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The impact of refinancing transaction policy adjustment on stock market volatility

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Abstract. This paper investigates the impact of refinancing transaction policy adjustment on the volatility of convertible bond market. Through GARCH model analysis, it is found that the refinancing policy adjustment significantly affects the spillover effect between CSI 300 index and CSI convertible bond index, indicating that the policy adjustment leads to differences in the speed of market reaction to common information and the degree of change in yield, which reflects the market's sensitivity to the policy change as well as the adaptability of market participants. The empirical results show that the convertible bond market has a significant dynamic impact on the stock market during the policy adjustment period, accompanied by the improvement of market efficiency, which supports the hypothesis that the refinancing policy adjustment has a significant impact on the spillover effect between the two markets.

Keywords: Refinancing policy adjustment; Convertible bond market; Market volatility; GARCH; Spillover effect.

1. Introduction

In China's capital market, convertible bonds, as an important financing tool, are of great significance in solving the problems of financing difficulties, expensive financing and high leverage of private listed companies. With the development of the economy and the continuous improvement of the market mechanism, the convertible bond market has gradually become an important channel for enterprises to realize direct financing. However, with the continuous development of the market, the adjustment of financing policies has become one of the important factors affecting the volatility and stability of the market.

In recent years, the CSRC and SSE have issued a number of financing policy adjustment measures, including the Issuance Supervision Q&A and the new regulations on convertible bonds. These policy changes affect the supply and demand in the convertible bond market, which in turn affects the volatility and stability of the market. For example, the Issuance Supervision Q&A issued in February 2017 required an 18-month time gap between various corporate financings, and the rules related to refinancing and reduction of holdings were tightened accordingly, a policy initiative aimed at standardizing the market order and preventing risks resulting from over-financing. In September of the same year, the introduction of new regulations on convertible bonds clarified the subscription method of convertible bonds, changing from deposit subscription to credit subscription, which helped to increase the demand for convertible bonds and promote the development of the market. However, the impact mechanism behind these policy adjustments is unclear and requires further research to reveal.

he purpose of this paper is to investigate the impact of financing policy adjustments on the volatility of the convertible bond market and further analyze its transmission effect on the stock market. By building an EGARCH model, we introduce the policy change as a dummy variable into the variance equation to assess the actual effect of the policy adjustment. Additionally, we incorporate the closing price of the underlying stock as a variable into the model to explore the mechanism of the impact of the convertible bond index on the market volatility of the underlying stock. The innovation of this paper lies in the use of the EGARCH model to specifically isolate and measure the impact of policy changes, and in examining the dynamic relationship between convertible bonds and underlying stock prices in the context of China's unique market environment. Through these studies, we hope to

provide useful references and suggestions for deepening the reform of China's capital market and promoting its healthy development.

The structure of this paper is organized as follows: first, we will review the relevant literature and present the research hypotheses, detailing the past research results as well as the core issues and objectives of this study; second, we will detail the construction of the model and the description of the sample, including the theoretical basis of the model, the selection of variables, and the acquisition of the data; and then, we will present the empirical results and analyze the results, exploring the impact of the policy adjustment on convertible bond market volatility and the transmission effect on the stock market; finally, we will summarize the main findings of the study and present the outlook of future research, exploring the implications and impact of policy adjustments on the market..

2. Literature Review and Research Hypothesis

First, the impact of refinancing policy adjustments on stock market volatility has been extensively discussed. On the one hand, studies such as Fama et al. (1969) and Jensen (1986) suggest that the easing of refinancing policies may increase market volatility by increasing the supply of equities and leading to increased market supply pressures. [1] This is mainly due to the difficulty of the market in absorbing additional stock supply in the short term, as well as the possible proxy issues between management and shareholders. [2] On the other hand, refinancing policy adjustments may also have a positive impact on market confidence, as Masulis and Korwar (1986) and Hovakimian et al. (2001) have found that refinancing activity reflects the market's optimism about the company's growth opportunities to some extent, which may reduce the volatility of stocks. [3] [4] In addition, the adjustment of refinancing policies also has a significant impact on market efficiency and liquidity. Bavless and Chaplinsky (1991) argue that refinancing activities such as additional issuances can increase market liquidity, which has the potential to reduce market volatility. [5] At the same time, Brau and Fawcett (2006) point out that the efficient functioning of equity markets is essential for the efficient allocation of resources and can help reduce market volatility. [6] However, over- or under-reaction by the market to refinancing policy adjustments may lead to increased market volatility. Finally, the spillover effect of the refinancing policy adjustment on the convertible bond market and the stock market has also attracted the attention of scholars. Zhang Xiuyan and Zhang Min (2009) and Hu Qiuling et al. (2011) show that the relationship between the two markets has different dynamics, including positive correlation and asymmetric volatility spillover. [7] [8] In addition, Zou Geman's (2020) study shows that the new refinancing rules have limited spillover effects between the two markets, but help to improve the efficiency and responsiveness of their respective markets. [9]

