

The Effect of Registration System Reform on IPO underpricing of GEM in China

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Abstract

Compared to other countries, the Chinese stock market has a more serious IPO underpricing issue. On July 22nd, 2019, China's registration system was officially implemented by the Sci-tech Innovation Board. With the first batch of companies successfully listed on August 24th, 2020, the Growth Enterprise Market (GEM) transferred from the approval-based initial public offering (IPO) system to the registration-based IPO system, while, the Main Board was still under the approval issuance system. We collected 889 IPOs across the Main Board and GEM from July, 2019 to August, 2023 and divided the sample into treated and control groups based on the implementation of registration reform on GEM. We conducted the DID and OLS regression analyses. The empirical results of this paper suggest that the registration reform policy plays a positive role in IPO underpricing and net assets per share before the issuance of GEM IPOs is negatively related to the underpricing rate in the background of the registration system. Overall, our findings show that registration system reform of the GEM does not improve the IPO pricing efficiency. However, as a financial indicator, net assets per share before the issuance alleviates information asymmetry between investors and issuers on the GEM in the background of the registration system.

Keywords: DID model, Growth Enterprise Market, IPO underpricing, OLS regression, registration system reform

1. Introduction

Initial public offering (IPO) underpricing is a common phenomenon in the global IPO market and is one of the problems plaguing the financial community. IPO underpricing occurs when an IPO in the stock market is priced significantly lower than the initial market price of the listing. Loughran and Ritter (2004) researched IPO underpricing in the U.S. IPO market from 1980 to 2000. They reported that IPO underpricing was almost 7% in the 1980s and then rose to 15% in the 1990s; during the Internet bubble period, they noted that underpricing exploded, with a 65% first-day return. Similarly, Unlu, Ferris and Noronha (2004) found that the mean IPO underpricing rates in the UK from 1993 to 2001 ranged between 2% and 64.48%. In addition to this, other scholars have found lower IPO underpricing rates than in China, e.g., the average market adjusted initial return for the first three trading days was about 17.8% in Tunisia (Boudriga, Ben Slama & Boulila, 2009); the average underpricing level of the Italian Stock Exchange from January, 2001 to December, 2012 was 6.75%, which is far below previous studies (Dell'Aqua, 2014). In China, this phenomenon is more prominent. Chan, Wang and Wei (2004) investigated 570 A-share IPOs issued in China and observed that the average IPO underpricing rate was 178%. From the above research results, it can be seen that Chinese stock market has a more serious IPO underpricing phenomenon than other countries.

Scholars have studied the negative impact of IPO underpricing on stock markets. Luo, Lin and Kou (2020) argue that high levels of IPO underpricing mean that the actual amount of capital raised by enterprises is lower than the desired value, which is an expensive hidden cost borne by the issuing company. This will not only prevent the issuing company from realizing the expected fund-raising goal but also lead to the pursuit of excessive returns brought about by IPO underpricing by investors,

triggering a mismatch of funds between the primary and secondary markets and lowering the operational efficiency of the capital market. Huang and Li (2021) support this analysis by stating that high IPO underpricing not only reflects inefficient pricing in the primary market, but also exacerbates the speculative atmosphere in the secondary market. On July 22nd, 2019, as part of the reforms carried out in China's financial market, the registration system was formally implemented, along with the establishment of the Sci-Tech Innovation Board. This triggered a discussion on stock market IPO underpricing under the registration system. The purpose of this study is to address the impacts of the registration system on IPO underpricing in China.

Prior literature seeking to explain IPO underpricing includes information asymmetry theories (Loughran & Ritter, 2004), institutional theories (Ibbotson, 1975; Lowry & Shu, 2002), ownership and control theories (Brennan & Franks, 1997) and behavioural theories (Ljungqvist, 2007). Our paper is part of a literature on the effect of issuance system change on IPO underpricing. We expand the IPO underpricing analysis by providing a new perspective and posit that registration reform influences it. Existing studies examine IPO underpricing from a perspective of financial market reform. Cheung, Ouyang and Weiqiang (2009) demonstrate that the Chinese IPO market has been transformed from a tightly-controlled system to a more market-oriented system. This study shows that the size of the underpricing decreases over the sample period and has policy implications in demonstrating the impacts of regulatory frameworks on IPO underpricing. Chu and Zhang (2019) empirically studied the IPO underpricing and influencing factors from 1992 to 2017. They conclude that pricing control is a key factor in the high IPO underpricing rate, and the IPO underpricing rate has a significant positive correlation with the issue price, fund-raising scale, and turnover rate. Some Chinese scholars analyze the causes of IPO underpricing based on information asymmetry theories. For instance, Luo *et al.* (2020) point out that the information asymmetry between issuers and investors is the main reason for IPO underpricing. Investors can only understand a company's business status through information published by the issuing company; thus, there is a risk that the company may hide or even falsify information. Information asymmetry between investors and issuers results in underpricing on the issuance day.

