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Essays on International Risk-Return Trade-Off Relations

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ESSAYS ON INTERNATIONAL RISK-RETURN TRADE-OFF RELATIONS

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ABSTRACTS

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This dissertation consists of two essays on the international risk-return trade-off relations. The first essay is titled "The Role of the US Market on International Risk-Return Trade-Off Relations" and the second essay is titled "The Role of Investor Sentiment on International Risk-Return Trade-Off Relations".

In our first essay, we study the intertemporal risk-return trade-off relations based on returns from eighteen international markets. Our main contribution is that we find that the US market plays an important role in affecting international risk-return trade-off. We present striking new empirical evidence that the inclusion of US market variables significantly changes the estimated risk-return trade-off relationship in international markets. The estimated risk aversion coefficient switches from mostly negative to mostly positive after the inclusion of these US market variables even when the conditional variance model specification remains the same. Our results are consistent with the state variable interpretation of the US market variables in the sense of Merton's Intertemporal CAPM. Our collective findings confirm and extend the recent literature that find an important role of US market return in predicting international stock returns. In our context of the risk-return trade-off relationship, we find that the contemporaneous state variables are more significant than the lagged ones, suggesting that the importance of US market

variables are more likely driven by expected changes in the investment opportunity set rather than the slow diffusion of information.

In our second essay, we investigate the role of domestic sentiment on the risk-return trade-off relation in the international markets context. We extend the study of Yu and Yuan (2011) by including sixteen international stock markets with longer sample period than prior international studies. Our main contribution is that we find the significant roles of the US market returns and the risk-free rates as we examine the local sentiment influence on the own country's risk-return relation. Our main finding is that after accounting for these variables, we tend to identify a two-regime sentiment pattern in most of the international markets: a low sentiment regime and a high sentiment regime. In the low sentiment period during which sentiment traders have small impact, the risk-return relation is largely robust positive in many international markets. Meanwhile, in the high sentiment period with more noise traders involved in the market, this positive trade-off is undermined. We also find that to some extent, US sentiment spreads to other countries and co-exists with local sentiment. However, the US sentiment effect is less significant and influential than the home sentiment effect. Our findings suggest that, concerning the domestic risk-return trade-off, the local sentiment effect dominates and effectively subsumes the US sentiment effect.

Members of Dissertation Committee: Dr. Mohammad Najand
Dr. David Selover

I dedicate this dissertation to my beloved family.

To my mother, Lixia Chen, and my father, Yasen Meng, thank you for giving me your love and support in every step of my way throughout my life. I love you.

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INTRODUCTION

In the first essay, we investigate the risk-return trade-off relation in the context of international markets. Although a positive trade-off relation between risk and return is probably one of most widely taught principles in finance, the sign of this relation is ambiguous in empirical studies. Over the past several decades, numerous studies have estimated the empirical relation between risk and return using the US stock market returns. However, the results are mixed. For example, French, Schwert, and Stambaugh (1987) find evidence of a positive relation, but Glosten, Jagannathan, and Runkle (1993) (hereafter GJR) document a negative relation. Hence, the risk-return trade-off relation remains an interesting but unresolved puzzle.

Most researchers conjecture that the inconclusiveness is likely due to model misspecifications. Many studies are devoted to identifying the correct specifications for the expected returns. For example, Pastor, Sinha, and Swaminathan (2008) use the implied cost of capital (ICC) derived from earnings forecasts to proxy for expected stock returns. They find a positive relation between the conditional mean and variance of stock returns. Guo and Whitelaw (2006) estimate an empirical model that separately identifies two components of expected returns: the risk component and the component due to the desire to hedge changes in investment opportunities. They find that expected returns are driven primarily by the hedge component, and the estimated risk-return relation is positive. Anderson et al. (2009) study asset pricing in economies featuring both risk and uncertainty. Empirically they measure uncertainty via the disagreement among professional forecasters and find evidence for an uncertainty-return trade-off.

Other researchers focus on the misspecification of the conditional variance. For instance, Harvey (2001) concludes that the relation between the conditional mean and variance depends on the specification of the conditional variance. Ghysels, Santa-Clara, and Valkanov (2005) introduce a MIDAS estimator for the conditional variance that forecasts monthly variance with past daily squared returns and find a significantly positive relation between risk and return. Brandt and Kang (2004) find a strong negative relation using the latent VAR approach.

In contrast to the voluminous amount of research based on the US market data, studies that examine international evidence on the risk-return trade-off relation are sporadic. For example, Pastor, Sinha, and Swaminathan (2008) apply their ICC approach to G-7 countries. However, due to data limitation, their sample periods are relatively short: 1981 to 2002 for the United States and 1990 to 2002 for Canada, France, Germany, Italy, Japan, and United Kingdom. Li, Yang, Hsiao, and Chang (2005) examine the international risk-return relations in the international markets from January 1980 to December 2001. They initially find a positive but insignificant relation for the majority of markets based on the GARCH model specification. However, after switching to a semiparametric specification of conditional variance, they find evidence of a significant negative relation in half of the twelve markets. León, Nave, and Rubio (2007) employ the MIDAS approach of Ghysels, Santa-Clara, and Valkanov (2005) to study the risk and return trade-off relations in several European stock indices. Their sample includes stock indices from Eurostoxx50, France, Germany, Spain, and United Kingdom from January 1988 to December 2003. They report that in most indices there is a significant positive relationship between risk and return.

In our view, the prior international studies in the extant literature are interesting but limited in several aspects. First, the samples selected by the prior studies seem to focus on developed countries, mostly from Europe. Second, their sample periods are quite short. As argued forcefully by Lundblad (2007), longer samples are needed in order to have more precise estimation of the true risk-return relation. Last, the prior studies appear to ignore the influence of the US market and test the international trade-off relation in isolation.

In our first essay, we posit that it is imperative to take into account the impact from the US market when testing the international risk-return trade-off relationship. We hypothesize there are two channels through which the US market can exert a significant influence. First, from a portfolio perspective, for an investor who holds both US and international stocks, the risk-return relations are interdependent. In particular, both the US market return and market volatility should have an impact on the risk and return relation of a given country, in addition to its own country variance. Second, from a state variable perspective, the US market will undoubtedly affect investors' investment opportunity sets and therefore influence the estimation of the international risk-return relation.

We find that the inclusion of US market variables significantly changes the estimated risk-return trade-off relationship in international markets. For example, we find that the estimated risk aversion coefficient switches from mostly negative to mostly positive after the inclusion of these US market related state variables. Our results also reject the portfolio interpretation but support the state variable interpretation of the US market variables. Our collective findings confirm and extend the recent literature that find an important role of the US market return in predicting international stock returns. In our context of the risk-return trade-off relationship, we find that the contemporaneous state variables are more significant than lagged ones, suggesting that the importance of US market variables is more likely driven by expected changes in investment opportunity sets rather than the slow diffusion of information.

In our second essay, we analyze the impact of the investor sentiment on the risk-return trade-off based on the approach we develop from essay one. To our best knowledge, although most prior research focuses on the cross-section or time series relation of investor sentiment, stock price and stock return, there is little empirical evidence on the impact of investor sentiment on the international risk-return relation from the aggregate stock market perspective.

The efficient market hypothesis (EMH) states that asset prices reflect fundamental values, investors are rational, and there are no market frictions. Hence, any mispricing in the market would be arbitraged away and the market price will return to its equilibrium. However, empirical studies show that there are abnormal returns in trading practices. For example, researchers have identified abnormal return anomalies such as value effect, size effect, momentum and a number of others. Behavioral-originated theories have been proposed as explanations for the return anomalies and noise trader behavior (Delong, Shleifer, Summers, and Waldmann, 1990; Shleifer and Vishny, 1997; Barberis, Shleifer and Vishny, 1998; Hong and Stein, 1999; Daniel, Hirshleifer and Subramanyam, 1998; Baker and Wurgler, 2006).

The noise trader approach has received growing attention as an alternative to the EMH during the past decades and important theoretical and empirical findings have been documented. Researchers propose sentiment theories based on two main assumptions of the noise trader approach. First, noise traders or sentiment investors are not fully rational and their demand for risky asset is affected by their sentiment that is not fully justified by fundamental values. Second, there are limits to arbitrage in the sense that arbitrage is not subject to sentiment, hence it becomes difficult, costly, and risky for rational investors to arbitrage. Consequently, the trading behavior of noise traders causes deviations of stock price from fundamental value because changes in investor sentiment are not fully accounted by rational investors.

Despite the fact that many empirical studies have been conducted to investigate the cross-section and time-series relation between investor sentiment and stock market returns, there is only limited empirical research focusing on the relation between the investor sentiment and the risk-return trade-off. A recent empirical study by Yu and Yuan (2011) has filled this gap in this field, to some extent, and brought up academic attentions to future extensions of their work. Yu and Yuan (2011) focus on the effect of investor sentiment on risk-return trade-off. They propose a two-regime pattern: a low sentiment period with positive mean-variance relation and a high sentiment period with a much weaker one. As their propositions are supported empirically, they document that in the low-sentiment period when sentiment investors have less influence on the market, the risk-return trade-off is significantly positive, but this positive relation is weakened in the bubble period when there are more noise traders in the market.

In our second essay, we extend Yu and Yuan's (2011) research to an international context. To our best knowledge, our study is the first one attempting to investigate the international evidence of sentiment effect on the risk-return trade-off. Following Yu and Yuan (2011), we hypothesize that investor sentiment can influence the risk-return trade-off through a two-regime pattern. Specifically, in the low sentiment regime, the trade-off is positive and in the high sentiment regime, this positive trade-off is weakened. The mechanism behind this is in high-sentiment periods, there is a greater participation of noise traders in the market, thereby perturbing prices away from levels that would otherwise reflect a positive mean-variance trade-off.

Our main contribution to the literature is that we include the US market returns, the US risk-free rate and the home country risk-free rate as state variables in our study. We argue that to better discover the sentiment effect on the home risk-return trade-off, it is necessary to account for the US market influence. Our argument derives from two important aspects. First, recent research indicates that the US market can influence international asset pricing (Stivers et al. 2009; Rapach et al. 2013). Second, the analysis in our first essay suggests that the US market can influence international equity markets from two perspectives: the portfolio and the state variable perspectives. For instance, our first essay finds that the estimated risk aversion coefficient switches from mostly negative to mostly positive after the inclusion of the US market related state variables.

The main finding of our second essay is that without considering these state variables, the sentiment effect on the risk-return trade-off relation is ambiguous and mixed. After accounting for the US market influence, the sentiment effect becomes clearer and more significant. That is, we seem to identify a two-regime pattern in most of the international markets: the low sentiment period and the high sentiment period. Our empirical evidence shows that the risk-return relationship varies distinctively within the two periods. In the low sentiment period when sentiment traders have small impact, the relationship is largely robust positive in many international markets. Moreover, in the high sentiment period with more noise traders involved in the market, this positive trade-off is undermined. The above findings are widely perceived in most countries. Fourteen out of sixteen international markets showing the above trend and seven out of fourteen countries are strongly supported with significant evidence at the 5% confidence level.

In addition to the US market returns and risk-free rates, we also consider the US sentiment impact on the local risk-return relation. Our motivation derives from some interesting empirical findings from recent studies. Baker, Wurgler and Yuan (2012) (hereafter BWY (2012)) discover that besides local sentiment, global sentiment and the US sentiment can serve as contrarian predictors of the international markets returns. Inspired by their findings, we add the US sentiment variable in our model. We find that to some extent, the US sentiment spreads to other countries, co-existing with local sentiment. We observe that similar to the local sentiment, the US sentiment also generates a two-regime pattern for the risk-return trade-off. However, this US sentiment effect is mild and not as significant as the local sentiment effect. While the US sentiment can also identify a two-regime pattern, this pattern is less significant than the one identified by the home sentiment. Our findings suggest that when we consider the joint outcome of home and the US sentiment, the US sentiment is less influential than the home in the sense that the home sentiment effect dominates and effectively subsumes the US sentiment effect in the international risk-return trade-off relations.

The remainder of this dissertation is organized into three more sections. In the second section, we focus on the role of the US market on the international risk-return trade-off relations. In the third section, we examine the effect of domestic investor sentiment on the international risk-return trade-off. We also examine the impact of the US investor sentiment along with the local sentiment effect. The last section includes conclusions and contributions of our research on this subject.

THE ROLE OF THE US MARKET ON INTERNATIONAL RISK-RETURN TRADE-OFF RELATIONS

I. LITERATURE REVIEW AND DISCUSSION

A. Literature review

The relation between risk and return, also known as risk-return trade-off, is an important topic in modern finance theory and has been one of its most extensively studied topics. Theoretical asset pricing models (e.g., Sharpe, 1964; Lintner, 1965; Merton, 1973, 1980) postulate the return of an asset to its own return variance. For example, Classic modern asset pricing models (Sharpe 1964 and Merton 1980) always imply a positive relationship between risk and return based on the argument that return increases with risk as investors want to be compensated with higher return when they hold riskier assets. According to these general asset-pricing theories, the risk-return relationship is described as the correlation between the expected asset return and the asset return volatility. The asset return volatility is measured by the covariance between its return and the market portfolio return or by its variance if the asset itself is the market portfolio.

Although theories suggest a positive risk-return trade-off, the empirical evidence on the relation is mixed and inconclusive. Some studies find support for the positive risk-return trade-off predicted by the asset pricing models, while other evidence supports a negative relation or even insignificant relation.

French, Schwert, and Stambaugh (1987) find a positive risk-return relation using a generalized autoregressive conditional heteroskedasticity model with mean effects (GARCH-M).

In contrast, they also find an insignificant relation when estimating conditional volatility using an autoregressive integrated moving average (ARIMA) model. Ghysels, Santa-Clara, and Valkanov (2005) argue that the conflicting evidence is mostly the outcome of differences in the approaches to modeling the conditional variance. They investigate the intertemporal relation between the conditional mean and conditional variance of the aggregate stock market returns by employing a mixed data sampling approach (MIDAS) and found a significant positive relation between risk and return in the stock market.

There are also other researchers who have found positive relations between expected returns and conditional volatility based on the GARCH-M model(Chou, 1988), implied volatility (Bollerslev and Zhou, 2006), high-frequency data (Bali and Peng, 2006), dynamic factor analysis (Ludvigson and Ng, 2007), extended sample period (Lundblad, 2007), implied cost of capital (Pástor et al., 2008), return component (Guo and Whitelaw, 2006), and uncertainty-return (Anderson et al., 2009).

However, some empirical studies suggest that the relationship between expected return and risk is negative or statistically insignificant. For example, using a traditional GARCH-M model Baillie and DeGennaro (1990) only find a weak and almost non-existent relationship on the US stock market. Based on the simple GARCH model by Bollerslev (1986), Nelson (1991) develops an exponential generalized autoregressive conditional heteroskedasticity (EGARCH) model. Unlike the other simple GARCH models that use assumptions of symmetric effects of positive and negative innovations, the EGARCH model differentiates itself in a way that responds asymmetrically to positive and negative innovations. In particular, Nelson uses the EGARCH-in-mean specification, which captures negative and positive innovations, yet finds a negative relation between the conditional mean and the conditional variance of the market stock returns.

