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The Implication of ChiNext on Main Board Stock Market

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Abstract

This study presents an Autoregressive Distributed Lag (ARDL) approach to ascertain the implication of ChiNext stock on main board stock market. The empirical data cover 12 years period, from 2010 to 2021, in daily basis. ARDL method is used in this study to estimate the short run and long run relationship between ChiNext stock index and main board stock index. The main board stock index is the dependent variable and ChiNext stock index and volume transaction as the independent variables. Among other, correlation analysis, Augmented Dickey unit root test, cointegration test, error correction model (ECM) and Long-run Equation test are carried out in this study. Long run results show that have negative relationship between ChiNext stock index and Main Board Stock Market Index. This finding suggests that the growth of ChiNext might be at the expense of the main board's performance, potentially due to capital diversion. The study contributes to the literature by providing robust evidence of inter-market dynamics in China's stock market. For practitioners, our findings offer insights into market integration and risk management. We recommend future research to incorporate additional stock indices and consider macroeconomic factors to further validate these dynamics. This study is crucial for investors, policymakers, and market regulators seeking to understand and navigate the complex interactions within China's capital markets.

Keywords: ARDL, ChiNext Stock, Main Board Stock Index

Introduction

There are various stock exchanges around the world, but only approximately 50 stock exchanges are active (Long, 2014). They are roughly classified as: well-developed markets, such as NASDQ America, New York Stock Exchange, London Stock Exchange, Singapore Stock Exchange; and developing markets, including Shanghai and Shenzhen Stock Exchanges in China, Brazil Stock Exchange, National Stock Exchange of India, Moscow Exchange in Russia (Claessens & Schmukler, 2007). Caglio et al. (2011) argue that some developed markets are losing their leading role, but some developing markets are growing into global listing venues.

The Chinese market is one of the fast-growing markets (Padmanabhan, Sinha, Venkataraman, Ravi, & Joshi, 2015). With many years of consecutive economy growth, since 2010 China has become the second largest economy community in terms of GDP in the world (Long, 2014). Meanwhile, China's stock market has become considerably active in aspects of both issuing amount and share number since then.

China's stock market is divided into the main board and the Growth Enterprise Market, the main board of China by the Shanghai Stock Exchange and the Shenzhen Stock Exchange. On December 1, 1990, Shenzhen Stock Exchange opened on a trial basis. The Shanghai Stock Exchange was established on November 26, 1990, and officially opened on December 29, 1990. China's Growth Enterprise Market (GEM or ChiNext) was launched on October 23, 2009. On October 30, 2009, China's Growth Enterprise Market was officially listed. On August 24, 2020, the first batch of enterprises registered on ChiNext were listed.

Compared with the main board market, the listing requirements of the Growth Enterprise Market are often more relaxed, mainly reflected in the requirements of establishment time, capital scale, medium- and long-term performance, etc. Companies listed on the ChiNext market have high growth potential, but they are usually established for a short time and have a small scale, and their performance is not outstanding, but they have a great room for growth. It can be said that the ChiNext is a stock market with low threshold and high risk and strict supervision, and it is also a cradle for incubating entrepreneurial small and medium-sized enterprises.

By 1990s, majority of developed stock markets have their second listing venue. Like second boards in other markets, the China ChiNext Board aims to provide a platform where smaller companies with growth potentials which cannot fulfill the full listing requirement of the Main board of the China stock market, can obtain financing through public offerings. A typical example of GEM is the NASDAQ in the US whose original composition was mainly high-tech companies and pharmaceutical companies that had a need for external financing but that was not fulfilling the entire requirement to be listed in the Main board, NYSE. One question arising from the introduction of GEM in China is whether it is established at the expense of the Main board. Because of the lucrative potential of an alternative high growth market, China investors might divert their funds and attention from the Main board to the ChiNext board. Trading activity in the Main board might thus diminish and the market quality in the Main board might also be undermined. In the literature, the potential trade-off between having GEM for high growth firms and second-rate market with poor quality stocks and low standard of listing requirements is still understudied especially in emerging markets. Unlike that of NASDAQ and NYSE which have different market designs, the China ChiNext board and the Main board essentially share a same trading mechanism. Both boards in China are organized as pure order-driven markets. All orders are submitted through a computerized system and are matched with price-time precedence.

To that the type of firms listed, and investors participated in China ChiNext board and the Main board could be vastly different for three reasons below. Firstly, firms listed in the Main board must satisfy a series of more strict requirements to go public and hence are relatively less risky. However, the listing requirements of China ChiNext board are less stringent. Secondly, the China Securities Regulatory Commission (CSRC) requires the ChiNext board

open only to investors who have at least two years of trading experience before they can trade ChiNext stocks. The third difference, albeit implicit, is the industry coverage in each of the board. Firms listed in the Main board cover most industries in China. However, the ChiNext board, like the NASDAQ, covers only a fraction of industry codes and this is especially so at the outset of the establishment of ChiNext Board.

