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When Markets Talk: Volatility Spillovers Between the UK and China

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Abstract

Research Originality: This study uniquely examines spillover effects among stock returns, gold prices, and exchange rates within the UK and China, as well as between them.

Research Objectives: This study aims to examine volatility spillover effects among stock, gold, and exchange rate returns within and across the UK and China.

Research Method: This study exploits monthly data from January 2000 to December 2024 and employs a bivariate GARCH model to analyze cross-market and cross-border volatility spillovers.

Empirical Results: The results demonstrate significant ARCH and GARCH effects, necessitating persistent volatility in markets to be studied. No evidence of mean spillover is observed in UK markets. However, volatility spillover persists from the exchange rate to gold within the UK and China. Cross-country analysis reveals one-way mean spillover from the UK to the Chinese equity market and bidirectional volatility spillovers in exchange rates and gold.

Implications: For investors and portfolio managers, deciphering volatility spillover improves diversification strategies and helps to mitigate systemic risk.

Keywords:
volatility spillover; gold; index return; exchange rate; GARCH

How to Cite:

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INTRODUCTION

Globalization and financial liberalization have profoundly transformed global markets with unprecedented levels of interconnection across economies. Commodity, currency, and equity markets are increasingly interconnected through the exchange of goods, services, technology, and capital globally (Pandey & Vipul, 2018). This integration leads to price co-movements across such markets and signifies implications for investment strategies regarding hedging and diversification during periods of higher volatility. Therefore, the relationship between commodity and financial markets has emerged as a critical area of research. The findings of this study show that, while mean spillovers are mostly absent in UK markets, there is significant volatility transmission from exchange rates to gold in both the UK and China. Cross-country analysis reveals a one-way mean spillover from the UK to China's equity market, suggesting asymmetric impact. Additionally, bidirectional volatility spillovers are found between the UK and China in both the exchange rate and gold markets, suggesting increasing financial interdependence across these asset classes. Overall, the degree of financial integration between the two countries differs by market.

The previous research mainly examined two variables together such as stock and exchange rate (Delgado et al., 2018; Nandy & Chattopadhyay, 2019) or analyze data from only single country (El Hedi Arouri et al., 2015; Shahzad et al., 2021) or from large group without separating developed and emerging countries (Balli et al., 2015; Vo & Ellis, 2018) potentially. The novelty of this research lies in its comprehensive approach to analyzing multi-asset interlinkages, including equities, exchange rates, and gold across both developed (UK) and emerging (China) markets, rather than focusing on a single market or asset. Unlike previous studies that mainly examine bilateral relationships, this study captures both cross-asset and cross-country spillovers, thereby offering more profound insights into directional volatility transmission and asymmetries in financial integration across distinct economic contexts.

Gold, exchange rates, and equity markets are important parts of global portfolios. During periods of uncertainty in equity markets, gold often serves as a hedge and a store of value, while exchange rates reflect core economic factors and money flows (Demirer et al., 2018). Analyzing the movement of these three assets is expected to reveal situations in which asset linkages might cause problems and how we should leverage their diversity to reduce risk (Le et al., 2021). In the literature, many studies have analyzed different dynamics in market volatility. Chen & Wang (2019) found that gold serves both as a hedge and a safe haven in developed stock markets. Evidence of gold-to-stock return spillovers in China was established by El Hedi Arouri et al. (2015). In separate works by Samanta & Zadeh (2012) and Badshah et al. (2013), it is discussed how cross-asset linkages are affected by macroeconomic changes and volatility. Delgado et al. (2018) and Leung et al. (2017) argued that volatility between equity and exchange rate markets was bidirectional, particularly after the financial crisis.

Despite many studies finding bilateral spillovers across markets, the interaction among equity, gold, and currency markets, particularly in the UK and China, still receives

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less attention. There is a significant difference between open, fast-moving markets in the UK and existing, regulated markets in China (Liu et al., 2017; Wang et al., 2018). An evaluation of three markets in both countries reveals that (1) either spillovers are balanced or handled mainly in one direction, (2) how market maturity and its rules impact volatility transmission, and (3) the effectiveness of different cross-market hedging strategies is based on the structure of each economy.