With regard to refinancing policy adjustments and their impact on stock market volatility, it is important to recognize that these views are mainly based on specific market environments and assumptions, and therefore their applicability in practice needs to be considered in light of specific market conditions and policy contexts. Next, this paper will discuss the types and characteristics of refinancing policies, as well as the background and motivation for adjustments at both the macro and micro levels. When analyzing the types of refinancing policies and their characteristics, it is first necessary to distinguish between different types of refinancing. Generally speaking, refinancing mainly includes the issuance of additional shares, convertible bonds and preferred shares. Stock issuance can be categorized into directed and public issuance, with directed issuance referring to the issuance of new shares to specific investors, while public issuance refers to the issuance of new shares to all shareholders on a pro rata basis. Convertible bonds are bonds that can be converted to common stock at a certain point in time. Preferred stock is a financing instrument between bonds and common stock, and its holders usually enjoy a fixed dividend income. Adjustments in refinancing policies are often closely related to market conditions, the macroeconomic environment, and the policy direction of regulators. For example, policy makers may adjust the rules and conditions of refinancing in accordance with the stage of economic development and the operation of the stock market in order to meet the financing needs of the market and maintain the stability of the capital market. The motives

for policy adjustments can be multifaceted: on the one hand, it is to promote the healthy development of the company and provide enterprises with multiple sources of capital; on the other hand, the regulator may impose stricter controls on refinancing activities in order to prevent and control financial risks.

In the course of implementation, adjustments to refinancing policies usually involve the relaxation or tightening of issuance conditions, mechanisms for determining issuance prices, and investor protection measures. For example, regulators may incentivize firms to refinance through the capital market by lowering the threshold for additional share issuance, shortening the issuance cycle, or relaxing restrictions on the target group. Conversely, in order to curb possible excessive speculative behavior, regulators may also raise the conditions for additional issuance to guide capital to flow into the stock market in a more prudent manner. The potential impact of refinancing policy adjustments on the market is multidimensional. First, changes in refinancing policy directly affect the financing cost and financing channels of listed companies. If the policy tends to be more lenient, it will reduce the cost of financing and increase the frequency of financing activities in the market: on the contrary, it may inhibit the willingness and ability of enterprises to raise funds. Secondly, the adjustment of refinancing policy affects the expectation of investors, which in turn affects the volatility of share prices. A looser policy may lead to an increase in supply expectations, which in turn affects the volatility of stock prices, while a tighter policy may stabilize market expectations and reduce market uncertainty. Finally, refinancing policy may also have an impact on market liquidity. Loose policies may enhance market liquidity and improve market efficiency, while strict policies may lead to lower market liquidity and affect the stability of the capital market. The potential impact of policy adjustments varies for different types of refinancing instruments. For example, a directed issue may have a relatively limited impact on overall market liquidity due to its private nature, but may have a more dilutive effect on the equity of investors participating in the directed issue. Public offerings, on the other hand, may have a more significant impact on the supply and demand relationship in the overall market due to their broad participatory nature. Convertible bonds and preferred stock refinancings, on the other hand, may have different impacts on market confidence and risk appetite due to their different financing characteristics and costs.

In summary, the types and characteristics of refinancing policy determine its flexibility in implementation and potential impact on the market. Adjustment of the policy is usually a comprehensive consideration by the regulator based on the current market state and economic environment, aiming to balance the needs of market stability and enterprise development by optimizing the financing environment. In the study of market volatility, an in-depth understanding of the meaning of refinancing policy and its potential impact on the market is a prerequisite for constructing scientific hypotheses.

Based on the previous literature review, we can formulate the following research hypotheses:

Hypothesis 1 (H1): The refinancing policy adjustment has a significant impact on the spillover effects of the equity and convertible bond markets. Specifically, it is expected that the refinancing policy adjustment will strengthen the positive correlation between the two markets, thus affecting the market volatility.

Hypothesis 2 (H2): After the refinancing policy adjustment, the stock market and the convertible bond market will react differently to the common information and the extent of the change in return.

Hypothesis 3 (H3): The stock market maintains its dominant position relative to the convertible bond market after the refinancing policy adjustment, but this absolute dominance may change due to the policy adjustment.

Hypothesis 4 (H4): The new refinancing regulation promotes the efficiency of both the convertible bond market and the stock market, implying that both markets will react more quickly and adequately to shocks in the other market.

3. Model construction and sample description

Considering the sharp peaks and thick tails and volatility aggregation characteristics of financial time series data, this paper adopts ARX-GARCH and EGARCH models to analyze such effects. These models can effectively capture the volatility characteristics of financial time series data and are suitable tools for analyzing the impact of policy adjustments on stock market volatility.

The ARX-GARCH model is an extension of the traditional GARCH model by including explanatory variables (e.g., volatility of the convertible bond market) in the mean equation, while the EGARCH model is another improvement of the GARCH model, which not only captures the asymmetry of the volatility, but also deals with the leverage effect of the volatility. With these models, we can more accurately characterize the impact of refinancing transaction policy adjustments on stock market volatility.

