International sentiment spillovers in equity returns

Deven Bathia
Queen Mary University of London*

Don Bredin
University College Dublin†

Dirk Nitzsche
Cass Business School‡

Abstract

This paper examines the extent of spillovers from US investor sentiment on G7 aggregate market, value and growth stock returns. As a proxy for investor sentiment, we include individual investor survey, measured by the University of Michigan consumer confidence index and market sentiment measured by Baker and Wurgler's (2006) composite sentiment index. Using monthly data for the period January 1991 to December 2013, our results indicate the presence of significant spillover effects of US investor sentiment on G7 stock returns. Our findings from generalized impulse response functions show that aggregate market and growth stocks of all non US G7 countries are significantly affected by the propagation of the US market sentiment. The financial crisis of 2007 has played a significant role in affecting value stock returns in these countries. Our findings further reveal that both the rational and irrational component of the US individual investor sentiment do not play any significant role in affecting international stock returns.

Keywords: Investor sentiment, International Financial Markets, Vector autoregression
JEL Classification: G14, G15,

*E-mail: d.bathia@qmul.ac.uk
†E-mail: don.bredin@ucd.ie
‡E-mail: d.nitzche@ city.ac.uk. **Corresponding author:** Deven Bathia, Queen Mary University of London, UK. The earlier version of this paper was titled "Sentiment spillovers in G7 equity returns". The authors are thankful for all comments received from conference participants at Financial Management Association Annual Meetings 2013, Financial Engineering and Banking Society conference 2014 and Midwest Finance Association Annual Meeting 2015.

1 Introduction

Traditional tests of market efficiency have relied heavily on asset pricing models, in particular capital asset pricing model (CAPM). The CAPM states that both rational investors and professional arbitrageurs play a significant role in minimizing security mispricing and therefore asset prices will always reflect their true fundamental values. Furthermore, CAPM does not place any role for behavioural factors (e.g. investor sentiment) in explaining asset prices. However, the EMH is put through renewed analysis following financial crises; e.g. October 1987 stock market crash (French (1988)) and the recent financial crisis (Ball (2009)). Several studies have attributed pricing anomalies to non-fundamental variables. For instance, Black (1986) and De Long et al. (1990) have shown that investors trade on noise rather than fundamentals. Furthermore, the presence of investors' under-reaction and overreaction resulting in securities mispricing is given as an explanation for pricing anomalies (e.g. De Bondt and Thaler (1985, 1987), Barberis et al. (1998), Daniel et al. (1998)).[1] Recently, Brown and Cliff (2005) highlight the role of uninformed demand shocks and limits to arbitrage as a potential explanation for security mispricing. Baker and Wurgler (2006) show that stocks that have subjective valuations and are difficult to arbitrage are mostly affected by investor sentiment. They find that these stocks usually tend to be small, young, highly volatile, unprofitable, non-dividend paying, extreme growth and distressed stocks.

The vast majority of empirical studies have examined time-series relationships between investor sentiment and stock returns. These studies were mainly centred around the US market. To our knowledge, very few studies have determined the extent of the propagation of US investor sentiment on international stock returns. As previous studies have shown that any movement in the US stock market has a significant effect on international stock markets (e.g. Masih and Masih (2001)), we expect US investor sentiment to play a significant role in affecting international stock returns. In this study, we examine the extent of spillover effects from US investor sentiment to non US G7 (G6, henceforth) aggregate market returns as well as value and growth stock returns.[2] The dynamic linkages between US investor sentiment and G6 stock market returns is investigated, and in doing so, it essentially asks two questions. First, to what extent do changes in the US sentiment levels affect G6 stock returns; and second, should global investors be sensitive to changes in US investor sentiment when considering non US G7 diversification potentials.

[1] The behavioural finance lexicon in the popular press has also expanded quite considerably in recent years, with terms such as confidence, optimism and irrational exuberance all becoming regular behavioural references to market movements. Alan Greenspan first used the term 'irrational exuberance' at a black tie meeting in Washington D.C. in December 1996 to describe the behavior of stock market investors. The immediate follow up televised speech rattled the world stock market by an average of 3% (Robert Shiller (2005)).

[2] We use 'G6' and 'non US G7' term interchangeably throughout this paper.

Is it still the case that when the US gets a cold, the rest of the world gets pneumonia? On the one hand there has been a considerable increase in the degree of global integration, measured in terms of trade. This is clearly depicted in figure 1 which represents an increase in trade integration by over 84% in last 23 years. Furthermore, the role US plays in global markets, as evidenced from its contribution to world GDP, also affirms the need for studying the shocks originating from the US and its effect on other countries (see table 1). However, the US contribution to world GDP has considerably declined over the last decade (see figure 2). Previous studies have already shown the significant role US sentiment plays in affecting domestic US returns (e.g. Brown and Cliff (2005), Baker and Wurgler (2006, 2007)). Our study examines the significance of shocks from the US sentiment on global financial markets of non US G7 countries. As a proxy for investor sentiment, we include both direct and indirect measures of US sentiment. Specifically, our direct measure is individual investor survey, measured by the University of Michigan consumer confidence (UMCC), while the indirect measure adopted is the Baker and Wurgler (2006) (BW henceforth) composite sentiment index. We study their impact on aggregate market, value and growth stock returns of G6 countries.

Our paper contributes to the existing literature in the following areas. This is the first study that investigates the presence of spillover effects of US investor sentiment on international aggregate market, value and growth stock returns. To our knowledge, only Verma and Soydemir (2006) have examined the international effects of US investor sentiment on aggregate stock returns. Verma and Soydemir (2006) include two developed economies, the US and the UK, and three developing South American economies, Brazil, Mexico and Chile. Our sample includes aggregate, value and growth stock returns of G6 countries, as they represent equity markets that are highly developed, regulated and institutionalised. Empirical evidence indicates that if stock markets across the globe are highly integrated, then their performance should be driven by similar factors.[3] As our study includes stock returns of G6 countries whose stock markets are considered to be highly developed, then the effect of the US sentiment on international stock returns should be pronounced.

Second, we include two measures of the US investor sentiment, a direct and an indirect, to determine their effect on international stock returns. Besides individual investor sentiment, measured by the UMCC index, we also examine the effect of the US market sentiment, measured by BW sentiment index, on G6 stock returns. Verma and Soydemir (2006) examine the influence of individual investors' sentiment index measured by the American Association of Individual Investors (AAII) and institutional investors' sentiment index measured by the Intelligence Investors (II) on stock returns of South American economies.

[3]Campbell and Hamao (1992) and Ferson and Harvey (1993) highlight the significance of global risk factors in predicting national stock market returns as well as explaining their cross-sectional differences. For instance, Campbell and Hamao (1992) show that the US dividend-price ratio or treasury bill rate not only predict the stock returns of the US market but also of Japanese stock market.

However, Fisher and Statman (2000) show that the level of II sentiment index does not have any significant effect on future S&P equity returns. As a result this raises doubt as to whether II index can be considered an effective measure of investor sentiment.[4] Furthermore, AAII sentiment index is constructed after seeking responses from consumers about their behaviour (e.g. bullish, bearish or neutral); however the UMCC index is calculated from survey responses by consumer households.[5] The UMCC index has been included as a measure of individual investor sentiment in many studies because of its longer time series. Although the survey sample size is small, and given that greater number of questions are based on expectations component, its role in affecting the US stock returns has been established by previous studies (e.g. Lemmon and Portniaguina (2006), Schmeling (2009) and Bathia and Bredin (2013)). The BW composite sentiment index was constructed by Baker and Wurgler (2006) and is considered as an indirect measure of investor sentiment as it is derived from six different variables representing investor sentiment.[6]

Third, we are motivated to explore the extent of rational (fundamental) and irrational (noise) components of the US sentiment effect on international stock returns. 'Rational sentiment is that component of sentiment that is warranted by fundamentals, whereas the unexplained component of sentiment that is unwarranted by fundamentals is referred as an 'irrational sentiment. The rational and irrational sentiment could be easily interpreted in a way they are constructed. For instance, the BW composite sentiment index could be considered as an 'irrational sentiment' as it is derived after stripping the net effect of fundamentals on raw sentiment proxies (see footnote 6 for the explanation of BW composite sentiment index methodology). Previous studies, including Lee et al. (2002) and Brown and Cliff (2004), have mainly construed investor sentiment as irrational. Delong et al. (1990) highlight that irrational noise traders with erroneous stochastic beliefs affect stock prices and earn higher expected returns. Campbell and Kyle (1993) highlight that stock prices are influenced by the interaction between 'noise' (irrational) traders and 'smart money' (rational) investors. However, studies have also shown that investor sentiment partially contain rational expectations based risk factors (e.g. Shliefer and Summers (1990), Brown and Cliff (2005)).[7] We decompose investor sentiment into a rational and an irrational

[4]Also see Solt and Statman(1988) and Clarke and Statman (1998) who observe similar findings.

[5]The University of Michigan conducts a monthly telephone interviews and asks them about their present and future financial situations, their business and economic outlook over the next one to five years, and also about their willingness to spend on durable goods in the near future. Of the total five questions asked, three questions are based on expectations component. The samples include a minimum of 500 American households, excluding those in Alaska and Hawaii. The survey methodology can be accessed from the following web link: `https://data.sca.isr.umich.edu/fetchdoc.php?docid=24774`

[6]Baker and Wurgler (2006) construct their sentiment index using six sentiment variables, viz. closed-end fund discount (CEFD), initial public offering (IPO) first day returns, IPO volume, dividend premium, NYSE share turnover and the equity shares in new issues. They adopt first principal component analysis in their sentiment index construction.

[7]Verma and Soydemir (2006) have examined the significance of both rational and irrational component

component by controlling for any information that sentiment may contain about rational factors.

Fourth, previous studies have shown that the US continues to be a dominating player in global markets. These studies have shown that various shocks originating in the US continues to affect global equity markets. For instance, the role of the US macro-economic news announcements (e,g Becker et al. (1995), election cycles (e.g. Foerester and Schmitz (1997), GDP (e.g. Dees and Guilhem (2011)), monetary policy (e.g. Canova (2005), Mackowiak (2007)), volatility (e.g. Ng (2000), Jiang et al. (2012)) have all found evidence of international spillover effects. Given the dominant role the US plays in affecting world equity market as evidenced from the above spillover studies, we therefore attempt to determine whether sentiment of US investors plays any significant role in transmitting its shocks to international financial markets.

Fifth, we examine the extent of the value-growth relationship for G6 countries. Previous studies have mainly explored time-series or cross-sectional relationships between investor sentiment and value and growth stock returns. (e.g. Schmeling (2009), Lemmon and Portniaguina (2006)).[8] As previous studies (e.g. Bird and Casavecchia (2007)) have shown that price momentum, measure of market sentiment, is useful in timing the acquisition of value and growth stocks, we believe our findings will be helpful to investors who can consider either rational or irrational component of sentiment while devising their international investment strategies.[9] [10]

Our results from the generalized impulse response functions show that aggregate market and growth stock returns of all G6 countries are significantly affected by the propagation of US market sentiment, measured by the BW composite sentiment index. The financial crisis of 2007 played a significant role in also affecting value stock returns, as we find that value stocks were immune from sentiment shocks during the pre-crisis period. Our findings further reveal that both the rational and irrational component of the US individual investor sentiment do not play any role in affecting stock returns of G6 countries. The rest of paper is structured as follows. In section 2, we discuss relevant literature followed by the discussion of econometric methodology adopted in section 3. Section 4 gives details on the data adopted and descriptive statistics. In section 5, we discuss our empirical findings.

of investor sentiment on international stock returns.

[8]Schmeling (2009) examine the effect of consumer confidence index of 18 industrialized countries on its respective stock returns and find that value stocks are mainly affected by investor sentiment. By allowing conditional market beta to be a function of consumer confidence index, Lemmon and Portniaguina (2006), find that value stocks respond significantly to changes in consumer confidence index.

[9]Also see Barberis and Shleifer (2003) who highlight that investors' group all assets into different styles (e.g. large-cap stocks, growth stocks, US government bonds, etc) and later allocate funds to these styles rather than to an individual security, thus pursuing style investing.

[10]We also determine the significance of US investor sentiment on sector returns of UK, Canada and Japan.

And finally we conclude the paper in section 6.

2 Literature Review

As discussed before, we study the propagation of the US individual investor sentiment and market sentiment on G6 aggregate market returns as well as value and growth stock returns. Given that many practitioners and traders who follow news and then trade on prevailing sentiment levels in the economy, it therefore becomes necessary to define what investor sentiment is. According to Brown and Cliff (2004), "investor sentiment represents the expectations of market participants relative to a norm: a bullish (bearish) investor expects returns to be above (below) average, whatever average may be" (page 2). As a proxy for individual investor sentiment, we include the monthly levels of individual investor survey; and also study the significance of the BW composite sentiment index as a proxy for market sentiment.

2.1 The role of the US in global financial markets

The US has continued to play a dominant role in affecting global markets. This is highlighted by the number of studies that have examined the impact of shocks originating from the US on international stock markets. A variety of shocks has been examined including macro-economic news announcements, monetary policy, volatility, election cycles, and sentiment originating from the US. For instance, Tandon and Urich (1987) show the presence of a significant relationship between US macroeconomic announcements and international stock market returns. Becker et al. (1995) examine the time UK equities took to respond to the US macroeconomic news and find that UK market responds immediately to US macroeconomic news surprises rather than waiting for the US reaction to the US news. Furthermore, the spillover effects of the shocks to the US monetary policy has been empirically explored by many studies (e.g. Canova (2005), and Mackowiak (2007), Bredin et al. (2010)). The role of the US election cycle has been examined by Foerster and Schmitz (1997). They argue that the US election cycle may be an important non-diversifiable political factor in the determination of international conditional expected stock returns. Soydemir (2000) study the transmission patterns of stock market movements between US and emerging market economies, and find that US stock market significantly affects emerging stock markets at varying degrees. Specifically, the author observe that significant links exist between the stock markets of the US and Mexico and weaker links between the markets of the US, Argentina, and Brazil.[11] Dees and Guilhem (2011) examine the spillover

[11] Also see Masih and Masih (2001) who show that the US plays dominant role in affecting world equity markets.

effect of the US gross domestic product (GDP) shocks to the rest of the world. They find that the change in US GDP has a weaker but persistent impact on the non-US economies in recent years.

The significance of the US stock market on international stock market returns has been studied to determine the extent of stock market co-movement. The seminal work by King and Wadhwani (1990) find the evidence supporting contagion hypothesis as they observe that the return correlation between markets increases with the volatility in each stock market. However, Forbes and Rigobon (2002) test for contagion during three periods of market turmoil: the 1997 East Asian crises, the 1994 Mexican peso collapse, and the 1987 U.S. stock market crash, and they did not find any evidence of contagion. They instead argue that the high levels of co-movement across many stock markets during tumultuous periods reflects a continuation of strong cross-market linkages, and not a significant shift in these linkage.

