

# Small Firm Effect in Stock Markets: An Assessment of the Chinese Listed Firm

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## ABSTRACT

The small firm effect has been a topic of debate amongst the investors and behavioral finance theorists alike, whereby it is hypothesized that the firms with smaller market capitalization rates tend to outperform their larger counterparts. This paper will empirically investigate the relationship between stock returns and the size of shares outstanding and total market capitalization for listed companies in the Chinese market from 2010 to 2019. A panel regression analysis was conducted on the collected data with the market capitalization variable as the dependent variable and monthly returns generated by the company stock as the independent variable. The data for the variables were acquired from the Win.d database and the analysis was performed using STATA analysis software. The analysis revealed that there was a positive relationship between the market capitalization and the monthly returns generated, which negates the presence of a small firm effect in the selected sample. Overall, the study finds that stock returns of Chinese companies are negatively related to company size.

**Keywords:** *Size effect, size premium, Chinese firms, risk factors, returns, Asset Pricing Models.*

## 1. INTRODUCTION

The small firm effect is a rather popular hypothesis in finance and academia alike. According to the small firm effect hypothesis, the returns generated by smaller firms are greater than those generated by larger firms. Roll in his study, describes the small firm effect as an anomaly in the financial markets which is often used to explain the outcome of higher returns generated by the firms which have a smaller market capitalization as compared to the firms with a larger market capitalization [1]. Before venturing forth with the concept, it is imminent that the asset pricing models be discussed. The first one is the Capital Asset Pricing Model (CAPM) which describes the relationship between systematic risk and the expected return on an asset (particularly equity) [2]. This anomaly that came to be known as the small firm effect, is a part of the Fama French three factor model, which is an extension of the CAPM and includes three factors of market return, high-minus low book-to-market values and small minus big stock capitalization [3].

The presence of the size effect anomaly brings to question the applicability and effectiveness of the asset pricing models in predicting the returns generated by the firms. Therefore, the study of the small firm effect in the Chinese stock market is of great importance to the

application of traditional asset pricing models to the Chinese stock market and in understanding the effectiveness of the stock market. This article will study the relationship between stock returns and the size of the company, whether the Chinese market is a semi-effective market, and explore the factors that cause the effect of small companies as specific topics. This article will conduct an empirical study on the relationship between the stock yield of listed companies in the Chinese market from 2010 to 2020, the size of outstanding shares and the total market capitalization

## 2. ANALYSIS

### 2.1. Research model

There are three types of stocks in China, namely, outstanding stocks, corporate stocks, and state stocks. In this paper, following the core research objective, the market capitalization of outstanding shares and the total market capitalization are chosen as the key instrumental variables. By definition, the market capitalization of a company is represented by

$$\begin{aligned} \text{Market Capitalization}_t &= \text{Number of Shares} \\ &\times \text{Closing stock price}_{t-1} \end{aligned}$$

Likewise, the monthly returns for a company as estimated as the percentage change in the stock prices of the company in the given period and can be expressed as

$$\text{Stock Return}_t = \frac{\text{Stock Price}_t - \text{Stock Price}_{t-1}}{\text{Stock Price}_t} \times 100$$

The study incorporates a log-linear panel regression model which used the monthly returns generated by ten Chinese publicly listed companies over the span of the past 10 years. Here, the market capitalization estimate has been assumed as the dependent variable while the monthly returns generated by the companies have been assumed as the explanatory variable. The empirical model can be explained as the,

$$\text{Market Capitalization}_{i,t} = \beta_0 + \beta_1(\text{Monthly Returns}_{i,t}) + \epsilon_i$$

Where, “i” is the panel variable or the company and “t” is the time variable.

The data for the paper has been sourced from Win.d database and has been processed as panel data. The analysis for the current study has been conducted using STATA software.

### 2.2. Empirical Findings

The pattern and structure of the data can be seen with the following descriptive statistics.