The fluctuations in the economy could plausibly affect both markets. An important but unexplored question is whether Main Board returns leads the ChiNext board in the happenstance of macroeconomic fluctuations because Main Board encompasses wider industry scope, or whether the ChiNext board's returns lead the Main board's returns because of its coverage of specific industries and strong vulnerability to fluctuations, and hence a quicker responsiveness to the whole economy (Cheung & Liu, 2014). (Chan, 1992) analyzes the lead-lag relationship between the cash market and stock index futures market and concludes that the futures market is the main source of market-wide information.

The Growth Enterprise Market of China is essential to address the long-standing financing difficulties for the Chinese Small and Medium-sized Enterprises, which are unqualified to raise capital from the Primary Stock Market. ChiNext was to provide emerging companies with a capital formation platform and as an alternative market to the Main Board.

The following two figures show the Shanghai Securities Composite Index (SSCI) and ChiNext market index from 2010 to 2021. Chinese main board index measured by the Shanghai Securities Composite Index (SSCI) and code is 000001. ChiNext index measured by Growth Enterprise Index (GEI), and code is 399006. From Figure 1, we can see that the overall trend of the ChiNext and Main Board indexes in daily is roughly consistent. From Figure 2, we can see except for 2016, the trend of the main board market index and the ChiNext market index is consistent in other years.

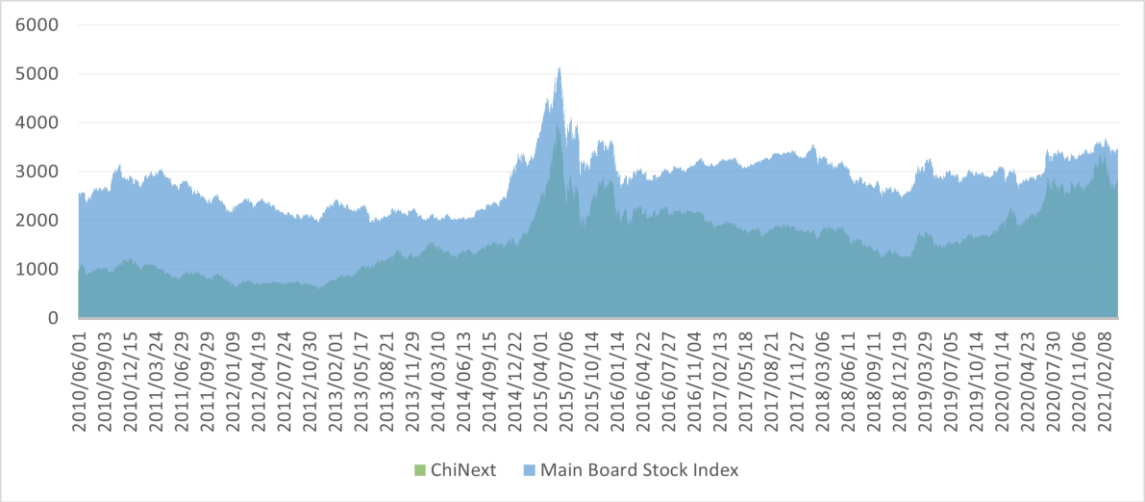

Figure 1: Daily data
Source: http://www.sse.com.cn/ & http://www.szse.cn/
Note: ChiNext Index daily and Mainboard Index daily from 2010 to 2021.

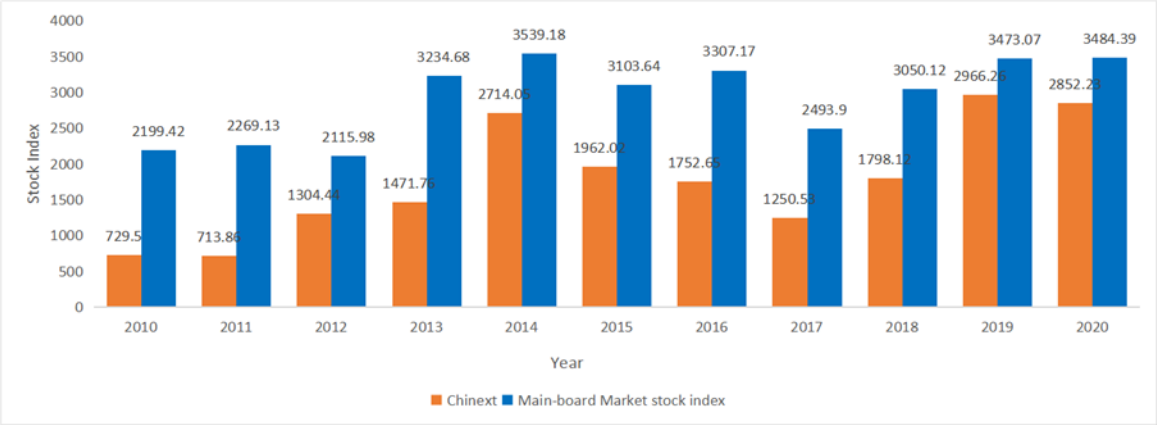

Figure 2: Yearly data
Source: http://www.sse.com.cn/ & http://www.szse.cn/
Note: ChiNext Index yearly and Mainboard Index yearly from 2010 to 2021.

The GEM and the main board index seem to influence each other from Figure 1. Sometimes, the GEM takes the lead to reflect the market trend and the performance is more violent than the main board, especially when there is a big pull up and a big drop. But their trends have not always been exactly the same, especially during China's bull market of 2014-2015, when the main board index rose earlier than the ChiNext index. Thus, the model is Main Board Stock index = f (ChiNext, Main Board Volume Transaction).

