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Impacts of Donald Trump's tweets on volatilities in the European stock markets

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ABSTRACT

This study investigates whether political news from Donald J. Trump affects European stock markets. We use realized volatility and the HAR-RV model to examine the effect of Trump's tweets on the stock market volatility in Germany, France, and the UK during his last presidential term. Results indicate that Trump's tweets positively impact volatilities in European stock markets, with these impacts increasing as attention to his tweets rises. The effect on the UK stock market is relatively weaker. The empirical results indicate that Trump's tweets influence global stock markets beyond the US.

1. Introduction

On Nov. 5, 2024, Donald J. Trump was elected to be the 47th U.S. President. During his last presidential term, he frequently shared important government information on his private social media, impacting financial markets with his unpredictable tweets. Some of the empirical literature finds evidence that Trump's tweets significantly impact the US stock market (Colonescu, 2018; Ge et al., 2019; Burggraf et al., 2020; Nishimura et al., 2021) as well as the global financial markets (Klaus and Koser, 2020; Nishimura and Sun, 2021).

Trump's tweets cover various fields, including diplomacy and foreign policy. Positive (negative) comments on a country could improve (worsen) US relations with that country. Investors may adjust their portfolios based on such news, affecting stock prices. For example, negative comments on Country A could signal worsened US-Country A relations, leading investors to expect lower returns for multinational enterprises tied to the US, causing them to undersell stocks and resulting in a drop in stock prices.

To examine the hypothesis presented above, we focus on three European countries, including Germany, France.[1] This study investigates the influence of political news spillover from Trump's official Twitter account during his last presidential term on the volatilities of European stock markets. To our knowledge, no research has been conducted on the impact of Trump's tweeting activity on volatility in European stock market.

[1] In addition to the scale of an economy, we consider the number of Trump's tweets about each country. During our sample period, Trump posted many tweets about the three main countries but fewer about other European countries. For example, he tweeted 11 times about Italy, 3 times about Spain, and once about Portugal.

2. Methodology

We utilize the following realized volatility (RV) to measure stock market volatility.

$$RV_t = \sum_{i=1}^{n} r_{t(i)}^2 \tag{1}$$

where, $r_{t(i)}$ represents the return within the ith period of trading day t.

RV follows a long-memory process (Andersen et al., 2003; Koopman et al., 2005). Therefore, we use the HAR-RV (Heterogeneous Autoregressive RV) model by Corsi (2009) to account for this in financial volatility, as shown below.

$$lnRV_t = c + \beta_{daily}lnRV_{t-1} + \beta_{weekly}lnRV_{t-5} + \beta_{monthly}lnRV_{t-22} + \beta_{tweet}Tweets_t + \beta_{hol}Hol_t + \sum_{m=1}^{16} News_{m,t} + \beta_{FOMC}FOMC_{t-1} + \beta_{VS}^{US}lnRV_{t-1}^{US}$$
$$+ \beta_{VS}^{Europe}lnRV_{t-1}^{Europe} + \varepsilon_t \tag{2}$$

where

$$RV_{t-5} = \frac{1}{5}\sum_{l=1}^{5} RV_{t-l}, \ RV_{t-22} = \frac{1}{22}\sum_{l=1}^{22} RV_{t-l}$$

$Tweets_t$ is a dummy variable for Trump tweets in Eq. (2), valued at 1 if Trump tweeted about the European country on day t, otherwise 0. Hol_t is a dummy variable valued at 1 for days after weekends or holidays, otherwise 0.

US news can affect global stock markets. Our study consider two types of news: macroeconomic announcements and volatility spillover effects.[2] Based on the studies by Huang (2018) and others, we define the news surprise as follows.

$$News_{m,t} = \frac{A_{m,t} - E_{m,t}}{\widehat{\sigma}_m} \tag{3}$$

where $A_{m,t}$ represents the released value for news m announced on day t, while $E_{m,t}$ refers to the forecast median, and $\widehat{\sigma}_m$ is the sample standard deviation of surprise $A_{m,t} - E_{m,t}$. $FOMC_t$ presents a dummy variable that is assigned a value of 1 on the regularly scheduled meeting days of the FOMC and 0 otherwise.