Compared with the former issuance system, the registration system is deemed to be a milestone in Chinese financial market reform towards marketization (Zhang & Zhang, 2023). The registration system is characterized by the requirement for continuous and full disclosure of information (Wei, 2017). However, from the perspective of information asymmetry theories, it is not clear how the implementation of the registration system affects IPO underpricing in China's stock market, and whether it improves IPO pricing efficiency. China's publicly traded stock market consists of four main boards: the Main Board, the Sci-Tech Innovation Board, the Growth Enterprise Market Board, and stocks listed on the Beijing Stock Exchange. Existing literature on China's financial market registration system reform has focused on the Sci-Tech Innovation Board since its implementation of the registration system (Chen & Fu, 2022; Pan & Ma, 2023) or examines the effect of the implementation of the registration system on premarket and aftermarket pricing efficiency (Liao, 2023). Few studies aim to analyze IPO underpricing on the Main Board and Growth Enterprise Market Board (GEM) in the context of the registration system. On August 24th, 2020, the GEM transferred from the approval-based to the registration-based IPO issuance system. However, China's Main board market did not implement an IPO registration system until April, 2023. This represents a prerequisite for comparing these two markets. Difference-in-differences (DID) analysis is used to estimate the effects of interventions and event dispositions in social science research. Cole, Floros and Ivanov (2019) perform DID to test whether the two changes in over the counter (OTC) rules are associated with lower information asymmetry for the two-stage IPOs. Thus, we selected the Main Board and GEM to conduct a DID analysis to test the effect of China's registration system reform on IPO underpricing.

Combining the features of higher disclosure requirements of the registration system and the theory of information asymmetry, we posit that registration reform improves IPO pricing efficiency, namely reducing the IPO underpricing rate. Besides, net asset value per share before issuance serves as a financial indicator that can mitigate the information asymmetry between investors and issuers. We

analyze the relationship between this indicator and the IPO price suppression rate after the implementation of the registration system. Our sample contains 889 IPOs across the Main Board and GEM from 2019 to 2023. In this study, we divide the sample period into two sub-periods based on issuance system changes. We conducted the DID and ordinary least squares (OLS) regression analyses. We find that the registration reform policy plays a positive role in IPO underpricing, and net assets per share before the issuance of GEM IPOs is negatively related to the underpricing rate in the background of the registration system.

Possible contributions of the study: this study uses updated data and conducts the DID analysis to analyze the changes in the degree of IPO underpricing in the registration system context by comparing IPO underpricing on the GEM and Main Board, which expands the scope of the study. In addition, the finding that net assets per share before the issuance of GEM IPOs is negatively related to the underpricing rate verifies that, as a financial indicator, net assets per share before the issuance alleviates information asymmetry between investors and issuers on GEM in the background of the registration system. Thus, it is negatively related to the IPO underpricing rate.

The remainder of this paper is organized as follows. Section 2 presents the background of the study. Section 3 provides a literature review and develops the hypotheses. Section 4 presents data collection and variables. Section 5 illustrates the results of analyses and discussion. Section 6 proposes the conclusions of this paper.

2. Background

2.1. Differences between Registration and Approval Systems in China

Table 1 shows the differences between registration and approval systems in China. From 2000-2019, the Chinese stock market adopted the approval system. Companies that plan to go public must obtain approval from the China Securities Regulatory Commission (CSRC). CSRC examines the comprehensiveness, accuracy, authenticity and timeliness of the declaration documents and conducts substantive examinations of the issuer's business nature, financial status, operating capacity, development prospects, issue quantity, and issue price. Following these procedures, the securities regulator makes a value judgment on whether the issuer meets issuance conditions. CSRC has the power to reject applications for stock issuances that do not meet prescribed conditions. On July 22nd, 2019, the Sci-tech Innovation Board (SIB) opened, and the registration system was officially implemented, which was the first trial. Since then, the registration system has been gradually implemented in different Chinese stock markets. The securities regulatory authority is no longer responsible for the quality of listed companies. The right to judge the value of the company will be given to the investors, to give better play to the decisive role of the market in resource allocation. This change requires regulators to strengthen disclosure oversight to ensure market transparency and fairness.

