Does Malaysian Stock Market Response Asymmetrically?

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Abstract: This paper examines the response asymmetries of the Malaysian market to two developed markets – the US and Japan. We used weekly data from January 1988 to December 2007 and simple regression and VAR analyses. In line with previous studies, we found evidence for the presence of response asymmetries in the Malaysian market. The evidence strongly suggests significant responses of the Malaysian market to the US and Japanese markets downturns. To a certain extent, the Japanese market is more important than the US in influencing Malaysia. Thus, the benefits of international portfolio diversification tend to diminish when they are needed most, that is, during market downturns.

Keywords: Response asymmetries, Malaysia, portfolio diversification, generalized impulse response functions

1. Introduction

Stock market integration has received wide empirical attention in the modern literature of financial economics. The degree of integration among the stock markets provides important implications for the potential benefits of the international portfolio diversification and financial stability of a country (Ibrahim, 2005). Earlier empirical studies on market integration generally suggest lower correlations among national stock markets (Grubel, 1968; and Solnik, 1974), implying the existence of potential benefits of international portfolio diversification. Nowadays, however, the world capital markets have been increasingly integrated and co-movements among the leading world financial markets have been rising (Blackman et al., 1994; Masih and Masih, 1997; and Ghosh et al., 1999). Moreover, the co-movements among stock prices are manifested strongly during periods of major financial disturbances such as the October 1987 market crash and the 1997/1998 Asian financial crisis.

For the emerging economies, especially Malaysia, there have been very few empirical analyses done in this area in the last few decades. However, in recent years, the vast growing economics activities and the increasing investment opportunities in some emerging markets have attracted investors’ and researchers’ attention. Recently, another interesting aspect of studies has been added in the analysis of international interactions among stock prices. Essentially, this so-called “response asymmetry” by Pagan and Soydemir (2001). The responses of an equity market to upturns and downturns in other equity markets may not be symmetrical. This means that returns in one stock market react differently to market upturns than downturns in terms of both speed and magnitude.
Pagan and Soydemir (2001) noted that response asymmetry suggests stronger reaction to market downturns than market upturns. The presence of asymmetric responses might be due to “optimism or pessimism” of investors who, being risk averse, are more concerned about losing their investments during periods of negative returns than gaining during periods of positive returns. Erb et al. (1994) and Bahn and Shin (2003) noted that the difference in market reaction to positive and negative changes in other markets may be due to investors’ different expectations about the impact of international market changes. Thus, the asymmetric responses seem to be consistent with the observed strong co-movements among stock prices which are apparent during the large market downturns or during periods of major disturbances (Ibrahim, 2006).

The purpose of this paper is to extend the line of research to the case of Malaysian stock market by assessing whether this market responds asymmetrically to the two world’s dominant markets – the US and Japan. This paper contributes to the literature in several ways. First, unlike previous studies that use daily data (Pagan and Soydemir, 2001; Bahn and Shin, 2003) and monthly data (Ibrahim, 2006), this study uses weekly data. The daily data contain too much noise and are subject to the problem of non-synchronous infrequent trading (Ibrahim, 2005). Thus, this might lead to erroneous conclusion in the lead-lags relationship among the variables. In addition, the transmission of shocks may take place within few days and, thus, cannot be fully captured by using monthly data. However, the problem could be reduced if a weekly interval of the indices is used (Hung and Cheung, 1995).

Second, various studies on the Malaysian market have focused on causal linkages nexus between Malaysia to developed markets to assess benefits of international diversification in this market (see, for instance Yusof and Majid, 2006; Karim and Gee, 2006). We explore the possibility of asymmetric responses in the Malaysian stock market. Thus, we hope to shed further light on the issue. If the Malaysian market response more strongly to market downturns, then the arguments’ for potential benefits of international portfolio diversification may be greatly weakened since it is during the times of market downturns that these benefits are mostly needed (Ibrahim 2006).

Third, while previous studies use impulse response functions (IRF), we employ generalized impulse response analysis as developed by Pesaran and Shin (1998), which is invariant to the ordering of the variables in the VAR model. This feature of the generalized impulse responses is particularly useful for studies on equity markets, which are generally characterized by quick price transmissions and adjustments (Ewing et al. 2003).

