The Impact of Financial Crises on IPO Underpricing in the Chinese Stock Market: A Comparative Analysis of the 2008 Financial Crisis and the COVID-19 Pandemic

Xiaohan Wei[1,a,*]

[1]*Accouting and Finance, University of Edinburgh, Scotland, UK*
a. s2245608@ed.ac.uk
*corresponding author

Abstract: The capacity of enterprises to access finance is intrinsically linked to their long-term sustainability. The efficient allocation of financial resources across society increases the utilization of social assets. Initial public offerings (IPOs) represent a highly effective mechanism for generating capital to support the growth and development of firms. The paper thus examines the impact of financial crises, specifically the 2008 financial crisis and the Covid-19 pandemic, on IPO pricing in the Chinese stock market. In this paper, pre-crisis and post-crisis IPO data are analyzed to identify trends and changes in underpricing. Statistical methods are used to examine the relationship between market conditions, economic indicators and IPO characteristics. The results show that IPO underpricing decreased significantly after the 2008 financial crisis due to increased market caution and regulatory changes, while the COVID-19 pandemic led to an increase in market uncertainty and volatility, which led to an increase in underpricing. These insights are significant for investors, companies planning initial public offerings, and policymakers aiming to stabilize financial markets during economic downturns.

Keywords: IPO Underpricing, 2008 Financial Crisis, COVID-19 Pandemic, Chinese Stock Market.

1.   Introduction

The phenomenon of IPO underpricing refers to the discrepancy between the price of a newly issued stock and its market value. One of the fundamental theories proposed by Rock to explain IPO underpricing is the information asymmetry model [1]. Rock posits that the IPO market is characterised by information asymmetry in the triangular relationship between investors, underwriters, and the issuing firm (which has superior information), with uninformed investors bearing the brunt of overpricing. In order to attract these uninformed investors and compensate them for the "winner's curse," issuers intentionally underprice their IPOs. As an emerging market, China's stock market offers a distinctive research opportunity in terms of its IPO market performance in the context of the global financial crisis. Therefore, the paper aims to compare the IPO pricing phenomenon in the Chinese stock market during the 2008 financial crisis and the COVID-19 pandemic. Additionally, it seeks to explore the impact of the two major crises on IPO underpricing and the mechanisms behind it. To this end, a quantitative analysis methodology is

employed to compare the IPO underpricing phenomenon during the 2008 financial crisis and the COVID-19 pandemic, which is achieved by collecting and analyzing the data of companies that conducted IPOs in the Chinese stock market during these two periods. In this paper, data on initial public offerings (IPOs) from the two periods mentioned above are analyzed to identify patterns of market reaction in the context of the financial crisis. Overall, the results of the study provide policymakers and investors with rich insights into the behavior of financial markets in times of economic turmoil.

2.   Literature Review

The relationship between the financial crisis and stock market dynamics has been demonstrated to have a significant impact on financial activities, including the phenomenon of IPO underpricing.. The 2008 Financial Crisis, one of the most severe since the Great Depression, led to heightened market volatility and the necessity for significant regulatory interventions. Empirical studies, such as that of Liu et al., have shown a significant decrease in IPO underpricing post-crisis, which has been attributed to increased transparency and stricter regulations [2]. Similarly, Tuominen observed that financial crises frequently result in more conservative IPO pricing due to stricter regulations and greater investor scrutiny [3]. These findings are consistent with those of Reinhart and Rogoff, who have highlighted that prolonged economic instability and increased volatility after a crisis affect investor behavior and IPO strategies [4]. During and after the crisis, increased regulation and cautious investor sentiment played a crucial role in reducing IPO underpricing, which underscores the need for policies to stabilize financial markets during economic downturns. Thus, this study has come up with the first hypothesis: The 2008 Financial Crisis led to a significant decrease in IPO underpricing in the Chinese stock market compared to pre-crisis periods (H1_2008).