The Figure 3 shows a 30-minute chart of the GEM and the main board in 2019. The chart shows a 30-minute chart of the GEM and the main board in 2019. The two lines are the trend lines of the GEM and the main board respectively. The lowest point of the main board is more than 1.85 times of the GEM index, in which the lowest point of the GEM in 2019 is 1483 and the lowest point of the main board is 2744. The highest point, the main board is about 1.5 times that of the GEM, in which the highest point of the main board is 3566 and the highest point of the GEM is 5884. From the trend line and the gap between the highest and lowest points of the two stock markets we can also see that the GEM volatility is more obvious than the main board.

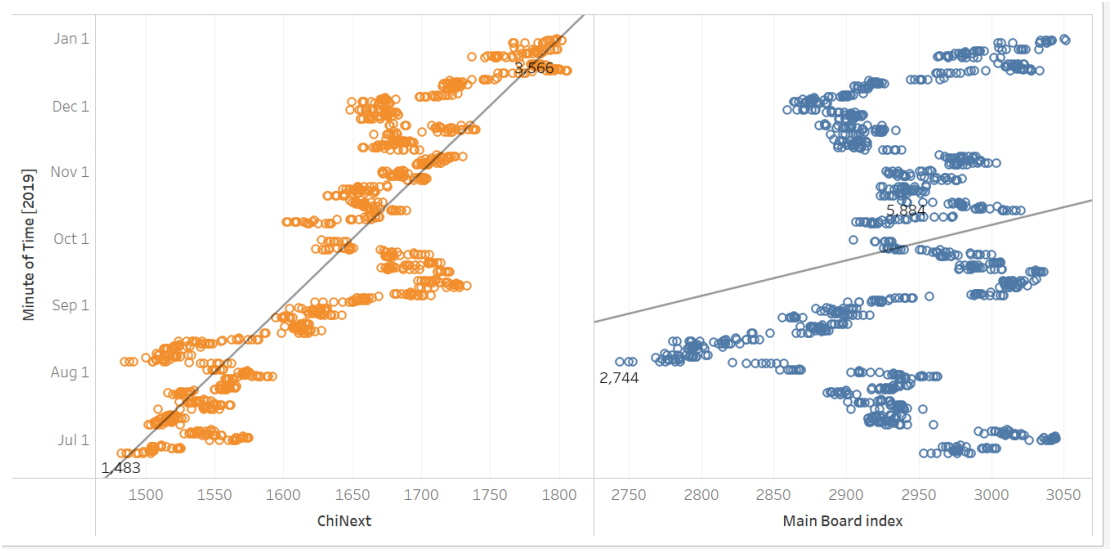

Figure 3: 30-min data in 2019
Source: http://www.sse.com.cn/ & http://www.szse.cn/
Note: ChiNext Index 30-min and Mainboard stock Index 30-min in 2019.

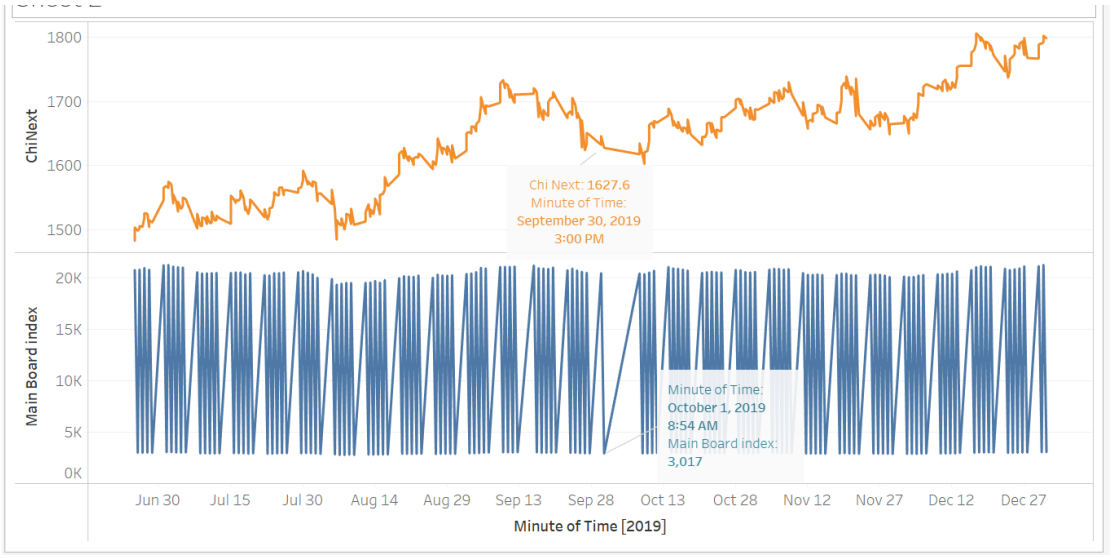

Figure 4: Minute data in 2019
Source: http://www.sse.com.cn/ & http://www.szse.cn/
Note: ChiNext Index 30-min and Mainboard stock Index 30-min from 30, Jun, 2019 to 27 Dec, 2019.

