets. Furthermore, having a better reputation also means that the VC/PEs are more likely to select better target firms. As those VC/PEs with a better reputation tend to have broader networks and more professional management teams, they can more quickly help firms to grow and improve their quality upon entry. The effect of VC/PE reputation on firm performance is supported by the literature. Nahata (2008) finds that VC reputation can improve investment returns. The higher the reputation of the VC, the higher the probability of its successful exit, the faster the invested firms can achieve IPO and the higher the asset productivity upon IPO. Nahata (2008) further examines the source of the value generated when VC/PE reputation improves investment returns and finds that the value comes from both ex ante effective screening and ex post adequate monitoring experience. Krishnan et al. (2011) also find that the better the reputation of the VC, the more likely it is to select well-qualified targets. In addition, VCs can provide high-quality services to promote firms' corporate governance and improve post-IPO firm performance in the long run. Although outsiders (the acquirers) are less likely to know much about the detailed information of the firms in which VC/PEs invest, they are aware that VC/PEs pay attention to managing and enhancing their reputation, selecting superior targets and providing better value-added services. Therefore, the better the reputation of the VC/PE, the more prominent its "certification" role and the stronger the signal of the targets being high quality. Based on this, we propose our second hypothesis.

Hypothesis 2. When VC/PEs have a better reputation, it sends a signal that target firms are higher quality, and the market reacts more positively.

Collective rationality behavior refers to the concerted action taken by the majority of the community under the guidance of "common faith". When a target has more participating VC/PEs, it suggests that more different VC/PEs have a "common belief" in the screening process, and that these VC/PEs are unanimously optimistic about the targets' potential market prospects. Hence, such investment behavior is a result of collective rationality behavior. Pence (1982) points out that VC/PEs usually invite other investors to make assessments when they find a valuable investment target. If other VC/PEs are also willing to invest, the leading VC/PE is very likely to make the investment decision. Given that different VC/PEs make the same investment choices, their investment behavior is essentially mutually confirmed and recognized (Perez, 1986), which further proves that they identify high-quality targets. Lerner (1994) argues that in the presence of asymmetric information, two or more VC/PEs are more effective in gathering information and assessing value than one. As a result, the quality of the investment projects jointly identified by multiple VC/PEs is higher. Meanwhile, multiple VC/PEs can offer more complementary professional knowledge and management experience for investing in target firms (Casamatta and Haritchabalet, 2007), are more likely to increase target firms' R&D investments (Guo and Jiang, 2013) and eventually enhance the value of the targets (Brander et al., 2002). This means that based on collective rationality behavior, the larger the number of VC/PEs a target firm has, the more likely it is to deliver the signal that it is high quality. This leads to the following hypothesis.

Hypothesis 3. When target firms have more VC/PEs, it sends a signal that they are higher quality, and the market reacts more positively.

3. Research design

3.1. Sample selection and data sources

We first sort out the initial sample of VC/PEs exiting through M&As from the “China PEVC database” in the Wind database. Based on this sample, we then use the “Chinese M&A database” to find M&A events started by A-share listed firms and match them with the initial sample of VC/PEs exiting through M&As. Meanwhile, combined with the M&A announcements made by <http://www.cninfo.com.cn>, which is the information disclosure Website designated by the China Securities Regulatory Commission, we obtain 135 M&A events with VC/PEs involved in target firms. Due to the special characteristics of the financial industry and the treatment from the prior literature, we exclude acquirers and targets from the financial industry. We lose five observations when calculating the CARs. Finally, we have 130 observations (M&A events) with M&A sellers backed by VC/PEs. It should be noted that these M&A events mainly occurred during 2013–2014. To test our hypotheses, we create a control sample group by selecting M&A events in which ownership was transferred and the transactions were completed during 2013–2014 from the Wind M&A database. At the same time, we collect the financial data of target firms from the M&A announcements of CNINF, and exclude observations with missing financial data for the target firms. We obtain our financial data for the acquirers from the China Stock Market & Accounting Research database. Finally, we obtain 384 observations for the control sample group. Therefore, our total regression sample contains 514 observations. To mitigate the effect of outliers, we winsorize continuous variables at the 1% level in both tails.

3.2. Model specification and variable definitions

3.2.1. Model specification

Following McNichols and Stubben (2015) and Liu et al. (2015), we use regression models (1) and (2) to test whether VC/PEs have information content and the difference in information content resulting from the heterogeneity of the VC/PEs during M&As. We include industry and year dummies to control for the effects of industries and years in all of the regressions. In addition, we report *t*-values based on robust standard errors clustered by individual firms.

$$CAR = \alpha + \beta_1 \times VC/PE + \delta \times Control + \xi \quad (1)$$

$$CAR = \alpha + \beta_1 \times Reputation/Syndicate + \delta \times Control + \xi \quad (2)$$

3.2.2. Variable definitions

CARs are the cumulative abnormal returns at the M&A event date. We use the market model (Brown and Warner, 1985) to calculate CARs, that is, $R_{i,t} = \alpha_i + \beta_i \times R_{m,t} + \xi$. $R_{i,t}$ is the daily yield of stock *i* for period *t* including cash dividend reinvestment and $R_{m,t}$ is the daily rate of return of market *m* for period *t* including cash dividend reinvestment. Following Tian et al. (2013), we use the period between 180 and 30 trading days before the M&A announcement date as the estimation period to calculate α and β for each transaction in the sample. We then calculate the expected return values from 30 trading days before to 30 trading days after the announcement date based on the preceding model, and use the actual values minus the expected values to calculate the abnormal returns from 30 trading days before to 30 trading days after the M&A announcement date. Finally, we use the estimated parameters to calculate CARs over the three-day (−1, +1) event window centered on the M&A announcement date (Huang et al., 2014).

Following Huang et al. (2014) and Liu et al. (2015), we control for other variables that affect CARs, including the natural logarithm of the book value of acquirers' total assets in year *t*−1 ($Size_{t-1}$); firm's return on net assets in year *t*−1 (ROA_{t-1}); investment opportunities in year *t*−1 (Tobin's q_{t-1}); revenue growth in year *t*−1 ($Growth_{t-1}$); financial leverage in year *t*−1 ($Risk_{t-1}$); firm's free cash flow in year *t*−1 ($Cashflow_{t-1}$); transaction value amount (Expense); ownership concentration (Top and Top²); CEO duality (Dual); and target's assets, ROA and age. The definitions of the main variables are presented in Table 1.

Table 1
Variable definitions.

Variable type	Variable name	Symbol	Definition
Dependent variables	Cumulative abnormal return	CAR	Cumulative abnormal return for the acquirer before and after the M&A announcement event-day window
	Venture capital/private equity fund	VC/PE	Dummy variable that equals 1 if there is a VC/PE-backed target and 0 otherwise
Explanatory variables	Reputation of VC/PE	Reputation	Age of the lead VC/PE ^a
	Syndicated VC/PE	Syndicate	Number of VC/PEs in the target
Control variables	Firm asset	Size	Natural logarithm of the book value of the acquirers' total assets
	Firm performance	ROA	Net income/total assets
	Operating income growth rate	Growth	(Amount of revenue this year – Amount of revenue previous year) / Amount of revenue previous year
	Investment opportunities of firm	Tobin's q	Market value of total assets/book value of total assets
	Financial leverage	Risk	(Net profit + Income tax Expense + Finance charge) / (Net profit + Income tax expense)
	Free cash flow	Cashflow	(Net profit + Interest expense + Non cash expense – Working capital supplement – Capital expenditure) / Total assets at the beginning of the year
	Transaction value	Expense	Natural logarithm of the value of M&A transactions
	Related M&A	Relative	Dummy variable that equals 1 if there is a related M&A and 0 otherwise
	Target asset	Target_asset	Natural logarithm of the book value of the target's total assets
	Target age	Target_age	Natural logarithm of (1 + Target age)
	Target performance	Target_roa	Net profit divided by total assets
	Ownership concentration	Top	Proportion of the first largest shareholder
	Square of ownership concentration	Top ²	Square of the proportion of the first largest shareholder
CEO duality	Dual	Firm's CEO duality, equal to 1 if the CEO also holds the position of board chair and 0 otherwise	

^a Lerner (1994), Gompers (1996) and Gompers and Lerner (1999) use the firm's age as a proxy for its reputation.

Table 2
Descriptive statistics.

Variables	Obs.	Mean	Median	Stdev	Min	Max
CAR[−1, 1]	514	0.060	0.030	0.100	−0.150	0.270
VC/PE	514	0.250	0	0.440	0	1
Size	514	21.66	21.57	1.060	19.57	24.91
Risk	514	1.190	1.020	0.880	−2.680	5.240
ROA	514	0.050	0.050	0.050	−0.100	0.200
Tobin's <i>q</i>	514	2.270	1.820	1.730	0.170	9.350
Growth	514	0.250	0.150	0.580	−0.520	4.650
Cashflow	514	0.010	0.020	0.090	−0.300	0.260
Dual	514	0.310	0	0.460	0	1
Top	514	0.343	0.318	0.147	0.106	0.708
Top ²	514	0.140	0.100	0.110	0.010	0.500
Relative	514	0.350	0	0.480	0	1
Expense	514	19.14	19.27	1.510	16.12	22.43
Target_roa	514	0.080	0.060	0.180	−0.630	0.640
Target_asset	514	18.93	18.95	1.510	14.43	22.59
Target_age	514	2.090	2.200	0.740	0	3.500

Table 3
Univariate tests of acquirers' CARs distinguished by VC backing status.

Variables	Obs.	CAR[−1, 1]
VC/PE-backed targets	130	0.117
Non-VC/PE-backed targets	384	0.040
Combined	514	0.053
Diff		0.077***

4. Empirical results

4.1. Descriptive statistics

Table 2 presents the descriptive statistics for the main variables. Table 3 lists the difference in average CARs between the VC/PE-backed targets and non-VC/PE-backed targets. There is a significant difference in stock market reactions based on whether the M&A activities involve VC/PE-backed targets. Compared with the scenario where the targets are not backed by VC/PEs, the stock market has a positive reaction to the M&A transactions in which the targets are backed by VC/PEs, and the acquirers receive higher CARs, providing preliminary support for Hypothesis 1.

4.2. Multivariate regression analysis

4.2.1. Results of Hypothesis 1

Table 4 reports the regression results of Hypothesis 1. Column (1) presents the regression result based on the sample excluding VC/PEs. The estimated coefficients of Target_roa and Target_asset are both insignificant, suggesting that the target firms' financial information does not convey significant information content for acquirers to distinguish the quality of the target firms. Column (2) includes the regression results with VC/PEs, not controlling for Target_roa and Target_asset. The results show that the coefficient of VC/PE is significantly positive at the 1% level (*t*-statistic = 3.05). Column (3) includes VC/PE, Target_roa and Target_asset, and the coefficient of VC/PE is still significantly positive at the 1% level (*t*-statistic = 3.20). This suggests that VC/PEs contain significant information content in the M&A process and send a favorable signal that the target firms are high quality. Thus, the market has positive feedback for M&A activities involving VC/PE-backed target firms. That is, relative to M&A transactions without VC/PE-backed target firms, those with VC/PE-backed targets yield higher CARs for investors. Overall, the results support Hypothesis 1.

Firms invested in by VC/PEs usually possess abundant heterogeneous resources, with high growth and potential market prospects. These resources function as “fresh blood” for the acquirers, and they play an important role in achieving transformation and upgrades for listed firms. In terms of the control variables, the size of the transaction is significantly positive at the 1% level, implying that the bigger the size of the transaction, the stronger the effect it has on the acquirers’ value. As a result, the stock market has a significant positive response. The coefficient of related M&A (Relative) is not significant, indicating an insignificant difference in the effect on acquirers’ value depending on whether the acquisitions are related. Firm size is significantly negative at the 1% level in all of the regressions, consistent with studies by Huang et al. (2014) and Liu et al. (2015).

Table 4
Hypothesis 1 results.