As an extension of Nelson's (1991) work of the EGARCH model, Glosten, Jagannathan and Runkle (1993) (hereafter GJR (1993)) introduce an asymmetric GARCH that extends the pure GARCH specification by adding an indicator variable. Their model is referred to as the GJR-GARCH. Similar to Nelson's EGARCH model, the GJR-GARCH model captures asymmetric innovations in the conditional variance estimate. In other words, their model can reflect the asymmetric impact that positive and negative news brings on the conditional variance. Even after using dummy variables to control for the January effect, they find a negative conditional risk-return link.

Using a latent VAR methodology, Brandt and Kang (2004) develop an alternative volatility process approach to estimate the relation between the conditional return and the variance. Their empirical findings generally suggest a significant and negative conditional mean-variance relation.

As summarized from the above extant literature review, the inconclusiveness of the risk-return trade-off comes from the difference in the model specification in two aspects: the variance specification and the return specification. First, for the variance specification, researchers focus on finding effective specification for the conditional variance. For instance, Ghysels, Santa-Clara, and Valkanov (2005) introduce a MIDAS estimator for the conditional variance that forecasts monthly variance with past daily squared returns and find a significantly positive relation between risk and return. Brandt and Kang (2004) employ the latent VAR approach to investigate the trade-off and find a negative relation.

Second, recently researchers have switched their attention from finding the correct specifications for the conditional variance to the correct specifications for the expected returns. For instance, Guo and Whitelaw (2006) identify two components of expected returns: the risk component and the hedge component. They find that it is the hedge component driving the positive relationship between the expected return and the risk. Pástor, Sinha and Swaminathan (2008) find a positive correlation between the conditional variance and the implied cost of capital (ICC) which is used to proxy for the expected return. Anderson et al. (2009) include the uncertainty term along with risk in estimating the trade-off. They measure uncertainty via the disagreement among professional forecasters. Instead of identifying an association between risk and return, they discover evidence for an uncertainty-return trade-off.

However, one of the limitations from prior research is that most of it focuses on developed markets, particularly the US market. The empirical studies conducted on the international markets regarding the risk-return trade-off are very limited in number. Only a small number of researchers (Theodossiou and Lee, 1995; De Santis and Imrohoroglu, 1997; Li, Yang, Hsiao, and Chang, 2005; and Pástor et al., 2008) have addressed the risk–return relationship in international stock markets. For example, Theodossiou and Lee (1995) find a positive but insignificant relationship between the stock market volatility and expected returns in ten industrialized countries, based on a GARCH-M model with logarithmic square root and linear specifications. Conducting data from emerging financial markets in fourteen countries in addition to Germany, Japan, the UK and the USA, De Santis and Imrohoroglu (1997) find a positive risk-return trade-off in Latin America but not in Asia. Li, Yang, Hsiao, and Chang (2005) use EGARCH-M models to estimate volatility. In particular, they use a semiparametric specification of conditional variance. They show that a positive but insignificant relationship for most of the twelve international stock markets exists. Pástor et al. (2008) apply their ICC approach to G-7 countries. However, due to data limitation, their sample periods are relatively short: from 1981 to 2002 for the United States and from 1990 to 2002 for Canada, France, Germany, Italy, Japan, and the UK. Leon et al. (2007) extend the MIDAS method by Ghysels et al. (2005) to predict the conditional risk-return relation. They examine daily returns from several European stock indices dating from January 1988 through December 2003. Their findings indicate a positive and significant risk-return trade-off in most indices.

In the context of the international evidence of the risk return relations, in our view, the previous international studies in the extant literature are interesting but limited in several aspects. First, the samples selected by the prior studies seem to focus on developed countries, mostly from Europe. Second, their sample periods are quite short. As argued forcefully by Lundblad (2007), longer samples are needed in order to have more precise estimation of the true risk-return relation. Third, most of the studies are based on the standard GARCH-in-mean model, which also gives ambiguous evidence to the mean variance relation. Thus, more extended studies with different model specifications and with a wider selection of countries' samples can help interpret the puzzling results obtained from the US data. Last, the prior studies appear to ignore the influence of the US market and test the international trade-off relation in isolation. In our next section, we posit that it is imperative to take into account the impact from the US market when testing the international risk-return trade-off relationship. We propose that there are two channels through which the US market can exert a significant influence. The first channel is from portfolio perspective through which the US market factors can affect the trade-off. The second channel is from Merton's ICAPM state variables perspective.

B. Discussion: The importance of the US market

To begin with, let us consider the Intertemporal Capital Asset Pricing Model of Merton (1973),

$$E_{t-1}(R_{M,t}) = \left[\frac{-J_{WW}W}{J_W}\right] \sigma_{M,t}^2 + \left[\frac{-J_{WF}}{J_W}\right] \sigma_{MF,t} \qquad (1)$$

$E_{t-1}(R_{M,t})$ denotes the expected market risk premium. *J* is the indirect utility function with subscripts indicating partial derivatives. σ_M^2 and $\sigma_{M,F}$ are market variance and market covariance with the state variable *F*, which describes the state of investment opportunities in the economy.

In the case when the investment opportunity set is constant or, alternatively, rates of return are independent and identically distributed, the second term in equation (1) goes away. Consequently, there is a positive relationship between expected excess return and conditional variance:

$$E_{t-1}(R_{M,t}) = \left[\frac{-J_{WW}W}{J_W}\right] \sigma_{M,t}^2 = \gamma\sigma_{M,t}^2 \qquad (2)$$

$\gamma = \left[\frac{-J_{WW}W}{J_W}\right]$ is the relative risk aversion coefficient. This equation predicts a positive risk-return trade-off relation due to investors' risk aversion. With econometric models based on equation (2), most researchers go on to test the trade-off relation using the US market index as a proxy for the market portfolio. While this approach is reasonable when the focus is on the US market only, we argue that applying equation (2) directly to the case of international markets is problematic.

In our view, to investigate the international risk-return trade-off relation, one has to evaluate carefully the influence from the US market. In other words, it is not enough to simply use the market index of an international market and test the risk-return trade-off relation in isolation. Our intuition is based on the fact the US is not only the largest economy in the world but is also the engine of global trade. Events that occur in the US market are closely monitored by everyone, including investors who reside in other countries.

More formally, we hypothesize there are two channels through which the US market could exert significant influence on other markets. First, let us consider an investor who holds a portfolio that is directly invested in markets of both the US and country *i*. Then the return on the market portfolio, in this case, is given by

$$R_{M,t} = \omega R_{i,t} + (1-\omega) R_{us,t} \qquad (3)$$

Here ω is the investment weight in country *i*. Obviously when $\omega = 0$, this reduces to the US only case. Plugging equation (3) into equation (2) and rearrange, we obtain

$$E_{t-1}(R_{i,t}) = -\frac{1-\omega}{\omega} E_{t-1}(R_{us,t}) + \gamma\omega\sigma_{i,t}^2 + \frac{\gamma(1-\omega)^2}{\omega}\sigma_{us,t}^2 + 2\gamma(1-\omega)\sigma_{i,us,t} \qquad (4)$$

Here $\sigma_{i,us,}$ denotes the covariance between the US market and international market *i*. Compare equation (4) with a naive application of equation (2) to the international market *i*, namely $E_{t-1}(R_{i,t}) = \gamma\sigma_{i,t}^2$, we find that there are three additional terms on the right hand side of equation (4). These terms are the expected US market return: $-\frac{1-\omega}{\omega} E_{t-1}(R_{us,t})$, the US market variance: $\frac{\gamma(1-\omega)^2}{\omega}\sigma_{us,t}^2$, and the covariance between the US and country *i*: $2\gamma(1-\omega)\sigma_{i,us,t}$.

Note that equation (4) imposes additional restrictions on the international risk-return relation. For instance, it indicates that international market variance: $\gamma\omega\sigma_{i,t}^2$ and the US market variance: $\frac{\gamma(1-\omega)^2}{\omega}\sigma_{us,t}^2$ must share the same signs since $(1-\omega)^2$ is positive. If we further assume that 0< ω <1, then the sign on the US market return: $-\frac{1-\omega}{\omega}E_{t-1}(R_{us,t})$ should be negative. We test these implications for the signs in our empirical investigation.

Secondly, there are reasons to believe that the US market return and its variance can be important state variables that affect investors' investment opportunity sets in the international setting. For example, Rapach, Strauss, and Zhou (2013) find that the lagged US returns significantly predict returns in many international markets, while the lagged non-US returns display limited predictive ability with respect to the US market returns. They find evidence supporting the notion that the predictive power for the lagged US returns is attributable to intense investors' attention on the US market, and a gradual diffusion of relevant information on macroeconomic fundamentals across countries in the presence of information-processing limitations. Stivers et al. (2009) find that January returns of the US market have predictive power for the subsequent 11-month returns from February to December in many international markets. Londono (2014) shows that the US variance risk premium, defined as the difference between option-implied variance and realized variance, has predictive power for international stock returns. Taken together, these prior studies provide striking evidence that the US market variables appear to have forecasting power for the returns of other countries. The empirical evidence seems consistent with the notion that the US market returns and variances should be treated as state variables that can affect investors' investment opportunity sets in the international setting.

In our following empirical investigation, we also augment the US market variables with both the US and the foreign countries own short-term risk-free rates to serve as additional state variables. This choice is based on the observation that interest rates are important macroeconomic variables that are often used as standard state variables in the literature. In addition, we also note that the difference between the US and foreign interest rates can influence foreign currency values via the interest rate parity relation, which in turn can have an impact on the relative attractiveness of a given international market.

II. DATA

The international market return data for this study is from the Global Financial Data database (GFD). GFD provides comprehensive economic and financial time-series database covering 150 countries and 6,500 different data series, including data on stock markets from 1690, interest rates from 1700, exchange rates from 1590, commodities from 1500 and inflation from 1264. For more information, please see the Bouman and Jacobsen (2002) study of "sell-in-May" effect as well as the study by Stivers et al. (2009) on "the Other January Effect" as examples of prior studies that feature GFD database.

To be consistent with the findings of Lundblad (2007), as well as for statistical power reasons, we apply a screen that requires the length of monthly equity return series to be larger than or equal to twenty-five years. In addition, since we are interested in excess returns, we require that short-term interest rate data should also be available for the same sample period to match equity returns. This leaves us with eighteen international markets that include Australia, Belgium, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, South Africa, Spain, Sweden, Switzerland, and the United Kingdom. The longest time series is from the UK, dating back to January 1900. Our sample does not include South America countries due to the difficulty of converging their data in our sample. This issue may attribute to abnormal high inflation in those countries during some specific periods. The shortest sample comes from Portugal, starting at February 1988. All of the international return data ends in December 2014. For the US data, we choose the value-weighted index from the Center for Research in Security Prices (CRSP) to be consistent with prior studies in the literature. Following the literature (Scruggs 1998), we use monthly return data in our regression models. We calculate monthly stock market returns in excess of their own country risk-free rates obtained from their respective short-term treasury yields.

Table 1 reports the summary statistics for the monthly excess returns of the various countries. The average monthly excess returns range from 0.74% in Spain to −0.07% in the case of Portugal. Most countries have an average monthly excess return between 0.3% and 0.6%, which gives us reasonable average yearly excess returns between 4% and 6%. The monthly return standard deviations vary from only 4.28% in Canada, up to 7.34%% for Italy. Based on the observation of the mean returns and the return standard deviations, we find heterogeneity and variation across our sample data. Table 1 also reports the correlations of the eighteen international markets with the US market during the period where their samples overlap. We find that the highest correlation is with the Canadian market at 0.717 and the lowest is with Italy at 0.283. For eight out of eighteen markets, their correlations with the US market returns are at or above 0.5. This observation partially supports our argument that the US market can play a key role here on the international trade-off. Overall, as one would desire for an international investigation of the risk-return trade-off relation with a focus on a potential US based effect, the statistics indicate there are sizable differences across the monthly stock excess returns of the eighteen countries and the US.

[Insert Table 1 here]

III. MODELS AND MAIN RESULTS

A. The GARCH-in-Mean model and main results

We first evaluate the international risk-return relations based on the most commonly used model specification in this context, the GARCH-in-Mean model. The model is set up as follows.

$$R_{i,t} = a_0 + a_1 h_{i,t} + \varepsilon_{i,t} \qquad (5)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \varepsilon_{i,t-1}^2 \qquad (6)$$

Here $R_{i,t}$ and $h_{i,t}$ are the market index excess return and conditional variance respectively for country *i* at month *t*. The key parameter of interest in this case is a_1, whose sign is the focus in the literature. As predicted by the traditional CAPM theories, we expect to observe a positive relationship between the expected return and the conditional variance in equation (5), i.e., $a_1 > 0$.

We report the results for this model in Table 2. To test for statistical significance, we rely on the robust *t*-statistic of Bollerslev and Wooldridge (1992). We find that eight out of nineteen markets (including the US) have negative estimated a_1. However, among them, only New Zealand is significantly negative. At the other end of the spectrum, eleven countries have positive a_1 values but only the UK is statistically significant. Therefore, we conclude that under the GARCH-in-Mean model, the risk-return trade-off relation is largely positive but insignificant. Our findings are also consistent with the literature (French et al. 1987; Harvey 2001) in the sense that the GARCH-in-Mean model specifications tend to produce insignificant positive risk-return trade-off.

[Insert Table 2 here]

B. The GJR GARCH-in-Mean model and main results

Next, we turn to the GJR GARCH-in-Mean model, which is the widely adopted model specification in the literature. In contrast to the GARCH-in-Mean model, the GJR model has been shown to give significant negative estimates of the risk aversion coefficient by many empirical findings. Following the prior research, we use the GJR model as our main empirical testing specification. The GJR GARCH-in-Mean model specification is as follows.

$$R_{i,t} = a_0 + a_1 h_{i,t} + \varepsilon_{i,t} \quad (7)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \varepsilon_{i,t-1}^2 + b_3 I_{i,t-1}^{-} \varepsilon_{i,t-1}^2 + b_4 r_{i,t}^f \quad (8)$$

Here I^- is an indicator variable where it takes the value of one if the residual ε_{t-1} is negative and zero otherwise. $r_{i,t}^f$ denotes the risk-free rate for country *i* at month *t*. Note that this model allows negative return shocks to have an impact on the conditional variance, which captures the well-known leverage effect. Following GJR (1993), we also include the risk-free rate in the conditional variance equation.

The results for the GJR GARCH-in-Mean model are presented in Table 3. Interestingly, we notice that thirteen out of nineteen countries (including the US) have negative estimated risk aversion parameter a_1. Among them, five markets (Australia, Denmark, New Zealand, Norway, and Portugal) are significant at 10% levels. Notably, Canada is just barely outside the 10% cutoff. In contrast, only the UK is significantly positive. Thus, consistent with the findings of GJR (1993) based on the US data, we find the the GJR GARCH-in-Mean model specification tends to generate more negative risk-return trade-off relations even for international markets. The only country that seems to survive the change in model specification is the UK market, which happens to have the longest sample among all the countries. We, therefore, conclude that under the GJR

GARCH-in-Mean model, the risk-return trade-off relation is largely negative and partially significant.