Concerning the control variable of volatility spillover effects from the US to Europe, the RV of the US market at day t-1 is included. Moreover, according to the evidence of volatility spillovers presented by Baele (2005) in Western European equity markets, we also control for the volatility spillovers across European countries. For Germany, we include the lagged volatilities of France (RV_{t-1}^{Fra}) and the UK (RV_{t-1}^{UK}).

3. Data description

3.1. Financial data

We use the 5-minute returns on Germany's DAX, France's CAC40, and the UK's FTSE100.[3] Our sample period spans from Jan. 23, 2017, through Dec. 31, 2019, taking into account the impact of COVID-19.[4]

Due to the varying opening hours and holidays of the stock markets examined in this study, the sample sizes differ across countries. For example, the trading hours of the UK market is 8.5 h, implying 103 intraday returns, including the overnight return.[5] On certain days, such as the day before Christmas and the final session of a calendar year, trading takes place for 4.5 h, with 55 five-minute returns. We exclude these trading days because low trading volumes on these days may cause bias in the volatility estimates (Barunik and Vacha, 2018). Consequently, our final sample consists of 75,396 returns (732 trading days) for the FTSE100 index. Detailed information about each European stock market is in Appendix A.

Table 1 shows the descriptive statistics of the daily logarithmic RV series. According to the mean value, the German market is the most volatile in our sample. LB_{10} is the Ljung-Box statistic for testing if autocorrelation coefficients in the log RV series up to 10 lags are

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[2] Baele (2005) finds evidence of a volatility spillover effect from the US market to many Western European equity markets. Nikkinen and Sahlström (2004) and Harju and Hussain (2011) conclude that announcements of US macroeconomic news have a significant impact on the volatility of European stock markets.

[3] Bloomberg is the source of all high-frequency data used in this study.

[4] Due to COVID-19, global stock market volatility spiked (VIX Index reached 82.7 on March 16, 2020). Such turmoil can magnify volatility spillover effects between markets (e.g. Hamao et al., 1990). To avoid COVID-19-induced market turmoil biasing our estimation, we set our sample period ending on December 31, 2019.

[5] Trump's tweets posted when European stock markets are closed may influence the next day's opening prices (i.e., increasing overnight volatility). Therefore, we include overnight returns in our analysis.

Table 1

Descriptive statistics of daily log(RV) (Sample period: January 23, 2017, to December 31, 2019).

	Mean	Std.Dev	Skewness	Kurtosis	LB_{10}	Obs
Germany	-0.637	0.783	0.263	3.263	964.46***	730
			(8.680)	(134.79)		
France	-0.811	0.763	0.544	3.783	1011.3***	744
			(8.578)	(115.03)		
U.K.	-1.050	0.677	0.642	4.251	1181.0***	732
			(14.639)	(305.57)		
US	-1.179	1.109	0.408	2.787	2448.4***	733
			(4.837)	(39.933)		

Notes: Numbers in parentheses are the skewness and kurtosis of the original RV series, respectively. LB_{10} is the Ljung-Box statistic that checks for the absence of serial correlation up to 10 lags. *** denotes statistical significance at the 1 % level.

0. As shown in Table 1, autocorrelation is present in the log RV series for all markets, indicating a long-memory process due to high Ljung-Box values. Accordingly, we adopt a HAR-RV model to conduct empirical analysis.

3.2. Tweets data

During our sample period, Trump issued a total of 13,827 tweets.[6] We extract all Trumps's tweets related to Germany, France, and the UK during the sample period. Additionally, we include tweets about Europe or the EU, as changes in US-EU relations can affect business conditions and stock markets in these countries. Among the 13,827, 58 of them are relevant to Germany, 101 to France, 88 to the UK, and 94 to the Europe/EU.

Trump's tweets about the three European countries and the EU also include retweets and opinions on his political performance. Some tweets contain keywords related to a certain country but do not have relevance to that country.[7] Therefore, we exclude the tweets that are irrelevant to our study. Sometimes, Trump posted several tweets relevant to these three countries and the EU on the same day, and we then set the tweet dummy for that day to be 1 since the tweet variable in our model is a daily variable.[8] Finally, we obtained 61 sample days with the tweet variable taking 1 for Germany, 74 for France, and 65 for the UK.