Variable	(1) Full sample CAR[−1, 1]	(2) Full sample CAR[−1, 1]	(3) Full sample CAR[−1, 1]
Constant	0.116 (1.07)	0.126 (1.18)	0.148 (1.39)
VC/PE		0.037*** (3.05)	0.038*** (3.20)
Size	−0.036*** (−7.83)	−0.035*** (−8.09)	−0.034*** (−7.39)
Risk	0.002 (0.53)	0.001 (0.36)	0.001 (0.34)
ROA	−0.141 (−1.35)	−0.144 (−1.42)	−0.133 (−1.30)
Growth	−0.003 (−0.41)	−0.002 (−0.33)	−0.004 (−0.57)
Tobin’s <i>q</i>	−0.008** (−2.45)	−0.008*** (−2.64)	−0.008*** (−2.60)
Cashflow	0.027 (0.62)	0.027 (0.63)	0.0200 (0.45)
Dual	0.012 (1.37)	0.009 (1.09)	0.011 (1.22)
Top	−0.161 (−1.35)	−0.189 (−1.60)	−0.193 (−1.64)
Top ²	0.272* (1.81)	0.317** (2.13)	0.326** (2.20)
Relative	0.012 (1.30)	0.011 (1.20)	0.013 (1.43)
Expense	0.027*** (6.55)	0.022*** (6.80)	0.022** (4.74)
Target_roa	0.028 (1.08)		0.038 (1.58)
Target_asset	−0.003 (−0.68)		−0.002 (−0.54)
Target_age	0.001 (0.18)	−0.001 (−0.19)	−0.000 (−0.07)
Year	YES	YES	YES
Industry	YES	YES	YES
<i>N</i>	514	514	514
Adj. <i>R</i> ²	0.311	0.327	0.329

Notes:

(1) ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

(2) *t*-values are reported in parentheses.

4.2.2. Further analysis of Hypothesis 1

Table 4 shows that the stock market responds positively to M&A transactions in which acquirers acquire VC/PE-backed targets. What is the mechanism underlying the effect of VC/PEs on the stock market? If VC/PEs play the role of an information mechanism in the M&A process, then we should observe that the more difficult it is for acquirers to obtain information to identify high-quality targets, the more significant VC/PEs' "certification" role is. To further verify that the information transmitted by VC/PEs during M&A serves as "certification", we choose two specific aspects to examine the question: the acquirers' M&A experience and the information environment of the target firms. First, we look at the acquirers' M&A experience. Organizational learning theory holds that experiential learning is a process of organizations acquiring, understanding, spreading, developing and using their experience (Huber, 1991). Sophisticated M&A experience can enable firms to continuously improve their M&A management process and apply the improved M&A knowledge to future strategic decisions (Guo et al., 2011). Such a process can effectively enhance the ability of firms to identify M&A targets and lead to better M&A performance (Fowler and Schmidt, 1989). When the acquirers lack M&A experience, it is more difficult to identify high-quality targets. At this time, if VC/PEs can transfer information, their "certification" role should be strengthened. Second, we investigate the information environment in which the targets are located. From the perspective of information dissemination, when a region has a higher degree of marketization, the information flow mechanism is smoother and communication costs are lower. This also makes it more efficient for outsiders to obtain business information (Yu et al., 2012) and encourages more standardized information disclosure. On the contrary, in areas with lower levels of marketization, it is more difficult and costly for outsiders to obtain information. Therefore, the worse the information environment is for target firms, the more difficult it is for acquirers to obtain effective information and identify high-quality targets. In this case, VC/PEs should be able to play a more significant "certification" role.

Accordingly, depending on the M&A experience of the acquirers, we divide the M&A sample into experienced and inexperienced groups.¹ We measure the information environment based on the government intervention index in the areas where target firms are located (Yu et al., 2012).² Using the level of government intervention, we sort the sample into two groups: targets with a better information environment for the targets and targets with a worse information environment. Table 5 lists the results. Columns (1) and (2) report the regression results of the groups sorted by M&A experience. The coefficient of VC/PE is significantly positive at the 1% level in the inexperienced group and insignificant in the experienced group, indicating that it is more difficult for acquirers to identify high-quality targets when they lack M&A experience and supporting the notion that VC/PEs provide stronger "certification". Columns (3) and (4) report the group results based on information environment. The coefficient of VC/PE is significantly positive at the 1% level in the bad information environment group and insignificant in the good information environment group. This means that VC/PEs play a more important role in the M&A process when acquirers are faced with a worse information environment. Thus, the results of Table 5 further support Hypothesis 1.

4.2.3. Results of Hypotheses 2 and 3

Table 6 presents the results of Hypotheses 2 and 3. Columns (1) and (2) report the regression results including VC/PE reputation. Column (2) includes the target firms' financial information, Target_roa and Target_asset. The results show that the coefficient of Reputation is significantly positive at the 5% level, suggesting that the better the VC/PE reputation, the more prominent its "certification" and consequently the stronger the stock market's reaction. This supports Hypothesis 2. Columns (3) and (4) report the results related to the number of VC/PEs. The coefficient of the number of VC/PEs is significantly positive at the 10% level. That is, the more VC/PEs there are, the stronger the "certification" is, supporting Hypothesis 3. For the same target, firm evaluation is more accurate when there are two or more VC/PEs involved compared with one single VC/PE. As a result, the target firm conveys a signal of having higher quality when it receives more recognition from multiple VC/PEs, and the acquirer obtains higher CARs when conducting M&A transactions.

¹ Acquisition experience is a proxy for the number of successful acquisitions. The higher the number of acquisitions, the more abundant the accumulated experience.

² The higher the amount of government intervention, the lower the degree of marketization, the higher the cost of obtaining a firm's information and the more difficult it is for the acquirer to obtain the target information.

Table 5
Cross-sectional analyses of different groups.

Variables	(1) Lack M&A experience CAR[−1, 1]	(2) Rich M&A experience CAR[−1, 1]	(3) Bad information environment CAR[−1, 1]	(4) Good information environment CAR[−1, 1]
Constant	0.157 (1.06)	0.546*** (2.69)	0.268* (1.66)	0.282* (1.82)
VC/PE	0.040*** (3.10)	0.028 (1.09)	0.058*** (3.37)	0.024 (1.50)
Size	−0.034*** (−5.88)	−0.026*** (−3.13)	−0.043*** (−7.06)	−0.029*** (−4.37)
Risk	0.002 (0.45)	0.003 (0.49)	0.005 (1.11)	0.006 (0.88)
ROA	−0.129 (−1.03)	−0.097 (−0.58)	−0.092 (−0.70)	−0.189 (−1.16)
Growth	−0.005 (−0.63)	0.012 (1.25)	−0.005 (−0.05)	−0.007 (−1.13)
Tobin's <i>q</i>	−0.010*** (−2.71)	−0.006 (−0.92)	−0.012** (−2.56)	−0.006 (−1.35)
Cashflow	0.013 (0.25)	0.110 (1.36)	−0.007 (−0.09)	−0.030 (−0.58)
Dual	0.013 (1.34)	0.011 (0.59)	0.013 (1.08)	0.013 (1.18)
Top	−0.232* (−1.76)	−0.246 (−0.87)	−0.233 (−1.35)	−0.144 (−0.86)
Top ²	0.425** (2.51)	0.276 (0.77)	0.366* (1.72)	0.242 (1.12)
Relative	0.023** (2.17)	−0.002 (−0.14)	−0.011 (−0.93)	0.045*** (3.41)
Expense	0.023*** (4.52)	0.018* (1.84)	0.017*** (2.66)	0.022*** (3.73)
Target_roa	0.065** (2.23)	0.002 (0.03)	−0.013 (−0.40)	0.086** (2.53)
Target_asset	−0.004 (−0.89)	−0.001 (−0.08)	0.005 (1.00)	−0.008 (−1.43)
Target_age	0.007 (1.16)	−0.009 (−0.84)	−0.002 (−0.28)	0.003 (0.34)
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
<i>N</i>	337	177	261	253
Adj. <i>R</i> ²	0.425	0.122	0.366	0.360

Notes:

(1) ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

(2) *t*-values are reported in parentheses.

5. Robustness checks

We also conduct the following robustness tests to further strengthen our results.

5.1. Propensity score matching (PSM)

As using an unbalanced sample may cause certain deviations in the regression results, we use the propensity score matching (PSM) method to match and construct a balanced sample for the regressions. Based on the characteristics of the target firms (e.g., Target_asset, Target_roa and Target_age), we use the near matching method to conduct one-to-one matches and create the control sample. This way, we find 120 observations in the control group (VC/PE = 0) based on the 120 observations in the treatment group (VC/PE = 1); thus,

Table 6
Results of Hypotheses 2 and 3.

Variables	(1) VC/PE = 1 CAR[-1, 1]	(2) VC/PE = 1 CAR[-1, 1]	(3) VC/PE = 1 CAR[-1, 1]	(4) VC/PE = 1 CAR[-1, 1]
Constant	0.767*** (3.57)	0.665*** (2.67)	0.710*** (3.24)	0.631** (2.49)
Reputation	0.028** (2.10)	0.027** (2.07)		
Syndicate			0.009* (1.85)	0.009* (1.66)
Size	-0.047*** (-4.64)	-0.048*** (-4.86)	-0.041*** (-3.82)	-0.042*** (-4.10)
Risk	0.022* (1.67)	0.021 (1.51)	0.021* (1.68)	0.021 (1.53)
ROA	0.202 (0.80)	0.204 (0.81)	0.117 (0.48)	0.124 (0.50)
Tobin's <i>q</i>	-0.011** (-2.14)	-0.010** (-1.99)	-0.010** (-1.99)	-0.009* (-1.78)
Growth	-0.033*** (-3.83)	-0.034*** (-3.87)	-0.036*** (-3.95)	-0.036*** (-3.94)
Expense	0.002 (0.15)	-0.006 (-0.33)	-0.002 (-0.16)	-0.009 (-0.53)
Cashflow	-0.042 (-0.50)	-0.032 (-0.37)	-0.062 (-0.78)	-0.051 (-0.61)
Target_roa		0.018 (0.26)		0.040 (0.56)
Target_asset		0.013 (1.03)		0.012 (0.86)
Relative	0.034 (1.16)	0.031 (1.09)	0.045 (1.57)	0.042 (1.46)
Target_age	0.036** (2.20)	0.030* (1.74)	0.046*** (2.66)	0.039** (2.17)
Dual	0.022 (1.02)	0.022 (0.98)	0.011 (0.55)	0.013 (0.60)
Top	-0.374 (-1.12)	-0.477 (-1.35)	-0.279 (-0.82)	-0.387 (-1.09)
Top ²	0.588 (1.22)	0.734 (1.43)	0.481 (0.98)	0.639 (1.24)
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
<i>N</i>	117	117	117	117
Adj. <i>R</i> ²	0.384	0.378	0.375	0.368

Notes:

- (1) ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.
(2) *t*-values are reported in parentheses.

the total sample size is 240. We re-run the regression for Hypothesis 1, and the regression results are shown in Table 7. Although their significance level slightly decreases, the coefficients remain significant, indicating that our results are consistent.

5.2. Using the Heckman correction

To mitigate the self-selection problem, we use the Heckman two-step method (Heckman, 1979) to adjust for self-selection. As firms with technological innovation are more likely to become the investment targets of VC/PEs and Guangdong, Beijing, Shanghai and Zhejiang are areas with more VC/PEs, and we create variables based on whether the target firms have technological innovation and whether they are located in Guangdong, Beijing, Shanghai or Zhejiang. The first-step regression results show that whether the target firms are technologically innovative and whether they are located in the preceding provinces have strong explanatory power

Table 7
Results of Hypothesis 1 (PSM).

Variables	(1) Full sample CAR[-1,1]	(2) Full sample CAR[-1,1]	(3) Full sample CAR[-1,1]
Constant	0.295** (2.06)	0.312** (2.22)	0.310** (2.17)
VC/PE		0.028* (1.83)	0.028* (1.78)
Size	-0.042*** (-7.19)	-0.042*** (-7.38)	-0.041*** (-6.78)
Risk	0.008 (0.90)	0.007 (0.86)	0.007 (0.83)
ROA	-0.117 (-0.71)	-0.133 (-0.83)	-0.128 (-0.78)
Growth	-0.015*** (-2.66)	-0.016*** (-2.75)	-0.017*** (-2.84)
Tobin's <i>q</i>	-0.009** (-2.41)	-0.010** (-2.54)	-0.010** (-2.48)
Cashflow	0.057 (0.87)	0.055 (0.87)	0.049 (0.76)
Dual	0.027* (1.93)	0.024* (1.85)	0.025* (1.82)
Top	-0.146 (-0.74)	-0.179 (-0.91)	-0.174 (-0.89)
Top ²	0.260 (1.01)	0.315 (1.21)	0.309 (1.20)
Relative	0.016 (1.18)	0.018 (1.29)	0.019 (1.35)
Expense	0.026*** (3.55)	0.020*** (3.43)	0.020** (2.29)
Target_roa	0.012 (0.20)		0.026 (0.46)
Target_asset	-0.004 (-0.40)		-0.001 (-0.06)
Target_age	0.005 (0.60)	0.006 (0.63)	0.006 (0.68)
Year	YES	YES	YES
Industry	YES	YES	YES
<i>N</i>	240	240	240
Adj. <i>R</i> ²	0.315	0.329	0.324

Notes:

(1) ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

(2) *t*-values are reported in parentheses.

toward the likelihood of targets having VC/PEs (not reported). We then include the inverse Mills ratio obtained from the first step in regression model 1. Table 8 lists that the inverse Mills ratio is significantly negative and that the VC/PE coefficients remain significantly positive, which again supports the validity of our results.