Autoregressive-exogenous (ARX) model is a time series model that is based on an autoregressive process and takes into account the effects of exogenous variables.The ARX(p,q) model can be expressed as follows:

$$y_t = \sum_{i=1}^{p} \phi_i y_{t-i} + \sum_{j=1}^{q} \theta_j x_{t-j} + \varepsilon_t \tag{1}$$

Where y_t is the observation of the time series, x_t is the observation of the exogenous variable, ϕi is the autoregressive coefficient, θj is the coefficient of influence of the exogenous variable, and εt is the error term. The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model is the model used to model the volatility of the time series.The expression of the GARCH(p,q) model is:

$$\sigma_t^2 = \omega + \sum_{i=1}^{p} \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^{q} \beta_j \sigma_{t-j}^2 \tag{2}$$

Where σ_t^2 is the conditional variance of the time series at moment t, ω is the constant term of the model, αi and βj are the parameters of the GARCH model, and εt is the sequence of random errors. The Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model is an extension of the GARCH model that allows for asymmetric changes in volatility.The EGARCH(p,q) model is expressed as:

$$\log(\sigma_t^2) = \omega + \sum_{i=1}^{p} \alpha_i |\varepsilon_{t-i}| + \sum_{j=1}^{q} \beta_j \log\left(\sigma_{t-j}^2\right) \tag{3}$$

Where ω is the constant term of the model, $\alpha_i$and β_j are the parameters of the EGARCH model, and εt is the random error sequence.

Looking back at the history of China's refinancing policy, between 2007 and 2008, the China Securities Regulatory Commission (CSRC) promulgated the Implementation Rules for Non-public Offering of Shares by Listed Companies, which included relaxing the refinancing review criteria and simplifying the approval procedures, so as to encourage listed companies to refinance and increase the proportion of direct financing. [10] In 2014, the China Securities Regulatory Commission (CSRC) promulgated the Administrative Measures for the Pilot Program of Preferred Shares, which is an important regulation of the convertible bond market and clarifies the requirements for the issuance conditions, issuance procedures, and trading mechanisms of convertible bonds. [11] In 2017, the China Securities Regulatory Commission (CSRC) revised the Detailed Rules for the Implementation of Non-public Offerings of Listed Companies to issue a Q&A on issuance supervision (regulating financing behaviors) with the aim of strictly controlling the number and pricing mechanism of non-

public offerings and reducing the impact on the stock market. This includes limiting the objects and quantities of non-public offerings, introducing stricter pricing and lock-up period requirements, and revising and publishing the Q&A on Issuance Supervision – Regulatory Requirements for Guiding and Regulating the Financing Practices of Listed Companies in 2018[12]. In 2020, in order to further optimize the capital market environment and support the development of the real economy, the China Securities Regulatory Commission (CSRC) revised its refinancing policies, such as the Administrative Measures for the Issuance of Securities by Listed Companies and the Interim Measures for the Administration of Securities Issuance by Listed Companies on the Growth Enterprise Market, simplifying the issuance procedures, relaxing the restrictions on pricing and lock-up periods, and in particular, making more flexible provisions for the refinancing of GEM companies. In 2022, the Shanghai Stock Exchange and the Shenzhen Stock Exchange issued the Notice on Matters Related to the Management of the Suitability of Convertible Corporate Bonds.

Therefore, this paper selects the returns of CSI 300 and CSI Bond Index for 3481 trading days from November 1, 2007 to March 1, 2022 as the research object. The EGARCH model is used to investigate the impact of re-policy adjustment on the volatility of the stock market, and all the data are obtained from the Window database. In order to visualize the statistical distribution of the returns of convertible bonds and underlying stocks, this paper firstly conducts descriptive statistics on the returns of CSI 300 and CSI Convertible Bond Index. The descriptive statistics include the full sample (from November 1, 2007 to March 1, 2022) and the period of initial opening of capital market (2007-11-01-2014-01-01), and the period after the initial standardization of convertible bond market (2014-09-01-2017-01-01), and the period after the initial standardization of convertible bond market (2014-09-01-2017-01-01). -2017-01-01), after policy restriction (2017-08-01 - 2020-05-01), and after policy relaxation (2020-10-06 - 2022-03-). 01), after policy restriction (2017-08-01--2020-05-01), after policy relaxation (2020-10-06--2022-03-01).