The spillovers from volatility shocks from the US have also been studied extensively. For instance, Liu and Pan (1997) find that the US market is more influential than the Japanese market in transmitting returns and volatilities to the Asian markets. They further observe that the spill-over effects are more unstable over time and increased substantially after the October 1987 stock market crash. Ing (2000) examine the magnitude and changing nature of volatility spillovers from Japan and the US to six Pacific-Basin equity markets, and confirms the presence of significance spillovers. Furthermore, Jiang et al. (2012) examine the effect of US and European news announcements on the spillover of volatility between US and European markets and across European market. They find that the lagged changes in the US volatility index (VIX) have a significant impact on all European volatility indices, therefore, noting the presence of implied volatility transmission from the US to Europe.[12].

The studies discussed above, nonetheless, argue that shocks originating from the US economy play a significant role in affecting the world equity markets.

2.2 Significance of the US sentiment

Previous studies have shown that US sentiment plays a significant role in affecting domestic returns. These studies have shown that so-called 'sentiment' measures play a significant role in affecting security returns as well as overall market returns. Some of these measures include closed-end fund discount (e.g. Zweig (1973), Lee et al. (1991)), fund flow (e.g. Warther (1995), Frazzini and Lamont (2006)), put-call ratio (e.g. Easley et al. (1998), Pan and Poteshman (2006)), dividend premium (e.g. Baker and Wurgler (2006, 2007)), IPO

[12]Also see Connolly and Wang (1998) who examine the relation between news announcements and stock market volatility spillovers for the US, UK and Japan. They find that news announcement affect the size of intermarket return spillovers, and it also partially explains volatility spillovers among the three markets.

first day returns (e.g. Ritter (2003), Ljungqvist (2006)). Of all the available sentiment proxies, investors survey have been found to be more useful and consistent in forecasting future stock returns. Investors survey are considered to be a direct measure of sentiment, as it is a proxy which is constructed after conducting direct interviews with investors. Monthly surveys are regularly conducted in most of the developed and developing countries with the objective to determine the investors' perception of current and future economic conditions (e.g. employment, household income, etc). For instance, increase (decrease) in investors confidence is usually considered bullish (bearish). In the US, different organisation, including American Association of Individual Investors (AAII), Investors Intelligence (II), University of Michigan Consumer Confidence Index Survey, the Conference Board, etc, conduct weekly and monthly surveys of household consumers.

Previous studies on survey sentiment-return relationship for the US market have shown positive (negative) association between investor confidence and concurrent (future) stock returns. Most of these studies only focussed on analysing time-series relationship between survey sentiment and domestic stock returns. For instance, Fisher and Statman (2000, 2003) show that an increase in the consumer confidence index results is associated with contemporaneously higher returns and subsequent lower returns. Brown and Cliff (2005) find that investor optimism is associated with low subsequent returns as valuation levels return to intrinsic value. Lemmon and Portniaguina (2006) highlight that consumer confidence index is useful in forecasting small-cap stock returns as well as returns of stocks with low institutional ownership. They find that investors appear to over value small stocks relative to large stocks during periods when consumer confidence is high and vice versa.

Similarly, Baker and Wurgler (2006) find that small, young, highly volatile, unprofitable, non-dividend paying, extreme growth and distressed stocks are mainly affected by investor sentiment and these stocks usually have subjective valuations and are also difficult to arbitrage. The findings of survey sentiment-return relationship for the non-US market are similar to the US studies. Schmeling (2009) finds a negative relationship between consumer confidence index and future stock returns of 18 industrialised countries. The author further highlights that the effect of sentiment is greater for countries where stock markets display low market integrity, less institutionalised and where investors display herding behaviour. The similar findings were noted by Bathia and Bredin (2013) who find negative relationship between survey sentiment and future stock returns of G7 countries. They further find that value stocks relative to growth stocks are significantly affected by investor sentiment. Finter et al. (2010) investigate the sentiment-return relationship of German stock market and also find similar results. Zouaoui et al. (2011) find the significance of consumer confidence index in predicting the stock market crisis of 15 European countries and the US. They also show that the impact of sentiment is more pronounced on the countries that are culturally prone to a herd-like behaviour and less institutionalised. From the above, it is evident that the US centred studies find that growth stocks are the main victim of investor sentiment,

whereas cross-sectional studies focused on international economies highlight that value stocks relative to growth stocks are mainly affected by investor sentiment.

2.3 Does the shock to US sentiment spillover?

As evidenced from the above studies, shocks from the US affects global financial markets, and shocks from the US sentiment play a significant role in affecting US stock returns. Our study, therefore, attempts to find whether spillovers from the US sentiment shocks affect stock returns of non US G7 countries.[13] As a proxy for individual investor sentiment, we include the UMCC index. The significance of the UMCC index, as a measure of investor sentiment, has been found by previous studies (e.g. Fisher and Statman (2003), Lemmon and Portniaguina (2006), Bathia and Bredin (2013)).

Previous studies have shown that any shift in the level of investor sentiment can be attributed as fully irrational where investors' mainly trade on noise and not fundamentals (e.g. Black (1986), De Long et al. (1990)) or combination of both rational and irrational (e.g. Shliefer and Summers (1990), Campbell and Kyle (1993)).[14] However, the extent to which rational and irrational component of US investor sentiment affects international stock returns have not been examined by many studies. And we therefore decompose the UMCC index into rational and irrational sentiment. The methodology to decompose the UMCC index in discussed in the next section.

As a proxy for market sentiment, we include the BW composite sentiment index, which is an indirect measure of investor sentiment. Indirect measure of sentiment is derived by observing any financial variable that reflects investors' optimism and pessimism. Baker and Wurgler (2006) construct sentiment index from the following sentiment proxies: closed-end fund discount (CEFD), IPO first day returns, IPO volume, dividend premium, NYSE share turnover and the equity shares in new issues. Before constructing a sentiment index, they remove business cycle variation from each of these proxies, where they regress each raw sentiment variable on five macro-economic variables (change in consumer durables, consumer non-durables, consumer services, dummy variable for NBER recession, and change in industrial production) and use the residuals from the regression in the first principal component analysis (PCA).[15] This index is considered fully irrational as the index is constructed from

[13]However our study differs from Baker et al. (2012) who construct investor sentiment indices for six major stock markets and decompose them into one global and six local indices. They find that both global and local sentiment are contrarian predictors of the time-series of cross-sectional returns within markets. Also see Bai (2014) who examines the case of sentiment and contagion for eight European stock markets.

[14]Also see Campbell and Kyle (1993) who highlight in their model that stock prices are influenced by competitive interaction between 'smart money' (rational) investors and noise traders. Also see Brown and Cliff (2005) who argue that investor sentiment contain both rational and irrational component. In doing so, they include a set of control variables that capture the rational predictability.

[15]Also see Brown and Cliff (2004) who adopt a similar approach in extracting a sentiment factor from a

orthogonalized proxies.

3 Methodology

3.1 Raw Sentiment Spillovers

An examination of the spillover effects of the US sentiment on international stock returns can be expressed in the following equation:

$$\mathrm{R}_{jt} = \alpha_0 + \beta_{ik} \sum_{i=1}^{3} \sum_{k=1}^{K} \mathrm{Sent}_{it-k} + \beta_{jk} \sum_{j=1}^{6} \sum_{k=1}^{K} \mathrm{R}_{jt-k} + \zeta_t \tag{1}$$

where, R_{jt} represents either aggregate market returns, value stock returns or growth stock returns of the j^{th} stock market at time t, k denotes the appropriate lag length, α_0 is a constant, β_{ik} and β_{jk} are the parameters to be estimated, Sent_{it-k} represents the US investor sentiment (where, i=1 represents individual rational sentiment, i=2 represents individual irrational sentiments and i=3 represents BW composite sentiment index) and ζ_t is a random error term. The variables representing individual rational sentiment and individual irrational sentiment are discussed later below.

We adopt the vector autoregression (VAR) modelling econometric methodology of Sims (1980) to investigate the propagation of the US sentiment on international aggregate market returns as well as value stock and growth stock returns. The VAR model treat all the observed variables as a priori endogenous. It contributes in explaining the current values of a set of variables that could be partly explained by past values of the variables involved. The VAR methodology has been implemented in several studies as it has shown its reliability and consistency in capturing cross-country spill overs (e.g. Verma and Soydemir (2006), Fornari and Stracca (2012), Fadejeva et al. (2013), Bai (2014)). This methodology, will therefore, facilitate a detailed analysis of the role of US sentiment on international markets. Direct estimation of the formulated models will only give the relationships between the anticipated components. The findings could be misleading if the effect of changes in the unanticipated components and stock market returns is ignored. We, therefore, use generalised impulse response function (GIRF) of Pearson and Shin (1998) generated from the VAR model to overcome such a potential misspecification problem. The GIRF is invariant to the ordering of the VAR variables and considered a more reliable approach versus the orthoganalized approach where the ordering of the variable determines result outcome. GIRF depicts the predicted pattern of surprise changes or innovations generated from running the VAR model. Due to time delays in the generation and dissemination of information

set of noisy proxies.

concerning both rational and irrational factors, the information generated from the stock return variables may not always be contemporaneous. Furthermore, the delay in reporting of information may create lags between the different observation of data concerning such variables. Therefore, it would be considered unrealistic if we were to only assume the presence of contemporaneous relationships between the different variables measured at time t.[16] The Akaike information criterion (AIC) and the Schwarz Bayesian information criterion (SBIC) are adopted to identify appropriate lag lengths. The VAR model can be expressed in the following form:

$$Z(t) = C + \sum_{i=1}^{12} A(s)Z(t-m) + \varepsilon_t \tag{2}$$

where, Z(t) is a column vector of variables under consideration, C is the deterministic component comprised of a constant, A(s) is a matrix of coefficients, m is the lag length, and ε_t is a vector of random error terms.

We perform diagnostic tests to determine the reliability of our VAR model. We failed to reject the null hypothesis that there is no autocorrelation in the residuals for any of the ten orders tested, therefore indicating that this test gives no hint of model misspecification. Furthermore, the Jarque-Bera statistics does not even come close to rejecting the null hypothesis that the disturbances in a VAR are normally distributed. The results of these tests are available from the author upon request.

3.2 Rational and Irrational Sentiment

We decompose individual investor sentiment into both rational (fundamental) and irrational (noise) components. As noted earlier, previous studies have mainly construed investor sentiment as fully irrational that reflects both investors' optimism and pessimism. However, a small number of studies have shown that investor sentiment also contains rational expectations based risk factors (e.g. Brown and Cliff (2005)). It is for this reason we think it is necessary to determine the propagation of both rational and irrational component of investor sentiment on international stock returns. We decompose individual investor sentiment, measured by the UMCC index, by controlling for any information sentiment may

[16]The importance of lag length determination is demonstrated in several studies. For instance, Lutkepohl (1993) highlight that when a higher order lag length is chosen over the true lag length will cause an increase in the mean-square forecast errors of the VAR and that underfitting the lag length will often generate autocorrelated errors. Also see Braun and Mittnik (1993) who investigate the consequences of model misspecifications in vector autoregressions (VARs). They show that estimates of a VAR whose lag length differs from the true lag length are inconsistent as are the impulse response functions and variance decompositions derived from the estimated VAR.

contain about rational factors. The equation can be shown in the following form:

$$\text{Isent}_t = \gamma_0 + \gamma_i \sum_{i=1}^{12} \text{fund}_{it} + \xi_t \tag{3}$$

where, Isent_t represents individual investor sentiment measured by the UMCC index, fund_{it} is the set of macro-economic variables representing rational expectations based on risk factors that carry non-redundant information, γ_0 is a constant and γ_i represents all the parameters to be estimated for different set of macro-economic variables, and ξ_t is a random error term.[17]

The fitted values of the above equation, $\hat{\text{I}}\text{sent}_t$, will then represent rational component and ξ_t will represent irrational component of individual investor sentiment. The approach that we adopt is consistent with the methodologies applied in the literature. [18] We consider the BW composite index that captures only the irrational component of the entire stock market. As noted earlier, Baker and Wurgler (2006) construct composite sentiment index after removing business cycle variations from six sentiment proxies. The resulting equation after considering BW composite sentiment index and individual investor rational and irrational sentiment in the return generating process can be expressed in the following form:

$$\text{R}_{jt} = \alpha_0 + \beta_{1k} \sum_{k=1}^{K} \hat{\text{I}}\text{sent}_{1t-k} + \beta_{2k} \sum_{k=1}^{K} \xi_{t-k} + \beta_{3k} \sum_{k=1}^{K} \text{Sent}_{3t-k} + \beta_{jk} \sum_{j=1}^{6} \sum_{k=1}^{K} \text{R}_{jt-k} + \upsilon_t \tag{4}$$

where , β_{1k}, β_{2k}, β_{3k} are the parameters to be estimated of individual investors' rational sentiment ($\hat{\text{I}}\text{sent}_{1t-k}$), individual investors' irrational sentiment (ξ_{t-k}) and BW sentiment index (Sent_{3t-k}) respectively. υ_t represents a random error term. In order to decompose investor survey sentiment into rational and irrational component, we include 12 macro-economic variables (discussed in next section) to net out commonly employed risk factors.

4 Data and Descriptive Statistics

As discussed earlier, we are interested in determining the significance of the spillover effects of US sentiment on the G6 countries. For this reason, we employ aggregate market,

[17]The macro-economic variables have also been considered in sentiment-return relationship study by Baker and Wurgler (2006), Lemmon and Portniaguina (2006) and Schmeling (2009).

[18]For instance, Barro (1978) estimate a model using two-step procedure. The author obtains OLS estimates of the forecasting equation and uses the residuals and fitted values as an independent variables in an OLS estimation of the output equation. Also see Poitras (1997) who adopts the similar methodology. Furthermore, Pagan (1984) notes that although two-step estimates are not efficient, they are certainly consistent.

value stock and growth stock returns in monthly intervals for the period January 1991 to December 2013 from Kenneth French's data library.[19] This gives us about 240 monthly observations. The measure of individual investor sentiment, the University of Michigan consumer confidence index, is sourced from the University of Michigan website; whereas the measure of market sentiment, Baker and Wurgler's composite sentiment index, is sourced from Jeffery Wurgler's website.[20]

We include 12 macro-economic variables as independent variables in order to decompose the UMCC index into rational and irrational component. In particular, we include monthly changes in 'consumer price index' (inflation) (Sharpe (2002)); monthly change in 'industrial production index' (Schwert (1990)); detrended '1 month Treasury Bill' (T-Bill) (Campbell (1991)); detrended 'default spread' which is measured as a difference in yield between Moody's BAA and AAA corporate bonds (Fama and French (1989)); detrended 'term spread' which is difference in yield of 10 year Treasury Bond and 3 month T-Bill (Fama (1990)); detrended 'economic risk premia' which is measured as the term structure of interest rates, the difference in monthly yield of 1 month and 3 month T-Bill (Ferson and Harvey (1991)); 'dividend yield' Fama and French (1988); currency fluctuation which is measured as monthly change in 26 country trade-weighted US dollar index (Elton and Gruber (1991)); excess return on market portfolio (MRP) (Sharpe (1964)); the premium on a portfolio of small stocks relative to large stocks (SMB) (Fama and French (1993)); the premium on a portfolio of high book to market stocks relative to low book to market stocks (HML) (Fama and French (1993)); and momentum factor (UMD) (Jegadeesh and Titman (1993)).[21] The data on industrial production index, 1 month T-Bill, economic risk premia, default spread, and term spread are sourced from the Board of Governors of the Federal Reserve System, whereas data on consumer price index and currency fluctuation are obtained from the Federal Reserve Bank of St. Louis. Dividend yield data is taken from the Center for Research for Security Prices (CRSP), while MRP, SMB, HML, and UMD factors are sourced from Kenneth French data library.

