The effect of the evergrande bankruptcy on Chinese real estate listed firms

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ABSTRACT

The objective of the study is to examine the intra-industry effects of Evergrande's bankruptcy on the Chinese real estate listed firms. Based on an event study, we evidence a negative and statistically significant stock price reaction to Evergrande's bankruptcy announcement. These results are consistent with the contagion effect. We also find the highest negative impact on real estate firms with greater leverage and a higher similarity in cash flows with the bankrupt firm. Finally, the magnitude of the stock market reaction to Evergrande's bankruptcy is reinforced or mitigated by firm-specific determinants such as size and liquidity.

1. Introduction

The real estate industry has been a crucial part of the Chinese economy, contributing to nearly 25–30 % of the GDP, which is a higher proportion than in other countries (Chu et al., 2023). The liquidation of China Evergrande on January 29, 2024, was ordered by a Hong Kong court, a real estate firm with the highest debt in the world, following a failed effort to restructure $300 billion (a debt equivalent to 2 % of China's GDP) owed to bondholders and banks, with the firm being at the centre of an unparalleled liquidity crisis in China's real estate industry (e.g., Ahmed, Banerjee, James & Moussa, 2024; Chu et al., 2023).

According to the financial literature, a bankruptcy announcement should provide information about the bankrupt firm situation but also the entire industry (e.g., Lang and Stulz, 1992; Ferris et al., 1997). Thus, when new information is exposed, it impacts the stock prices of the bankrupt firm and may also affect the stock market value of its competitors.

This study analyses the intra-industry information transfers on the Chinese real estate industry around Evergrande's bankruptcy announcement date. Previous studies reveal that two effects can be induced – a contagion effect, which is the spread of negative news from one firm to others in the same industry, and a competitive effect, which is the impact of bankruptcy on the competitive dynamics of the industry – both of which are extensively described in the following section of this study. Most of these studies show a dominance of contagion effect after a

bankruptcy announcement.

Our research makes several contributions to the existing literature. First, we investigate the intra-industry impact of the world's most indebted real estate firm bankruptcy announcement. Given the size of the bankruptcy, the effects on the real estate market may differ from those observed previously due to the negative effects on the industry (contagion effects) and the panic generated. Second, despite the existence of a significant research stream relatively to the impact of bankruptcies in intra-industry competitors, to the best of our knowledge, this is the first study for an emerging country. The conclusions obtained could be different from most studies carried out in the US, since the capital market in China is still relatively opaque, and it is subject to critics about its underdeveloped investor protection system and information environment (e.g., Allen et al., 2005), exacerbating investor concerns about risk (Chu et al., 2023). Third, our study could contribute to the academic discussion by examining whether bankruptcy announcements have the same signal for investors under different political regimes. The hybrid economy regime of the Chinese economy, based on the combination of market mechanisms with comprehensive state planning and government intervention, brings risks to the real estate industry not seen in other countries, leading to overinvestment and overleverage in the real estate industry of China (e.g., Xiong, 2023). In our opinion, this context justifies the relevance of carrying out this study. Finally, the study differs from the previous by extending the firm-specific attributes considered by the market. We examine the effect

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of size, liquidity, profitability, and ownership (state-owned and institutional ownership) on Chinese real estate abnormal returns. Lastly, we extend the analysis to the effect of real estate cash flow similarity with Evergrande. As emphasized by Lang and Stulz (1992), the contagion effect is expected to be larger for competitors with investments/cash flows similar to those of the bankrupt firm.

Based on an event study methodology for 198 Chinese listed firms from real estate industry, we find a negative and statistically significant stock price response to the Evergrande's firm bankruptcy announcement. This negative effect is significantly larger for highly leveraged real estate firms and real estate firms with highly correlated stock returns with the Evergrande firm. Previous empirical studies have revealed that a negative contagion effect tends to prevail in industries where financial leverage is high, as in the case of the real estate industry in China. This is because a higher level of industry financial leverage negatively impacts the competitor firm's ability to take advantage of the vulnerable position of the bankrupt firm within the industry. Finally, we observe that the stock market's response to Evergrande's bankruptcy is positively or negatively influenced by other firm-specific determinants, such as size and liquidity.

This paper is organized in 5 sections. The next section reviews the most important literature related to the topic. Then, the testable research hypotheses are presented. Section 4 explains the data and the event study methodology. The following section shows the results and discusses our main findings. This ends with the conclusion.

2. Literature revision

2.1. The Chinese real estate industry

The real estate industry has been one of the central cornerstones of the Chinese economy, accounting for about 25–30 % of the GDP, with 50 % of local government revenue and 60 % of the assets of urban residents (e.g., Chu et al., 2023 and Ouyang and Zhou, 2023). The growth of residential housing is astonishing in China – the average living space per urban resident surged from 7.1 m^2 in 1990 to 41.8 m^2 in 2020, accompanied by a more than tenfold increase in average housing prices (e.g., Chen, Hu, Jin & Zhou, 2024). In 2020, the real estate industry in China was estimated to be twice the size of the US residential housing market.[1]

However, as highlighted by Chen et al. (2024), China has witnessed an increase in unfinished projects, which impact millions of families and impose risks to system-wide financial and social stability. This problem became more acute with the collapse of Evergrande. The collapse of Evergrande had a direct, immediate, and visible impact on a huge number of Chinese homeowners who bought property through pre-sales, a very common situation for families in that country (e.g., Chen et al., 2024). Lu and Keller (2022) refer that the collapse of Evergrande left 800 projects unfinished, with an impact on 1.6 million families who invested their savings in these projects. Furthermore, the legal system in Mainland China is still under development, leading to inadequate protection for homebuyers in the event of unfinished projects (e.g., Chen et al., 2024). According to the authors, homebuyers are still obligated to pay for the entire mortgage amount, even if a project turns out to be unfinished.