Table 1. Sample Statistical Patterns

	period	mean	median	maximum	minimum	std	skewness	kurtosis	J-B
CSI	Full	-0.006258	0.043867	8.930877	-9.154437	1.664827	-0.499041	4.149764	263282
300	1	-0.059545	0.025025	8.930877	-8.455975	1.908019	-0.213084	2.580952	42332
Yield	2	0.060974	0.112627	6.498873	-9.154437	1.973296	-1.048083	4.275910	52836
	3	0.005403	0.019644	5.777373	-8.208697	1.301331	-0.552095	4.237322	52239
	4	0.002069	0.049749	3.110599	-3.596482	1.130858	-0.299853	0.559367	906
CSI	Full	0.005959	0.017182	13.333035	-16.360068	1.175923	-1.702420	34.855460	17736857
Convertible	1	-0.014254	-0.003575	4.861413	-8.275416	0.976316	-1.614009	14.032734	1285984
Bond	2	-0.008750	0.055433	13.333035	-16.360068	2.236211	-1.125511	13.062469	409506
Index	3	0.021062	0.001412	3.499947	-3.593862	0.668329	-0.165253	3.702147	37585
Yield	4	0.049146	0.103531	1.459474	-3.061535	0.585420	-0.818435	2.372945	11357

Over the full sample period, the returns of CSI 300 exhibit negative skewness and thick peaks and tails, which do not conform to a normal distribution. The mean return is -0.006258, the median is 0.043867 and the standard deviation is 1.664827. This indicates the abnormal volatility and asymmetric distribution of the market. After liberalization and regulation, the volatility of returns increases slightly, but it is still characterized by negative skewness and sharp peaks and thick tails. After restriction and deregulation, the volatility of yields decreases, but still shows asymmetric distribution. The yield data of CSI Tranche Bond Index shows extreme negative skewness and thick tails with sharp peaks, which is far beyond the scope of normal distribution. The mean return is 0.005959, the median is 0.017182, the standard deviation is 1.175923, the kurtosis is as high as 34.855460, and the skewness is -1.702420, which shows the extreme and abnormal volatility of the market under this index. Volatility declined in several sub-sample ranges. For the CSI 300 and CSI Convertible Bond Index returns, both over the full sample period and at different stages, there are obvious asymmetric distribution characteristics and the phenomenon of sharp peaks and thick tails. These characteristics make the traditional assumption of normal distribution less accurate and reliable in analyzing these data, so more flexible modeling methods are needed for in-depth analysis and forecasting. In portfolio management and risk control, it is necessary to take into account market

asymmetries and sharp peaks and thick tails in order to develop effective investment strategies and risk management programs.