The 2008 financial crisis and the COVID-19 pandemic present two distinct economic disruptions that affected IPO underpricing. Loughran and Ritter analyzed the impact of market conditions on IPO underpricing over time, noting significant variations during periods of economic instability [5]. Their study showed that increased uncertainty and market volatility during the crisis led to increased underpricing as issuers tried to attract risk-averse investors. The IPO market demonstrated remarkable resilience during the COVID-19 pandemic. Derrien and Kecskés investigated the initial market response to IPOs during the pandemic, finding that the increased uncertainty and volatility resulted in higher underpricing [6]. This response was driven by the need to compensate investors for the heightened risks associated with the uncertain economic environment. Therefore,this study contributed to the formulation of the second hypothesis: The Covid-19 pandemic led to a significant increase in IPO underpricing in the Chinese stock market in comparison to pre-pandemic periods (H2_Covid). Similarly, Shao et al. explored the resilience of IPO markets during the pandemic [7]. Their findings suggested that while the overall number of IPOs declined, the level of underpricing remained high due to increased volatility and investor uncertainty, which underscores the adaptive strategies employed by issuers and underwriters in response to the crisis. The understanding of two different scenarios led to the final hypothesis: The magnitude and nature of IPO underpricing during the COVID-19 pandemic differ significantly from those observed during the 2008 Financial Crisis (H3_Comparison).

3.   Methodology

3.1.   Data Collection

This study uses a sample of 3,796 firms that conducted IPOs on Chinese stock exchanges within two distinct periods: from January 1, 2006 to January 1, 2010, and from January 1, 2017 to January 1, 2023. The initial period was selected to precede the implementation of the policy by the Shanghai

and Shenzhen Stock Exchanges in 2014, which capped the yield on the first day of IPOs at 44%. The firm information and IPO transaction data used are sourced from the China Stock Market & Accounting Research (CSMAR) database. This comprehensive dataset contains detailed financial and transaction information that is essential for analyzing the impact of the financial crisis on IPO underpricing.
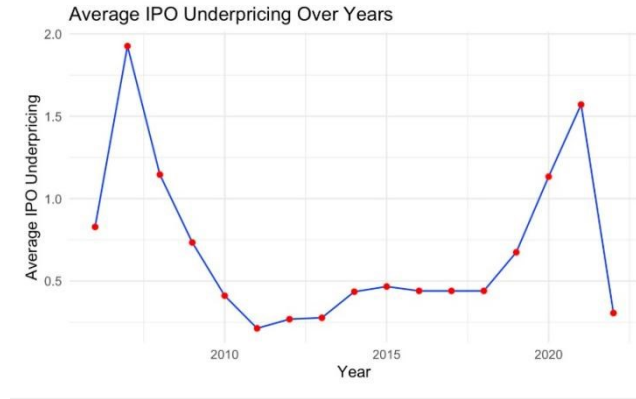

Figure 1: Average IPO Underpricing Trend

Figure 1 illustrates the average underpricing of IPOs over the years, which highlights significant trends and fluctuations over the sample period. The notable spike around 2008 coincided with the global financial crisis, reflecting heightened market volatility and investor uncertainty. The decline after 2010 indicates the stabilizing effect of regulatory changes and market corrections. However, a resurgence in underpricing is observed post-2017, possibly influenced by new market dynamics and economic policies. This trend analysis underscores the importance of temporal context in assessing IPO performance and provides a visual representation of the underlying market conditions during the studied periods. Such insights are crucial for us to understand the complex interplay between regulatory environments, market behavior, and financial crises in shaping IPO outcomes.

3.2. Variable Measurement

The dependent variable in this analysis is IPO underpricing. As mentioned earlier, underpricing refers to the difference between the price initially offered and the closing price on the first day of trading. Therefore, IPO underpricing is commonly measured by the return on the first day of IPO, indicating the extent to which the issue price is undervalued, as shown in the following equation:

$$R = \left[\frac{P(t0)}{P(t1)}\right] - 1 \tag{1}$$

The comprehensive set of variables presented in Table 1 encompasses both market-specific and firm-specific factors that are crucial for the analysis of the impact of financial crises on IPO underpricing. The time indicators for the post-2008 financial crisis and the post-Covid-19 pandemic permit an examination of temporal effects on IPO performance. Other variables, including firm size, ROA, MB ratio, leverage, and turnover, provide insights into the operational and financial characteristics influencing IPO outcomes.