3.3. US news data

In the US, there are numerous macroeconomic news releases almost every day. Given that the impact of these announcements varies across different samples, as shown in previous studies, we have chosen to use 16 significant indicators of great interest to investors. A basic overview of the announcement releases is presented in Appendix B. All data is from Bloomberg.

All macroeconomic news announcements are released between 8:30 AM and 10:00 AM Eastern Standard Time (EST). Therefore, US macroeconomic news can affect the three European stock markets on their announced days. The press release time of the FOMC scheduled meetings in our sample period is 2:00 PM EST; the three European markets are closed then. Hence, the FOMC announcement of day t may impact these European stock markets on day $t+1$.[9]

4. Empirical analysis

4.1. Estimation results for the full sample period

Table 2 displays the results of estimating the HAR-RV models. The estimates of β_{tweet} is positive, indicating that Trump's tweets tend to increase volatility in European stock markets. As to Germany and France, the estimates of β_{tweet} are significantly positive at the level of 5 %. However, the estimate on β_{tweet} for the UK is insignificantly positive, showing the limited influence of Trump's tweeting activity on the volatility of the UK market during the full sample period.

4.2. Estimation results for two subsample periods

The effect of Trump's tweets on marker volatilities might rise along with the increased influence of the poster. The attention paid to Trump's Twitter account has gradually risen since his election, so the latter part of his first term has acquired more attention than

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[6] All tweet data were acquired from the Trump Twitter Archive (www.trumptwitterarchive.com/, accessed in Jan. 2020).

[7] For instance, one of Trump tweet is 'Great discussion with Prime Minister @BorisJohnson today. We talked about Brexit and how we can move rapidly on a US-UK free trade deal. I look forward to meeting with Boris this weekend at the @G7 in France! (August 19, 2017)'. Even though this tweet mentions France, it is targeted at the UK, not France. Accordingly, we regard it as irrelevant to our study of the stock market of France.

[8] We count the tweets issued between the market closing time of period t-1 and the market closing time of period t in the European stock market.

[9] When the stock markets are not open on the announcement day, these announcements may then influence European stock markets on the next trading day, and we accordingly address this question in our study.

Table 2
Estimation results of basic HAR-RV model (Sample period: January 23, 2017, to December 31, 2019).

	Germany	France	UK
β_{tweet}	0.237**	0.199**	0.128
	(0.095)	(0.088)	(0.078)
c	-0.195***	-0.273***	-0.375***
	(0.052)	(0.048)	(0.047)
β_{daily}	-0.094	0.184**	0.046
	(0.078)	(0.076)	(0.066)
β_{weekly}	0.402***	0.408***	0.386***
	(0.080)	(0.068)	(0.067)
$\beta_{monthly}$	0.114	-0.018	0.063
	(0.081)	(0.069)	(0.076)
β_{VS}^{US}	0.181***	0.180***	0.175***
	(0.037)	(0.035)	(0.033)
$\beta_{VS}^{Germany}$	-	-0.060	-0.044
		(0.064)	(0.046)
β_{VS}^{France}	0.163**	-	0.064
	(0.083)		(0.060)
β_{VS}^{UK}	-0.066	-0.046	-
	(0.061)	(0.062)	
β_{FOMC}	0.275**	0.268**	0.345***
	(0.130)	(0.115)	(0.112)
β_{hol}	-0.079	-0.165***	-0.018
	(0.065)	(0.060)	(0.053)
News Controls	Yes	Yes	Yes
Obs	730	744	732

Notes: Numbers in parentheses are robust standard errors. ***, ** and * denote statistical significance at the 1 %, 5 % and 10 % level, respectively.

earlier (Fig. 1). Consequently, we split our sample into two distinct subsample periods: the earlier period, which spans from Jan. 23, 2017, to Jun. 30, 2018, and the later period, which spans from Jul. 1, 2018 to Dec. 31, 2019.

Panel A of Table 3 (earlier period) shows that all estimates on β_{tweet} are insignificant, denoting a trivial influence of Trump's tweets on European markets. However, for the later period, the estimates of β_{tweet} for Germany and France are both significantly positive, and the estimate of β_{tweet} for the UK is statistically insignificant.