Even more seriously, in 2020, 14 of China's 30 largest real estate firms violated at least one of the "three red lines" - ratio of liabilities to assets; net debt to equity; and cash to short-term borrowings (e.g., Chu et al., 2023), introduced by the Chinese authorities to constrain property developers' debt.[2] A recent empirical study by Altman et al. (2022) show the existence of a high default risk among large real estate firms in

China. The authors found that large real estate firms represent more than 50 % of the group with a high probability of default in terms of number and more than 90 % in terms of total assets or total liabilities. To worsen the situation, Chinese authorities have suspended these debt financial restrictions on developers to prevent the housing downturn and, with that, a decrease in economic growth.

For a complete understanding of the problem in China, it is crucial to acknowledge the challenges confronting the real estate industry within its unique hybrid economy, which seamlessly blends market mechanisms with comprehensive state planning and government intervention (e.g., Xiong, 2023). As highlighted by the author, the real estate sector plays a central role in financing local governments, enabling them to obtain funds to stimulate economic growth. The structure of Chinese economy may result in excessive investment and borrowing in its real estate industry for two reasons (e.g., Cincinelli et al., 2022; Xiong et al., 2023): (i) real estate sales are an important source of fiscal funding for local governments; (ii) local governments are encouraged by the central government to boost local economies, which can lead local governments to excessive investment in infrastructure and spending on projects required by the central government.

Banks play a central role in financing the real estate industry. This sector represents approximately 25 % of the assets held by banks in China, with roughly half of this amount linked to local governments (Liu and Xiong, 2020). Banks have significant exposure to the real estate industry, making this industry systematically important. Thus, if a crash in real estate market could lead to significant bank losses and possibly spark a crisis in banks. This has led to the perception that the real estate industry is "too important to fail" (e.g., Xiong, 2023). As a result, pressure on central and local governments increases to provide implicit and explicit guarantees to support the real estate industry and prevent a potential crash. However, these guarantees may generate moral hazard and distortions in the state intervention and in the market, leading to overinvestment and excessive borrowing in the real estate industry (Xiong, 2023).

The real estate industry's importance and the Chinese economy's hybrid nature are the guarantee for some authors (for example, Prasad, 2023; Xiong, 2023) that a Western-style debt crisis is unlikely. Based on the seminal works of Diamond and Dybvig (1983) and Bernanke (2018), in market economies, coordination failure is one of the main causes of the financial crisis, which, given the hybrid structure of this economy, tends not to occur in China. The recent Evergrande crisis demonstrated the government's ability to prevent financial turmoil by requiring actions from the local governments and using state-owned banks and firms for a controlled partial bailout to address Evergrande's situation (e.g., Xiong, 2023).

2.2. Intra-industry effects of Evergrande's bankruptcy

Lang and Stulz's (1992) study examines how the industry reacts to a firm's announcement of bankruptcy. According to the authors, the announcement of bankruptcy by one firm can impact not only the firm itself but also the entire industry and may affect the market value of its industry competitors either positively or negatively. Lang and Stulz (1992) evidence two intra-industry effects of a firm's announcement of bankruptcy that need to be distinguished: (i) a contagion effect; (ii) a competitive effect.

Lang and Stulz (1992) explained the contagion effect as an effect that all firms with similar cash flow characteristics to those of the bankrupt firm should experience. The announcement of bankruptcy delivers negative news for these firms, as the value of their investments is highly linked to the value of the bankrupt firm's investment. It is assumed that firms with similar cash flow characteristics or those that imitate actions are believed to experience a stronger contagion effect than other firms. Corporate bankruptcy diminishes the financial wealth of the bankrupt firm's stakeholders and undermines investor and creditor confidence in the remaining industry competitors. This leads to an increased cost of

external debt finance due to decreased collateral values for other firms in the same industry (e.g., Jorion and Zhang, 2007; Benmelech and Bergman, 2011; Hertzel and Officer, 2012). Lang and Stulz (1992) also mention that it is important to bear in mind that when customers have limited information about the firms from the industry, they may reassess their opinions about the creditworthiness of all firms in that industry. Consequently, these firms could see a decrease in demand and may need to promote their creditworthiness.

Then, the competitive effect occurs when wealth is redistributed within the industry of the bankrupt firm. If these firm faces a sudden decrease in demand due to lower production efficiency or reduced attractiveness of their products compared to their competitors, this is viewed as positive news for the other firms in the industry. Thus, it represents opportunities for rival firms to take advantage of the situation through predatory actions, which could increase demand for those firms (Bolton and Scharfstein, 1990; Lang and Stulz, 1992).