5.3. Alternative proxy for CAR

According to the literature, the commonly used window periods also include $[-1, 0]$ and $[-1, 2]$, and the estimated period also includes $[-150, -30]$. Therefore, we use these new window periods and estimated period to calculate new price reactions and re-run the regressions. The main results remain unchanged (not reported).

Table 8
Results of Hypothesis 1 (Heckman two-step).

Variables	(1) Full sample CAR[−1, 1]	(2) Full sample CAR[−1, 1]
Constant	0.160 (1.49)	0.169 (1.57)
VC/PE	0.027** (2.35)	0.029** (2.50)
Size	−0.033*** (−7.45)	−0.032*** (−7.05)
Risk	0.001 (0.26)	0.001 (0.25)
ROA	−0.147 (−1.44)	−0.140 (−1.36)
Growth	−0.004 (−0.58)	−0.005 (−0.72)
Tobin's <i>q</i>	−0.008** (−2.42)	−0.008** (−2.38)
Cashflow	0.026 (0.62)	0.022 (0.51)
Dual	0.010 (1.23)	0.011 (1.31)
Top	−0.185 (−1.58)	−0.189 (−1.61)
Top ²	0.312** (2.12)	0.320** (2.17)
Relative	0.011 (1.30)	0.013 (1.42)
Expense	0.022*** (6.76)	0.021*** (4.52)
Target_roa		0.026 (1.09)
Target_asset		−0.001 (−0.09)
Target_age	−0.001 (−0.25)	−0.001 (−0.22)
Inverse Mills ratio	−0.051*** (−3.78)	−0.048*** (−3.37)
Year	YES	YES
Industry	YES	YES
<i>N</i>	514	514
Adj. <i>R</i> ²	0.343	0.342

Notes:

(1) ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

(2) *t*-values are reported in parentheses.

5.4. Controlling for other corporate governance variables

We include executive compensation and board size to test Hypotheses 1–3, and the results of the main explanatory variables remain the same (not reported).

6. Complementary test: The effect of VC/PEs on M&A premiums

In theory, if VC/PEs convey the signal that target firms are high quality, then the sellers in M&A transactions should have more negotiating power over pricing and may in turn ask for higher M&A prices. A large number of studies have shown that a high M&A price is often an important reason for the failure of an M&A,

causing the acquirers to encounter a “winner’s curse” situation. In this case, the market may respond negatively to such M&A activities (Gompers and Xuan, 2012). However, our empirical results show that the CAR is significantly positive. Therefore, the acquirers do not fall into the “winner’s curse” situation, which means that the acquirers do not pay an excessive premium. To verify this inference, we use the M&A premium regression model following Huang et al. (2014). Table 9 lists the results. Column (1) contains the results without controlling for year and industry, and Column (2) controls for year and industry. Column (3) controls for the corporate governance variables. The results show that regardless of whether we control for the industry, year or corporate governance variables, the VC/PE coefficients are significantly negative, suggesting that acquirers do not need to pay a higher premium when acquiring VC/PE-backed targets; in fact, they actually pay a lower M&A premium. The results indicate that acquirers who acquire VC/PE-backed targets do not

Table 9
Results of M&A premiums.^a

Variables	(1) Full sample Premium	(2) Full sample Premium	(3) Full sample Premium
Constant	-3.014 (-1.25)	-2.328 (-0.98)	-6.541* (-1.95)
VC/PE	-0.487** (-2.12)	-0.483* (-1.88)	-0.571** (-2.26)
Size	0.052 (0.53)	-0.014 (-0.14)	-0.032 (-0.27)
ROA	-1.242 (-0.60)	-1.950 (-0.92)	-2.279 (-1.00)
Tobin’s <i>q</i>	0.033 (0.44)	0.012 (0.16)	0.003 (0.04)
Growth	0.028 (0.19)	0.019 (0.11)	0.028 (0.17)
Cashflow	0.627 (0.83)	0.881 (1.04)	1.035 (1.22)
Target_age	-0.090 (-0.76)	-0.104 (-0.85)	-0.098 (-0.80)
Target_roa	2.017*** (2.93)	1.939*** (2.75)	1.838** (2.40)
Target_asset	-1.274*** (-10.65)	-1.292*** (-9.98)	-1.265*** (-9.67)
Expense	1.510*** (11.86)	1.530*** (11.37)	1.529*** (11.27)
Dual			0.113 (0.57)
Top			0.039 (1.43)
Top ²			-5.755 (-1.65)
Dir_num			-0.068 (-1.05)
Pay			0.264 (1.38)
Year	NO	YES	YES
Industry	NO	YES	YES
<i>N</i>	435	435	435
Adj. <i>R</i> ²	0.442	0.454	0.457

Notes:

(1) ***, ** and * represent statistical significance at the 1%, 5% and 10% levels, respectively.

(2) *t*-values are reported in parentheses.

^a Excluding negative net assets and missing data, the regression sample decreases to 435 firms.

encounter a “winner’s curse” situation. In terms of control variables, the acquirers’ characteristics and corporate governance have little influence on M&A premiums, which is consistent with the findings by Huang et al. (2014). However, the characteristics of target firms have a significant effect on M&A premiums. In addition, the scale of M&A transactions has a significant positive effect on M&A premiums.

Why do VC/PEs not ask for higher purchase prices when they seem to have the advantage in negotiations? We offer two possible explanations. First, from the information perspective, VC/PEs may communicate more with acquirers in the M&A process, thus decreasing the degree of information asymmetry on the acquirers’ side and making the M&A transaction process more effective. As a result, the acquirers do not pay a higher premium. Second, VC/PEs face the pressure of liquidity in China. Based on the reality of China’s VC/PE investments, the almost feverish stock market before 2007 attracted a large number of VC/PEs to invest in non-listed firms, which helped the VC/PEs to obtain high returns through IPOs. However, after 2007, China’s stock market experienced a long bear market. Furthermore, IPO approvals and listings were shutdown during 2012 and 2013. These events led to inventory accumulation for many VC/PEs.³ Faced with severe pressure from liquidity, VC/PEs can only change their exiting channel to exit M&As.

Therefore, VC/PEs convey the signal that a target is high quality, and effective communication with acquirers decreases the information asymmetry in target pricing. In addition, VC/PEs face liquidity pressure, causing target firms to make concessions in price negotiations.⁴ This suggests that acquiring VC/PE-backed targets is a “cheap but fine” transaction. As a result, acquirers not only obtain high-quality targets, but also benefit from not paying excessively high premiums.

7. Conclusions and implications

Due to the information gap faced by many acquirers in the M&A process, identifying high-quality target firms has become a crucial step in M&A transactions for firms to generate value. In this study, we examine the characteristics of M&A sellers and find that VC/PEs have significant information content in the M&A market. Our specific findings are detailed as follows.

First, VC/PEs have a very significant “certification” role during M&As. Based on the short-term reactions of the stock market, investors respond positively when bidders acquire VC/PE-backed targets. Second, when acquirers lack M&A experience and targets are located in inferior information environments, bidders face a greater information gap, and the “certification” role of VC/PEs becomes more prominent. Third, there is a significant difference in the information content due to the heterogeneity of VC/PE features. The higher the reputation of the VC/PE and the more involved it is in the target firm, the stronger its information content. Finally, acquirers do not pay premiums when acquiring high-quality targets, suggesting that the acquisition of VC/PE-backed targets is a “cheap but fine” transaction.

Our study has three practical implications. First, through VC/PEs’ signaling, acquirers can select high-quality targets in the M&A market. At present, China’s many firms are facing the dilemmas of transformation and upgrading. Their main problem lies in the lack of core competitiveness gained from heterogeneous resources. M&As, as an important way to achieve rapid transformation and upgrading, have been accepted and favored by an increasing amount of firms. However, determining how to identify high-quality targets has been an ongoing struggle for acquirers. According to our findings, it is a wise investment to acquire VC/PE-backed targets. As acquirers face a serious information gap when searching for target firms with potentially high growth (e.g., technological innovation firms), it is difficult for them to evaluate the future market value of targets. Relying on “certification” from VC/PEs, acquirers can more easily screen out high-quality targets from the large pool of potential target firms.

Second, investors can obtain higher returns from investments by purchasing the stocks of firms that acquire VC/PE-backed targets. Based on our findings, bidders who acquire targets with VC/PE holdings can receive

³ China’s first investment research report shows that since 2000 PEs have invested in more than 9000 projects and failed to exit from more than 7500 projects. Those who did not withdraw from projects invested a total of more than 600 billion yuan.

⁴ *Chongqing Business Newspaper* provides a realistic annotation titled “How VC/PE see profit is almost equal to the ‘flesh’ as the IPO blocked”. According to statistics, the total transaction amount was \$355 million in 2012 with 140 cases of M&A exit. The average book return is only 1.1 times, which means that the M&A transaction price for VC/PEs is very low.

higher abnormal returns from the market. Therefore, investors who buy the stocks of such firms can make more investment profits in the stock market. In addition, market reactions differ depending on the heterogeneity of the VC/PE characteristics, which also help investors to better identify and discover the value of stocks after M&As.

Third, our study shows that an active M&A market not only provides acquirers with the opportunity to gain heterogeneous resources externally and quickly improve the core competitiveness of firms, but also develops VC/PEs. VC/PEs search for valuable start-ups on the entrepreneurial market in which to invest so they can gain reasonable returns through M&A exits. Meanwhile, large firms acquire these high-quality targets through the M&A market to achieve rapid development. As a result, a benign “ecosystem” is formed from the interaction between mature firms, VC/PEs and start-ups.

Acknowledgments

The authors owe many thanks to Kevin Zhu for his enlightening advice and other participants at the CJAR Special Issue Conference in November 2015. We are completely responsible for the content of this study. This study was supported by the National Natural Science Foundation of China (Project Nos. 71702038; 71572201; 71672204) and the Natural Science Foundation of Guangdong Province (Project No. 2015A030313074).

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Margin trading, short selling, and bond yield spread

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ARTICLE INFO

Article history:

Received 1 October 2016

Accepted 15 December 2017

Available online 1 February 2018

Keywords:

Margin trading

Short selling

Bond yield spread

Information spillover

ABSTRACT

Using a quasi-natural experiment, this study examines the effects of margin trading and short selling on bond yield spread in China. It finds that both margin trading and short selling can reduce bond yield spread. Additionally, it finds that margin trading lowers firms' debt ratios and increases their credit ratings, which explains the reduced spread. In other words, margin trading can impact investors' decisions by revealing positive information about a firm. Another finding is that short selling lowers the bond yield spread by decreasing earnings management, suggesting that short selling has an impact on investors' decisions through its effect on corporate governance. Our results suggest that margin trading transmits positive information and short selling impacts firms' policies. These results provide support for future regulations of margin trading and short selling.

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1. Introduction

Compared to the abundant information about the equity market provided by analysts, there is little information about the bond market. Furthermore, the lag in the credit rating of bonds creates a poor information environment. Therefore, information that spills over from the equity market to the bond market may be important. Specifically, margin trading activities on a stock may reveal good news about the firm, whereas short sellers may transmit bad news to the bond market. Thus, margin trading or short selling may affect bond yield spread.