As can be seen from Figure 4, at 3 o' clock in the afternoon of September 1, 2019, the GEM did not fall to the lowest point, but was still in the downward trend, while the main board market had already fallen to the lowest point at this moment. We can assume that the GEM downward trend accelerated the decline of the main board, so the main board quickly fell to the lowest point.

Figure 5 shows a short-term chart of the GEM and the main board from June 25 to August 5, 2019. In the short term, the indexes of the two markets seem to have roughly similar trends and seem to interact.

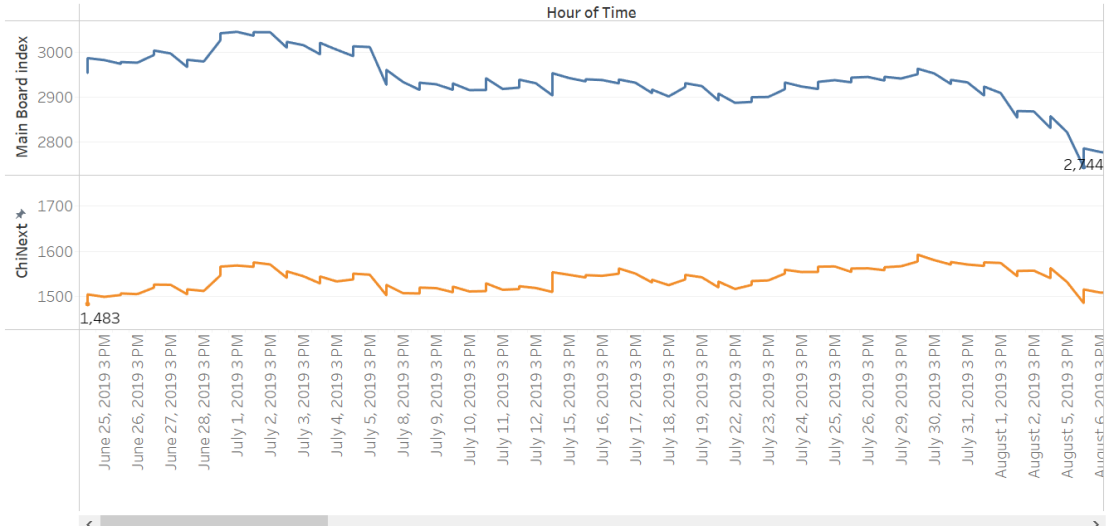

Figure 5: 30-min data from 25, Jun 2019 to 5, Aug 2019
Source: http://www.sse.com.cn/ & http://www.szse.cn/
Note: ChiNext Index 30-min and Mainboard stock Index 30-min from 25, Jun 2019 to 5, Aug 2019.

Therefore, whether there is a relationship between the two, what kind of relationship it is, who influences who first, and who has more influence, is the focus of this paper.

Although the ChiNext may reflect the trend of the stock market in advance, the ChiNext's decline during a bear market may exacerbate the decline of the main board market.

There are also some articles that have studied the relationship between China's main board market and GEM. For example, (Chao et al., 2013) study on the Spillover Effect of Main Board and GEM Stock Market. This paper discusses the spillover effect regarding return and liquidity caused between Main Board and Growth Enterprise Market at the beginning stage and the maturity stage respectively. (Wang & Liao, 2009) study on the Impact of the Second Board on the Main Board: Evidence and Enlightenment from Hongkong Stock Market and Shenzhen Small-and-medium Enterprise Board Market. The paper studies the relationship between the main-board market and the second-board market by using the data of Hongkong stock market. The studies reveal that there exist unidirectional spillover effect of volatility and liquidity between the two markets above which means that the second board market has not intensified the volatility of the main-board market and also has not significantly attracted the capital of the main-board market.

Problem Statement: While ChiNext may serve as an early indicator of stock market trends, its decline during a bear market might amplify the downturn of the main board market. There are many factors that affect stock prices on the main board market. This study mainly studies the implication of ChiNext stock price on the main board market, so as to explore whether there is a relationship between the ChiNext and the main board market.

The objective of this study is analysing the impact of ChiNext stock prices on the main board market and the relationship between ChiNext and Chines main board market.

Scope of Study: Because ChiNext (Growth Enterprises Market or Second-board Market) started in 2009, however, China Main-Board Market started in 1990. So, this study will analyze both market data from 2010 to 2021. The scope country is only China. The main market data will be based on the closing price of the Shanghai Securities Composite Index (SSE), and the GEM Index will be based on the closing price of the GEM Index.

Significance of the Study: This study is of paramount importance as it delves into the intricate relationship between the ChiNext board and the main board stock market, a critical yet often overlooked area in financial literature. The implications of this research are manifold:
Theoretical Enrichment: It enhances the academic discourse by providing a nuanced understanding of the co-evolution of these two pivotal market segments. The ARDL model's application offers a robust analytical framework that can be replicated in other emerging market contexts.

Policy Formulation: The insights gleaned from this study are vital for regulatory bodies tasked with fostering a balanced and vibrant capital market. It offers a template for crafting policies that can harness the innovative energies of the ChiNext board while ensuring stability in the main board market.