[Insert Table 3 here]

C. The role of the US market variables and the main results

As a first step to explore the role of the US market variables on international risk-return trade-off relations, we modify the GJR GARCH-in-Mean model by adding the lagged US returns to the conditional mean equation. To be specific, we have the following conditional mean and variance equations:

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + \varepsilon_{i,t} \quad (9)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \varepsilon_{i,t-1}^2 + b_3 I_{i,t-1}^{-} \varepsilon_{i,t-1}^2 + b_4 r_{i,t}^f \quad (10)$$

Here we view $R_{us,t-1}$ as a state variable in the sense of Merton's ICAPM (see equation (1)). Rapach, Strauss, and Zhou (2013), who document that the lagged US market return possesses predictive power for international markets, motivate the choice of this variable.

The results for this modified GJR GARCH-in-Mean model are presented in Table 4. We find that twelve out of eighteen international markets[1] have negative estimated risk aversion parameter a_1. Among them, four markets (Denmark, New Zealand, Norway, and Portugal) are significant at the 10% level. It is noteworthy that while still positive, the UK market has lost its statistical significance. At first appearance, these results look quite similar to those presented in Table 3. However, we notice that the parameter estimates for a_2 are highly significant in fifteen

[1] We no longer include the US market since our focus is now on the influence the US has on other markets.

out of eighteen markets. The only exceptions are Denmark, Singapore, and South Africa. Taken together, we believe that the use of the lagged US market return as the only state variable while promising is insufficient to move the needle, which inspires us to investigate the role of additional US market variables.

[Insert Table 4 here]

An obvious extension is to include both the contemporaneous and the lagged US market returns in the conditional mean equation of the GJR GARCH specification. Therefore, we obtain:

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + a_3 R_{us,t} + \varepsilon_{i,t} \qquad (11)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \varepsilon_{i,t-1}^2 + b_3 I_{i,t-1}^- \varepsilon_{i,t-1}^2 + b_4 r_{i,t}^f \qquad (12)$$

Here $R_{us,t}$ and $R_{us,t-1}$ denote the contemporaneous and the lagged US market excess returns respectively.

The results for the above model specification are presented in Table 5. We find that eight out of eighteen international markets have negative estimated risk aversion parameter a_1. Among them, only three markets (Denmark, New Zealand, and Portugal) are significant at the 10% level. It is interesting that with the inclusion of the contemporaneous US market returns in the conditional mean specification, the UK market remains positive and actually has regained its statistical significance.

In addition to their interpretation as state variables, the US market returns should also play an important role from the portfolio perspective. From the portfolio interpretation, equation (4) suggests that the sign on the US market return should be negative. This is because in equation (4), the US market return term is given by $-\frac{1-\omega}{\omega} E_{t-1}(R_{us,t})$ and the sign of this term is determined by $-\frac{1-\omega}{\omega}$. Under the assumption that the investment weight ω stays positive and less than 100%, $-\frac{1-\omega}{\omega}$ is negative, thus the sign of the US market return is negative.

Contradictory to the prediction of the negative signs for the US market returns, we find that in Table 5 the estimated parameter values for a_2 and a_3 are all positive and highly significant. For example, the lagged US market coefficient a_2 is positive for all markets and highly significant in all but two cases: Singapore and South Africa. The results for the contemporaneous US returns are even more striking. The a_3 estimates are positive and highly significant in all markets with *t*-statistics range from 3.49 to 21.38. Thus, it appears that one of the predictions of the portfolio prediction is rejected, and the evidence appears to favor the state variable interpretation.

[Insert Table 5 here]

While the results from Table 5 are interesting, equation (4) and the empirical evidence presented by Rapach et al. (2013) and Bollerslev et al. (2014) indicate that we need to consider additional variables in the specification of the conditional mean equation. Therefore, we present the following modified version of the GJR GARCH-in-Mean model with the following set of seven state variables: the contemporaneous and lagged US market returns, the contemporaneous and lagged US market variance[2], the lagged return of international market under investigation, risk-free rates from both the US and the international market under investigation. The full model specification is given as follows:

[2] We obtain estimates of the US market conditional variances separately from a GARCH (1,1) model.

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + a_3 R_{us,t} + a_4 R_{i,t-1} + a_5 \sigma^2_{us,t} + a_6 \sigma^2_{us,t-1} + a_7 r^f_{us,t} + a_8 r^f_{i,t} + \varepsilon_{i,t} \tag{13}$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \varepsilon^2_{i,t-1} + b_3 I^-_{i,t-1} \varepsilon^2_{i,t-1} + b_4 r^f_{i,t} \tag{14}$$

In the above equations, $\sigma^2_{us,t}$ and $\sigma^2_{us,t-1}$ denote the contemporaneous and lagged US market return variances respectively. $R_{i,t-1}$ denotes the lagged return of country i, $r^f_{i,t}$ is the own country risk-free rate, and $r^f_{us,t}$ is the US risk-free rate.

Our main empirical results are presented in Table 6. First, we notice that seventeen out of eighteen countries have a positive estimated risk aversion coefficient a_1. The only exception is Denmark. In addition, five countries now have a positive and significant risk-return trade-off relation. These include New Zealand, Norway, South Africa, Sweden, and the United Kingdom. Therefore, the overall evidence seems to have tilted toward a positive risk-return trade-off relationship among international markets.

Next, we find that the parameter estimates for the contemporaneous and lagged US market returns a_2 and a_3 are all positive and mostly highly significant. This is consistent with the results from Table 5, suggesting that one of the predictions of the portfolio interpretation is rejected.

Equation (4) from the portfolio interpretation suggests that the sign on the US and international market variances should share the same sign. Recall that in equation (4), the US market variance term is given by $\frac{\gamma(1-\omega)^2}{\omega}\sigma^2_{us,t}$ and the international market variance is given by $\gamma\omega\sigma^2_{i,t}$. Comparing these two terms, we notice that since $(1-\omega)^2$ is positive, the signs of the US and the international market variance are both determined by the two parameters, γ and ω. Therefore, the US and the international market variances terms should share the same sign.

However, contrary to this prediction, the parameter estimates a_5 for the US market variance are negative in sixteen out of eighteen countries (with four markets significantly so) while the parameter estimates a_1 for the domestic market variance are positive in seventeen out of eighteen countries. This forms a sharp contrast with the international market variance parameter a_1, which for most countries is estimated to be positive. In only three countries, the signs of a_1 and a_5 agree with each other. These are Denmark (negative), South Africa and Spain (positive). However, even in these three cases, none are statistically significant for both parameters. On the contrary, in three markets, New Zealand, Norway, and Sweden, the signs are both opposite and significant. Based on this observation, we conclude that the empirical evidence does not support the portfolio interpretation for the role of the US returns and variances.

[Insert Table 6 here]

Table 6 also shows that both interest rate variables are mostly highly significant, with positive signs on the US risk-free rate and negative signs on the own-country risk-free rate in sixteen out of eighteen cases for both variables. One potential interpretation for the signs of these interest rate variables is that they reflect market expectations regarding the value of the foreign currency in a given country. A rising US interest rate or a declining foreign interest rate could signal expected depreciation in the value of the foreign currency via the interest rate parity, which in turn should spur exports and therefor economic growth in that country. Thus, we are motivated by this observation to look further into the potential explanation for the interest rate effect. We include the exchange rate expectation in our conditional mean equation. This derives from the widely perceived research that exchange rate is an effective factor that can affect the stock price in the literature. More formally, the model specification is given by:

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + a_3 R_{us,t} + a_4 R_{i,t-1} + a_5 \sigma^2_{us,t} + a_6 \sigma^2_{us,t-1} + a_7 r^f_{us,t} + a_8 r^f_{i,t} + a_9 EX_{i,us,t-1} + \varepsilon_{i,t} \quad (15)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \varepsilon^2_{i,t-1} + b_3 I^-_{i,t-1} \varepsilon^2_{i,t-1} + b_4 r^f_{i,t} \quad (16)$$

$EX_{i,us,t-1}$ is the one-month lagged monthly exchange rate between the US dollar and the home country currency and is measured as units of home currency per US dollar.

The results are reported in Table 7. We have similar results as in Table 6. First, seventeen out of eighteen countries have positive estimates for risk aversion coefficient a_1. The only exception is Denmark. Among the seventeen countries, four countries are statistically significant at 10% level. These include New Zealand, Norway, Sweden and the UK. Comparing Table 7 to Table 6, we notice that we have lost South Africa in the significance group in Table 7. Other than that, the two tables' findings are generally consistent. For example, the above four countries hold the similar results in Table 7 as in Table 6 with significant positive estimates a_1. Thus, the inclusion of the exchange rate as an explanatory state factor does not change our previous primary results in Table 6.

Second, this result is not surprising since we find that the exchange rate factor has less significant explanatory power than the US market returns and the risk-free rates. For example, only four countries out of eighteen have a significant estimated coefficient for the exchange rate variable.

However, it is noteworthy that findings also show that the lagged exchange rate variable is generally positively related to the international stock market return. Fifteen out of eighteen countries have positive coefficient estimates a_9 of the exchange rate variable. The exchange rate proxy we use here is the rate of home country's currency PER US Dollar. Therefore, a rising exchange rate value in our equation leads to an appreciation of the US Dollar and a depreciation of home country's currency, which in turn should spur exports and therefore economic growth in home country. As a result, the stock market in that country would expect a higher return in the future. This can be a potential channel or interpretation to the effects of the interest rates on the international stock market returns.

[Insert Table 7 here]

Moreover, we summarize the adjusted $\bar{R}^2$ results from different equation (a), (b), (c) and (d) in Table 8. Equation (a) has no US market variables included and its adjusted $\bar{R}^2$ is represented by $\bar{R}^2_{(a)}$. Equation (b) adds only the lagged US market return and its adjusted $\bar{R}^2$ is represented by $\bar{R}^2_{(b)}$. Equation (c) adds the US and international risk-free rates as well as the lagged US returns and its adjusted $\bar{R}^2$ is given by $\bar{R}^2_{(c)}$. Equation (d) adds the contemporaneous US return along with the lagged US return and the risk-free rates and its adjusted $\bar{R}^2$ is presented by $\bar{R}^2_{(d)}$. Table 8 shows that the adjusted $\bar{R}^2$ rises when including the US market returns and the risk-free rate in the mean-variance regression. For example, in most countries, the $\bar{R}^2$ increases from negative or less than 1% to above 2% when we include the lagged US return, the US risk-free rates and the home country risk-free rate in the equation. This reveals that the US market factors and the risk-free rates add quite some explanatory power relative to other factor variables.

[Insert Table 8 here]

Overall, the empirical results and especially the highly significant estimated coefficients are consistent with the notion that these variables should be viewed as state variables that can capture changes in investors' investment opportunity sets in the sense of Merton's ICAPM.

D. Robustness checks

To ensure that our results are robust, we perform a battery of robustness checks. First, we consider the impact of the US January market returns as well as negative returns from the US market. The use of the US January return variable is motivated by the works of Cooper et al. (2006) and Stivers et al. (2009), who show that the US market returns in January have lasting effects on the subsequent 11-month period from February to December, and this effect tends to spread from the US to other markets as well. The use of a negative US market return variable is motivated by the empirical finding that international stock return correlation tends to go up during periods of market crisis.[3] More formally, our model specification is as follows

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + a_3 R_{us,t} + a_4 R_{i,t-1} + a_5 \sigma^2_{us,t} + a_6 \sigma^2_{us,t-1} + a_7 r^f_{us,t} + a_8 r^f_{i,t} + a_9 I^{Jan}_{us,t} + a_{10} I^{Neg}_{us,t} + \varepsilon_{i,t} \quad (17)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \varepsilon^2_{i,t-1} + b_3 I^-_{i,t-1} \varepsilon^2_{i,t-1} + b_4 r^f_{i,t} \quad (18)$$

$I^{Jan}_{us,t}$ is an indicator variable where it takes the value of 1 if the US prior January return is non-negative and zero otherwise. $I^{Neg}_{us,t}$ is an indicator variable where it takes the value of 1 if the US market return is negative and zero otherwise.

[3] See, for example, Forbes and Rigobon (2002) among many others.

Table 9 presents the results. We find that the results are largely consistent with those reported in Table 6. First, we find that for the risk aversion coefficient a_1, it is positive in sixteen out of eighteen countries. Six markets (France, New Zealand, Norway, South Africa, Sweden, and the UK) are significantly positive, but only one country (Denmark) is significantly negative. The parameter estimates for the US market returns a_2 and a_3 are mostly positive and significant. The estimates for other state variables (the US market variances and risk-free rates) are also broadly consistent with those reported in Table 6. These results are not surprising as the two newly added variables on the US January and negative returns are in most cases insignificant.

[Insert Table 9 here]

Recall that our main empirical results from Table 6 use the same conditional variance equation as in the GJR model. Namely it includes a dummy variable for the negative residuals as well as the own country risk-free rate. If we compare the results from Tables 2 and 3, it is obvious that the use of GJR model specification seems to induce a more negative risk-return trade-off relation even in the case when the conditional mean equations are the same. However, a closer look at the results from Panel B of Table 6 shows that the estimated parameter values of b_3, the coefficient for the negative residual dummy, are statistically insignificant for all countries except for Denmark. In contrast, the estimated coefficient for the risk-free rate, b_4, is significant in seven out of eighteen countries. Based on this observation, we drop the negative residual dummy but keep the risk-free rate in the conditional variance equation. In this case, the conditional variance specification is similar to the standard GARCH-in-Mean model but with an additional risk-free rate variable. More formally, the model that we estimate is as follows:

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + a_3 R_{us,t} + a_4 R_{i,t-1} + a_5 \sigma^2_{us,t} + a_6 \sigma^2_{us,t-1} + a_7 r^f_{us,t} + a_8 r^f_{i,t} + \varepsilon_{i,t} \quad (19)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \varepsilon^2_{i,t-1} + b_3 r^f_{i,t} \quad (20)$$

We report the results under this model specification in Table 10. We find that in this case, all eighteen countries have positive risk-return trade-off and among them, six countries are statistically significant. In addition, the estimated parameter values of a_2 and a_3 are all positive and mostly significant. We also find that the estimated values for a_5 are mostly negative. The estimated coefficients for the two risk-free rates in the conditional mean equation are mostly highly significant. Taken together, these results are strikingly similar to those reported in Table 6. Therefore, we conclude that after the inclusion of the US market and risk-free rates as state variables, there appears to be a positive risk-return trade-off relationship in these international markets. Furthermore, our results are consistent with the state variable interpretation of the US market variables but appear to contradict the portfolio interpretation.