Short selling activities could transmit bad news about a stock price and help to avoid a stock crash (Hong et al., 2008). In addition, short sellers try to acquire private information to increase their profit, which intensifies the absorption of information into stock price (Xiao and Kong, 2014). Accordingly, as short sellers seek

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negative information, managers could make timely disclosures of bad news (Li and Zhang, 2015) to facilitate accounting conservatism (Chen and Liu, 2014b), decrease earnings management (Fang et al., 2016; Massa et al., 2015; Chen and Liu, 2014a), and reduce overinvestment (Jin et al., 2015). Margin trading helps to transmit positive information, which leads to higher stock prices (Chu and Fang, 2016). Additionally, insiders may purchase stocks through margin trading to earn arbitrage profits (Zhang et al., 2016). Therefore, optimistic investors use leverage to buy securities and pessimistic investors sell borrowed securities. These transactions reveal positive and negative private information, which results in stock price return with intrinsic values. By causing information to spill over into the bond market, margin trading and short selling may affect the bond yield spread.

Developed capital markets have permitted margin trading and short selling of securities for many years. As an emerging market, China's capital market is relatively young, suggesting a concomitant need to enhance regulations and guide investors' rationality. However, after 20 years of development, the capital market in China has made great progress. To incorporate more information into stock price (Miller, 1977), the China Securities Regulatory Commission (CSRC) launched a trial period of margin trading and short selling in March of 2010. This offers researchers an opportunity to explore the effects of margin trading and short selling on bond yield spread. Kecskés et al. (2013) have verified that in an American setting short selling leads to lower credit ratings and higher spreads. However, margin trading and short selling in China possess some special characteristics. First, margin trading and short selling are very popular in America, but they are only pilot schemes in China. The 900 firms that allow the short selling of stocks also allow leverage buyouts. Short selling delivers bad news, and thus leads to increased bond yield spreads, whereas margin trading may release good news into the bond market. Second, after the introduction of margin trading and short selling in America, regulators realized the potential risks of these transactions and developed appropriate regulations. However, these transactions are still new in China. The current regulatory system needs to be improved, as insufficient regulations may provide opportunities for speculators. Third, due to the absence of short selling, Chinese investors are more used to margin trading. Although both short selling and margin trading are approved, short selling transactions account for a smaller proportion of the total transactions. Securities refinancing has been allowed since February 2013, which has increased the number of short selling transactions. However, lenders of securities for refinancing face liquidity and market risks. Given the lower interest rates of securities refinancing, lenders have no desire to engage in refinancing transactions. Fourth, the interest rates of financing and refinancing are not always adjusted. The current interest rate is not consistent with brokers' capital costs. Short selling fees and securities refinancing fees for these securities are the same for all stocks, and as a result borrowing fees do not reveal the lending value, which discourages stock owners from lending out their securities. Lastly, brokers' self-management of their business and social securities fund have limited the opportunities for margin trading and short selling, leading to weaker trade size and effects. Therefore, margin trading and short selling effects may be different in the Chinese stock market than in America, and it is necessary to examine the effects of margin trading and short selling on bond yield spread in China.

We examine the relationship between bond yield spread, margin trading, and short selling based on monthly bond data for the 2008 to 2015 period. We find that margin trading and short selling both decrease bond yield spread, even after the application of the propensity score matching method, which eliminates the selection biases in our data. Additional tests show that margin trading leads to lower leverage and higher credit rating, which results in lower bond yield spread, whereas short selling reduces bond yield spread by lowering earnings management.

This study makes several contributions. First, it examines the information spillover effects between the stock market and bond market. Previous studies have come to different conclusions about spillover (Fleming et al. 1998; Shi et al. 2013). Fleming et al. (1998) concluded that there are links between the stock market and the bond market. However, Shi et al. (2013) found no significant interaction between the stock market and bond market using Chinese data. This study finds that positive information in the stock market can be transmitted to the bond market. Therefore, this study contributes to the literature on the spillover effects. In addition, the effects of margin trading and short selling on bond yield spread are explored in this study. Merton (1974) and Jiang (2008) studied the relationship between firm characteristics and bond yield spread. Longstaff and Schwartz (1995) and Wang et al. (2015) examined the effect of the bond yield spread on macro perspective. This study contributes to the understanding of bond yield spread by finding that margin

trading in the stock market transmits positive information to the bond market, and short selling in the stock market decreases yield spread by improving monitoring. These results can be helpful for regulators.

2. Literature review

2.1. *Effects on bond yield spread*

Previous studies have identified the influences of credit rating, information environment, stock ownership, and contagion effects on bond yield spread. First, credit rating has been shown to explain bond yield spread. Higher crediting ratings lead to a lower bond yield spread (Ziebart and Reiter, 1992; He and Jin, 2010; Wang and Zhang, 2013). When credit rating agencies provide positive information about firm credit risk, the interest rate of the short-term financing bond becomes lower. This effect is more significant when firm size is smaller or information asymmetry is more severe (Shen and Liao, 2014). Second, information transparency lowers the bond yield spread by limiting investors' speculation for default risk (Sengupta, 1998; Yu, 2005). Given the higher transaction costs of bond covenants, investors have to request higher interest rates for default risk (Bharath et al., 2008), especially for bonds with lower information quality. Bond issue spread increases when a firm reports a restatement (Baber et al., 2013). Short selling may increase bond yield spread because short selling firms may conceal bad news (Keckés et al., 2013). Third, ownership structure affects bond yield spread. Founder family ownership decreases the spread when the family owns more shares. Moreover, a conflict between shareholders and creditors increases the spread (Anderson et al., 2003). Management ownership increases firm value and elevates bond returns. However, when management ownership is too high, managers over-emphasize the risk as creditors, which may eliminate the relationship between bond return and ownership (Bagnani et al., 1994). State ownership increases the spread by raising the policy risk, although this effect remains weak during financial crises (Borisova et al., 2015). Lastly, contagion effects may impact bond yield spread. Jarrow and Yu (2001) pointed out that customer default risk is embedded in bond price and these connections are amplified when customers purchase more commodities. Jorion and Zhang (2009) studied customer default risk and risk of credit default swaps. They concluded that customers' declaration of bankruptcy increases the risk of credit default swaps.

Risk free interest rates, investor sentiment, monetary policy, and political uncertainty impact bond yield spread. Longstaff and Schwartz (1995) noted that a decrease in the risk free rate leads to an increase in bond value, suggesting a rise in bond yield spread. Duffee (1998) found that an increase in treasury yield causes increases in callable bond prices, which decreases the bond yield spread. Xu and Yang (2013) stated that investor sentiments in the stock market reduces investment demands in the bond market and thus causes lower yield spread. According to Wang et al. (2015), volatility of monetary policy increases bond yield spread by expanding the liquidity risk of bonds. They also argued that credit scale and product market environment have negative correlations with bond risk premiums. Luo and She (2015) found that a turnover in party secretary or mayor causes municipal bond costs to increase by increasing risk, and this effect is more significant when uncertainty is high or when a city has greater pressure from debt payments.

These studies examined bond yield spread based on firm characteristics, inter-firm relationships, and the macroeconomic environment. Keckés et al. (2013) revealed that bond investors' awareness of bad news that leads to short selling increases bond yield spread. However, as we described above, margin trading and short selling in China are different than in America, and it is necessary to explore the effects of margin trading and short selling on bond yield spread in the context of China.

2.2. *Short selling and bad news*

Some studies have discussed the relationship between bad news and short selling. Dechow et al. (2001) pointed out that firms with poor performance tend to be faced with short selling, indicating that short selling reveals negative information. Additionally, account information quality impacts short selling. Desai et al. (2006) found that short sellers tend to increase short selling before restatements and that stock price decreases after restatement; furthermore, short sellers' position also decreases. Karpoff and Lou (2010) documented that short sellers uncover bad news; in fact, abnormal short selling increases in the 19 months before financial mis-

conduct is discovered. Using Chinese data, Chang et al. (2014) found that after the approval of margin trading and short selling, target firms' stock price efficiency improves, indicating that bad information is embedded into the price through short selling. Li et al. (2015) pointed out that margin trading and short selling increase stock liquidity and ownership breadth and decrease information asymmetry. Xiao and Kong (2014) also argued that short selling integrates bad news into stock prices.

Short selling may impact accounting information. Fang et al. (2016) concluded that earnings management incurs costs and increases profit. The SEC's exemption of stock price tests has encouraged short selling, leading to a decrease in earnings management. Massa et al. (2015) revealed that short sellers may decrease earnings management through discipline. Chen and Liu (2014a) also identified this phenomenon in China. In another study, they noted that short selling improves accounting conservatism (Chen and Liu, 2014b). Zhang et al. (2016) documented a decrease in financial restatements due to short selling, which they attributed to incentive contracts and analyst following. Some studies have found that short selling improves information disclosure quality. Li and Zhang (2015) showed that before short selling, managers disclose bad news with lower precision and lower readability. According to Zhang et al. (2016), short selling provides opportunities for insider trading.

Previous studies have mainly concluded that negative information causes short selling, and thus leads managers to reduce earnings management and increase disclosure quality. However, there is little research on the effects of margin trading. Some studies have explored the effects of short selling in the bond market. Kecskés et al. (2013) pointed out that short sellers occupy a larger position among firms with bad news. Due to the information spillover between the stock and bond markets, bonds with more stock short selling have higher yield spreads. Erturk and Nejadmalayeri (2012) verified that short selling increases bond price. Christophe et al. (2015) concluded that short selling leads to a decrease in firm value; thus, firms identified as short selling targets have lower bond returns. Henry et al. (2010) argued that credit rating downgrades lead to an increase in short selling. It was reported by some studies using American data that short selling increases bond yield spread, but margin trading and short selling in China have different targets, scales, and regulations. Therefore, margin trading and short selling may have different impacts in the Chinese and American bond markets. In this study, the discussion of the effects of margin trading and short selling on bond yield spread is based on Chinese data.

3. Institutional background and research hypothesis

3.1. Development of Chinese bond market

The Chinese bond market has developed in the 30 years since the first treasury bonds were issued in 1981. In the early state of the bond market, from 1981 to 1991, transactions were mainly completed over the counter. In the second stage, from 1992 to 1996, the bond market gradually moved towards standardization, and bonds were traded through an exchange. The third stage lasted from 1997 to 2001. During this stage, the inter-bank market thrived. The last stage began in 2002. In recent years, bond products have become more and more diversified.

During the first stage of the Chinese bond market, from 1981 to 1991, bonds were traded over the counter. The Chinese government released *Regulations of the People's Republic of China on State Treasury Bonds* in 1981. The Treasury Department issued treasury bonds by apportionment. However, treasury bonds could not be freely traded. They had value, but there was no market for treasury bonds. In 1988, the treasury department began to issue treasury bonds through commercial banks and post office counters; thus, the treasury bond primary market appeared. In the same year, the Treasury Department began a trial of trading treasury bonds in 61 cities, introducing a secondary market for treasury bonds. When the Shanghai Stock Exchange was established in 1990, it became possible to deposit a material bond on the exchange and to trade book entry treasury bonds on the exchange. Counter and exchange markets existed together for the first time. In 1991, the number of cities allowing treasury bond trading was expanded to 400. Both the counter trading and exchange trading of the treasury bond secondary market were available at that time. Financial bonds, enterprise bonds, and short financial bonds were also issued during this stage. The Industrial and Commercial Bank of China and the Agricultural Bank of China began to issue financial bonds in 1985, which was the beginning of financ-

ing bonds. *Interim Regulations on Enterprise Bond Management* was released in 1987. Enterprise bonds were regulated by the Chinese government and only enterprises owned by the people could issue enterprise bonds. The issuing needed to be approved by the Central Bank and the State Development Planning Commission, the predecessor of the National Development and Reform Commission. In the second half of 1988, short financing bonds became more common. In 1989, the Central Bank allowed the issuance of short financing bonds to increase liquidity. Although firms remained the issuers of enterprise and short financing bonds, the requirement of the approval of the Central Bank and State Development Planning Commission indicated the similarity of the treasury bonds and the other two bond products.