Investment Decision-making: For investors, the study provides a compass to navigate the interlinked dynamics of ChiNext and the main board, enabling them to make informed investment choices that could potentially yield higher risk-adjusted returns.
Market Efficiency: By identifying the direction and magnitude of influence between the markets, this study contributes to the broader goal of enhancing market efficiency and liquidity, which are cornerstones of a thriving financial ecosystem.

Economic Development: The findings are instrumental for economic planners aiming to stimulate innovation and entrepreneurship. A thriving ChiNext market can act as a catalyst for economic growth by providing necessary capital to startups and scale-ups.

This study, therefore, serves as a bridge between academic theory and practical application, offering a comprehensive toolkit for a diverse audience ranging from academicians to market practitioners. The recommendations for future research further extend the utility of this study, ensuring its relevance in the evolving landscape of China's financial markets.

Literature Review

This study relies primarily on the On Balance Volume (OBV) theory and Behavioral Finance theory. Introduced by Joseph Granville in 1963, OBV theory posits that changes in market prices must be accompanied by corresponding changes in trading volume. The theory emphasizes the close connection between share price fluctuations and the expansion or contraction of turnover. If the price rises or falls without a corresponding increase or decrease in turnover, sustaining the change in market price becomes challenging. Notably, significant changes in volume, independent of substantial price shifts, can precede a subsequent "spring" in price, either upward or downward. Trading volume serves as a direct indicator of market activity and reflects the dynamic interplay between supply and demand in the market's operational process. Without volume, market prices remain unchanged, and share price trends are absent. Therefore, fluctuations in volume signify specific share price trends.

Behavioral Finance theory, emerging in the 1980s, has had a profound impact on the capital asset pricing model and the efficient market hypothesis. This theory explores the decision-making behavior of traders based on the psychological activities of capital market participants and information asymmetry. According to Behavioral Finance theory, investor behaviors that affect psychology indirectly influence stock prices. As a theory successfully challenging traditional financial paradigms, Behavioral Finance provides a rational explanation for industry anomalies. By studying traders' decision-making behavior through the lens of psychological activities and information asymmetry, Behavioral Finance theory reveals that fluctuations in the Growth Enterprise Market (GEM) can impact investor psychology and, consequently, have an indirect effect on Main Board stock prices.

ChiNext Stock Price on Main Board Stock Price: Several studies suggest that ChiNext has a negative effect on the Main Board Stock Market. According to Yue (2001), the launch of the Growth Enterprise Market (GEM) forms a competitive situation for the main board market. It not only competes for potential high-quality listing resources but also diverts investment funds from the secondary market of the main board. Liao et al. (2014) used the Lotka-Volterra model to quantitatively analyze the competition relationship between GEM and the main board in terms of trading volume. The research found that the GEM market “preys” on the trading volume of the main boards.

However, there are also studies that observe a positive effect of ChiNext on the Main Board Stock Market. Mei (2001), suggests that when some stocks are hotly speculated in the GEM, similar industries or related concept stocks on the main board will also be sought. Therefore, the GEM will bring incremental capital to the main board market. Another perspective is presented by Cheung and Liu (2013), who argue that the types of firms listed and investors participating in the China GEM board and the Main board are different. The GEM board does not prey on main board stock capital due to requirements set by the China Securities Regulatory Commission (CSRC), limiting GEM board access to investors with at least two years of trading experience. Additionally, the Main Board encompasses a wider industry scope and exhibits stronger vulnerability to fluctuations, leading to quicker responsiveness to the entire economy.

Contrarily, Xia and Wen (2010), reveal that ChiNext has no effect on the Main Board Stock Market. They argue that although there is a long-term co-integration relationship between the GEM market and the main board market, the main board market is the Granger cause of the GEM fluctuations. In other words, the fluctuations of the main board market will affect the GEM fluctuations. However, ChiNext has no impact on the main board market. The small number of listed enterprises on the GEM and the much smaller total market value of enterprises on the GEM compared to the main board market suggest that the GEM index has little influence on the main board market index (Wang et al., 2010).

Main Board Stock Volume Transaction on Main Board Stock Price: Some studies suggest a positive relationship between stock volume transactions and stock prices. For instance, Saatcioglu and Starks (1998), found a positive relation between volume and both the magnitude of price change and price change itself in their investigation of Latin American markets, without strong evidence of a causality relation. In another study, Smirlock and Starks (1988), explored the lagged relation between price changes and volume, using individual

stock transactions data. They documented a strong positive lagged relation between volume and absolute price changes. Our paper employs Granger causality tests to examine the empirical relationship between absolute stock price changes and trading volume in the stock market. The results reveal a significant causal relationship between absolute price changes and volume at the firm level, with this relationship being stronger in periods surrounding earnings announcements. This suggests that information arrival follows a sequential rather than a simultaneous process, although the results do not support an extreme version of either information arrival model.