[Insert Table 10 here]

Finally, we consider using conditional standard deviation rather than conditional variance in the conditional mean equation. More formally, the model specification is given by:

$$R_{i,t} = a_0 + a_1 \sqrt{h_{i,t}} + a_2 R_{us,t-1} + a_3 R_{us,t} + a_4 R_{i,t-1} + a_5 \sigma^2_{us,t} + a_6 \sigma^2_{us,t-1} + a_7 r^f_{us,t} + a_8 r^f_{i,t} + \varepsilon_{i,t} \quad (21)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \varepsilon^2_{i,t-1} + b_3 I^-_{i,t-1} \varepsilon^2_{i,t-1} + b_4 r^f_{i,t} \quad (22)$$

$\sqrt{h_{i,t}}$ is the conditional standard deviation for country *i* at month *t*.

The results are reported in Table 11. We find that in three out of eighteen countries, the estimated risk aversion coefficients are negative, but they are also insignificant. In contrast, seven markets are significantly positive. These include Belgium, France, Italy, New Zealand, Norway, South Africa, and the United Kingdom. In addition, the estimated coefficients for US return variables are mostly positive and significant, whereas estimated coefficient for the US market variance is mostly negative. The risk-free rate variables are highly significant. Hence, we conclude that our main results remain unchanged under this model specification.

[Insert Table 11 here]

THE ROLE OF INVESTOR SENTIMENT ON INTERNATIONAL RISK-RETURN TRADE-OFF RELATIONS

I. BACKGROUND OF STUDY

The efficient market hypothesis (EMH) is one of the central theories widely accepted in finance. According to the EMH, asset prices reflect fundamental values, investors are rational, and there are no market frictions. Hence, any mispricing in the market can be arbitraged away and the market will return to its equilibrium prices. However, there are empirical studies showing that there are abnormal returns in trading practices. For example, there are the contrarian strategies (De Bondt and Thaler, 1985) and momentum strategies (Jegadeesh and Titman, 1993). Based on the notable behavioral finance theory by Kahneman and Tversky (1979), researchers have been working on alternative behavioral models to explain the anomalies from EMH. One of the alternative approaches to the EMH is often referred to as the noise trader approach. The noise trader approach is based on two main assumptions. The first assumption is from the notable work of Delong, Shleifer, Summers, and Waldmann (1990) (hereafter DSSW 1990). They assume that not all investors are fully rational and are subject to sentiment. The second assumption, emphasized by Shleifer and Vishny (1997), is widely perceived as "limits to arbitrage". Arguments for "limits to arbitrage" point out that the irrationality of investors causes mispricing and generates arbitrage profits in the market. However, betting against sentimental investors is costly and risky. Therefore, arbitrageurs are not as aggressive in forcing prices to fundamentals.

The noise trader approach suggests that investors have pessimistic or optimistic sentiments when they are participating in stock markets (DSSW 1990), are likely more loss averse than rational investors and keen to speculate (Baker and Wurgler 2006). Individuals also often trade on noise news than fundamental values of the asset. The irrational activities of the noise traders may increase the risk unrelated to fundamental risk (DSSW 1990). Therefore, since noise traders' sentiment are volatile, unpredictable, and bring extra risk to the market, there will be limits of arbitrage that deter the equilibrium premium mechanism (Shleifer and Summers 1990).

Over the past decade, behavioral theories in finance have been employed to widely investigate the stock price behavior and explain the relation between sentiment and return. The noise trader approach has also been developed and plenty of empirical evidence is provided suggesting that investor sentiment is closely related to stock price and return. For example, there are studies focusing on the time-series relation between sentiment and price. Fisher and Statman (2000) use two survey-based sentiment indices, the Association of Individual Investors sentiment index and the Wall Street strategists' sentiment. They find that the two indices are negatively correlated with the S&P 500 returns in the following month. In another study of sentiment, Fisher and Statman (2003) present evidence showing that there is a positive association between consumer confidence and investors' bullishness of the market. Their results also show that, while high consumer confidence leads to low subsequent stock returns, monthly changes in consumer confidence indices are positively correlated to S&P 500 returns contemporaneously. Brown and Cliff (2004) find that there is a contemporaneous association between investor sentiment changes and stock market return while in the short run, the relation between sentiment and future return is insignificant. In contrast, their later study, Brown and Cliff (2005) find evidence supporting the argument that high sentiment is followed by two or three years of low returns in large and growth stocks. Baker and Stein (2004) show that, as investor sentiment increases, liquidity and stock prices increases, and hence subsequent stock returns will be low.

Despite the fact that many empirical studies have been conducted to investigate the cross-section and time-series relation between investor sentiment and stock market returns, there is limited empirical research focusing on the relation among noise traders, the volatility of stock returns, and the mean return. In other words, there exists much room for exploring the effect of investor sentiments on the return-volatility relation of the aggregate stock market, also known as risk-return trade-off or mean-variance relation.

A number of empirical studies explore the effect of investor sentiment on conditional volatility using the alternative sentiment proxies. For example, Brown (1999) shows that investor sentiment is related to increased volatility of close-end funds and irrational investors acting in concert on noise not only influence asset prices but also generate additional volatility. Using the Investor Intelligence sentiment index, Lee, Jiang and Indro (2002) examine the role of sentiment on weekly return volatility and excess return in a GARCH model. The stock markets they study include DJIA, S&P 500, and the NASDAQ indices for the period of 1973-1995. They find a significant positive relation between excess returns and changes in sentiment for all three indices. They find that sentiment affects both large and small stock returns with a larger effect on small stocks. In addition, they find that changes in sentiment are negatively correlated with return volatility; bearishness leads to increases in volatility while bullishness leads to decreases in volatility.

Based on the above literature review of the noise trader approach, sentiment investors are theorized as investing irrationally, showing abnormal trading behaviors such as loss aversion, mental accounting, and overconfidence. Previous theories indicate that the presence of sentiment traders will influence the link between risk and return. This argument is also supported by empirical evidence that investor sentiment should be mean-reverting. For example, Scheinkman and Xiong (2003) have argued that the return distribution would be left skewed, since higher sentiment would increase the prices and decreases the returns. As a result, sentiment traders have more impact on the stock prices during a high sentiment period. Thus, it is expected that all moments of realized variance in high sentiment periods are greatly higher than low sentiment periods indicating that stock prices are more volatile when the investor sentiment is high. Another model explaining the sentiment impact on risk-return trade-off is by Barberis and Huang (2008). They develop a utility function of equilibrium, showing that noise traders invest with loss aversion and mental accounting. They find that these noise investors tend to hold stocks with positively skewed returns because it improves their utility function. As a result, stock price will increase and the positive risk-return trade-off is weakened.

Based on the above intuition and theoretical analysis done by previous researchers on investor sentiment, more recently, Yu and Yuan (2011) employ an empirical study on the effect of investor sentiment on risk-return trade-off. They propose a two-regime pattern: a low sentiment period with positive mean-variance relation and a high sentiment period with a much weaker one. As their propositions are supported empirically, they document that in the low-sentiment period when sentiment investors have less influence on the market, the risk-return trade-off is significantly positive, but this positive relation is weaken in the bubble period when there are more noise traders in the market.

The proposition by Yu and Yuan (2011) can be justified by the empirical findings in the literature. For example, there are studies suggesting that the sentiment traders enter the stock market and participate aggressively during high sentiment periods. Yuan (2015) find that individuals tend to trade often and more when the market is performing well. In addition, sentiment theories indicate that during the high sentiment period, sentiment traders who always participate in the stock market will allocate a larger fraction of their wealth to stock investments (De Long et al. 1990). Arbitrage is also more difficult in the high-sentiment regime since arbitrageurs would need to short stocks to correct overpricing, which is very costly (Geczy, Musto and Reed 2002).

Yu and Yuan (2011) use the investor sentiment index developed by Baker and Wurgler (2006) to form high and low sentiment periods. Their findings indicate that there is a strong positive trade-off when sentiment is low, but the relation becomes smaller when sentiment is high. In the low sentiment periods when sentiment investors should have weak influence, the trade-off is significantly positive: a one-standard-deviation increase in conditional variance is associated with approximately a 1% increase in expected monthly excess return. During high sentiment periods with a strong sentiment effect, the trade-off is significantly lower and nearly flat. This significant result confirms their argument that the increasing participation of sentiment traders in the high sentiment period will detract from the positive risk-return trade-off.

As a following and extended study of Yu and Yuan (2011), the purpose of our study is to investigate the role of investor sentiment in the risk–return relationship in an international context. To our best knowledge, although most of the studies focus on the cross-section or time series relation of investor sentiment, stock price and stock return, there are few empirical works studying the impact of investor sentiment on the international risk-return relation in the aggregate stock market. The study of Yu and Yuan (2011) is the first attempting to fill this gap in the literature based on the US market data. However, there is no updated research on international evidence concerning the investor sentiment effect on the risk-return trade-off. Therefore, our first extension of Yu and Yuan (2011) is to test their model in the international markets specifications. An analysis of this kind is interesting for several reasons.

First, differences in the behavior of investors in different countries may influence market-trading patterns differently. For example, Schmeling (2009) finds that there exists a general negative relationship between sentiment and the aggregate market returns across countries. Second, adopting international aggregate market data provides an out-of-sample test for earlier US findings in Yu and Yuan (2011) and using data across countries can increase the empirical test power that can give more reliable estimates.

In addition to adopting Yu and Yuan (2011) in the international context, our second extension of their study is to include the US market variables in their mean-variance model. This motivation derives from two perspectives: the recent empirical findings in the literature and the striking new empirical evidence in our first essay.

First, recently in the literature, researchers find that US market aggregate returns significantly predict returns in many international markets. For example, Stivers et al. (2009) find that January returns of the US market have predictive power for the subsequent 11-month returns from February to December in many international markets. Rapach, Strauss, and Zhou (2013) find that lagged US returns significantly predict returns in many international markets while lagged non-US returns display limited predictive ability with respect to US returns.

Second, in our first essay, we develop an empirical framework from the ICAPM perspective to show that there are limitations to ignoring US market variables in the international risk-return trade-off relations. In our models of the first essay, we show that US market variables can play important roles as state variables. Previous empirical findings in the literature also suggest that there may exist important state variables that can influence the trade-off. For example, Scruggs (1998) shows that the inclusion of the long term government bond yields as a second factor in the GARCH model affects their findings significantly. Consistent with their findings, our empirical results indicate that the inclusion of US market variables significantly changes the estimated risk-return trade-off relationship in international markets. For example, we find that the estimated risk aversion coefficient switches from mostly negative to mostly positive after adding the US market related state variables. The findings in our first essays are consistent with the previous literature that US market variables are important, which provides us with new evidence support from this perspective that we should also consider US market variables when evaluating the investor sentiment impact on the international risk-return relations.

A third extension of Yu and Yuan (2011) adopted in our second essay is that, in addition to the US market returns and risk-free rates, we include the US investor sentiment effect in the international risk-return trade-off. Our main motivation for this research angle is from the study of Baker, Wurgler and Yuan (2012) (hereafter BWY 2012). BWY (2012) finds that sentiment is contagious and spreads across international markets. In their study, empirical evidence suggests that both the international sentiment and the local sentiment help to predict the international market-level returns.

In our opinion, US sentiment may be contagious and may emerge across countries. The logic here is largely intuitive. For example, for a US investor who holds both US and international assets, he is optimistic about the future market performance and this leads to increased demand on risky assets including the US and international assets. The US sentiment will then affect the international asset price. This logic is also supported by BWY (2012). They find that, in addition to local and global sentiment, the US sentiment can also predict the cross-section of the international markets' returns. They further suggest that a plausible reason for US sentiment impact on the other markets is due to capital flows between the US and the international markets. Therefore, based on the findings of BWY (2012), we extend our model to include US sentiment index. Our purpose is to test the US sentiment impact along with the local sentiment impact on the risk-return trade-off relations.

The remainder of this essay is divided into two more sections. In the second section, we discuss the properties of our sample data. The third section discusses our main models and empirical evidence with effects of US market variables and US investor sentiment. In the third section, we also check the robustness of our empirical findings.

II. DATA

The international market return data and the investor sentiment indices for this study is from the Global Financial Data Database (GFD) and the OECD (Organization for Economic Co-operation and Development) database, which provides time-series of international equity and interest rate data going back as early as 1900.

We use the investor sentiment indicator in each country to investigate the relationship between investor sentiment and the risk-return trade-off relation. For the US market, we adopt the composite sentiment index developed by Baker and Wurgler (2006) (B-W Index), which is the first principal component of the six measures of investor sentiment. Their index data can be downloaded from their website. For the European countries, we use the Consumer Confidence Index (CCI) for each country developed by the OECD. We adopt the CCI as the proxies for investor sentiments in Europe. We employ consumer confidence indices as investor sentiment measures for the Asian markets, namely, Japan, Australia, and New Zealand. We also adopt the consumer confidence indices for one African country, South Africa and one North American market, Canada.

The Consumer Confidence Index (CCI) focuses on a different aspect of the economic cycle and captures cyclical patterns in household consumption behavior fairly well. OECD has standardized the CCI data in order to be able to present comparable indicators across countries and to present zone aggregates. In addition to standardization, OECD also adopts normalization and amplitude adjustment to the CCI data. Country confidence components were normalized so that their cyclical movements have the same amplitude. Then the normalized series were amplitude adjusted to match the amplitudes of the de-trended world proxy aggregate industrial production index series. Finally, the normalized series were converted into index form by adding 100.

Since we are interested in excess returns, we require that short-term interest rate data should also be available for the same sample period to match equity returns. In addition, we use the consumer confidence index as the investor sentiment indicator in our study. Therefore, we also require that the consumer confidence indices should be available for the same sample period to match the stock market return. This leaves us with seventeen international markets. They include Australia, Belgium, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, New Zealand, Portugal, South Africa, Spain, Sweden, Switzerland, the United Kingdom and the United States of America. The longest time series is from the US, dating back to January 1963. The shortest sample comes from Sweden, starting at October 1995. All of the international return data and the investor sentiment indices end in December 2014. For the US data, we choose the value-weighted index from the Center for Research in Security Prices (CRSP) to be consistent with prior studies in the literature. We calculate monthly stock market returns in excess of their own country risk-free rates, which are obtained from their respective short-term Treasury yields.

Using the sentiment indices, we need to identify the high and low sentiment period in our analysis of the sentiment impact on the risk-return relation. We define a month as a high-sentiment month if its sentiment index value is bigger than the mean sentiment value of the whole sample period. Otherwise, a month is considered a low sentiment month.

Table 12 reports the summary statistics for the investor sentiment index. The US has the longest sample period for the Baker-Wurgler sentiment index from 07/1965 to 12/2014. The shortest sample period is for Sweden from 10/1995 to 12/2014. All countries have sample periods longer than twenty years. Each country's CCI is normalized and standardized by OECD with the long-term average mean equal 100. Therefore, we can see that in Table 12, all countries except the US have their mean close to 100. The B-W Index for the US sentiment is also standardized and normalized with the long-term average mean equal to 0. In Table 12, the mean of the US B-W Index is -0.032 which is close to 0. The standard deviations for all sixteen countries are close to each other with range from 2.138 to 4.111. Moreover, if we look to the minimum and maximum of the CCI, we also do not observe a big variation among the sixteen countries. For example, the maximum CCI is 109.298 and the minimum CCI is 86.466. This small variation of the CCI index is due to the normalization and amplitude adjustments made to the data by OECD.