Thus in this paper, we assess the Malaysian market responses to upturns and downturns in the markets of US and Japan. We attempt to partially fill this gap in the literature and to provide recent empirical evidence on market integration in the Malaysian market, relying on longer and more recent sample of data and asymmetric responses analysis. The rest of this paper is structured as follows. Section 2 presents literature review while Section 3 provides the empirical framework and description of the data. The fourth section provides the empirical results and discussion. Finally, the fifth section concludes the study, providing some implications and proposing some recommendations for further study.
2. Literature Review

There have been many studies investigating financial integration from different perspectives such as stock markets, bond markets and exchange rates, including regional trade arrangements and Yen bloc. Earlier studies on the stock market integration (See e.g. Grubel, 1968; Levy and Sarnat, 1970; Solnik, 1974) found lower correlations among national stock markets; therefore suggest potential benefits of international portfolio diversification. However, Goldstein and Michael (1993) found evidence that the international stock market linkages have been increasing over the past decade, especially for the stocks traded actively in the major financial centres. The impact of the October 1987 stock market crash and the 1997 Asian financial crisis on stock market integration has also drawn much attention among economists and practitioners for instance Arshanapalli et al. (1995); Francis et al. (2002); and Yang et al. (2003). They noted that the stock markets have become more cointegrated after the crisis.

In recent years, the vast growing economic activities and the increasing investment opportunities in some Asian emerging markets have attracted investors and researchers’ attention. Examples of these recent studies include Cheung and Mak (1992), Hung and Cheung (1995), Palac McMiken (1997), Roca et al. (1998), Janakiramanan and Lamba (1998), Masih and Masih, (1999), Azman-Saini et al. (2002), Ng (2002), Ibrahim (2005), Yusof and Majid (2006) and Majid et al. (2008). It is well documented that the US market is the most dominant in influencing variations in other developed and emerging equity markets. For example, Cheung and Mak (1992) noted that the US market is a ‘global factor’ which leads most of the Asian emerging markets. Consistent with Arshanapalli et al. (1995), Ibrahim (2005) found evidence that the ASEAN markets respond quickly to shocks in the US regardless of the sample period but seem to be less influenced by the Japanese market. However Yusof and Majid (2006) document that the Japanese stock market is found to significantly move the Malaysian market compared to the US during the post-crisis period.

Using monthly data from January 1987 to October 1995 and cointegration approach, Palac McMiken (1997) found with the exception of Indonesia all other ASEAN markets were linked to each other. In contrast, Roca et al. (1998) found no evidence of cointegration among them. However, with the exception of Indonesia, these markets had significant short-run linkages. Janakiramanan and Lamba (1998) also found that the Indonesian market was a relatively isolated market. Using Granger non-causality test and weekly data from January 1988 to August 1999, Azman-Saini (2002) found the dominance of the Singaporean market in the region. With the exception of Malaysia, the Indonesian market was affected by other ASEAN markets but did not significantly influence the other markets.

Ibrahim (2005) examined the international linkages of the Indonesian stock market during the pre- and post crisis periods using cointegration and vector autoregression (VAR). He found evidence for lack of cointegration among the Indonesian market, other ASEAN markets and two advanced markets (the US and Japan) during both period. However, consistent with Ng (2002), Majid et al. (2008) concluded that the Asian stock markets are going towards a greater integration either among themselves or with the US and Japan, especially in the post-1997 financial crisis.
McCauley et al. (2002) examined the East Asia’s bond and loan markets integration for the period of 1999-2002. They found both markets become more integrated. In contrast, in their recent study, Yu et al. (2007) found weak bond market integration in the region during 1997 to 2003 period. They noted that the lack of progress might be due to the “local” or “idiosyncratic” factors in some Asian economies. Plummer and Click (2005) argued that the deepening of local bond markets could strengthen the financial integration. As for the exchange rate integration, Aggarwal and Mougoue (1996) documented that Asian currencies are found to be cointegrated, with the influence of the Japanese Yen increasing relative to the US dollar in recent years. Since 1980, economic integration among Japan’s neighbours has been intensified and their business cycles have been highly synchronised. These cycles have been closely linked to fluctuations in the Yen/Dollar exchange rate - through changes in the export competitiveness, inflows of foreign direct investment and intra-Asian income effects (McKinnon and Schnabl, 2003).