The bond market started to be normalized in the 1991 to 1996 period. During this stage, bond trading was mainly completed on the exchange. In 1991, treasury bonds began to be issued with syndicate underwriting. Treasury bond auctions began in 1995, indicating the beginning of the marketization of the treasury yield. In 1992, the Shanghai Stock Exchange launched treasury bond forward contracts, but the market was thin due to the limited number of investors with investment experience. The *Notice on Adjust Condition of Treasury Bond Issuance* was released in 1993, which attempted to protect investors' interests, and thus increase the volume and forward volume on the exchange. However, short selling and artificial repurchasing appeared in the treasury bond market in 1995, possibly due to the secret ballot of over-the-counter bonds considered by the government. Over-the-counter sales were prohibited and the securities exchange became the only legal transaction area for the bond market. In 1996, there were a variety of treasury bond products and the basic exchange bond market was built. During this stage, bond categories were being specified. Enterprise bonds were not popular in these early stages. In 1992, the total value of issuance amounted to RMB 68.4 billion and covered seven categories. However, in 1993, the *Regulations on Enterprise Bond* were released to constrain the development of the bond market. During this period, the issuance of short financing bonds was paused. In 1993 and 1994, there was a default of short financing bonds. Therefore, the Central Bank terminated the issuance of short financing bonds. The issuance of financial bonds shifted from commercial banks to policy banks after the latter were established in 1994.

The interbank bond market grew vigorously from 1997 to 2001. The rising stock market meant more money moved from the bond market to the stock market. The Central Bank required the commercial banks to put their treasury bonds, short financing bonds, and policy financial bonds into the China Government Securities Depository Trust & Clearing Company. Since then, the national bank market has been launched. In 1998, the Central Bank's promotion of an open market promoted a dynamic interbank bond market. In the same year, the Treasury Department issued bonds through the interbank bond market, which increased the inventory of bonds. In addition, new members joined the interbank bond market and by 2000, the interbank bond market covered most of the financial systems of China. At the beginning of 2000, the *Regulations on National Inter-Bank Bond Market Transaction* were released, in which bilateral market makers were mentioned. In August 2001, the Industrial & Commercial Bank of China, Agricultural Bank of China, and China Construction Bank were authorized as bilateral market makers. A market maker system between the interbank and bond market was established to promote the development of the interbank bond market. In 1997, the Department of State released the *Trial Procedures on Convertible Bond*. This was the first time that convertible bonds were issued in China. After 1999, policy banks became the major issuer of financial bonds. The China Development Bank and China Import and Export Bank issued financial bonds through an open bidding process. By 2000, most financial bonds were issued in this way. In 1999, the Central Bank proposed that enterprise bonds should be approved by the State Development Planning Commission. Since then, enterprise bonds have been mainly raised by approved large- and medium-sized projects. Firms with small projects are not allowed to issue enterprise bonds.

Since 2002, the bond market has contained a variety of products. Access to the interbank bond market has been transferred from a chartered system to a system of put on records. This transition expanded the range of participants in the market. In 2002, 15 treasury bonds were issued to the interbank, exchange, and over-the-counter markets, allowing the exchange of bonds between different markets. Since then, the Chinese bond market has been united, multi-layered, and mainly exchanged on the interbank market. To avoid a trade surplus shock to the treasury bond market, the Central Bank launched the Central Bank bill, which was one of the most effective tools for open market operations. In 2003, an interim measure on broker bonds was released. This regulation allowed brokers to issue bonds only with the approval of the CSRC, which was

intended to solve the financing problems of the brokers. Short financing bonds with the registered system reappeared on the market in 2005. After two years, the *Trial Methods on Corporate Bond Issuance* were released. The first corporate bond, which was the 07changdian bond, launched on the Shanghai Securities Exchange, marking the beginning of financing with corporate bonds for listed companies. In 2008, a medium-term note with the registration system was issued, which enriched the term of bond products. Most notes lasted for between 1 and 10 years. Local treasury bonds were issued by the Treasury Department in 2009, which filled the local bond gap. In November of the same year, small or medium collection bonds were issued with the registration system on the interbank bond market. Super short-term financing bonds were issued on the interbank market in 2010. This term for this kind of bond was shorter than 270 days, and it required the issuer to have high credit worthiness. After one year, Shanghai, Zhejiang, Guangdong, and Shenzhen began issuing their own debt. However, the Treasury Department could charge for the payment on capital and interest. On February 15, 2012, Shandong Hailong's rating was downgraded from BB+ to CCC and the bond rating was downgraded from B to C. Shandong Hailong was faced with default risk. Since then, several credit bonds have defaulted. In 2014, the 11Chao Ri Bond defaulted, which was the first defaulted public bond in China. In 2015, the *Measure on Corporate Bond Issuance and Transaction* was released. This measure expanded the list of potential issuers, enriched the issuance format, added bond trading places, and simplified the audit process.

After 30 years of development, the Chinese bond market has grown to offer a variety of products. There are a variety of issuers trading on the interbank, exchange, and over-the-counter markets. At present, the interbank bond market is mainly monitored by the Central Bank and the China Banking Regulatory Commission. The products traded on this market are treasury bonds, local treasury bonds, financial bonds, enterprise bonds, medium bonds, and short financing bonds. The exchange market is currently regulated by the CSRC and the National Development and Reform Commission. The products traded on this market are book-entry treasury bonds, local treasury bonds, financial bonds, enterprise bonds, corporate bonds, and convertible bonds. According to the statistics issued by the Central Bank, the size of bond issuance in China has reached RMB 36.1 trillion, of which the interbank bond size is 32.2 trillion. By 2016, the total deposit in bonds was 63.7 trillion, including 56.3 trillion in the interbank bond market. Currently, the Chinese bond market is ranked as the third largest global bond market after the American and Japanese markets.

Although the Chinese bond market is one of the top three global bond markets, most bond products here are treasury and financial bonds; corporate bonds have had a late start. The *Trial Methods on Corporate Bond Issuance* provided policy for the issuance of corporate bonds. In September 2007, the 07Chang Dian Bond was issued publicly. This was the first corporate bond in the Chinese bond market. In 2013, the Third Plenary Session of the Eighteen Session approved the *Decisions on Numbers of Major Issues about Deepen Reform in all-around Way of Central Committee of the Communist Party of China*. This declaration discussed the development and standardization of the bond market and the improvement of direct financing, offering great opportunities for the development of the bond market. In 2015, the *Methods on Corporate Bond Issuance* expanded the issuance range and simplified the audit process, which activated the corporate bond market. Like enterprise bonds, corporate bonds can relieve financing problems in non-financial firms. However, there are differences between corporate bonds and enterprise bonds. First, the issuance of corporate bonds must be approved by the CSRC, whereas enterprise bonds must be approved by the National Development and Reform Commission. Second, requirements for corporate bond issuance are lower than those for enterprise bonds.¹ In the end, the issuance of enterprise bonds is guaranteed and approved by the government. However, money raised by corporate bonds does not have to be connected to projects and a guarantee is not necessary. Therefore, corporate bonds are more market-oriented than enterprise bonds.

¹ (1) The production and operation of the company conforms to the provisions of laws, administrative regulations, and the articles of incorporation, and conforms to the national industrial policies. (2) The internal control system of the company is sound, and the integrity, rationality, and validity of the internal control system do not have significant deficiencies. (3) The bond is rated by a credit rating agency as fine. (4) The latest audited net assets of the company shall comply with the relevant laws and administrative regulations and the relevant provisions of the CSRC. (5) Average distributable profits over the latest three accounting years are no less than interest fees of corporate bonds of one year. (6) The balance of the accumulated corporate bonds after the issuance does not exceed 40% of the net assets of year end; the accumulated corporate bonds of the financial companies are calculated according to the relevant provisions of financial enterprises.

3.2. *Corporate bond pricing mechanism*

Currently, all corporate bonds have a face value of RMB100, and they are issued at par in China. Apart from a small number of bonds that are paid two or four times a year, most bonds are paid annually. The interest is calculated as simple interest. Most bonds offer fixed or accumulated interest; only a small number offer floating interest. Offline requests and the placement of bookkeeping together determine the interest rate. First, the issuer and broker reach an agreement based on market interest, terms, and credit rating. Then, the issuer announces an issuance and offers the bonds publicly online and accepts inquiries from institutional investments offline. Finally, the issuer and broker reach an agreement on interest based on the level of institutional investors' interest.

In the secondary market, corporate bonds are exchanged on the Shanghai or Shenzhen Security Exchanges. Corporate bond transactions are based on net price and full price settlement, so bid prices do not contain accrued interest; however, accrued interest is included in transaction settlements. Price is determined by supply and demand. Market risk affects the price (Gao and Zhou, 2015). Price, terms, interest rate, and face value determine the yield spread. In particular, a higher price may predict a lower yield spread. Beaver (1966) points out that a bond's default risk is affected by accounting performance. A higher default risk predicts a higher yield spread. Merton (1974) concludes that volatility affects price. When volatility increases, default risk and yield spread both increase. Therefore, accounting performance and the volatility of assets could both impact bond price.

Investors in the secondary market cannot access private information as institutions do in the primary market. Therefore, investors in the secondary market have greater need for public information. However, the information environment of the bond market is poorer than that of the stock market (Gebhardt et al., 2005). For one thing, many analysts and a lot of mediation are involved in the stock market, whereas few analysts focus on the bond market. These analysts in the bond market offer little private information to investors. Furthermore, credit rating agencies provide lagged information on bonds. Therefore, information on the stock market may spill over into the bond market. More specifically, margin trading may deliver positive information to the bond market and short selling of stock may transmit negative information to investors in the bond market, which leads to changes in yield spread.

3.3. *Relationship between margin trading, short selling and bond yield spread*

Margin traders predict that a stock price will increase in the future, so they pay a deposit and borrow stocks from brokers. When the stock prices increase, they sell the stocks and pay back the brokers the money they borrowed. Leverage deals transfer positive information about firms (Chu and Fang, 2016), which may include information about firms' better accounting performance. The information is transferred between markets (Fleming et al., 1998) and due to the poorer information environment of bond market, investors in the bond market will learn of the good performance or lower volatilities of target firms from margin trading.

Accounting information may predict default risk (Beaver, 1966; Shi and Jiang, 2013); specifically, firms with better performance may have low default risk. Lower default risk causes higher prices and lower yield spread. Therefore, margin trading may cause a decrease in the yield spread. However, bonds have distinctive characteristics. Stockholders get residual income and bear limited liabilities (Jensen and Meckling, 1976), whereas bondholders bear the downside risk and get a fixed income (Fischer and Verrecchia, 1997). As a result, bondholders pay more attention to risks (Gao and Zhou, 2015). Therefore, margin trading information about better performance or lower risk may not attract the attention of bondholders. In this case, margin trading may not impact bond yield spread.

Conversely, short sellers predict a decrease in a stock's price. Therefore, they pay a deposit to borrow stocks and sell out. When the price drops, short sellers buy the stocks and pay back the brokers. These transactions transfer bad information about firms, as they are indicators of poor performance, high volatilities, or poor information quality (Dechow et al., 2001; Desai et al., 2006). This information is transferred between markets (Fleming et al., 1998), and investors in the bond market gain the negative information about the target firms.

Badly performing firms may have a higher default risk, which causes a lower price and higher yield spread. In addition, the bad news that prompts short selling may increase speculations on default risk and lead to fur-

ther increases in the yield spread (Sengupta, 1998; Yu, 2005). Therefore, short selling may increase the bond yield spread. However, even if there is no bad news, speculators may manipulate prices by short selling to generate a decrease (Goldstein and Guembel, 2008). This kind of transaction does not transfer information about firms. So, short selling may not affect the bond yield spread. In addition, short selling may increase the probability of being funded by earnings management. This may decrease firms' earnings management (Fang et al., 2016). Accordingly, short selling may decrease speculation on default risk by increasing accounting information, and thus decreases bond yield spread. Therefore, short selling may decrease bond yield spreads.

The above discussion leads to the following hypotheses.

Hypothesis 1. Margin trading on the stock market does not impact the bond yield spread.

Hypothesis 2. Short selling on the stock market does not impact the bond yield spread.

4. Research design

4.1. Model and variables

Margin trading and short selling targets are only part of the bond issue process. Our setting provides a quasi-natural experiment that can avoid endogeneity problems in the study of the effects of margin trading and short selling on bonds. Due to the temporal variations in the targets, this study uses a difference in differences model with fixed effects of the month and bond (Bertrand and Mullainathan, 2003). Armstrong et al. (2012) used this model to study corporate governance and the information environment. Zhou and Chen (2005) applied this model in a Chinese setting. Jin et al. (2015) explored the relationship between short selling and investment by using this model. Zhang et al. (2016) also used this model to study the effect of short selling on restatement. The model applied in this research is as follows:

$$Spread_{i,t} = \alpha_t + \alpha_i + \beta_1 Long_{i,t} + \beta_2 Short_{i,t} + \beta_3 BondControl_i + \beta_4 FirmControl_{i,t} + \varepsilon_{i,t}. \quad (1)$$

In this model, spread is the monthly bond yield spread, which is calculated as the yield spread of the closing price minus the treasury bond yield spread with the same term and same issuance time (Kecskés et al., 2013). α_t is the month fixed effects, and α_i is the bond fixed effects. *Long* is the margin trading amount divided by negotiable market capitalization. *Short selling* is the short selling amount multiplied by 100 and divided by negotiable market capitalization.² β_1 is the effects of margin trading on bond yield spread. β_2 is the effects of short selling on bond yield spread.