Among these three countries, the estimate of β_{tweet} for the UK is weaker in terms of its magnitude and significance than those for Germany and France. The reason for such phenomenon may lie in the relative independence of the UK. In our sample period, even when the UK is still a member of the EU, it is quite different from other EU member countries. For example, the UK is not a part of the Eurozone and keeps its own currency. Our sample period begins in early 2017, half year past the day of the Brexit referendum, with the result in favor of the UK leaving the EU. Consequently, we further analyze the impacts of Trump's tweets about Europe/EU on the market volatility of Germany, France, and the UK.

### 4.3. Estimation results for the Trump tweets relevant to Europe/EU

We focus on the effect of Trump's tweets about Europe/EU on the volatility of Germany, France, and the UK markets in this subsection. The tweet data exclude those related to all three countries, and the sample period corresponds to Panel B of Table 3 for comparison.

Table 4 provides the estimation results. As with Panel B of Table 3, the estimates β_{tweet} for Germany and France are both significantly positive. The estimate of β_{tweet} for the UK, however, is not statistically significant, implying that the influence of Trump's tweets relating to the Europe/EU on the British stock market is limited.

Here are two specific examples of European stock market reactions to Trump's tweets. Fig. 2 shows the price movements on July 25-26, 2018. After markets closed on July 25, Trump tweeted positively about the EU-US trade meeting, stating they 'love each other.'[10] European markets reacted differently to this positive news. This optimism led to a sharp rise in German and French stock market opening prices. In particular, Germany's trade with the US is relatively larger, and the stock market reacted more significantly. However, the UK market had little reaction, with an FTSE 100 return of only 0.06% on July 26. This likely reflects the UK's relative independence.

Another case occurred on July 11, 2018 (Fig. 3). On July 10, 2018, Trump posted a tweet critical of the EU at 8:52 PM. In this tweet,

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[10] *"Great meeting on Trade today with @JunckerEU and representatives of the European Union. We have come to a very strong understanding and are all believers in no tariffs no barriers and no subsidies. Work on documents has already started and the process is moving along quickly. European Union Nations will be open to the United States and at the same time benefiting by everything we are doing for them. There was great warmth and feeling in the room - a breakthrough has been quickly made that nobody thought possible!"* (July 26, 2018, 1:42 AM CET) and *"Obviously the European Union as represented by @JunckerEU and the United States as represented by yours truly love each other!"* (July 26, 2018, 1:49 AM CET).
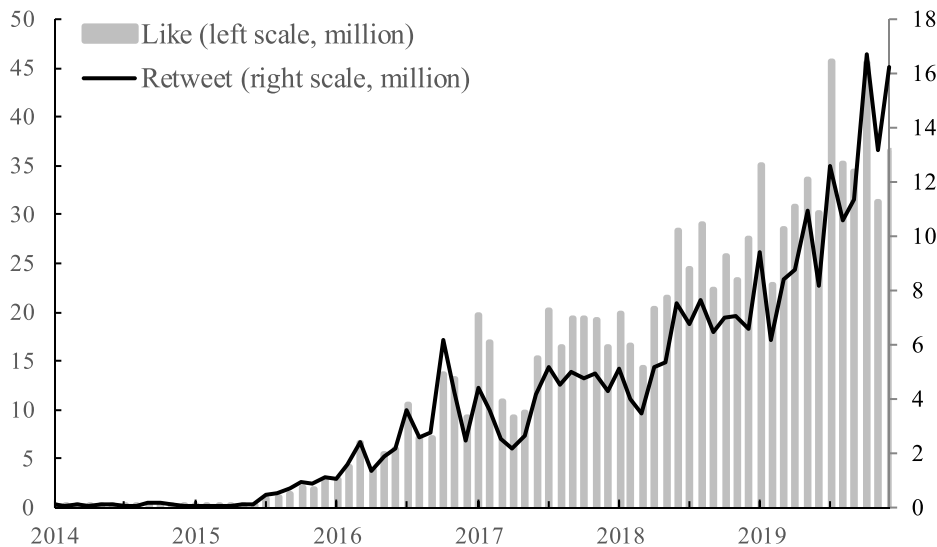
Fig. 1. Number of likes and retweets of Trump tweets (2014-2019).
Notes: This figure shows the Number of Likes (left-hand scale) and the Number of retweets (right-hand scale) of President Trump's tweets in the sample period. Both are total monthly values and the unit is million.