Table 1: *Differences between China's registration system and approval system; source: Authors*

Issuance System	Period	Features
Approval System	2000-2019	The issuance and pricing of securities are subject to the review and approval of CSRC. The CSRC not only has to review and approve the content of the documents declared by the proposed listed companies for compliance, but also makes substantive judgment on the financial quality of the companies.

Approval and System	System Registration	2019-2023	CSRC no longer conducts substantive audits on the financial status of the enterprises to be listed, but only conducts formal audits on the listed companies, and sets higher requirements on the accuracy and truthfulness of the information disclosure of the companies.
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2.2. Differences in Listing Requirements of GEM between the Registration System and the Approval System

As part of the Chinese stock market, GEM is mainly used for high-tech, high-growth, and high-risk small and medium-sized enterprises (SMEs), such as those in the Internet, biotechnology, and new energy industries. Enterprises on GEM have strong innovation ability and development potential but also face greater market risks and uncertainties. On August 24th, 2020, the GEM piloted its registration system. The differences between the listing requirements under the GEM registration system and those under the approval system are reflected in the following aspects:

(i) Profit requirement: under the registration system, GEM-listed companies are only required to have made profits in the last two years, and the net profit is calculated based on the lower net profit before and after deducting non-recurring gains and losses. Under the approval system, GEM-listed companies are required to have made profits in the last three consecutive years; the net profit of each of the last two years is not less than RMB20 million, and the net profit of the last year is not less than RMB30 million.

(ii) Operating Income Requirement: under the registration system, GEM-listed companies are required to have an operating income of not less than RMB50 million and RMB60 million for the last two years or a net cash flow of not less than RMB20 million and RMB30 million for the last two years, respectively. Under the approval system, GEM-listed companies are required to have an operating income of not less than RMB30 million, RMB50 million, and RMB80 million for the last three years.

(iii) Net asset requirement: under the registration system, there are three criteria required for an ordinary enterprise to be listed on the GEM. Criterion 1: Positive net profit for the last two years and cumulative net profit of not less than RMB 50 million; Criterion 2: Estimated market capitalization of not less than RMB 1 billion, positive net profit for the previous year, and operating revenue of not less than RMB 100 million; Criterion 3: Estimated market capitalization of not less than RMB 5 billion and operating revenue of not less than RMB 300 million in the most recent year. Under the approved system, GEM-listed companies are required to have a net asset of not less than RMB20 million for the most recent year, and to have a certain percentage of capital surplus.

(iv) Market capitalization requirement: under the registration system, GEM-listed companies are not required to have a specific market capitalization requirement but are only required to have no less than 40 million shares after the issuance. Under the approval system, GEM-listed companies are required to have a market capitalization of no less than RMB400 million after issuance.

3. Literature Review

After the implementation of the registration system, the conditions for enterprises to go public changed. Some studies have examined the impact of registration system reform on IPO underpricing. However, scholars have not reached a consensus on this issue, and two scenarios have emerged from the research findings.

Some scholars have found that the registration system significantly increased IPO underpricing on the first day of the IPO or reduced IPO pricing efficiency. Feng, Zhou and Ren (2022) analyze the impact

of the registration system reform on the IPO underpricing and short-term returns of GEM new shares. They find that the success of the reform of the registration system of the Science and Technology Innovation Board (STB) has aroused the enthusiasm and speculative sentiment of investors, which has significantly increased the IPO underpricing in ChiNext after the implementation of the registration system. This finding is also supported by Chen and Fu (2022). They illustrate that the registration system relaxes the listing conditions and increase the IPO pass rate. The introduction of the registration system has effectively stimulated the enthusiasm of SMEs to go public and brought new vitality to the market.

Lyu (2022) uses a stochastic frontier model to analyze the impact of the registration system reform on the IPO pricing efficiency of the GEM and the STB. The results show that the registration system reform reduced the IPO pricing efficiency of the GEM from 93.2% before the reform to 80.8% after the reform, whereas the IPO pricing efficiency of the STB was 77.9%.