For example, if Firm A is targeted in March 2010, the margin trading amount is $Long_A$ and the spread change is

$$E(Spread_{i,t}|i = A, t = 201003) - E(Spread_{i,t}|i = A, t = 201002) = \alpha_{201003} - \alpha_{201002} + \beta_1 * Long_A. \quad (2)$$

The controlled firm A- is not affected by margin trading and the time trending change is

$$E(Spread_{i,t}|i = A-, t = 201003) - E(Spread_{i,t}|i = A-, t = 201002) = \alpha_{201003} - \alpha_{201002}. \quad (3)$$

Therefore, the margin trading effects on the bond yield spread of firm A is

$$\begin{aligned} & E(Spread_{i,t}|i = A, t = 201003) - E(Spread_{i,t}|i = A, t = 201002) \\ & - (E(Spread_{i,t}|i = A-, t = 201003) - E(Spread_{i,t}|i = A-, t = 201002)) \\ & = \beta_1 * Long_A. \end{aligned} \quad (4)$$

Finally, β_1 measures the effects of margin trading on bond yield spread. If β_1 is significantly negative, margin trading could decrease the bond yield spread; if β_1 is significantly positive, margin trading could increase the bond yield spread. The effect of short selling on yield spread are the same as the effects of margin trading. If

² To avoid an over-large coefficient in the late report, we multiply the number of securities traded by 100 and then divide the number of shares in circulation by 100.

Table 1
Statistics of margin trading and short selling.

Date	Including	Including percent (%)	Excluding	Excluding percent (%)	Remainder
2010/3/31	90	9.128	–	–	90
2010/7/1	5	0.507	5	5.814	90
2010/7/29	1	0.101	1	1.163	90
2011/12/5	190	19.27	2	2.326	278
2013/1/31	276	27.992	54	62.791	500
2013/3/6	0	0	1	1.163	499
2013/3/7	0	0	1	1.163	498
2013/3/29	0	0	2	2.326	496
2013/5/2	0	0	1	1.163	495
2013/5/3	0	0	1	1.163	494
2013/9/16	206	20.892	0	0	700
2014/3/28	0	0	1	1.163	699
2014/4/1	0	0	1	1.163	698
2014/4/29	0	0	1	1.163	697
2014/5/5	0	0	2	2.326	695
2014/9/22	218	22.11	13	15.116	900
Total	986	100	86	100	900

β_2 is significantly negative, short selling could decrease the bond yield spread; if β_2 is significantly positive, short selling could increase bond yield spread.

In Equation (1), margin trading and short selling values are the total amount for one month, and the yield spread is determined at the end of the month. So there is a period of time between variables, which avoids reverse causality problems. In addition, the bond variables include *BondRate*, which is the bond's credit rating,³ and *BondTerm*, which is the log of its maturity.⁴ Firm control variables include *Size*, calculated as the log of assets; *Age*, calculated as the log of firm age; *Leverage*; *ROA*; *PPE*, which is the ratio of fixed assets to total assets; *Capex*, which is the ratio of capital expenditure and total asset; *InstitutionShare*, which is the shareholding ratio of institutional investors; *ManagerShare*, which is the shareholding ratio of managers; *Analyst*, which is the log of the number of analysts following the firm plus one; *SOE*; *BoardSize*, which is the size of the board; *Independence*, which is the ratio of independent directors to independent directors number; and *ReturnVol*, which is the monthly volatility of the stock price.

4.2. Observations and data sources

On March 31, 2010, China approved margin trading and short selling for 90 stocks. After four revisions of the list, the number of targeted stocks had risen to 900 by September 22, 2014. The timeline is illustrated in Table 1. 986 stocks were added to the list and among them, 86 stocks were deleted during 2010 to 2014. On March 31 of 2010, 90 stocks were on the list, which accounted for 9.128% of the including targets number. By July 1 in the same year, 5 stocks were deleted and other 5 stock were added. The including and excluding percent were 0.507% and 5.814. At the end of the month, 1 stock was deleted, which only account for 0.101% of the total including targets. In 2011, 190 stocks were included. It implies that including percent was 19.270%. When it comes to January 31, 2013, including percent was 27.992% while excluding percent was 62.791%. From March 6 to May 2 in 2013, there was no including stocks but 5 stocks were deleted because of the risk warning or delisting. On September 16, 2013, 206 stocks were added and the total targets number was 700. In the first half of 2014, 5 stocks were deleted for the risk warning. On September 22 of 2014, 218 stocks were including on the list which account for 22.11% of the total including targets. Therefore, the five recruiting periods were mainly realized on March 31, 2010, December 5, 2011, January 31, 2013, September 16, 2013, and

³ Credit ratings range from BBB to AAA. For BBB *BondRate* is 1; for BBB + *BondRate* is 2; for A- *BondRate* is 3; for A *BondRate* is 4; for A + *BondRate* is 5; for AA- *BondRate* is 6; for AA *BondRate* is 7; for AA + *BondRate* is 8; and for AAA *BondRate* is 9.

⁴ The size of the bond issuance and other variables are not included in the control variable because this study controls the bond fixed effect. The issuance size of each bond and the other variables changing over time does not affect the results in the model.

September 22, 2014. On every day of these 5 dates, the including stocks accounted for more than 9% while on the other 11 dates, the number was less than 1%.

On August 14, 2007, *Trial Methods on Corporate Bond Issuance* was released. This marked the formal development of corporate bond in China. As only two bonds were issued in 2007, our dataset excludes the bonds issued in 2007. Our dataset includes all of the corporate bonds publicly listed on the Shanghai or Shenzhen Security Exchange from 2008 to 2015. After excluding financing bonds and floating interest rate bonds, we have 12,241 bond-month observations representing 468 bonds. These observations are merged with the data on margin trading and short selling. We exclude observations with negative yield spread, missing data, and an issuance year after 2015. All of the variables are winsorized at the 5% and 95% levels. The final dataset contains 8662 bond-month observations. The margin trading and short selling target data are obtained from the online disclosures of the Shanghai or Shenzhen Securities Exchange. Bond data are from the WIND and CSMAR databases, whereas the margin trading and short selling transaction data and other control variables are from the CSMAR database.

5. Empirical results

5.1. Statistics description

Table 2 presents the variables' statistics. The bond yield spread varies from 0.853 to 5.115, the mean value is 2.513 and the standard deviation is 1.134. These figures indicate that the distribution of the bond yield spread is reasonable. The mean of *Long* is 0.018, indicating that, on average, 1.8% of stocks are margin traded. The mean of *Short* is 0.045, indicating that, on average, 0.045% stocks experience short selling. The smallest value for *BondRate* is 6 and the largest is 9, indicating the high credit rating of the observations. All of these results could be explained by issuer characteristics.

Table 3 reports the coefficients of the correlation between the independent and dependent variables. The values on the lower left of Table 3 are the Pearson correlation coefficients and those on the upper right are the Spearman correlation coefficients. The result shows that margin trading and short selling both have significantly negative correlations with bond yield spread, possibly indicating that margin trading and short selling decrease bond yield spread.

Fig. 1 describes the transaction status of margin trading and short selling in China. The left axis is the volume of margin trading and the right axis is the volume of short selling. Fig. 1 shows that the volume of short

Table 2
Descriptive statistics.

Variables	Mean	S.D.	Minimum	Median	Maximum
Spread	2.513	1.134	0.853	2.309	5.115
Long	0.018	0.037	0.000	0.000	0.134
Short	0.045	0.104	0.000	0.000	0.390
BondRate	7.547	0.856	6.000	7.000	9.000
BondTerm	3.906	0.370	3.178	3.932	4.522
Size	23.245	1.113	21.571	23.102	25.768
Age	2.714	0.335	1.946	2.773	3.178
Leverage	0.579	0.138	0.341	0.576	0.798
ROA	0.023	0.032	-0.053	0.02	0.086
PPE	0.327	0.194	0.036	0.319	0.689
Capx	0.057	0.044	0.003	0.047	0.158
InstitutionShare	0.05	0.053	0.000	0.033	0.197
ManagerShare	0.042	0.103	0.000	0.000	0.380
Analyst	2.349	0.966	0.000	2.565	3.584
Soe	0.533	0.499	0.000	1.000	1.000
Boardsize	2.219	0.183	1.946	2.197	2.639
Independence	0.367	0.042	0.333	0.333	0.455
ReturnVol	0.027	0.014	0.008	0.023	0.061

Table 3

Correlation: Pearson (Spearman) correlation coefficients are below (above) the diagonal.

	Spread	Long	Short
Spread	1.000	-0.251***	-0.230***
Long	-0.162***	1.000	0.893***
Short	-0.181***	0.737***	1.000

**Represents a significance level of 5%.

*Represents a significance level of 10%.

*** Represents a significance level of 1%.

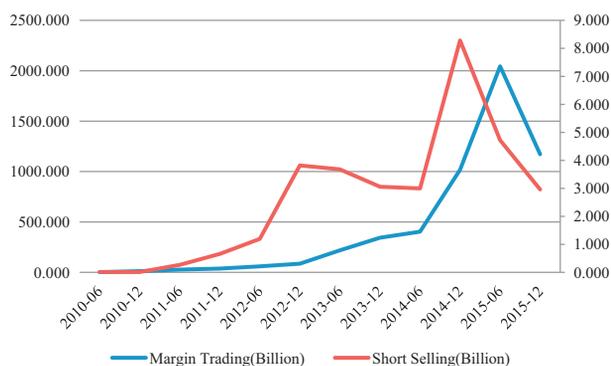


Fig. 1. Trends in margin trading and short selling.

selling outweighs the volume of margin trading. During the 2010 to 2012 period, there was only a small amount of margin trading and short selling. This changed around 2015.

5.2. Multivariate regression analysis

Table 4 reports the results of the regressions. In the first column of Table 4, the dependent variable is bond yield spread. The independent variables are margin trading and short selling. The observations include all of the margin trading and short selling observations. The second column drops the short selling observations and the independent variable is only margin trading. The third column drops the margin trading observations and the independent variable is only short selling. Columns 4 to 6 drop observations with different excluded or included targets.

In column 1 of Table 4, the coefficients of *Long* and *Short* are -0.976 and -0.369. They are both significant at the 1% level, indicating that margin trading and short selling both decrease bond yield spread even when bond characteristics and firm characteristics are controlled. In column 2 of Table 4, the coefficient of *Long* is significantly negative, suggesting that margin trading can explain a lower bond yield spread. In column 3 of Table 4, the coefficient of *Short* is significantly negative, indicating that short selling causes lower bond yield spread, perhaps for the following reasons. Margin trading transfers positive news to the bond market, whereas short selling decreases managers' earnings management, which leads to lower bond yield spreads. In additional tests, this study tests these mechanisms. Column 1 of Table 4 reports the coefficients of the control variables. It shows that bond rate, size, and leverage all lower bond yield spread. These results are consistent with previous research (Wang and Zhang, 2013).

5.3. PSM+DID analysis

Implementing Regulations for Margin Trading and Short Selling outlines the qualifications for target stocks such as list time, outstanding market value, shareholders, turnover rate, highs and lows, and volatilities. Tar-

get stocks may have characteristics that are different from non-target stocks.⁵ To avoid this bias, propensity score matching is used along with the difference in differences method.

First, the observations for firms with less than 4000 shareholders, less than 0.1 billion outstanding shares, and monthly volumes of less than 50,000 million are all excluded. Then, the observations are grouped by the period when the stocks were targeted and exchanged. Then, we run a logit regressions using daily turnover, daily high and low, and daily return volatilities as control variables. Next, the non-replacement near neighbor method of propensity score matching is used to match each target with a control observation. This process identifies 79 targets as a treatment group and 79 non-targets as a control group. We test whether the observations are balanced and commonly supported. The results of the variables' balance, given in Table 5, show that there are no differences between the treatment and control groups. Therefore, our observations after matching are balanced. Fig. 2 shows the p-scores of the treatment and control groups before and after matching. Before matching, the p-score of the treatment group is higher than that of the control group. However, after matching, the p-scores of the two groups are the same. Fig. 2 proves that the treatment and control groups satisfy the common support criteria after propensity score matching.