[Insert Table 12 here]

Since we check the US sentiment effect along with local sentiment, we had to make sure that the US sentiment index is not highly correlated with the home confidence indices. Table 12 reports the computed correlations of the confidence indices. We find that the highest correlation is with the Canadian market at 0.417 and the lowest is with Portugal at -0.255. We are not surprised to observe high correlation between the US sentiment index and indices such as Canada and the UK. The overall result suggests that the correlation is generally not strong. There is considerable variability across the countries. The difference among the indices is further confirmed in the sentiment index figures (Figure 1 throughout Figure 6), which illustrate the different consumer confidence indices in countries over time. Overall, as one would desire for an international investigation of the risk-return trade-off relation with a focus on the local sentiment and the US sentiment effects, statistics indicate that there are sizable differences across the sentiment index of the sixteen countries and the US.

Figure 1 throughout Figure 6 show graphs of investor sentiment index over the sample period for each country. The overall trend is that for most of the countries, sentiment fell during the mid-1970s and rose back in the early and mid-1980s. Sentiment started to drop again in the late 1980s and early 1990s; as we know, those periods are plagued with recessions. Sentiment rose back again in the late 1990s and most countries reach peaks in the early 2000s, years widely known as the bubble period in academic research. The impact of the financial crisis in 2008 is apparent in the steep drop of consumer confidence at that time across all of the indices. This shows both similarities and differences in the consumer confidence indices of sixteen countries and the US over time.

[Insert Figure 1, 2, 3, 4, 5 and 6 here]

We report the summary statistics of the market excess returns in different investor sentiment periods in Table 13. The results partly support our hypothesis: the large impact of sentiment traders during the high sentiment periods provides a very different scenario from the low sentiment period. These are some interesting findings. For example, nine out of seventeen countries have larger mean excess returns in the low sentiment period than in the high sentiment period. Among those nine markets, six markets have substantial difference between the mean excess returns in the two different sentiment regimes. For example, in Belgium, the mean of monthly excess returns during the high sentiment periods is negative -0.09% while the mean returns in the low sentiment periods is much higher 0.9%. We can observe a similar scenario for Germany (0.04%, 0.91%), the Netherlands (0.19%, 0.99%), Portugal (-0.57%, 0.22%), Sweden (0.32%, 1.14%), and Switzerland (0.08%, 1.14%).

[Insert Table 13 here]

III. MODELS AND MAIN EMPIRICAL RESULTS

A. The GJR GARCH-in-Mean model with investor sentiment

Following our prior model, we start with Equation (7) and (8) in our first essay. Equation (7) and (8) represent the most widely adopted risk-return model in the existing literature, the GJR GARCH-in-Mean model.

$$R_{i,t} = a_0 + a_1 h_{i,t} + \varepsilon_{i,t} \tag{7}$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^- \epsilon_{i,t-1}^2 + b_4 r_{i,t}^f \tag{8}$$

In equation (7) and (8) from our first essay, $R_{i,t}$ and $h_{i,t}$ are the market index excess return and conditional variance respectively for country *i* at month *t*. The above equation is a one-regime equation. Under the assumption of this equation, the risk-return trade-off relation should remain unchanged in the whole sample period.

As an extended study of Yu and Yuan (2011), we argue that there is an investor sentiment impact on the above equation during the period. We should consider a two-regime scenario where the sentiment effect plays an important role. We hypothesize that there is a positive risk-return trade-off in the low sentiment period. We also predict that in the high investor sentiment period, the increased active participation of noise traders should weaken this positive risk-return trade-off. Therefore, we adopt the above equation (7) and (8) to include a dummy variable to specify our modified two-regime equation (23) and (24):

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} + a_3 D_{i,t}^{Sen} h_{i,t} + \epsilon_{i,t} \qquad (23)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^- \epsilon_{i,t-1}^2 + b_4 r_{i,t}^f \qquad (24)$$

Here $D_{i,t}^{Sen}$ is a dummy variable that takes the value of 1 if month *t* in country *i* is in the high sentiment period and 0 otherwise. We use the Consumer Confidence Index (CCI) to proxy investor sentiment in the sixteen international markets. We identify the high and low sentiment period in the international market by comparing the monthly index to the overall index mean. If the monthly index is higher than the mean, we categorize the corresponding month as a high sentiment period. Otherwise, the corresponding month is categorized as low sentiment period.

According to our hypothesis, we expect to observe a two-regime pattern, with a positive mean-variance relation in low sentiment periods and a much weaker relation in high sentiment periods. In the two regime equation estimation, a_1 represents the risk aversion coeffient in the low sentiment period, a_3 represents the weakening effect of the high sentiment period, and a_1+a_3 represents the risk aversion coefficient in the high sentiment period. Our hypothesis predicts that the estimated risk aversion coefficient on the conditional variance is positive, i.e., a_1>0. In addition, the coefficient on the interaction term of the dummy variable and the conditional variance is negative, i.e., a_3<0.

The results are presented in Table 14. It shows that there is heterogeneity across countries. First, we find that seven out of sixteen international markets have a positive a_1 and a negative a_3. Among them, three markets (Denmark, Spain and the UK) are significant at the 10% level for both a_1 and a_3. It is noteworthy that even though the positive coefficient a_1 is not significant for the Belgium market, the negative parameter estimate a_3 is significant at the 10% level, which partially supports the prediction of the sign of a_3. We also report the result for the US market here in Table 14 as well as the other sixteen countries. We note that US has both significant positive coefficient a_1 and significant negative coefficient a_3. This result is consistent with the findings in Yu and Yuan (2011).

Second, seven out of sixteen markets have a negative a_1 and a positive a_3 (Australia, Canada, Italy, Japan, New Zealand, Portugal and Switzerland). Only two out of seven countries are at the 10% significant level (New Zealand and Portugal). We also find that France and South Africa have both a negative a_1 and a_3 and none of the markets are significant.

Looking at the results, we find that there is quite some heterogeneity across international markets. Our hypothesized sentiment effect is found to be significant in three countries (Denmark, Spain, and the UK), which covers 25% of the numbers of countries studied in our sample. The signs for the parameter a_1 and a_3 do not widely agree among all countries in our sample. Thus, Table 14 presents ambiguous and mixed evidence, which stimulates our interests to further investigate the additional factors that affect the association between sentiment and the risk-return trade-off.

[Insert Table 14 here]

B. The role of the US market returns and the risk-free rates

Continued from the last section, we argue here that the reason why we observe mixed results from Table 14 is that we ignore the impact from the US market when we study the international risk-return relation. In our previous essay, we discuss the importance of the US market variables. As the results of our first essay strongly suggest that US market variables play an important role in the risk-return trade-off relations, we believe it is important to include US market variables when examining the international trade-off relation from the investor sentiment perspective. Our first step is to add the lagged US returns and the contemporaneous US returns to the conditional mean equation of our investor sentiment model. Here we have the following equations:

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} + a_3 D_{i,t}^{Sen} h_{i,t} + a_4 R_{us,t-1} + a_5 R_{us,t} + \epsilon_{i,t} \quad (25)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^{-} \epsilon_{i,t-1}^2 + b_4 r_{i,t}^f \quad (26)$$

In these equations, we view $R_{us,t-1}$ and $R_{us,t}$ as state variables in the sense of Merton's ICAPM. Our choice was motivated by Rapach, Strauss and Zhou (2013), who document that the lagged US market return possesses predictive power for international market returns. Here, our prediction for the estimated coefficients of the conditional variance is the same as in equation (23) and (24). That is, the estimated risk aversion coefficient on the conditional variance is positive, i.e., a_1> 0. In addition, the coefficient on the interaction term of the dummy variable and the conditional variance is negative, i.e., a_3< 0.

The results are presented in Table 15. In Table 15, we no longer include the US market as our focus is now on the influence of the US market returns on the international markets. We hypothesize that, in the two-regime pattern, the risk aversion parameter a_1 is expected to be positive and a_3 is expected to be negative. In Table 15, we find that ten out of sixteen international markets have positive estimated risk aversion coefficient a_1 and negative estimated parameter a_3. Among them, five markets (Belgium, Denmark, the Netherlands, Spain and the UK) are significant. For example, Belgium has significant $+a_1$ and significant $-a_3$ at the 1% level, with t-stat of 2.92 and -4.52 respectively. The Netherlands has significant $+a_1$ and $-a_3$ at the 10% level with t-stat of 1.71 and -1.82 respectively. The UK has significant $+a_1$ and $-a_3$ at the 1% level with t-value of 2.96 and -2.24. Among the other five markets with $+a_1$ and $-a_3$, Japan has a significant risk aversion parameter a_1 at the 1% level with a t-value of 3.68.

One of the important findings from Table 15 is that the newly added US market returns have shown great explanatory power to the mean variance equation. For example, the parameter estimates for a_4 are significant from the 5% to 1% level with t-values ranging from 2.03 to 3.71 in fourteen out of sixteen countries. The only exceptions are South Africa and Sweden. The results of the parameter estimates for a_5 are even more highly significant. All sixteen countries are significant at the 1% level with t-stats from 8.7 to 24.2. The results are consistent with findings in our first essay. The findings of significant a_4 and a_5 indicate that the use of the lagged and the contemporaneous US market returns is promising.

[Insert Table 15 here]

Overall, the results from Table 15 suggest that after including the lagged US market returns in the model, we tend to observe more countries with positive coefficient estimates of a_1 and negative estimates of a_3. While the results from Table 15 are interesting, we believe that the use of US market returns is insufficient though promising. The empirical findings from our first essay suggest that we should consider additional variables in the specification of the conditional mean equation. Taken together, we are inspired by this motivation to further investigate other explanatory variables. Empirical results in Table 6 from our first essay indicate that the US risk-free rate and the international risk-free rate have shown great explanatory power to the conditional mean equation with highly significant estimated coefficients. For example, in Table 6, the parameters of a_7 for the US risk-free rate are highly significant in eleven out of sixteen countries, and the estimates of a_8 are significant in twelve countries out of sixteen. Therefore, we present the following modified version of the GJR GARCH-in-Mean model that includes the US risk-free rate and the home market risk-free rate with the lagged US return and the contemporaneous US return. The full model specification is given as follows:

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} + a_3 D_{i,t}^{Sen} h_{i,t} + a_4 R_{us,t-1} + a_5 R_{us,t} + a_6 r_{us,t}^{f} + a_7 r_{i,t}^{f} + \epsilon_{i,t} \quad (27)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^{-} \epsilon_{i,t-1}^2 + b_4 r_{i,t}^{f} \quad (28)$$

$D_{i,t}^{Sen}$ is a dummy variable where it takes the value of 1 if the month *t* in country *i* is in the high sentiment period and 0 otherwise. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return. $r_{us,t}^{f}$ is the US risk-free rate and $r_{i,t}^{f}$ is the international market risk-free rate.

Our main empirical results are presented in Table 16. First, we notice an overall trend. That is, with the inclusion of the US market returns and the risk-free rate, fourteen out of sixteen international markets have a positive parameter a_1 and a negative parameter a_3. The only two exceptions are Germany and New Zealand. Among the fourteen markets which have positive a_1 coefficients and negative a_3 coefficients, seven markets are significant at the 10% level for the estimates of a_1 and a_3. These countries include Belgium, Denmark, the Netherlands, Portugal, South Africa, Spain and the UK. It is noteworthy that even though the negative coefficient a_3 is not significant for the France and Japan market, the positive parameter estimate for a_1 is strongly significant at the 1% level for these two markets, which supports our prediction of the a_1 coefficient. Therefore, the evidence seems to have tilted towards a positive parameter a_1 and a negative parameter a_3 among the international markets. The overall findings indicate that in the low sentiment period the risk-return relationship tends to be positive because of less participation of sentiment traders. The findings also suggest that in the high sentiment period, the positive trade-off will be undermined due to the increased number of sentiment traders.

Second, another noticeable change in Table 16 compared is that now we observe more countries with significant $+a_1$ and more with significant $-a_3$ compared with results in with Table 14 and Table 15. For example, in Table 14, there are only three countries with significant positive a_1. The numbers of the countries with significant positive a_1 increase to six and nine in Table 15 and Table 16 respectively. In the meantime, the numbers of the countries with significant $-a_3$ are four, five and seven in Table 14, Table 15 and Table 16 respectively. We can notice there is an improvement here in the significance of the results in Table 16 for the coefficient estimates of a_1 and a_3.

Third, our predictions also suggest that in the high sentiment period, the increased participation of the noise traders will distort positive trade-off to a nearly flat or negative level. So we should expect to observe a negative or a near 0 a_1+a_3. Some interesting results in Table 16 present indirect support for the above prediction. For example, among the fourteen markets which have a positive a_1 and negative a_3, ten of them have a negative a_1+a_3 or a close to 0 a_1+a_3 (Australia(0.97), Belgium(-0.3), Denmark(-5.4), France (-0.9), Italy (-0.8), Portugal(-5.1), Spain(-3.3), Sweden(0.07), and the UK(-0.4)). Generally, accounting the investor sentiment for the risk-return relation gives us additional information of how the trade-off varies during the whole period.

Fourth, we find that the parameter estimate a_4 for the lagged US return and the estimate a_5 for the contemporaneous US return are highly significant. For instance, fourteen out of sixteen markets have a significant positive a_4 at a 5% level with their t-values ranging from 2.06 to 4.13. The only two markets with insignificant a_4 are South Africa and Sweden. The results for the estimates of a_5 are more striking. All countries have a highly significant positive a_5 estimate at well above a 0.5% level with t-stats from 9.45 to 31.30. This is consistent with the results in Table 15, suggesting that the lagged US return and the contemporaneous US return present sufficient explanatory power for the estimates results.

Fifth, Table 16 also shows that both the US risk-free rate and the international risk-free rate variables are highly significant with positive signs on the US risk-free rate and negative signs on the own-country risk-free rate. For instance, fourteen out of sixteen countries have significant estimates of a_6 at a 5% level with t-values ranging from 1.67 to 5.10. The only two exceptions are Japan and New Zealand. For the parameter a_7, the estimates are significantly negative for fifteen countries with t-values from -2.14 to -7.63. These above results strongly suggest that we should include the US and the international risk-free rate due to their highly significant power in explaining the mean-variance equation.