Moosa and Loughani (1995), tested the price-volume relation using data from four emerging Asian stock markets: Malaysia, the Philippines, Singapore, and Thailand. They found evidence for causality from volume to absolute price changes and from price changes per se to volume. Some evidence was also found for bidirectional causality. Another finding was that the relation is contemporaneous, lagged, positive, and sensitive to institutional, organizational, and structural factors. Nonlinear specifications did not seem to be superior to linear causality models. Ying (1966), studied the relationship between the daily closing price of the S&P 500 common stock index and the daily trading volume of the New York Stock Exchange (NYSE). He found that a large quantity increase is usually accompanied by a large price change, a large quantity increase is usually accompanied by a price increase, and a small quantity decrease is usually accompanied by a price decrease.

Several studies have indicated a negative impact of stock volume on main board stock prices. Initially, early research utilizing spectral analysis on weekly index data, as well as daily and transaction-level individual stock data, found little correlation between prices and volume, suggesting that price changes follow a random walk (Godfrey & Morgenstern, 1964). Additionally, Assogbavi and Osagie (2006), found that the absence of a direct positive relation between volume and price change is attributed to the lack of asymmetry in transaction costs. The limited evidence of the well-documented positive absolute price-volume relation suggests that variations in institutions and information flows in emerging markets significantly impact the valuation process of equity securities. Karpoff (1987), proposed that the dissemination of information in financial markets might influence the price-volume relationship. In cases where most investors receive information late in the queue, the widely observed positive correlation can only manifest with a certain lag, and it may not be evident when examining volume and price changes on the same date.

Lee (2002), investigates the dynamic relationships, including causal links and the direction and magnitude of dynamic effects, between trading volume and returns (as well as volatility) in both domestic and cross-country stock markets. The analysis is based on daily data from the three largest stock markets: New York, Tokyo, and London. Key findings include: firstly, trading volume does not Granger-cause stock market returns in any of the three markets. Secondly, there is a positive feedback relationship between trading volume and return volatility across all three markets. Thirdly, in terms of cross-country relationships, U.S. financial market variables, particularly U.S. trading volume, exhibit significant predictive power for UK and Japanese financial market variables. Lastly, sub-sample analyses reveal stronger spillover effects post the 1987 market crash and an increased significance of trading volume as an information variable following the introduction of options in the U.S. and Japan (Lee, 2002).

Li (2007) pioneered the use of the asymmetric GARCH-M model to explore the relationship between volume and price in China's stock market. Findings suggest that short-term price fluctuations are primarily explained by transactions, with expected trading volume significantly influencing market volatility. This contrasts with mature markets like the United States, as China's stock market fluctuations involve various factors beyond volume. The study introduces the impact of lagging return shocks, noting a post-1997 trend where negative returns have a more substantial effect on market volatility, reflecting the leverage effect.

Methods

This study presents an analysis of the implication of ChiNext on main board stock market. Although the ChiNext may reflect the trend of the stock market in advance, the ChiNext's decline during a bear market may exacerbate the decline of the main board market. ARDL method is used in this study to estimate the short run and long run relationship between ChiNext stock index and main board stock index. In model 1, the main board stock index is the dependent variable and ChiNext stock index and main board volume transaction as the independent variables. In model 2, the main board stock index is the dependent variable and ChiNext volume transaction and main board volume transaction as the independent variables. Among other, correlation analysis, Augmented Dickey unit root test, cointegration test, error correction model (ECM) and Long-run Equation test are carried out in this study. The period of this study is from June 1, 2010, to April 2, 2021. The data scope country is only China.

Based on the theory of On Balance Volume which holds that the change of market price must be coordinated by the volume of trading, and the fluctuation of stock price is closely related to the increase or decrease of trading volume. Volume is relatively heavy in bull markets and light in bear markets, and it takes volume to make prices move are relevant for emerging stock markets. Combined with empirical literature, the model to be estimated in this study can be expressed as:

$$P_M = \text{ƒ}\ (V_M)$$

Where P_M stands for Main Board Stock Price in China, V_M stands Main Board Volume Transaction.

Based on the literature and hypotheses about the impact of GEM on the main board market, the above model can be augmented to include ChiNext:

$$P_{M,t} = \text{ƒ}\ (\text{ChiNext}, V_{M,t})$$

Where ChiNext stands the stock prices or volume transaction on the second board market.

The above equation further expanded to examine the effect of ChiNext on Main Board Stock Price.

$$\text{Model 1: } P_{M,t} = a_0 + a_1 ChiNextP_t + a_2 V_{M,t} + \varepsilon$$

$$\text{Model 2: } P_{M,t} = a_0 + a_1 ChiNextV_t + a_2 V_{M,t} + \varepsilon$$

Where: a_0 = Y intercept

a_1 = slope of $P_{M,t}$ with variable $ChiNextP_t$ or $ChiNextV_t$, holding $V_{M,t}$ constant

a_2 = slope of $P_{M,t}$ with variable $V_{M,t}$, holding $ChiNextP_t$ constant

ε = random error in $P_{M,t}$ for observation t

Where $P_{M,t}$ stands for Main Board Market stock price at time t. $ChiNextP_t$ represent the Second Board Market Stock Price at time t. $V_{M,t}$ stands Main Board Volume Transaction at time t. And $ChiNextV_t$ represents stands ChiNext volume transaction at time t.