Table 2 reports the descriptive statistics of the above variables plus value and growth stock returns of the G7 countries for the period January 1991 to December 2013. From the table, we see that value stocks on average have yielded higher returns than growth stocks for all the countries. For instance, value stocks in Canada on average have yielded 1.20%

[19]Returns are sourced from `http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html` Stock returns are from the value weighted portfolio including dividends in the US dollar. The top 30% of stocks sorted by book-to-market ratio are considered as value stocks and the bottom 30% of stocks sorted by book-to-market ratio are considered as growth stocks.

[20]The UMCC index is sourced from `http://www.sca.isr.umich.edu/data-archive/mine.php` and BW composite sentiment index is sourced from `http://people.stern.nyu.edu/jwurgler/` As BW composite sentiment index data is available until December 2010, our sample consists of data until that time.

[21]We consider detrending 1 month T-Bill, economic risk premia, term spread and default spread as we found these series to display properties of stochastic non-stationarity.

monthly returns whereas growth stocks have yielded 0.89%. The positive mean value of the BW composite sentiment index of 0.09 tells us that investors were generally bullish for over last two decades. Furthermore, given the minimum and maximum value of the UMCC index (which is 55.30 and 112.00 respectively), the mean value of the UMCC index (86.30) is found to be slightly close to the maximum value, therefore, indicating the presence of bullish behaviour of individual investors. Before performing empirical analysis, we check for the presence of a unit root in the series. We run augmented Dickey Fuller test for each series (results reported in table 1, last column). The null hypothesis of a unit root is rejected for each series as t-statistic is more negative than the critical values.[22]

5 Empirical Analysis

We decompose individual investor sentiment into a rational and irrational component by running the OLS regression of the UMCC index on 12 macro-economic variables.[23] The results are reported in table 4 (Regression 1). We find that the UMCC index is significantly related to 1 month T-Bill, economic risk premia, dividend yield and momentum. The Lagrange multiplier test of Breusch and Godfrey (BG) suggests evidence of of serial correlation in the residuals. The appropriate number of lags determined by the BG test in order to remove autocorrelation were 19. Regression 2 presents updated coefficients for all variables after inclusion of lags (see table 4). With lag inclusion, we observe significant improvement in adjusted R^2 from 28.61% to 92.54%.[24]

To determine the significance of spillover effects of US investor sentiment (individual investors' rational sentiment, individual investors' irrational sentiment and BW composite sentiment index) on G6 aggregate market, value stock and growth stock returns, we estimate three separate nine-variable VAR models; aggregate market, value stocks and growth stocks portfolios. A nine variable VAR model includes 6 stock returns variables (of non US G7 countries), individual rational sentiment, individual irrational sentiment and BW composite sentiment index. We determine the appropriate number of lags to be one for all three VAR models after considering consistent and asymptotically efficient Akaike infor-

[22]The critical values of Dickey Fuller at 1%, 5% and 10% significance level is -3.464, -2.881 and -2.571 respectively.

[23]Before we perform our analysis, we also check for the presence of multicollinearity in our data by examining cross-correlations amongst different macro-economic variables. The results of cross-correlations of different macro-economic variables are reported in table 3. From the results it is evident that there is, in fact, low correlation amongst different macro-economic variables (the lowest being -0.63 between term spread and on month T-Bill, and the highest being 0.49 between one month T-Bill and economic risk premia). Hence we confirm that the issue of multicollinearity does not exist in our data.

[24]The IRF plots from structaral VAR were also consistent with the GIRF. The reults are not reported here for the sake of brevity. However they are available from the authors upon request.

mation criterion (AIC) and Schwarz Bayesian information criterion (SBIC) as well as loss in degrees of freedom. The AIC and SBIC values up to lag 6 are reported in table 5.

5.1 Significance of the BW composite sentiment index

We plot GIRF from the vector autoregression (VAR) estimation for 24 months.[25] We find that any shifts in the level of the BW composite sentiment index has a significant effect on aggregate market and growth stocks of all G6 countries as well as value stocks of all G6 countries except for Canada and France. For instance, a one standard deviation shock in the BW composite sentiment index results in an increase in growth stock returns of Canada by 3.33%. This effect increases in the second month and gradually declines in the subsequent months. In the case of aggregate market returns, we find that the effect is very much similar across all G6 countries. We find that the mean response for all G6 countries is positive and significant, and note that one unit of sentiment shock results in an increase in overall market returns by an average of 2.77%. Interestingly, we observe that the magnitude of the shock on value stock returns is slightly smaller relative to aggregate market returns and growth stock returns (i.e. 2.35%), indicating that value stocks are slightly less sensitive to sentiment shocks from the US.

In order to determine the implications of the financial crisis on our sentiment results, we plot GIRF for both pre-criss and crisis period. We consider pre-crisis period from January 1991 to December 2006 and crisis period from January 2007 to December 2013.[26] [27] Interestingly, we observe that the effect on value stocks is more pronounced during the crisis period as we find mean responses to be insignificant (significant) for pre-crisis (crisis) period. This observation is noted for all G6 countries. For instance, a one standard deviation shock in the BW composite sentiment index depresses value stock returns of non US G7 countries by an average of 2.31%. Furthermore, we also find that both aggregate market returns and growth stock returns are also affected by spillovers from the BW composite sentiment index for both pre-crisis and crisis period. Our findings are in line with previous studies on the US (e.g. Brown and Cliff (2005), Baker and Wurgler (2006)), where they find that both aggregate market and growth stocks are significantly affected by the US

[25]The plots of mean response of G6 aggregate market, value and growth stock returns to a one standard deviation shock in the BW composite sentiment index are not reported here for brevity sake. However they are available from the authors upon request.

[26]The Federal Reserve Bank of St Louis note in their report, 'Financial crisis: The timeline of events and policy actions', that in Ferbruary 2007 the Federal Home Loan Mortgage Corporation, Freddie Mac, announced that it will no longer buy the most risky subprime mortgages and mortgage-related securities, reflecting their suspicious behavior about bubble in the credit market. This report could be accessed from the following weblink, `http://timeline.stlouisfed.org/index.cfm?p=timeline`

[27]The GIRF plots for both pre-crisis and crisis period are not reported here for brevity sake. These plots are avilable from the authors upon request.

sentiment. For instance, Baker and Wurgler (2006) find that when sentiment is estimated to be high, growth stocks that are attractive to optimists and speculators and at the same time unattractive to arbitrageurs, because of their difficulty to price, tend to earn relatively low subsequent returns. Brown and Cliff (2005) determine the significance of Investor's Intelligence survey data, and find that an increase in investor optimism is associated with lower subsequent aggregate market returns. They further note that higher capitalization growth stocks are the main victims of survey sentiment.

The inevitable role the BW composite sentiment index plays in affecting international stock returns is determined in relation to trade ties that G6 countries enjoy with the US. We implement this approach based on the findings of previous studies that have shown that factors internal to the US results into global stock market co-movement. For instance, Dornbusch et al. (2000) identify trade links, regional patterns, and macro-similarities to be major determinants of the stock market co-movements. In table 6, we report trade shares of non US G7 countries with the US. Interestingly, we observe that trade interdependencies between non US G7 countries and the US has declined significantly over the last two decades (1990's and 2000's). Furthermore, when we measure the change in non US G7 countries' trade shares with the US for pre-crisis and crisis period, we observe that the decline further increases. For instance, we observe that Japan's trade dependence on the US during pre-crisis and crisis period almost halved (i.e. 43.22%). However, that did not let Japanese stocks to remain immune from the shocks of US sentiment. In fact, not only aggregate market and growth stocks were affected during the crisis period, but value stocks were also significantly affected by the US sentiment. Recall, that value stocks were immune to shocks from the US sentiment during pre-crisis period.

The decline in trade dependence of G6 countries on the US reflects the fact that G6 economies have increased their trade engagement with other world countries excluding the US. This is clearly evident in table 7, which reports non US G7 countries' trade activity relative to nominal GDP. The widening of trade with rest of the world excluding US is observed for all non US G7 countries. This increase is observed in double digits when measured for the last two decades (1990's and 2000's) as well as for pre-crisis and crisis period. Furthermore, we also observe that the degree of trade integration of non US G7 countries with the US declined over the last two decades and also during pre-crisis and crisis period. The degree of trade integration of non US G7 countries with the US is reported in table 8. In all, it seems that despite the declining trade interdependence between G6 countries and US, shocks pertaining from the US sentiment continue to affect G6 stock returns. Our results, therefore, affirm the findings of previous studies that have shown that the US plays a dominant role in global markets; although this dominance has declined over a period of last 23 years when measured in terms of GDP (see table 1).[28]

[28]Table 1 reports the change in G7 countries share of world GDP over the last two decades and for both

However, the above findings clearly questions the fact whether trade linkages have any role in affecting stock market co-movements as noted by previous studies (e.g. Dornbusch et al. (2000)). Verma and Soydemir (2006) also noted that the effect of US sentiment on international stock returns is dependent on the trade relationship that each country enjoys with the US. Our findings are therefore not consistent with previous findings; and we therefore note that shocks from the US sentiment play a significant role in affecting international stock returns despite a decrease in trade interdependence. Our conclusion is that, these spillovers are not necessarily linked to trade interdependence between non US G7 countries and US. The persistent effect observed across all non US G7 countries could be due to the dominant role the US plays in world economy. Furthermore, the declining role of the US in global market, when measured in terms of the GDP, does not result in any change in magnitude of shocks on stock returns of G6 countries over the last two decades.

The significance of the BW composite sentiment index in affecting non US G7 stock returns could also be explained in the light of degree of capital markets integration. Previous studies have found the evidence of capital markets integration amongst G7 countries (e.g. Kasa (1992), Swanson (2003), Morelli (2009)). For instance, Kasa (1992) find the evidence of single common risk factor driving the stock markets of the US, UK, Germany, Canada and Japan. Swanson (2003) find the evidence supporting the hypothesis of capital market integration of the US, Germany and Japan.[29]

Given the significance of the BW composite sentiment index, our findings, therefore, suggest that the BW composite sentiment index could play as role of global risk factor and its significance could be determined in international asset pricing models.

5.2 Significance of rational and irrational sentiment

We now proceed to discuss the responses of G6 aggregate market, value and growth stock returns due to the propagation of US rational and irrational sentiments of individual investors, measured by the UMCC index.[30] Interestingly, we find that rational sentiments of the US individual investors generally do not play any role in affecting international stock returns except for French growth stocks. Our analysis for pre-crisis and crisis period further reveal that only French growth stocks were (affected) unaffected by the rational sentiments during (crisis) pre-crisis period; whereas all other countries remain immune to shocks from

pre-crisis and crisis period.

[29] Also see Heston et al. (1995) who find that the rewards for risks are identical across US and twelve European countries supporting the hypothesis of capital market integration.

[30] The plots of responses of stock returns to a unitary shock in rational and irrational sentiments are not presented here for brevity sake. They are available from the authors upon request.

rational sentiment spillovers.[31] Our findings, therefore, cast doubt on the significance of rational sentiment of the US individual investors; as previous studies have shown that rational sentiments play a significant role in affecting international stock returns (e.g. Verma and Soydemir (2006)). Verma and Soydemir (2006) find that rational sentiment of US individual investors, measured by AAII, significantly affects US and UK stock returns. We attribute inconsistent findings for the UK market for the two separate time periods, as well as the different measures of individual investor sentiment adopted in our study. In all, we note that rational sentiment of US individual investors does not play any role in affecting G6 stock returns; and therefore conclude that sentiment is not necessarily a manifestation of the rational risk factors driving expected stock returns as shown by previous studies (e.g. Verma and Soydemir (2006)).[32]

Furthermore, we find that the irrational component of individual investor sentiment does not play any role in affecting G6 stock returns. The results remain the same for both pre-crisis and crisis period, as we find insignificant mean responses for all G6 countries. This finding is consistent with previous studies (see Verma and Soydemir (2006)). However, our findings differ from previous studies on the US and non US countries that have examined sentiment-return relationship using either time-series data or cross-sectional data. These studies have construed sentiment as fully irrational (e.g. Brown and Cliff (2004)). For instance, previous studies using US data have shown that large capitalized growth stocks are being significantly affected by the US individual investor sentiment (e.g Brown and Cliff (2004)). Furthermore, studies that have examined survey sentiment-return relationship for either emerging or non US developed economies have shown that aggregate market, value and growth stocks are significantly affected by domestic survey sentiment (e.g. Schmeling (2009), Bathia and Bredin (2013)).

In spite of regional proximity and high trade interdependence with the US, Canadian and Japanese stock returns (overall, value and growth) are immune to the propagation of rational and irrational sentiments of the US individual investors; whereas only French growth stocks are affected by the rational sentiment of the US individual investors. For instance, the average US imports from and exports to Canada during 2000's were $279.07 billion and $228.06 billion respectively, whilst that of France was $36.59 billion and $24.78 billion respectively (see table 9). As previous studies, including Dornbusch et al. (2000), highlight trade links, regional patterns, and macro-similarities as being major determinants of stock market co-movements, it is therefore surprising to note that both Canadian and

[31] As noted before, the GIRF plots for pre-crisis and crisis period are not reported here for brevity sake. They are available from the authors upon request.

[32] As per the BG test, we include 7 lags for pre-crisis period and 1 lag for crisis period so as to remove autocorrelation from residuals. The UMCC index for both pre-crisis and crisis period is then decomposed into rational and irrational component.

Japanese stocks are immune to shocks from the US individual investor sentiment.[33] Our findings, therefore, question the significance of direct measures of investor sentiment, individual surveys, in global markets. Previous studies, including Brown and Cliff (2004), have noted the significant role of the US individual survey sentiment in affecting US stock returns.