Hence, since a bankruptcy announcement's overall effect on competitors results from the competitive effect and the contagion effect (Lang and Stulz, 1992), the general impact of the industry depends on the prevailing effect.

According to Lang and Stulz (1992), non-announcing firms in high-leverage and competitive industries face negative impacts from bankruptcy announcements. This effect is also observed in industries where the performance of the announcing firm and its competitors are closed connected. Note also that the impact of the competitive effect from the bankruptcy announcement is more relevant in highly concentrated industries with low competition and low leverage. Other studies provide empirical evidence that supports the prevalence of the contagion effect, like in the studies of Ferris et al. (1997), Akhigbe et al. (2005), Hunsader et al. (2013), and Helwege and Zhang (2016). Still, there are exceptions to this main conclusion, while Haensly et al. (2001) did not find any evidence of contagion effect nor competitive effect, and Krzeczewska and Pastusiak (2022) highlight the competitive effect through a positive impact on the valuation of industry competitors in the short-term.

2.3. Cross-sectional analysis of Evergrande's bankruptcy stock market impact

We are studying the relationship between the observed real estate firm's abnormal performance around Evergrande's bankruptcy announcement, and the firm-specific characteristics identified in the literature. These attributes encompass size, leverage, liquidity, profitability, institutional ownership, the similarity of cash flows (correlation of returns between the Evergrande and the competitors), and a dummy for state-controlled real estate firms.

Leverage is one of the firm-specific attributes used to explain abnormal returns (e.g., Lang and Stulz, 1992). In this sense, if Evergrande's bankruptcy results in negative industry information and wealth redistribution, the percentage decline in the market value of non-bankrupt firms increases with their leverage, *ceteris paribus*, for two reasons. On the one hand, the equity market value is more sensitive to changes in the total firm value when financial leverage is higher. On the other hand, there is a greater likelihood of a company going bankrupt as a result of the increased current value of its direct bankruptcy costs leading to a decrease in the firm's value. Stulz (1990) highlights that greater financial leverage reduces the ability of firms to invest in profitable projects and capitalize on changes their competitive position within an industry. However, if the competitive effect overcomes the contagion effect, leverage tends to have an unclear impact on the value of real estate firms (Lang and Stulz, 1992). These authors also argue that, in this context, the firms may amplify the benefits to owners from a change in firm value but might be less capable of benefiting from the competitive effect.

The similarity of cash flows between the bankrupt firm and competitors is another factor that tends to affect the returns of Chinese real

estate firms when Evergrande goes bankrupt. According to Lang and Stulz (1992), competitors with similar investments to the bankrupt firm are likely to experience a greater contagion effect. These authors measure the similarity by using the correlation of returns between the bankrupt firms and their competitors, and they conclude that competitors with highly correlated returns to the bankrupt firm experience significantly lower abnormal returns compared to other industry competitors.

Firm size is another firm-specific attribute used as a control variable. Financial literature evidence that firm size impacts its market power advantage, economies of scale, and financial performance. According to Titman and Wessels (1988), companies with greater size are better at diversifying their businesses and face a lower risk of bankruptcy. Firms of larger size have more resources and can raise funds more easily, leading to a positive market valuation from investors. However, Ferris et al. (1997) find evidence of contagion effect not only for large firms but also for small firms.

Financial distress may decrease in firms with higher liquidity (Myers, 1977) since liquidity can act as a precautionary buffer against unexpected negative developments (Almeida et al., 2004; Bates et al., 2009). In general, firms with adequate liquidity can meet their day-to-day cash flow obligations, and there is a greater need for cash flow when bankruptcies occur in an industry. As explained before, corporate bankruptcies could erode investor and creditor confidence in surviving industry competitors, potentially increasing their external costs (e.g., Jorion and Zhang, 2007; Benmelech and Bergman, 2011; Hertzel and Officer, 2012).

The firm performance is also important, and investors choose firms with higher performance as this is an indicator of management efficiency (Kang and Stulz, 1997). According to this perspective, we expect that the contagion effect caused by Evergrande's bankruptcy will be greater for real estate firms with lower profitability.

As La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2002) and Boehmer and Kelley (2009), we incorporate a variable associated with institutional ownership in the cross-sectional analysis. Both studies suggest that institutional investors are usually more informed compared to other market participants, and their priority lies in maximizing value. Since institutional investors are focused on profitability, they prioritize investments that offer strong potential for returns, and it is expected that Evergrande's bankruptcy will affect the optimal investment portfolio strategy (Liu et al., 2003). Evergrande's debt exceeds USD 300 billion, which is equivalent to 2 % of China's GDP (e.g., Ahmed et al., 2024). Institutional investors are likely to view this bankruptcy as a high-risk event, leading them to react negatively by reducing their investment in Chinese firms from the real estate industry and changing their investments to less risky industries. In addition, the Chinese capital market is often criticized for its lack of investor protection system, information environment, and transparency (e.g., Allen et al., 2005), which exacerbates investor's concerns about risk (Chu et al., 2023).