[Insert Table 16 here]

Moreover, in Table 17, we report the adjusted $\bar{R}^2$ results for equation (f), (g), (h) and (i) under different specifications. Equation (f) has no US market variables included and its adjusted $\bar{R}^2$ is represented by $\bar{R}^2_{(f)}$. Equation (g) adds only the lagged US market return and its adjusted $\bar{R}^2$ is presented by $\bar{R}^2_{(g)}$. Equation (h) adds the US and international risk-free rates as well as the lagged US returns and its adjusted $\bar{R}^2$ is given by $\bar{R}^2_{(h)}$. Equation (i) adds the contemporaneous US return along with the lagged US return and the risk-free rates and the equation's adjusted $\bar{R}^2$ is represented by $\bar{R}^2_{(i)}$. Table 17 shows that the adjusted $\bar{R}^2$ rises when additionally including the US market returns and the risk-free rate in the mean-variance regression. First, the adjusted $\bar{R}^2$ is low in the base regression with no US market factors included. Half of the adjusted $\bar{R}^2$ are negative and only three or four of the adjusted $\bar{R}^2$ are above 1%. Second, with the inclusion of the lagged US returns, most of the countries have the adjusted $\bar{R}^2$ above 2%. The adding of the risk-free rates can increase the adjusted $\bar{R}^2$. Finally, after adding the contemporaneous US returns, the adjusted $\bar{R}^2$ reaches its peak ranging from 28% to 65%. This is due to the high correlation between the contemporaneous US returns and the home market return. Overall, the rise of the adjusted $\bar{R}^2$ reveals that the US market factors and the risk-free rates add quite some explanatory power relative to other factor variables.

[Insert Table 17 here]

To summarize, Table 16 and Table 17 present main empirical findings supporting our hypothesis. First, our results present the importance of the US market returns, the US and the international risk-free rates. The findings show that, after including the above variables in the model, it seems to have tilted toward obtaining a positive parameter a_1 and a negative parameter a_3 among most of the international markets. We have fourteen out of sixteen international markets showing the above trends. Second, our findings are consistent with that of Yu and Yuan (2011) in the sense that we observe a two-regime pattern for the risk-return trade-off in most of the international markets. In the low sentiment regime, the risk-return trade-off seems to be positive. In the high sentiment regime, this positive trade-off is undermined and a much weaker relation is observed. Last, our study contributes to the literature in the sense that we present the importance of the US market variables and the risk-free rates when applying Yu and Yuan (2011) to the international markets context.

C. The US investor sentiment effect

In this section, we extend our prior studies in section B. by exploring the interaction between the US sentiment and the home country sentiment and testing their joint outcome on the risk-return trade-off. Investigating the US sentiment along with local sentiment is important and insightful. Recently, it has been perceived in literature that international investor sentiment affects assets price in domestic markets (e.g. Baker, Wurgler and Yuan 2012, also referred as BWY 2012). However, little efforts have been taken to investigate whether and how international sentiment influences domestic markets' risk-return trade-off. Motivated by Baker, Wurgler and Yuan (2012), in this section, we include the US investor sentiment as a US market variable in the international conditional mean equation. Our first purpose is to find if there is a

US sentiment effect along with the local sentiment effect, or, how much of an impact US sentiment has on the risk-return relation. According to BWY (2012), the sentiment is contagious among geographically different markets. Their results suggest that both global and local sentiment affect stock prices. When global and local sentiment is high, future local stock returns are low. They also find that in addition to the local and global sentiment, the US sentiment is a significant contrarian predictor of the international market returns.

Our second purpose is to find if the previous evidence on the local sentiment still holds after controlling for the US sentiment effect, or, to what extent the local sentiment can explain the two-sentiment regime pattern after adding the US sentiment as factor. We want to find answers for the following questions. Does the local sentiment lose explanatory power on the risk-return trade-off after including the US sentiment? Does the US sentiment explain the local trade-off? We try to answer the above research questions based on the following regression model:

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} h_{i,t} + a_3 D_{us,t}^{Sen} h_{i,t} + a_4 R_{us,t-1} + a_5 R_{us,t} + a_6 r_{us,t}^{f} + a_7 r_{i,t}^{f} + \epsilon_{i,t} \quad (29)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^{-} \epsilon_{i,t-1}^2 + b_4 r_{i,t}^{f} \quad (30)$$

$D_{i,t}^{Sen}$ is a dummy variable that takes the value of 1 if the month *t* in country *i* is in the high sentiment period and 0 otherwise. $D_{us,t}^{Sen}$ is a dummy variable that takes the value of 1 if the month *t* in US is in the high sentiment period and 0 otherwise. We use the Baker-Wurgler sentiment index to proxy the US sentiment and identify the high and low sentiment period in the US market by comparing the monthly index to the overall index mean. If the monthly index is higher than the mean, we categorize the corresponding month as a high sentiment period. Otherwise, the corresponding month is categorized as low sentiment period.

In our equation (29), a_3 is the coefficient of the US sentiment effect on the domestic risk-return trade-off. As suggested by BWY (2012), here we expect to have $a_3 < 0$. In addition, similar to our previous analysis, a_1 is the risk aversion coefficient of the variance for the low sentiment period in the domestic market. We predict that the risk aversion coefficient is positive in the low sentiment regime, i.e. $a_1 > 0$. Moreover, a_2 here represents the coefficient of the sentiment effect on the trade-off in a domestic high sentiment period. The trade-off is weakened in the high sentiment regime, i.e. $a_2 < 0$.

Table 18 reports the empirical findings. First, we test the sentiment contagion prediction from BWY (2012), i.e., in our equation (29) and (30), we test if $a_2 < 0$ and $a_3 < 0$. Our results show that fourteen out of sixteen countries are with negative coefficient estimates of a_2. Among them, nine are statistically negative at the 10% level with t-stats from -1.71 to -3.45. They include Australia, Belgium, Canada, Denmark, France, the Netherlands, Portugal, Spain and the UK. Twelve out of sixteen countries have negative coefficient estimates of a_3. Among the twelve, only two countries are statistically negative. They are Australia and Portugal. In general, Table 18 indicates that the findings of BWY (2012) are widely consistent with our results. When the local sentiment and the US sentiment are high, the positive risk-return relation is expected to be weakened in most of the countries in our sample. For instance, in Table 18, the estimated coefficients of the local sentiment variables and the US sentiment variables are negative in fourteen out of sixteen sample countries. Specifically, the local sentiment effects seem to be more significant than the US sentiment effects, i.e., nine countries obtain a significant negative parameter estimate of the local sentiment variable while only two countries obtain a significant negative parameter estimate of the US sentiment variable. This indicates that the sentiment contagion effect exists in the international markets. However, this finding is ambiguous due to the low statistical significance in most of the countries. Moreover, when we consider the joint outcome of local and US sentiment on the risk-return trade-off, we find that the local sentiment effect is more significant in evidence than the US sentiment effect, i.e., while the estimated coefficient a_2 is significant in most markets, the coefficient a_3 is insignificant. Thus, our findings suggest that the local sentiment effect dominates and effectively subsumes the US sentiment effect.

Moreover, our findings show that with the inclusion of the US sentiment effect, our findings of the signs and significance of a_1 and a_2 still hold. Their estimates are generally consistent with previous findings in Table 16. Our results show that thirteen out of sixteen markets have positive parameter estimates of a_1 and negative estimates of a_2. Among these thirteen countries, six are statistically significant at a 5% level for the estimates of + a_1 and - a_2. The countries include Belgium, Canada, France, the Netherlands, Portugal and the UK. The results indicate that in these countries, the results from Yu and Yuan (2011) are statistically consistent with our findings. This is also consistent with our previous findings that these countries exhibit a two-regime low and high pattern for the risk-return relation. In the low sentiment regime, the risk-return trade-off is positive and this trade-off is weakened in the high sentiment regime.

[Insert Table 18 here]

Overall, results from Table 18 suggest that, to some extent, US sentiment spreads to other countries, co-exists with local sentiment and mildly affects risk-return trade-off in domestic markets, thus indirectly supporting the notion of sentiment contagion by BWY (2012). However, while the US sentiment can also identify a two-regime pattern in the risk-return trade-off for domestic markets, its effect is less significant and influential than the local sentiment effects when we consider the joint outcome of local and US sentiment.

D. Robustness checks

We perform several robustness checks to ensure our results are robust. First, as cardinal numbers have greater explanatory power than nominal numbers, we adopt the sentiment index themselves rather than dummies as explanatory variables to further investigate the effect of investor sentiment on the risk-return relationship. More formally, our model specification is as follows:

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 Sen_{i,t} + a_3 Sen_{i,t} h_{i,t} + a_4 R_{us,t-1} + a_5 R_{us,t} + a_6 r^f_{us,t} + a_7 r^f_{i,t} + \epsilon_{i,t} \quad (31)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon^2_{i,t-1} + b_3 I^-_{i,t-1} \epsilon^2_{i,t-1} + b_4 r^f_{i,t} \quad (32)$$

$Sen_{i,t}$ is the international investor sentiment index for the own country. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return. $r^f_{us,t}$ is the US risk-free rate. $r^f_{i,t}$ is the home country risk-free rate.

a_1 represents the estimated coefficient for the conditional variance $h_{i,t}$. Similar to our previous analysis, here we expect to have $a_1 > 0$. a_3 is the estimated coefficient of the interaction term between domestic sentiment and the conditional variance. It represents the weakening effect of noise traders on the trade-off in a high sentiment period. As predicted in our prior equation, $a_3 < 0$. Also, according to Schmeling (2009), a_2 is negative. This is also tested in our empirical model.

Table 19 presents the following findings. First, in thirteen out of sixteen countries, the estimated risk aversion parameters, a_1, have positive signs and the parameters a_3 have negative signs. Out of these thirteen countries, seven countries have significant positive a_1 and negative a_3 in 10% to 5% significance level with the range of t-values from 1.70 to 5.67. Our hypothesis is strongly supported by the results in these seven countries with significant positive a_1 and negative a_3. It is worth to note that, France has a significant positive a_1 with a t-stat of 2.18 and an insignificant a_3. The result indicates that in France during the low sentiment period, we expect to see a strong positive risk-return trade-off. In addition, for Denmark and South Africa, a_1 is insignificantly positive and a_3 is strongly negative with a t-value of -2.50 and -2.51. This suggests that in Denmark and South Africa, the negative risk-return relation in the high sentiment period is more prominent and obvious to observe.

In addition, eleven out of sixteen countries have the negative estimated parameter value of a_2. Moreover, seven of them are statistically significant at a 5% level with t-stats ranging from 2.10 to 6.16. These results are widely consistent with the findings in Schemling (2009) in that expected returns are negatively related to the investor sentiment.

Consistent with the findings in Table 16, Table 19 presents that the estimated coefficients for the US return variables are mostly positive and significant. Moreover, the risk-free rate variables are highly significant as well. Hence, we can conclude that our main results remain consistent with previous findings when using the sentiment index itself in the conditional mean equation rather than the dummy variables in the previous models.

[Insert Table 19 here]

Next, we employ our second robustness check by adopting the GARCH-in-Mean specification (GARCH-M) and examine the investor sentiment effects. As is discussed in our first essay, we compare our results from Table 2 and 3. We find that the GJR specification tends to give more negative risk-return relation than the GARCH-M specification even in the case when the conditional mean equations are the same. This is also consistent with the findings in the literature (Harvey 2001). Therefore, we choose to use the GARCH-M specification to compare the results with our first GJR model specification. We include the risk-free rate in the conditional variance equation for the GARCH-M model. This is motivated by the observation that in Table 16, the estimated coefficient for the risk-free variable, b_4, is significant in ten out of sixteen countries. Based on this result, our model is given as follows:

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} + a_3 D_{i,t}^{Sen} h_{i,t} + a_4 R_{us,t-1} + a_5 R_{us,t} + a_6 r_{us,t}^{f} + a_7 r_{i,t}^{f} + \epsilon_{i,t} \quad (33)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 r_{i,t}^{f} \quad (34)$$

Table 20 presents the empirical results. Table 20 shows that under the GARCH-in-Mean specification, thirteen out of sixteen countries have positive a_1 estimates and negative a_3 estimates. Among the thirteen, six are statistically significant. They are Belgium, France, Portugal, South Africa, Spain and the UK. Additionally, the estimated parameter values of a_4 and a_5 are all positive and mostly significant. The estimated coefficients for the two risk-free rates in the conditional mean equation are mostly highly significant. Taken together, these results are very similar to the results reported in Table 16 and Table 19. Thus, we can conclude from Table 20 that our findings are robust in the GARCH-M model specification.

[Insert Table 20 here]

CONCLUSION

In our first essay, we offer interesting new evidence on the international risk-return trade-off relationship. Our main contribution is to highlight the importance of the US market variables for the estimation of this trade-off relation.

We show that there are at least two reasons why the US market variables should play a very significant role. The first reason is based on a portfolio interpretation. We show that if a representative investor holds both international and US stocks, then the US market returns and variances should be included in the conditional mean equation. This portfolio perspective also gives us very specific predictions on the signs of these coefficients, which we have tested using the international stock market data. The second reason is built upon Merton's ICAPM, where investors' investment opportunity sets covary with a state variable. We argue that the US market variables as well as interest rate variables can be viewed as important state variables in the sense of Merton's ICAPM.

We find striking new empirical evidence that the inclusion of the US market variables significantly changes the estimated risk-return trade-off relationship in international markets. For example, we find that the estimated risk aversion coefficient switches from mostly negative to mostly positive after the inclusion of these US market related state variables. Our results also reject the portfolio interpretation but support the state variable interpretation of the US market variables.

Our collective findings confirm and extend the recent literature that find an important role of US market return in predicting international stock returns. In our context of the risk-return trade-off relationship, we find that the contemporaneous state variables are more significant than the lagged ones, suggesting that the importance of US market variables is more likely driven by expected changes in the investment opportunity sets rather than the slow diffusion of information.

The goal of our second essay is to investigate the role of domestic sentiment in the risk-return trade-off relation in international markets. Our first contribution is that we extend the study of Yu and Yuan (2011) by including sixteen international stock markets as well as the US market with a longer sample period from 1970 to 2014 than previous articles. To our best knowledge, our article is the first one to address this issue from the international perspective.

Our second contribution is that we assign the US market returns and risk-free rates as significant roles when we examine the local sentiment influence on home country's risk-return relation. After accounting for these variables, we tend to observe more countries with positive risk-return relation in the low sentiment period and more countries with negative relation in the high sentiment period. We find that the risk-return trade-off relation is impacted by the home country's sentiment level. We identify a two-regime sentiment pattern in most countries: a low sentiment regime and a high sentiment regime. The risk-return relationship varies distinctively within the two regimes. In the low sentiment period during which sentiment traders have a small impact, the risk-return relation is largely robust positive in many international markets. Meanwhile, in the high sentiment period with more noise traders involved in the market, this positive trade-off is undermined. One of the potential reasons for the significant effects of the US market variables is market contagion. That is, stock prices in one country may be affected by the changes in another country through economic fundamentals. Thus, we suggest that models of international risk-return trade-off should integrate local investor sentiment with important international markets such as the US and important international economic factors such as interest rates.