5.3 Does US sentiment spillover?

There is significant evidence to indicate that US sentiment plays a role in affecting stock returns of non US G7 countries. From the above findings, we note that the BW composite sentiment index relative to the UMCC index often play a significant role in affecting stock returns of non US G7 economies. As noted before, the BW composite sentiment index, an indirect measure of investor sentiment, is constructed from six sentiment proxies. These sentiment proxies are often referred to, by stock market commentators as 'market weather vanes' (e.g. Brown and Cliff (2004)). As the BW composite sentiment index indirectly reflects collective behaviour of the US stock market investors, they'd certainly display more ability in affecting international stock returns. On the other hand, the UMCC index, a direct measure of investor sentiment, is constructed from monthly survey responses of at least 500 consumers. Understandably, this index would therefore have at least lower predictive ability in affecting international stock returns relative to the BW composite sentiment index.

Our study includes G7 countries that have developed economies, with financial markets that are considered to be highly regulated and institutionalised. It is for this reason we find that the magnitude and timing of shocks is consistent across these countries. As noted before, the US plays a dominant role in affecting world equity markets. Furthermore, the degree of trade integration that non US G7 economies enjoys with the US is considerably significant. And therefore, it is anticipated that US sentiment would be propagated abroad, and this would be reflected in asset prices of non US G7 countries. Our results, furthermore, affirm the findings of the previous studies on the US that have shown the role US plays in global market (e.g. Masih and Masih (2001), Becker et. al. (1995)). For instance, Masih and Masih (2001), in their study of dynamic causal linkages amongst international stock markets, find significant interdependencies between the established OECD and the emerging Asian Markets. They highlight that the US and the UK display leadership in both the short run and the long run. Becker et al. (1995) argue that the international equity market linkages are attributable to the reactions of foreign traders to public information originating from the US.

[33] As noted before, French growth stocks are affected by rational sentiments of the US individual investors due to financial crisis of 2007.

Finally, we note that the BW composite sentiment index (market sentiment) is more useful in predicting international aggregate market and growth stock returns. Furthermore, both rational and irrational component of the US individual investor sentiment do not play any role in forecasting stock returns of non US G7 countries.

5.4 Sentiment-sector analysis

We now extend our analysis to sector returns. Rather than concentrating on all countries we restrict our analysis to Canada, UK, and Japan (G3, henceforth) for the 1991-2013 period.[34] We focus on the following eight sectors: energy, financial services, healthcare, industrials, information technology (IT), telecommunication and utilities. The data on sector returns are sourced from Thomson Eikon.

The IRFs are presented in figures 3 to 11. Our results are generally consistent with previous findings. Both rational and irrational sentiment of US individual investors has no effect on any sector returns for the G3. We also observe that the BW composite sentiment index affects only IT and telecommunication stocks for the G3. It is not unreasonable to expect that growth stocks would be well represented in both the IT and telecommunications sectors. We interpret the above results to be broadly in line with our earlier finding that growth stocks are the main target of US investor sentiment. Furthermore, the BW composite sentiment index affects all sectors of Japan (except energy and utilities). We are not surprised by this finding given that Japan has the second highest trade-interdependence with the US (next to Canada). Our results affirm the findings of previous studies (e.g. Campbell and Hamao (1992)) who find that US and Japanese market are substantially integrated. They also find that the US variables are indeed helpful in forecasting Japanese stock returns and not vice-versa. Furthermore, our results also consistent with the findings of Forbes and Rigobon (2002).[35]

However, the BW composite sentiment index fails to display its significance level when it comes to Canadian and UK sectors (except IT and telecommunication stocks). This finding is surprising given that both Canada and UK enjoy significant trade relationship with the US since 1991. This finding could be explained by following two reason: First, there has been substantial decline in the degree of trade integration between US and Canada and US and UK over the last two decades (see table 8). This decline is in double digit (-19.45% for UK and -14.91% for Canada). Second, it could be due to the difference in distribution of value and growth stocks across these eight sectors.

[34]Canada, UK, and Japan represent markets that have highly integrated capital markets with the US (Kasa (1992)) and there is considerable trade links (see table 6 and 9).

[35]Forbes and Rigobon (2002) note that the high levels of co-movement across stock markets, especially during turbulent times, reflects a continuation of strong cross-market linkages, and not a significant shift in these linkages.

Furthermore, our findings on sentiment-sector analysis differ from our earlier finding of this study where we noted the significance of the BW composite sentiment index in affecting non-US G7 aggregate market, value and growth stock returns. Given this observation, we therefore note that the BW composite sentiment index is useful to investors who follow value-growth investing strategy rather than sector level investing strategy.

6 Conclusion

In this paper, we determine the extent of spillover effects of the US individual investor sentiment, measured by the UMCC index as well as market sentiment, measured by BW composite sentiment index on value and growth stock returns of G6 countries. We find significant presence of the propagation of the US sentiment on aggregate market, value and growth stock returns of G6 countries. Particularly, we observe that aggregate market and growth stocks of all G6 countries are significantly affected by the spillovers from the US market sentiment. Furthermore, we find that value stocks become main victim from sentiment spillovers due to financial crisis. The rational component of the US individual investor sentiment do not play any role in affecting stock returns of all G6 countries (except for French growth stocks, which is mainly driven by financial crisis); whereas in line with previous studies, irrational component of the US individual investor sentiment do not play any role in affecting stock returns of G6 countries. Furthermore, we find that aggregate, value and growth stocks of Canada and Japan are immune to the propagation of both rational and irrational component of the US individual investor sentiment in spite of high trade interdependence.

Our findings indicate that investor sentiment, which is mainly construed as irrational by previous studies failed to reflect its significance in affecting international stock returns. This consistency is also observed for rational sentiment as they do not display any predictive ability in forecasting international stock returns. And, therefore, we note that the direct measure of investor sentiment, i.e. investor survey, has no explanatory power across US borders. Its significance is limited within the US market (e.g. Baker and Wurgler (2006)). However, the indirect measure of investor sentiment, measured by the BW composite sentiment index, continue to play a significant role in affecting G6 stock returns. This suggests that collective shocks from investors action as reflected by financial (behavioural) variables within sentiment index play a greater predictive power in affecting stock returns than sentiments of individual investors.

As previous studies have shown the presence of casual linkages between developed financial markets (Masih and Masih (2001)), our study extends the analysis of the US investor sentiment to an international perspective, further reflecting implications of our results to a number of practical investment implications. For instance, investors could easily ignore

the role of rational and irrational component of individual investor sentiment while devising their global investment strategies. Furthermore, since predictive ability of the US investor sentiment in affecting domestic returns have already been noted by previous studies (Fisher and Statman (2000, 2003)), and now the propagation of US investor sentiment in affecting international stock returns have been observed, we, therefore, note that US investor sentiment could play a role of a 'global risk' factor. And therefore one could consider incorporating investor sentiment in international asset pricing models to determine its significance in capturing asset pricing anomalies.

References

[1] Bai, Y., 2014. Cross-border sentiment: An empirical analysis on EU stock markets. Applied Financial Economics 24. 259-290.

[2] Baker, M., and Wurgler, J., 2006. Investor Sentiment and the Cross-Section of Stock Returns. Journal of Finance 61. 1645-1680.

[3] Baker, M., and Wurgler, J., 2007. Investor Sentiment in the Stock Market. Journal of Economic Perspectives 21. 129-151.

[4] Baker, M., Wurgler, J. and Yuan, Y., 2012. Global, local and contagious investor sentiment, Journal of Financial Economics 104. 27287.

[5] Ball, R., 2009. The global financial crisis and the efficient market hypothesis: What have we learned?. Journal of Applied Corporate Finance 21. 8-16.

[6] Barberis, N., and Shleifer, A., 2003. Style Investing. Journal of Financial Economics 68. 161-200.

[7] Barberis, N., Shleifer, A., and Vishny, R., 1998. A model of investor sentiment. Journal of Financial Economics 49. 307-343.

[8] Barro, R., 1978. Unanticipated money, output and the price level in the United States. Journal of Political Economy 86. 549-580.

[9] Bathia, D., and Bredin, D., 2013. An examination of investor sentiment effect on G7 stock market returns. European Journal of Finance 19. 909-937.

[10] Becker, K., Finnerty, J., and Friedman, J., 1995. Economic news and equity market linkages between the US and UK. Journal of Banking and Finance 19. 1191-1210

[11] Bird, R., and Casavecchia, L., 2007. Sentiment and Financial Health Indicators for Value and Growth Stocks: The European Experience. European Journal of Finance 13. 769-793.

[12] Black, F., 1986. Noise. Journal of Finance 41. 529-543.

[13] Bredin, D., Hyde, S., and O Reilly, G., 2010. Monetary policy surprises and international bond markets. Journal of International Money and Finance 29. 988-1002.

[14] Brown, G., and Cliff, M., 2004. Investor Sentiment and the near term stock market. Journal of Empirical Finance 11. 1-27.

[15] Brown, G., and Cliff, M., 2005. Investor Sentiment and Asset Valuation. Journal of Business 78. 405-440.

[16] Campbell, J., 1991. A Variance Decomposition for Stock Returns. Economic Journal 101. 157-179.

[17] Campbell, J., and Hamao, Y., 1992. Predictable Stock Returns in the United States and Japan: A Study of Long-Term Capital Market Integration. Journal of Finance 47. 43-69.

[18] Campbell, J., and Kyle, A., 1993. Smart Money, Noise Trading and Stock Price Behavior. Review of Economic Studies 60. 1-34.

[19] Canova, F., 2005. The transmission of US shocks to Latin America. Journal of Applied Econometrics 20. 229-251.

[20] Clarke, R., and Statman, M., 1998. Bullish or Bearish?. Financial Analysts Journal 54. 63-72.

[21] Connolly, R., and Wang, A., 1998. Economic news and stock market linkages: evidence from the US, UK and Japan. Proceedings of the Second Joint Central Bank Research Conference 1, 211240.

[22] Daniel, K., Hirshleifer, D., and Subrahmanyam, A., 1998. Investor psychology and security market under and overreactions. Journal of Finance 53. 1839-1886.

[23] De Bondt, W., and Thaler, R., 1985. Does the stock market overreact?. Journal of Finance 40. 793-805.

[24] De Bondt, W., and Thaler, R., 1987. Further evidence on investor overreaction and stock market seasonality. Journal of Finance 42. 557-581.

[25] Dees, S., and Guilhem, A, 2011. The role of the United States in the global economy and its evolution over time. Empirical Economics 41. 573-591.

[26] De Long, J.B., Shleifer, A., Summers, L. and Waldmann, R., 1990. Noise Trader Risk in Financial Markets. Journal of Political Economy 98. 703-738.

[27] Dornbusch, R., Park, Y.C., and Claessens, S., 2000. Contagion: How It Spreads and How It Can Be Stopped. World Bank Research Observer 15. 177-197.

[28] Easley, D., O'Hara, M., and Srinivas, P., 1998. Option volume and stock prices: Evidence on where informed traders trade. Journal of Finance 53. 431-465.

[29] Elton, E., and Gruber, M., 1991. Modern portfolio theory and investment analysis 4^{th} edition. John Wiley and Sons Inc.

[30] Fadejeva, L., Feldkircher, M., and Reininger, T., 2014. International Transmission of Credit Shocks: Evidence from Global Vector Autoregression Model. Latvijas Banka Working Paper Series 5.

[31] Fama, E., 1990. Term Structure Forecasts of Interest Rates, Inflation, and Real Returns. Journal of Monetary Economics 25. 59-76.

[32] Fama, E., and French, K., 1988. Dividend Yields and Expected Stock Returns. Journal of Financial Economics 22. 3-25.

[33] Fama, E., and French, K., 1989. Business Conditions and Expected Returns on Stocks and Bonds. Journal of Financial Economics 25. 23-49.

[34] Fama, E., and French, K., 1993. Common risk factors in the returns on stocks and bonds. Journal of Financial Economics 33. 3-56.

[35] Ferson, W., and Harvey, C., 1991. The Variation in Economic Risk Premiums. Journal of Political Economy 99. 385-415.

[36] Ferson, W., and Harvey, C., 1993. The Risk and Predictability of International Stock Returns. Review of Financial Studies 6. 527-566.

[37] Fisher, K., and Statman, M., 2000. Investor Sentiment and Stock Returns. Financial Analysts Journal 56. 16-23.

[38] Fisher, K., and Statman, M., 2003. Consumer Confidence and Stock Returns. Journal of Portfolio Management 30. 115-127.

[39] Foerster, S., and Schmitz, J., 1997. The transmission of US election cycles to international stock returns. Journal of International Business Studies 28. 1-27.

[40] Forbes, K., and Rigobon, R., 2002. No contagion, only interdependence: measuring stock market co-movements. Journal of Finance 57. 2223-2261.

[41] Fornari, F., and Stracca, L., 2013. What does a financial shock do? First international evidence. European Central Bank Working Paper Series 1522.

[42] Frazzini, A., and Lamont, O., 2006. Dumb Money: Mutual Fund Flows and the Cross Section of Stock Returns. Journal of Financial Economics 88. 299-322.

[43] French, K., 1988. Crash Testing the Efficient Market Hypothesis. FNBER Macroeconomics Annual 3. 277-286.

[44] Heston, S., Rouwenhorst, G., and Wessels, R., 1995. The structure of international stock returns and the integration of capital markets. Journal of Empirical Finance 2. 173-197.

[45] Jegadeesh, N., and Titman, S., 1993. Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. Journal of Finance 48. 65-91.

[46] Jiang, G., Konstantinidi, E., and Skiadopoulos, G., 2012. Volatility Spillovers and the Effect of News Announcements. Journal of Banking and Finance 36. 2260-2273.

[47] Kasa, K., 1992. Common stochastic trends in international stock markets. Journal of Monetary Economics 29. 95-123.

[48] King, M., and Wadhwani, S., 1990. Transmission of volatility between stock markets. Review of Financial Studies 3. 5-33.

[49] Lee, C., Shleifer, A., and Thaler, R., 1991. Investor Sentiment and the Closed End Puzzle. Journal of Finance 46. 75-109.

[50] Lee, W.Y., Jiang, C.X., and Indro, D.C., 2002. Stock Market Volatility, Excess Returns, and the Role of Investor Sentiments. Journal of Banking and Finance 26. 2277-2299.

[51] Lemmon, M., and Portniaguina, E., 2006. Consumer confidence and Asset Prices: Some Empirical Evidence. Review of Financial Studies 19. 1499-1529.

[52] Liu, A. and Pan, M., 1997. Mean and volatility spillover effects in the US and Pacific-Basin stock markets. Multinational Finance Journal 1. 47-62.

[53] Ljungqvist, A., 2006. IPO Underpricing. Handbook of Corporate Finance: Empirical Corporate Finance Chapter 7. Elsevier/North-Holland Publication.

[54] Mackowiak, B., 2007. External Shocks, US Monetary Policy and Macroeconomic Fluctuations in Emerging Markets. Journal of Monetary Economics 54. 2512-2520.

[55] Masih, R., and Masih, A., 2001. Long and short term dynamic causal transmission amongst international stock markets. Journal of International Money and Finance 20. 563-587.

