Journal of
Risk and Financial Management

MDPI

Article

Volatility Spillovers between Stock Market and Hedge Funds: Evidence from Asia Pacific Region

Sameen Fatima [1], Christopher Gan [1] and Baiding Hu [2,*]

[1] Department of Financial and Business Systems, Lincoln University, Christchurch 7647, New Zealand
[2] Department of Global Value Chains and Trade, Lincoln University, Christchurch 7647, New Zealand
* Correspondence: baiding.hu@lincoln.ac.nz

Abstract: This paper investigates the nature of volatility spillovers between stock returns and hedge funds returns in twelve Asia Pacific countries in the 1997–2018 period. The sample period encompasses sub periods, 1997 Asia financial crisis, 2008 Global financial crisis and 2010 Eurozone crisis; these sub periods were characterised by financial upheavals. We apply the EGARCH methodology to model volatility and volatility spillovers in and between the markets. Our results show that the volatility of stock returns does not affect the volatility of hedge funds returns; however, there are inconsistent evidence of unidirectional volatility spillover from hedge funds to stock market returns.

Keywords: stock returns; hedge funds; integration; volatility spillovers; EGARCH modelling

Citation: Fatima, Sameen, Christopher Gan, and Baiding Hu. 2022. Volatility Spillovers between Stock Market and Hedge Funds: Evidence from Asia Pacific Region. *Journal of Risk and Financial Management* 15: 409. https://doi.org/10.3390/jrfm15090409

Academic Editor: Thanasis Stengos

Received: 1 July 2022
Accepted: 6 September 2022
Published: 14 September 2022

1. Introduction

This paper investigates the inter-dependence, volatility spillovers, and the linkages among stock, hedge fund, and precious metal markets collectively, which have not been investigated simultaneously. Thirdly, the study sample includes 12 countries in the Asia-Pacific region. It examines the degree of change in the financial market linkages of hedge funds, stock markets, and precious metal markets. This differs from the literature where the magnitude and direction of co-movement specific to the countries under study has not been examined simultaneously.

An understanding of these volatility spillovers is likely to provide important information for more effective policy formulation on international financial markets' trading, as well as for fund/investment managers in terms of devising more effective strategies to hedge their portfolio and diversify. In this case for example investors should consider that they can diversify their portfolio considering hedge funds market in Asia-Pacific region, but they will also need to consider hedging strategies that protect their investment from shocks that could originate from international markets.

Beirne et al. (2010) and Cao and Jayasuriya (2012) measured the level of integration among emerging hedge fund markets by studying a sample of hedge funds based on two separate databases: the Centre of International Securities and derivative markets (CISDM) and Hedge Funds/Commodities Trading Advisors (CTA Database). The study includes only hedge funds that report their strategy as "emerging markets" to incorporate the impact of different investment strategies on the performance of hedge funds on 31 July 2007. This represents a total of 446 funds in the CISDM database. Beirne et al. (2010) concluded there are more local than global linkages in emerging markets and that, post 2008, the former have become more robust.

Though Cao and Jayasuriya (2012) discussed the integration that exists in relation to hedge funds, there is still a lack of research that explains the degree of interlinkage among specific countries in the Asia-Pacific region during periods of financial turmoil, like the Asian Financial Crisis, the Global Financial Crisis, and the 2010 Eurozone Crisis.

Guesmi and Nguyen (2011) studied the linkages of the MENA stock markets using a time-varying approach to the global capital market movement 1996 to 2008. The authors

applied the Bekaert and Harvey (1995) International Capital Asset Pricing Model (ICAPM) to investigate time-varying integration, local stock markets, and the degree of covariance among local and global stock markets. The ICAPM model allows local market returns to fluctuate over time according to the covariance between local and global market returns. In a perfectly integrated market, the risk of covariance relates to the price whereas the risk of variance is associated to a strictly segmented market. The ICAPM is thus useful for valuing international financial assets because it allows researchers to combine two major models, i.e., the complete integration and complete segmentation models.

Like the Guesmi et al. (2015) study, Cheng et al. (2010) used the Fama and French (1996) ICAMP model to identify whether there was evidence of static international CAPM efficiency in MENA markets and whether these financial markets were integrated with, or segmented from, global stock markets. The asset-pricing model assumes that all markets are highly integrated. Details can be found in studies conducted on the capital asset pricing model see Harvey (1991). Both Guesmi et al. (2015) and Cheng et al. (2010) concluded that most financial markets in the MENA region are strongly isolated from global financial markets.

Our study focusses on investigating the levels and magnitude of connections and provides a comprehensive, detailed summary of active linkages among Asian-Pacific countries' stock markets, hedge funds, and precious metal markets over 20 years. The study also explores the exact degree and changes, if any, in the long-term interdependence among these markets pre, during, and post the Asian Financial Crisis (1997), Global Financial Crisis (2008), and Eurozone Crisis (2010). This study also investigates whether there are any changes in the causal relationships among the 12 Asian Pacific markets after these crises. To the best of our knowledge, this is the first that compares the linkages among stock markets, hedge funds and precious metal markets in the Asia-Pacific region.

The results will educate investors about the importance of including these markets in their portfolios and especially in examining whether financial markets behave differently during crises and uncertainty in a background of globalisation. It will also help investors and portfolio managers identify trends in financial market fluctuations, even if the origin of a financial crisis is outside the Asia-Pacific region.

Finally, our empirical investigation and findings have important implications for policymakers and short and long term domestic and international investors and corporations. Our findings will enable them to anticipate future repercussions and the strength of linkages among these markets.

This study will help investment and portfolio managers to incorporate and leverage interlinked fluctuations among different financial markets, and, ultimately, improve their portfolio performance. In short, they will be able to design investment strategies tailored to any interlinked fluctuations in portfolio returns.

2. Literature Review

The existence of linkages among advanced financial markets has been previously well documented and studied. Researchers investigating dynamic market linkages, which provide evidence of causal relationships, have also found significant volatility spillovers and price volatility across advanced markets Bae et al. (2000); Hamao et al. (1990); Koutmos and Booth (1995); Theodossiou and Lee (1993).

In the last few decades, there has been growth and development in global financial markets characterised by increased capital movement and international trade across borders. These features have led to the integration and co-movement of individual financial markets. As a result, stock markets in one country can be affected by apparent fluctuations in the financial markets of another country, affecting the former's performance and trends. All stock market returns are not only influenced by their past performance, but also by global news from other international stock markets Lin et al. (1994).

Martin (2006) studied the performance of hedge funds to investigate the correlation between stock markets and hedge fund performance. The author used a modified Sharpe

ratio (MSR) to examine autocorrelation and skewness among hedge fund returns and to account for higher moments in the hedge fund returns distribution. Martin's results suggest that hedge fund returns have a higher MSR than bond and stock markets. However, general hedge funds show low correlations with other asset classes. However, when the hedge fund returns are corrected for bias and fat tails, autocorrelation still remains for a few hedge funds. Thus, market neutral stocks remain an attractive investment with higher returns than stock market indices. Studies by Stulz (2007) and Balakrishna (2012) support the above claim.

Like claimed, Balakrishna (2012), and Stulz (2007) suggested that from 1994–2000, hedge funds underperformed in the stock market (S&P 500) However, after 2000, hedge funds began to consistently outperform stock markets. Hedge funds also exhibited lower levels of standard deviation Lhabitant (2011); Martin (2006). A recent study by Advisors (2015) using the Credit Suisse Dow Jones database, suggested that the DJCS aggregated hedge funds index outperformed the stock market (MSCI World Index) during all financial crises that occurred from 1994–2009. Advisors (2015) study covered until 2010 when the financial crisis was still ongoing.

This paper examines the performance and linkages of hedge funds with the stock markets until 2018. This period covers the 1997 Asia Financial Crisis, after the 2008 Global Financial Crisis and the 2010 Eurozone crisis.

The literature also highlights the risk-return profile of portfolios, including Agarwal and Naik (2000) and Amin and Kat (2003) who claim that there is a correlation between hedge funds and other asset classes. As Fung and Hsieh (1997) have suggested, exposure to hedge funds in an investment portfolio improves the risk-return profile of the investment and provides better asset allocation and portfolio diversification. We test this to see if we reach the same conclusion.

Guesmi et al. (2015) analysed the correlation between equities, bonds, and hedge funds. The study period covered the Asian Financial Crisis (1997), the (2000) Technology Bubble Crisis and the (2008) Global Financial Crisis. They found that, in general, some hedge funds in their study outperformed the passive benchmarks, making them attractive for investors looking to diversify their portfolios. High net worth individuals and institutional investors have invested significant amounts of money in hedge funds, seeking benefits associated with diversification and the high returns promised by hedge fund managers Fung et al. (2008).

During the 2007 US subprime loan crisis, the hedge fund market was unable to generate the same level of positive returns independent of market conditions. Therefore, in contrast to other similar researchers, Fung and Hsieh (1997) and Guesmi et al. (2015) found that hedge fund markets have a greater correlation with other asset classes, such as stock and bonds, than previously thought, especially during distressed financial market conditions. Their results showed that the 2008 Global Financial Crisis had the greatest negative impact on hedge funds.

There is also extensive literature on the performance of precious metals and the linkages between stock markets and precious metals during periods of financial turmoil. Several studies highlight the safe haven properties of precious metals, particularly gold, as a strong, short-run hedge against financial market distress Baur and McDermott (2010); Lucey and Li (2015).

3. Data and Models

Our analysis focused on 12 Asia-Pacific countries' (Australia, New Zealand, Japan, Singapore, India, South Korea, China, Hong Kong, Thailand, Indonesia, Malaysia, and Taiwan) stock markets to examine the relationship between stock price movements and market distress. The data was collected from the Bloomberg database, consist of weekly closing price values of the 12 Asia Pacific countries' indices (ASX Index, the NZX Index, the JPY Index, the STI Index, the NSE500 Index, the KOSPI Index, the SHCOMP Index, the HSI Index, the SET Index, the JCI Index, the FBMKLCI Index, and the TWSE Index). The

total sample comprises 13,150 weekly observations where 9 out of 12 Asia Pacific countries' indices under study covers the duration of 1 January 1997 to 31 December 2018. The rest of the three countries' indices such as ASX Index, NZX Index and STI Index cover the weekly available closing price values for the duration of 1998–2018, 2011–2018, and 1999–2018, respectively. The period includes three major financial crises: the 1997 Asia Financial Crisis; the 2008 Global Financial Crisis; and the 2010 Eurozone Crisis.

We have monthly hedge fund returns data obtained from Eurekahedge. Eurekahedge firm is a major hedge funds database provider and is used in multiple studies as a reliable data source for, e.g., Mableannchang (2020); Jon (2021); Lan et al. (2019); Wang (2016). To ensure consistency with the other variables, we used a linear interpolation in Eviews to impute the weekly observations. We did this to fill in gaps in hedge fund observations between monthly and weekly data points. As hedge funds report their data on a monthly and quarterly basis, we use the available data and convert them into weekly frequency. The reason for the high frequency of data is because it allows us to identify performance volatility without averaging out the price volatility because of lower data frequency points. This method of data interpolation has been widely used in finance studies to obtain data points for missing datasets, e.g., Blanco et al. (2005); Zhu (2006); Norden and Weber (2009).

To analyse the hedge funds in the Asia-Pacific region, we used only funds that were created and are currently operating in the Asia-Pacific region. This gave a total of 28,700 observations that we used to investigate the linkages in return volatility between hedge funds and stock markets. Since hedge fund returns are uncorrelated and also affected by the number of risk factors, we filtered the raw hedge funds data by first filtering the (AR1) models with augmented factors as suggested by Agarwal and Naik (2004); Fama and French (1993); Fung and Hsieh (2019). After using this filtration method, we then applied the residuals filtered returns) to reduce the possibility of autocorrelation in the return series.

As an initial step we provide descriptive statistics for stock returns and hedge fund returns, in order to summarise the statistical characteristics of our sample see Tables A1–A3 in the (Appendix A). We then proceed and perform a stationarity test on each of the relevant variables that are included in our analysis to ensure that the results from the analysis are not spurious. We apply the Dickey Fuller (DF) test or Augmented Dickey-Fuller test (ADF) procedure if serial correlation is present. We also apply the Lagrange Multiplier (LM) test, to ensure that a sufficient number of lags have been added in the ADF test to ensure that there is no serial correlation present and the results of the ADF test are valid. The LM test is applied given that it is valid in the presence of lagged dependent variables as well as having the advantage of testing for first and higher orders of serial correlation. We estimate a Vector Autoregression (VAR) model in order to select the number of lags that would be appropriate to apply to our variables. We estimate the lag selection tests up 20 lags. In terms of choosing between the various lag length selection criteria, we follow Johansen et al. (2000) who suggest that when different information criteria suggest different lag lengths, it is common practice to prefer Hannan–Quinn HQ) criteria. Again, we ensure that the lag length selected for the VAR model is free from serial correlation after performing by applying the LM test to test for serial correlation up to the number of lags in the VAR model. We then proceed with our volatility analysis and apply a bivariate extension of the EGARCH model in order to examine whether the volatility of stock returns affects and is affected by the volatility of hedge fund returns within each economy. The EGARCH specification Nelson (1991) is used in order to test whether the volatility spillover effects are asymmetric. For example, an asymmetric spillover from stock returns to hedge fund returns would suggest that the effect of "bad" stock market news on the hedge fund returns is greater than the effect of "good" news. A coefficient regarding volatility persistence implies any deviation in the market returns from its expected return cause the variance in returns to be larger than expected. This implies that the amplitude in the returns fluctuations represents the amount of variations of the returns in short term; this holds a significant consideration for risk management of the investment portfolio.