Table 3
Estimation results for two subsample periods.

	Panel A: earlier-period January 23, 2017, to June 30, 2018			Panel B: later-period July 1, 2018, to December 31, 2019		
	Germany	France	UK	Germany	France	UK
β_{tweet}	0.174	0.192	0.139	0.266**	0.195*	0.089
	(0.191)	(0.158)	(0.133)	(0.115)	(0.110)	(0.094)
c	-0.183*	-0.272***	-0.589***	-0.190***	-0.281***	-0.323***
	(0.098)	(0.098)	(0.095)	(0.065)	(0.059)	(0.058)
β_{daily}	-0.139	0.301**	0.040	-0.089	0.041	-0.027
	(0.110)	(0.118)	(0.098)	(0.118)	(0.108)	(0.087)
β_{weekly}	0.377***	0.381***	0.383***	0.421***	0.393***	0.309***
	(0.120)	(0.096)	(0.089)	(0.116)	(0.104)	(0.104)
$\beta_{monthly}$	0.144	-0.060	-0.082	0.043	0.026	0.130
	(0.112)	(0.091)	(0.108)	(0.120)	(0.107)	(0.104)
β_{VS}^{US}	0.200***	0.160***	0.200***	0.148***	0.216***	0.146***
	(0.054)	(0.048)	(0.051)	(0.056)	(0.056)	(0.042)
$\beta_{VS}^{Germany}$	-	-0.127	-0.070	-	0.056	-0.025
		(0.087)	(0.066)		(0.100)	(0.067)
β_{VS}^{France}	0.258**	-	0.087	0.139	-	0.140*
	(0.121)		(0.093)	(0.124)		(0.080)
β_{VS}^{UK}	-0.094	-0.032	-	-0.032	-0.048	-
	(0.087)	(0.089)		(0.099)	(0.099)	
β_{FOMC}	0.215	0.271	0.374**	0.291*	0.221	0.272*
	(0.228)	(0.195)	(0.182)	(0.174)	(0.168)	(0.157)
β_{hol}	0.036	-0.181**	0.033	-0.187**	-0.153*	-0.079
	(0.091)	(0.079)	(0.081)	(0.094)	(0.088)	(0.070)
News Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs	359	364	359	371	380	373

Notes: Numbers in parentheses are robust standard errors. ***, ** and * denote statistical significance at the 1 %, 5 % and 10 % level, respectively.

Trump criticized NATO allies' military spending.[11] It is noteworthy that all European stock markets, including the UK stock market, dropped sharply in response to this critical tweet. The next day, Germany's DAX, France's CAC40, and the UK's FTSE100 lost 1.52 %, 1.48 %, and 1.30 %, respectively. As the UK is a NATO member, its stock market is likely affected by Trump's NATO-related tweets. In short, the UK stock market may react to Trump's tweets about Europe/EU only if the content is relevant to the UK.

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[11] *"The European Union makes it impossible for our farmers and workers and companies to do business in Europe (U.S. has a $151 Billion trade deficit) and then they want us to happily defend them through NATO and nicely pay for it. Just doesn't work!"* (July 10, 2018, 20:52 PM CET).

Table 4
Estimation results for the Trump tweets relating to Europe/EU (Sample period: July 1, 2018, to December 31, 2019).

	Germany	France	UK
β_{tweet}	0.263**	0.301**	0.126
	(0.130)	(0.133)	(0.115)
c	-0.178*	-0.280***	-0.324***
	(0.065)	(0.058)	(0.057)
β_{daily}	-0.096	0.042	-0.025
	(0.118)	(0.108)	(0.087)
β_{weekly}	0.419***	0.410***	0.315***
	(0.116)	(0.104)	(0.103)
$\beta_{monthly}$	0.056	0.017	0.121
	(0.120)	(0.106)	(0.105)
β_{VS}^{US}	0.152***	0.215***	0.147***
	(0.056)	(0.055)	(0.042)
$\beta_{VS}^{Germany}$	-	0.053	-0.025
		(0.100)	(0.067)
β_{VS}^{France}	0.147	-	0.141*
	(0.124)		(0.080)
β_{VS}^{UK}	-0.037	-0.050	-
	(0.099)	(0.099)	
β_{FOMC}	0.280	0.203*	0.269*
	(0.176)	(0.171)	(0.159)
β_{hol}	-0.187**	-0.149	-0.079
	(0.094)	(0.088)	(0.070)
News Controls	Yes	Yes	Yes
Obs	371	380	373