[56] Morelli, D., 2009. Capital Market Integration: evidence from the G7 countries. Applied Financial Economics 19. 1043-1057.

[57] Ng, A., 2000. Volatility spillover effects from Japan and the US to the Pacific-Basin. Journal of International Money and Finance 19. 207-233.

[58] Pagan, A., 1984. Econometric issues in the analysis of regressions with generated regressors. International Economic Review 25. 221-247.

[59] Pan, J., and Poteshman, A., 2006. The Information in Option Volume for Future Stock Prices. Review of Financial Studies 19. 871-908.

[60] Pearson, H., and Shin, Y., 1998. Generalized impulse response analysis in linear multivariate models. Economics Letters 58. 17-29.

[61] Poitras, M., 1997. Expectations and monetary neutrality: An empirical reexamination. Southern Economic Journal 63. 920-928.

[62] Ritter, J., 2003. Investment Banking and Securities Issuance. Handbook of the Economics of Finance Chapter 5. Elsevier Science Publication.

[63] Schmeling, M., 2009. Investor Sentiment and Stock Returns: Some International Evidence. Journal of Empirical Finance 16. 394-408.

[64] Schwert, W., 1990. Stock returns and real activity: A century of evidence. Journal of Finance 45. 1237-1257.

[65] Sharpe, W., 1964. Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. Journal of Finance 19. 425-442.

[66] Sharpe, S., 2002. Reexamining Stock Valuation and Inflation: The Implications of Analysts Earnings Forecasts. Review of Economics and Statistics 84. 632-648.

[67] Shiller, R., 2005. Irrational Exuberance. Princeton, NJ: Princeton University Press.

[68] Shleifer, A., and Summers, L., 1990. The noise trader approach to finance. Journal of Economic Perspectives 4. 19-33.

[69] Sims, C., 1980. Macroeconomic and reality. Econometrica 48. 1-49.

[70] Solt, M., and Statman, M., 1988. How Useful Is the Sentiment Index?. Financial Analysts Journal 44. 45-55.

[71] Soydemir, G., 2000. International Transmission Mechanism of Stock Market Movements: Evidence from Emerging Equity Markets. Journal of Forecasting 19. 149-176.

[72] Swanson, P., 2003. The interrelatedness of global equity markets, money markets, and foreign exchange markets. International Review of Financial Analysis 12. 135155.

[73] Tandon, K., and Urich, T., 1987. International Market Response to Announcements of US Macroeconomic Data. Journal of International Money and Finance, 6. 71-83.

[74] Verma, R., and Soydemir, G., 2006. The Impact of US Individual and Institutional Investor Sentiment on Foreign Stock Market. Journal of Behavioural Finance 7. 128-144.

[75] Warther, V., 1995. Aggregate mutual fund flows and security returns. Journal of Financial Economics 39. 209-235.

[76] Zouaoui, M., Nouyrigat, G., and Beer, F., 2011. How does Investor Sentiment affect Stock Market Crises? Evidence from Panel Data. The Financial Review 46. 723-747..

[77] Zweig, M., 1973. An investor expectations stock price predictive model using closed-end premiums. Journal of Finance 28. 67-78.

Table 1: G7 countries share of World GDP from 1991 to 2013

	US	CN	UK	FR	GR	IT	JP
1990's	27.92	2.21	4.38	4.97	7.52	4.14	15.48
2000's	26.52	2.44	4.36	4.31	5.67	3.52	9.33
Change	-5.03	10.66	-0.51	-13.27	-24.63	-14.97	-39.74
Pre-crisis	28.71	2.28	4.58	4.80	6.97	4.01	13.76
Crisis	23.51	2.49	3.88	4.13	5.34	3.29	7.99
Change	-18.12	9.44	-15.31	-13.92	-23.39	-17.97	-41.95

Table 1 reports G7 countries share of world GDP for the period January 1991 to December 2013. The above figures are in percentage, and it represents average for 1990's (1991 to 2000), 2000's (2001 to 2013), pre-crisis period (1991 to 2006) and crisis period (2007 to 2013).

Table 2: Descriptive Statistics

Variable	**Mean** (%)	**Std Dev** (%)	**Max** (%)	**Min** (%)	**ADF t-stat**
Δ Inflation	0.20	0.33	1.22	-1.92	-10.22
Δ Industrial production	0.21	2.00	5.57	-4.87	-27.44
1 month T-bill	0.25	0.17	0.56	0.00	-22.85
Economic risk premia	2.72	1.89	5.7	0.01	-11.16
Term spread	1.93	1.15	3.76	-0.53	-12.20
Default spread	0.96	0.42	3.38	0.55	-10.13
Dividend yield	19.22	6.08	34.99	12.11	-2.83
Δ USD	0.14	1.25	6.64	-3.26	-10.89
MRP	0.68	4.36	11.34	-17.23	-15.20
SMB	0.28	3.34	22.02	-16.39	-17.58
HML	0.30	3.20	13.87	-12.68	-14.31
UMD	0.52	5.05	18.39	-34.72	-15.28
UMCC index	86.30	13.16	112.00	55.30	-2.86
BW sentiment index	0.09	0.54	2.50	-0.90	-2.66
Canada (M)	0.96	5.55	22.02	-26.73	-15.02
Canada (V)	1.06	6.31	23.36	-26.30	-15.27
Canada (G)	0.77	6.60	20.26	-29.13	-14.79
UK (M)	0.82	4.71	14.12	-19.91	-14.96
UK (V)	0.92	5.99	28.03	-27.05	-14.05
UK (G)	0.84	4.39	13.31	-18.44	-14.91
France (M)	0.93	5.83	15.04	-21.90	-15.28
France (V)	1.12	7.52	28.01	-30.92	-14.08
France (G)	0.89	5.80	16.37	-22.49	-15.49
Germany (M)	0.91	6.15	21.99	-23.30	-16.11
Germany (V)	1.39	7.12	25.35	-26.86	-16.71
Germany (G)	0.69	6.54	20.28	-26.79	-16.21
Italy (M)	0.72	7.23	21.22	-23.72	-16.89
Italy (V)	0.68	9.02	31.06	-26.75	-16.22
Italy (G)	0.75	6.93	22.92	-25.53	-17.16
Japan (M)	0.32	5.74	17.93	-15.88	-14.37
Japan (V)	1.00	7.02	34.78	-15.96	-15.05
Japan (G)	-0.00	5.93	23.39	-17.43	-14.68

Table 2 reports the descriptive statistics. The variables are monthly change in consumer price index (Δ Inflation), monthly change in industrial production index (Δ Industrial Production), 1 month Treasury bill, Economic risk premia (the difference in monthly yield of 1 month and 3 month T-bill), Term spread (difference in yield of 10 year Treasury Bond and 3 month T-Bill), Default spread (difference in yield between Moody's BAA and AAA corporate bonds), Dividend yield, monthly change in 26 country trade-weighted US dollar index (Δ USD), market risk premium (MRP), premium on portfolio of small stocks relative to large stocks (SMB), premium on portfolio of high book/market stocks relative to low book/market stocks (HML), momentum factor (UMD), the University of Michigan consumer confidence index (UMCC index) and Baker and Wurgler (2006) composite sentiment index (BW sentiment index). 'M, 'V' and 'G' denotes aggregate market, value stock and growth stock returns of Canada, UK, France, Germany, Italy and Japan. Std Dev, Min and Max denotes standard deviation, minimum value and maximum value of each variables respectively. 'ADF t-stat' is augmented Dickey-Fuller t-statistic that has critical values of -3.464, -2.881 and -2.571 at 1%, 5% and 10% significance level respectively.

Table 3: Cross-Correlations of Variables representing fundamentals

	Inf	**IP**	**TBill**	**ERP**	**TSpr**	**DSpr**	**Div**	**USD**	**MRP**	**SMB**	**HML**	**UMD**
Inf	1.00											
IP	0.11	1.00										
TBill	0.11	0.03	1.00									
ERP	0.12	0.05	0.49	1.00								
TSpr	-0.05	0.00	-0.63	-0.61	1.00							
DSpr	-0.23	-0.16	-0.50	-0.52	0.27	1.00						
Div	-0.09	-0.07	-0.59	-0.61	-0.08	0.45	1.00					
Δ USD	-0.20	0.08	0.14	0.14	-0.01	-0.01	-0.12	1.00				
MRP	0.01	-0.08	-0.01	-0.01	0.01	-0.09	-0.03	-0.28	1.00			
SMB	0.02	0.09	-0.08	-0.07	0.11	0.06	-0.01	-0.07	0.24	1.00		
HML	0.05	-0.01	0.03	0.04	0.00	-0.11	-0.06	0.03	-0.24	-0.34	1.00	
UMD	0.01	0.11	0.09	0.11	-0.04	-0.22	-0.07	0.15	-0.25	0.07	-0.14	1.00

Table 3 reports cross correlations amongst different macro-economic variables that is considered in decomposing individual investor sentiment into individual rational sentiment and individual irrational sentiment. The variables are monthly change in consumer price index (Inf), monthly change in industrial production index (IP), 1 month Treasury Bill (TBill), Economic risk premia (ERP), Term spread (TSpr), Default spread (Dspread), Dividend yield (Div), monthly change in 26 country trade-weighted US dollar index (Δ USD), market risk premium (MRP), premium on portfolio of small stocks relative to large stocks (SMB), premium on portfolio of high book/market stocks relative to low book/market stocks (HML) and momentum factor (UMD).

Table 4: Effects of Fundamentals on Individual Investor Sentiment measured by UMCC Index

Dependent variable: UMCC index				
Variables	**Regression 1**		**Regression 2**	
	Coeff	p-values	Coeff	p-values
Inf	-0.66	0.84	-4.36	(0.00)***
IP	0.48	0.35	-0.13	0.49
TBill	57.20	(0.05)**	3.82	0.71
ERP	22.41	(0.00)***	8.56	(0.00)***
TSpr	4.13	0.41	1.34	0.43
DSpr	7.05	0.50	-7.87	(0.03)**
Div	-1.58	(0.00)***	-0.12	0.11
Δ USD	-0.93	0.32	0.35	0.27
MRP	0.22	0.40	0.13	0.16
SMB	-0.18	0.59	0.39	(0.00)***
HML	0.44	0.21	0.35	(0.01)***
UMD	0.41	(0.06)*	-0.15	(0.04)**
Adj R^2 (%)	28.61		92.54	

Table 4 reports regression of individual investor sentiment, measured by the University of Michigan consumer confidence index (UMCC index) on different macro-economic variables. The variables are monthly change in consumer price index (Inf), monthly change in industrial production index (IP), 1 month Treasury Bill (TBill), Economic risk premia (ERP), Term spread (TSpr), Default spread (Dspread), Dividend yield (Div), monthly change in 26 country trade-weighted US dollar index (Δ USD), market risk premium (MRP), premium on portfolio of small stocks relative to large stocks (SMB), premium on portfolio of high book/market stocks relative to low book/market stocks (HML) and momentum factor (UMD). The coefficients and p-values of regression 1 represents all values before inclusion of the AR term and coefficient and p-values of regression 2 represents all values after inclusion of the AR term. The coefficients of lags are not presented here for the sake of brevity.

Table 5: AIC and BIC values at different lags

Lags	Aggregate market returns		Value stock retunrs		Growth stock returns	
	AIC	SBIC	AIC	BIC	AIC	SBIC
1	-21.75*	-20.79*	-18.13*	-17.21*	-19.97*	-19.05*
2	-21.71	-20.28	-18.11	-16.66	-19.91	-18.43
3	-21.60	-19.57	-18.01	-15.98	-19.76	-17.74
4	-21.48	-18.90	-17.87	-15.29	-19.61	-17.02
5	-21.33	-18.19	-17.79	-14.65	-19.42	-16.28
6	-21.20	-17.51	-17.68	-13.99	-19.29	-15.60

Table 5 reports Akaike information criterion (AIC) and Schwarz Bayesian information criterion (SBIC) values at different lags for estimating two VAR models of nine variables each. The first model includes value stock returns of G6 countries besides 3 sentiment measures (individual rational sentiment, individual irrational sentiment and BW composite sentiment index). And second model includes growth stock returns of G6 countries besides the above three sentiment measures.

Table 6: Non US G7 trade shares with the US over last 23 years (1991 to 2013)

	CN	UK	FR	GR	IT	JP
1990's	46.88	5.69	3.38	3.93	3.21	13.59
2000's	39.83	3.70	2.95	3.44	2.82	8.69
Change	-15.04	-35.00	-12.80	-12.53	-12.09	-36.01
Pre-crisis	45.47	5.11	3.38	3.92	3.17	12.46
Crisis	37.00	3.33	2.59	3.05	2.59	7.08
Change	-18.63	-34.68	-23.40	-22.15	-18.47	-43.22

Table 6 reports non US G7 trade shares with the US for the period January 1991 to December 2013. Trade shares with the US indicates the ratio of the sum of exports to and imports from the US to the sum of export to and import from all of the world in each country. The above figures are in percentage, and it represents average for 1990's (1991 to 2000), 2000's (2001 to 2013), pre-crisis period (1991 to 2006) and crisis period (2007 to 2013).

Table 7: Non US G7 trade activity relative to nominal GDP (total trade with other countries excluding US) from 1991 to 2013

	CN	UK	FR	GR	IT	JP
1990's	49.41	78.81	71.20	71.87	67.10	25.36
2000's	59.47	110.95	91.07	120.42	82.75	43.34
Change	20.36	40.78	27.91	67.56	23.34	70.90
Pre-crisis	53.29	86.69	75.63	85.10	71.59	29.62
Crisis	59.22	120.47	97.99	131.79	85.91	49.00
Change	11.11	38.96	29.57	54.87	20.01	65.42

Table 7 reports non US G7 trade activity with all of the world relative to nominal GDP for the period January 1991 to December 2013. Trade activity relative to nominal GDP indivates the ratio of the sum of import to and export from to nominal GDP for each country. The above figures are in percentage, and it represents average for 1990's (1991 to 2000), 2000's (2001 to 2013), pre-crisis period (1991 to 2006) and crisis period (2007 to 2013).

Table 8: Trade Integration of non US G7 countries with the US from 1991 to 2013

	CN	UK	FR	GR	IT	JP
1990's	20.62	2.48	1.13	1.11	0.75	1.31
2000's	17.69	1.99	1.10	1.36	0.71	1.23
Change	-14.19	-19.45	-2.60	23.39	-5.06	-5.69
Pre-crisis	20.21	2.28	1.13	1.18	0.74	1.29
Crisis	16.10	2.03	1.06	1.40	0.70	1.21
Change	-20.35	-10.72	-6.02	18.49	-4.74	-6.17

Table 8 reports degree of trade integration of non US G7 countries with the US for the period January 1991 to December 2013. Degree of trade integration is defined as total imports from the US for each of the above country relative to its respective nominal GDP. The above figures are in percentage, and it represents average for 1990's (1991 to 2000), 2000's (2001 to 2013), pre-crisis period (1991 to 2006) and crisis period (2007 to 2013).