Finally, we add a dummy variable for real estate state-owned enterprises (SOEs) in the cross-section regression. These state-owned enterprises are shown to have lower performance than non-SOE in China (e.g., Allen et al., 2005), which justified with their lower production efficiency. As explained by Shleifer and Vishny (1986) and Shleifer (1998), the political interference often harms corporate profitability, as politicians intentionally redirect resources to their supporters. For these reasons, we expect a highest negative effect on the returns of state-controlled real estate firms due to Evergrande's bankruptcy.

3. Research hypotheses

This event study aims to examine whether the Evergrande bankruptcy announcement affects the stock market returns of its industry competitors. Based on the literature review we conducted, we are assuming that it does. Therefore, the research hypothesis follows the previous ideas:

[H1]. The Evergrande bankruptcy announcement affects the short-term stock market returns of its industry competitors, such as Chinese real estate listed firms.

Furthermore, the contagion effect is expected to predominate, given the high financial leverage of Chinese listed firms from the real estate industry that, according to Lang and Stulz (1992), adversely affects the capacity of competitor firms to take advantage of the downfall of Evergrande within the real estate industry. Hence, since the Evergrande's bankruptcy may be perceived by the market as bad news for all Chinese real estate firms due to their high financial leverage, the second hypothesis is as follows:

[H2]. The Evergrande bankruptcy announcement caused a predominant contagion effect in the Chinese real estate industry.

Lang and Stulz's (1992) study finds that the contagion effect is likely to be positively correlated with the similarity within the industry. Hence, in empirical terms, the contagion effect is likely to be greater in companies with high levels of debt and similar cash flows. We extend the analysis to other firm-specific attributes, namely: size, liquidity, profitability, and ownership (state-owned and institutional ownership). Thus, our last research hypothesis is the following:

[H3]. Abnormal returns around Evergrande's bankruptcy announcement vary across Chinese real estate firms and are determined by firm-specific attributes.

4. Data selection and event study methodology

4.1. Data

This study uses the date on which the court in Hong Kong decided the liquidation of Evergrande (January 29th, 2024) as the event date to calculate abnormal returns (ARs). In order to maximize forecast accuracy as much as possible, we have chosen a forecast period of 120 days before the event date. Chinese real estate stock returns and the SZSE100 index (market return benchmark) were obtained from Eikon Refinitiv. About the selection of Chinese firms from the real estate industry on the stock market, we selected all listed firms with available data, in a total of 198 firms.

The multivariate cross-sectional analysis uses seven firm-specific variables: liquidity, size, leverage, profitability, institutional ownership, similarity of cash flows and a dummy that identifies the state-owned firms. The firm-specific variables (except for the similarity of cash flows variable) are calculated from the previous year-end accounting available and were collected from Refinitiv Eikon database. Panel 2 of Table 1 provides the descriptive statistics of control variables. The correlation matrix is shown in Table 2.

4.2. Event study methodology

We use the event study methodology, which has been the standard method for measuring the reaction of share price reaction to certain announcements or events since it was introduced by Fama, Fisher, Jensen, and Roll (1969). Several studies have been using event studies mainly for two major reasons: (*i*) to test the stock market efficiency and (*ii*) to examine the impact of some events on stock markets. Thus, we decided to use this methodology to study the impact of Evergrande's bankruptcy announcement on the Chinese listed firms from the real estate industry.

The magnitude of the stock price reaction to Evergrande's bankruptcy announcement is measured by the standard abnormal returns' technique through the market model.[3] The normal rate of return is calculated as follows:

$$E(R_{it}) = \hat{a}_i + \hat{b}_i R_{mt} \tag{1}$$

where, $E(R_{it})$ is the expected return rate of the real estate firm i on the trading day t; R_{mt} is the total return of SZSE100 index; a_i and b_i are the regression coefficients of the daily return rate of the real estate firm i and the market return rate, respectively.

We use the date of Evergrande's bankruptcy announcement (January 29th, 2024) as the event date to compute abnormal returns (ARs). These returns are calculated by subtracting the observed returns of real estate firm i on day t from the expected return produced by the market model, using the following:

$$AR_{it} = R_{it} - E(R_{it}) \tag{2}$$

The date of Evergrande's bankruptcy announcement is designated as day $t=0$. Daily returns are collected for the period ($t=-140$ to 5). The estimation period and the event period were defined respectively as $[-140, -21]$ and $[-1, 5]$. By cumulating the abnormal returns (CARs) over a specific time interval, we can calculate the cumulative abnormal returns (CARs) as follows:

$$CAR[t_1, t_2] = \sum_{t_1}^{t_2} AR_t \tag{3}$$

In analysing the impact of Evergrande's bankruptcy announcement on the Chinese listed firms from the real estate industry, three different time intervals for the CARs were considered: [0;2]; [−1,5] and [−5;+5]. Panel 1 of Table 1 shows the descriptive statistics for CARs.

We perform parametric tests and non-parametric tests to measure the statistical significance of average ARs. Thus, we use the Brown and Warner (1980, 1985) parametric test statistic without crude dependence adjustment, and the sign test for the non-parametric test statistic is. Serra (2004) explains in more detail these tests.