This study focuses on the UK and China, representing developed and emerging economies, respectively. Comparing these two countries offers a valuable perspective by helping explore how financial integration, market efficiency, and volatility transmission differ across economic stability, regulatory frameworks, and investor behavior. Developed markets typically have more stable institutions, deeper liquidity, better transparency, and longer histories of financial liberalization. On the contrary, emerging markets exhibit more volatile, less transparent, and more sensitive traits to external shocks. This research helps assess whether volatility spillovers are symmetric or asymmetric across markets. For example, a shock in a developed market is considered to transmit more strongly due to global influence than in emerging markets, which may exhibit greater sensitivity to external shocks due to structural vulnerabilities or limited hedging instruments.

In this research paper, we use the bivariate GARCH model to evaluate and compare volatility spillovers between the United Kingdom and China. Bhowmik & Wang (2020) discussed in their systematic literature review of stock market volatility and return analysis that many researchers have used the GARCH(1,1) model to examine volatility in time-series data. Whereas Balli et al. (2015) noted that although many other techniques are available to analyze volatility spillover, the GARCH(1,1) model is highly valued for its ease of implementation. They also noted that multivariate models often struggle to find a trade-off between generality and feasibility, a phenomenon known as "the curse of dimensionality" (Hou & Behdinan, 2022).

This study contributes to the current literature on volatility spillover across asset classes. It shifts focus from individual pair-based links to considering how effects from different speculations influence two or three asset types. Moreover, this study compares developed and emerging markets owing to differences in market depth, transparency, and investor behavior, which influence spillovers (Vo & Ellis, 2018; Le et al., 2020). The analysis of the UK and China helps us understand how different policy frameworks can alter the severity and timing of volatility moves. These learnings form a basis for constructing strong cross-market hedging strategies and for managing risks.

METHODS

This study used returns on the FTSE 100 index (UK), the SHCOMP index (China), gold returns, and the exchange rates of the pound to the dollar and the Renminbi to the dollar. To examine spillover effects across markets, this study uses monthly DataStream data from January 2000 to December 2024. To analyze volatility spillover among variables, we first test the stationarity of the return series. The Augmented Dickey-Fuller (ADF)

test is applied to return series to test whether the series is stationary. The null hypothesis is that the series has a unit root; if the t-statistic is significant, we can reject the null hypothesis. The literature supports the use of the GARCH model to examine volatility spillover among markets, both nationally and internationally; however, before that, it is necessary to test for an ARCH effect. In financial markets, volatility is often uneven and shifts over time. Therefore, behaving this way is important for accurately assessing market risk and setting asset prices. To resolve this issue, Engle (1982) developed the Autoregressive Conditional Heteroskedasticity (ARCH) model, which describes the time series' changing variance as an autoregressive process. A few years later, Bollerslev (1986) introduced the Generalized ARCH (GARCH) model by adding a moving average term to the original model. Additionally, the heteroscedasticity test (ARCH test) is used to test the presence of the ARCH effect among variables. Due to the presence of the ARCH effect among variables, this study uses the following bivariate GARCH model:

$$R_{Index} = c + \alpha\varepsilon_{t-1}^2 + \beta h_{t-1} + \gamma\sigma_{t-1} \quad (1)$$

$$R_{Gold} = c + \alpha\varepsilon_{t-1}^2 + \beta h_{t-1} + \gamma\sigma_{t-1} \quad (2)$$

$$R_{ER} = c + \alpha\varepsilon_{t-1}^2 + \beta h_{t-1} + \gamma\sigma_{t-1} \quad (3)$$

Where R_{Index} is the monthly return of the FTSE100 (UK) Index and SHCOMP (China) Index, R_{Gold} is the monthly return on gold in the UK and China, R_{ER} are the currency returns for the UK (GBP per dollar) and China (CNY per dollar). ε_{t-1}^2 show the changes in the return of the dependent variable with respect to the corresponding independent variables at time $_{(t-1)}$, and also show the persistence in the short-run (ARCH effect of past shocks), h_{t-1} represents the interdependence among markets, and it also represents the GARCH effect of past volatilities (long-run persistence) and σ_{t-1} shows volatility spillover between markets.