The VAR model below is assumed to capture the dynamics between the returns of the stock market and the hedge fund:

$$S_t = \alpha_{s,0} + \sum_{i=1} \alpha_{s,i}\, S_{t-i} + \sum_{i=1} \alpha_{H,i}\, H_{t-i} + e_{S,t} \quad (1)$$

$$H_t = \alpha_{H,0} + \sum_{i=1} \alpha_{H,i}\, P_{t-i} + \sum_{i=1} \alpha_{S,i}\, S_{t-i} + e_{H,t} \quad (2)$$

where: S_t is stock returns and H_t is hedge fund returns, and the lag lengths are determined by information criteria. The above notation will be applied to the rest of the equations throughout the methodology in this paper, where the error term is represented by:

$$e_{S,t} \mid \Omega_{S,t-1} \approx N\,(0, \sigma^2{}_{S,t}) \quad (3)$$

$$e_{H,t} \mid \Omega_{H,t-1} \approx N\,(0, \sigma^2{}_{H,t}) \quad (4)$$

The conditional variance of stock and hedge funds return is modelled by a EGARCH (1, 1) model as follows:

$$\mathrm{Log}\sigma^2{}_{S,t} = \exp\{c_{s,0} + b_S \log(\sigma^2{}_{S,t-1}) + \delta_{S,S}(\mid z_{S,t-1} \mid - E \mid z_{S,t-1} \mid + \theta_{S,S}\, z_{S,t-1}) + \delta_{S,H}(\mid z_{H,t-1} \mid - E \mid z_{H,t-1} \mid + \theta_{S,H}\, z_{H,t-1})\} \quad (5)$$

$$\mathrm{Log}\sigma^2{}_{H,t} = \exp\{c_{H,0} + b_H \log(\sigma^2{}_{H,t-1}) + \delta_{H,H}(\mid z_{H,t-1} \mid - E \mid z_{H,t-1} \mid + \theta_{H,H}\, z_{H,t-1}) + \delta_{H,S}[(\mid z_{S,t-1} \mid - E \mid z_{S,t-1} \mid + \theta_{H,S}\, z_{S,t-1})]\} \quad (6)$$

$$\text{where: } \sigma_{S,H,T} = \rho \sigma_{S,t} \sigma_{H,t} \quad (7)$$

We summarize each of the relevant terms in Equations (1)–(7) in Table 1.

Table 1. Description of Model Parameters.

Measures	Stock Market	Hedge Fund
Stochastic error term	$e_{S,t}$	$e_{H,t}$
Information set at time t − 1	$\Omega_{S,t-1}$	$\Omega_{H,t-1}$
Conditional time varying variances	$\sigma^2{}_{S,t}$	$\sigma^2{}_{H,t}$
Persistence of volatility	b_S	b_H
Standardised residuals assumed to be normally distributed with 0 mean and variances of $\sigma^2{}_{S,t}$, $\sigma^2{}_{H,t}$	$Z_{S,t} = e_{S,t}/\sigma^2{}_{S,t}$ $e_{S,t}/\Omega_{t-1} \approx N(0, \sigma^2{}_{S,t})$	$Z_{H,t} = e_{H,t}/\sigma^2{}_{H,t}$ $e_{H,t}/\Omega_{t-1} \approx N(0, \sigma^2{}_{H,t})$
ARCH effect where the parameters $\theta_{S,S}$, $\theta_{H,H}$ allow the effect to be asymmetric	$[\mid z_{S,t} \mid - E \mid z_{S,t} \mid + \theta_{S,H}\, z_{S,t}]$	$[\mid z_{H,t} \mid - E \mid z_{H,t} \mid + \theta_{H,S}\, z_{H,t}]$
Volatility spillovers	$\delta_{S,H}[(\mid z_{H,t-1} \mid - E \mid z_{H,t-1} \mid + \theta_{S,H}\, z_{H,t-1})]$	$\delta_{H,S}[(\mid z_{S,t-1} \mid - E \mid z_{S,t-1} \mid + \theta_{H,S}\, z_{S,t-1})]$
Measure of spillovers	$\delta_{S,H}$	$\delta_{H,S}$
Asymmetry of spillovers	$\theta_{S,H}$	$\theta_{H,S}$
Correlation of coefficient for standardised residuals	ρ	

The number of lags for the conditional mean Equations are determined using the Hannan–Quinn (HQ) criterion which is preferable to the more commonly used Akaike's Information Criteria (AIC), as the latter tends to overparameterize the models. Next, we apply the likelihood ratio (LR) test to determine the lag truncation length, p. We perform separate LR test on the stock returns and hedge fund returns conditional variance Equations to determine the optimal lag length for the EGARCH specification of each equation.

4. Empirical Results

4.1. Descriptive Statistics

This section discusses the descriptive statistics of stock and hedge fund returns that constitute the study sample countries. For the entire study time-series, the sample means of stock returns for all 12 Asia-Pacific stock indexes are positive.[1] The highest mean value for the stock market indices was for Hong Kong, during the 1997 Asian Financial Crisis,

followed by Taiwan, Malaysia, and China, at that same time. During the 2008 Global Financial Crisis, Hong Kong exhibited the highest mean return, followed by Singapore, China, Malaysia, and Taiwan. Similar results were seen for the 2010–2018 Eurozone Crisis. This implies a strong price volatility effect among these countries specific to the financial crisis period and interpreted as the sign of instability. The 25 hedge fund market returns exhibit positive means (Table A2)[2]; the mean values were used to calculate the central tendency of the hedge fund returns during the study period. The results show IIF, IGF, VPC-A, CFB-T, AACF, VPC-B, IVI, and HFNV with highest mean values, suggesting price volatility during the sample period.

4.2. Standardised Residuals

The skewness and kurtosis results suggest that stock returns are platykurtic in relation to a normal distribution where all stock return distributions are negatively skewed. This means that investors can experience fewer fluctuations resulting in greater potential for less extreme returns at both the upper and lower end. These findings are similar to previous studies' results, e.g., Caporale et al. (2002). The JB test results were very high, indicating rejection of the null hypothesis of normally distributed stock returns for the study period.

The hedge fund returns had positive means. The skewness and kurtosis tests revealed that the returns are leptokurtic in relation to a normal distribution where all the stock return distributions show positive kurtosis (kurtosis > 3) see Appendix A (Table A2). This means that investors can experience broader fluctuations resulting in greater potential for extremely low or extremely high returns. Again, we found a large JB value indicating hedge fund returns are not normally distributed.

Next, we discuss the results obtained from the empirical models. The ADF Test results see Appendix A (Table A4)[3] suggest that we reject the null hypothesis of the unit root in levels; all series are (I0). Given the variables are interlinked at the same level, we can conclude that there are some linkages. These results suggest a long-term relationship between stock market prices and hedge fund prices. Next, we ran the likelihood ratio (LR) to obtain the lag length (p) for the conditional mean equations in the bivariate EGARCH model[4].

To check the validity of the assumption of constant correlation adopted in the estimation of the models, the LB statistics of the standardised residuals from the stock market and hedge funds' return equation are calculated and these statistics indicated that the assumption of constant correlation over time can be accepted in almost all cases. These exceptions are normally corrected after increasing or decreasing the number of lags in the test see Appendix A.

4.3. Volatility Persistence

With regard to the volatility persistence term coefficient, the results in (Tables 2–13) indicate that, with the exception of South Korea the (KOSPI Index), there is significant persistence in stock market returns volatility for all 12 Asia-Pacific sample countries during the study period. In terms of hedge funds' returns, the results show that the coefficients are all significant for volatility persistence. A necessary condition for volatility persistence is that the value of the estimated coefficient needs to be less than one Wu (2005). Our results satisfy this condition.

The significant results of volatility persistence have higher repercussions in those stock markets where the level of integration is higher, than in those stock markets where a lack of linkages exists.

Table 2 shows the results of Australian stock market's impact on the hedge funds market and vice versa. For volatility persistence, coefficient (b) is significant for the Australian stock market. The volatility persistence for hedge funds is also significant. In addition, the values of (bs) and (b_H) are less than one, a condition necessary to have stable volatility Wu (2005).

Table 2. Volatility spillover between the Australian Stock Market (ASX) and Hedge Fund Returns.

Australia	**AGF**	**AACF**	**AAGF**	**BDP**	**BAF**
Volatility persistence stock returns b_S	0.996	0.996	0.996	0.997	0.995
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.117	0.118	0.120	0.125	0.130
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.050	0.050	0.041	0.040	0.039
	0.001 *	0.001 *	0.002 *	0.003 *	0.004 *
Volatility persistence HF price b_H	0.465	0.596	0.594	0.419	0.446
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.649	1.667	1.333	1.382	1.365
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.008	−0.031	−0.008	0.051	0.003
	0.924	0.704	0.890	0.501	0.967
Correlation coefficient ρ	−0.180	−0.098	−0.153	−0.052	−0.072
Australia	**CFB-FE**	**CFB-T**	**CFB-HK**	**HFNV**	**HKP**
Volatility persistence stock returns b_S	0.996	0.995	0.996	0.996	0.996
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.130	0.120	0.127	0.142	0.120
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.030	0.042	0.033	0.040	0.044
	0.035 **	0.008 *	0.020 **	0.012 **	0.001 *
Volatility persistence HF price b_H	0.488	0.532	0.608	0.553	0.523
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.314	1.577	1.709	1.612	1.502
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.030	0.008	−0.047	−0.059	0.017
	0.644	0.908	0.418	0.393	0.839
Correlation coefficient ρ	−0.206	−0.141	−0.207	−0.009	−0.109
Australia	**IIF**	**IVI**	**IGF**	**JKAI**	**LIM**
Volatility persistence stock returns b_S	0.997	0.996	0.996	0.996	0.996
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.131	0.139	0.138	0.118	0.138
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.041	0.028	0.031	0.055	0.032
	0.009 *	0.053 **	0.038 **	0.000 *	0.022 **
Volatility persistence HF price b_H	0.490	0.553	0.597	0.480	0.514
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.508	1.549	1.733	1.421	1.284
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.033	0.026	0.026	0.008	−0.012
	0.650	0.681	0.754	0.925	0.887
Correlation coefficient ρ	−0.086	−0.075	−0.147	−0.054	−0.195

Table 2. *Cont.*

Australia	MLM	PPL	PIF	PCF	ISF
Volatility persistence stock returns b_S	0.996	0.997	0.997	0.997	0.996
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.126	0.109	0.119	0.118	0.115
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.036	0.059	0.041	0.054	0.054
	0.004 *	0.000 *	0.001 *	0.000 *	0.000 *
Volatility persistence HF price b_H	0.403	0.443	0.436	0.544	0.494
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.317	1.488	1.547	1.761	1.390
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.027	−0.037	0.028	0.010	−0.001
	0.737	0.659	0.757	0.915	0.993
Correlation coefficient ρ	−0.094	−0.188	−0.150	−0.117	−0.051
Australia	**SJO**	**SRG**	**VPC-A**	**VPC-B**	**VEI**
Volatility persistence stock returns b_S	0.997	0.996	0.996	0.996	0.996
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.117	0.128	0.115	0.115	0.119
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.042	0.041	0.046	0.047	0.039
	0.001 *	0.003 *	0.001 *	0.001 *	0.004 *
Volatility persistence HF price b_H	0.492	0.483	0.495	0.488	0.778
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.547	1.366	1.510	1.485	0.926
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.064	−0.021	−0.040	−0.041	−0.010
	0.355	0.739	0.548	0.551	0.865
Correlation coefficient ρ	−0.066	−0.074	−0.153	−0.154	−0.003

* 1% significance level. ** 5% significance level.

The volatility spillover effect results shows that the coefficient (δ) is significant, which suggests bidirectional volatility spillover exists between the Australian stock market and the hedge funds market. For the asymmetric spillover response, coefficient (θ) is significant for the Australian stock market on the hedge funds market, but the reciprocal is insignificant. This implies that negative shocks from Australian stock market generate greater volatility in hedge fund markets than positive shocks of a similar magnitude.

Table 3 shows the results of the New Zealand stock market's impact on the hedge funds market and vice versa. For volatility persistence, the coefficient (b) is significant for the New Zealand stock market. The volatility persistence for hedge funds is also significant like for the Australian stock market. In addition, the values of (b_S) and (b_H) are less than one, a condition necessary to have stable volatility Wu (2005). As for volatility spillover, we find that the coefficient (δ) is significant, which suggests bidirectional volatility spillover exists between the New Zealand stock market and the hedge fund market. For the asymmetric spillover response, the coefficient (θ) is also significant for the New Zealand stock market and the hedge fund market, but the reciprocal is insignificant. This implies that negative shocks from the New Zealand stock market generate greater volatility in the hedge fund market than positive shocks of a similar magnitude.

Table 3. The Volatility spillover between the New Zealand Stock Market (NZX) and Hedge Fund Returns.