Interest in a Yen bloc in Asia has been on the rise because of a deepening economic interdependence between Japan and its neighbours. The onset of the Asian currency crisis, the introduction of the Euro in Europe, and the implementation of Japan’s financial reform program have contributed to ongoing discussions on the possibility among policymakers in those countries (Kwan, 2001). With Yen bloc, Japan would become the centre of gravity of the Asian Pacific economy. As the region becomes increasingly integrated, more business activity goes into the gravitational pull of Japan and its corporations. Trade and investment within the region would continue to grow faster than the rest of the world.

The asymmetric responses are the focus of recent studies by Pagan and Soydemir (2001), Bahng and Shin (2003) and Ibrahim (2006). Utilizing both regression and vector autoregressive (VAR), Pagan and Soydemir (2001) examine asymmetric responses of three Latin American stock markets (Brazil, Argentina and Chile) to the market of Mexico. The results show significant asymmetries in the response of these three markets to the market of Mexico. They response more strongly and more persistently to downturns than the upturns in the Mexican market. Using a similar approach, Bahng and Shin (2003) also document evidence supportive of asymmetric responses among the northeast Asian markets of China, Japan and South Korea. In a more recent study by Ibrahim (2006), he evaluates response asymmetries in ASEAN stock markets (Indonesia, Malaysia, Singapore, the Philippines and Thailand) to market upturns and downturns of two developed markets (the US and Japan). He also discovers evidence that there exists asymmetric response of the ASEAN markets to the US market downturns. The US market is more dominant than the Japanese market in influencing the ASEAN markets.

3. Methodology and Data Preliminaries

3.1 Empirical Methods

Following Pagan and Soyndemir (2001), Bahng and Shin (2003) and Ibrahim (2006), we implement the following regression to examine asymmetric responses of Malaysian market to the US and Japanese market upturns and downturns.

\[ \text{DMAL}_i = \alpha_0 + \delta_1 \text{DUS}^+_i + \delta_2 \text{DUS}^-_i + \delta_3 \text{DJPN}^+_i + \delta_4 \text{DJPN}^-_i + \epsilon_i \]  

(1)
where DMAL, DUS and DJPN are respectively logarithmic changes in a Malaysia index, the US index and the Japanese index. The superscripts + and – refer to the upturns and downturns of the US and Japanese market calculated as:

\[ R^+ = \begin{cases} 
\ln(P_t / P_{t-1}), & \text{if } \ln(P_t / P_{t-1}) \geq 0 \\
0, & \text{otherwise} 
\end{cases} \]

\[ R^- = \begin{cases} 
\ln(P_t / P_{t-1}), & \text{if } \ln(P_t / P_{t-1}) < 0 \\
0, & \text{otherwise} 
\end{cases} \]

where R = (DUS or DJPN) and P = (US or JPN). Based on equation (1), we test whether the Malaysian market responds differently to market upturns and downturns of the US and Japan. The magnitude asymmetry is examined by testing the hypotheses, (i) H: \( \delta_1 = \delta_2 \) and (ii). H: \( \delta_3 = \delta_4 \), using Wald F Test.

Then, we adopt a VAR framework to examine pattern asymmetry in the response of the Malaysian market to positive and negative changes of the two developed markets share prices. The main advantage of VAR is the method is simple and it captures empirical regularities in the data with minimal theoretical restrictions imposed on the system. Thus, the VAR model employed in this study is as follows:

\[ Z_t = A_0 + \sum_{k=1}^{p} A_k Z_{t-k} + u_t \]  

(2)

where \( Z \) is a 3 x 1 vector of the variables consisting of positive and negative returns of the Malaysian market, positive and negative returns of the US market, and positive and negative returns of the Japanese market. \( A_0 \) is an 3 x 1 vector of constant terms, \( A_k \) is an 3 x 3 matrix of coefficients, \( u_t \) is an 3 x 1 of error terms with zero mean, and \( p \) is the order of autoregression. Normally, interpretation of the VAR is based on its moving average representation. By inverting or successive substitution, VAR model (2) has a moving average representation as follows:

\[ Z_t = C + \sum_{k=0}^{\infty} C_k u_{t-k} \]  

(3)