**Table 1** Descriptive Statistics

	Mean	Standard Deviation	Minimum	Maximum
Monthly Returns	0.6370863	10.62472	-44.0249	47.8336
Market Capitalization	123000000000.00	144000000000.00	944000000.00	612000000000.00
Observations	1200			
Correlation Coefficient	0.0241			

Here, it can be seen that the average monthly returns, spread across the panel data are 0.637 percent, with a standard deviation of 10.625. The minimum value reported for the monthly returns was -44.0249 while the maximum value for the monthly returns across the panel was 47.8336 percent. Likewise, the average market capitalization across the panel was 123000000000.00 while the standard deviation was observed to be

144000000000.00. The correlation coefficient can be seen to be 0.0241, which indicates a weak positive correlation between monthly returns and market capitalization

The average monthly returns and the average market capitalization estimates for the selected companies can be seen in table 1.

**Table 2** Average Monthly Returns and Market Cap

Company Name	Average Monthly Returns	Average Market Capitalization
Huitong Energy	0.84109	1878790892.59
First Pharmaceutical	0.84699667	2663342912.10
Kaikai Industry	0.53634167	2841966000.00
Axiata	0.46092167	3415746316.13
Hongda New Material	0.57380333	3436282464.82
Baosteel Co., Ltd.	0.23402917	113846938014.91
SAIC	0.90191583	226455631853.78
China Pacific Insurance	0.88503083	235042522166.67
Shanghai Pudong Development Bank	0.8133625	256904137647.53
Bank of Communications	0.27737083	386017683950.39

Here based on the average estimates for the firms under consideration, it can be observed that the firms with the lowest average market cap, Huitong Energy and First Pharmaceutical have considerably high average monthly returns. Further, the Bank of Communications stock, with the highest average market cap can be seen to

have considerably low average monthly returns. The only exceptions here are SAIC, the China Pacific Insurance and the Shanghai Pudong Development Bank, which can be seen to be offering both high average market cap and average monthly returns.

The assessment of the underlying linkages between the monthly returns has been undertaken in the form of panel regression analysis and the results have been presented in table 2.

**Table 3** Panel Data Regression Models

	Fixed Effects	Random Effects
Monthly Returns	0.0054288	0.0054288
	6.29***	6.29***
Constant	23.89087	23.89087
	2603.1***	30.38***
F test that all $u_i=0$	6585.35***	
Wald Chi2		39.62***
N	1200	1200
Hausman Test	0.9986	

Note: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

It is evident through the fixed and random effect models constructed for studying the linkages between monthly returns and the market capitalization of the firms, that the average monthly returns had a positive coefficient. This implies that an increase in the monthly returns would imply an increase in the market capitalization.

$$\begin{aligned} \text{Market Capitalization}_{i,t} &= 23.89087 \\ &+ 0.0054288 (\text{Monthly Returns}) \\ &+ \epsilon_i \end{aligned}$$

The probability value of the regression coefficients is all less than 0.05 and 0.001 which allows us to deduce statistical significance at 95 per cent and 99 per cent level of significance.

Based on the estimates, it can be inferred that the monthly returns generated by the stocks of the Chinese companies under consideration had a positive relationship with the market capitalization of the given companies. Further, venturing on the test of the choice between the fixed effects and the random effects model we make use of the Hausman test. The Hausman test is based on the null that the random effects (whenever in the time varying effect of the variables is ignored) model is more suited for the current data and the alternate hypothesis is that fixed effects model is more suitable. The Hausman test statistic has a probability value greater than 0.05 which leads us to go forth with the fixed effects model, implying that the linkages between the market

capitalization and monthly returns controls for the panel varying effect.

Ultimately, it can be surmised that the current sample rejects notion of the results postulated by the small firm effect hypothesis, that the smaller sized firms tend to present higher returns. This stands against the small firm effect. However, these results reflect the 10 Chinese companies and the monthly returns generated by the said companies over a period spanning between 2010-2020, which might impact the variables significantly. The small firm effect can be impacted by the personal bias of the researcher while selecting the time period. The stock market performance of the firms is impacted by the performance of the firms, their sales and the market information circulating for the company under consideration, rather than just the factors classified in the asset pricing models. The current analysis has presented some peculiar results that are stated above related to the small firm effect.

