Unveiling the Relationship between Economic Policy Uncertainty and Stock Market Volatility--A Comparative Study of Overnight and Intraday Trading Sessions in China

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Abstract. With China's economic evolution entering a new phase, the influence of economic policy uncertainty on the informational dynamics of financial markets has become increasingly pronounced. Although most research focuses on the effects of economic policy uncertainty on macroeconomics and corporate behavior, there has been little investigation into its impact on stock markets. Nevertheless, the correlation between economic policy uncertainty and stock market volatility is strong and has a significant impact on investors' decision-making processes. However, the correlation between economic policy uncertainty and stock market volatility is strong, significantly impacting investors' decision-making processes. Quantile regression offers distinct advantages over traditional techniques, particularly in detecting asymmetries in variable relationships. While most scholarly endeavors concentrate on assessing the impact of economic policy uncertainty (EPU) on daily fluctuations, policy shifts in foreign countries and global events can swiftly permeate domestic markets, consequently affecting overnight trading volatility. In light of these insights, this study disaggregates intraday volatility into overnight and intraday components. Investigating the influence of economic policy uncertainty (EPU) on overnight stock market volatility in China through quantile regression methods during intraday trading sessions reveals noteworthy insights. Specifically, EPU exhibits a positive association with overnight stock market volatility in the Chinese context, with its coefficient being statistically significant at the first quantile (0.05%), albeit insignificantly positive at other quantiles. Conversely, Economic Policy Uncertainty (EPU) exerts a statistically significant adverse impact on intraday stock market volatility, demonstrating a consistent negative correlation. These findings offer detailed insights into the impact of EPU on stock market volatility during different trading periods, shedding light on the intricate interplay between policy uncertainty and market behavior within the global arena.

Keywords: economic policy uncertainty; stock market volatility; overnight and intraday analysis

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1 Introduction

Al-Thaqeb and Algharabali (2019) argue that economic policy uncertainty (EPU) significantly contributes to stock market volatility[1]. Fluctuations in stock prices can be attributed to various factors, including changes in economic policies that create uncertainty among market participants about future economic conditions and corporate earnings prospects. Furthermore, policymakers' actions and statements and the potential for policy adjustments directly impact investors' expectations and confidence in the market[2][3]. This, in turn, affects stock price volatility, as demonstrated in studies by Daniel, Hirshleifer, and Teoh (2002) and Masini and Menichetti (2012). These findings highlight the importance of intraday trading, where investors make decisions within compressed timeframes, making them more sensitive to fluctuations in economic policy and more likely to trade or adjust positions frequently[4][5], as noted by Andersen, Bollerslev, and Diebold (2007). Furthermore, as stated by Bekaert, Hoerova, and Duca (2013), economic policy uncertainty has the potential to raise intraday trading volatility, resulting in an overall increase in the volatility of the trading environment[6].

Overnight trading has particularly been susceptible to these policy shifts. For instance, research by Caldara, Gagnon, Martínez-García, and Neely (2020) revealed that international events and policy modifications exert a notable influence on overnight trading, especially in the context of deepening globalization[7]. They observed that as the global economy becomes increasingly intertwined, policy alterations in foreign jurisdictions and international events have a propensity to rapidly disseminate to domestic markets, thereby impacting volatility in overnight trading sessions. This assertion is validated by the findings of Jiang, Shi, and Zhang (2021), who have determined that global occurrences such as international trade tensions and geopolitical frictions among major nations can exert a substantial influence on overnight trading, consequently precipitating heightened volatility in the stock market[8]. These scholarly inquiries underscore the significance of overnight trading in its susceptibility to international variables and provide both theoretical and empirical grounds for further exploration into the correlation between overnight trading and global events.

Moreover, Masih (2002) argues that the actions and statements of policymakers, coupled with the potential for policy adjustments, directly influence investors' expectations and confidence in the market, thereby impacting stock price volatility[9]. Also, Vandenbergh (2004) argues that fine-tuning monetary policy, changes in trade policy, or major economic reform initiatives among influential countries may directly affect the stock markets of other countries[10].

In addition, other scholars pointed out that stock market fluctuations are clustered (Han & Ge, 2020; Lee, Wang, & Zhang, 2023), that is, big fluctuations will be followed by big fluctuations, and small fluctuations will be followed by small fluctuations[11][12].