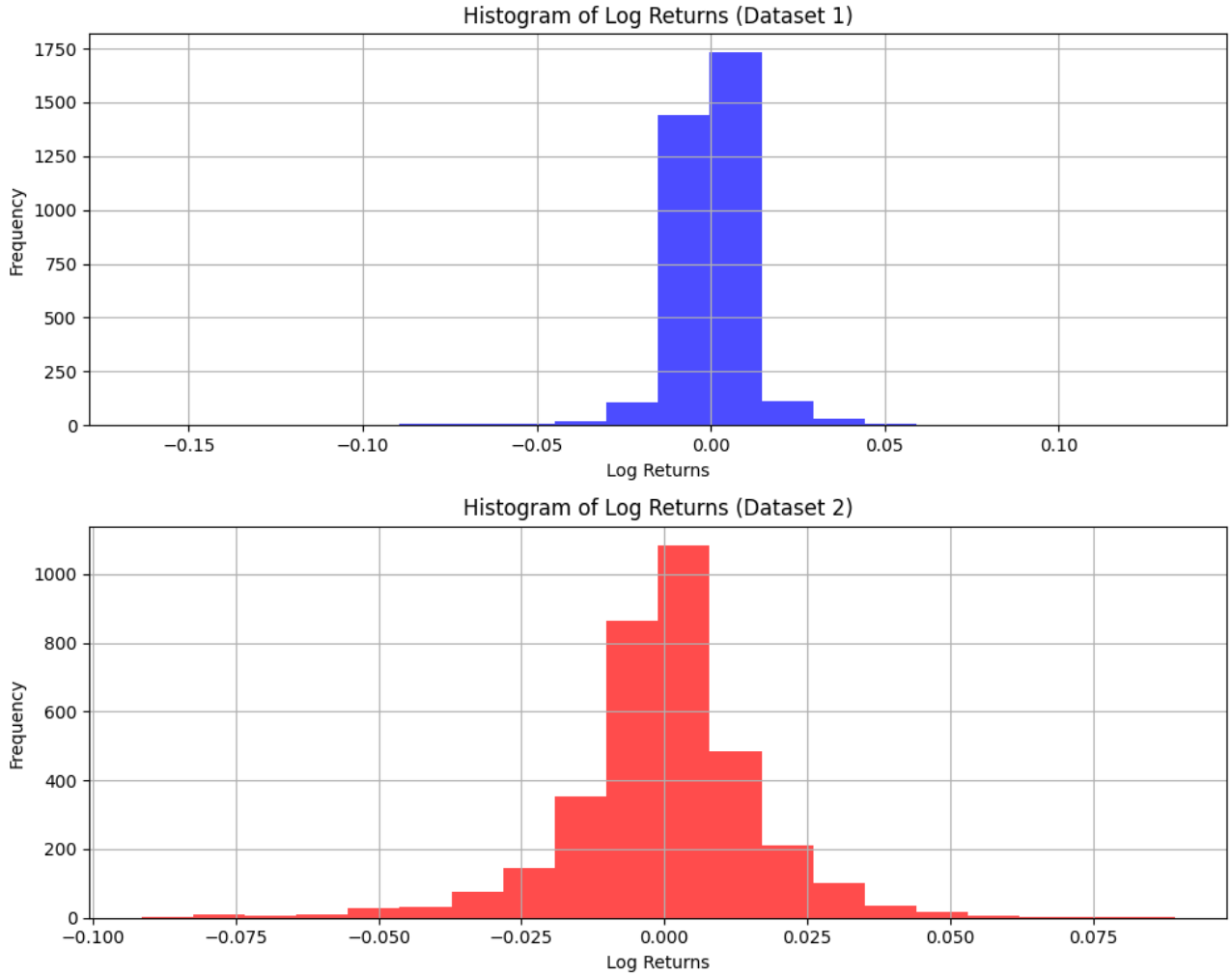

Fig. 1 Sample Histogram (Dataset1 is CSI Bond Index, Dataset2 is CSI 300 Index)

4. Empirical results and analysis

This paper analyzes whether there is a causal relationship between the daily closing logarithmic returns (x) of CSI 300 Index and the daily closing logarithmic returns (y) of CSI Bond Index through Granger causality test, and the performance of this relationship in different time periods, and the results are as follows:

Table 2. Results of the Granger causality test

Period	Lag 1		Lag 2		Lag 3		Lag 4		Lag 5	
	F-Statistic	p-value	F-Statistic	p-value	F-Statistic	p-value	F-Statistic	p-value	F-Statistic	p-value
1	0.8032	0.3702	0.6196	0.5382	1.0040	0.3900	0.9981	0.4073	1.2739	0.2725
2	9.3441	0.00234	10.234	4.30e-05	6.7401	0.0002	6.2613	6.21e-05	5.4181	7.07e-05
3	0.2065	0.6496	0.2268	0.7970	1.1410	0.3316	0.9187	0.4524	1.0179	0.4059
4	5.0711	0.0249	3.7972	0.0234	2.7488	0.0428	3.9572	0.0037	2.9465	0.0128

The results of this paper show that the causal effect of the daily closing log returns of CSI 300 index on the daily closing log returns of CSI Tranche Bond Index shows significant dynamic changes under different policy or market environments. The CSI 300 Index has a significant positive causality on the CSI Tranche Index during the regulated and deregulated time periods, while the causality is not significant after the liberalized and restricted time periods. This alternating significance may reflect the impact of market environment or related policy changes on the interactions between the

two market indices, revealing the complexity and dynamics of asset interactions under different market conditions.

The logic and mechanism behind this dynamic change can be explained in depth from the following aspects: first, changes in the policy environment directly affect the behavior and investment decisions of market participants. First, changes in the policy environment directly affect the behavior and investment decisions of market participants. During the period of policy regulation and deregulation, the market may respond positively to the policy changes by increasing investment and trading activities, which strengthens the positive linkage between the CSI 300 Index and the CSI Convertible Bond Index. This suggests that during these periods, market participants may view policy changes as signals of growth and profitability opportunities, leading to increased investment in the equity and convertible bond markets. Second, policy easing or standardization tends to affect market confidence and investors' risk appetite. When policies are liberalized, increased market confidence and higher willingness to take risks may encourage capital inflows into both equity and bond markets, strengthening the linkages between the two markets. On the contrary, following policy liberalization and restrictions, market uncertainty may increase and investors may adopt more cautious investment strategies, leading to a weakening of the causal relationship between the two markets. Third, policy changes may also affect market liquidity and capital flows. During the period of policy relaxation, market liquidity may increase and funds may flow more easily among different asset classes, contributing to the positive causality between CSI 300 Index and CSI Tranche Bond Index. On the other hand, tighter or more restrictive policies may reduce market liquidity, limiting capital mobility and weakening the correlation between the two markets. Fourth, changes in economic fundamentals and market expectations under different policy or market environments may also affect the relationship between the two market indices. For example, policy easing may be accompanied by increased expectations of economic growth, boosting both equity and bond markets. On the contrary, during periods of high economic or policy uncertainty, market expectations may become negative, affecting the performance of the equity and convertible bond markets and their correlation. In summary, the causal relationship between the CSI 300 Index and the CSI Convertible Bond Index shows significant dynamics, reflecting a combination of factors such as the policy environment, market confidence and risk appetite, market liquidity and fund flows, as well as economic fundamentals and market expectations. This finding highlights the complexity and dynamics of inter-asset interactions under different market conditions, and provides important insights for investors and policymakers alike.

In order to examine the impact of the refinancing policy release on the spillover effect of the stock market and convertible bond market, this paper takes the daily return of CSI convertible bond index as x1 and adds it into the variance regression equations of GARCH and EGARCH models respectively.