Here, \( Z \) is expressed as a linear combination of current and past innovations. From the model, the IRF can be generated. This IRF enables us to characterize the dynamic interaction among markets, and observe the speed of adjustment of markets in the system. Unfortunately, innovation accounting results based on the Choleski factorization are sensitive to the ordering of variables when the residual covariance matrix is nondiagonal (Yang et al. 2003). Thus, in order to overcome the drawback, instead of using IRF, we employ generalized impulse response analysis as developed by Pesaran and Shin (1998), which is invariant to the ordering of the variables in the VAR model. This feature of the generalized impulse responses is particularly useful for studies on equity markets, which are generally characterized by quick price transmissions and adjustments (Ewing et al. 2003). A convenient feature of the VAR representation is that it can be estimated by OLS, which yields consistent, asymptotically efficient estimates and allows us to examine whether more complex transmission mechanism are involved (Hutson et al. 2008).
However, using VAR in level may be spurious and misleading if log level variables are non-stationary. Transforming the variables into first differences to render the variables stationary before running VAR, however, introduces misspecification problem in the case that the variables under consideration are cointegrated (Ibrahim, 2005). For proper model specification, we conduct the unit root and cointegration tests. To conserve space, these results are not reported. Using both ADF and PP unit root tests, we find that the data are non-stationary integrated of order one. The results from the Johansen (1988) and Johansen and Juselius (1990) cointegration test show that there is no evidence for the presence of cointegration between Malaysian, the US and Japanese markets. Therefore, the models outlined in the previous section, where the market returns are used in the analysis, are justifiable (Ibrahim, 2006).

3.2 Data Preliminaries

The data used in this study are weekly stock indices spanning from January 1988 to December 2007. The study employs weekly data instead of higher frequency data to avoid the problem of non-synchronous trading. The daily data contain too much noise and are subject to the problem of non-synchronous infrequent trading (Ibrahim, 2005). Thus, this might lead to erroneous conclusion in the lead-lags relationship among the variables. In addition, the transmission of shocks may take place within few days and, thus, cannot be fully captured by using monthly data. However, the problem could be reduced if a weekly interval of the indices is used (Hung and Cheung, 1995). The following indices are used to represent the markets: the Kuala Lumpur Composite Index (KLCI) for Malaysia, the Standard and Poor 500 (S&P 500) Index for the US and the Tokyo Price Index (TOPIX) for Japan. All indices are based on local currency and are collected from the Bloomberg Database. All series are transformed into natural logarithm.

To avoid the disturbances of the “financial crisis” in July 1997 on the response asymmetries analysis, we divide the data into full, pre- and post-crisis periods. The pre-crisis period covers the period from January 1988 to June 1997. The post-crisis period covers the period from July 1998 to December 2007.

Table 1 reports summary statistics of the markets, which are computed for the whole sample, positive returns and negative returns. We find that the observations are fairly divided between positive and negative returns with the percentage of positive returns ranges from 51.8% for Japan to 56.6% for the US. Over the sample period, all markets recorded average positive returns. For all cases, the Malaysian market witnessed highest average returns, average positive returns and average negative returns. In line with a stylized fact for emerging market, we find that the Malaysian market is more volatile than the developed markets. In addition, the last two columns of Table 1 show simple correlation coefficients among market returns to preliminary gauge the presence of asymmetric responses in the Malaysian market. We may note that the Malaysian market is more correlated to the market of the Japanese than the market of US. This could also be due to the geographic distance as compared to US stock market. For instance, Janakiramanan and Lamba (1998) provide empirical evidence that the geographically and economically close countries such as Australia-New Zealand and Malaysia- Singapore should exhibit higher levels of market integration.
4. Empirical Findings

4.1 Magnitude Asymmetry

Table 2 shows regression results of equation (1) for the Malaysian market. Although the $R^2$ values are relatively low, they are still regarded as acceptable given that the estimates are based on first differenced values. The values of $R^2$ are comparable to those documented by Pagan and Soydemir (2001) and Ibrahim (2006). From the results, we note the following. For all periods, the Malaysian market reacts significantly to negative changes in both the US and the Japanese markets. To certain extent the Japanese market seems to play more important role than the US in influencing the Malaysian market. Indeed, the coefficients of DJPN are significant at better than 1% significance level. However, with the exception of the US in the full sample period, the Malaysian market does not seem to significantly influenced by “good” news from both the US and Japanese markets. Lastly, the F tests for joint significance of the slope coefficient are significant for all cases. Thus, the results indicate the presence of magnitude asymmetry in the Malaysian market. In line with previous studies, it seems that the Malaysian response more strongly to market downturns than to market upturns of the two advanced markets. According to Bahng and Shin (2003), the difference in market reaction to positive and negative changes in other markets may be due to investors’ different expectations about the impact of international market changes.