By using the quantile regression model, we aimed to achieve more reliable outcomes and provide a comprehensive depiction of the influence and pattern of economic policy uncertainty on stock market volatility. To improve the analysis of the impact of economic policy uncertainty on stock market volatility during periods of extreme volatility, we adopted a model that takes into consideration the clustering phenomenon of volatility. This approach was chosen to increase the reliability of the results.

Unlike the well-established stock markets in the West, China's stock market is still in its early stages of development and lacks a fully mature regulatory framework within the financial sector. As a result, regulatory mechanisms and operational frameworks are still in the process of evolution, resulting in inefficiencies in addressing market abnormalities and mitigating excessive fluctuations that could potentially disrupt the stability of the real economy. Given the complex external environment characterized by heightened global uncertainty and internal economic pressures, it is crucial to understand the implications of economic policy uncertainty on stock market dynamics. This understanding is essential for preserving global financial stability and mitigating systemic financial risks.

2 Methodology

When addressing such inquiries, the predominant approach adopted by most scholars involves the utilization of time series vector autoregressive (VAR) models or fundamental panel regression frameworks, both of which adhere to mean reversion methodologies. Employing linear regression models to forecast forthcoming equity premiums is a commonplace practice within financial economics. This encapsulates the procedural framework underpinning the model's application. The data filtering method employed involves the utilization of the average volatility across trading days within a month. Overnight and intraday volatility are computed as follows:

$$IV_{i,t} = 100 \cdot \left| \ln \left(\frac{P_{i,t,c}}{P_{i,t,o}} \right) \right| \tag{1}$$

$$OV_{i,t} = 100 \cdot \left| \ln \left(\frac{P_{i,t,o}}{P_{i,t-1,o}} \right) \right| \tag{2}$$

Quantile regression presents several advantages over traditional regression methodologies, notably its capability to elucidate asymmetries within variable relationships. Classical regression focuses on approximating the conditional mean of a dependent variable given independent variables. In contrast, quantile regression enables the estimation of conditional quantiles, such as the median or other percentile values.

Koenker et al. (2005) pioneered the concept of quantile regression, unveiling the attributes of variable heterogeneity for the inaugural time[13]. To determine the impact of economic uncertainty on overnight and intraday stock volatility across different countries, while considering its significance and the clustered structure of volatility, we constructed a quantile regression model. In this model, the Economic Policy Uncertainty (EPU) index served as the independent variable, while lagging volatility was incorporated as a control variable.

$$\mathrm{Q}_\tau(OV_{\mathrm{t,i}}|L_{\mathrm{t-1,i}}, LEPU_{\mathrm{t,i}}) = \alpha_i^{(\tau)} + \sum_{j=1}^{p} \beta_{j,i}{}^{(\tau)} OV_{\mathrm{t-j,i}} + \theta^{(\tau)} LEPU_{\mathrm{t,i}} + \varepsilon_{\mathrm{i}} \tag{3}$$

$$\mathrm{Q}_\tau(IV_{\mathrm{t,i}}|L_{\mathrm{t-1,i}}, LEPU_{\mathrm{t,i}}) = \alpha_i^{(\tau)} + \sum_{j=1}^{p} \beta_{j,i}{}^{(\tau)} IV_{\mathrm{t-j,i}} + \theta^{(\tau)} LEPU_{\mathrm{t,i}} + \varepsilon_{\mathrm{i}} \tag{4}$$

where $\mathrm{OV}_{\mathrm{t,i}}$ and $\mathrm{IV}_{\mathrm{t,i}}$ are respectively the overnight volatility and intraday volatility

of the stock in the month i of the country t, and $LEPU_{t,i}$ is the logarithm of the uncertainty index of economic policy in the month i of the country t, $L_{t-1,i}$is the corresponding lagged volatility.$Q_\tau(OV_{t,i}|L_{t-1,i}, LEPU_{t,i})$and $Q_\tau(IV_{t,i}|L_{t-1,i}, LEPU_{t,i})$ are the conditional quantile of the given independent variables $L_{t-1,i}, LEPU_{t,i}$, where $\tau \in (0, 1)$. $\beta_{j,i}{}^{(\tau)}$ is quantile regressive parameter, signifying a positive impact on the outcome when its value is greater than zero and a negative impact when its value is less than zero. The lag order p is the first order. The $\theta^{(\tau)}$ measures the dependence degree of stock volatility atττth quantile to $LEPU_{t,i}$,which is also the target parameter.