After matching, we analyze the effects of margin trading and short selling using the difference in differences method. We use the *After*, *Treat*, and *Treat*After* variables. The *After* variable is equal to 1 after an observation that has been a target or a target's control group. *Treat* is equal to 1 if an observation belongs to treatment group. The model is as follows:

$$Spread_{i,t} = \alpha_t + \alpha_i + \beta_1 Treat_i + \beta_2 After_t + \beta_3 Treat_i * After_t + \beta_4 BondControl_i + \beta_5 FirmControl_{i,t} + \varepsilon_{i,t} \quad (5)$$

For example, firm A became a target in March 2010, so the margin trading or short selling effects on the bond spread can be calculated as follows:

$$E(Spread_{i,t}|i = A, t = 201003) - E(Spread_{i,t}|i = A, t = 201002) = \alpha_{201003} - \alpha_{201002} + \beta_2 + \beta_3. \quad (6)$$

The control firm A- cannot have been affected by margin trading, so the time trending change is calculated as follows:

$$E(Spread_{i,t}|i = A-, t = 201003) - E(Spread_{i,t}|i = A-, t = 201002) = \alpha_{201003} - \alpha_{201002} + \beta_2. \quad (7)$$

Therefore, the margin trading and short selling effects on the bond yield spread of firm A are

$$\begin{aligned} E(Spread_{i,t}|i = A, t = 201003) - E(Spread_{i,t}|i = A, t = 201002) - (E(Spread_{i,t}|i = A-, t \\ = 201003) - E(Spread_{i,t}|i = A-, t = 201002)) = \beta_3. \end{aligned} \quad (8)$$

In the end, β_3 measures the effects of margin trading or short selling on bond yield spread. If β_3 is significantly negative, margin trading or short selling decreases bond yield spread; if β_3 is significantly positive, margin trading or short selling increases the bond yield spread.

Table 6 reports the regression results for the post-match DID analysis. Column 1 shows the regression results of the margin and bond yield spread. Column 2 presents only the effects of margin trading on bond yield spread. Column 3 presents only the effects of short selling on bond yield spreads. As shown in column 1, the coefficient of *Treat*After* is significantly negative at the 1% level. As shown in column 2, the coefficient of *Treat*After* is significantly negative at the 1% level after excluding the short selling sample, indicating that margin trading alone can reduce the bond yield spread. As shown in column 3, the coefficient of *Treat*After* is significantly negative at the 5% level after excluding the margin trading sample, indicating that short selling

⁵ *Implementing Regulations for Margin Trading and Short Selling* stipulates that the choice of an underlying asset for the financial margin must meet the following criteria. (1) The stock must have been trading for more than three months. (2) The capital stock of the share in the long position is no less than 100 million or the value is no less than RMB 500 million. The capital stock of the share in the short position is no less than 200 million or the value is no less than RMB 800 million. (3) The number of shareholders is not less than 4000. (4) In the previous three months, none of the following circumstances occurred: daily average turnover rate is lower than 15% of the benchmark index daily turnover rate, and the average daily turnover amount is less than RMB 50 million; the deviation between the mean of the amplitude and the average of the benchmark index is more than 4%; and the fluctuation range is more than five times the volatility of the benchmark index. (5) The stock trade is not subject to a risk warning.

Table 4
Main results.

Variables	Main results			Drop included and excluded observations		
	(1)	(2)	(3)	(4)	(5)	(6)
Long	−0.976*** (−3.18)	−2.486*** (−4.29)		−1.025*** (−3.30)	−2.505*** (−4.23)	
Short	−0.369*** (−3.60)		−499.243** (−2.36)	−0.370*** (−3.56)		−499.243** (−2.36)
BondRate	−0.394*** (−14.73)	−0.420*** (−12.27)	−0.456*** (−13.34)	−0.396*** (−14.68)	−0.427*** (−12.34)	−0.456*** (−13.34)
BondTerm	−0.839*** (−8.01)	−1.080*** (−7.20)	−1.052*** (−6.37)	−0.853*** (−8.07)	−1.093*** (−7.21)	−1.052*** (−6.37)
Size	−0.447*** (−10.11)	−0.335*** (−6.15)	−0.329*** (−5.96)	−0.446*** (−10.02)	−0.329*** (−6.01)	−0.329*** (−5.96)
Age	0.444* (1.79)	0.683** (2.06)	0.703** (2.09)	0.470* (1.88)	0.721** (2.16)	0.703** (2.09)
Leverage	0.998*** (5.82)	0.838*** (4.07)	0.816*** (3.93)	1.006*** (5.82)	0.819*** (3.95)	0.816*** (3.93)
ROA	0.038 (0.09)	0.558 (1.08)	1.088** (2.11)	−0.021 (−0.05)	0.530 (1.02)	1.088** (2.11)
PPE	0.047 (0.34)	0.098 (0.58)	−0.319* (−1.87)	0.056 (0.40)	0.106 (0.63)	−0.319* (−1.87)
Capx	−1.508*** (−5.14)	−0.938*** (−2.69)	−0.855** (−2.44)	−1.496*** (−5.06)	−0.919*** (−2.61)	−0.855** (−2.44)
InstitutionShare	1.111*** (4.47)	1.163*** (3.68)	0.631** (1.97)	1.096*** (4.38)	1.184*** (3.71)	0.631** (1.97)
ManagerShare	−0.810*** (−3.57)	−1.042*** (−3.63)	−0.543* (−1.88)	−0.841*** (−3.67)	−0.983*** (−3.38)	−0.543* (−1.88)
Analyst	−0.143*** (−7.07)	−0.134*** (−5.58)	−0.099*** (−4.01)	−0.140*** (−6.91)	−0.133*** (−5.50)	−0.099*** (−4.01)
Soe	0.022 (0.20)	−0.161 (−1.22)	−0.090 (−0.71)	0.020 (0.18)	−0.159 (−1.21)	−0.090 (−0.71)
Boardsize	0.068 (0.61)	−0.063 (−0.45)	0.067 (0.48)	0.066 (0.59)	−0.064 (−0.46)	0.067 (0.48)
Independence	−0.430 (−1.35)	0.025 (0.06)	0.388 (0.88)	−0.475 (−1.48)	−0.074 (−0.17)	0.388 (0.88)
ReturnVol	−0.362 (−0.51)	−0.466 (−0.58)	−0.438 (−0.55)	−0.275 (−0.38)	−0.416 (−0.51)	−0.438 (−0.55)
Constant	18.302*** (14.05)	16.050*** (9.98)	15.849*** (9.61)	17.945*** (13.68)	16.351*** (10.09)	15.849*** (9.61)
Bond Fixed	YES	YES	YES	YES	YES	YES
Year & Month Fixed	YES	YES	YES	YES	YES	YES
Observations	8662	6126	5845	8565	6067	5845
R-Squared	0.197	0.200	0.207	0.196	0.201	0.207
F-value	18.13	12.96	12.85	17.83	12.85	12.85

*** Represents a significance level of 1%.

** Represents a significance level of 5%.

* Represents a significance level of 10%.

Table 5
Balance test.

Variables	Control group	Treatment group	SB (%)	T-test	P > T
TurnOver	15.817	16.873	−7.600	−0.500	0.615
HighLow	0.037	0.037	−4.700	−0.310	0.755
ReturnVol	0.023	0.023	3.800	0.250	0.800

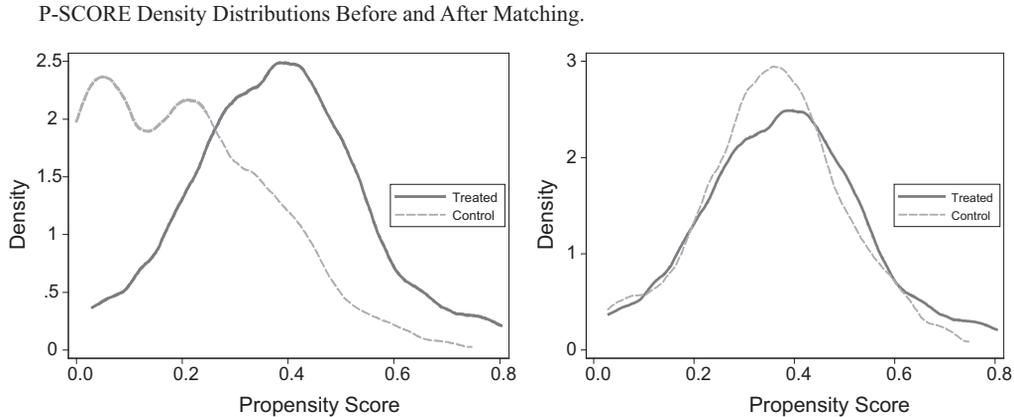


Fig. 2. P-SCORE density distributions before and after matching.

alone can reduce the bond yield spread. In summary, the analysis of the PSM + DID shows that both margin trading and short selling can reduce the bond yield spread, which is consistent with the results given in Table 4.

5.4. Other robustness analysis

In August 2012, China began a pilot scheme of using securities to refinance businesses, allowing security companies to re-lend, through margin trading, to long-buyers, which increased the amount of margin trading. In February 2013, as part of the official pilot securities refinancing business, the security companies were allowed to borrow from institutional investors and re-lend to short sellers, which increased the amount of short selling. This study's analysis of the post-August 2012 sample shows that the effect of margin trading on the bond yield spread is present in this period. The analysis of the post-February 2013 sample shows that short selling securities has a negative effect on the bond yield spread, further proving the reliability of our conclusions.

This study also conducts robustness tests to examine the effect of variable selection on the results. First, we select an alternate measure of bond yield spreads, which is equal to the bond closing maturity rate at the end of the month minus the bank one-year deposit interest rate. Second, to eliminate the effects of industry or annual heterogeneity in the short selling and margin trading of securities, we adjust the short selling and margin trading data by industry and year. Third, the degree of margin trading is measured as the percentage of all share transactions that is made up of margin trading and the degree of short selling is measured as the percentage of all share trading that is made up of short selling. Fourth, as the total amount of short selling is small, the net amount can only measure the effect of margin trading on bond yield spread. In this study, after the proportion of short selling is deducted from the total short trading, we find the minimum is zero, indicating that there are no times when the amount of short selling is greater than the amount of margin trading. Therefore, the impact of the short selling of securities on bond yield spreads cannot be measured in this analysis. To ensure the robustness of the results, this study adopts the net amount to analyze the impact of margin trading on yield spreads. Fifth, the current short selling and margin trading are regressed with the next period yield spread to avoid a reverse causal relationship. The results of these robustness analyses are consistent with the conclusions of the main regression. Further details of these analyses are omitted due to space limitations.

6. Further analysis

6.1. Path through which margin trading affects the yield spread of bonds

This section explores how margin trading affects bond yield spreads. Previous research has indicated that low leverage (Shi and Jiang, 2013) and high credit rating (Ziebart and Reiter, 1992) are positive information in

Table 6
PSM + DID analysis.

Model	(1)	(2)	(3)
Sample	All	Margin trading	Short selling
Treat	1.492*** (6.12)	1.153*** (3.50)	1.277** (2.07)
After	0.165*** (5.55)	0.092*** (2.83)	0.063** (2.01)
Treat*After ^a	-0.307*** (-8.25)	-0.530*** (-8.66)	-1.067** (-2.32)
BondRate	-0.277*** (-9.79)	-0.297*** (-8.39)	-0.319*** (-8.98)
BondTerm	-0.878*** (-7.06)	-0.639*** (-3.79)	-0.684*** (-3.64)
Size	-0.639*** (-11.96)	-0.524*** (-7.69)	-0.570*** (-8.11)
FirmAge	0.605* (1.95)	0.239 (0.62)	0.287 (0.72)
Leverage	0.984*** (4.67)	1.054*** (4.41)	1.057*** (4.41)
ROA	1.400*** (2.89)	3.024*** (5.28)	3.331*** (5.80)
PPE	0.112 (0.69)	0.354* (1.84)	-0.039 (-0.20)
Capx	-1.648*** (-4.91)	-1.336*** (-3.28)	-1.031** (-2.47)
InstitutionShare	0.983*** (3.33)	0.085 (0.23)	-0.478 (-1.28)
ManagerShare	-0.280 (-0.98)	-0.439 (-1.08)	-0.092 (-0.22)
Analyst	-0.140*** (-5.80)	-0.098*** (-3.22)	-0.042 (-1.34)
Soe	0.635 (1.40)	0.522 (0.71)	-0.901*** (-3.78)
Boardsize	-0.024 (-0.18)	0.194 (1.17)	0.296* (1.72)
Independence	0.343 (0.93)	0.884* (1.88)	1.033** (2.08)
ReturnVol	-1.073 (-1.25)	-0.743 (-0.74)	-0.674 (-0.68)
Constant	18.491*** (11.57)	15.650*** (7.55)	18.119*** (8.75)
Bond Fixed	YES	YES	YES
Year & Month Fixed	YES	YES	YES
Observations	6488	4643	4417
R-Squared	0.757	0.756	0.766
F-value	78.34	55.00	55.11

*** Represents a significance level of 1%.

** Represents a significance level of 5%.

* Represents a significance level of 10%.