Table 3. Model parameters for the period 2007-11-01 to 2014-01-01

Model Component	Coefficient	Standard Error	t-Value	P-Value	95% Confidence Interval
AR-X - GARCH Model Results					
Const	-0.0214	2.872e-02	-0.744	0.457	[-7.767e-02, 3.491e-02]
x1	1.4714	8.739e-02	16.837	1.31e-63	[1.300, 1.643]
omega	0.0257	1.118e-02	2.301	2.14e-02	[3.812e-03, 4.764e-02]
alpha[1]	0.0794	2.097e-02	3.788	1.52e-04	[3.833e-02, 0.121]
beta[1]	0.9076	2.244e-02	40.450	0.000	[0.864, 0.952]
Constant Mean - EGARCH Model Results					
mu	-0.0327	4.329e-02	-0.757	0.449	[-0.118, 5.209e-02]
omega	0.0102	6.536e-03	1.563	0.118	[-2.593e-03, 2.303e-02]
alpha[1]	0.0809	2.989e-02	2.706	6.811e-03	[2.230e-02, 0.139]
beta[1]	0.9938	4.355e-03	228.208	0.000	[0.985, 1.002]

During the period from 2007-11-01 to 2014-01-01, the AR-X GARCH model shows that the CSI Convertible Bond Index has a significant positive impact on the daily return of the CSI 300 Index, indicating that the performance of the convertible bond market has a positive predictive effect on the stock market during this period. The volatility model partially shows that external shocks and prior period volatility have a significant impact on the current volatility, suggesting that there is a volatility aggregation phenomenon in the market. Meanwhile, the EGARCH model fails to capture the significant mean effect, but the conditional variance equation suggests that external shocks have a significant impact on volatility and that market volatility is persistent. The significant positive effect during this period may be related to the relaxation of refinancing policies between 2007 and 2008. Policies included relaxation of refinancing review criteria and simplification of the approval process, which encouraged listed companies to refinance, thus increasing the share of direct financing. These policy measures may have increased the activity of the convertible bond market, making it a positive predictor of the equity market. At the same time, they may have increased liquidity and participation in the market, leading to volatility aggregation.

Table 4. Model parameters for the period 2014-09-01 to 2017-01-01

Model Component	Coefficient	Standard Error	t-Value	P-Value	95% Confidence Interval
AR-X - GARCH Model Results					
Const	0.0701	3.824e-02	1.833	6.68e-02	[-4.858e-03, 0.145]
x1	0.7860	5.514e-02	14.257	4.08e-46	[0.678, 0.894]
omega	5.7451e-03	6.624e-03	0.867	0.386	[-7.239e-03, 1.873e-02]
alpha[1]	0.0673	2.345e-02	2.869	4.12e-03	[2.131e-02, 0.113]
beta[1]	0.9327	2.338e-02	39.902	0.000	[0.887, 0.979]
Constant Mean - EGARCH Model Results					
mu	0.0911	7.841e-04	116.201	0.000	[8.957e-02, 9.265e-02]
omega	0.0186	8.711e-03	2.139	0.03244	[1.559e-03, 3.570e-02]
alpha[1]	0.1512	3.657e-02	4.133	3.577e-05	[7.948e-02, 0.223]
beta[1]	0.9932	5.770e-03	172.132	0.000	[0.982, 1.004]

During the period from 2014-09-01 to 2017-01-01, the CSI Tranche Index still has a significant positive impact on the daily return of the CSI 300 Index, but the impact coefficient has decreased compared to the previous period. The volatility model part also shows the significant impact of external shocks and prior volatility on current volatility. the mean effect of the EGARCH model is still not significant, but the parameters in the volatility model show that the market reacts to the information more, and the persistence of volatility is more significant. It is worth noting that the release of the "Preferred Stock Pilot Management Measures" in 2014, as an important regulation of the convertible bond market, may have played a key role in influencing market volatility and the CSI Convertible Bond Index during this period. These regulations clarified the issuance conditions, procedures and trading mechanism of convertible bonds, and improved the transparency and standardization of the market. Although the impact coefficient decreased compared to the previous period, this may be due to the fact that the market became more cautious about future expectations as it adapted to the new rules.

Table 5. Model parameters for the period 2017-08-01 to 2020-05-01

Model Component	Coefficient	Standard Error	t-Value	P-Value	95% Confidence Interval
AR-X - GARCH Model Results					
Const	-0.0193	2.779e-02	-0.695	0.487	[-7.379e-02, 3.515e-02]
x1	1.5494	7.135e-02	21.716	1.4e-104	[1.410, 1.689]
omega	0.0143	8.877e-03	1.613	0.107	[-3.076e-03, 3.172e-02]
alpha[1]	0.0822	2.572e-02	3.196	1.39e-03	[3.179e-02, 0.133]
beta[1]	0.8938	3.227e-02	27.694	8.2e-169	[0.831, 0.957]
Constant Mean - EGARCH Model Results					
mu	0.0572	4.157e-02	1.376	0.169	[-2.426e-02, 0.139]

omega	0.0315	2.115e-02	1.491	0.136	[-9.913e-03, 7.298e-02]
alpha[1]	0.2746	0.114	2.415	1.57e-02	[5.172e-02, 0.497]
beta[1]	0.9657	2.157e-02	44.759	0.000	[0.923, 1.008]