This article examines the overall stock market price level rather than individual stock prices, necessitating the selection of a comprehensive stock market price index. Commonly utilized stock price indexes in China include the Shanghai Composite Index and the CSI 300 Index. However, the CSI 300 Index only includes the top 300 stocks listed on the Shanghai and Shenzhen Stock Exchanges by market capitalization, providing limited market coverage and information. As a result, it is not sufficiently responsive and its release time is delayed. Therefore, the Shanghai Composite Index, which is the most widely used and has the highest reference value, is chosen to measure the overall fluctuations in China's stock market. The data is collected from the CHOICE financial terminal (https://choice.eastmoney. com/) and includes 344 monthly data from January 1995 to August 2023. The details are shown in Table 1 which can be seen that the mean and standard deviation of overnight volatility and intraday volatility are the same.

Table 1. Descriptive statistics.

	Variable	Period	Observation	Mean	S.D	J-B	ADF
China (SHCOMP)	OV	1995.1-2023.8	344	0.0038	0.5238	34.1864	-13.7393***
	IV			0.0038	0.5238	-3.4494	-13.3205***
	EPU			5.4577	0.5238	26.9003	-14.9038***

3 Result Finding

After identifying significant associations between the variables under investigation, the research proceeded to estimate long-run coefficients using panel quantile regression instead of mean-based models to investigate the evolving relationship between the variables. The panel quantile estimates at 0.05, 0.25, 0.50, 0.75, and 0.95 quantiles are detailed in Table 2, elucidating the differential influences of Economic Policy Uncertainty (EPU) on stock market volatility. This approach facilitated a comprehensive investigation into the varied impacts of multiple variables on stock market volatility across distributional quantiles.

In China, Economic Policy Uncertainty (EPU) exhibits a statistically significant positive impact on overnight stock market volatility, particularly evident at the 0.05% quantile level, although its significance diminishes at higher quantiles. Despite variations across selected quantiles for different countries, the overall trend indicates a positive association. Information asymmetry likely contributes to this positive relationship,

stemming from uncertainties in economic policy that sow doubts about future economic conditions. Such ambiguity fosters a lack of clarity among market participants, exacerbating information disparities. Consequently, investors may swiftly adjust their positions based on new information, potentially increasing overnight trading activity and anxiety levels. This heightened trading activity during night hours, coupled with the absence of real-time regulation, may amplify the impact of economic policy uncertainty on stock prices. To summarise, the combination of greater information asymmetry and the distinct features of overnight trading could result in a positive correlation between economic policy uncertainty and overnight stock market volatility.

Conversely, Economic Policy Uncertainty (EPU) exhibits a statistically significant negative impact on intraday volatility in the Chinese stock market at quantiles 0.25, 0.50, and 0.75, while displaying an insignificant positive effect at other quantiles. During regular trading hours, market mechanisms play an active role in contributing to the negative correlation between economic policy uncertainty and intraday stock market volatility. Institutional investors and market makers provide liquidity during day trading, which stabilizes price fluctuations by increasing market participation. The ambiguity surrounding economic policy allows these participants to swiftly assimilate new information into stock prices, fostering a more efficient pricing mechanism and reducing volatility. Furthermore, real-time news updates and market monitoring tools enable investors to promptly respond to economic policy developments, thereby mitigating excessive price volatility, particularly during day trading sessions. The active involvement of market participants during trading sessions and the rapid dissemination of information in intraday trading is attributed to the negative relationship between economic policy uncertainty and stock market volatility.

Bootstrap quantile regression analysis was used to construct overnight and intraday quantile plots for each country simultaneously, as shown in Figure 1. The plots in Figure 1 illustrate the diverse trends in the coefficients of overnight and intraday drivers across different magnitudes. The solid blue line with filled circles represents the quantile estimates, while the light blue region indicates the 95% point-wise confidence interval.