However, some scholars hold the opposite view, believing that the registration system alleviates IPO underpricing and improves IPO pricing efficiency. Adopting the PSM-DIM model, Geng (2021) proposes that the threshold for RFQ respondents in the offline subscription phase of the primary market is raised, which optimizes excessive competition among institutions and leads to improved IPO pricing efficiency, thus reducing the IPO underpricing rate. Pan and Ma (2022) perform the stochastic frontier analysis and state that the registration system reform improves the efficiency of Chinese IPO pricing. Additionally, IPO pricing efficiency is negatively affected by underwriter reputation.

Registration system reform reduces the administrative intervention of IPO and increases the market-oriented inquiry pricing method, which is conducive to improving the fairness and reasonableness of IPO pricing. The registration system is characterized by the requirement for continuous and full disclosure of information (Wei, 2017). Compared with the former issuance system, the registration system is deemed a milestone in China's financial market reform towards marketization (Zhang & Zhang, 2023; Luo, Wang & Zuo, 2023). Combining the features of the registration system's higher disclosure requirements and the theory of information asymmetry, we posit that registration reform improves IPO pricing efficiency. Hence, this thesis proposes the following hypothesis:

Hypothesis 1: The degree of IPO underpricing in the GEM is negatively affected by the registration system reform.

Under the registration system, there are three criteria required for an ordinary enterprise to be listed on the GEM. Criterion 1: Positive net profit for the last two years and cumulative net profit of not less than RMB 50 million; Criterion 2: Estimated market capitalization of not less than RMB 1 billion, positive net profit for the previous year, and operating revenue of not less than RMB 100 million; Criterion 3: Estimated market capitalization of not less than RMB 5 billion and operating revenue of not less than RMB 300 million in the most recent year. Under the approved system, GEM-listed companies are required to have a net asset value of not less than RMB20 million for the most recent year, and to have a certain percentage of capital surplus. It is clear that after the implementation of the registration system, the requirement for profitability of companies listed on the GEM has increased.

Through an empirical study of the effectiveness of the primary market for IPOs in China, Wang (2015) points out that net asset value per share (NAVPS) is positively related to firms' IPO offering prices. The larger NAVPS indicates that the larger the NPV of the company, the stronger the company's financial strength and its ability to resist risks in the face of a crisis. Besides, the higher the NAVPS, the greater the investment value of the company and the greater the value of the investor's investment. Since NAVPS can help mitigate information asymmetry between investors and issuers, the IPO price of a company with a larger NAVPS is likely to be higher. On this basis, we further deduce that a high IPO offering price leads to a lower IPO underpricing rate. Accordingly, we assume that the net asset value per share before issuance is negatively related to IPO underpricing rate. Based on the increased

net worth requirement under the GEM registration system and information asymmetry between investors and issuers, Hypothesis 2 is proposed.

Hypothesis 2: IPO underpricing is negatively related to net assets per share before issuance in the GEM market in the context of the registration system.

4. Methodology

4.1. Data Collecting of Growth Enterprise Market and Main Board

The GEM and the Main Board have different characteristics. GEM is mainly for high-tech, high-growth and high-risk SMEs, such as the Internet, biotechnology, new energy, and other industries, whereas the Main Board has no industry restrictions and is mostly for large and outstanding enterprises, such as banking, petroleum, power, and other industries. Enterprises on the GEM have strong innovation ability and development potential, but also face greater market risks and uncertainties, while enterprises on the Main Board are relatively stable and mature, but may also lack vitality and competitiveness. Enterprises on GEM are smaller in size and raise smaller amounts of capital, whereas enterprises on the Main Board are larger in size and raise larger amounts of capital. Based on the Wind database, by the end of 2023, the average market capitalization of GEM is RMB 8.545 billion and the average financing size of GEM is RMB 1.13 billion, respectively, while the average market capitalization of the Main Board is RMB 12.559 billion and the average financing size of the Main Board is RMB 1.24 billion, respectively. Companies on the GEM are better suited to raising smaller amounts of capital, while companies on the Main Board are better suited to raising larger amounts of capital.