During the period from 2017-08-01 to 2020-05-01, the positive impact of CSI Convertible Bond Index on the daily return of CSI 300 Index has further increased, indicating that the predictive effect of convertible bond market on the stock market has increased. The volatility model parameters indicate that the source of market volatility is mainly prior period fluctuations and external shocks, and the EGARCH volatility model parameters show that the market's responsiveness to shocks and the persistence of volatility have remained at a high level. 2017 saw the revision of the Implementing Rules for the Private Issuance of Shares by Listed Companies and the ensuing standardization measures aimed at tightly controlling the number of private offerings and pricing mechanism, which may have contributed to the positive impact of CSI T-bond index on the stock market during this period. This may be one of the reasons for the increased positive impact of the CSI Tranche Index on the daily return of the CSI 300 Index during this period. These policies enhanced the stability and predictability of the market by minimizing the impact on the stock market, thus improving the predictive effect of the convertible bond market on the stock market.

Table 6. Model parameters for the period 2020-10-06 to 2022-03-01

Model Component	Coefficient	Standard Error	t-Value	P-Value	95% Confidence Interval
AR-X - GARCH Model Resultsl					
Const	-0.0425	5.148e-02	-0.825	0.409	[-0.143, 5.842e-02]
x1	1.1918	0.152	7.827	4.99e-15	[0.893, 1.490]
omega	0.0468	3.599e-02	1.300	0.194	[-2.377e-02, 0.117]
alpha[1]	0.0600	5.545e-02	1.081	0.280	[-4.871e-02, 0.169]
beta[1]	0.8819	8.874e-02	9.937	2.87e-23	[0.708, 1.056]
Constant Mean - EGARCH Model Results					
mu	-9.28e-03	5.560e-02	-0.167	0.867	[-0.118, 9.970e-02]
omega	8.9865e-03	9.637e-03	0.932	0.351	[-9.902e-03, 2.788e-02]
alpha[1]	0.1500	5.018e-02	2.989	2.80e-03	[5.163e-02, 0.248]
beta[1]	0.9580	2.203e-02	43.477	0.000	[0.915, 1.001]

During the period from 2020-10-06 to 2022-03-01, the positive impact of CSI Bond Index on the daily return of CSI 300 Index decreases, but is still significant. In the volatility model, the effect of external shocks on volatility is relatively weak, but the effect of prior period volatility on current volatility is still significant. the effect of external shocks on volatility in the EGARCH volatility model is significant, and the persistence of market volatility is very high. 2020's revision of the refinancing policy, in particular, the more flexible provisions on the refinancing of the GEM board companies, and the "Notice on Matters Related to the Appropriate Management of Convertible Bonds" released in 2022, are also significant. The revision of the refinancing policy in 2020, especially the more flexible regulations on refinancing for GEM companies, and the Circular on Matters Related to the Appropriateness Management of Convertible Bonds issued in 2022 may be the reason why the CSI Convertible Bond Index has less of a positive impact on the daily return of the CSI 300 Index in this period. Although the policies aim to optimize the capital market environment and support the development of the real economy by simplifying the issuance procedures and relaxing the pricing and lock-up period restrictions, these measures may have increased market uncertainty and led to mixed reactions from market participants to the changes in the short term, thus affecting the predictive effect of the convertible bond market on the equity market.

In the GARCH model, omega, alpha and beta coefficients together describe the behavior of market volatility. omega represents long-term volatility, alpha represents the effect of news on volatility, and beta represents the persistence of volatility. egarch model provides a more detailed description of volatility asymmetry through the introduction of logarithmic transformation and leverage effect. In this regression experiment, the values of Alpha+beta are all less than 1, which indicates that the regression equation is stable in the long run. beta is high in all time periods, which indicates that

market volatility is highly persistent, i.e., the volatility of the previous period is largely predictive of the volatility of the future. alpha shows that the market's response to new information varies across time, but in general, new information leads to a short-term increase in market volatility. The ω coefficient varies over time, reflecting differences in the level of underlying market volatility, which can be influenced by a number of factors, including macroeconomic conditions, market sentiment and policy changes.

By analyzing the results of the model in different time periods, it can be found that there is a long-term positive relationship between the daily return of CSI 300 Index and CSI Convertible Bond Index, which indicates that the performance of convertible bond market has a certain predictive effect on the stock market. In addition, the analysis of market volatility shows that in both GARCH and EGARCH models, the reaction of the market to external information and the continuity of volatility are important aspects of the analysis. These results provide valuable insights into the spillover effects of refinancing policy adjustments on the equity and convertible bond markets, especially in assessing the dynamic relationship and volatility characteristics between the two markets.