Table 9: US imports from and exports to non US G7 countries from 1991 to 2013 *(in $ billion)*

	CN		UK		FR		GR		IT		JP	
Year	Imp	Exp	Imp	Exp	Imp	Exp	Imp	Exp	Imp	Exp	Imp	Exp
Avg 1990's	149.96	130.60	29.13	31.35	19.61	15.85	39.78	23.40	17.45	8.77	117.48	57.50
Avg 2000's	279.07	228.06	49.79	44.88	36.59	24.78	85.26	41.00	30.84	13.08	130.53	58.95
Change (%)	86.10	74.63	70.94	43.16	86.56	56.40	114.36	75.24	76.67	49.05	11.10	2.51
Pre-crisis	187.23	152.04	35.44	33.82	24.15	17.57	52.41	26.64	21.23	9.56	122.30	56.42
Crisis	304.54	262.59	53.08	50.82	40.76	28.51	95.38	48.68	33.67	14.96	130.71	62.67
Change (%)	62.65	72.71	49.79	50.29	68.74	62.28	81.99	82.76	58.57	56.40	6.87	11.09

Table 9 reports average trading data [imports (imp) and exports (exp)] of the US with non US G7 countries, viz. Canada (CN), United Kingdom (UK), France (FR), Germany (GR), Italy (IT) and Japan (JP) for the period 1991 to 2013. The above figures are in billions of dollars, except for 'change' which is given in percentage. The above figures represents average for 1990's (1991 to 2000), 2000's (2001 to 2013), pre-crisis period (1991 to 2006) and crisis period (2007 to 2013). Data is sourced from the US Department of Commerce, US Census Bureau.

Figure 1: Degree of trade integration for the period January 1991 to December 2013

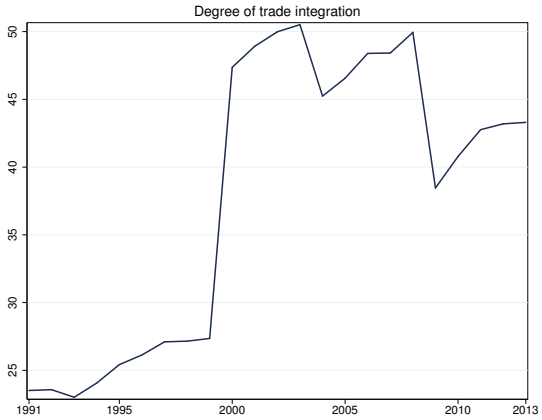


Figure 1 reports degree of trade integration for the period January 1991 to December 2013. Degree of trade integration is defined as the world import volume relative to world GDP. The data are sourced from the International Monetary Fund (IMF) and World Trade Organization (WTO).

Figure 2: US share of the world GDP

Figure 2 reports the US share of world GDP for the period January 1991 to December 2013. The data are sourced from the International Monetary Fund (IMF).

Figure 3: Response of Canada (CN), United Kingdon (UK) and Japan (JP) energy (left), financial (centre) and healthcare (right) sector returns to Baker and Wurgler, (BW), (2006) composite sentiment index

Figure 3a: Canada

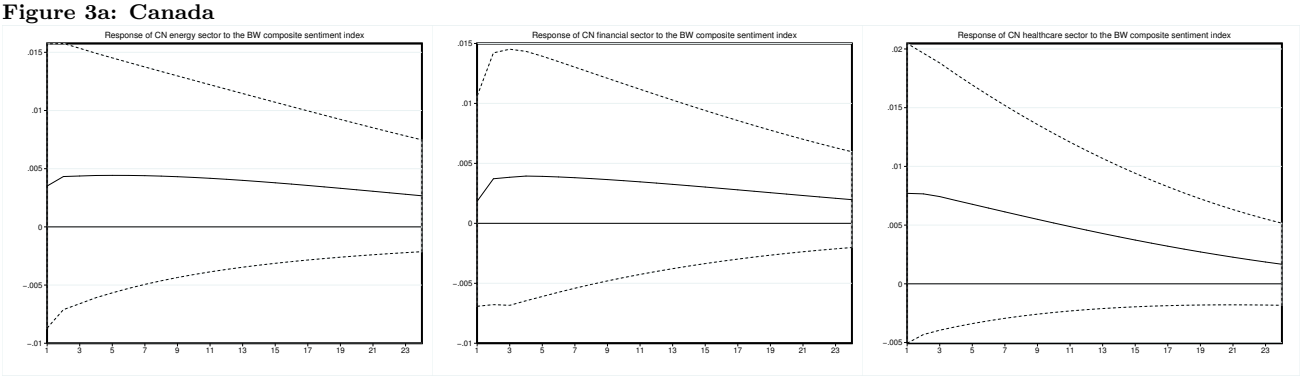


Figure 3b: UK

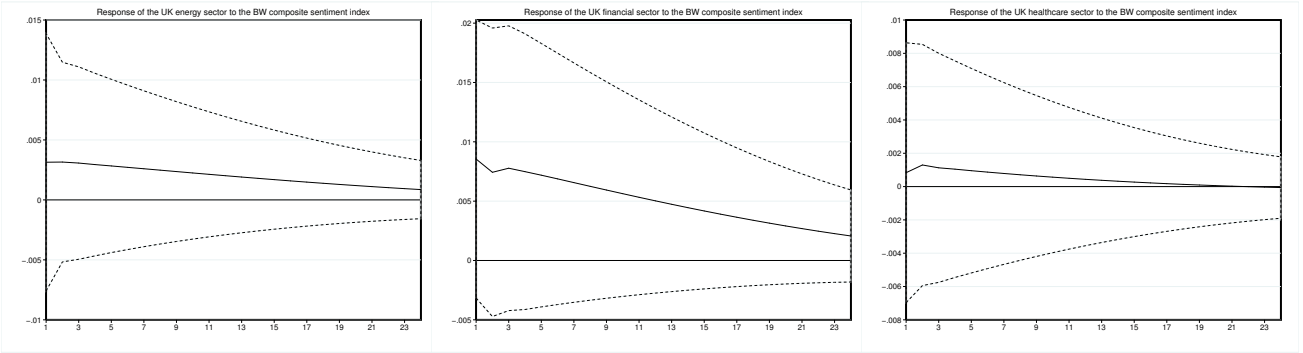
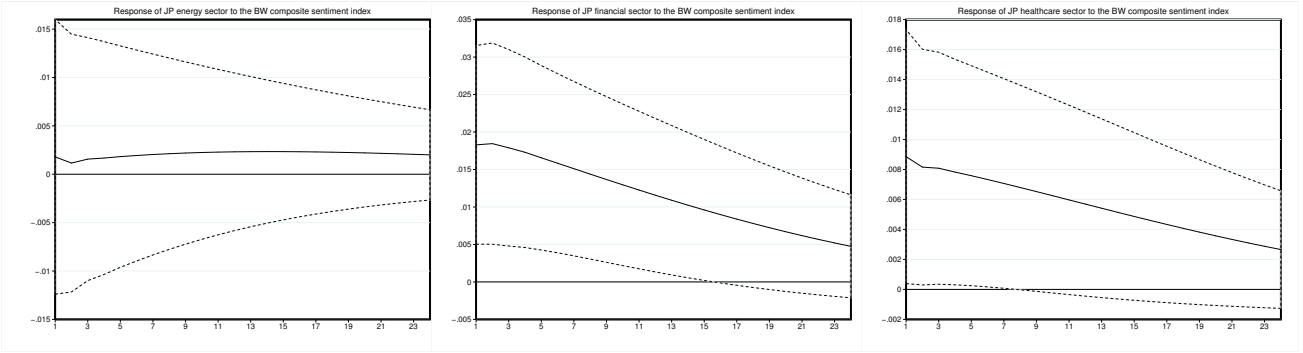


Figure 3c: Japan



Note: The dashed line on each graph represent the upper and lower 95% confidence bands. The response is considered to be statistically significant when the upper and lower bounds carry the same sign. The "percentage returns" on each graph is on the vertical axis and "time horizon" is on the horizontal axis.

Figure 4: Response of Canada (CN), United Kingdon (UK) and Japan (JP) industrials (left), information technology (centre) and basic materials (right) sector returns to Baker and Wurgler, (BW), (2006) composite sentiment index

Figure 4a: Canada

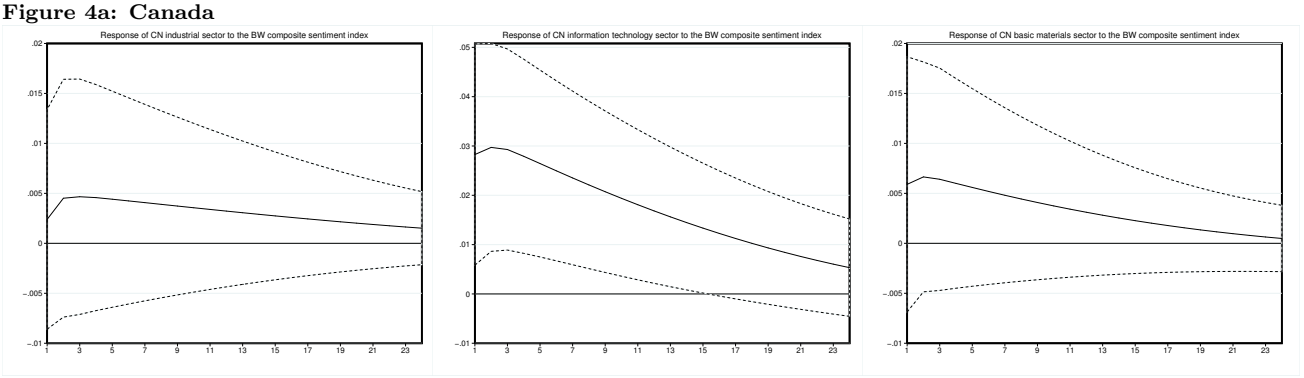


Figure 4b: UK

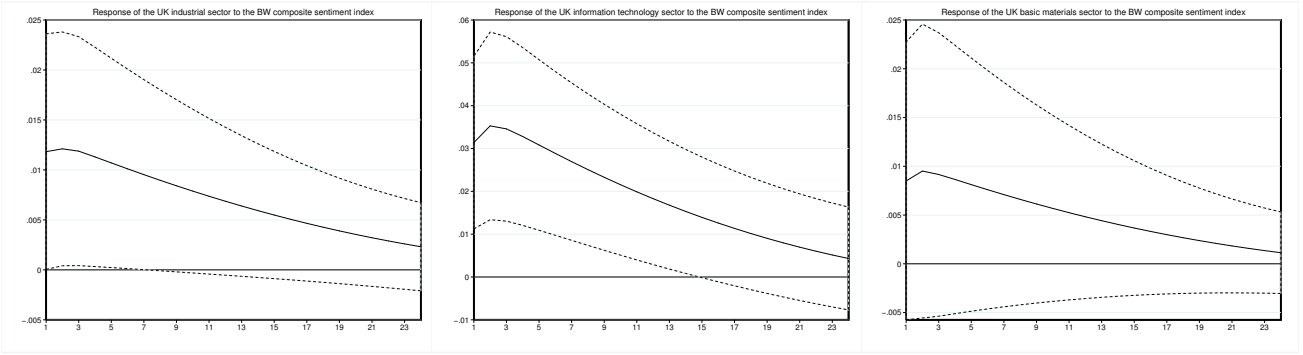
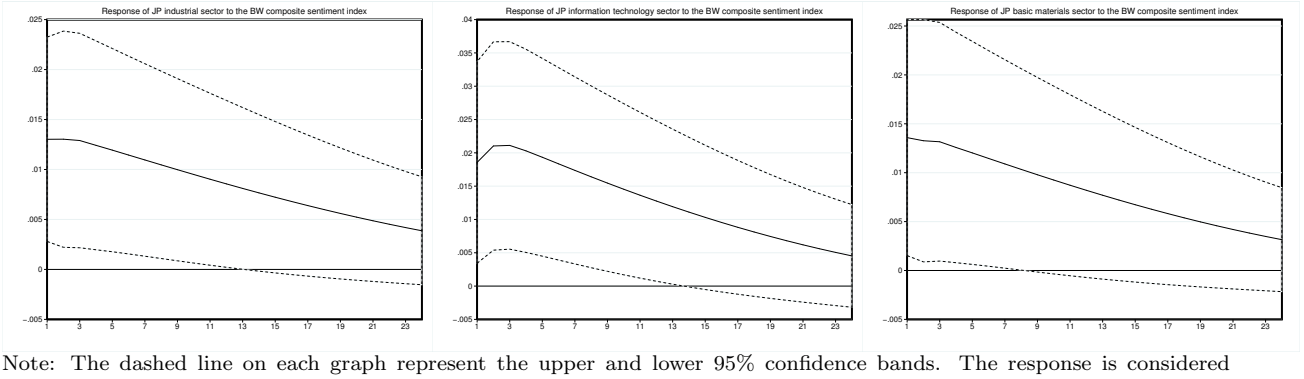


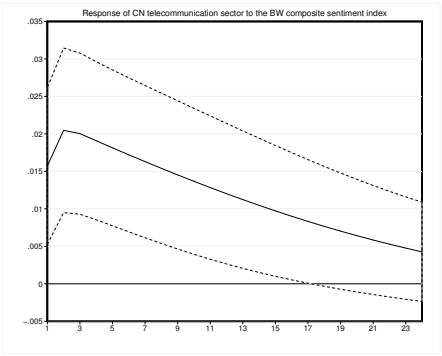
Figure 4c: Japan



Note: The dashed line on each graph represent the upper and lower 95% confidence bands. The response is considered to be statistically significant when the upper and lower bounds carry the same sign. The "percentage returns" on each graph is on the vertical axis and "time horizon" is on the horizontal axis.