RESULTS AND DISCUSSIONS

Table 1 reports the descriptive statistics of the variables used in the study for the UK and China. The mean value for all variables is positive, except for the UK exchange rate return, which shows a positive average return from January 2000 to December 2024. In contrast, the minimum value for all variables is negative. In both countries, gold gives the highest monthly return over the sample period, though the risk is also high.

In order to use the GARCH model, three aspects should be tested (Hassanzoy & Ito, 2018): i) normal distributions, ii) ARCH effects, and iii) autocorrelation. To assess data normality, the Jarque-Bera test is applied, and significant p-values indicate that, except for gold (in China), the returns are not normally distributed. The stationarity of the return series is tested using the ADF test, and the results in Table 2 indicate that all variables are stationary at the level. Table 2 also shows ARCH effects in the variables, allowing us to use GARCH to examine volatility spillovers among the markets.

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Table 1. Descriptive Statistics

Variables	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
United Kingdom									
R_Gold	0.008	0.005	0.130	-0.100	0.025	0.311	4.102	7.235	0.0301
R_Index	0.0004	0.0067	0.2012	-0.1091	0.0501	-0.6210	4.7560	9.1023	0.0000
R_ER	-0.0003	-0.0004	0.0920	-0.0921	0.0254	-0.2081	4.2300	15.0500	0.0000
China									
R_Gold	0.0080	0.0032	0.1120	-0.1210	0.0400	0.0901	4.4101	2.9101	0.425 0
R_Index	0.0056	0.0052	0.2810	-0.2110	0.0741	-0.1210	4.7710	11.1912	0.0000
R_ER	0.0011	0.0010	0.0312	-0.0369	0.0085	-0.6321	7.2110	35.9125	0.0000

Source: Data processed

Table 2. Unit Root Test and ARCH Test

	United Kingdom			China		
	Index	**Gold**	**Exchange rate**	**Index**	**Gold**	**Exchange rate**
Unit root test						
ADF I(0)	-14.0350***	-13.9203**	-16.1211***	-14.2971***	-12.9810***	-12.7412**
ARCH test						
F-statistics	13.9850***	7.9510**	6.9874***	17.8711***	6.7104**	5.0991**

Source: Data processed

Further, Table 3 indicates the result of the Durbin Watson and Breusch–Godfrey serial correlation Lagrange Multiplier (LM) test. The results show that standardized squared residuals are not autocorrelated. The null hypothesis is not rejected at the required level of significance. The Durbin-Watson test is also used to examine the independence of residuals. The Durbin-Watson test results indicate that the Durbin-Watson statistic for all variables in the study is close to 2, confirming the absence of serial correlation in the residuals or error terms. Therefore, the variables considered in this study do not have autocorrelation.

Table 3. Results of the Serial Autocorrelation Test

	United Kingdom			China		
	Index	**Gold**	**Exchange rate**	**Index**	**Gold**	**Exchange rate**
Breusch-Godfrey serial correlation LM test						
F-statistics	0.6135	0.9885	0.5444	1.3508	1.3685	1.3310
Prob. Chi-square	0.5100	0.4120	0.6100	0.3112	0.3310	0.1999
Durbin-Watson (DW)						
DW stats	1.9910	1.9951	1.9671	1.999	1.9823	1.9789

Source: Data processed

To test volatility spillover across markets, we first generated volatility series and then included volatility as an independent variable. The key findings indicate that changes in gold and exchange rates in China and the UK can strongly influence each other, suggesting volatility spillover. However, there are limited or one-sided effects on the country's equity markets.