Table 1: Description of Variables

Variable Abbreviation	Variable Definition	Dimension
IPO Underpricing	Market-adjusted IPO underpricing	%
Post2008	Time Indicator of Post-2008 Financial Crisis	(Dummy)
PostCovid	Time indicator of post-COVID-19 Pandemic	(Dummy)
FirmSize	Size of the firm	Million Yuan
ROA	Return on Assets	%
MB Ratio	Market-to-Book Ratio	Ratio
Turnover	Leverage Ratio	Ratio
Leverage	Turnover on the first day of IPO	%

3.3. Research Design

To obtain sophisticated results, this paper employs the Ordinary Least Squares (OLS) model to perform empirical analysis for both hypotheses. Model 1 and Model 2 examine the differences in IPO underpricing between pre-crisis and post-crisis periods.

In Model 1, the focus is on the impact of the 2008 Financial Crisis on IPO underpricing, which is specified as:

$$\text{IPO Underpricing}_i = \alpha + \beta_1 \text{Post2008}_{it} + \beta_2 \text{FirmSize}_{it} + \beta_3 \text{ROA}_{it} + \beta_4 \text{Leverage}_{it} + \beta_5 \text{MB ratio}_{it} + \beta_6 \text{Turnover}_{it} + \varepsilon_{it} \tag{2}$$

In Model 2, the impact of the COVID-19 pandemic on IPO underpricing is examined, which is specified as:

$$\text{IPO Underpricing}_i = \alpha + \beta_1 \text{PostCovid}_{it} + \beta_2 \text{FirmSize}_{it} + \beta_3 \text{ROA}_{it} + \beta_4 \text{Leverage}_{it} + \beta_5 \text{MB ratio}_{it} + \beta_6 \text{Turnover}_t + \varepsilon_{it} \tag{3}$$

4. Results

4.1. Regression Analyses and Results

4.1.1. Regression-Model 1

The regression analysis for Model 1, which investigates the impact of the 2008 Financial Crisis on IPO underpricing, provides several significant insights and directly tests Hypothesis 1 (H1_2008), as shown in Table 2. The dependent variable in this model is IPO underpricing. The coefficient for the post-2008 financial crisis period (PostCrisis2008) is -0.799, indicating a highly significant reduction in IPO underpricing following the 2008 Financial Crisis ($p < 0.01$). This result strongly supports Hypothesis 1 as it shows a notable decrease in the extent to which IPOs were underpriced. Firm Size is negatively correlated with IPO underpricing, with a coefficient of -0.799 ($p < 0.01$), indicating a statistically significant negative impact and showing that larger firms tend to experience lower levels of underpricing after the 2008 Financial crisis.

Table 2: Regression of Model 1

Variables	Model 1
PostCrisis2008	-0.799 (2.2e^-16)
Firm Size	-0.134 (1.88e^-16)
ROA	-0.021 (3.1e^-7)
MB Ratio	0.126 (2.2e^-16)
Leverage	-0.00003 (0.873)
Turnover	0.090 (0.0304)
Constant	3.769 (2.2e^-16)
Observation	687
R^2	0.427
F-Statistic	84.534

Similarly, Return on Assets (ROA) shows a negative and significant coefficient of -0.021 ($p < 0.01$), implying that more profitable firms have reduced underpricing. In contrast, the Market-to-Book Ratio (MB Ratio) has a positive and significant coefficient of 0.126 ($p < 0.01$), suggesting that firms with higher growth potential tend to have higher IPO underpricing. Leverage, with a coefficient of -0.00003, is not statistically significant, indicating that the firm's debt-equity ratio does not have a discernible impact on IPO underpricing. However, Turnover on the first day of the IPO is positively associated with underpricing, as evidenced by a coefficient of 0.090, significant at the 5% level ($p < 0.05$). This indicates that higher trading activity on the first day is linked to greater underpricing.