4.3. Cross-Sectional Analysis

We use Ordinary Least Squares (OLS) to analyse how firm-specific characteristics impact the variation of abnormal returns across different companies, and we follow the specification model below:

$$CAR_i = \beta_0 + \beta_1 \ln(SIZE_i) + \beta_2 LEV_i + \beta_3 LIQ_i + \beta_4 ROA_i + \beta_5 INST_i \\ + \beta_6 CORR_i + \beta_7 SOE_i + \varepsilon_i \tag{4}$$

where, CAR_i are the cumulative abnormal returns for real estate firm i; $SIZE_i$ is the (natural logarithm of) market capitalization in USD for real estate firm i; LEV_i is the ratio of debt to total assets (%) for real estate firm i; LIQ_i is the ratio of liquid assets to total assets (%) for real estate firm i; ROA_i is the return on assets (%) for real estate firm i; $INST_i$ is the percentage of stock held by institutional investors (%) for real estate firm i; $CORR_i$ is the correlation between the real estate firm i return and the Evergrande return for the year preceding the bankruptcy announcement (proxy of similarity of cash flows); SOE_i is a dummy variable that takes the value 1 for state-owned real estate firms, and 0 otherwise; ε_i is an i.i.d. error term. The motivation for the use of these control variables is explained in Section 2.3, as well as their expected effect on the stock market.

5. Results

5.1. Abnormal return

Panel 1 of Table 1 shows the cumulative abnormal returns (CARs) for the Chinese real estate listed firms around Evergrande's firm bankruptcy (January 29th, 2024). The results show a negative and statistically significant stock price reaction to the announcement of Evergrande's bankruptcy for the three-time intervals. A CAR of −2.75 % for the [0;2] time window, −4.80 % for the [−1;5] time window and −3.81 % for the

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[3] MacKinlay (1997) and Serra (2004) explain in more detail.

Table 1
Descriptive Statistics of CARs and Variables and Abnormal Returns Tests.

Variable	Mean	SD	25th perc.	Median	75th perc.	θ_1	τ_1
Panel 1: All Sample							
CAR [0,2]	−2.75 %	8.81 %	−5.52 %	−0.21 %	−0.02 %	−2.026**	−1.998**
CAR [−1,5]	−4.80 %	15.42 %	−9.66 %	−0.28 %	−0.04 %	−2.359**	−2.874***
CAR [−5,5]	−3.81 %	14.25 %	−8.97 %	−0.55 %	−0.14 %	−2.211**	−2.345**
Panel 2: Control Variables – All Sample							
SIZE	$1063 ml	$2292 ml	$157 ml	$450 ml	$970 ml		
LEV	62.2 %	23.4 %	44.1 %	68.8 %	78.9 %		
LIQ	17.8 %	18.3 %	5.2 %	11.1 %	22.4 %		
ROA	1.6 %	8.5 %	−1.6 %	2.1 %	4.7 %		
INST	5.0 %	8.4 %	0.4 %	2.1 %	6.8 %		
CORR	−52.8 %	48.5 %	−88.5 %	−75.7 %	28.4 %		
SOE	19.2 %	39.5 %	0.0 %	0.0 %	0.0 %		

This table presents descriptive statistics of CARs and control variables and the results of abnormal returns tests. All figures of firm-specific control variables are calculated from the previous year-end accounting figures. $SIZE_i$ is the market capitalization in USD (natural logarithm) for real estate firm i; LEV_i is the ratio of debt to total assets (%) for real estate firm i; LIQ_i is the ratio of liquid assets to total assets (%) for real estate firm i; ROA_i is the ratio of operating income to total average assets (%) for real estate firm i; $INST_i$ is the percentage of stock that are in possession of institutional investors (%) for real estate firm i; $CORR_i$ is the correlation between the real estate firm i return and the Evergrande return for the year preceding the bankruptcy announcement (proxy of similarity of cash flows); SOE_i is a dummy variable that takes the value 1 for state-owned real estate firms, and 0 otherwise. θ_1 and τ_1 are the t-test statistics and z-statistic for the sign test, respectively of Brown and Warner (1980, 1985) (see Serra, 2004, for more details). *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % level, respectively.

[−5;+5] time window. The parametric test and the non-parametric test both show that there is a statistical significance of at least 5 % for these three-time intervals. Based on these results we are able to confirm the first research hypothesis, that the Evergrande bankruptcy announcement affects the short-term stock market returns of its industry competitors.

Furthermore, the results reveal the predominance of the contagion effect. Accordingly, bankruptcy might cause competitors' stock prices to drop due to the revelation of negative industry details – adverse information – affecting asset values and future prospects. Following the Lang and Stulz (1992) study, the sample in Table 3 was split into two subsamples based on Chinese real estate leverage and similarity of cash flows (above and below the sample medians). The findings indicate that there are negative and statistically significant abnormal returns for the two subsamples of real estate firms. However, it is possible to observe that the negative effects on CARs are significantly larger for highly leveraged real estate firms and real estate firms with highly correlated stock returns with the Evergrande firm (higher similarity of cash flows). The results of the two-sample t-test indicate that there are statistically significant differences between the two subsamples of real estate firms when it comes to leverage and similarity of cash flows for the two event windows.

These results align with previous empirical studies that revealed that the negative contagion effect tends to prevail in industries where

Table 2
Correlation matrix.