Table 2. Quantile regression Results for overnight and intraday volatility

		QT=0.05	QT=0.25	QT=0.50	QT=0.75	QT=0.95
		Estimate	Estimate	Estimate	Estimate	Estimate
China	OV	0.0004***	0.0006*	0.0004	-0.0004	-0.0047
		(0.0001)	(0.0001)	(0.0001)	(0.001)	(0.004)
	IV	-0.0005*	-0.0029***	-0.004***	-0.0084***	-0.0154*
		(0.0010)	(0.0020)	(0.0020)	(0.0040)	(0.010)

Notes: The firm's relative security level. *, **, and *** indicate that the p-value is less than the significance levels, 10%, 5%, and 1%, respectively, and coefficients without any indicator show no statistical significance.

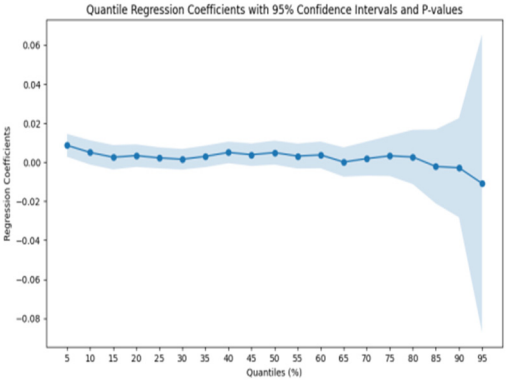

Fig. 1. China IV

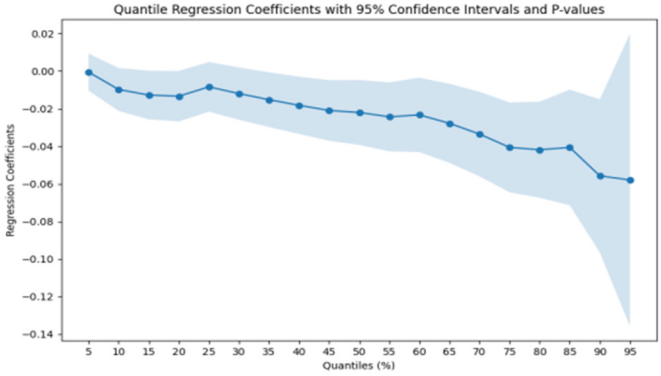

Fig. 2. China OV

Fig. 1 and Fig. 2 Plot of quantile regression results.

Notes: The solid blue line with solid circles represents the quantile estimates, with the light blue area representing the 95% point-by-point confidence interval.

4 Conclusion

First, The heightened responsiveness of market participants to policy uncertainty is underscored by the positive correlation observed between Economic Policy Uncertainty (EPU) and stock market volatility during overnight trading. This underscores the profound influence of news and events related to policy changes on investor sentiment and subsequent market volatility during overnight hours. Thus, when examining the nexus between EPU and stock market volatility, it becomes imperative to consider overnight trading periods, as this empirical finding elucidates.

Secondly, an inverse relationship between Economic Policy Uncertainty (EPU) and intraday stock market volatility is observed, indicating a nuanced reaction to policy uncertainty during active trading periods. Heightened trading activity and real-time information can help market participants reduce the initial adverse effects of policy uncertainty on stock market volatility. Consequently, this study underscores the adaptability and efficacy of day trading in efficiently processing and integrating new information, thereby contributing to the moderation of overall volatility levels.

The research findings have practical implications for market participants, policymakers, and investors due to the varied effects of Economic Policy Uncertainty (EPU) on stock market volatility in different trading sessions and countries. Market players must closely monitor policy-related developments during extended market closures, recognizing the positive correlation between EPU and overnight stock market volatility. They should anticipate heightened volatility and implement effective risk management measures to mitigate the impact of EPU on investment portfolios. Policymakers should acknowledge the varying influence of policy uncertainty on market behavior during different trading sessions and develop policies to enhance market stability, particularly during overnight trading when EPU's impact on volatility is more pronounced. Additionally, investors and financial institutions should consider the temporal aspect of market volatility when managing investment risks, analyzing the specific effects of EPU on stock market volatility in different trading periods to refine risk management practices and adapt investment strategies accordingly.

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