According to the timetable for the implementation of the registration system reform in the Chinese stock market, the GEM piloted the registration system on August 24th, 2020. On that day, the first batch of registered shares was listed prior to which the GEM implemented the approval system. Meanwhile, the China's Main Board kept on implementing the approval system until April 2023. To test whether there is any change in IPO underpricing in the GEM after the implementation of the registration system, this study applies the difference-in-differences (DID) model, which is also called the double-difference method. This is a common method used in social science research to estimate the effects of interventions and event dispositions. Some studies have used the DID model to analyze stock markets (Xie & Mo, 2014; Campello, Ribas & Wang, 2014; Xu *et al.*, 2020) and IPO underpricing (Cole *et al.*, 2019). This method requires that the data contain at least two periods, and that all samples are divided into two categories: treated and control groups. The treated group is unaffected by the policy during the first period. After that the policy starts to be implemented, the second period is the result of the implementation of the policy. On the other hand, the control group is not affected by the policy intervention all the time, so its first and second periods are the result of no policy intervention.

In our research, the IPOs from the GEM were selected as the treated group, and the Main Board acted as the control group. Using the DID model, this study analyzes the impact of two different issuance systems – the registration system and the approval system – on IPO underpricing. The data selected for the DID in this study are the economic indicators of the GEM and Main Board IPO companies from July 1st, 2019, to March 31st, 2023. The data comes from the CSMAR and Choice Database, including 291 IPO companies in the GEM and 292 IPO companies on the Main Board.

4.2. Variables and Models

In terms of measuring IPO underpricing rate, some researchers are apt to use initial return as the proxy. Chalk and Peavy (1987) investigate the distribution of IPO daily returns. The formula involves that first listing day's closing price minus offering price divided by offering price and it often appears in Chinese literature (Wu, Wang & Dong, 2009; Lu & Yang, 2012).

$$R_L = \frac{P_{i1} - P_{i0}}{P_{i0}} \quad (1)$$

Where P_{i0} is the i^{th} stock's offering price and P_{i1} is its listing day's closing price. R_L represents the listing day's return of an IPO stock. The formula of the first listing day's closing price minus the offering price divided by offering price shows the IPO underpricing degree on the listing day. A positive listing day's return indicates that the closing price is above the offering price, providing investors with capital gains, and negative listing day's returns indicate capital loss. However, this implies the existence of inefficient IPO pricing.

We construct the OLS regression model as follows:

$$R_L = \beta_0 + \beta_1 \text{NAPS} + \sum \beta_i \text{controls}_i + \varepsilon_i \quad (2)$$

Model 2 focuses on the effect of net assets per share on IPO underpricing rate (R_L) on GEM, where net assets per share is the independent variable, R_L is the dependent variable, and 10 other variables are selected as control variables, namely offline over-subscription multiple, offline placing ratio of total issuance, market return on listing day, online over-subscription multiple, issuance costs per share, net assets per share before issuance, earnings per share before issuance, capital raised through IPO, price-to-earnings ratio on listing day, stock turnover rate on listing day and total assets in the year before issuance. Table 2 shows the definition of variables and literature that explore the relationship between these variables and IPO underpricing.

Table 2: Definition of variables; source: Authors

Symbol	Name	Literature
OFFOSM	Offline over-subscription multiple	Zou <i>et al.</i> (2020)
OPR	offline placing ratio of total issuance	Zou <i>et al.</i> (2020)
MR	market return on listing day	Ljungqvist (2007)
ONOSM	online over-subscription multiple	Geertsema and Lu (2016)
ICPS	issuance costs per share	Wang and Yao (2021)
NAVPS	net assets value per share before issuance	Yu, Shao and Yi (2021)
EPS	earnings per share before issuance	Rudianto <i>et al.</i> (2022)
CR	capital raised through IPO	Su and Fleisher (1999)
PER	price-to-earnings ratio on listing day	Sohail <i>et al.</i> (2018)
STR	stock turnover rate on listing day	Fernando, Krisnamurthy and Spindt. (2004)
TA	total assets in the year before issuance	Liu (2024)

5. Results and Discussions

5.1. Results of DID model

Table 3 shows the distribution of the samples in the treated and control groups, as well as before and after the treatment. From the table, we can see that the number of IPOs in the GEM (treated group) is 494, and the number of IPOs in the Main Board (control group) is 395. Using August 24th, 2020, as the time demarcation, the two boards implemented the approval system for issuance before this time, which was represented by before. After this time, the GEM implements the registration system, and the Main Board is still under the approval system, which is represented by after. The sample size of GEM IPOs before the treatment is 69 and after it is 425, while the sample size of Main Board IPOs before the treatment is 107 and after it is 288.