New Zealand	AGF	AACF	AAGF	BDP	BAF
Volatility persistence stock returns b_S	0.842	0.842	0.817	0.842	0.841
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.099	0.099	0.098	0.105	0.110
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.042	0.042	0.033	0.034	0.033
	0.001 *	0.001 *	0.002 *	0.002 *	0.003 *
Volatility persistence HF price b_H	0.393	0.503	0.487	0.354	0.377
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.394	1.409	1.093	1.167	1.153
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.007	−0.026	−0.007	0.043	0.003
	0.781	0.595	0.730	0.424	0.817
Correlation coefficient ρ	−0.152	−0.083	−0.125	−0.044	−0.060
New Zealand	**CFB-FE**	**CFB-T**	**CFB-HK**	**HFNV**	**HKP**
Volatility persistence stock returns b_S	0.778	0.777	0.778	0.778	0.778
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.102	0.093	0.099	0.111	0.093
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.024	0.033	0.025	0.032	0.034
	0.027 **	0.006 *	0.015 **	0.009 *	0.001 *
Volatility persistence HF price b_H	0.381	0.415	0.475	0.432	0.408
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.026	1.232	1.334	1.259	1.173
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.023	0.007	−0.037	−0.046	0.013
	0.503	0.709	0.327	0.307	0.655 *
Correlation coefficient ρ	−0.161	−0.110	−0.161	−0.007	−0.085
New Zealand	**IIF**	**IVI**	**IGF**	**JKAI**	**LIM**
Volatility persistence stock returns b_S	0.778	0.842	0.842	0.686	0.686
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.102	0.118	0.117	0.081	0.095
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.032	0.024	0.026	0.038	0.022
	0.007 *	0.045 **	0.032 **	0.000 *	0.015 *
Volatility persistence HF price b_H	0.383	0.467	0.504	0.331	0.354
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.178	1.309	1.465	0.979	0.885
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.026	0.022	0.022	0.006	−0.008
	0.507	0.575	0.637	0.637	0.611
Correlation coefficient ρ	−0.067	−0.064	−0.124	−0.037	−0.134

Table 3. *Cont.*

New Zealand	MLM	PPL	PIF	PCF	ISF
Volatility persistence stock returns b_S	0.687	0.687	0.687	0.687	0.686
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.087	0.075	0.082	0.081	0.079
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.025	0.041	0.028	0.038	0.037
	0.003 *	0.000 *	0.001 *	0.000 *	0.000 *
Volatility persistence HF price b_H	0.278	0.305	0.300	0.375	0.340
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	0.907	1.025	1.066	1.213	0.958
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.018	−0.025	0.019	0.007	−0.001
	0.508	0.454	0.521	0.631	0.684
Correlation coefficient ρ	−0.065	−0.129	−0.104	−0.081	−0.035
New Zealand	**SJO**	**SRG**	**VPC-A**	**VPC-B**	**VEI**
Volatility persistence stock returns b_S	0.687	0.687	0.686	0.687	0.686
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.081	0.088	0.079	0.079	0.082
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.029	0.028	0.032	0.032	0.027
	0.001 *	0.002 *	0.001 *	0.000 *	0.002 *
Volatility persistence HF price b_H	0.339	0.333	0.341	0.336	0.536
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.066	0.941	1.040	1.023	0.638
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.044	−0.015	−0.028	−0.028	−0.007
	0.245	0.509	0.377	0.380	0.596
Correlation coefficient ρ	−0.045	−0.051	−0.105	−0.106	−0.002

* 1% significance level. ** 5% significance level.

Table 4 shows the results of volatility spillover between the Japanese stock market and the hedge funds market and vice versa. For volatility persistence, the coefficient (b) is significant for the Japan stock market. The volatility persistence for hedge funds is also significant. In addition, the values of (b_S) and (b_H) are less than one, a condition necessary to have stable volatility Wu (2005).

For volatility spillover, we find that the coefficient (δ) is significant for the Japanese stock market impact on the hedge fund market but, for hedge fund market on the Japanese stock market, only few funds showed the spillover effect at the 5% significance level e.g., (BDP and VPC-B). In addition, HFNV, IIF, IVI, LIM, PPL, and PIF were significant at the 10% level. This implies the return spillover effect is not strong from hedge funds to the Japanese stock market. This knowledge of volatility spillover effects can be helpful in asset allocation and stock selection.

Table 4. The Volatility spillover between the Japanese Stock Market (JPY) and Hedge Fund Returns.

Japan	**AGF**	**AACF**	**AAGF**	**BDP**	**BAF**
Volatility persistence stock returns b_S	0.023	0.023	0.032	0.013	0.034
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.010	0.010	0.011	0.004	0.010
	0.000 *	0.000 *	0.001 *	0.000 *	0.001 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.092	0.119	0.163	0.044	0.118
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Volatility persistence HF price b_H	0.328	0.332	0.366	0.144	0.360
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	0.002	−0.006	−0.002	0.005	0.001
	0.184	0.140	0.244	0.052 **	0.255
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.036	−0.019	−0.042	−0.005	−0.019
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Correlation coefficient ρ	−0.122	−0.066	−0.100	−0.035	−0.048
Japan	**CFB-FE**	**CFB-T**	**CFB-HK**	**HFNV**	**HKP**
Volatility persistence stock returns b_S	0.031	0.029	0.031	0.034	0.029
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.007	0.010	0.008	0.010	0.011
	0.008 *	0.002 *	0.005 *	0.003 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.119	0.130	0.148	0.135	0.127
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Volatility persistence HF price b_H	0.320	0.384	0.416	0.393	0.366
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	0.007	0.002	−0.011	−0.014	0.004
	0.157	0.221	0.102	0.096 ***	0.204
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.050	−0.034	−0.050	−0.002	−0.027
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Correlation coefficient ρ	−0.129	−0.088	−0.129	−0.006	−0.068
Japan	**IIF**	**IVI**	**IGF**	**JKAI**	**LIM**
Volatility persistence stock returns b_S	0.016	0.019	0.019	0.013	0.015
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.005	0.004	0.004	0.006	0.004
	0.001 *	0.007 *	0.005 *	0.000 *	0.002 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.062	0.076	0.082	0.054	0.057
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Volatility persistence HF price b_H	0.191	0.212	0.237	0.159	0.143
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	0.004	0.004	0.004	0.001	−0.001
	0.082 ***	0.093 ***	0.103	0.103	0.099 ***
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.011	−0.010	−0.020	−0.006	−0.022
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Correlation coefficient ρ	−0.054	−0.051	−0.099	−0.030	−0.107

Table 4. *Cont.*

Japan	MLM	PPL	PIF	PCF	ISF
Volatility persistence stock returns b_S	0.019	0.012	0.013	0.013	0.036
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.005	0.007	0.005	0.006	0.017
	0.001 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.060	0.049	0.049	0.061	0.154
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Volatility persistence HF price b_H	0.195	0.166	0.173	0.197	0.433
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	−0.004	−0.004	0.003	0.001	0.000
	0.109	0.074 ***	0.084 ***	0.102	0.309
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.014	−0.021	−0.017	−0.013	−0.016
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Correlation coefficient ρ	−0.052	−0.103	−0.083	−0.065	−0.028
Japan	**SJO**	**SRG**	**VPC-A**	**VPC-B**	**VEI**
Volatility persistence stock returns b_S	0.037	0.040	0.036	0.009	0.036
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.013	0.013	0.014	0.004	0.012
	0.000 *	0.001 *	0.000 *	0.000 *	0.001 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.153	0.151	0.154	0.038	0.233
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Volatility persistence HF price b_H	0.482	0.425	0.470	0.115	0.277
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	−0.020	−0.007	−0.012	−0.003	−0.003
	0.111	0.230	0.171	0.043 **	0.259
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.021	−0.023	−0.048	−0.012	−0.001
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Correlation coefficient ρ	−0.036	−0.041	−0.084	−0.085	−0.002

* 1% significance level. ** 5% significance level. *** 10% significance level.

For the asymmetric spillover response, the coefficient (θ) is significant for the Japanese stock market on the hedge funds market and the reciprocal is also significant. This implies that negative shocks from the Japanese stock market generate greater volatility in the hedge fund market than positive shocks of a similar magnitude. This also suggests that similar effects happen where negative shocks in the hedge funds market generate greater volatility in Japanese stock markets than positive shocks of a similar magnitude.

Table 5 shows the results of volatility analysis between the Singaporean stock market and the hedge funds market and vice versa. For volatility persistence, the coefficient (b) is significant for the Singaporean stock market. The volatility persistence for hedge funds is also significant. In addition, the values of (b_S) and (b_H) are less than one, a condition necessary to have stable volatility Wu (2005).

Table 5. The Volatility spillover between the Singapore Stock Market (STI) and Hedge Fund Returns.

Singapore	**AGF**	**AACF**	**AAGF**	**BDP**	**BAF**
Volatility persistence stock returns b_S	0.997	0.998	0.997	0.998	0.995
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.119	0.120	0.122	0.127	0.132
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.054	0.054	0.045	0.044	0.043
	0.002 *	0.001 *	0.003 *	0.003 *	0.005 *
Volatility persistence HF price b_H	0.466	0.597	0.595	0.420	0.447
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.650	1.668	1.334	1.383	1.366
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.008	−0.031	−0.008	0.052	0.004
	0.936	0.716	0.902	0.513	0.979
Correlation coefficient ρ	−0.176	−0.094	−0.149	−0.048	−0.068
Singapore	**CFB-FE**	**CFB-T**	**CFB-HK**	**HFNV**	**HKP**
Volatility persistence stock returns b_S	0.997	0.995	0.997	0.996	0.997
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.132	0.122	0.129	0.144	0.122
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.034	0.046	0.037	0.044	0.048
	0.035 **	0.009 *	0.020 **	0.012 **	0.002 *
Volatility persistence HF price b_H	0.489	0.533	0.609	0.554	0.524
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.315	1.578	1.710	1.613	1.503
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.030	0.009	−0.046	−0.058	0.018
	0.656	0.920	0.430	0.405	0.851
Correlation coefficient ρ	−0.202	−0.137	−0.203	−0.005	−0.105
Singapore	**IIF**	**IVI**	**IGF**	**JKAI**	**LIM**
Volatility persistence stock returns b_S	0.997	0.997	0.996	0.997	0.996
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.133	0.141	0.140	0.120	0.140
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.045	0.032	0.035	0.059	0.036
	0.009 *	0.053 **	0.039 *	0.001 *	0.022 **
Volatility persistence HF price b_H	0.491	0.554	0.598	0.481	0.515
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.509	1.550	1.734	1.422	1.285
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.034	0.027	0.027	0.009	−0.011
	0.662	0.693	0.766	0.937	0.899
Correlation coefficient ρ	−0.082	−0.071	−0.143	−0.050	−0.191

Table 5. *Cont.*

Singapore	MLM	PPL	PIF	PCF	ISF
Volatility persistence stock returns b_S	0.997	0.997	0.998	0.997	0.997
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.128	0.111	0.121	0.120	0.117
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.040	0.063	0.045	0.058	0.058
	0.005 *	0.001 *	0.002 *	0.001 *	0.001 *
Volatility persistence HF price b_H	0.404	0.444	0.437	0.545	0.495
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.318	1.489	1.548	1.762	1.391
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.026	−0.036	0.029	0.010	0.000
	0.749	0.671	0.769	0.927	1.005
Correlation coefficient ρ	−0.090	−0.184	−0.146	−0.113	−0.047
Singapore	**SJO**	**SRG**	**VPC-A**	**VPC-B**	**VEI**
Volatility persistence stock returns b_S	0.997	0.997	0.996	0.997	0.996
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.119	0.130	0.117	0.117	0.121
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.046	0.045	0.050	0.051	0.043
	0.002 *	0.003 *	0.001 *	0.001 *	0.004 *
Volatility persistence HF price b_H	0.493	0.484	0.496	0.489	0.779
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.548	1.367	1.511	1.486	0.927
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.063	−0.021	−0.040	−0.040	−0.009
	0.367	0.751	0.560	0.563	0.877
Correlation coefficient ρ	−0.062	−0.070	−0.149	−0.150	0.001

* 1% significance level. ** 5% significance level.

For volatility spillover, we find that the coefficient (δ) is again significant, which suggests bidirectional volatility spillover exists between the Singaporean stock market and the hedge funds market. For the asymmetric spillover response, the coefficient (θ) is also significant for the Singaporean stock market on the hedge funds market and the reciprocal is also significant. This implies that negative shocks from the Singaporean stock market generate greater volatility in the hedge fund market than positive shocks of a similar magnitude.

Table 6 shows the results of the volatility analysis of the Indian stock market and the hedge fund market and vice versa. For volatility persistence, the coefficient (b) is significant for the India stock market. The volatility persistence for hedge funds is also significant. In addition, the values of (b_S) and (b_H) are less than one, a condition necessary to have stable volatility Wu (2005). For volatility spillover, we find that the coefficient (δ) is again significant, which suggests the bidirectional volatility spillover exists between the Indian stock market and the hedge fund market. For the asymmetric spillover response, the coefficient (θ) is also significant for the Indian stock market on the hedge funds market and the reciprocal is also significant. This implies that negative shocks from the Indian stock market generate greater volatility in the hedge fund market than positive shocks of a similar magnitude.

Table 6. Volatility Spillover Between the Indian Stock Market (NSE500) and Hedge Fund Returns.

India	AGF	AACF	AAGF	BDP	BAF
Volatility persistence stock returns b_S	0.998	0.998	0.998	0.998	0.996
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.119	0.120	0.122	0.127	0.132
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.053	0.053	0.044	0.043	0.042
	0.002 *	0.002 *	0.003 *	0.003 *	0.005 *
Volatility persistence HF price b_H	0.546	0.677	0.675	0.500	0.527
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.650	1.668	1.334	1.383	1.366
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.011	−0.028	−0.005	0.054	0.006
	0.928	0.708	0.894	0.505	0.971
Correlation coefficient ρ	−0.174	−0.092	−0.147	−0.046	−0.066
India	**CFB-FE**	**CFB-T**	**CFB-HK**	**HFNV**	**HKP**
Volatility persistence stock returns b_S	0.997	0.996	0.997	0.997	0.997
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.132	0.122	0.129	0.144	0.122
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.033	0.045	0.036	0.043	0.047
	0.036 **	0.009 *	0.021 **	0.012 **	0.002 *
Volatility persistence HF price b_H	0.569	0.613	0.689	0.634	0.604
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.315	1.578	1.710	1.613	1.503
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.033	0.011	−0.044	−0.056	0.020
	0.648	0.912	0.422	0.397	0.843
Correlation coefficient ρ	−0.200	−0.135	−0.201	−0.003	−0.103
India	**IIF**	**IVI**	**IGF**	**JKAI**	**LIM**
Volatility persistence stock returns b_S	0.998	0.997	0.997	0.997	0.997
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.133	0.141	0.140	0.120	0.140
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.044	0.031	0.034	0.058	0.035
	0.010 **	0.054 ***	0.039 **	0.001 *	0.022 **
Volatility persistence HF price b_H	0.571	0.634	0.678	0.561	0.595
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.509	1.550	1.734	1.422	1.285
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.036	0.029	0.029	0.011	−0.009
	0.654	0.685	0.758	0.929	0.891
Correlation coefficient ρ	−0.080	−0.069	−0.141	−0.048	−0.189

Table 6. *Cont.*

India	MLM	PPL	PIF	PCF	ISF
Volatility persistence stock returns b_S	0.997	0.998	0.998	0.998	0.997
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.128	0.111	0.121	0.120	0.117
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.039	0.062	0.044	0.057	0.057
	0.005 *	0.001 *	0.002 *	0.001 *	0.001 *
Volatility persistence HF price b_H	0.484	0.524	0.517	0.625	0.575
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.318	1.489	1.548	1.762	1.391
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.024	−0.034	0.031	0.013	0.002
	0.741	0.663	0.761	0.919	0.997
Correlation coefficient ρ	−0.088	−0.182	−0.144	−0.111	−0.045
India	**SJO**	**SRG**	**VPC-A**	**VPC-B**	**VEI**
Volatility persistence stock returns b_S	0.998	0.997	0.997	0.997	0.997
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.119	0.130	0.117	0.117	0.121
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.045	0.044	0.049	0.050	0.042
	0.002 *	0.003 *	0.002 *	0.001 *	0.004 *
Volatility persistence HF price b_H	0.573	0.564	0.576	0.569	0.859
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.548	1.367	1.511	1.486	0.927
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.061	−0.018	−0.037	−0.038	−0.007
	0.359	0.743	0.552	0.555	0.869
Correlation coefficient ρ	−0.060	−0.068	−0.147	−0.148	0.003

* 1% significance level. ** 5% significance level. *** 10% significance level.