In order to unify the measurement and facilitate calculation and analysis, this study will take the logarithm of all the data and then analyze it. logarithm may help to offer better insight about each impact, as well as value judgement for each impact without comparing. So, the above equation will transform to:

Model 1: $logP_{M,t} = a_0 + a_1 logChiNextP_t + a_2 logV_{M,t} + \varepsilon$

Model 2: $logP_{M,t} = a_0 + a_1 logChiNextV_t + a_2 logV_{M,t} + \varepsilon$

Measurement of ChiNext is the Growth Enterprise Index (GEI) and code is 399006, Measurement of main board stock price is the Shanghai Securities Composite Index (SSCI) and code is 000001. And the Main board Volume Transaction measured by the daily cumulative number of shares traded of volume.

Since there is a strong correlation between the GEM index and the main board index, and the fluctuation trend is sometimes similar, this study hypothesizes that the ChiNext stock price significantly on the Main Board stock price. From Figure 1.1, we also can see that the overall trend of the ChiNext and Main Board indexes in daily is roughly consistent.

Findings

The descriptive analysis results are shown in following Table 1. As showed in Table 1, the summary of the common statistics contains the means, minimum, maximum and standard deviation values of each series after transforming into the logarithmic form. Over the past 10 years, mean of Main board stock index logarithm was 7.934 per day, with a peak at 8.55 and a low of 7.576. The mean of ChiNext volume transaction logarithm was 16.884, with a peak at 19.624 and the minimum at 13.814 from 2010 to 2021. The mean of logarithm volume transaction of Main board stock market was 18.88, with a peak at 20.57 and a low of 17.5 in the past 10 years. The mean of ChiNext index logarithm was 7.305, with a peak at 8.29 and the minimum at 7.58 from 2010 to 2021.

The index difference between the main board and ChiNext is small except standard deviation, less than 1. The trading volume difference between the two cities is not big, but it is greater than the index difference.

Table 1
Descriptive

	$logP_{M,t}$	$logChiNextP_t$	$logChiNextV_t$	$logV_{M,t}$
Mean	7.934	7.305	16.884	18.876
Median	7.969	7.354	17.278	18.854
Maximum	8.550	8.290	19.624	20.569
Minimum	7.576	6.386	13.814	17.495
Std. Dev.	0.186	0.421	1.267	0.588

Table 2 displays the results of correlation matrix which show the pairwise correlations between all variables (dependent and independent). From the table, the variables are correlated and unlikely there is an issue of serious multicollinearity in model 1, as all correlation coefficients (*logP$_M$, logV$_M$, logChiNextP*) are not more than 80%. The data must not show multicollinearity, which occurs when you have two or more independent variables that are highly correlated with each other. When significant multicollinearity is present, it becomes difficult to isolate the effect of one independent variable on the dependent variable,

the signs of coefficients may be the opposite of what they should be, making it difficult to interpret regression coefficients, and p-values can be inflated.

There is not serious multicollinearity issue in model 2 too, as *logChiNextV* and *logV_M* correlation coefficients are more than 80%. ChiNext stock index is likely to affect Main Board index positively and ChiNext stock volume transaction affect Main Board volume transaction positively too.

Table 2
Correlation Analysis

	$logV_{M,t}$	$logP_{M,t}$	$logChiNextP_t$	$logChiNextV_t$
$logV_{M,t}$	1.00			
$logP_{M,t}$	0.757	1.00		
$logChiNextP_t$	0.774	0.773	1.00	
$logChiNextV_t$	0.662	0.519	0.795	1.00

Table 3 present the result of unit root test. For model 1, *PM= f (ChiNext, V_M),* except V_M , all variables are stationary at order of 1, V_M is stationary at level. Since all variables is stationary at order 1 or below, then ARDL is suitable for model 1. For model 2, P_M*= f (*V_C*,* V_M*)*, V_C and V_M is stationary at level. Since all variables is stationary at order 1 or below, then ARDL is suitable for model 2.

Table 3
Unit root test

	Level		1st Difference	
	C	C&T	C	C&T
$logP_{M,t}$	-1.6995	-2.192	-49.456***	-49.449***
$logChiNextP_t$	-0.998	-1.899	-48.254***	-48.248***
$logV_{M,t}$	-3.645***	-4.439***	-26.062***	-26.057***
$logChiNextV_t$	-1.984	-5.169***	-26.062***	-26.062***

Note: Three asterisks (***) denotes statistically significance.

The Cointegration Test results are shown in following Table 4. From the table 4, the model 1 passed the cointegration test at 5%, so there is a short run impact among the variables. From the result, the model 2 passed the cointegration test at 1%, this model is valid.

Table 4
Cointegration test

	F-stat	Upper bound critical value		
MODEL 1:	4.561	10%	5%	1%
ARDL (1, 2, 2)	I (0)	2.63	3.1	4.13
	I (1)	3.35	3.87	5
MODEL 2:	8.784	10%	5%	1%
ARDL (1, 1, 0)	I (0)	2.63	3.1	4.13
	I (1)	3.35	3.87	5

Table 5 and Table 6 present the results of the Error Correction Model. From table 5, the adjusted R^2 is 0.567 which shows the 56.7% of variation in Y explained by all X variables adjusted for the number of X variables used in the model 1.