The model in this study shows robust explanatory power, with an R-squared value of 0.427 and an adjusted R-squared value of 0.422, indicating that approximately 42% of the variability in IPO underpricing is explained by the model. The F-statistic of 84.534 is highly significant ($p < 0.01$), affirming the overall significance of the regression model. These results underscore the significant impact of the 2008 Financial Crisis on IPO underpricing in the Chinese stock market and highlight the importance of firm-specific characteristics and market conditions in influencing IPO pricing behavior. The findings provide strong empirical support for Hypothesis 1, confirming that the financial turmoil of 2008 led to a substantial decrease in IPO underpricing, likely due to increased market caution and adjustments in investor behavior during and after the crisis.

4.1.2. Regression-Model 2

In addition, the regression analysis for Model 2, shown in Table 3, foucuses on the period following the 2020 crisis, which yields several noteworthy insights that align with my research hypothesis 2. The positive and highly significant coefficient for the post-crisis period (0.647, p-value < 2.2e-16) suggests a substantial increase in the dependent variables which highlighting the resilience and adaptation of firms during this challenging time. This finding supports my hypothesis that the 2020 crisis had a significant impact on firm performance metrics. Interestingly, Firm Size presents a non-significant effect (coefficient: -0.006, p-value: 0.6786), indicating that firm size did not play a

crucial role in determining the dependent variable post-2020, contrary to our initial expectations. Similarly, ROA shows an insignificant influence (coefficient: -0.001, p-value: 0.7379), suggesting that profitability, as measured by return on assets, was not a key determinant in this period.

Table 3: Regression of Model 2

Variables	Model 2
PostCrisis2020	0.647 (2.2e^-16)
Firm Size	-0.006 (0.6786)
ROA	-0.001 (0.7379)
MB Ratio	0.149 (6.81e^-13)
Leverage	-0.00002 (0.8332)
Turnover	-0.161 (4.92e^-5)
Constant	0.035 (0.9277)
Observation	2,128
R^2	0.202
F-Statistic	89.516

The MB Ratio exhibits a positive and significant relationship (coefficient: 0.149, p-value: 6.81e-13), reaffirming my objective to understand the factors contributing to market valuation's impact on firm performance. Leverage remains insignificant (coefficient: -0.00002, p-value: 0.8332), suggesting that debt levels did not notably affect the dependent variable. Interestingly, Turnover demonstrates a significant negative effect (coefficient: -0.161, p-value: 4.92e-5), which could imply a shift in market dynamics and operational efficiencies during the post-crisis period.

The overall model explains a moderate portion of the variance (R-squared: 0.202) and the F-statistic of 89.516 confirms the model's validity, highlighting the complexity of the Covid-19 crisis and its multifaceted impact on firms. The varying significance and direction of the coefficients suggest that no single factor can wholly explain the changes in firm performance during this period.

4.2. Robustness check, VIF

To ensure the robustness of this regression models and to check for multicollinearity among the independent variables, the study has conducted a Variance Inflation Factor (VIF) analysis for both Model 1 (post-2008 crisis) and Model 2 (post-2020 crisis). The VIF values for each variable are presented in Tables 4 and 5.