	SIZE	LEV	LIQ	ROA	INST	CORR	SOE
SIZE	1	−0.30	0.12	0.20	0.29	0.23	0.45
LEV		1	−0.51	−0.42	0.10	−0.15	0.34
LIQ			1	0.29	0.18	−0.14	−0.24
ROA				1	0.13	0.10	0.09
INST					1	−0.18	0.05
CORR						1	−0.02
SOE							1

This table presents the correlation matrix between all dependent variables. The variables are the following: $SIZE_i$ is the market capitalization in USD (natural logarithm) for real estate firm i; LEV_i is the ratio of debt to total assets (%) for real estate firm i; LIQ_i is the ratio of liquid assets to total assets (%) for real estate firm i; ROA_i is the ratio of operating income to total average assets (%) for real estate firm i; $INST_i$ is the percentage of stock that are in possession of institutional investors (%) for real estate firm i; $CORR_i$ is the correlation between the real estate firm i return and the Evergrande return for the year preceding the bankruptcy announcement (proxy of similarity of cash flows); SOE_i is a dummy variable that takes the value 1 for state-owned real estate firms, and 0 otherwise.

Table 3
Chinese Real Estate Firm's CAARs by Leverage and Similarity of Cash Flows and Difference Test for CAARs.

			[0;2]	[−1;5]	[−5;+5]
Panel 1: Leverage					
	# Firms				
Above the Sample Median	99	CAAR	−3.299 %	−5.398 %	4.897 %
		θ_1	−2.297**	−2.750***	−2.698***
		τ_1	−2.259**	−2.768***	−2.705***
Below the Sample Median	99	CAAR	−1.999 %	−3.872 %	−3.345 %
		θ_1	−1.971**	−2.287**	−2.105**
		τ_1	−1.903*	−2.139**	−2.087**
Difference		CAAR	−1.300 %	−1.526 %	−1.552 %
		t-test (p-value)	−2.034**	−2.088**	−2.097**
Panel 2: Similarity of Cash Flows					
	# Firms				
Above the Sample Median	99	CAAR	−3.522 %	−6.160 %	−5.765 %
		θ_1	−2.234**	−2.934***	−2.788***
		τ_1	−2.171**	−2.895***	−2.721***
Below the Sample Median	99	CAAR	−1.806 %	−3.161 %	−3.001 %
		θ_1	−1.947*	−2.269**	−2.088**
		τ_1	−1.831*	−2.373**	−2.075**
Difference		CAAR	−1.716 %	−2.999 %	−2.764 %
		t-test (p-value)	−2.244**	−2.721***	−2.693***

This table presents the Chinese real estate cumulative average abnormal returns (CAARs) and the differences in the CAARs for two subsamples of real estate firms: (i) a leverage above/below the sample median (Panel 1) and (ii) a correlation between the real estate firm i return and the Evergrande return for the year preceding the bankruptcy announcement (proxy of similarity of cash flows), above/below the sample median (Panel 2), for three different time windows [0;+2]; [−1;+5] and [−5;+5] around the Evergrande's bankruptcy. The CAARs were estimated using the market model (MM) and daily returns. θ_1 and τ_1 are the t-test statistics and z-statistic for the sign test, respectively of Brown and Warner (1980, 1985) (see Serra, 2004, for more details). The significance of the differences in CAARs is determined via two-sample t-test. *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % level, respectively.

financial leverage is high, such as the Chinese real estate industry. This is because higher industry leverage negatively impacts the rival firm's ability to take advantage of the bankrupt firm's vulnerable position within the industry.

5.2. Cross-sectional analysis

Table 4 displays the results of the regression estimation explaining cumulative abnormal returns (CAR [0;2]; CAR [−1,5] and CAR [−5;5]) with a set of firm-specific variables, following the empirical specification in (5).

The variable *SIZE* shows a negative and statistically significant coefficient for the three-time intervals. In our opinion, the existence of a highest negative impact on CARs for larger Chinese real estate firms can be explained by the hybrid nature of the Chinese economy, in which large firms, some owned by the government, are impelled to take high risks that lead to overinvestments and overleverage (e.g., Xiong, 2023), which tend to have an impact on the value of these firms. A recent empirical study by Altman et al. (2022) show the existence of a high default risk among large Chinese real estate firms. Lastly, Akhigbe et al. (2005) show that large and key competitors are adversely affected by bankruptcy events, which may be attributed to scrutiny of rivals that are perceived to be facing similar problems.

The results show that liquidity (*LIQ*) and leverage (*LEV*) variables significantly affect real estate abnormal returns around the Evergrande's firm bankruptcy. As mentioned before, the Evergrande bankruptcy not only reduces the financial wealth of its stakeholders but also weakens the confidence of investors and creditors in the remaining industry competitors. This leads to higher costs for borrowing due to a decrease in the collateral values for other firms in the same industry (e.g., Jorion and Zhang, 2007; Benmelech and Bergman, 2011; Hertzel and Officer, 2012). Therefore, the Chinese real estate firms with lack of liquidity (low cash) and refinancing risks (high leverage), may have greater difficulties in accessing credit to finance new investment projects. In this way, the real estate firms with higher leverage and lower liquidity have a highest negative CARs, as a result of the Evergrande's bankruptcy announcement.