4.2 Pattern Asymmetry

In order to examine patterns asymmetry of the Malaysian market in response to positive and negative shocks in the two advanced markets, the VAR models are estimated. The estimation is done for the full, pre- and post-crisis periods. We chose the lag order of the VAR models based on the AIC. From the estimated VAR, we simulate the generalized impulse response functions, presented in Figure1 to Figure 3. The results from generalized impulse response function are qualitatively similar for all periods. We note that the Malaysian market reacts significantly to its own innovations. The innovations in both the US and Japanese markets, positive and negative, solicit immediate and significant responses from Malaysia. However, the reaction of the Malaysian market to the US and Japanese market downturns are stronger than market upturns. Thus, consistent with Ibrahim (2006), the results affirm the presence of pattern asymmetry in the Malaysian market.

Another point worth mentioning is that, consistent with Yusof and Majid (2006) the Japanese market seems to be more dominant in affecting the Malaysian market. One plausible reason is that there seems to be a growing proportion of bilateral trade between Malaysia and Japan. This finding seems to be in line with the view that the stronger the bilateral trade ties between countries, the higher the degree of co-movements (Masih and Masih, 1999; Bracker et al. 1999; Kearney and Lucey, 2004). In addition, the greater degree of integration between Malaysia and Japan could also be due to the geographic distance as compared to the US market. For instance, Janakiramanan and Lamba (1998) provide empirical evidence that the geographically and economically close countries such as Australia-New Zealand and Malaysia-Singapore should exhibit higher levels of market integration.
5. CONCLUSION

This paper examines the response asymmetries of the Malaysian market to two developed markets – the US and Japan. We used weekly data from January 1988 to December 2007 and simple regression and VAR analyses. In line with previous studies, we found evidence for the presence of response asymmetries in the Malaysian market. The evidence strongly suggests significant responses of the Malaysian market to the US and Japanese market downturns. To the certain extent the Japanese market is more important than the US in influencing Malaysia. While many studies have argued for increasing dominance of the Japanese economy and the formation of the Yen bloc in the Asian region, our results show the highly significant role of Japan compared to the US. Two plausible reasons for the greater degree of integration between Japan and Malaysia are trade bilateral dependencies and geographic distance. Thus, from the equity market perspective, the formation of yen bloc may be forthcoming.

The major implication of the findings might be the potential benefits of international portfolio diversification are greatly undermined when they are needed most, especially during times of crisis (market downturns). In addition, Malaysian market is highly vulnerable to international financial market crisis originating from both the US and Japan. This further implies that international financial instabilities are easily transmitted to domestic market, a phenomenon called as “financial contagion” (Ibrahim, 2005). Thus, any developments in the US and Japanese markets must be taken into consideration by the Malaysian government in formulating policies pertaining to its stock market.

The evidence for response asymmetries has added further evidence to the issue previously documented by Pagan and Soydemir (2001), Bahng and Shin (2003) and Ibrahim (2006). Returns in the Malaysian stock market react differently to market downturns than upturns in terms of both speed and magnitude. Investors generally are more concerned about market downturns than upturns, partly due to their risk-aversion. In addition, investors’ different expectations about the potential impact of the changes in foreign markets could result in asymmetric responses (Bahng and Shin, 2003).

In order to add the existing literature on market integration in Malaysia, further empirical studies on the issue can cover broader areas of market integration and explore factors contributing to market integration. Thus, study on stock market integration would be more interesting and valuable if we could take into account driving forces behind stock market integration such as market liberalization, financial deregulation, economic fundamentals (e.g. exchange rate, inflation, interest rate, trade openness and industrial growth); market attributes (e.g. financial development and market volatility) and world information (e.g. world volatility, market premium and oil price changes).