### 3. DISCUSSION

The results of the current study do not correspond with the findings of the small firm effect in the case of the Chinese firms being selected for analysis and the results point towards a positive linkage between market capitalization and the monthly returns generated by the firms. Several authors have studied the small firm effects prevalent in the returns generated by the firms and their estimation using the asset pricing models. Banz was the first to study the effects of small firms [4]. He along with Fama and French proposed the small firm model effect successively with their three-factor model. The model was an improvement from the Fama French 3 factor model [5]. Banz divided the stocks of listed companies in New York between 1936 and 1975 into five groups according to firm size. The results of the study were that the average return of the largest group was 19.8% lower than the average return of the smallest group. He also found that after firms adjusted for risk, company returns were still negatively correlated with firm size. This interpretation was subsequently challenged by a number of scholars. A number of authors argue that the small firm effect is simply an illusory conclusion drawn when there are residual biases in the conditions assumed in the research process [6]. The results presented by Barry and Brown corroborate the findings drawn from the analysis of the panel data. Because of the high systematic and unsystematic risks associated with small companies, there is a possibility of delisting in the course of the study. However, Banz's studies are conducted on small companies that have been listed for at least five years and have a good track record. This leads to a residual bias in the data.

In China, Songxing and Weigen analysed stock trading data from the Shanghai Stock Exchange from 1993 to 1994. They found that the utility of small firms

existed in the Shanghai stock market[7]. However, their selection of firms is not comprehensive and representative. Therefore, this paper will use a full sample, long time horizon, equilibrium regression method and exclude the effect of beta and firm size on the cross-sectional regressions to investigate the existence of the small firm effect in the Shanghai and Beijing stock exchanges and discuss the reasons for this phenomenon and its implications for the stock market.

#### 4. CONCLUSION

This paper conducts an empirical study on the relationship between firm size and stock returns for all listed companies in Shanghai from 2010 to 2019, and explores the reasons for the existence and relevance of the small firm effect. The data has been curated in the form of panel data with the company name being the panel variable. The assessment of the average returns and the average market capitalization for the companies reflected that the small sized companies in certain cases Huitong Energy and First Pharmaceutical had significantly high monthly returns as compared to larger firms, despite having the smallest market capitalization, and likewise Bank of Communications had significantly low monthly returns as compared to larger firms, despite having the largest market capitalization. This points towards the presence of small sized effect in the case of a limited number of companies in the sample.

The results drawn from the panel data analysis indicated that the effect of small companies in the Chinese market is not significant, rather the monthly returns are positively linked with the market capitalization of the firms in the Chinese market. The key inferences are drawn from the analysis point towards the idea that the size of the firms, proxied by the market capitalization estimate, in the current sample of Chinese listed companies presented a positive relationship with the monthly stock returns. Secondly, the small firm effect does not exist in the current analysis for a variety of reasons, which might include the selection bias on part of the researcher while selecting a time frame for the analysis. The limited number of companies selected, which is further limited by the industry being chosen is likely to have impacted the quality of results and the identification of the small size effect in the current sample. Third, the absence of the small firm effect suggests that the selected firms in the Chinese stock market replicate the conditions of semi-strong market efficiency.

#### ACKNOWLEDGMENTS

In preparation of my assignment, I had to take the help and guidance of some respected persons, who deserve my deepest gratitude. Foremost, I would like to thank my supervisor and mentor who guided me at every step of the project. Moreover, I would like to thank my

peers for guiding me through all the tough times that I faced and for keeping my morale high through the entire process of this project. Lastly, I would like to thank my friends and family who have been with me through my entire academic career and have been the bedrock of my support, not only for this project but for my academics as well.

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