Table 4. Estimates of the GARCH Model for the stock index, gold, and exchange rate

Panel A. $R\_Index = c + \alpha\varepsilon_{t-1}^2 + \beta h_{t-1} + \gamma\sigma_{t-1}$

Variables	UK		China	
	Gold	Exchange rate	Gold	Exchange rate
Mean equation				
C	0.0030*	-0.0029	0.0025	0.0014
R_Index	0.0362		0.0235	
R_Index		0.0381		0.9922**
Variance equation				
C	0.0001	0.0001	0.0010***	0.0010**
ε_{t-1}^2	0.1882***	0.2111	0.2420***	0.2100***
h_{t-1}	0.7441***	0.7420	0.7320***	0.7211***
σ_{t-1}	0.0000	-0.0021	-0.0070	0.0090

Panel B. $R\_Gold = c + \alpha\varepsilon_{t-1}^2 + \beta h_{t-1} + \gamma\sigma_{t-1}$

Variables	UK		China	
	Index	Exchange rate	Index	Exchange rate
Mean equation				
C	0.0075**	0.0072**	0.0081**	0.0065**
R_Gold	0.0220		0.0241	
R_Gold		-0.0221		0.2921
Variance equation				
C	0.0011	0.0010**	0.0001	0.0001***
ε_{t-1}^2	0.0910	0.0641	0.1421**	0.1782***
h_{t-1}	0.4811**	0.6352***	0.5323***	0.4464**
σ_{t-1}	-0.0032	-0.0064*	0.0011	0.0310**

Panel C. $R\_ER = c + \alpha\varepsilon_{t-1}^2 + \beta h_{t-1} + \gamma\sigma_{t-1}$

Variables	UK		China	
	Index	Gold	Index	Gold
Mean equation				
C	0.0001	-0.0001	0.0011	0.0010*
R_ER	0.0450		0.0121	
R_ER		-0.2035**		-0.0312*
Variance equation				
C	0.0001	0.0010**	0.0001***	0.0010**
ε_{t-1}^2	-0.0011	0.0165	0.1810**	0.2311***
h_{t-1}	0.9870***	-0.8010***	0.4520***	0.4322***
σ_{t-1}	-0.0010***	0.0022	0.0011***	0.0011***

Source: Data processed

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Table 4 reports the results of the bivariate GARCH model. Panel A of Table 4 reports the result of Model 1 and shows that the ARCH and GARCH effects are present among the variables. However, there is no mean spillover in any of the markets in the UK or China. Panel B (Table 4) includes return on gold as a dependent variable, and results indicate that volatility spillover from the exchange rate market to the gold market occurs in the UK and China. However, there is no mean spillover impact between the gold and equity markets in either country.

Additionally, in Panel C, the dependent variable is an exchange rate return, and the results indicate a positive mean spillover from the exchange rate market to the equity index market in China. This finding is consistent with Njegić et al. (2018) and Andreu et al. (2013). Njegić et al. (2018) found volatility spillover from the exchange rate to the equity market in seven developing countries and one developed country. Andreu et al. (2013) conducted a study across 12 developing countries, and the results show a directional spillover effect from equity markets to exchange rate markets, except in Colombia. Moreover, the results in Panel C also show that there is no spillover from the equity index to the exchange rate in the UK. This suggests that developed markets, such as the UK, are less reactive to currency fluctuations than emerging markets, such as China.

Our empirical results further support the theoretical claim that financial markets in emerging economies are more sensitive to external shocks. This aligns with the findings of Nazlioglu et al. (2022), who emphasized that volatility transmission is more pronounced in emerging economies due to market inefficiencies and lower levels of financial integration. Overall, the results suggest that spillover effects are more pronounced in China, particularly in the exchange rate-stock market relationship, highlighting the greater sensitivity of emerging markets to cross-asset shocks. This study also examined the volatility spillover between UK and Chinese markets to analyze shock transmission between the UK equities index market and the Chinese equity index market, the UK exchange rate market and the Chinese exchange rate market, and the UK gold market and the Chinese gold market.