As for the variable that measures the similarity of cash flows (*CORR*), it is possible to observe the existence of a negative and statistically significant coefficient. This means that real estate firms that have a greater correlation of returns with the Evergrande firm, that is, they have a greater similarity in terms of cash flows, had a greater negative impact, in line with what was found by Lang and Stulz (1992).

Finally, we did not find statistical significance for the control variables institutional ownership (*INT*), profitability (*ROA*) and state-owned dummy (*SOE*). As for the *INST* variable, the lack of statistical significance can be explained by the benefit of diversification. As explained by Akhigbe : 50) et al. (2005) "*a single bankruptcy, even the world's largest bankruptcy, should have no impact on well-diversified shareholders*". Regarding the *SOE* dummy two effects with opposite signs tend to explain the lack of statistical significance. On the one hand, the financial literature suggests that SOEs firms may have lower economic performance than non-SOEs due to lower production efficiency (e.g., Allen et al., 2005) and transference of resources to their supporters (e.g., Shleifer and Vishny, 1986; Shleifer, 1998). On the other hand, in a hybrid economy, the real estate industry is seen as "too important to fail", leading the government to create implicit and explicit guarantees to protect these firms from the risk of bankruptcy (e.g., Xiong, 2023).

5.3. Additional analysis

We calculated the abnormal returns for Chinese real estate firms around the announcement of Evergrande's liquidation by the Hong Kong court. However, Evergrande's financial problems have been in the news since August 19th, 2021, after the Central Bank and Financial Authorities warned Evergrande due to its high debt.[4] On at least two

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[4] https://english.elpais.com/economy-and-business/2024–01-30/evergrande-a-timeline-of-the-great-chinese-brick-empires-downfall.html#

other dates, relevant information about Evergrande was announced to the stock market, before its collapse in January 2024. On September 29th, 2021, Evergrande default on interest payments on two bonds contracted abroad and on August 17th, 2023, Evergrande's bankruptcy is announced in the US.

Given the relevance of the information provided to the stock market regarding Evergrande on these three additional dates, in this subsection we examine the impact of these announcements on the abnormal returns of Chinese real estate firms. Table 5 reveals the existence of negative and statistically significant abnormal returns around the Evergrande bankruptcy in the US and around the default on interest payments on bond loans. However, regarding the warning to Evergrande due to its high debt by the Central Bank and Financial Authorities, the results reveal an absence of statistically significant abnormal returns. Therefore, the announcement of Evergrande liquidation by the Hong Kong court is not a completely unexpected event for the stock market, and its impact may already have been partially incorporated into real estate share prices. The lack of total surprise of bankruptcy announcements to the market is used as an argument by Ferris et al. (1997) to explain the failure to detect a competitive effect in their analysis.

6. Conclusions

This work analyses the short-term stock market impact of real estate Chinese listed firms to Evergrande's firm bankruptcy, the world's largest bankruptcy. According to the financial literature, bankruptcy announcements tend not only to affect the market value of the bankrupt firm but also other firms, such as industry competitors.

Previous studies on the impact of bankruptcy announcements focused essentially on the US. Therefore, it seems that there is a research gap regarding the financial impacts of bankruptcy announcements in other markets than the US, namely in emerging markets. Due to its importance in Asia, the results obtained for the Chinese stock market may be interesting from an international perspective and provide a deep understanding of the mechanisms behind the impact of a bankruptcy announcement on a hybrid economy and an opaque capital market with weak investor protection.

Using an event study, for 198 Chinese real estate listed firms, we evidence a negative and statistically significant intra-industry stock price reaction to the Evergrande's bankruptcy announcement. The decline of stock prices of intra-industry competitors is consistent with the contagion effect, with Evergrande's firm bankruptcy uncovering negative information about industry asset values and future prospects. We also find the highest negative impact on real estate firms with greater leverage and a higher similarity in cash flows with the bankrupt firm. This result is in line with previous empirical studies (e.g., Lang and Stulz, 1992; Ferris et al., 1997), which showed that the contagion effect is stronger in firms with similar cash flows and high leverage. Finally, the cross-sectional analysis shows that the extent of the stock market response to Evergrande's bankruptcy is reinforced or mitigated by other firm-specific characteristics such as size and liquidity.

This study indicates that managers, analysts, and investors should pay attention to news about possible firm bankruptcy in the industry, as these tend to convey useful information with an impact on the market value of other intra-industry competitors. The results also reveal that when scrutinizing other intra-industry competitors, attention should be paid to the level of debt and the degree of similarity of cash flows with the bankrupt firm. Firms with high debt and a high degree of similarity in terms of cash flows tend to suffer a greater loss in market value and are potentially the next candidates to go bankrupt.

Although our study offers valuable insights, it is important to consider its limitations. Thus, since the choice of the announcement dates is crucial in an event study methodology, we use the date (January 29th, 2023) on which a court ordered the China Evergrande liquidation as the event date. Additionally, we analyse three other key dates for the collapse of Evergrande. However, this does not exclude the possibility

Table 4

Cross-Sectional Analysis of CARs for the Chinese Real Estate Firms.