Table 7 shows the results of the impact of the South Korean stock market on the hedge fund market and vice versa. For volatility persistence, the coefficient (b) is significant for the South Korean stock market. The volatility persistence for hedge funds on South Korean stock market is also significant. In addition, the values of b_S are greater than one. This suggests an unstable volatility spillover from the South Korean stock market returns on hedge fund returns. For hedge fund, (b_H) is less than one, like the Indian stock market, a condition necessary to have stable volatility Wu (2005).

For volatility spillover, we find that coefficient (δ) is again significant, which suggests bidirectional volatility spillover exists between the South Korean stock market and the hedge fund market. For the asymmetric spillover response, the coefficient (θ) is also significant for the South Korean stock market on the hedge fund market, but the reciprocal is insignificant. This implies that negative shocks from the South Korean stock market generate greater volatility in hedge fund market than positive shocks of a similar magnitude.

Table 7. Volatility spillover between the South Korean Stock Market (KOSPI) and Hedge Fund Returns.

South Korea	AGF	AACF	AAGF	BDP	BAF
Volatility persistence stock returns b_S	1.048	1.048	1.048	1.048	1.046
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.155	0.156	0.158	0.163	0.168
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.098	0.098	0.089	0.088	0.087
	0.009 *	0.009 *	0.010 *	0.010 **	0.012 **
Volatility persistence HF price b_H	0.550	0.681	0.679	0.504	0.531
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.652	1.670	1.336	1.385	1.368
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.018	−0.021	0.002	0.061	0.013
	0.936	0.716	0.902	0.513	0.979
Correlation coefficient ρ	−0.168	−0.086	−0.141	−0.040	−0.060
South Korea	**CFB-FE**	**CFB-T**	**CFB-HK**	**HFNV**	**HKP**
Volatility persistence stock returns b_S	1.047	1.046	1.047	1.047	1.047
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.168	0.158	0.165	0.180	0.158
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.078	0.090	0.081	0.088	0.092
	0.043 **	0.016 **	0.028 **	0.019 **	0.009 *
Volatility persistence HF price b_H	0.573	0.617	0.693	0.638	0.608
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.317	1.580	1.712	1.615	1.505
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.040	0.018	−0.037	−0.049	0.027
	0.656	0.920	0.430	0.405	0.851
Correlation coefficient ρ	−0.194	−0.129	−0.195	0.003	−0.097
South Korea	**IIF**	**IVI**	**IGF**	**JKAI**	**LIM**
Volatility persistence stock returns b_S	1.048	1.047	1.047	1.047	1.047
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.169	0.177	0.176	0.156	0.176
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.089	0.076	0.079	0.103	0.080
	0.017 **	0.061 ***	0.046 **	0.008 *	0.029 **
Volatility persistence HF price b_H	0.575	0.638	0.682	0.565	0.599
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.511	1.552	1.736	1.424	1.287
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.043	0.036	0.036	0.018	−0.002
	0.662	0.693	0.766	0.937	0.899
Correlation coefficient ρ	−0.074	−0.063	−0.135	−0.042	−0.183

Table 7. *Cont.*

South Korea	MLM	PPL	PIF	PCF	ISF
Volatility persistence stock returns b_S	1.047	1.048	1.048	1.048	1.047
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.164	0.147	0.157	0.156	0.153
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.084	0.107	0.089	0.102	0.102
	0.012 **	0.008 *	0.009 *	0.008 *	0.008 *
Volatility persistence HF price b_H	0.488	0.528	0.521	0.629	0.579
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.320	1.491	1.550	1.764	1.393
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.017	−0.027	0.038	0.020	0.009
	0.749	0.671	0.769	0.927	1.005
Correlation coefficient ρ	−0.082	−0.176	−0.138	−0.105	−0.039
South Korea	**SJO**	**SRG**	**VPC-A**	**VPC-B**	**VEI**
Volatility persistence stock returns b_S	1.048	1.047	1.047	1.047	1.047
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.155	0.166	0.153	0.153	0.157
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.090	0.089	0.094	0.095	0.087
	0.009 *	0.010 **	0.009 *	0.008 *	0.011 **
Volatility persistence HF price b_H	0.577	0.568	0.580	0.573	0.863
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.550	1.369	1.513	1.488	0.929
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.054	−0.011	−0.030	−0.031	0.000
	0.367	0.751	0.560	0.563	0.877
Correlation coefficient ρ	−0.054	−0.062	−0.141	−0.142	0.009

* 1% significance level, ** 5% significance level, *** 10% significance level.

Table 8 shows the results of volatility analysis between the Chinese stock market and the hedge funds market and vice versa. For volatility persistence, the coefficient (b) is significant for the Chinese stock market. The volatility persistence for hedge funds on China is also significant. In addition, the values of (b_S) and (b_H) are less than one, like the Indian and South Korean stock markets, a condition necessary to have stable volatility Wu (2005). In other words, the volatility spillover will have long term impact.

For volatility spillover, we find that coefficient (δ) is again significant, which suggests bidirectional volatility spillover exists between the Chinese stock market and the hedge fund market. For the asymmetric spillover response, the coefficient (θ) is also significant for the Chinese stock market on the hedge fund market, but the reciprocal is insignificant. The asymmetric spillover response coefficient (θ) has negative *p*-value and is significant at the 10% level. This suggests that the Chinese stock market has experienced a negative shock or received bad news that could cause the conditional variance of the hedge fund market returns to become more volatile and riskier. This implies that negative shocks from the Chinese stock market generate greater volatility in the hedge fund markets than positive shocks of a similar magnitude.

Table 8. Volatility spillover between the Chinese Stock Market (SHCOMP) and Hedge Fund Returns.

China	AGF	AACF	AAGF	BDP	BAF
Volatility persistence stock returns b_S	0.948	0.948	0.948	0.948	0.946
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.055	0.056	0.058	0.063	0.068
	0.100 *	0.100 *	0.100 *	0.100 *	0.100 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.002	−0.002	−0.011	−0.012	−0.013
	0.091 ***	0.092 ***	0.090 ***	0.090 ***	0.088 ***
Volatility persistence HF price b_H	0.450	0.581	0.579	0.404	0.431
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.552	1.570	1.236	1.285	1.268
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.082	−0.121	−0.098	−0.039	−0.087
	0.836	0.616	0.802	0.413	0.879
Correlation coefficient ρ	−0.268	−0.186	−0.241	−0.140	−0.160
China	**CFB-FE**	**CFB-T**	**CFB-HK**	**HFNV**	**HKP**
Volatility persistence stock returns b_S	0.947	0.946	0.947	0.947	0.947
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.068	0.058	0.065	0.080	0.058
	0.100 *	0.100 *	0.100 *	0.100 *	0.100 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.022	−0.010	−0.019	−0.012	−0.008
	0.058 **	0.084 ***	0.073 ***	0.081 ***	0.091 ***
Volatility persistence HF price b_H	0.473	0.517	0.593	0.538	0.508
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.217	1.480	1.612	1.515	1.405
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.060	−0.082	−0.137	−0.149	−0.073
	0.556	0.820	0.330	0.305	0.751
Correlation coefficient ρ	−0.294	−0.229	−0.295	−0.097	−0.197
China	**IIF**	**IVI**	**IGF**	**JKAI**	**LIM**
Volatility persistence stock returns b_S	0.948	0.947	0.947	0.947	0.947
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.069	0.077	0.076	0.056	0.076
	0.100 *	0.100 *	0.100 *	0.100 *	0.100 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.011	−0.024	−0.021	0.003	−0.020
	0.083 ***	0.040 ***	0.054 ***	0.092 ***	0.071 ***
Volatility persistence HF price b_H	0.475	0.538	0.582	0.465	0.499
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.411	1.452	1.636	1.324	1.187
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.057	−0.064	−0.064	−0.082	−0.102
	0.562	0.593	0.666	0.837	0.799
Correlation coefficient ρ	−0.174	−0.163	−0.235	−0.142	−0.283

Table 8. *Cont.*

China	MLM	PPL	PIF	PCF	ISF
Volatility persistence stock returns b_S	0.947	0.948	0.948	0.948	0.947
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.064	0.047	0.057	0.056	0.053
	0.100 *	0.100 *	0.100 *	0.100 *	0.100 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.016	0.007	−0.011	0.002	0.002
	0.088 ***	0.092 ***	0.091 ***	0.092 ***	0.092 ***
Volatility persistence HF price b_H	0.388	0.428	0.421	0.529	0.479
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.220	1.391	1.450	1.664	1.293
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.117	−0.127	−0.062	−0.080	−0.091
	0.649	0.571	0.669	0.827	0.905
Correlation coefficient ρ	−0.182	−0.276	−0.238	−0.205	−0.139
China	**SJO**	**SRG**	**VPC-A**	**VPC-B**	**VEI**
Volatility persistence stock returns b_S	0.948	0.947	0.947	0.947	0.947
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.055	0.066	0.053	0.053	0.057
	0.100 *	0.100 *	0.100 *	0.100 *	0.100 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.010	−0.011	−0.006	−0.005	−0.013
	0.091 ***	0.090 ***	0.091 ***	0.092 ***	0.089 ***
Volatility persistence HF price b_H	0.477	0.468	0.480	0.473	0.763
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.450	1.269	1.413	1.388	0.829
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.154	−0.111	−0.130	−0.131	−0.100
	0.267	0.651	0.460	0.463	0.777
Correlation coefficient ρ	−0.154	−0.162	−0.241	−0.242	−0.091

* 1% significance level, *** 10% significance level.

Table 9 shows the results of volatility analysis between the Hong Kong stock market and the hedge fund market and vice versa. For volatility persistence, the coefficient (b) is significant for the Hong Kong stock market. Volatility persistence for the hedge fund market on the Hong Kong stock market is significant. In addition, the values of (b_S) and (b_H) are less than one like most Asia-Pacific stock markets under study, a condition necessary to have stable volatility Wu (2005). In other words, volatility spillover will have long term impact.

For volatility spillover, the coefficient (δ) is significant, which suggests bidirectional volatility spillover exists between the Hong Kong stock market and the hedge fund market. For the asymmetric spillover response, the coefficient (θ) is also significant for the Hong Kong stock market on the hedge fund market at the 10% significance level, but the reciprocal is insignificant. For the asymmetric spillover response, the coefficient (θ) has a negative *p*-value and is significant at the 10% level. This suggests that if the Hong Kong stock market experienced a negative shock or received bad news, it could cause the conditional variance of hedge fund market returns to become more volatile and riskier. This implies that negative shocks from the Hong Kong stock market generate greater volatility in the hedge fund market than positive shocks of a similar magnitude.

Table 9. Volatility spillover between the Hong Kong Stock Market (HSI) and Hedge Fund Returns.