In addition, since cointegration tests are only able to detect linear long-run equilibrium relationships, but fail to detect non-linear cointegration (Okunev and Wilson, 1997), a more advanced test is needed to discover the existence of non-linear cointegration among the markets.
REFERENCES


Table 1: Summary Statistics

<table>
<thead>
<tr>
<th>Index</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>DUS</th>
<th>DJPN</th>
</tr>
</thead>
<tbody>
<tr>
<td>DMAL</td>
<td>1043</td>
<td>0.0021</td>
<td>0.0318</td>
<td>0.2169</td>
<td>0.2637</td>
</tr>
<tr>
<td>DMAL+</td>
<td>560</td>
<td>0.0221</td>
<td>0.0238</td>
<td>0.1616</td>
<td>0.1699</td>
</tr>
<tr>
<td>DMAL-</td>
<td>483</td>
<td>-0.0211</td>
<td>0.0232</td>
<td>0.2347</td>
<td>0.3000</td>
</tr>
<tr>
<td>DUS</td>
<td>1043</td>
<td>0.0019</td>
<td>0.0205</td>
<td>1</td>
<td>0.3414</td>
</tr>
<tr>
<td>DUS+</td>
<td>590</td>
<td>0.0154</td>
<td>0.0129</td>
<td>1</td>
<td>0.2509</td>
</tr>
<tr>
<td>DUS-</td>
<td>453</td>
<td>-0.0156</td>
<td>0.0143</td>
<td>1</td>
<td>0.3134</td>
</tr>
<tr>
<td>DJPN</td>
<td>1043</td>
<td>0.0002</td>
<td>0.0261</td>
<td>0.3414</td>
<td>1</td>
</tr>
<tr>
<td>DJPN+</td>
<td>541</td>
<td>0.0195</td>
<td>0.0167</td>
<td>0.2510</td>
<td>1</td>
</tr>
<tr>
<td>DJPN-</td>
<td>502</td>
<td>-0.0207</td>
<td>0.0168</td>
<td>0.3134</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2: Regression Tests for Magnitude Asymmetry

<table>
<thead>
<tr>
<th>Period</th>
<th>Dependent Variables</th>
<th>Constant</th>
<th>DUS+</th>
<th>DUS-</th>
<th>DJPN+</th>
<th>DJPN-</th>
<th>R²</th>
<th>δ₁ = δ₂</th>
<th>δ₁ = δ₂</th>
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</thead>
<tbody>
<tr>
<td>Full Sample</td>
<td>DMAL</td>
<td>0.006</td>
<td>0.165</td>
<td>0.272</td>
<td>0.085</td>
<td>0.436</td>
<td>0.10</td>
<td>10.209</td>
<td>27.604</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[0.001]</td>
<td>[0.051]</td>
<td>[0.002]</td>
<td>[0.211]</td>
<td>[0.000]</td>
<td></td>
<td>[0.000]</td>
<td>[0.000]</td>
</tr>
<tr>
<td>Pre-crisis</td>
<td>DMAL</td>
<td>0.007</td>
<td>0.061</td>
<td>0.318</td>
<td>0.118</td>
<td>0.422</td>
<td>0.11</td>
<td>3.802</td>
<td>19.503</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[0.001]</td>
<td>[0.614]</td>
<td>[0.022]</td>
<td>[0.140]</td>
<td>[0.000]</td>
<td></td>
<td>[0.023]</td>
<td>[0.000]</td>
</tr>
<tr>
<td>Post-Crisis</td>
<td>DMAL</td>
<td>0.006**</td>
<td>0.142</td>
<td>0.187</td>
<td>0.111</td>
<td>0.400</td>
<td>0.10</td>
<td>4.044</td>
<td>13.573</td>
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<tr>
<td></td>
<td></td>
<td>[0.015]</td>
<td>[0.163]</td>
<td>[0.061]</td>
<td>[0.256]</td>
<td>[0.000]</td>
<td></td>
<td>[0.018]</td>
<td>[0.000]</td>
</tr>
</tbody>
</table>

Note: Numbers in parentheses are p-values. ** and *** denote significance at 1%, 5% and 10% respectively.

Figure 1: Response to Generalized One S.D. Innovations ± 2 S.E. (Full Sample)
Figure 2: Response to Generalized One S.D. Innovations ± 2 S.E. (Pre-crisis)

Figure 3: Response to Generalized One S.D. Innovations ± 2 S.E. (Post-crisis)