Table 4: Model 1-2008 Crisis

	Variable <chr>	VIF <dbl>
PostCrisis2020	PostCrisis2020	1.024372
'Firm Size'	'Firm Size'	1.168007
ROA	ROA	1.181610
'MB Ratio'	'MB Ratio'	1.036060
Leverage	Leverage	1.172150
Turnover	Turnover	1.163027

Table 5: Model 2-Covid Crisis

	Variable <chr>	VIF <dbl>
PostCrlsls2008	PostCrlsls2008	1.377035
'Firm Size'	'Firm Size'	1.300465
ROA	ROA	1.692847
'MB Ratio'	'MB Ratio'	1.204725
Leverage	Leverage	1.369219
Turnover	Turnover	1.241492

These robustness checks confirm that the explanatory variables in this model are appropriate and that the relationships identified are not distorted by multicollinearity. This reinforces my earlier findings that the 2008 and 2020 crises had significant but distinct impacts on IPO underpricing, shaped by different sets of firm-specific factors. Moreover, the complexities of these crises, as reflected in my models, highlight the multifaceted nature of their economic impacts, which cannot be fully captured by single-factor analyses. Therefore, this underscores the necessity of a comprehensive approach in evaluating the effects of such significant financial events.

4.3. Default Residual Plot

To further validate the robustness and reliability of my regression models, this study has conducted a residual analysis. The residual plots for Model 1 (2008 post-crisis) and Model 2 (2020 post-crisis) are shown in Figures 2 and 3, which provides an assessment of the assumptions underlying our regression analysis.
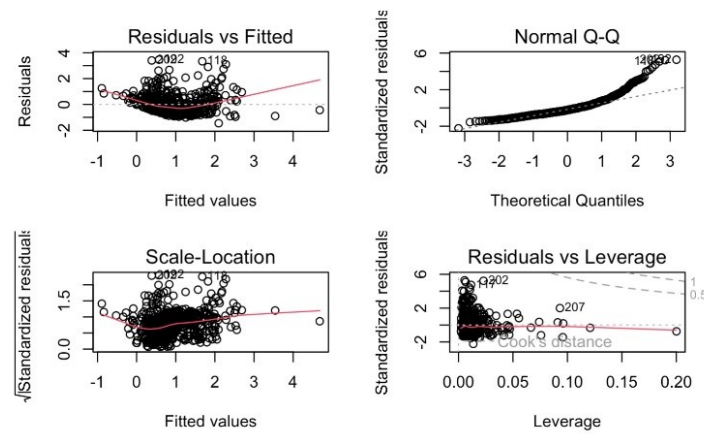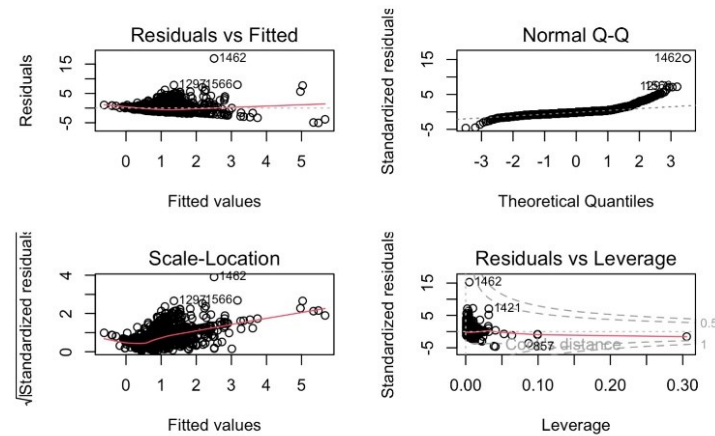
Figure 2: Model 1

Figure 3: Model 2

For Model 1 (post-2008 crisis), the Residuals vs Fitted plot shows some non-random patterns, indicating potential issues with non-linearity or heteroscedasticity. The Normal Q-Q plot reveals deviations from the diagonal line, particularly at the tails, suggesting that the residuals are not perfectly normally distributed. The Scale-Location plot presents a slight funnel shape, indicative of heteroscedasticity. Additionally, the Residuals vs Leverage plot highlights a few points with higher leverage, indicating some potentially influential observations. The results suggest that while Model 1 captures some important relationships, there are underlying issues with non-linearity and variance consistency that need to be addressed for a more accurate model.