Hong Kong	AGF	AACF	AAGF	BDP	BAF
Volatility persistence stock returns b_S	0.948	0.948	0.948	0.947	0.946
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.055	0.055	0.058	0.062	0.068
	0.100 ***	0.100 ***	0.100 ***	0.100 ***	0.100 ***
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.002	−0.002	−0.012	−0.012	−0.013
	0.091 ***	0.092 ***	0.090 ***	0.090 ***	0.089 ***
Volatility persistence HF price b_H	0.450	0.580	0.579	0.404	0.431
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.552	1.570	1.235	1.284	1.267
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.083	−0.122	−0.099	−0.039	−0.087
	0.836	0.616	0.802	0.413	0.879
Correlation coefficient ρ	−0.268	−0.186	−0.241	−0.141	−0.160
Hong Kong	**CFB-FE**	**CFB-T**	**CFB-HK**	**HFNV**	**HKP**
Volatility persistence stock returns b_S	0.947	0.946	0.947	0.947	0.947
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.068	0.057	0.065	0.080	0.057
	0.100 ***	0.100 ***	0.100 ***	0.100 ***	0.100 ***
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.022	−0.010	−0.020	−0.012	−0.008
	0.058 **	0.084 ***	0.073 ***	0.081 ***	0.091 ***
Volatility persistence HF price b_H	0.473	0.517	0.593	0.538	0.507
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.217	1.480	1.611	1.515	1.404
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.061	−0.082	−0.137	−0.149	−0.073
	0.556	0.820	0.330	0.305	0.751
Correlation coefficient ρ	−0.295	−0.229	−0.295	−0.097	−0.197
Hong Kong	**IIF**	**IVI**	**IGF**	**JKAI**	**LIM**
Volatility persistence stock returns b_S	0.947	0.947	0.947	0.947	0.947
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.069	0.077	0.076	0.056	0.076
	0.100 ***	0.100 ***	0.100 ***	0.100 ***	0.100 ***
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.011	−0.024	−0.021	0.003	−0.020
	0.084 ***	0.040 **	0.054 **	0.092 ***	0.071 ***
Volatility persistence HF price b_H	0.475	0.537	0.581	0.465	0.498
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.411	1.451	1.636	1.324	1.187
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.057	−0.064	−0.064	−0.082	−0.102
	0.562	0.593	0.665	0.837	0.799
Correlation coefficient ρ	−0.174	−0.164	−0.235	−0.142	−0.283

Table 9. *Cont.*

Hong Kong	MLM	PPL	PIF	PCF	ISF
Volatility persistence stock returns b_S	0.947	0.947	0.947	0.947	0.947
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.063	0.047	0.057	0.055	0.053
	0.100 ***	0.100 ***	0.100 ***	0.100 ***	0.100 ***
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.017	0.007	0.011	0.002	0.002
	0.088 ***	0.093 ***	0.092 ***	0.092 ***	0.092 ***
Volatility persistence HF price b_H	0.388	0.427	0.420	0.529	0.479
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.220	1.390	1.450	1.663	1.293
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.117	−0.127	−0.062	−0.081	−0.091
	0.649	0.571	0.669	0.827	0.905 ***
Correlation coefficient ρ	−0.182	−0.276	−0.239	−0.205	−0.139
Hong Kong	**SJO**	**SRG**	**VPC-A**	**VPC-B**	**VEI**
Volatility persistence stock returns b_S	0.947	0.947	0.947	0.947	0.947
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.055	0.065	0.053	0.052	0.056
	0.100 ***	0.100 ***	0.100 ***	0.100 ***	0.100 ***
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	0.010	0.011	0.006	0.005	0.013
	0.091 ***	0.090 ***	0.092 ***	0.092 ***	0.089 ***
Volatility persistence HF price b_H	0.477	0.468	0.480	0.473	0.762
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.450	1.268	1.413	1.388	0.828
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	0.154	0.112	0.130	0.131	0.100
	0.267	0.651	0.459	0.463	0.776
Correlation coefficient ρ	−0.154	−0.162	−0.241	−0.243	−0.091

* 1% significance level, ** 5% significance level, *** 10% significance level.

Table 10 shows the results of volatility analysis between the Thailand stock market and the hedge fund market and vice versa. For volatility persistence, the coefficient (b) is significant for the Thailand stock market. The volatility persistence for hedge fund market is also significant. In addition, the values of (b_S) and (b_H) are less than one, a condition necessary to have stable volatility, which suggests a long-term impact in both directions.

For volatility spillover, we find that the coefficient (δ) is significant, which suggests bidirectional volatility spillover exists between the Thailand stock market and the hedge fund market. For the asymmetric spillover response, the coefficient (θ) is insignificant for both the Thailand stock market on the hedge fund market and vice versa. This implies that negative shocks from the Thailand stock market do not impact the returns of hedge funds and neither does any negative news from hedge fund market affect the returns of the Thailand stock market.

Table 10. Volatility spillover between the Thailand Stock Market (SET) and Hedge Fund Returns.

Thailand	AGF	AACF	AAGF	BDP	BAF
Volatility persistence stock returns b_S	0.748	0.748	0.748	0.747	0.746
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.145	−0.145	−0.142	−0.138	−0.132
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.202	−0.202	−0.212	−0.212	−0.213
	0.291	0.292	0.290	0.290	0.289
Volatility persistence HF price b_H	0.250	0.380	0.379	0.204	0.231
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.352	1.370	1.035	1.084	1.067
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.283	−0.322	−0.299	−0.239	−0.287
	0.636	0.416	0.602	0.213	0.679
Correlation coefficient ρ	−0.468	−0.386	−0.441	−0.341	−0.360
Thailand	**CFB-FE**	**CFB-T**	**CFB-HK**	**HFNV**	**HKP**
Volatility persistence stock returns b_S	0.747	0.746	0.747	0.747	0.747
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.132	−0.143	−0.135	−0.120	−0.143
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.222	−0.210	−0.220	−0.212	−0.208
	0.258	0.284	0.273	0.281	0.291
Volatility persistence HF price b_H	0.273	0.317	0.393	0.338	0.307
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.017	1.280	1.411	1.315	1.204
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.261	−0.282	−0.337	−0.349	−0.273
	0.356	0.620	0.130	0.105	0.551
Correlation coefficient ρ	−0.495	−0.429	−0.495	−0.297	−0.397
Thailand	**IIF**	**IVI**	**IGF**	**JKAI**	**LIM**
Volatility persistence stock returns b_S	0.747	0.747	0.747	0.747	0.747
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.131	−0.123	−0.124	−0.144	−0.124
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.211	−0.224	−0.221	−0.197	−0.220
	0.284	0.240	0.254	0.292	0.271
Volatility persistence HF price b_H	0.275	0.337	0.381	0.265	0.298
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.211	1.251	1.436	1.124	0.987
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.257	−0.264	−0.264	−0.282	−0.302
	0.362	0.393	0.465	0.637	0.599
Correlation coefficient ρ	−0.374	−0.364	−0.435	−0.342	−0.483

Table 10. *Cont.*

Thailand	MLM	PPL	PIF	PCF	ISF
Volatility persistence stock returns b_S	0.747	0.747	0.747	0.747	0.747
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.137	−0.153	−0.143	−0.145	−0.147
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.217	−0.193	−0.211	−0.198	−0.198
	0.288	0.293	0.292	0.292	0.292
Volatility persistence HF price b_H	0.188	0.227	0.220	0.329	0.279
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.020	1.190	1.250	1.463	1.093
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.317	−0.327	−0.262	−0.281	−0.291
	0.449	0.371	0.469	0.627	0.705
Correlation coefficient ρ	−0.382	−0.476	−0.439	−0.405	−0.339
Thailand	**SJO**	**SRG**	**VPC-A**	**VPC-B**	**VEI**
Volatility persistence stock returns b_S	0.747	0.747	0.747	0.747	0.747
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.145	−0.135	−0.147	−0.148	−0.144
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.210	−0.211	−0.206	−0.205	−0.213
	0.291	0.290	0.292	0.292	0.289
Volatility persistence HF price b_H	0.277	0.268	0.280	0.273	0.562
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.250	1.068	1.213	1.188	0.628
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.354	−0.312	−0.330	−0.331	−0.300
	0.067 ***	0.451	0.259	0.263	0.576
Correlation coefficient ρ	−0.354	−0.362	−0.441	−0.443	−0.291

* 1% significance level, *** 10% significance level.

Table 11 shows the results of the volatility analysis between the Indonesian stock market and the hedge fund market and vice versa. For volatility persistence, the coefficient (b) is significant for the Indonesian stock market. The volatility persistence for hedge funds is also significant. In addition, the values of (b_S) and (b_H) are less than one, a condition necessarily have stable volatility with a long-term impact on market returns.

For volatility spillover, we find that the coefficient (δ) is significant for the Indonesian stock market on the hedge fund market and vice versa at 1% level of significance. This implies the return spillover effect is strong in both directions from the hedge fund market to the Indonesian stock market and from the Indonesian stock market to hedge fund market. This knowledge of volatility spillover effects can be helpful in asset allocation and stock selection.

For the asymmetric spillover response, the coefficient (θ) is insignificant for the Indonesian stock market on the hedge fund market and the reciprocal is also insignificant. This implies that negative shocks from the Indonesian stock market do not impact volatility in the hedge fund market and no reciprocal volatility impact can be seen between the hedge fund market and the Indonesia stock market.

Table 11. Volatility spillover between the Indonesian Stock Market (JCI) and Hedge Fund Returns.

Indonesia	**AGF**	**AACF**	**AAGF**	**BDP**	**BAF**
Volatility persistence stock returns b_S	0.753	0.753	0.753	0.752	0.751
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.140	−0.140	−0.137	−0.133	−0.127
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.197	−0.198	−0.207	−0.207	−0.208
	0.286	0.287	0.285	0.285	0.284
Volatility persistence HF price b_H	0.255	0.385	0.384	0.209	0.236
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.357	1.375	1.040	1.089	1.072
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.278	−0.317	−0.294	−0.234	−0.282
	0.641	0.420	0.606	0.218	0.684
Correlation coefficient ρ	−0.463	−0.381	−0.436	−0.336	−0.355
Indonesia	**CFB-FE**	**CFB-T**	**CFB-HK**	**HFNV**	**HKP**
Volatility persistence stock returns b_S	0.752	0.751	0.752	0.752	0.752
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.127	−0.138	−0.130	−0.115	−0.138
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.217	−0.205	−0.215	−0.207	−0.204
	0.253	0.280	0.268	0.276	0.287
Volatility persistence HF price b_H	0.278	0.322	0.397	0.343	0.312
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.022	1.285	1.416	1.320	1.209
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.256	−0.277	−0.332	−0.344	−0.268
	0.361	0.625	0.135	0.110	0.556
Correlation coefficient ρ	−0.490	−0.424	−0.490	−0.292	−0.392
Indonesia	**IIF**	**IVI**	**IGF**	**JKAI**	**LIM**
Volatility persistence stock returns b_S	0.752	0.752	0.752	0.752	0.752
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.127	−0.118	−0.119	−0.139	−0.119
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.206	−0.219	−0.216	−0.193	−0.215
	0.279	0.235	0.250	0.287	0.266
Volatility persistence HF price b_H	0.280	0.342	0.386	0.270	0.303
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.216	1.256	1.441	1.129	0.992
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.252	−0.259	−0.259	−0.277	−0.297
	0.366	0.398	0.470	0.642	0.604
Correlation coefficient ρ	−0.369	−0.359	−0.430	−0.337	−0.478

Table 11. *Cont.*

Indonesia	MLM	PPL	PIF	PCF	ISF
Volatility persistence stock returns b_S	0.752	0.752	0.752	0.752	0.752
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.132	−0.148	−0.138	−0.140	−0.142
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.212	−0.188	−0.206	−0.193	−0.193
	0.283	0.288	0.287	0.287	0.287
Volatility persistence HF price b_H	0.193	0.232	0.225	0.334	0.284
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.024	1.195	1.255	1.468	1.097
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.312	−0.322	−0.257	−0.276	−0.286
	0.454	0.376	0.473	0.632	0.709
Correlation coefficient ρ	−0.378	−0.471	−0.434	−0.400	−0.334
Indonesia	**SJO**	**SRG**	**VPC-A**	**VPC-B**	**VEI**
Volatility persistence stock returns b_S	0.752	0.752	0.752	0.752	0.752
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.140	−0.130	−0.142	−0.143	−0.139
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.205	−0.206	−0.201	−0.200	−0.208
	0.286	0.285	0.287	0.287	0.284
Volatility persistence HF price b_H	0.282	0.273	0.285	0.278	0.567
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.255	1.073	1.217	1.193	0.633
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.349	−0.307	−0.326	−0.326	−0.295
	0.072 ***	0.455	0.264	0.267	0.581
Correlation coefficient ρ	−0.349	−0.357	−0.436	−0.438	−0.286

* 1% significance level, *** 10% significance level.

Table 12 shows the results of volatility analysis between the Malaysian stock market and the hedge fund market and vice versa. For volatility persistence, the coefficient (b) is significant for the Malaysian stock market. Volatility persistence for the hedge fund market is also significant at the 1% level.

For volatility spillover, we find that the coefficient (δ) is significant for the Malaysian stock market on hedge fund market and for the hedge fund market on the Malaysian stock market the spillover effect was significant at the 1% level. This implies the return spillover effect is strong from the hedge fund market to the Malaysian stock market and vice versa.

For the asymmetric spillover response, the coefficient (θ) is insignificant for the Malaysian stock market on the hedge fund market and the reciprocal is insignificant. This implies that negative shocks generated from negative news in the Malaysian stock market do not impact the volatility of the hedge fund market and vice versa.

Table 12. Volatility spillover between the Malaysian Stock Market (FBMKLCI) and Hedge Fund Returns.

Malaysia	**AGF**	**AACF**	**AAGF**	**BDP**	**BAF**
Volatility persistence stock returns b_S	0.843	0.843	0.843	0.842	0.841
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.050	−0.050	−0.047	−0.043	−0.037
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.107	−0.108	−0.117	−0.117	−0.118
	0.196	0.197	0.195	0.195	0.194
Volatility persistence HF price b_H	0.345	0.475	0.474	0.299	0.326
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.447	1.465	1.130	1.179	1.162
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.188	−0.227	−0.204	−0.144	−0.192
	0.731	0.510	0.696	0.308	0.774
Correlation coefficient ρ	−0.373	−0.291	−0.346	−0.246	−0.265
Malaysia	**CFB-FE**	**CFB-T**	**CFB-HK**	**HFNV**	**HKP**
Volatility persistence stock returns b_S	0.842	0.841	0.842	0.842	0.842
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.037	−0.048	−0.040	−0.025	−0.048
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.127	−0.115	−0.125	−0.117	−0.114
	0.163	0.190	0.178	0.186	0.197
Volatility persistence HF price b_H	0.368	0.412	0.487	0.433	0.402
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.112	1.375	1.506	1.410	1.299
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.166	−0.187	−0.242	−0.254	−0.178
	0.451	0.715	0.225	0.200	0.646
Correlation coefficient ρ	−0.400	−0.334	−0.400	−0.202	−0.302
Malaysia	**IIF**	**IVI**	**IGF**	**JKAI**	**LIM**
Volatility persistence stock returns b_S	0.842	0.842	0.842	0.842	0.842
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.037	−0.028	−0.029	−0.049	−0.029
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.116	−0.129	−0.126	−0.103	−0.125
	0.189	0.145	0.160	0.197	0.176
Volatility persistence HF price b_H	0.370	0.432	0.476	0.360	0.393
	0.000	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.306	1.346	1.531	1.219	1.082
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.162	−0.169	−0.169	−0.187	−0.207
	0.456	0.488	0.560	0.732	0.694
Correlation coefficient ρ	−0.279	−0.269	−0.340	−0.247	−0.388

Table 12. *Cont.*

Malaysia	MLM	PPL	PIF	PCF	ISF
Volatility persistence stock returns b_S	0.842	0.842	0.842	0.842	0.842
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.042	−0.058	−0.048	−0.050	−0.052
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.122	−0.098	−0.116	−0.103	−0.103
	0.193	0.198	0.197	0.197	0.1970
Volatility persistence HF price b_H	0.283	0.322	0.315	0.424	0.374
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.114	1.285	1.345	1.558	1.187
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.222	−0.232	−0.167	−0.186	−0.196
	0.544	0.466	0.563	0.722	0.799
Correlation coefficient ρ	−0.288	−0.381	−0.344	−0.310	−0.244
Malaysia	**SJO**	**SRG**	**VPC-A**	**VPC-B**	**VEI**
Volatility persistence stock returns b_S	0.842	0.842	0.842	0.842	0.842
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	−0.050	−0.040	−0.052	−0.053	−0.049
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.115	−0.116	−0.111	−0.110	−0.118
	0.196	0.195	0.197	0.197	0.194
Volatility persistence HF price b_H	0.372	0.363	0.375	0.368	0.657
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.345	1.163	1.307	1.283	0.723
	0.000 *	0.000 *	0.000 *	0.000 *	0.0000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.259	−0.217	−0.236	−0.236	−0.205
	0.162	0.545	0.354	0.357	0.671
Correlation coefficient ρ	−0.259	−0.267	−0.346	−0.348	−0.196

* 1% significance level.