Table 5, Panel A, presents the results on volatility spillover between the UK and Chinese equity indices. In model (1), the dependent variable is the UK equity index, which shows that there is no mean spillover effect from the Chinese equity index to the UK equity index. However, in model (2), the results present the mean spillover effect from the UK equity index to the Chinese equity index. The results are consistent with the study of Jebran & Iqbal (2016) and Li & Giles (2015). Jebran & Iqbal (2016) found that there is unidirectional spillover from the Pakistan equity market to Sri Lanka, Japan, and Hong Kong; from the Indian equity market to the Chinese equity market; from Sri Lanka to the Japanese equity market; and from Hong Kong to the Indian equity market. Moreover, Li & Giles (2015) found a significant spillover effect from the US stock market to Japan and other Asian markets. These results reflect the dominance of developed equity markets in shaping the behavior of emerging markets, as discussed in studies such as Cavusgil (2021).

Table 5. Estimates of the GARCH Model for China and the UK

Panel A.		
Variables	**R_Index UK(1)**	**R_Index China(2)**
Mean equation		
C	0.002	0.0022
R_Index China	0.0872***	
R_Index UK		0.2895***
Variance equation		
C	0.0002*	0.0005**
ε_{t-1}^2	0.1386***	0.2231***
h_{t-1}	0.7197***	0.6907***
σ_{t-1}	-0.001	-0.017**
Panel B.		
Variable	**R_ ER UK(1)**	**R_ER China(2)**
Mean equation		
C	-0.0007	0.0002
R_ER China	0.8970***	
R_ER UK		0.0015
Variance equation		
C	0.0012***	0.0000***
ε_{t-1}^2	0.0249**	0.3549***
h_{t-1}	-0.9273***	0.6788***
σ_{t-1}	-0.0133***	-0.0001***
Panel C.		
Variable	**R_Gold UK(1)**	**R_Gold China(2)**
Mean equation		
C	0.0001	0.0005
R_Gold China	0.8745***	
R_Gold UK		0.8174***
Variance equation		
C	0.0001*	0.0001*
ε_{t-1}^2	0.1910***	0.1198***
h_{t-1}	0.5358***	0.7439***
σ_{t-1}	0.0010**	0.0013***

Source: Data processed

Panel B of Table 5 indicates the results of mean volatility spillover between the UK and Chinese exchange rate markets. The dependent variable in model (1) is the UK's exchange rate, indicating that there is a mean-shock transmission from the Chinese exchange rate market to the UK exchange rate market and vice versa, as shown in model (2). The results align with the study by Emenike (2018), which found a bidirectional spillover effect among West African currency/US exchange rate markets, specifically the West African CFA franc, Gambian dalasi, and Nigerian naira. Moreover, Panel C of Table 5 illustrates the volatility spillover between the UK and China gold markets. The findings

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show there is a spillover effect between the UK and Chinese gold markets in both models. Hence, variations in the gold market in China affect the UK market, and vice versa. The bidirectional spillover result is supported by the study by Baklaci et al. (2016). These patterns support the notion that commodities such as gold act as global hedges, strengthening the hypothesis that commodity markets are more integrated than financial markets.

The findings indicate that UK-Chinese financial integration varies across asset classes. The asymmetric spillover in the equity market is apparent: the UK index has a substantial impact on the Chinese index, whereas the reverse is not true. It portrays the power of developed markets in shaping global equity markets. Nevertheless, the exchange rate and gold markets exhibit two-way spillover, implying that shocks in one country influence the other. This correlation can indicate a stronger interaction between the currency and commodity markets globally. This may be in terms of international trade, international financial flows, and gold, which is considered a safe-haven asset.

It is observed that financial time series data are usually vulnerable to structural breaks, which may be caused by political, economic, social, or natural events. Structural presence can bias estimates of GARCH parameters and lead to overestimation of volatility (Yu et al., 2020; Naimoli et al., 2022; Zhang & Zhang, 2023). Therefore, this study employs Bai & Perron's (2003) multiple structural break test. There are many advantages of using this test. Identifying multiple structural breaks helps understand the events that cause them and enables better forecasting of results compared to the whole sample. It also improves robustness to misspecification, particularly with respect to instability in time series, serial correlation, and heteroskedasticity (Bai & Perron, 1998).