Table 3: Sample Statistics for the DID model; source: Authors

	Before	After	Sum
Control	107	288	395
Treated	69	425	494
Sum	176	713	889

DID models typically require parallel trend testing. The central assumption of the parallel trend test is that the trends in the treated and control groups were similar before the treatment was introduced. In other words, the treated and control groups were trending parallelly on factors other than the treatment itself before the treatment was introduced. If this hypothesis holds, then the treatment effect can be attributed to the treatment itself and not to other factors that may have contributed to the differences between the groups. This paper uses the graphical method and analyzes whether the trends of the treated and control groups before the introduction of the treatment are similar.

Figure 1 Trend Plot of Treated and Control Groups; source: Authors

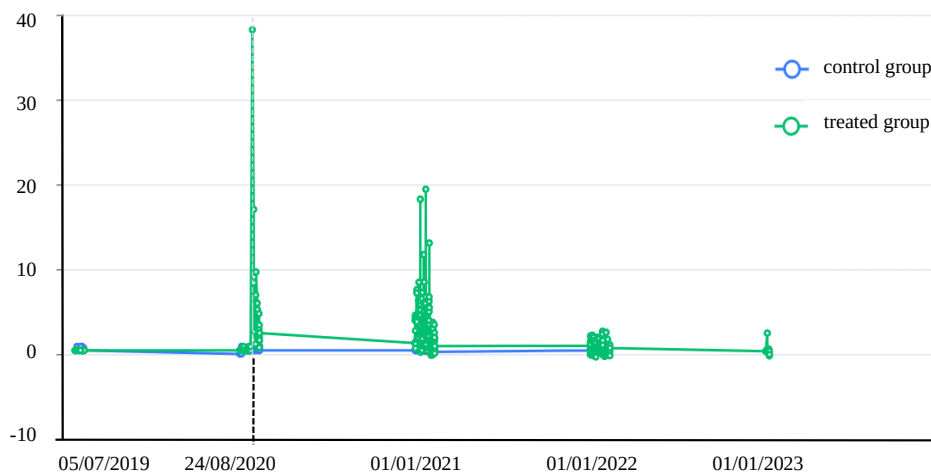


Figure 1 illustrates the trend of listing day's returns on IPO stocks (R_L) for the treated and control groups. The figure shows the changes in the listing day's returns on the GEM and Main Board before

and after the implementation of the registration reform policy. The vertical axis represents R_L , and the horizontal axis represents time. The green line represents the change in the GEM and the blue line represents the change in the Main Board. As shown, before August 24th, 2020, the trends of these two lines are similar, but after the implementation of registration, the trends of the two lines are quite different. Based on Figure 1, it can be determined that the data satisfies the parallel trend assumption.

Table 4: Result of DID model; source: Authors

Time	Item	Effect Sizes on R_L	Standard Deviation	<i>t</i> -value	<i>p</i> -value
Before	Control	0.419			
	Treated	0.381			
	Diff (T – C)	-0.038	0.204	-0.185	0.853
After	Control	0.425			
	Treated	1.55			
	Diff (T – C)	1.125	0.153	7.375	0.000***
DID		1.163	0.227	5.118	0.000***

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 4 presents the final results for the DID model. It includes the levels of effect sizes for the control and treated groups at pre- and post-treatment, as well as the double-difference (DID) effect values.

First, if the Diff value before the treatment presents significance, it means that there is a significant difference between the effect values of the control and treated groups before the treatment. For the pre-treatment, the Diff effect value is -0.038 but does not present significance ($p = 0.853 > 0.05$), which means that the effect value of the treated group before the treatment does not have a significant difference from the effect value of the control group. This satisfies the requirement of the DID model for the assumption of a parallel trend of data.

Second, the Diff-value after the experiment, if it shows significance, implies that there is a significant difference between the control group and treated group effect values after the experiment. For the post-experiment, the Diff effect value is $1.125 > 0$ and shows significance at the 1% level, implying that the post-experiment treated group effect value is significantly lower than the control group effect value.

Third, DID is a double-difference value, in which, if the effect value presents significance, implies that the policy of the study plays a role. A double-difference effect value (DID) of $1.163 > 0$ and significance at the 1% level means that the registration reform policy plays a positive role in IPO underpricing. Therefore, Hypothesis 1 is not accepted.