According to the analysis of this paper, the adjustment of refinancing policy has a significant impact on the causality between CSI 300 Index and CSI Bond Index in different time periods, especially in the time periods of "after regulating" and "after loosening", CSI 300 Index has a significant positive causality on CSI Bond Index. This proves that the refinancing policy adjustment has a significant positive causal effect on the CSI index. This proves that the refinancing policy adjustment does have a significant impact on the spillover effect between the two markets, supporting hypothesis H1. The analysis of ARX-GARCH and EGARCH models shows that the change of CSI Bond Index has a significant positive impact on the daily return of CSI 300 Index, and this impact shows a dynamic change in the different periods of policy adjustment. This shows that the adjustment of refinancing policy does lead to the difference in the speed of response to the common information and the degree of change in the yield between the stock market and the convertible bond market, which is in line with the expectation of hypothesis H2. In addition, the empirical results show that the relationship between CSI 300 index and CSI convertible bond index does show significant dynamic changes in different stages of policy adjustment. Although the stock market maintains its influence on the convertible bond market at certain stages, the degree of this influence changes according to the policy adjustments, which verifies hypothesis H3. Finally, through the analysis of the relationship between CSI 300 Index and CSI Convertible Bond Index in different time periods, it can be seen that the adjustments of the refinancing policy do promote the improvement of the efficiency of the market, especially in the "post-regulation" and "post-relaxation" periods, and the "post-regulation" and "post-relaxation" periods. It can be seen that the adjustment of refinancing policy does promote the market efficiency, especially in the "post-regulation" and "post-relaxation" phases. This suggests that the two markets react more quickly and adequately to each other's shocks, which is consistent with hypothesis H4.

5. Summary

Through a detailed empirical analysis, this paper examines the causal relationship between the refinancing policy adjustment on the CSI 300 Index and the CSI Convertible Bond Index and the impact of the volatility of the two markets. By constructing the ARX-GARCH and EGARCH models, this paper not only explores the direct effects of refinancing policy adjustments, but also analyzes the impact of these policy changes on the spillover effects between the stock market and the convertible bond market.

It is found that the causal relationship between CSI 300 Index and CSI Rebond Index shows significant dynamic changes in different policy adjustment periods. Especially in the "post-regulation" and "post-relaxation" periods, it shows that CSI 300 Index has a significant positive causal relationship with CSI Bond Index, which confirms that the refinancing policy adjustment has a significant impact on the spillover effect between the two markets. This result supports the hypothesis

that the refinancing policy adjustment strengthens the positive correlation between the two markets and affects the market volatility. In addition, the results of this study also show that the refinancing policy adjustment leads to the difference in the speed of reaction to common information and the degree of change in the yield between the stock market and the convertible bond market, and this dynamic change reflects the market's sensitivity to the policy change and the adaptability of market participants. Meanwhile, the empirical results also point out that although the stock market maintains its dominant position over the convertible bond market at certain stages, the degree of influence varies according to policy adjustments. Finally, by analyzing the relationship between CSI 300 Index and CSI Convertible Bond Index in different time periods, the study shows that the adjustment of refinancing policy promotes the efficiency of the market, especially in the "post-regulation" and "post-deregulation" phases. This suggests that the two markets reacted more quickly and adequately to shocks in each other's markets.

In conclusion, the findings of this paper provide a valuable perspective for understanding the spillover effects of refinancing policy adjustments on the equity market and the convertible bond market, especially in assessing the dynamic relationship and volatility characteristics between the two markets. These findings are valuable for policymakers, market participants, and academic research. Here are a few takeaways from the results of this study:

(1) Policy predictability and transparency are key factors in maintaining market stability. When policymakers make policy adjustments, they should announce the relevant information to the market as early as possible, so as to ensure that the policy changes are not totally unexpected to market participants. Early announcement of policy information can help market participants to have sufficient time to adjust their expectations and reduce market uncertainty about the future, thereby reducing market volatility. For example, a clear indication of the timetable, target and expected market reaction to policy adjustments can increase market confidence and reduce speculative behavior due to speculation about policy intentions. (2) Given the potential for market volatility associated with policy adjustments, regulators should strengthen market surveillance and early warning mechanisms. This means that effective monitoring tools and indicators are needed to detect market anomalies in a timely manner and take measures to prevent and manage potential risks. At the same time, investors themselves should improve their risk management capabilities by diversifying their portfolios and using stop-loss strategies to counteract the adverse effects of policy changes. In addition, regulators can help investors better understand market dynamics and enhance their self-protection capabilities through education and the provision of more market data. (3) Effective information sharing and communication among market participants is essential to adapt to policy changes. Communication among policymakers, investors and research institutions should be more frequent and in-depth. This will not only help policymakers obtain market feedback and adjust and improve their policies, but also help investors and research institutes understand policy intentions and market trends more accurately. For example, holding regular policy briefings and investor exchanges can strengthen the understanding and trust of all parties in the market, and jointly enhance the market's ability to adapt to and respond to policy adjustments. This study provides valuable insights into market stability and development by analyzing the impact of refinancing policy adjustments on market volatility. By adopting the measures suggested in the above insights, we can effectively cope with the challenges brought by the policy changes and promote the stability and healthy development of the financial market.

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