Our third contribution is that we investigate the role of US investor sentiment in local risk-return trade-off along with local investor sentiment. Our motivation derives from the recently developed notion of investor sentiment contagion (Baker, Wurgler and Yuan 2012). Recent studies suggest that in addition to local sentiment, global sentiment and US sentiment can serve as contrarian predictors of the international markets returns. We employ this method to the extent of mean-variance relations and test the effect of US sentiment along with local sentiment. We find that to some extent, US sentiment spreads to other countries, co-exists with local sentiment and mildly affects risk-return trade-off in domestic markets, thus indirectly supporting the notion of sentiment contagion by BWY (2012). However, while US sentiment can also identify a two-regime pattern in the risk-return trade-off for domestic markets, its effect is less significant and less influential than the home sentiment effects when we consider the joint outcome of home and US sentiment. For example, nine countries present significantly negative effects of their local sentiment on their home countries' trade-off relations. However, only two countries present significantly negative effects of US sentiment on their home countries' trade-off relations. Thus, our findings suggest that, concerning the domestic risk-return trade-off, the local sentiment effect dominates and effectively subsumes the US sentiment effect.

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Table 1: Descriptive Statistics for Monthly Excess Returns of International Markets

This table reports descriptive statistics for the monthly excess returns of the 18 international stock markets as well as the US market. The last column reports their correlations with US market returns, which is calculated using CRSP value-weighted index returns.

	Sample Period	Mean (%)	Std.Dev. (%)	Min (%)	Max (%)	Correlation with US
Australia	07/1928 - 12/2014	0.578	4.384	-43.08	22.67	0.341
Belgium	01/1951 - 12/2014	0.379	4.281	-31.77	23.55	0.501
Canada	03/1934 - 12/2014	0.502	4.277	-23.19	16.02	0.717
Denmark	01/1976 - 12/2014	0.423	4.983	-19.00	18.57	0.507
France	01/1960 - 12/2014	0.360	5.414	-22.52	22.40	0.548
Germany	01/1953 - 12/2014	0.579	5.004	-24.06	19.84	0.521
Italy	04/1946 - 12/2014	0.561	7.336	-26.75	58.88	0.283
Japan	01/1960 - 12/2014	0.486	5.240	-21.72	27.45	0.362
Netherlands	01/1951 - 12/2014	0.651	4.912	-22.76	22.00	0.647
Norway	01/1984 - 12/2014	0.536	6.289	-28.61	16.45	0.627
New Zealand	07/1986 - 12/2014	0.039	5.130	-29.88	23.92	0.451
Portugal	02/1988 - 12/2014	-0.072	5.573	-21.44	18.41	0.468
Singapore	12/1987 - 12/2014	0.689	6.290	-26.37	22.79	0.582
South Africa	02/1960 - 12/2014	0.733	6.082	-29.10	18.80	0.353
Spain	07/1982 - 12/2014	0.738	6.225	-26.11	26.15	0.593
Sweden	01/1955 - 12/2014	0.672	5.281	-22.59	26.61	0.500
Switzerland	01/1980 - 12/2014	0.600	4.460	-24.94	12.23	0.673
UK	01/1900 - 12/2014	0.407	4.452	-27.25	53.24	0.415
US	07/1926 - 12/2014	0.654	5.402	-29.13	38.85	1.000

Table 2: International Risk-Return Relation: GARCH-in-Mean Model

This table reports the results from the GARCH-in-Mean model using excess returns of 18 international stock markets as well as the US market.

$$R_{i,t} = a_0 + a_1 h_{i,t} + \epsilon_{i,t} \qquad (5)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 \qquad (6)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. The Bollerslev and Wooldridge robust *t*-statistics are reported in parenthesis.

	a_0	a_1	b_0	b_1	b_2
Australia	0.0094	-1.0868	0.3543	0.7667	0.2585
	(7.59)	(-1.40)	(1.66)	(17.92)	(3.83)
Belgium	0.0022	1.5537	1.6077	0.7672	0.1568
	(0.73)	(1.06)	(2.21)	(9.28)	(1.91)
Canada	0.0079	-0.9009	2.1791	0.7699	0.1141
	(2.04)	(-0.43)	(1.63)	(6.86)	(2.22)
Denmark	0.0163	-4.3752	3.0373	0.7912	0.0868
	(0.52)	(-0.36)	(0.72)	(4.01)	(2.10)
France	-0.0013	2.4933	2.8963	0.7551	0.1515
	(-0.19)	(1.16)	(2.26)	(10.13)	(2.93)
Germany	0.0026	1.3816	1.5897	0.7928	0.1533
	(0.70)	(1.02)	(1.81)	(12.57)	(3.71)
Italy	0.0038	0.3536	1.2863	0.8063	0.1786
	(0.91)	(0.34)	(2.06)	(21.02)	(4.42)
Japan	0.0054	0.1727	0.9913	0.8485	0.1216
	(1.36)	(0.11)	(0.61)	(5.99)	(1.23)

Table 2: (continued)

	a_0	a_1	b_0	b_1	b_2
Netherlands	0.0058	0.7277	2.2521	0.8185	0.0893
	(0.97)	(0.30)	(2.87)	(21.12)	(3.40)
Norway	0.0366	-7.7654	21.1349	0.3632	0.0887
	(1.27)	(-1.02)	(0.87)	(0.59)	(2.03)
New Zealand	0.0119	-4.2513	0.0880	0.8934	0.1059
	(4.19)	(-2.75)	(0.31)	(27.49)	(2.96)
Portugal	0.0186	-5.8571	3.5810	0.7422	0.1346
	(0.45)	(-0.41)	(0.46)	(1.35)	(0.41)
Singapore	0.0052	0.9637	1.9563	0.7621	0.2066
	(1.21)	(0.88)	(1.92)	(16.77)	(3.21)
South Africa	0.0089	-0.2120	0.8119	0.8453	0.1410
	(3.09)	(-0.25)	(1.51)	(18.67)	(3.29)
Spain	-0.0088	4.3092	7.7134	0.6395	0.1702
	(-0.62)	(1.16)	(1.28)	(3.61)	(2.41)
Sweden	0.0061	0.6463	1.1042	0.7922	0.1784
	(2.25)	(0.59)	(2.20)	(18.77)	(4.72)
Switzerland	0.0100	-2.0520	3.0354	0.6845	0.1732
	(1.98)	(-0.83)	(1.00)	(3.25)	(2.33)
UK	0.0007	2.2555	0.2772	0.8448	0.1566
	(0.54)	(2.40)	(1.91)	(27.99)	(4.27)
US	0.0058	1.2005	0.6995	0.8416	0.1388
	(2.84)	(1.39)	(2.49)	(33.67)	(5.65)

Table 3: International Risk-Return Relation: GJR GARCH-in-Mean Model

This table reports the results from the GJR GARCH-in-Mean model using excess returns of the 18 international stock markets as well as the US market.

$$R_{i,t} = a_0 + a_1 h_{i,t} + \epsilon_{i,t} \quad (7)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^- \epsilon_{i,t-1}^2 + b_4 r_{i,t}^f \quad (8)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. I^- is an indicator variable where it takes the value of 1 if the residual ϵ_{t-1} is negative and zero otherwise. $r_{i,t}^f$ is the risk free rate of country *i* at month *t*. The Bollerslev and Wooldridge robust *t*-statistics are reported in parenthesis.

	a_0	a_1	b_0	b_1	b_2	b_3	b_4
Australia	0.0099	-1.7799	0.1575	0.6591	0.2014	0.0543	0.0587
	(6.52)	(-1.80)	(0.64)	(11.59)	(2.57)	(0.59)	(2.89)
Belgium	0.0052	-0.5349	1.3215	0.7218	0.1127	0.1126	0.0184
	(1.30)	(-0.25)	(1.58)	(8.25)	(1.08)	(1.02)	(1.39)
Canada	0.0165	-6.1109	4.4802	0.5410	-0.0037	0.1948	0.0542
	(2.66)	(-1.64)	(1.51)	(2.39)	(-0.05)	(1.91)	(1.30)
Denmark	0.0362	-13.2636	3.5942	0.7398	-0.0026	0.1333	0.0159
	(2.87)	(-2.35)	(1.74)	(7.70)	(-0.09)	(2.97)	(1.77)
France	0.0057	-0.5825	2.2165	0.6903	0.0604	0.1923	0.0468
	(1.13)	(-0.31)	(2.47)	(8.98)	(1.85)	(2.25)	(2.12)
Germany	0.0014	1.9460	1.7811	0.7947	0.1638	-0.0196	-0.0069
	(0.28)	(0.93)	(1.39)	(11.83)	(3.48)	(-0.32)	(-0.47)
Italy	0.0043	0.2859	0.4497	0.8004	0.1733	-0.0153	0.0285
	(1.05)	(0.25)	(0.89)	(19.71)	(3.94)	(-0.38)	(2.38)
Japan	0.0067	-0.7093	1.0448	0.8627	0.0685	0.0701	-0.0010
	(1.58)	(-0.43)	(0.77)	(9.14)	(1.24)	(1.45)	(-0.09)

Table 3: (continued)

	a_0	a_1	b_0	b_1	b_2	b_3	b_4
Netherlands	0.0202	-5.6685	4.6529	0.5935	0.0247	0.1578	0.0735
	(2.04)	(-1.32)	(1.02)	(1.88)	(0.57)	(1.47)	(0.97)
New Zealand	0.0134	-5.5953	-0.4579	0.8720	0.0462	0.0028	0.0365
	(3.88)	(-2.68)	(-1.93)	(13.99)	(1.35)	(0.09)	(1.91)
Norway	0.0328	-7.1799	14.6419	0.1189	-0.0374	0.1608	0.3230
	(2.41)	(-1.79)	(0.47)	(0.07)	(-0.69)	(2.44)	(0.62)
Portugal	0.0685	-23.7851	8.4171	0.6113	0.0120	0.1068	0.0176
	(2.37)	(-2.37)	(0.72)	(1.37)	(0.36)	(1.10)	(0.87)
Singapore	0.0052	0.6566	1.0728	0.7770	0.1292	0.0900	0.0829
	(1.23)	(0.51)	(0.94)	(14.88)	(1.24)	(0.82)	(1.30)
South Africa	0.0104	-0.5199	0.2338	0.8316	0.1503	-0.0209	0.0153
	(3.35)	(-0.57)	(0.45)	(12.24)	(3.56)	(-0.33)	(1.32)
Spain	0.0057	0.5551	1.8066	0.7732	0.1319	0.0427	0.0285
	(0.20)	(0.08)	(0.20)	(1.92)	(0.85)	(0.42)	(1.13)
Sweden	0.0076	-0.3062	0.4422	0.7900	0.1164	0.0719	0.0258
	(2.58)	(-0.24)	(0.88)	(15.78)	(3.15)	(1.29)	(2.51)
Switzerland	0.0128	-3.30	1.3432	0.7509	0.1659	-0.0378	0.0392
	(2.98)	(-1.50)	(0.54)	(3.05)	(2.18)	(-0.40)	(0.84)
UK	0.0006	2.2439	0.0782	0.8254	0.1526	0.0150	0.0123
	(0.42)	(2.30)	(0.50)	(23.55)	(3.44)	(0.40)	(2.30)
US	0.0063	0.6143	0.5727	0.8428	0.0746	0.0958	0.0105
	(2.82)	(0.58)	(1.30)	(25.73)	(2.37)	(1.67)	(1.53)

Table 4: GJR GARCH-in-Mean Model with Lagged US Returns

This table reports the results from the GJR GARCH-in-Mean model using excess returns of the 18 international stock markets.

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + \epsilon_{i,t} \quad (9)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^- \epsilon_{i,t-1}^2 + b_4 r_{i,t}^f \quad (10)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. $R_{us,t-1}$ is the lagged US market return. $r_{i,t}^f$ is the international market risk-free rate at month *t*. I^- is an indicator variable where it takes the value of 1 if the residual ϵ_{t-1} is negative and zero otherwise. The Bollerslev and Wooldridge robust *t*-statistics are reported in parenthesis.

	a_0	a_1	a_2	b_0	b_1	b_2	b_3	b_4
Australia	0.0086	-1.4896	0.0928	0.1013	0.6685	0.2013	0.0434	0.0574
	(5.90)	(-1.49)	(5.23)	(0.46)	(12.80)	(2.59)	(0.49)	(3.03)
Belgium	0.0034	-0.1995	0.1594	1.4649	0.7199	0.0967	0.1290	0.0173
	(1.05)	(-0.11)	(4.12)	(1.57)	(6.02)	(1.07)	(1.05)	(1.23)
Canada	0.0059	-1.2674	0.2420	3.7538	0.5515	0.0117	0.2088	0.0527
	(1.36)	(-0.49)	(7.46)	(2.04)	(3.27)	(0.26)	(1.62)	(1.90)
Denmark	0.0348	-12.8753	0.0490	3.3442	0.7561	-0.0003	0.1195	0.0151
	(2.69)	(-2.25)	(0.79)	(1.66)	(7.96)	(-0.01)	(2.48)	(1.79)
France	0.0019	0.4042	0.1481	2.0510	0.7155	0.0546	0.1862	0.0394
	(0.37)	(0.22)	(2.93)	(2.59)	(11.85)	(1.75)	(2.47)	(2.22)
Germany	0.0007	1.7206	0.2030	1.8324	0.8006	0.1438	-0.0060	-0.0079
	(0.16)	(0.83)	(4.96)	(1.27)	(10.59)	(3.15)	(-0.10)	(-0.49)
Italy	0.0031	0.2696	0.1794	0.4136	0.8077	0.1680	-0.0203	0.0276
	(0.80)	(0.25)	(3.73)	(0.86)	(22.95)	(4.17)	(-0.52)	(2.46)
Japan	0.0053	-0.4827	0.1483	0.9756	0.8667	0.0701	0.0612	-0.0005
	(1.19)	(-0.27)	(3.38)	(0.81)	(9.58)	(1.23)	(1.42)	(-0.06)

Table 4: (continued)

	a_0	a_1	a_2	b_0	b_1	b_2	b_3	b_4
Netherlands	0.0122	-2.7163	0.1435	2.8251	0.7269	0.0387	0.1034	0.0421
	(1.33)	(-0.68)	(3.13)	(0.80)	(2.97)	(0.84)	(0.89)	(0.80)
New Zealand	0.0121	-5.5165	0.1255	-0.4095	0.8796	0.0457	-0.0086	0.0343
	(3.49)	(-2.58)	(2.36)	(-1.87)	(16.10)	(1.33)	(-0.28)	(2.01)
Norway	0.0275	-6.3480	0.2113	22.9353	-0.3991	-0.0312	0.1037	0.5389
	(3.25)	(-2.75)	(2.35)	(2.76)	(-1.02)	(-0.47)	(1.24)	(2.28)
Portugal	0.0649	-24.0694	0.2438	7.0769	0.6816	0.0158	0.0474	0.0120
	(2.42)	(-2.47)	(2.88)	(0.96)	(2.50)	(0.52)	(0.76)	(0.94)
Singapore	0.0042	0.7471	0.0743	1.0468	0.7744	0.1364	0.0848	0.08140
	(0.98)	(0.58)	(0.94)	(0.92)	(14.86)	(1.24)	(0.75)	(1.32)
South Africa	0.0101	-0.4983	0.0288	0.2570	0.8314	0.1477	-0.0181	0.0155
	(3.10)	(-0.54)	(0.55)	(0.46)	(11.82)	(3.44)	(-0.28)	(1.30)
Spain	-0.0100	4.2139	0.2117	6.1740	0.6471	0.1436	0.0468	0.0223
	(-0.35)	(0.54)	(2.64)	(0.53)	(2.14)	(2.03)	(0.46)	(0.51)
Sweden	0.0066	-0.1880	0.1033	0.3911	0.8003	0.1124	0.0651	0.0246
	(2.31)	(-0.15)	(2.50)	(0.79)	(16.06)	(3.11)	(1.23)	(2.59)
Switzerland	0.0121	-3.6202	0.1554	0.5392	0.8631	0.1200	-0.0475	0.0155
	(2.59)	(-1.39)	(1.93)	(0.59)	(8.15)	(3.02)	(-0.82)	(0.73)
UK	0.0022	1.5676	0.1385	1.2020	0.6933	0.1210	0.1553	0.0311
	(0.65)	(0.76)	(4.77)	(1.18)	(5.25)	(1.85)	(1.16)	(1.34)

Table 5: GJR GARCH-in-Mean Model with Contemporaneous and Lagged US Returns

This table reports the results from the GJR GARCH-in-Mean model using excess returns of the 18 international stock markets.