Table 6. Multiple Structural Break Test

Variable	Break Test	F-statistic	Critical Value	Break Date
United Kingdom				
R_Index	1	2.1041	8.58	2008M10
R_Er	1	2.3635	10.13	2007M11
R_Gold	1*	7.5416	5.96	2011M11
China				
R_Index	1	3.5836	8.58	2008M03
R_ER	1	3.1475	8.58	2005M07
	2*	38.4072	10.13	2014M01
R_Gold	1*	9.9745	7.82	2011M11

*Indicates 5% level of significance & Bai and Perron (2003) critical values.
Source: Data processed

The results of the structural break test are presented in Table 6, and it can be seen that one structural break is found in the return series for gold (China and UK) and in the exchange rate series for China. A structural break in gold occurred during November 2011, while a structural break in the exchange rate (China) occurred in January 2014. At these break test points, the F-statistic value is greater than the critical value. Arguna

& Kannan (2020) found that the 2008 financial crisis led to a decrease in commodity prices, but the gold price continued to increase and began to fall after the COMEX gold futures price hit an all-time high of 1,923.70 US dollars an ounce in 2011 (Kitco, 2011). The exchange rate structural break may be due to a mild depreciation in 2014.

If structural breaks are significant, failure to identify them can lead to overestimation of volatility persistence (Hood & Malik, 2018; Aharon et al., 2023). In a GARCH model, dummy variables are incorporated into the mean and variance equations to capture structural breaks in each equation (Budd, 2016). The GARCH(1,1) model is re-estimated by incorporating a dummy variable into the conditional mean and variance equations. It will allow us to validate the statistical significance of the structural break date. The results in Table 7 show volatility spillover across markets after incorporating the dummy (Di) for a structural break in the mean and variance equations. Compared with the results in Table 4 (GARCH effect without structural break), volatility spillover is significant in Panel A, indicating that volatility spillover flows from gold to the UK equity market. In China, it exists from the gold and foreign exchange markets to the equity market.

Table 7. Estimates of the GARCH Model with Structural Break

Panel A $R\_Index = c + \alpha\varepsilon_{t-1}^2 + \beta h_{t-1} + \gamma\sigma_{t-1} + \mathrm{D}i$

Variables	UK		China	
	Gold	Exchange rate	Gold	Exchange rate
Mean equation				
C	0.0020	0.0040	0.0061	0.0042
R_Index	0.0370	-0.0031	0.0432	1.238**
D*i*	0.0020	-0.0023	-0.0044	0.0053***
Variance equation				
C	0.0010***	0.0011	0.0031***	0.0033**
ε_{t-1}^2	0.1390***	0.1514***	0.0303	0.0444
h_{t-1}	0.5540***	0.7530***	0.5701**	0.5411***
σ_{t-1}	-0.0062***	-0.0020	-0.0251***	-0.0590***
D*i*	-0.0010***	0.0001	-0.0020**	-0.0022***

Panel B. $R\_Gold = c + \alpha\varepsilon_{t-1}^2 + \beta h_{t-1} + \gamma\sigma_{t-1} + \mathrm{D}i$

Variables	UK		China	
	Index	Exchange rate	Index	Exchange rate
Mean equation				
C	0.0111***	0.0070**	0.0100**	0.0081**
R_Gold	0.0391	-0.0633	0.0151	0.0980
D*i*	-0.0090*	-0.0020	-0.0091*	-0.0034
Variance equation				
C	0.0010	0.0010*	0.0021*	0.0010
ε_{t-1}^2	0.0680	0.0020	0.1261	0.1282*
h_{t-1}	0.7790***	0.9141***	0.7163***	0.6990***
σ_{t-1}	-0.0020	-0.0070	-0.0010	-0.0041
D*i*	0.0001	0.0010*	0.0001	-0.0011