Notes: Numbers in parentheses are robust standard errors. ***, ** and * denote statistical significance at the 1 %, 5 % and 10 % level, respectively.
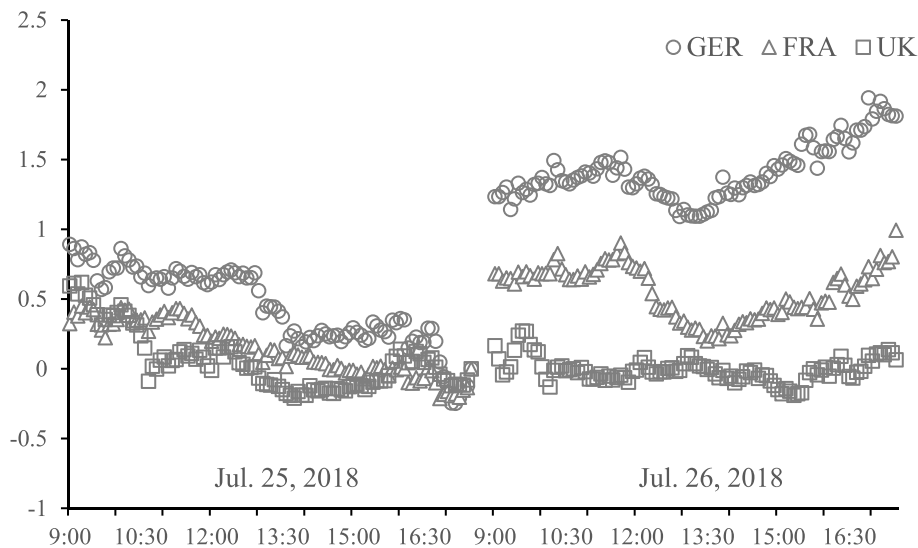
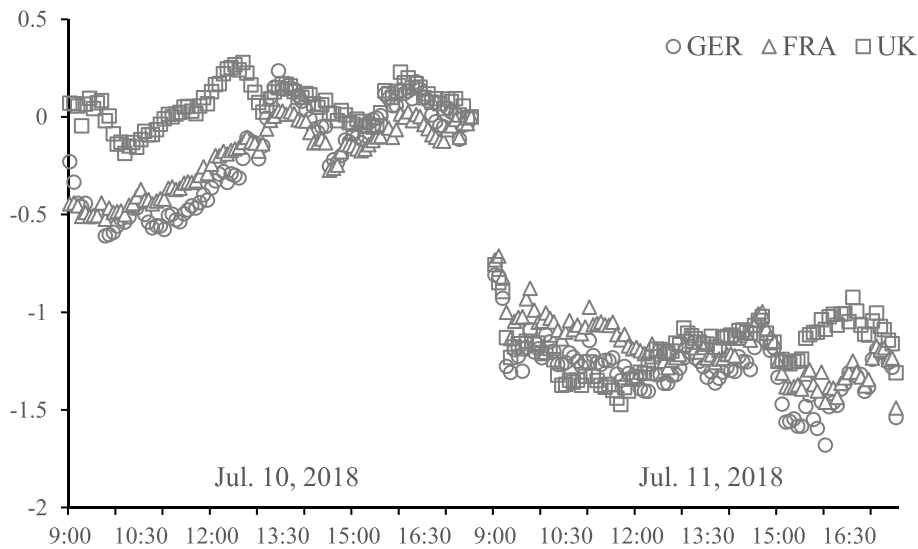**Fig. 2.** Intraday price movements (July 25-26, 2018).
Notes: This figure depicts the intraday price movements of Germany's DAX (GER), France's CAC40 (FRA), and the UK's FTSE 100 (UK) on two consecutive trading days, Jul 25 and 26, 2018. The dots denote five-minute intraday logarithmic prices. For the convenience of comparison, these prices are shifted to set the final logarithmic prices on the first day at zero. The trading time is Central European Time (CET).