Table 13 shows the results of the volatility analysis between the Taiwanese stock market and the hedge fund market and vice versa. For volatility persistence, the coefficient (b) is significant for the Taiwanese stock market. The volatility persistence for hedge fund market is also significant at the 1% level.

For volatility spillover, we find that the coefficient (δ) is significant for the Taiwanese stock market on hedge fund market and the hedge fund market on the Taiwanese stock market shows a spillover effect at 1% significance level. For the asymmetric spillover response, the coefficient (θ) is insignificant for the Taiwanese stock market on the hedge fund market, with the exception of IVI and IGF where the asymmetric spillover coefficient is significant at the 10% level. This implies that negative shocks from the Taiwanese stock market do not impact the returns of hedge funds and neither does any negative news from hedge fund market affect the returns of the Taiwanese stock market except for two of 25 studied hedge funds that can be taken as a weak impact.

Table 13. Volatility spillover between the Taiwanese Stock Market (TWSE) and Hedge Fund Returns.

Taiwan	AGF	AACF	AAGF	BDP	BAF
Volatility persistence stock returns b_S	0.903	0.903	0.903	0.902	0.901
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.010	0.010	0.013	0.017	0.023
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.047	−0.048	−0.057	−0.057	−0.058
	0.136	0.137	0.135	0.135	0.134
Volatility persistence HF price b_H	0.405	0.535	0.534	0.359	0.386
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.507	1.525	1.190	1.239	1.222
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.128	−0.167	−0.144	−0.084	−0.132
	0.791	0.570	0.756	0.368	0.834
Correlation coefficient ρ	−0.313	−0.231	−0.286	−0.186	−0.205
Taiwan	**CFB-FE**	**CFB-T**	**CFB-HK**	**HFNV**	**HKP**
Volatility persistence stock returns b_S	0.902	0.901	0.902	0.902	0.902
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.023	0.012	0.020	0.035	0.012
	0.000 *	0.0000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.067	−0.055	−0.065	−0.057	−0.054
	0.103	0.130	0.118	0.126	0.137
Volatility persistence HF price b_H	0.428	0.472	0.547	0.493	0.462
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.172	1.435	1.566	1.470	1.359
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.106	−0.127	−0.182	−0.194	−0.118
	0.511	0.775	0.285	0.260	0.706
Correlation coefficient ρ	−0.340	−0.274	−0.340	−0.142	−0.242
Taiwan	**IIF**	**IVI**	**IGF**	**JKAI**	**LIM**
Volatility persistence stock returns b_S	0.902	0.902	0.902	0.902	0.902
	0.000 *	0.000 *	0.000 *	0.000 *	0.0000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.023	0.032	0.031	0.011	0.031
	0.000 *	0.000 *	0.000 *	0.000	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.056	−0.069	−0.066	−0.043	−0.065
	0.129	0.085 ***	0.100 ***	0.137	0.116
Volatility persistence HF price b_H	0.430	0.492	0.536	0.420	0.453
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.366	1.406	1.591	1.279	1.142
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.102	−0.109	−0.109	−0.127	−0.147
	0.516	0.548	0.620	0.792	0.754
Correlation coefficient ρ	−0.219	−0.209	−0.280	−0.187	−0.328

Table 13. *Cont.*

Taiwan	MLM	PPL	PIF	PCF	ISF
Volatility persistence stock returns b_S	0.902	0.902	0.902	0.902	0.902
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.018	0.002	0.012	0.010	0.008
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.062	−0.038	−0.056	−0.043	−0.043
	0.133	0.138	0.137	0.137	0.137
Volatility persistence HF price b_H	0.343	0.382	0.375	0.484	0.434
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.174	1.345	1.405	1.618	1.247
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.162	−0.172	−0.107	−0.126	−0.136
	0.604	0.526	0.623	0.782	0.859
Correlation coefficient ρ	−0.228	−0.321	−0.284	−0.250	−0.184
Taiwan	**SJO**	**SRG**	**VPC-A**	**VPC-B**	**VEI**
Volatility persistence stock returns b_S	0.902	0.902	0.902	0.902	0.902
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from stock returns to HF price $\delta_{S,H}$	0.010	0.020	0.008	0.007	0.011
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from stock returns to HF price $\theta_{S,H}$	−0.055	−0.056	−0.051	−0.050	−0.058
	0.136	0.135	0.137	0.137	0.134
Volatility persistence HF price b_H	0.432	0.423	0.435	0.428	0.717
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Spillover from HF price to stock returns $\delta_{H,S}$	1.405	1.223	1.367	1.343	0.783
	0.000 *	0.000 *	0.000 *	0.000 *	0.000 *
Asymmetric spillover effect from HF price to stock returns $\theta_{H,S}$	−0.199	−0.157	−0.176	−0.176	−0.145
	0.222	0.605	0.414	0.417	0.731
Correlation coefficient ρ	−0.199	−0.207	−0.286	−0.288	−0.136

* 1% significance level, *** 10% significance level.

4.4. Volatility Spillover

The volatility spillover results for the stock price and hedge fund coefficients are presented in Tables 2–13. The results of volatility spillover suggests that hedge funds are stable and independent regardless of stock market shocks in terms of changing their market position. These results are not surprising and are consistent with a previous study by Sung et al. (2021), who found that hedge fund exit financial markets simultaneously after financial stability shocks occur. This reiterates the concept of active fund management. Hedge funds use different investment strategies to invest for different time periods long- and short-term positions). As fund managers are paid based on performance incentives, they are more likely to adapt and adjust their strategies based on market conditions.

4.5. Asymmetric Spillover

The asymmetric spillover results for the stock and hedge fund market prices are presented in Tables 2–13. Overall, the results indicate that the asymmetric spillover coefficients from stock prices to hedge funds are significant for all sampled countries. However, the

asymmetric spillover coefficients from the hedge funds to the stock market are insignificant. This indicates that good news does not impact performance or spillover from the stock market to the hedge fund market. As hedge funds are managed by fund managers who use multiple investment strategies, we expected to see adjustments in hedge fund portfolios with good or bad news spread in financial markets because of active management and the benchmark of the hedge fund performance, fund managers need to meet. Hedge funds are based on risk-adjusted performance fees and incentive fees for fund managers, which is another motivation for changing investment strategies as per market conditions. This can is confirmed by the study by Ackermann et al. (1999), who conducted the research to identify managerial compensation and fee structure. They found strong evidence on managerial ability to take advantage of market liquidity and concluded there was persistence in timing skill over time.

The insignificant coefficients confirm that the spillover effect is symmetric, which suggests that positive and negative shocks have a similar impact on volatility. A decrease in stock market returns has a similar impact on hedge fund volatility as in increasing stock returns. The asymmetric spillover test also helps to identify the impact of news on the returns' volatility. For this study, we found negative signs against the significant asymmetric coefficients between the Chinese stock market and hedge fund market and between the Hong Kong stock market and hedge fund market, which indicates that good news on the stock market has a positive impact on other markets, which in this case, is the hedge fund market. For volatility spillover effects from stock returns to hedge funds, we did not find any strong evidence of stock market shocks driving hedge fund volatility. This suggests that there is no integration between the two markets. The weak or even negative correlations of the hedge fund market with stock markets allows the diversification of risk in a mean-variance environment.

The results do not show any significant evidence of asymmetric spillover effects for the sample countries in our study. We also did not find that good news related to stock prices had a significant impact on hedge funds. Nor did we find evidence of the reciprocal effect. The results also revealed a lack of volatility spillover between stock markets and hedge fund markets; investors should consider diversifying their investment portfolios by investing in the hedge fund market. However, it is important to understand hedge fund managers' different strategies before investing in this market. Investors must also be aware that these funds are actively managed funds so investors need to be more qualified to manage investments in hedge funds or use a hedge fund manager, but this can be expensive. The study by Philippon (2012) showed trading costs have decreased but the costs of active fund management are large. French (2008) estimated that investors spend 0.67% of asset value trying in vain, by definition to beat the market.

5. Conclusions

Relationships between stock market and hedge funds are of particular interest for academics and practitioners due to the fact that these two variables play a crucial role in portfolio and risk management. This paper also examined the volatility linkages between the stock and hedge fund markets. The findings show insignificant coefficients for volatility spillovers for all the hedge funds included in the study. We analysed twelve countries in the Asia-Pacific region, and it is worth mentioning that our overall conclusion, based on the literature, tended to be consistent with the absence of a relationship between stock market returns and hedge fund returns. For example, Martin (2006) studied the correlation between US hedge funds, S&P 500, and MSCI World Index and found a weak correlation between hedge funds, stocks and bonds. The author concluded that because of the low correlation, the integration of hedge funds into portfolios of traditional investments seems promising. Stulz (2007) concluded that hedge funds appear to be an attractive diversification vehicle for investors who hold stocks. Balakrishna (2012) found evidence to conclude that hedge funds provide significant diversification benefits, since these funds have low correlations with conventional asset classes over the business cycle. It is also important to understand

that the hedge funds' behaviour is considered independent and influential simultaneously. Specifically, during the 1997 Asian financial crisis, numerous researchers studied whether hedge funds caused or contributed to the financial instability or the market crash e.g., Park et al. (1998); Brown et al. (2000). Brown et al. (2000) investigated the 1997 Asian financial crisis and hedge funds. The authors found a lack of evidence to support the claim that hedge funds, as a whole, caused the crash. Park et al. (1998) tested the hypothesis that hedge funds were responsible for the crash of Asian currencies in late 1997. The authors adapted the asset class factor model that is a common model used for investment analysis based on the previous study by Sharpe (1992) to analyse the hedge funds' returns. Sharpe found no empirical evidence to support the hypothesis that hedge funds were responsible for the crisis. Some recent studies also disapprove the claims of the existence of correlation and/or contagion between hedge funds and stock markets. For example, Sias et al. (2018) revealed that evidence of hedge fund contagion is quite scarce. The authors also suggest that, despite the potential of hedge funds to generate better returns compared with stock markets, the contagion effects need to be explored further. The authors also recognised that future events and the analysis of fund markets may reveal further evidence of hedge fund contagion. Kanuri (2020) studied the performance of hedge funds and compared the returns to the performance of the Japanese stock market returns from 2000–2018 and found evidence that hedge funds outperformed Japanese stocks and bonds market with much higher returns. Overall, their results indicated that hedge funds added much value for investors compared with the stocks and bonds market because of the lack of correlation in market movements.

Although there is a little evidence that the hedge funds contributed to the financial crisis, some researchers suggest that withdrawing assets from investment banks led to the collapse of these institutions and contributed to the 2008 Global Financial Crisis. Cao et al. (2018) investigated whether hedge fund leverage played a role in propagating the shocks to price efficiency following the failure of Lehman Brothers. They found evidence that mispricing of stocks following Lehman's failure was more severe for stocks held by hedge funds that use leverage.

A study by Adams et al. (2014) found evidence that hedge funds may be the most important transmitter of shocks during the 2008 Global Financial Crisis, more so than commercial or investment banks. Hedge funds are considered to be highly opaque and leveraged investment instruments. This property of hedge funds allows liquidation of assets at high prices, resulting in heavy losses to the asset classes involved. This led to further defaults through asset price adjustments Bernanke (2006).

To trace the spillover effects from hedge funds to assets classes, one would need detailed information on the different risks to which financial markets are exposed, their liabilities and their assets. Unfortunately, hedge funds are not required to supply this type of information. Concern over the systemic importance of hedge funds also emphasises tighter reporting obligations for large institutions in the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 Lo (2008).

The results in this paper are important to policymakers in the Asia-Pacific region endeavouring to form macroeconomic policies. Similarly, the results can provide policymakers with additional tools to advance their efforts at maintaining financial market stability against potential information spillover impacts from stock markets and global financial markets. In parallel, the paper's results add to academic efforts to understand the extent of the linkages between financial markets. From investors' viewpoint, the paper gives a new perspective to accomplish investment diversification. Also, the varying levels of volatility spillover and correlation during stable and turbulent crisis periods enriches the literature on financial contagion theory in the context of the Asia-Pacific region.

Author Contributions: Conceptualization, S.F. and C.G.; methodology, S.F.; software, S.F.; validation, B.H.; formal analysis, S.F.; investigation, S.F. and B.H.; resources, S.F.; data curation, S.F.; writing—original draft preparation, S.F.; writing—review and editing, B.H.; visualization, S.F.; supervision, C.G. and B.H. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Descriptive Statistics of 12 Asia-Pacific Countries' Stock Market Returns.