In Model 2 (post-2020 crisis), the Residuals vs Fitted plot similarly indicates patterns that suggest issues with model fit, non-linearity, or heteroscedasticity. The Normal Q-Q plot shows significant deviations from the diagonal line, particularly at the extremes, suggesting a non-normal distribution of residuals. The Scale-Location plot for Model 2 displays a pronounced pattern, further indicating heteroscedasticity as the spread of residuals increases with the fitted values. Moreover, the Residuals vs Leverage plot reveals several points of elevated leverage, indicating the potential for influential observations to exert a disproportionate influence on the model.

Overall, the residual analyses for both models highlight the complexity of analyzing the impacts of financial crises. The more pronounced issues in Model 1 indicate that the 2008 financial crisis had a deeper and more multifaceted impact on financial metrics, which could be harder to capture with simple regression models. In contrast, the issues identified in Model 2, while still considerable,

are less severe, indicating that the COVID-19 crisis may not be as closely related to the financial variables studied. The difference highlights the necessity of using advanced modeling techniques to fully understand the distinct impacts of these two major economic disruptions on IPO underpricing and other financial outcomes.

5. Discussion

5.1. Implications for Investors

For investors, these findings underscore the significance of understanding the broader economic landscape when evaluating IPOs. During financial crises like the 2008 crisis, investors can expect more conservative IPO pricing, indicating a safer investment environment despite the potential for lower immediate returns. While lower IPO pricing during crises such as the COVID-19 pandemic may result in higher initial returns, it also reflects higher market volatility and risk. Investors should thus adapt their strategies to reflect these changing circumstances, exercising greater caution during periods of heightened uncertainty and volatility.

5.2. Policy Recommendations

Policymakers can glean important lessons from this comparative analysis. The reduced underpricing following the 2008 crisis suggests that regulatory measures aimed at increasing transparency and investor protection were effective. As such, during future financial disruptions, similar regulatory approaches could help stabilize markets. However, the increased underpricing during the COVID-19 pandemic highlights the need for policies that can mitigate market volatility and support investor confidence. Policymakers should consider implementing measures that address the specific nature of each crisis, providing targeted support to maintain market stability.

6. Conclusion

This paper examines the differences in IPO underpricing patterns before and after the 2008 and 2020 financial crises based on an analysis of 3,796 firms that conducted IPOs on the Chinese stock exchanges during the periods from January 2006 to January 2010 and from January 2017 to January 2023, respectively. The results suggest that IPOs were significantly less underpriced in the post-2008 crisis period, indicating that heightened regulatory measures and increased market caution following the crisis played a crucial role in stabilizing IPO pricing. For the period following the COVID-19 pandemic, the results of this study indicate an increase in IPO underpricing, driven by increased market volatility and uncertainty. The regression analysis shows a positive and significant relationship between the post-2020 crisis period and IPO underpricing, highlighting the different nature of the COVID-19 crisis compared to the 2008 financial crisis.

References

[1] Rock, K. (1986) Why New Issues are Underpriced. Journal of Financial Economics, 15(1-2), pp.187-212.
[2] Liu, X., Tian, G., and Wang, X. (2018) The impact of the 2008 financial crisis on IPO underpricing in China. International Review of Financial Analysis, 55, pp.68-79.
[3] Tuominen, S. (2020) The impact of financial crises on IPO underpricing: Evidence from the 2008 financial crisis and the COVID-19 pandemic. Master's Thesis, LUT University.
[4] Ang, J.S., and Brau, J.C. (2002) Firm transparency and the costs of going public. Journal of Financial Research, 25(1), pp.1-17.
[5] Loughran, T., and Ritter, J.R. (2004) Why Has IPO Underpricing Changed Over Time?. Financial Management, [online] 33(3), pp.5-37..
[6] Derrien, F., and Kecskés, A. (2021) Global IPO underpricing during the Covid-19 pandemic: The impact of increased uncertainty.

[7] Shao, Y., Han, B., and Liu, L. (2020) IPO underpricing and short-term performance during the COVID-19 pandemic. Journal of Financial Markets, 50, 100565.