5. Conclusion

This paper investigates the impact of Trump tweets relating to Germany, France, the UK, and Europe/EU on the stock market volatilities of these three European countries.

The empirical findings of this study primarily enrich the current literature in the following aspects. First, our empirical results find the effect of political information spillover from Trump's tweets on European stock markets. In other words, Trump's tweeting activities impact global stock markets beyond the US.

Second, our research indicates that Trump's tweets significantly increased market volatility in Germany and France during the later

Fig. 3. Intraday price movements (July 10-11, 2018).
Notes: This figure depicts the intraday price movements of Germany's DAX (GER), France's CAC40 (FRA), and the UK's FTSE 100 (UK) on two consecutive trading days, Jul 10 and 11, 2018. The dots denote five-minute intraday logarithmic prices. For the convenience of comparison, these prices are shifted to set the final logarithmic prices on the first day at zero. The trading time is Central European Time (CET).

period of our sample. In other words, the degree of influence of tweets on financial markets is positively related to the degree of attention to the tweets themselves.

Third, our empirical findings show that the UK market is not significantly influenced by Trump's tweets about Europe/EU, contrary to the other two markets. Such a difference might be due to the relative independence of the UK from the EU, even when it was a member of the EU in the sample period.

Our study is based on the analysis of historical tweet data. Trump still posts many tweets, and their impact on financial markets remains interesting. Our framework can be applied to study if tweets from other influential people affect market volatility. For instance, Elon Musk, who supported Trump, is also an interesting subject for future research.

CRediT authorship contribution statement

Yusaku Nishimura: Writing – original draft, Visualization, Software, Investigation, Formal analysis, Data curation. **Bianxia Sun:** Writing – review & editing, Validation, Supervision, Methodology, Funding acquisition, Conceptualization.

Appendix A

Trading days, trading time, and numbers of intraday observations
(Sample period: January 23, 2017 through December 31, 2019)

	Trading days	Trading time	No. of intraday observations	Total intraday observations
Germany	730	9:00-17:30	103	75,190
France	744	9:00-17:30	103	76,632
U.K.	732	8:00-16:30	103	75,396
US	733	9:30-16:00	79	57,907

Notes: The trading time is local time. Trading days with only a half-day trading session, such as the day before Christmas, are excluded from our samples.

Appendix B

List of US macroeconomic news announcements
(Sample period: January 23, 2017, to December 31, 2019)

Announcement	Abbreviation	Time	Mean	Std.Dev	Obs
Consumer confidence	CC	10:00	0.192	1.009	36
Consumer price index	CPI	8:30	-0.140	1.042	35
Durable goods orders	DGO	8:30	0.066	0.974	36
Existing homes sales	EHS	10:00	-0.080	0.995	36
Gross domestic product	GDP	8:30	0.291	1.022	35
Industrial production	IP	9:15	-0.135	1.032	35
Initial unemployment claims	IUC	8:30	-0.063	0.988	153
Michigan consumer sentiment	MCS	10:00	0.021	0.988	71
New homes sales	NHS	10:00	0.079	1.020	36
Housing starts	HS	8:30	-0.187	0.911	35
Nonfarm payroll employment	NPE	8:30	0.045	1.027	35
Personal consumption expenditures	PCE	8:30	-0.199	0.946	35
Personal income	PI	8:30	-0.045	0.928	35
Purchasing managers' index	PMI	10:00	0.068	1.024	35
Retail sales	RS	8:30	-0.134	1.050	34
Unemployment rate	UR	8:30	-0.095	0.945	35

Notes: All announcement times are presented in Eastern Standard Time. For each announcement variable, Mean and Standard deviation are those of the macroeconomic news surprise after we standardize it. GDP includes an advance, a preliminary, and a final series. Michigan Consumer Sentiment includes a preliminary and a final series. The last column, Obs, indicates how many times each announcement takes place in our sample period. Source: Bloomberg.

Data availability

The authors do not have permission to share data.

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