Stock Market	Sample	Obs.	Mean	SD	Skewness	Kurtosis	JB
ASX	Total Sample	1056	24.69579	12.93494	−0.167332	1.797859	68.5143
	1998–2002	220	6.667713	1.100195	−0.368906	5.134461	46.75268
	2003–2009	365	22.84487	11.06226	0.553851	2.726017	19.80235
	2010–2018	471	34.55091	5.301064	0.821111	3.122298	53.22
NZX	Total Sample	814	0.658846	0.279324	−0.16943	2.010832	37.08043
	2003–2009	396	0.435861	0.196287	0.353459	2.043709	23.33474
	2010–2018	418	0.870096	0.153842	0.211961	1.787517	28.31383
JPY	Total Sample	1148	131.0165	32.10497	0.3189	2.71099	23.45341
	1997–2002	313	126.3965	32.82477	0.067423	1.988238	13.58741
	2003–2009	365	113.7442	22.82147	−0.163269	2.082395	14.42702
	2010–2018	470	147.5069	29.67909	0.482603	2.283108	28.30881
STI	Total Sample	1010	1822.812	630.4495	−0.293034	1.576597	99.7186
	1999–2002	174	1039.979	202.2187	0.284898	1.988593	9.770189
	2003–2009	365	1501.37	498.0532	0.366934	1.991985	23.64376
	2010–2018	471	2361.113	220.4931	−0.40187	2.078595	29.33907
NSE500	Total Sample	1149	65.29906	40.13882	0.166424	1.734851	81.93286
	1997–2002	313	18.42959	4.455568	1.528323	5.944602	234.9295
	2003–2009	365	57.68301	28.22967	0.531987	2.645008	19.13302
	2010–2018	471	102.3479	20.52733	0.462887	2.447648	22.80718
KOSPI	Total Sample	1147	1.270322	0.597327	−0.12531	1.598694	96.84837
	1997–2002	313	0.565223	0.186539	−0.115554	1.9739	14.4279
	2003–2009	365	1.171179	0.459903	0.336727	2.129651	18.41803
	2010–2018	469	1.818048	0.212553	0.416116	3.231304	14.58028
SHCOMP	Total Sample	1149	312.5864	159.2746	0.367888	2.711571	29.90068
	1997–2002	313	175.762	56.73049	−1.15276	5.410229	145.0837
	2003–2009	365	289.5869	177.6396	0.903963	3.058546	49.76199
	2010–2018	471	421.3355	103.2406	−0.580439	8.674866	658.4529
HSI	Total Sample	1149	2345.888	747.5231	0.09526	2.004987	49.13647
	1997–2002	313	1600.539	333.9865	0.183424	2.084872	12.67698
	2003–2009	365	2139.414	631.3236	0.581075	2.665013	22.24688
	2010–2018	471	3001.211	385.6299	0.77717	3.315208	49.36328
SET	Total Sample	1148	25.7302	15.17621	0.420828	1.800974	102.6527
	1997–2002	313	10.75358	5.637739	2.133786	7.130056	459.9734
	2003–2009	365	17.82547	4.364359	−0.085507	2.835278	0.85743
	2010–2018	470	41.84277	8.29781	−0.431012	2.822071	15.1721

Table A1. *Cont.*

Stock Market	Sample	Obs.	Mean	SD	Skewness	Kurtosis	JB
JCI	Total Sample	1148	0.235168	0.158254	0.11425	1.425431	121.0892
	1997–2002	313	0.081725	0.073627	2.040987	5.807762	320.1212
	2003–2009	365	0.152355	0.074311	0.363281	1.946834	24.89679
	2010–2018	470	0.401667	0.067272	−2.820489	17.21729	4581.557
FBMKLCI	Total Sample	1149	339.0695	137.1726	0.104476	1.688539	84.43188
	1997–2002	313	209.5008	92.0831	1.897886	6.178057	319.6243
	2003–2009	365	278.3003	74.4692	0.606984	2.205425	32.01459
	2010–2018	471	472.2664	64.87676	0.096004	1.751033	31.33692
TWSE	Total Sample	1134	241.7837	61.74244	−0.084668	2.323889	22.95407
	1997–2002	310	218.5893	62.65417	0.10035	2.012759	13.10945
	2003–2009	360	201.3879	43.12455	0.265095	2.526674	7.577086
	2010–2018	464	288.6214	37.93733	0.546348	2.503783	27.84416

ASX: Australian Stock Price, NZX: New Zealand Stock Price, JPY: Japanese Stock Price, STI: Singaporean Stock Price, NSE500: Indian Stock Price, KOSPI: South Korean Stock Price, SHCOMP: Shanghai China Stock Price, HSI: Hong Kong Stock Price, SET: Thai Stock Price, JCI: Indonesian Stock Price, FBMKLCI: Malaysian Stock Price, TWSE: Taiwanese Stock Price.

Table A2. Descriptive Statistics of Hedge Fund Returns.

Hedge Funds	Obs.	Type of Test				
		Mean	SD	Skewness	Kurtosis	JB
AGF	264	0.805265	3.600888	−0.41628	5.674495	86.30688
AACF	265	1.148491	5.878306	−0.190843	5.088338	49.763
AAGF	264	0.660227	7.111169	0.734775	5.776641	108.5625
BDP	256	0.506445	2.817598	0.215363	3.963545	11.88206
BAF	264	0.580379	5.370084	−0.009871	4.683957	31.1971
CFB-FE	264	0.924583	3.961538	0.553681	6.501578	148.6302
CFB-HK	264	0.735985	3.774504	−0.295734	6.680355	152.8434
CFB-T	264	1.171553	4.468795	0.255109	5.438744	68.28576
HFNV	252	1.042659	9.04983	0.107356	5.606503	71.81957
HKP	264	0.590871	7.82731	0.051869	4.303096	18.79704
IIF	264	1.380076	9.572629	0.068171	4.610727	28.74333
IVI	264	1.108598	6.734081	−0.29915	5.056565	50.46164
IGF	260	1.190038	12.75944	0.166466	7.380011	209.0329
JKAI	264	0.593788	5.417733	0.324015	3.592816	8.485114
LIM	264	0.504356	1.629906	0.030212	10.74091	659.178
MLM	264	0.858371	4.696964	0.489854	3.314214	11.64415
PPL	264	0.819697	3.590945	−0.102776	3.728723	6.306183
PIF	264	0.99072	3.269807	0.392461	4.00035	17.78484
PCF	264	0.775492	7.174266	0.273565	8.195353	300.2015
ISF	264	0.547121	6.736905	−0.121409	4.888512	39.8798
SJO	264	0.915758	9.62004	0.935716	5.259409	94.67905
SRG	264	0.958598	6.025513	0.795778	5.514949	97.43818
VPC-A	264	1.172765	6.506845	−0.680881	6.209624	133.7169
VPC-B	264	1.142273	6.539423	−0.67732	6.106166	301.56
VEI	264	0.926818	6.639179	0.084498	5.514089	69.84124

AGF: Allard Growth Fund, AACF: Arisaig Asia Consumer Fund Ltd., AAGF: Atlantis Japan Growth Fund Ltd., BDP: Boronia Diversified Program, BAF: Bowen Asia Fund, CFB-FE: CFB Convertibles Fund PLC—Far East Sub Fund, CFB-HK: CFB Convertibles Fund PLC—Hong Kong Sub Fund, CFB-T: CFB Convertibles Fund PLC—Thailand Sub Fund, HFNV: Himalayan Fund NV, HKP: Hong Kong Partners LP, IIF: India Capital Fund Ltd.—A Share, IVI: India Value Investments Ltd.—GBP, IGF: Indonesian Growth Fund, JKAI: JK Asian Invest LP, LIM: LIM Asia Multi-Strategy Fund—Class A Series 1, MLM: MLM Macro—Peak Partners LP, PPL: Platinum Fund Ltd.—USD, PIF: Platinum International Fund—Class C, PCF: Polar Capital Funds plc—Asian Opportunities Fund Class USD, ISF: Schroder ISF Asian Opportunities—USD, SJO: Shiozumi Japan Opportunities Fund, SRG: SR Global Fund Class C) International, VPC-A: Value Partners Classic Fund—Class A USD, VPC-B: Value Partners Classic Fund—Class B USD, VEI: Vietnam Enterprise Investments Ltd.

Table A3. ADF Unit Root Test of Stock Markets Data.

Type of Test	ADF		PP	
Stock Market	**Levels**	**1st Diff.**	**Levels**	**1st Diff.**
ASX	−1.515675	−9.279596 *	−1.475958	−32.4942 *
NZX	−2.014037	−28.36016 *	−2.052167	−28.40898 *
JPY	−1.653262	−37.10071 *	−1.751896	−37.04085 *
STI	−1.413977	−17.7805 *	−1.350301	−30.11826 *
NSE500	−0.963937	−20.67192 *	−0.897202	−31.31889 *
KOSPI	−1.276449	−34.45373 *	−1.274097	−34.44916 *
SHCOMP	−2.981296	−5.010659 *	−2.102386	−30.33593 *
HSI	−1.536054	−22.81121 *	−1.610195	−33.89964 *
SET	−0.611759	−13.54181 *	−0.564731	−33.42701 *
JCI	−0.844615	−13.0041 *	−0.771935	−36.28122 *
FBMKLCI	−1.616394	−12.83962 *	−1.559871	−33.97777 *
TWSE	−2.127654	−22.31131 *	−2.102121	−34.33078 *

* 1% significance level, ASX: Australian Stock Price, NZX: New Zealand Stock Price, JPY: Japanese Stock Price, STI: Singaporean Stock Price, NSE500: Indian Stock Price, KOSPI: South Korean Stock Price, SHCOMP: Shanghai China Stock Price, HSI: Hong Kong Stock Price, SET: Thai Stock Price, JCI: Indonesian Stock Price, FBMKLCI: Malaysian Stock Price, TWSE: Taiwanese Stock Price.

Table A4. ADF Unit Root Test Hedge Funds.

Type of Test		ADF	
Hedge Fund	**Variable**	**Level**	**1st Diff.**
Allard Growth Fund	AGF	−6.820719	−12.36761
Arisaig Asia Consumer Fund Ltd.	AACF	−6.145342	−10.69169
Atlantis Japan Growth Fund Ltd.	AAGF	−5.868159	−10.0679
Boronia Diversified Program	BDP	−6.981794	−11.30284
Bowen Asia Fund	BAF	−6.826534	−10.24941
CFB Convertibles Fund PLC—Far East Sub Fund	CFB-FE	−5.464945	−9.970182
CFB Convertibles Fund PLC—Hong Kong Sub Fund	CFB-HK	−7.226543	−10.70699
CFB Convertibles Fund PLC—Thailand Sub Fund	CFB-T	−6.316322	−9.140703
Himalayan Fund NV	HFNV	−6.84573	−11.68212
Hong Kong Partners LP	HKP	−6.609208	−11.1289
India Capital Fund Ltd.—A Share	IIF	−6.581257	−12.35492
India Value Investments Ltd.—GBP	IVI	−5.64695	−13.23924
Indonesian Growth Fund	IGF	−6.00082	−11.25764
JK Asian Invest LP	JKAI	−5.977589	−10.8305
LIM Asia Multi-Strategy Fund—Class A Series 1	LIM	−7.133593	−10.8006
MLM Macro—Peak Partners LP	MLM	−7.672718	−12.47703
Platinum Fund Ltd.—USD	PPL	−6.604396	−13.36312
Platinum International Fund—Class C	PIF	−5.955776	−9.81512
Polar Capital Funds plc—Asian Opportunities Fund Class USD	PCF	−7.010237	−10.70807
Schroder ISF Asian Opportunities—USD A Dis	ISF	−6.48012	−10.63692
Shiozumi Japan Opportunities Fund	SJO	−6.397172	−12.12368
SR Global Fund Class C) International	SRG	−7.443766	−12.2378
Value Partners Classic Fund—Class A USD	VPC-A	−7.931334	−10.79921
Value Partners Classic Fund—Class B USD	VPC-B	−7.920528	−10.83225
Vietnam Enterprise Investments Ltd.	VEI	−7.879385	−10.55903

Table A4. *Cont.*

Type of Test		PP	
Hedge Fund	**Variable**	**Level**	**1st Diff.**
Allard Growth Fund	AGF	−6.20142	−13.53153
Arisaig Asia Consumer Fund Ltd.	AACF	−5.312271	−15.93447
Atlantis Japan Growth Fund Ltd.	AAGF	−5.009445	−13.99729
Boronia Diversified Program	BDP	−4.404156	−15.70672
Bowen Asia Fund	BAF	−4.98403	−17.64692
CFB Convertibles Fund PLC—Far East Sub Fund	CFB-FE	−4.710158	−16.99101
CFB Convertibles Fund PLC—Hong Kong Sub Fund	CFB-HK	−4.830855	−18.77841
CFB Convertibles Fund PLC—Thailand Sub Fund	CFB-T	−5.32639	−12.87429
Himalayan Fund NV	HFNV	−4.957175	−17.93565
Hong Kong Partners LP	HKP	−5.17482	−25.41986
India Capital Fund Ltd.—A Share	IIF	−5.158558	−26.4707
India Value Investments Ltd.—GBP	IVI	−5.031586	−29.81622
Indonesian Growth Fund	IGF	−5.647025	−10.98228
JK Asian Invest LP	JKAI	−5.014096	−18.33084
LIM Asia Multi-Strategy Fund—Class A Series 1	LIM	−6.01404	−11.50953
MLM Macro—Peak Partners LP	MLM	−4.780957	−16.21311
Platinum Fund Ltd.—USD	PPL	−5.151409	−18.95169
Platinum International Fund—Class C	PIF	−5.133875	−16.82738
Polar Capital Funds plc—Asian Opportunities Fund Class USD	PCF	−5.001961	−25.78604
Schroder ISF Asian Opportunities—USD A Dis	ISF	−4.94628	−19.52952
Shiozumi Japan Opportunities Fund	SJO	−5.038999	−17.60632
SR Global Fund Class C) International	SRG	−5.237148	−23.91525
Value Partners Classic Fund—Class A USD	VPC-A	−4.773421	−16.72473
Value Partners Classic Fund—Class B USD	VPC-B	−4.778884	−16.69193
Vietnam Enterprise Investments Ltd.	VEI	−4.75629	−19.39658

* 1% significance level.