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Panel C. $R_{ER} = c + \alpha\varepsilon_{t-1} + \beta h_{t-1} + \gamma\sigma_{t-1} + \mathrm{D}i$

Variables	UK		China	
	Index	Gold	Index	Gold
Mean equation				
C	0.0011	0.0050	0.0052	0.0011
R_ER	0.0291	-0.0312	0.0470	-0.0253
D*i*	-0.0020	-0.0022	0.0021	0.0081
Variance equation				
C	0.0151	0.0010	0.0001***	0.0002***
ε_{t-1}^2	-0.0010	0.0151	0.1480**	0.2261***
h_{t-1}	0.6650***	-0.0071**	0.5822***	0.5854***
σ_{t-1}	-0.0010***	0.0021	0.0010***	0.0012***
D*i*	0.0000	0.0001	0.0001	0.0000

Source: Data processed

Table 8. Estimates of the GARCH Model for China and the UK with Structural Break

Panel A.

Variables	R_Index UK(1)	R_Index China(2)
Mean equation		
C	0.001	0.006
R_Index China	0.073**	
R_Index UK		0.372***
D*i*	0.002	0.002
Variance equation		
C	0.002	0.002***
ε_{t-1}^2	0.138**	0.323***
h_{t-1}	0.679***	0.487***
σ_{t-1}	-0.002	-0.003**
D*i*	0.000	-0.001

Panel B.

Variable	R_ ER UK(1)	R_ER China(2)
Mean equation		
C	-0.001	0.002
R_ER China	0.837*	
R_ER UK		0.079
D*i*	-0.002	-0.002
Variance equation		
C	0.001*	0.000**
ε_{t-1}^2	0.150**	0.199**
h_{t-1}	0.600**	0.788***
σ_{t-1}	0.019**	-0.001**
D*i*	0.000	0.000

Panel C.		
Variable	**R_Gold UK(1)**	**R_Gold China(2)**
Mean equation		
C	0.003	0.0005
R_Gold China	0.862***	
R_Gold UK		0.179***
Di	-0.006	0.007
Variance equation		
C	0.003	0.002
ε_{t-1}^2	0.910**	0.981***
h_{t-1}	0.583***	0.939***
σ_{t-1}	0.001**	0.103***
D*i*	0.001	0.001

Source: Data processed

Incorporating the structural allows for a more accurate representation of market dynamics during periods of significant change, such as financial crises or policy shifts. The presence of another spillover post-break shows the need to account for such structural changes to avoid biased results. Similarly, the GARCH(1,1) model is re-estimated by incorporating a dummy variable to capture volatility spillovers across the same markets in China and the UK. The results in Table 8 show that there is no significant difference in volatility spillover after incorporating structural break effects. The data for this study also include the financial crisis period, but no significant structural break is observed during that period. For robustness, we include a dummy variable for 2008, but it does not significantly alter the results.

CONCLUSION

This study analyzes how shocks (spillovers) spread across stock markets, gold, and exchange rates in the UK and China from 2000 to 2024. It finds no spillovers in average returns within the UK, but strong spillovers in volatility, especially from exchange rates to gold in both countries. Between the UK and China, the UK stock market influences China's, but not vice versa. Volatility spillovers also occur between the two countries in gold and exchange rate markets, showing increasing financial interconnectedness. However, this connection differs by asset type. In equities, the relationship is uneven, with the UK having a stronger impact on China.

These findings matter for several groups. Investors can use this information to better diversify portfolios across countries and assets. Risk managers can improve hedging strategies and prepare for shocks that spread across markets. For policymakers, the results highlight the need to carefully manage growing financial links between major economies. Regulators should strengthen frameworks to monitor and reduce cross-border risks, especially in gold and currency markets. Cooperation between the UK and China can help address uneven influences, such as the UK's stronger role in equities. Central banks should also consider spillover risks in their policies to ensure financial stability. Since spillovers differ across markets, policies should be tailored for stocks, gold, and exchange rates.

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