Figure 5: Response of Canada (CN), United Kingdon (UK) and Japan (JP) telecommunication (left) and utilities (right) sector returns to Baker and Wurgler, (BW), (2006) composite sentiment index

Figure 5a: Canada



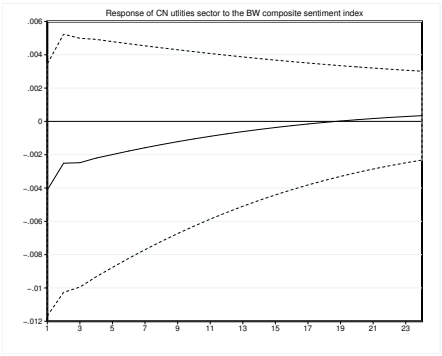
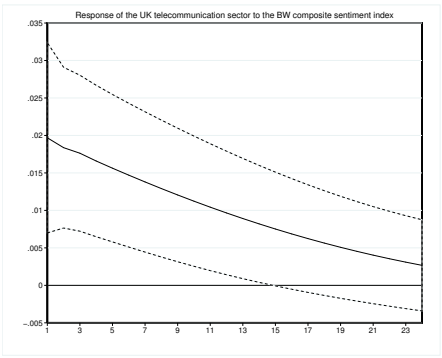


Figure 5b: UK



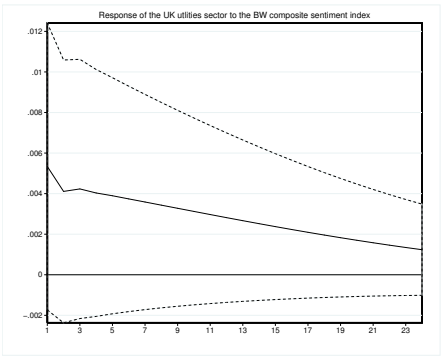
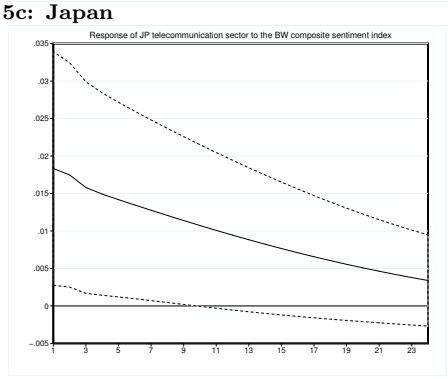
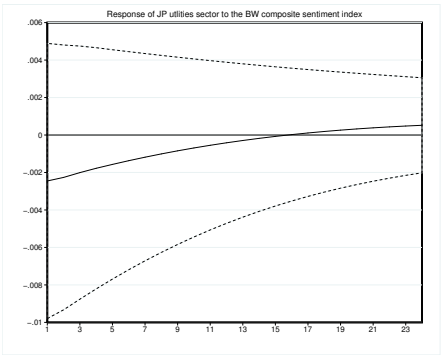


Figure 5c: Japan





Note: The dashed line on each graph represent the upper and lower 95% confidence bands. The response is considered to be statistically significant when the upper and lower bounds carry the same sign. The "percentage returns" on each graph is on the vertical axis and "time horizon" is on the horizontal axis.

Figure 6: Response of Canada (CN), United Kingdon (UK) and Japan (JP) energy (left), financial (centre) and healthcare (right) sector returns to rational sentiments of the US individual investors

Figure 6a: Canada

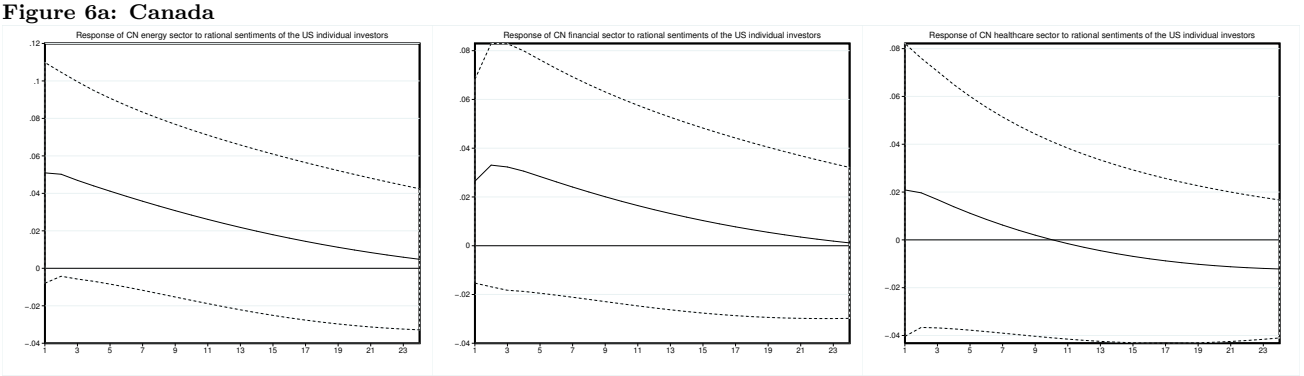


Figure 6b: UK

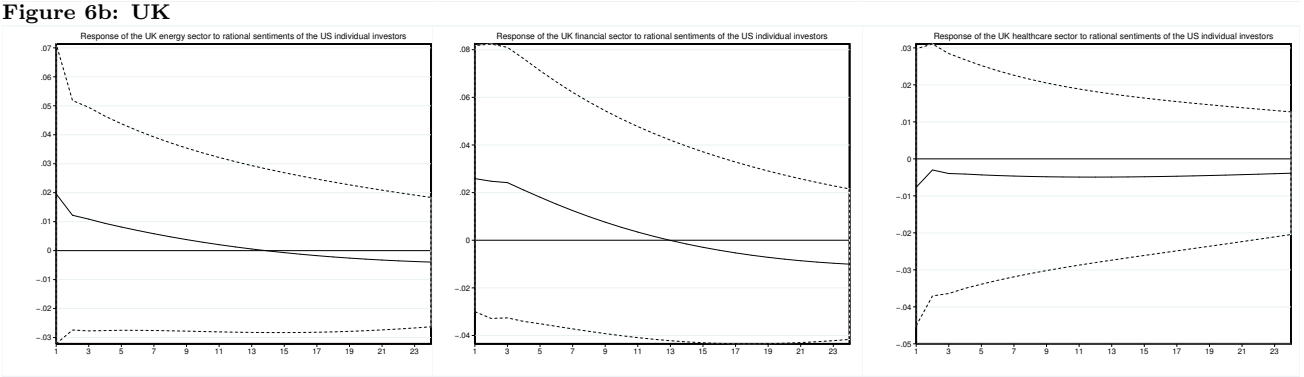
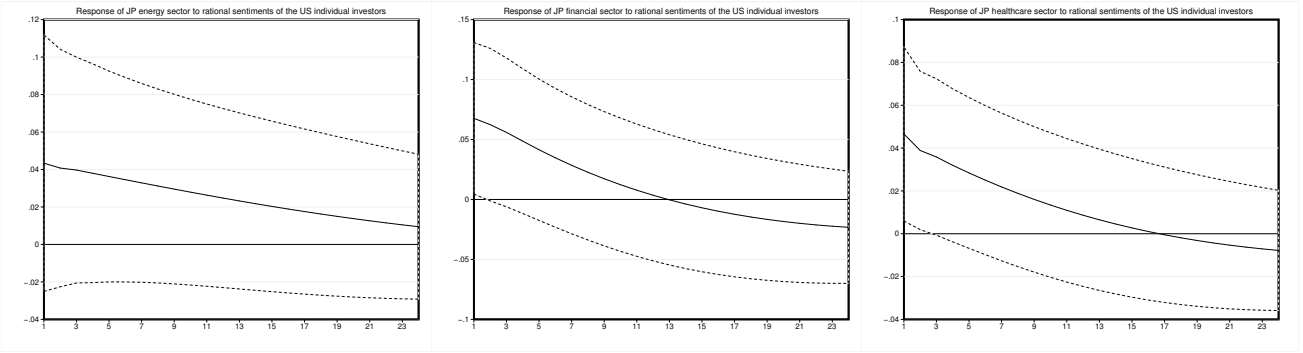


Figure 6c: Japan



Note: The dashed line on each graph represent the upper and lower 95% confidence bands. The response is considered to be statistically significant when the upper and lower bounds carry the same sign. The "percentage returns" on each graph is on the vertical axis and "time horizon" is on the horizontal axis.

Figure 7: Response of Canada (CN), United Kingdon (UK) and Japan (JP) industrials (left), information technology (centre) and basic materials (right) sector returns to rational sentiments of the US individual investors

Figure 7a: Canada

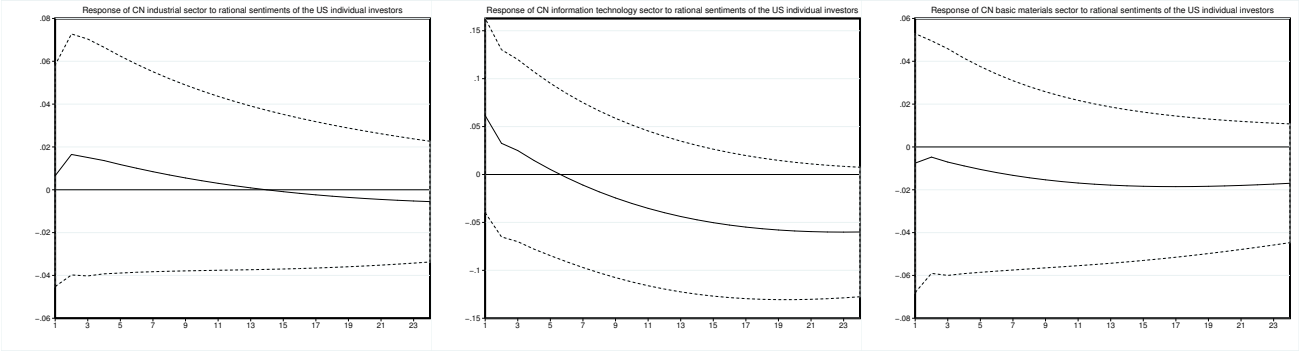


Figure 7b: UK

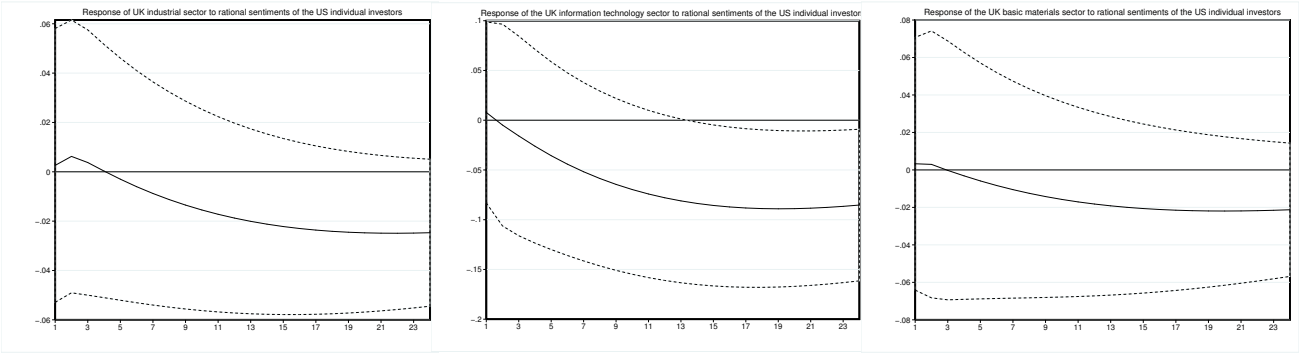
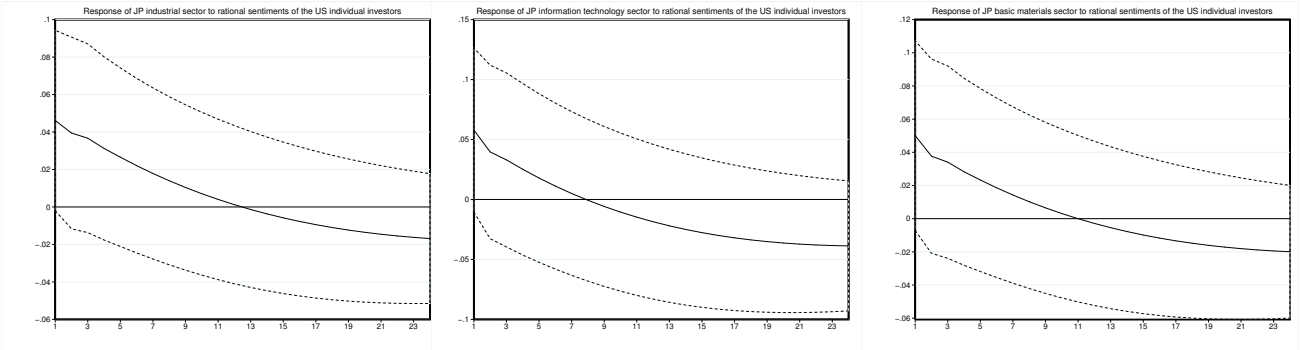


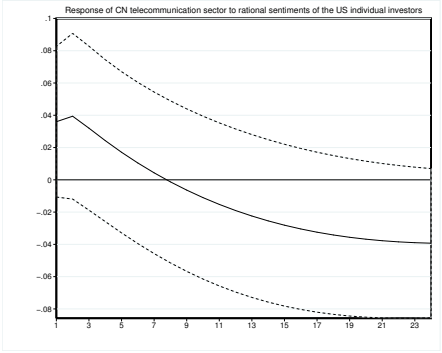
Figure 7c: Japan



Note: The dashed line on each graph represent the upper and lower 95% confidence bands. The response is considered to be statistically significant when the upper and lower bounds carry the same sign. The "percentage returns" on each graph is on the vertical axis and "time horizon" is on the horizontal axis.

Figure 8: Response of Canada (CN), United Kingdon (UK) and Japan (JP) telecommunication (left) and utilities (right) sector returns to rational sentiments of the US individual investors

Figure 8a: Canada



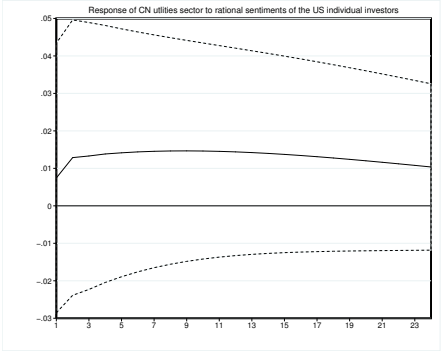
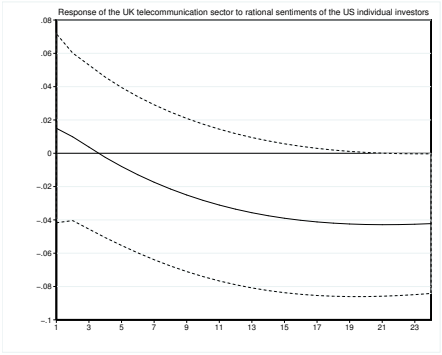


Figure 8b: UK



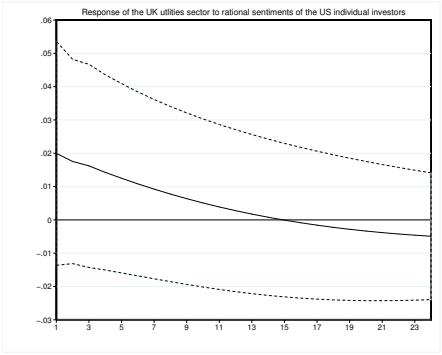
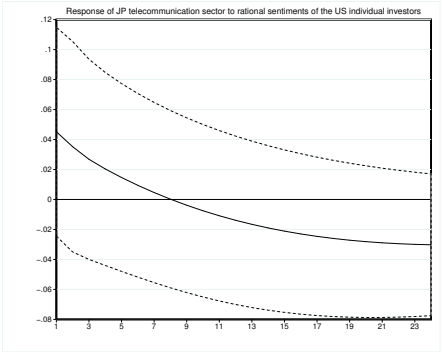
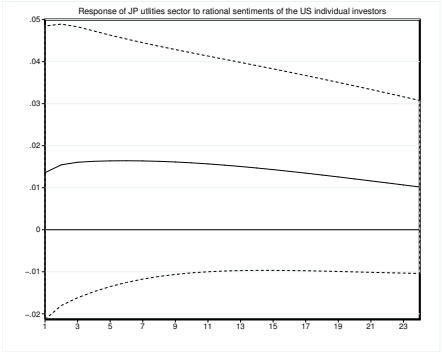


Figure 8c: Japan





Note: The dashed line on each graph represent the upper and lower 95% confidence bands. The response is considered to be statistically significant when the upper and lower bounds carry the same sign. The "percentage returns" on each graph is on the vertical axis and "time horizon" is on the horizontal axis.