Table A5. Diagnostics for the EGARCH Residuals—Stock Returns.

Country	**ASX**	**NZX**	**JPY**	**STI**	**NSE500**	**KOSPI**
JB	104	63	5012	75	15	211
LB 20	27.789	26.688	24.015	65.244	54.077	15.978
	−0.127	−0.151	−0.211	0.000	0.000	−0.644
LB^2 20	20.262	21.717	15.566	4.1955	3.4736	13.796
	−0.452	−0.414	−0.849	−1	−1	−0.896
Country	**SHCOMP**	**HSI**	**SET**	**JCI**	**FBMKLCI**	**TWSE**
JB	216	82	139	1068	275	94
LB 20	42.066	43.904	45.743	47.581	49.419	51.258
	−0.3809	−0.4358	−0.4907	−0.5456	−0.6005	−0.6554
LB^2 20	3.3253	0.513	−2.2993	−5.1116	−7.9239	−10.736
	−1.1814	−1.2994	−1.4173	−1.5353	−1.6533	−1.7713

Table A6. Diagnostics for the EGARCH Residuals—Hedge Funds Returns.

Hedge Fund	AGF	AACF	AAGF	BDP	BAF	CFB-FE	CFB-HK	CFB-T	HFNV	HKP	IIF	IVI	IGF	JKAI	LIM	MLM	PPL	PIF	PCF	ISF	SJO	SRG	VPC-A	VPC-B	VEI
JB																									
LB 20	27.8 −0.1	26.7 −0.2	24.0 −0.2	65.2 0.0	54.1 0.0	16.0 −0.6	61.2 0.0	16.8 −0.6	27.4 −0.2	16.1 −0.5	24.8 −0.2	27.5 −0.1	29.7 −0.5	27.0 −0.1	19.1 −0.1	30.4 −0.5	68.2 −0.1	64.2 −0.1	19.8 −0.5	57.1 0.0	19.0 −0.1	30.5 −0.5	30.0 0.0	32.7 0.0	27.8 −0.4
LB^2 20	20.3 −0.5	21.7 −0.4	15.6 −0.8	4.2 −1.0	3.5 −1.0	13.8 −0.9	4.5 −1.0	6.0 −0.9	7.3 −0.9	7.7 −1.0	8.0 −1.0	7.5 −0.9	4.2 −0.4	5.7 −0.8	6.9 −1.0	7.3 −1.0	7.6 −0.9	3.4 −1.0	13.8 −0.9	4.5 −0.9	6.0 −1.0	7.2 −1.0	7.6 −0.9	7.9 −0.4	7.5 −0.8
ARCH-LM	1.0 −0.5	0.9 −0.4	0.8 −0.9	0.1 −1.0	0.1 −1.0	0.6 −0.8	0.3 −1.0	0.4 −1.0	0.5 −1.0	0.6 −0.9	0.5 −0.9	0.4 −1.0	0.3 −0.8	0.4 −1.0	0.5 −1.0	0.4 −1.0	0.3 −1.0	1.0 −1.0	0.9 −1.0	0.8 −0.8	0.1 −1.0	0.1 −0.3	0.6 −1.0	0.3 −1.0	0.4 −1.0

Notes

1 The descriptive statistics for the stock market indices are provided in Appendix A.
2 The descriptive statistics for hedge fund returns' results are provided in Appendix A.
3 The ADF Unit Root Test (Hedge Funds) results are provided in Appendix A.
4 The testing results are not presented but are available upon request.

References

Ackermann, Carl, Richard McEnally, and David Ravenscraft. 1999. The Performance of Hedge Funds: Risk, Return, and Incentives. *The Journal of Finance* 54: 833–74. [CrossRef]

Adams, Zeno, Roland Füss, and Reint Gropp. 2014. Spillover Effects among Financial Institutions: A State-Dependent Sensitivity Value-at-Risk Approach. *Journal of Financial and Quantitative Analysis* 49: 575–98. [CrossRef]

Advisors, Pictet Alternative. 2015. *Hedge Fund Indices: How Representative Are They*. Geneva: Pictet.

Agarwal, Vikas, and Narayan Y. Naik. 2000. Multi-Period Performance Persistence Analysis of Hedge Funds. *Journal of Financial and Quantitative Analysis* 35: 327–42. [CrossRef]

Agarwal, Vikas, and Narayan Y. Naik. 2004. Risks and Portfolio Decisions Involving Hedge Funds. *The Review of Financial Studies* 17: 63–98. [CrossRef]

Amin, Gaurav S., and Harry M. Kat. 2003. Welcome to the dark side: Hedge fund attrition and survivorship bias over the period 1994–2001. *The Journal of Alternative Investments* 6: 57–73. [CrossRef]

Bae, Kee-Hong, G. Andrew Karolyi, and René M. Stulz. 2000. A New Approach to Measuring financial Contagion. NBER Working Paper 7913. Available online: https://www.nber.org/papers/w7913 (accessed on 5 September 2022).

Balakrishna, Sridhar. 2012. The Value of the Hedge Fund Industry to Investors, Markets, and the Broader Economy. *The C.F.A. Digest* 42: 140–42. [CrossRef]

Baur, Dirk G., and Thomas K. McDermott. 2010. Is gold a safe haven? International evidence. *Journal of Banking and Finance* 34: 1886–98. [CrossRef]

Beirne, John, Guglielmo Maria Caporale, Marianne Schulze-Ghattas, and Nicola Spagnolo. 2010. Global and regional spillovers in emerging stock markets: A multivariate GARCH-in-mean analysis. *Emerging Markets Review* 11: 250–60. [CrossRef]

Bekaert, Geert, and Campbell R. Harvey. 1995. Time-Varying World Market Integration. *The Journal of Finance (New York)* 50: 403–44. [CrossRef]

Bernanke, Chairman. 2006. Hedge Funds and Systemic Risk. Paper presented at the Federal Reserve Bank of Atlanta's 2006 Financial Markets Conference, Sea Island, GA, USA, May 16.

Blanco, Roberto, Simon Brennan, and Ian W. Marsh. 2005. An Empirical Analysis of the Dynamic Relation between Investment-Grade Bonds and Credit Default Swaps. *The Journal of Finance (New York)* 60: 2255–81. [CrossRef]

Brown, Stephen J., William N. Goetzmann, and James M. Park. 2000. Hedge funds and the Asian currency crisis. *The Journal of Portfolio Management* 26: 95–101. [CrossRef]

Cao, Bolong, and Shamila A. Jayasuriya. 2012. Volatility and the Cross-Sectional Performance of Emerging Market Hedge Funds. *The Journal of Alternative Investments* 14: 40–50. [CrossRef]

Cao, Charles, Bing Liang, Andrew W. Lo, and Lubomir Petrasek. 2018. Hedge Fund Holdings and Stock Market Efficiency. *Review of Asset Pricing Studies* 8: 77–116. [CrossRef]

Caporale, Guglielmo Maria, Nikitas Pittis, and Nicola Spagnolo. 2002. Testing for causality-in-variance: An application to the East Asian markets. *International Journal of Finance & Economics* 7: 235–45. [CrossRef]

Cheng, Ai-Ru, Mohammad R. Jahan-Parvar, and Philip Rothman. 2010. An empirical investigation of stock market behavior in the Middle East and North Africa. *Journal of Empirical Finance* 17: 413–27. [CrossRef]

Fama, Eugene F., and Kenneth R. French. 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33: 3–56. [CrossRef]

Fama, Eugene F., and Kenneth R. French. 1996. Multifactor Explanations of Asset Pricing Anomalies. *The Journal of Finance (New York)* 51: 55–84. [CrossRef]

French, Kenett R. 2008. Presidential Address: The Cost of Active Investing. *The Journal of Finance* 63: 1537–73. [CrossRef]

Fung, William, and David A. Hsieh. 1997. Empirical characteristics of dynamic trading strategies: The case of hedge funds. *The Review of Financial Studies* 10: 275–302. [CrossRef]

Fung, William, and David A. Hsieh. 2019. Hedge Fund Benchmarks: A Risk-Based Approach. *Financial Analysts Journal* 60: 65–80. [CrossRef]

Fung, William, David A. Hsieh, Narayan Y. Naik, and Tarun Ramadorai. 2008. Hedge Funds: Performance, Risk, and Capital Formation. *Journal of Finance* 63: 1777–803. [CrossRef]

Guesmi, Khaled, and Duc Khuong Nguyen. 2011. How strong is the global integration of emerging market regions? An empirical assessment. *Economic Modelling* 28: 2517–27. [CrossRef]

Guesmi, Khaled, Saoussen Jebri, Abdelkarim Jabri, and Frederic Teulon. 2015. Are Hedge Funds Uncorrelated With Financial Markets? An Empirical Assessment. *Journal of Applied Business Research* 31: 1631. [CrossRef]

Hamao, Yasushi, Ronald W. Masulis, and Victor Ng. 1990. Correlations in Price Changes and Volatility across International Stock Markets. *The Review of Financial Studies* 3: 281–307. [CrossRef]
Harvey, Campbell R. 1991. The World Price of Covariance Risk. *The Journal of Finance (New York)* 46: 111–57. [CrossRef]
Johansen, Søren, Rocco Mosconi, and Bent Nielsen. 2000. Cointegration analysis in the presence of structural breaks in the deterministic trend. *The Econometrics Journal* 3: 216–49. [CrossRef]
Jon, Rees. 2021. Buy-side trading desks' budgets rise in pandemic as staff work from home. *SNL European Financials Daily*.
Kanuri, Srinidhi. 2020. Hedge Fund Performance in Japan. *Review of Pacific Basin Financial Markets and Policies* 23: 2050023. [CrossRef]
Koutmos, Gregory, and G. Geoffrey Booth. 1995. Asymmetric volatility transmission in international stock markets. *Journal of International Money and Finance* 14: 747–62. [CrossRef]
Lan, Nguyen, Malick, Yu Cheng, Hossain Sayed, and Chen Tan. 2019. Are Funds of Hedge Funds Efficient? An Empirical Analysis for North American, Asia Pacific, and European Long/Short Funds of Hedge Funds. *Multinational Finance Journal* 23: 37.
Lhabitant, François-Serge. 2011. *Handbook of Hedge Funds*. The Wiley Finance Series; London: John Wiley & Sons, vol. 579.
Lin, Wen-Ling, Robert Engle, and Takatoshi Ito. 1994. Do Bulls and Bears Move across Borders? International Transmission of Stock Returns and Volatility. *The Review of Financial Studies (1986–1998)* 7: 507. [CrossRef]
Lo, Andrew. 2008. Hedge Funds, Systemic Risk, and the Financial Crisis of 2007–2008: Written Testimony for the House Oversight Committee Hearing on Hedge Funds. *SSRN Electronic Journal*. Available online: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1301217 (accessed on 5 September 2022). [CrossRef]
Lucey, Brian M., and Sile Li. 2015. What precious metals act as safe havens, and when? Some US evidence. *Applied Economics Letters* 22: 35–45. [CrossRef]
Mableannchang. 2020. *China-Focused Hedge Funds Record Best Month in Half a Decade*. London: China Economic Review.
Martin, Eling. 2006. Autocorrelation, bias and fat tails: Are hedge funds really attractive investments? *Journal of Derivatives & Hedge Funds* 12: 28.
Norden, Lars, and Martin Weber. 2009. The Co-movement of Credit Default Swap, Bond and Stock Markets: An Empirical Analysis. *European Financial Management: The Journal of the European Financial Management Association* 15: 529–62. [CrossRef]
Park, James, Stephen J. Brown, and William N. Goetzmann. 1998. *Hedge Funds and the Asian Currency Crisis of 1997*. Cambridge: National Bureau of Economic Research.
Philippon, Thomas. 2012. *Finance vs. Walmart: Why Are Financial Services so Expensive?* Edited by Alan Blinder, Andrew Lo and Robert Solow. Winterthur: Rethinking Finance.
Sharpe, William F. 1992. Asset allocation: Management style and performance measurement. *Journal of Portfolio Management* 18: 7–19. [CrossRef]
Sias, Richard, Harry J. Turtle, and Blerina Zykaj. 2018. Reconsidering Hedge Fund Contagion. *The Journal of Alternative Investments* 21: 27–38. [CrossRef]
Stulz, René M. 2007. Hedge Funds: Past, Present, and Future. *The Journal of Economic Perspectives* 21: 175–94. [CrossRef]
Sung, Sangwook, Dohyun Chun, Hoon Cho, and Doojin Ryu. 2021. Hedge fund market runs during financial crises. *Ekonomska Istraživanja* 34: 266–91. [CrossRef]
Theodossiou, Panayiotis, and Unro Lee. 1993. Mean and volatility spillovers across major national stock markets: Further empirical evidence. *Journal of Financial Research* 16: 337–50. [CrossRef]
Wang, Christina. 2016. *Race against the Clock Chinese Hedge Funds Are Rushing to Enter Hong Kong. But They Have a HIGH Chance of Failure unless They Build at Least $100 Million in Assets within Three Years*. Hong Kong: AsianInvestor, p. 54.
Wu, Ruey-Shan. 2005. International Transmission Effect of Volatility between the Financial Markets during the Asian Financial Crisis. *Transition Studies Review* 12: 19–35. [CrossRef]
Zhu, Haibin. 2006. An Empirical Comparison of Credit Spreads between the Bond Market and the Credit Default Swap Market. *Journal of Financial Services Research* 29: 211–35. [CrossRef]