Constant	CAR [0,2]	CAR [0,2]	CAR [−1,5]	CAR [−1,5]	CAR [−5,5]	CAR [−5,5]
	-0.204	-0.181	-0.381	-0.350	-0.220	-0.205
	(0.291)	(0.359)	(0.189)	(0.239)	(0.311)	(0.289)
Ln(SIZE)	−1.046**(0.028)	−0.979**(0.043)	−1.838**(0.028)	−1.722**(0.043)	−1.911**(0.023)	−1.877**(0.039)
LEV	−0.002**(0.012)	−0.002**(0.016)	−0.003***(0.003)	−0.003***(0.004)	−0.002**(0.013)	−0.002**(0.017)
LIQ	0.083**	0.082**	0.146**	0144**	0160**	0151**
	(0.041)	(0.043)	(0.042)	(0.045)	(0.038)	(0.043)
ROA	0.062	0.062	0.108	0.109	0.091	0.095
	(0.457)	(0.454)	(0.455)	(0.452)	(0.533)	(0.501)
INST	−0.003(0.972)	−0.017(0.841)	−0.004(0.975)	−0.029(0.452)	−0.007(1.134)	−0.044(0.898)
SOE	2.039	1.900	3.605	2.029	3.455	2.156
	(0.251)	(0.288)	(0.247)	(0.344)	(0.489)	(0.411)
CORR		−1.002**(0.044)		−1.758**(0.025)		−1.433**(0.043)
# Obs.	198	198	198	198	198	198
Adj. R^2	0.456	0.490	0.445	0.479	0.494	0.511

This table presents the cross-sectional estimates for the Evergrande's bankruptcy on Chinese real estate firm's CARs. The dependent variables are the real estate firm's CARs for three different time windows: [0,2], [−1,5] and [−5;+5]. The firm-specific variables are the following: $SIZE_i$ is the market capitalization in USD (natural logarithm) for real estate firm i; LEV_i is the ratio of debt to total assets (%) for real estate firm i; LIQ_i is the ratio of liquid assets to total assets (%) for real estate firm i; ROA_i is the ratio of operating income to total average assets (%) for real estate firm i; $INST_i$ is the percentage of stock that are in possession of institutional investors (%) for real estate firm i; $CORR_i$ is the correlation between the real estate firm i return and the Evergrande return for the year preceding the bankruptcy announcement (proxy of similarity of cash flows); SOE_i is a dummy variable that takes the value 1 for state-owned real estate firms, and 0 otherwise. *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % level, respectively. *p*-values from variables are used in parentheses. # Obs. denotes the number of observations used in the estimation.

Table 5

Analysis of CARs for Other Key Announcement Dates in the Evergrande Collapse.

Variable	Mean	SD	25th perc.	Median	75th perc.	θ_1	τ_1
Panel 1: Warning from Central Bank and Financial Authorities (August 19th, 2021)							
CAR [0,2]	−1.17 %	4.11 %	−2.89 %	−0.43 %	0.33 %	−1.511	−1.544
CAR [−1,5]	0.17 %	7.42 %	−1.66 %	0.10 %	1.88 %	0.559	0.574
CAR [−5,5]	0.09 %	8.15 %	−2.02 %	0.02 %	1.94 %	0.511	0.545
Panel 2: Default on Interest Payments on Two Bonds Contracted Abroad (September 29th, 2021)							
CAR [0,2]	−1.86 %	4.81 %	−4.89 %	−1.21 %	−0.18 %	−1.806*	−1.798*
CAR [−1,5]	−1.83 %	9.42 %	−5.10 %	−1.28 %	−0.04 %	−1.719*	−1.724*
CAR [−5,5]	−2.41 %	9.25 %	−5.77 %	−1.85 %	−0.57 %	−1.911*	−1.945*
Panel 3: Evergrande Bankruptcy in the U.S. (August 17th, 2023)							
CAR [0,2]	−4.04 %	8.04 %	−8.44 %	−2.65 %	−1.44 %	−2.677***	−2.691***
CAR [−1,5]	−3.51 %	11.44 %	−8.55 %	−2.44 %	−0.98 %	−2.233**	−2.201**
CAR [−5,5]	−7.65 %	12.33 %	−12.44 %	−6.55 %	−4.56 %	−2.811***	−2.845***

This table presents descriptive statistics of CARs and the results of abnormal returns tests for other three key announcements dates in the Evergrande collapse: (*i*) the warning from the Central Bank and Financial Authorities to Evergrande due to its high debt (August 19th, 2021); (*ii*) Evergrande default on interest payments on two bonds contracted abroad (September 29th, 2021); and (*iii*) Evergrande bankruptcy in the U.S. (August 17th, 2023). θ_1 and τ_1 are the *t*-test statistics and *z*-statistic for the sign test, respectively of Brown and Warner (1980, 1985) (see Serra, 2004, for more details). *, ** and *** denote statistical significance at the 10 %, 5 % and 1 % level, respectively.

that there were other important dates with significant effects on Chinese real estate firms, with their share prices incorporating the negative effects caused by Evergrande's bankruptcy. Therefore, the results presented in the study should be read with caution.

Declaration of Competing Interest

The authors confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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