^a As the model has fixed bond effects, the treated variable is excluded.

the bond market. To see whether margin trading transactions can identify such information, we examine the intermediary effect (*Media*) of leverage and credit rating. The results are shown in Table 7.

In columns 1 and 3 of Table 7, *Leverage* and *BondRate* are the dependent variables, and *Long* is the independent variable. In columns 2 and 4, we regress the asset-debt ratio (*Leverage*), credit rating (*BondRate*), and margin trading position (*Long*) with the yield spread (*Spread*). As shown in column 1, the coefficient of *Long* is significantly negative at the 1% level, indicating that stock market investors prefer companies with lower asset-

Table 7
Path of optimistic information in margin trading.

Model	Intermediary of leverage		Intermediary of credit	
	(1)	(2)	(3)	(4)
Variable	Leverage	Yield spread	Bondrate	Yield spread
Long	-0.131*** (-3.52)	-2.486*** (-4.29)	15.631*** (5.55)	-2.486*** (-4.29)
Media		0.838*** (4.07)		-0.420*** (-12.27)
Size	0.030*** (9.03)	-0.335*** (-6.15)	3.943*** (15.38)	-0.335*** (-6.15)
FirmAge	0.006 (0.27)	0.683** (2.06)	17.301*** (11.82)	0.683** (2.06)
Leverage			-2.759*** (-2.77)	0.838*** (4.07)
ROA	-0.737*** (-23.45)	0.558 (1.08)	-21.605*** (-8.87)	0.558 (1.08)
PPE	0.053*** (4.90)	0.098 (0.58)	2.667*** (3.39)	0.098 (0.58)
Capx	0.160*** (7.16)	-0.938*** (-2.69)	12.486*** (7.19)	-0.938*** (-2.69)
InstitutionShare	-0.064*** (-3.20)	1.163*** (3.68)	-6.089*** (-4.08)	1.163*** (3.68)
ManagerShare	0.090*** (4.96)	-1.042*** (-3.63)	4.722*** (3.36)	-1.042*** (-3.63)
Soe	0.001 (0.06)	-0.161 (-1.22)	-2.311*** (-5.55)	-0.161 (-1.22)
Boardsize	0.040*** (4.60)	-0.063 (-0.45)	0.200 (0.34)	-0.063 (-0.45)
Independence	-0.011 (-0.39)	0.025 (0.06)	12.352*** (6.37)	0.025 (0.06)
Analyst		-0.134*** (-5.58)		-0.134*** (-5.58)
ReturnVol		-0.466 (-0.58)		-0.466 (-0.58)
BondRate		-0.420*** (-12.27)		
BondTerm		-1.080*** (-7.20)		-1.080*** (-7.20)
Constant	-0.252*** (-2.81)	16.050*** (9.98)		16.050*** (9.98)
Bond Fixed	YES	YES	YES	YES
Year & Month Fixed	YES	YES	YES	YES
Observations	6126	6126	6126	6126
R-Squared	0.139	0.200		0.200
F-value	8.779	12.96		12.96
Pseudo Adjusted R ²			0.8731	
Chi ²			11807.92	

* Represents a significance level of 10%.

** Represents a significance level of 5%.

*** Represents a significance level of 1%.

debt ratios. As shown in column 2, the coefficient of *Media* is significantly positive at the 1% level. In other words, *Leverage* is positively correlated with the yield spread. The Sobel *Z* value, calculated with the mediation effect model, is 2.662, the *p* value is 0.008, and the coefficient of margin trading is significantly negative at the 1% level, indicating that asset-debt ratio (*Leverage*) is one type of optimistic information transmitted by a long transaction. This positive information decreases the bond yield spreads.

The coefficient of *Long* shown in column 3 of Table 7 is significantly positive at the 1% level, indicating that the credit rating of the bond issued by the company that has margin trading is higher; the coefficient of *Media*, shown in column 4 of Table 7, is significantly negative. In other words, the higher the bond credit rating (*Bon-*

Table 8
Mechanism of short selling's governance effect.

Model	Intermediary of EM		Intermediary of conservatism	
	(1)	(2)	(3)	(4)
Variables	EM	Yield spread	Conservatism	Yield spread
Short	-26.127*	-467.745**	876.948***	-501.169**
	(-1.75)	(-2.22)	(4.14)	(-2.36)
Media		1.683***		0.003
		(9.03)		(0.25)
Size	0.024***	-0.335***	0.032	-0.329***
	(6.45)	(-6.12)	(0.60)	(-5.95)
FirmAge	-0.021	0.716**	1.632***	0.696**
	(-0.92)	(2.14)	(4.93)	(2.06)
Leverage	0.125***	0.576***	-0.852***	0.815***
	(8.64)	(2.76)	(-4.15)	(3.91)
ROA	0.282***	1.014**	1.061**	1.095**
	(7.40)	(1.98)	(1.97)	(2.12)
PPE		-0.198		-0.319*
		(-1.17)		(-1.87)
Capx		-0.585*		-0.845**
		(-1.68)		(-2.39)
InstitutionShare	-0.089***	0.790**	-1.349***	0.618*
	(-4.00)	(2.47)	(-4.27)	(1.92)
ManagerShare	0.053***	-0.708**	1.595***	-0.550*
	(2.63)	(-2.46)	(5.63)	(-1.89)
Analyst	-0.001	-0.090***	0.017	-0.099***
	(-0.86)	(-3.68)	(0.71)	(-4.02)
Soe	0.024***	-0.121	0.926***	-0.094
	(2.72)	(-0.96)	(7.32)	(-0.74)
Boardsize	-0.032***	0.098	0.797***	0.081
	(-3.17)	(0.69)	(5.65)	(0.57)
Independence	-0.104***	0.570	-3.032***	0.380
	(-3.38)	(1.30)	(-6.95)	(0.86)
ReturnVol		-0.636		-0.436
		(-0.80)		(-0.54)
BondRate		-0.456***		-0.456***
		(-13.41)		(-13.29)
BondTerm		-0.980***		-1.046***
		(-5.97)		(-6.33)
VS ^a	0.914***		0.308	
	(18.45)		(0.44)	
Constant	-0.436***	15.477***	-6.082***	15.797***
	(-4.38)	(9.44)	(-4.31)	(9.57)
Bond Fixed	YES	YES	YES	YES
Year & Month Fixed	YES	YES	YES	YES
Observations	5839 ^b	5839	5839	5839
R-Squared	0.133	0.219	0.094	0.207
F-value	7.805	13.62	5.282	12.70

* Represents a significance level of 10%.

** Represents a significance level of 5%.

*** Represents a significance level of 1%.

^a VS measures performance volatility, measured by the standard deviation of ROA in the current year and the previous four years.

^b The sample value here is 5839, which is lower than the sample value of 5845 in column 3 of Table 4, due to the calculation of the VS missing value.

dRate), the lower the credit spread. The Sobel Z value, calculated with the Mediation Effect model, is 5.057, the p value is zero, and the margin trading position is significantly negative at the 1% level, indicating that credit rating is another intermediary. Table 7 shows that companies with margin trading have lower asset-debt ratios and higher credit ratings. This kind of optimistic information is passed on to the bond market and reduces the bond yield spreads, supporting the argument that margin trading transmits a company's optimistic information to the bond market and thus reduces the bond yield spread.

6.2. Path through which short selling affects the yield spread of bonds

Short selling of securities increases the information contained in stock price and thus reduces the motivation for earnings management (Fang et al., 2016; Chen and Liu, 2014a). This restriction on the opportunistic behavior of executives may reduce the information asymmetry between bond investors and firms, and thus reduce the bond yield spreads. Table 8 presents the results of an examination of the mediating effects of earnings managements and the accounting conservatism.

In columns 1 and 3 of Table 8, earnings management (*EM*)⁶ and accounting conservatism (*Conservatism*)⁷ are the respective dependent variables, and short selling (*Short*) is the independent variable. Columns 2 and 4 show the results of regressing earnings management (*EM*), accounting conservatism (*Conservatism*), short selling (*Short*), and yield spread (*Spread*). The results show that the coefficient of short selling is significantly negative at the 10% level, indicating that earnings management is lower in companies associated with short selling. As shown in column 2, the coefficient of *Media* is significantly positive at the 1% level. In other words, *Media* is positively correlated with the credit spread. The Sobel Z value is 1.718, the p value is 0.086, and the short selling position is significantly negative at the 5% level, indicating that earnings management is one of the paths through which short selling decreases bond yield spreads.

As shown in column 3 of Table 8, the coefficient of short selling is significantly positive at the 1% level, indicating that the short selling of the securities improves accounting conservatism. As shown in column 4, the coefficient of *Media* is not significant, indicating that accounting conservatism does not affect the bond yield spread and the short selling of securities does not reduce the bond yield spread by increasing accounting conservatism. This result is not surprising. From the debt contracting perspective, accounting conservatism forces listed companies to report bad news in a timely fashion, which helps creditors to supervise the listed companies and to renegotiate debt contracts; therefore, accounting conservatism may reduce the bond yield spread. However, from the contractual cost of bond contracting perspective, the existence of transaction costs increases the costs of forming bond contracts. Even if accounting conservatism ensures that bad news is reported in a timely fashion, the cost for bond investors in the public market to renegotiate the bond contract is higher (Bharath et al., 2008). Therefore, higher accounting conservatism may increase the cost of contracts, making bond investors more dependent on bond prices and requiring higher bond yield spreads. In this case, accounting conservatism may increase bond yield spreads (Li, 2013; Liu and Magnan, 2016).

This study finds that short selling can reduce the yield spreads of bonds. However, Kecskés et al. (2013) pointed out that short selling of securities conveys bad news, resulting in higher yield spreads. The explanation for this inconsistency may lie in the poor governance environment of listed companies in China and the short selling habits of investors. Listed companies with poor governance, to avoid being stalled by short sellers, tend to improve their level of governance and reduce opportunistic behavior. However, when it comes to making transactions in China's securities, institutional investors are only involved in a limited way, and individual investors' understanding of short selling and private information is insufficient for them to understand the bad news about listed companies being transmitted by these transactions.

⁶ *EM* is the absolute value of earnings management as calculated by the Jones model (Jones, 1991).

⁷ Conservatism is measured as in Khan and Watts (2009).

7. Conclusions

This study examines the impact of margin trading and short selling on bond yield spreads using corporate bonds data from the 2008–2015 period. The results show that (1) margin trading and short selling of stocks have significantly reduced the yield spreads of bonds; (2) companies involved in margin trading have lower asset-debt ratios and higher credit ratings than those that are not, which also reduces the yield spreads; and (3) the effect of short selling reduces bond yield spreads indirectly by reducing earnings management. Previous studies of the economic consequences of margin trading and short selling focused on the stock market and corporate governance. This study explores the possible impact of margin trading and short selling on the bond market through the spillover effect of stock market information. It concludes that the margin trading and short selling of securities is a “carnival” both for the stock market and the bond market, proving that stock market information can spill over into the bond market through margin trading and short selling and have widespread effects. These results will be useful for regulators and policy advisors.

Acknowledgements

We acknowledge financial support from the National Science Foundation of China (Project No. 71602148), the MOE (Ministry of Education, China) Project of Humanities and Social Sciences (Project No. 16YJC630065), and the Fundamental Research Funds for the Central Universities (Project No. 531107051035).

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