5.2. Results of the OLS Regression Model

Table 5 demonstrates the results of the regression analysis of the GEM IPO underpricing. It can be seen that the adjusted R^2 is 0.555, which implies that the explanatory variables in general can explain the changes in R_L . The standardized coefficient beta of NAVPS is -0.095 ($p = 0.099 < 1\%$), indicating that net asset value per share before the issuance is significantly negatively related to IPO underpricing in the GEM. Hence, hypothesis 2 is accepted. Among the other control variables, five variables are positively related to R_L , including OFFOSM, MR, EPS, PER and STR. Two variables, ICPS and CR, were negatively related to R_L .

Table 5: Results of the OLS Regression Analysis of the GEM; source: Authors

Variables	Standardized Coefficients Beta	<i>t</i> -value	<i>p</i> -value
NAVPS	-0.095	-1.655	0.099*
OFFOSM	0.276	3.379	0.001***
OPR	0.100	1.578	0.116
MR	0.177	2.843	0.005***
ONOSM	0.027	0.659	0.510
ICPS	-0.273	-4.704	0.000***
EPS	0.271	3.813	0.000***
CR	-0.479	-5.599	0.000***
PER	0.339	4.204	0.000***
STR	0.512	10.779	0.000***
TA	0.304	4.030	0.000***
R ²		0.575	
Adjusted R ²		0.555	
D-W		1.772	

***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

5.3. Discussion

Offline over-subscription multiple can reflect institutional investors' expectation and demand for the new IPOs. Typically, information asymmetry exists in the primary market and institutional investors have access to more information. Hence, the positive relationship between OFFOSM and R_L may indicate that the party with the information advantage is in a better position to determine accurately the intrinsic value of an IPO. MR is positively related to R_L . We conjecture that this is caused by market conditions: Market returns increase in a rising or bullish market. Investors tend to buy stocks and at the same time, the demand for IPO stocks also increases under such conditions, which aggravates the IPO underpricing rate. The EPS and PER positively affect the listing day's return of IPOs on the GEM. We conjecture that a firm's financial condition prior to an IPO can positively affect the degree of IPO underpricing on the GEM. The results of the OLS regression show that the higher the STR, the higher is the IPO underpricing rate. This can be explained by the fact that STR is an indicator of investors' enthusiasm for trading on IPO listing days, reflecting the impact of investor sentiment on IPO underpricing. A high investor sentiment leads to higher demand, thus a higher trading price of IPO stocks. The standardized coefficient beta of ICPS is -0.095, indicating that issuance costs per share are negatively correlated with R_L of IPOs, which is consistent with the analysis of Wang and Yao (2021). In addition, CR has a negative relationship with the IPO underpricing rate of the GEM, which shares the same conclusion as Su and Fleisher (1999).

Through the DID model, we find that the registration reform policy plays a positive role in IPO underpricing, which is contrary to our assumption. However, the results of the OSL regression provide us with ideas for further research on the reasons for the increase in the IPO underpricing rate. Among the 11 variables selected, five – OFFOSM, MR, EPS, PER, and STR – are positively related with the IPO underpricing rate of the GEM after the implementation of the registration system. NAVPS has a positive impact on the IPO underpricing rate as an indicator of an enterprise's financial position. This conclusion is consistent with hypothesis 2. However, the other two financial indicators, EPS and PER, have different effects on IPO underpricing rates, which requires further research on the underlying causes.

6. Conclusion

By conducting the DID analysis, this study shows a double-difference effect value (DID) of $1.163 > 0$ significant at the 1% level. This means that registration reform policy plays a positive role in IPO underpricing. We also find that IPO underpricing is negatively related to net assets per share before the issuance of the GEM in the context of the registration system. This verifies that, as a financial indicator, net assets per share before the issuance alleviates information asymmetry between investors and issuers on GEM in the background of the registration system.

One of the main limitations of this study is that the registration system has not been implemented in the GEM for a long time; therefore, the time span of the data in this study is relatively short, and future research can provide more research conclusions based on a longer period of time.

Another important research question related to the recent IPO reform is that financial indicators Measuring GEM Firms Have Different Impacts on IPO underpricing. The net asset value per share before issuance negatively affects the IPO underpricing rate, whereas earnings per share before issuance and price-to-earnings ratio on listing days positively affect the IPO underpricing rate. The underlying reasons for this require further research.

7. References

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