Figure 9: Response of Canada (CN), United Kingdon (UK) and Japan (JP) energy (left), financial (centre) and healthcare (right) sector returns to irrational sentiments of the US individual investors

Figure 9a: Canada

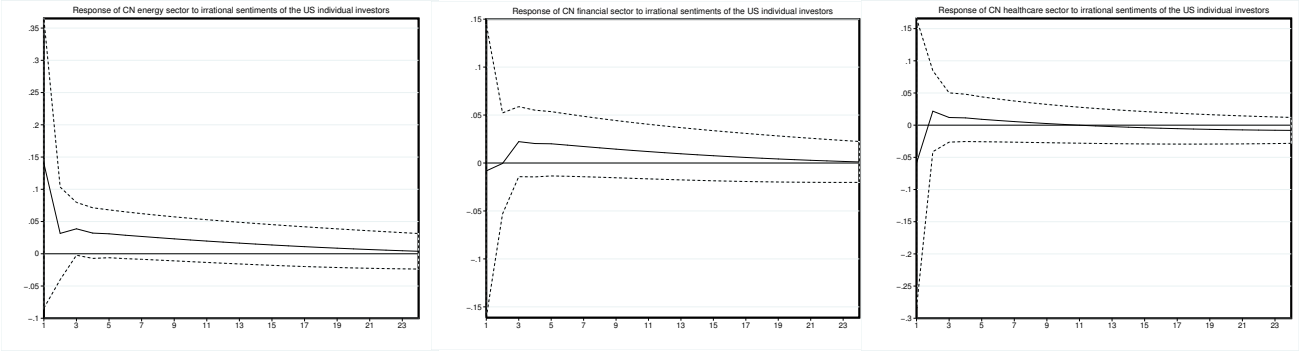


Figure 9b: UK

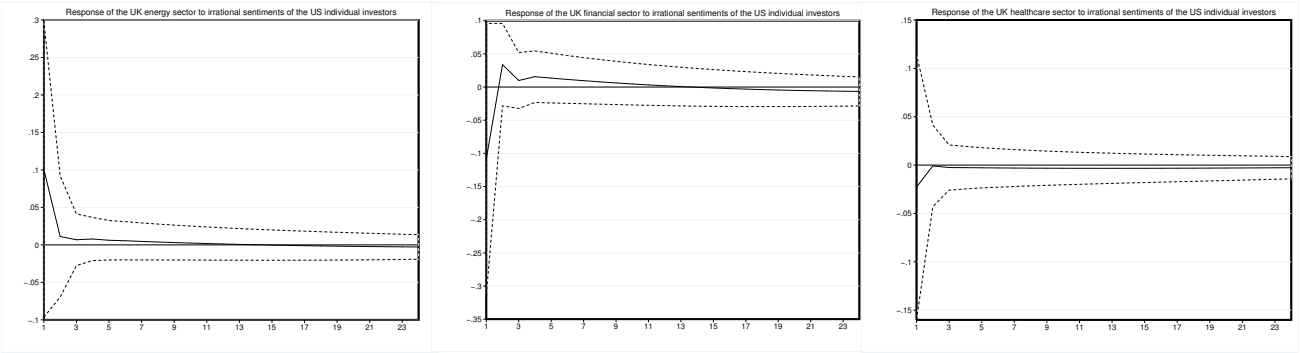
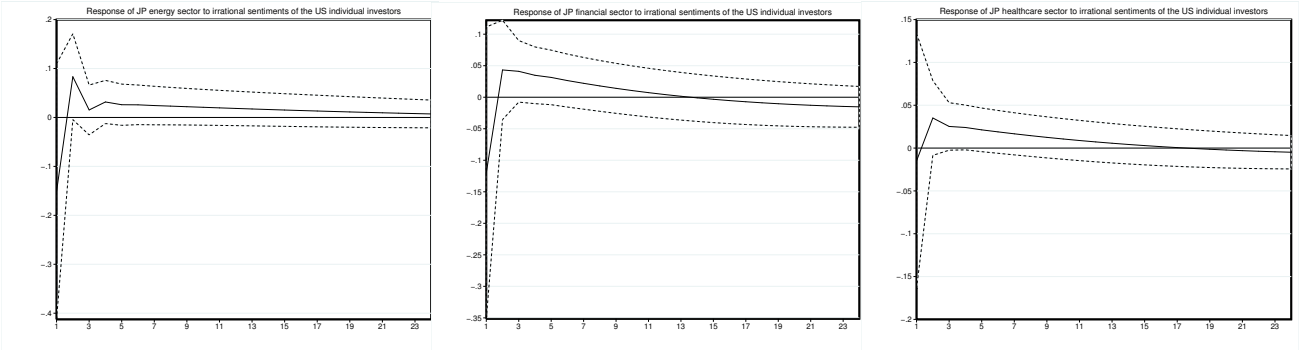


Figure 9c: Japan



Note: The dashed line on each graph represent the upper and lower 95% confidence bands. The response is considered to be statistically significant when the upper and lower bounds carry the same sign. The "percentage returns" on each graph is on the vertical axis and "time horizon" is on the horizontal axis.

Figure 10: Response of Canada (CN), United Kingdon (UK) and Japan (JP) industrials (left), information technology (centre) and basic materials (right) sector returns to irrational sentiments of the US individual investors

Figure 10a: Canada

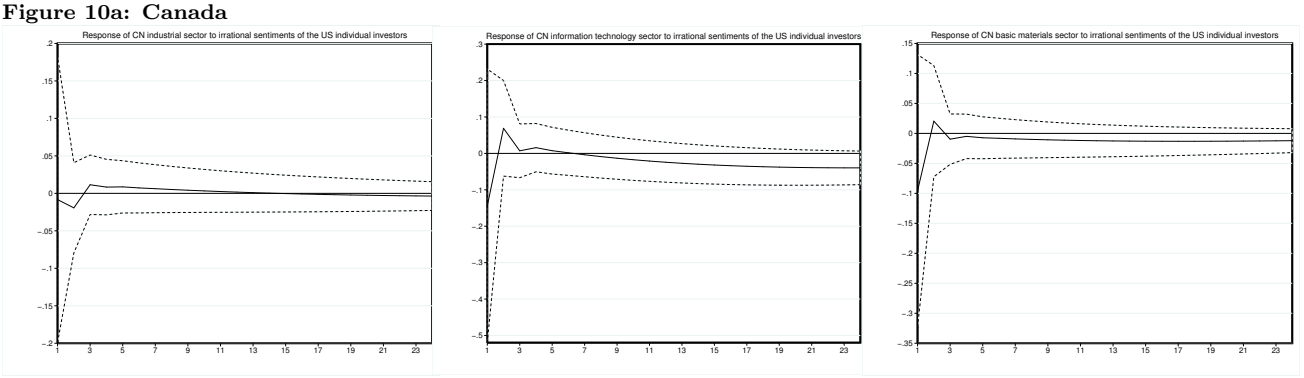


Figure 10b: UK

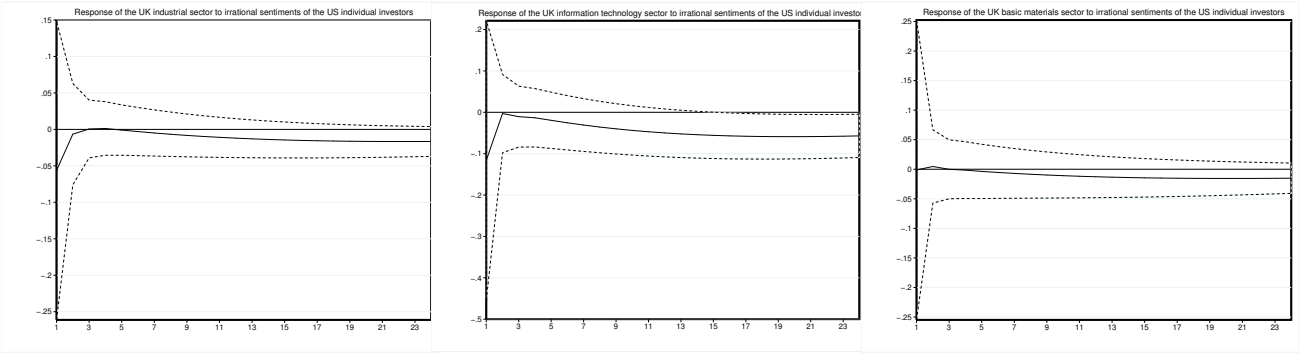
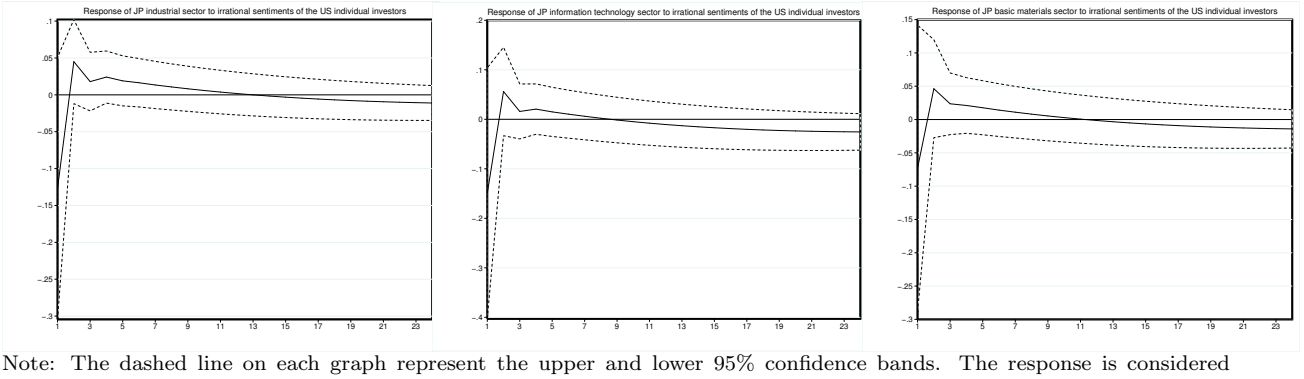


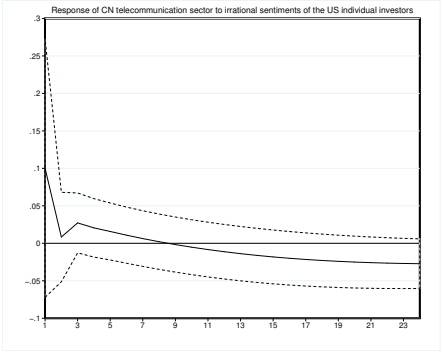
Figure 10c: Japan



Note: The dashed line on each graph represent the upper and lower 95% confidence bands. The response is considered to be statistically significant when the upper and lower bounds carry the same sign. The "percentage returns" on each graph is on the vertical axis and "time horizon" is on the horizontal axis.

Figure 11: Response of Canada (CN), United Kingdon (UK) and Japan (JP) telecommunication (left) and utilities (right) sector returns to irrational sentiments of the US individual investors

Figure 11a: Canada



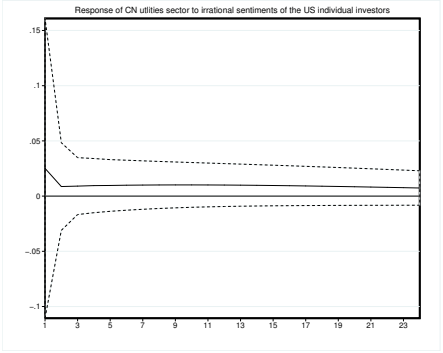
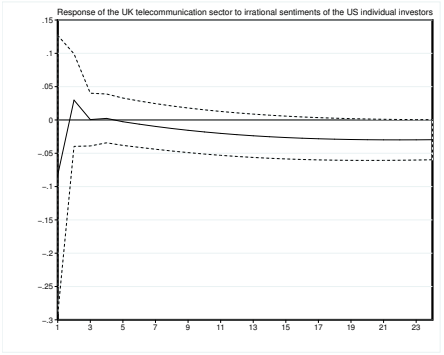


Figure 11b: UK



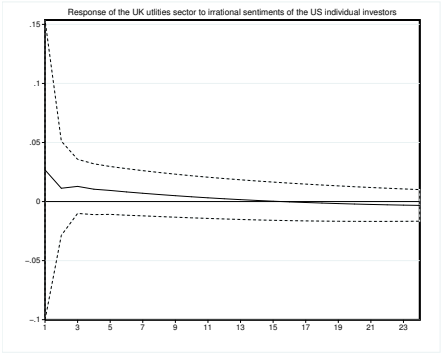
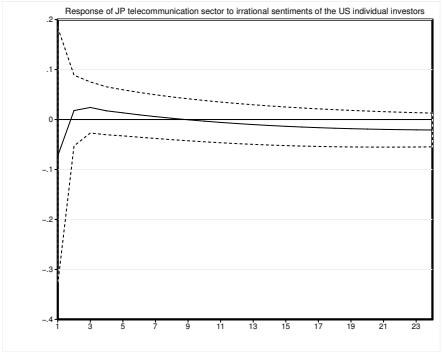
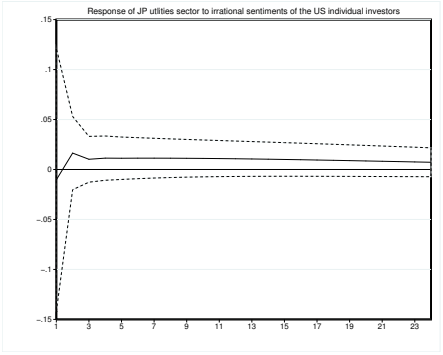


Figure 11c: Japan





Note: The dashed line on each graph represent the upper and lower 95% confidence bands. The response is considered to be statistically significant when the upper and lower bounds carry the same sign. The "percentage returns" on each graph is on the vertical axis and "time horizon" is on the horizontal axis.