Table 5
Error Correction Model 1

Model 1: $logP_{M,t} = a_1 + a_2 logChiNextP_t + a_3 logV_{M,t} + \varepsilon$			
Adjusted-R^2	0.567	S.E. of regression	0.0089

It can be seen from table 6, the adjusted R^2 is 0.0449 which shows which shows the 4.49% of variation in Y explained by all X variables adjusted for the number of X variables used in the model 2.

Table 6
Error Correction Model 2

Model 2: $logP_{M,t} = a_1 + a_2 logChiNextV_t + a_3 logV_{M,t} + \varepsilon$			
Adjusted-R^2	0.0449	S.E. of regression	0.0132

Table 7 and Table 8 presents the results of Long-run Equation Model. From Table 7, Model 1 can be represented as follows:

$$logP_{M,t} = -0.08 logChiNextP_t + 0.435 logV_{M,t} + 0.285$$

ChiNext unlikely to exert any effect on Main board market. From the Error Correction Regression and this Long-run Equation Model, ChiNext index has negative effect on Main Board Market index in the short run. On the other hand, results show if volume transaction in the Main Board Market increase by 1%, the Main Board Market Index will increase by 0.435%. This finding is consistent with the theory the rise in stock price is necessarily accompanied by an increase in trading volume.

Table 7
Long-run Equation Model 1

	Model 1	P-Value
Constant	0.2851[0.163]	0.8709
$logChiNextP_t$	-0.0799[-0.585]	0.6277
$logV_{M,t}$	0.4353[0.141]***	0.0021

Based table 8, Model 2 can be represented as follows:

$$logP_{M,t} = -0.035logChiNextV_t + 0.389logV_{M,t} + 1.21$$

From the table, ChiNext volume transaction unlikely to exert any effect on Main board market. From the Error Correction Regression, ChiNext volume transaction has negative effect on Main Board Market index, in short term. On the other hand, results show if volume transaction in the Main Board Market increase by 1%, the Main Board Market Index will increase by 0.389%. This finding is consistent with the theory the rise in stock price is necessarily accompanied by an increase in trading volume.

Table 8
Long-run Equation Model 2

	Model 2	P-Value
Constant	1.2066[1.351]	0.1767
$logChiNextV_t$	-0.0354[-1.389]	0.1649
$logV_{M,t}$	0.3886[6.433]***	0.0000

The reason why ChiNext unlikely to exert any effect on Main board market maybe the ChiNext is small compared with main board. The reason why GEM has a small negative impact on the main board market index in the short term is that GEM's reaction is faster and more intense, so it will accelerate the decline of the main board in the short term.

Discussion and Conclusion

For correlation analysis, the variables are correlated and unlikely there is an issue of serious multicollinearity all correlation coefficients are not more than 80%. For Unit root test, all variables are stationary at order 1 or below, so ARDL is suitable for model 1 and model 2. For error correction test, model 1 adjusted R^2 is 0.567 which shows the model 1 is correlated and the data fits the sample regression line. Model 2 adjusted R^2 is just 0.0449 which shows the model 2 is a little correlated. From long-run equation model, it shows ChiNext index has negative effect on Main Board Market index. Every 1% rise in the ChiNext index will cause The Main Board index to fall 0.08%. And every 1% rise in ChiNext volume transaction will cause Main board index to fall by 0.035%. On the other hand, results show if volume transaction in the Main Board Market increase by 1%, the Main Board Market Index will increase by 0.389%. This finding is consistent with the theory the rise in stock price is necessarily accompanied by an increase in trading volume.

For investors, the Growth Enterprise Market should target investors who can objectively and comprehensively assess the operating conditions of listed companies and the risks involved. Retail investors who lack proper understanding of high-risk companies or are mainly led by rumours and chase rise and fall should not be encouraged to participate in the market. Therefore, government should vigorously cultivate institutional investors in GEM, such as

pension funds, insurance funds, venture capital companies, etc., to make institutional investors become the backbone of the GEM market. When the GEM market is mainly run by institutional investors who are familiar with investment skills, the speculative nature of the market will be greatly reduced, and the risks will be greatly reduced.

For listed companies, there should be more listings of high-tech growth companies that belong to the physical category, and these companies must have real products manufactured and have a market. Doing so reduces risk by preventing large bubbles in the stock market.
For government, it is very important to coordinate the structure and development of both markets, to propel market-oriented reform process of Chinese security market furthermore, because in the long run, the ChiNext will not prey on the capital of the main board market. It is encouraged to develop the ChiNext and build a multi-level capital market. And this paper also puts up some suggestion on the risk aversion of both Main-Board stock market and the ChiNext stock market.

Limitation of Study: In this study, only the Shanghai Composite Index was used to represent the main board market, which is not sufficient. More other indexes should be used to represent the main board market, such as the Shanghai and Shenzhen 300 Index. Moreover, some representative listed companies should be selected from the ChiNext and the main board for supplementary analysis. Finally, this paper only studies the implication of ChiNext index, ChiNext trading volume and main board trading volume on the main board index, so it is suggested to add more factors, such as macroeconomic indicators and global market trends.
Suggestion for Future Research: It is recommended that future research expand the scope of analysis to include other stock indices and consider additional variables that may affect the main board market. This could provide a more holistic view of the relationship between ChiNext and the main board market and offer further insights into the factors driving market performance.

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