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + a_3 R_{us,t} + \epsilon_{i,t} \tag{11}$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^- \epsilon_{i,t-1}^2 + b_4 r_{i,t}^f \tag{12}$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return at month *t*. $r_{i,t}^f$ is the international market risk-free rate at month *t*. I^- is an indicator variable where it takes the value of 1 if the residual ϵ_{t-1} is negative and zero otherwise. The Bollerslev and Wooldridge robust *t*-statistics are reported in parenthesis.

	a_0	a_1	a_2	a_3	b_0	b_1	b_2	b_3	b_4
Australia	0.0066	-1.2893	0.0915	0.1711	0.2826	0.7193	0.1897	-0.0021	0.0369
	(4.27)	(-1.11)	(3.43)	(3.49)	(1.34)	(11.42)	(2.77)	(-0.03)	(2.20)
Belgium	0.0003	-0.2128	0.1494	0.4675	0.9657	0.8099	0.0272	0.0707	0.0147
	(0.04)	(-0.04)	(4.39)	(8.62)	(1.14)	(6.96)	(0.67)	(1.30)	(1.18)
Canada	0.0005	-1.3828	0.1763	0.6748	0.2674	0.8785	0.0986	-0.0379	0.0021
	(0.21)	(-0.41)	(7.39)	(21.38)	(0.67)	(7.66)	(1.67)	(-1.24)	(0.82)
Denmark	0.0163	-9.1216	0.1105	0.5870	1.8434	0.7798	-0.0054	0.0753	0.0227
	(1.96)	(-1.90)	(1.91)	(10.68)	(2.10)	(10.35)	(-0.16)	(1.64)	(2.16)
France	-0.0041	1.7888	0.1135	0.6993	0.9997	0.7821	0.0457	0.0576	0.0379
	(-1.02)	(0.86)	(2.67)	(14.39)	(0.71)	(3.40)	(0.62)	(1.12)	(0.85)
Germany	0.0012	0.1434	0.1846	0.5549	1.5006	0.7753	0.1108	0.0024	0.0156
	(0.15)	(0.03)	(5.09)	(9.16)	(1.45)	(10.69)	(2.32)	(0.04)	(0.81)
Italy	-0.0022	0.6865	0.1483	0.5652	0.7012	0.8144	0.1570	-0.0476	0.0248
	(-0.57)	(0.62)	(3.35)	(9.48)	(1.34)	(22.77)	(3.99)	(-1.11)	(2.38)
Japan	0.0001	0.8379	0.1374	0.3625	1.1270	0.8377	0.0747	0.0758	0.0045
	(0.01)	(0.14)	(3.41)	(6.74)	(0.24)	(1.89)	(0.32)	(1.13)	(0.45)

Table 5: (continued)

	a_0	a_1	a_2	a_3	b_0	b_1	b_2	b_3	b_4
Netherlands	0.0005	0.5829	0.1245	0.7270	0.6655	0.8837	0.0609	-0.0200	0.0071
	(0.08)	(0.13)	(3.41)	(18.69)	(1.67)	(20.40)	(2.03)	(-0.56)	(1.41)
New Zealand	0.0059	-4.8033	0.1264	0.4020	-0.3157	0.8355	0.0574	-0.0170	0.0375
	(1.51)	(-1.66)	(2.63)	(7.70)	(-1.00)	(6.64)	(1.16)	(-0.38)	(1.09)
Norway	-0.0047	1.0017	0.1904	0.8910	0.4570	0.7797	0.1271	-0.0054	0.0345
	(-1.00)	(0.44)	(3.95)	(16.69)	(0.96)	(10.50)	(3.02)	(-0.08)	(1.50)
Portugal	0.0391	-21.3044	0.2146	0.6080	0.9628	0.9369	0.0218	-0.0129	-0.0010
	(3.72)	(-4.34)	(2.95)	(8.97)	(1.82)	(27.43)	(1.52)	(-0.66)	(0.43)
Singapore	-0.0038	1.8059	0.0615	0.7969	1.1182	0.8235	0.0916	0.0691	0.0119
	(-0.66)	(0.74)	(0.91)	(10.32)	(1.16)	(12.88)	(0.81)	(0.69)	(0.31)
South Africa	0.0047	0.2431	0.0059	0.4447	0.0472	0.8743	0.1270	-0.0325	0.0077
	(1.48)	(0.23)	(0.13)	(7.50)	(0.15)	(17.69)	(3.20)	(-0.87)	(1.29)
Spain	0.0076	-3.0509	0.1458	0.8333	0.3749	0.8778	0.0404	0.0764	0.0143
	(1.34)	(-1.16)	(2.38)	(14.57)	(0.81)	(14.38)	(1.17)	(1.48)	(1.49)
Sweden	0.0030	0.2709	0.0861	0.5186	0.2882	0.7971	0.1029	0.0396	0.0290
	(1.12)	(0.17)	(2.17)	(9.77)	(0.87)	(13.26)	(2.14)	(0.81)	(2.88)
Switzerland	0.0029	-1.5988	0.1147	0.6250	1.5094	0.6341	0.1848	-0.0571	0.0307
	(0.64)	(-0.35)	(3.21)	(13.25)	(0.94)	(2.10)	(1.99)	(-0.59)	(1.07)
UK	-0.0015	2.5143	0.0675	0.3905	0.5473	0.7722	0.1776	0.0366	0.0068
	(-0.71)	(1.65)	(2.37)	(8.04)	(1.89)	(16.15)	(3.36)	(0.55)	(1.55)

Table 6: GJR GARCH-in-Mean Model with US Market Returns and Variances

This table reports the results from the GJR GARCH-in-Mean model using excess returns of the 18 international stock markets.

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + a_3 R_{us,t} + a_4 R_{i,t-1} + a_5 \sigma^2_{us,t} + a_6 \sigma^2_{us,t-1} + a_7 r^f_{us,t} + a_8 r^f_{i,t} + \varepsilon_{i,t} \quad (13)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon^2_{i,t-1} + b_3 I^-_{i,t-1} \epsilon^2_{i,t-1} + b_4 r^f_{i,t} \quad (14)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return at month *t*. $\sigma^2_{us,t}$ and $\sigma^2_{us,t-1}$ denote the contemporaneous and lagged US market return variance respectively. $r^f_{i,t}$ is the international market risk-free rate at month *t*. I^- is an indicator variable where it takes the value of 1 if the residual ϵ_{t-1} is negative and zero otherwise. The Bollerslev and Wooldridge robust *t*-statistics are reported in parenthesis.

Table 6

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8
Australia	0.0069	0.6122	0.0910	0.1695	0.0390	-2.7173	2.7243	1.6388	-2.0381
	(4.02)	(0.40)	(3.44)	(3.44)	(0.77)	(-1.34)	(1.43)	(1.69)	(-2.77)
Belgium	-0.0022	11.6602	0.1075	0.4887	0.0915	-2.8019	0.5348	2.0660	-3.3008
	(-0.37)	(1.42)	(2.73)	(7.90)	(2.13)	(-0.67)	(0.12)	(1.94)	(-2.67)
Canada	0.0013	1.9004	0.2182	0.6674	-0.0689	-2.5229	2.3022	3.2938	-3.3906
	(0.55)	(0.55)	(6.67)	(22.92)	(-2.14)	(-0.74)	(0.74)	(3.18)	(-4.34)
Denmark	0.0209	-18.3091	0.1290	0.5938	-0.0748	-7.0645	7.5790	3.1092	-0.2690
	(2.08)	(-2.54)	(2.00)	(10.99)	(-1.12)	(-1.01)	(1.18)	(2.24)	(-0.25)
France	-0.0114	16.3216	0.0257	0.6855	0.1113	-4.5105	3.3493	1.9444	-5.1751
	(-0.80)	(1.00)	(0.19)	(13.71)	(0.55)	(-0.90)	(0.67)	(1.56)	(-1.26)
Germany	0.0027	2.8361	0.1271	0.5465	0.1010	-0.9821	-0.3291	1.3690	-2.6185
	(0.48)	(0.83)	(3.13)	(9.02)	(2.14)	(-0.28)	(-0.10)	(1.48)	(-1.98)
Italy	0.0040	1.8369	0.1513	0.5772	0.0230	-0.0529	-3.8554	2.6022	-2.1788
	(0.88)	(1.27)	(2.73)	(9.20)	(0.57)	(-0.01)	(-0.85)	(1.78)	(-2.07)
Japan	-0.0001	1.2525	0.0953	0.3751	0.0793	-3.0228	1.5888	0.2271	0.3459
	(-0.00)	(0.23)	(2.05)	(7.01)	(1.80)	(-0.77)	(0.39)	(0.29)	(0.29)

Table 6: (continued)

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8
Netherlands	0.0013	2.2981	0.1188	0.7219	-0.0375	-7.3555	6.4770	3.4956	-3.9888
	(0.22)	(0.49)	(2.83)	(19.17)	(-1.02)	(-2.20)	(1.97)	(3.49)	(-3.55)
New Zealand	0.0288	37.0260	0.1379	0.4200	-0.0950	-12.1113	7.6403	2.6100	-14.7429
	(3.84)	(8.64)	(2.35)	(7.91)	(-1.70)	(-2.55)	(1.59)	(1.68)	(-8.16)
Norway	-0.0069	20.8748	0.1122	0.8826	0.0787	-5.7044	4.8439	1.9505	-8.5410
	(-0.94)	(2.93)	(1.28)	(17.74)	(1.11)	(-1.26)	(1.10)	(1.25)	(-2.88)
Portugal	-0.0025	2.7163	0.1628	0.5782	0.1344	-1.9488	-0.5635	2.9941	-2.5390
	(-0.06)	(0.13)	(1.00)	(6.81)	(0.97)	(-0.15)	(-0.05)	(0.71)	(-1.64)
Singapore	-0.0056	2.0094	0.0465	0.8005	0.0100	-5.7787	5.7398	-2.5692	6.1256
	(-1.02)	(0.77)	(0.60)	(10.36)	(0.16)	(-0.62)	(0.72)	(-1.11)	(1.15)
South Africa	0.0162	2.9094	0.0087	0.4495	0.0425	2.0785	-5.1392	-0.0568	-1.8298
	(3.47)	(1.68)	(0.18)	(7.92)	(1.00)	(0.49)	(-1.29)	(-0.04)	(-3.04)
Spain	0.0010	1.4262	0.1703	0.8241	0.0235	7.3375	-7.4753	3.9568	-3.3372
	(0.12)	(0.34)	(1.93)	(11.15)	(0.38)	(1.03)	(-1.34)	(2.19)	(-2.09)
Sweden	0.0024	4.0961	0.0376	0.5332	0.0307	-11.0054	10.6287	3.1941	-3.6776
	(0.75)	(2.07)	(0.93)	(10.92)	(0.81)	(-2.91)	(2.83)	(2.58)	(-3.23)
Switzerland	0.0055	3.0808	0.0918	0.6348	-0.0022	-5.9760	3.1213	1.3135	-2.5172
	(1.18)	(0.46)	(1.96)	(13.00)	(-0.04)	(-1.79)	(0.92)	(1.98)	(-1.85)
UK	-0.0001	3.1637	0.0811	0.3970	-0.0404	-0.7662	0.2484	0.7669	-0.8040
	(-0.03)	(1.95)	(2.57)	(8.12)	(-1.11)	(-0.39)	(0.12)	(0.69)	(-0.87)

Table 6: (continued)

Panel B: Parameter Estimates for the Conditional Variance Equation

	b_0	b_1	b_2	b_3	b_4
Australia	0.2528	0.7221	0.1794	0.0134	0.0369
	(1.31)	(10.74)	(2.64)	(0.15)	(1.92)
Belgium	0.6208	0.8566	0.0087	0.0720	0.0132
	(0.88)	(7.26)	(0.30)	(1.43)	(1.44)
Canada	0.4696	0.8257	0.1233	-0.0277	0.0014
	(1.45)	(10.34)	(3.32)	(-0.68)	(0.65)
Denmark	1.8847	0.7756	-0.0184	0.0943	0.0232
	(1.92)	(7.50)	(-0.66)	(2.34)	(2.02)
France	2.8108	0.5147	0.0305	0.1110	0.0994
	(0.33)	(0.40)	(0.36)	(0.40)	(0.33)
Germany	1.4730	0.7691	0.1217	0.0056	0.0130
	(1.69)	(12.19)	(2.99)	(0.10)	(0.87)
Italy	0.8046	0.8049	0.1654	-0.0550	0.0246
	(1.56)	(20.29)	(3.85)	(-1.17)	(2.57)
Japan	1.1983	0.8364	0.0645	0.0939	0.0039
	(0.23)	(1.79)	(0.29)	(1.06)	(0.43)
Netherlands	0.7531	0.8689	0.0623	-0.0169	0.0084
	(1.84)	(19.38)	(1.66)	(-0.44)	(1.56)
New Zealand	-0.2261	0.8166	-0.0009	0.0139	0.0487
	(-0.80)	(9.31)	(-0.08)	(0.45)	(2.09)
Norway	0.5693	0.7874	0.0774	-0.0141	0.0468
	(1.07)	(11.26)	(2.04)	(-0.34)	(2.27)
Portugal	7.6731	0.3667	0.2512	-0.0512	0.0143
	(0.20)	(0.19)	(0.93)	(-0.07)	(0.44)
Singapore	1.0887	0.8160	0.1081	0.0598	0.0097
	(1.13)	(12.82)	(0.90)	(0.55)	(0.25)
South Africa	0.2036	0.8527	0.1337	-0.0180	0.0087
	(0.52)	(14.25)	(3.06)	(-0.34)	(1.11)
Spain	0.6941	0.8165	0.0583	0.1126	0.0204
	(0.29)	(2.30)	(0.34)	(0.93)	(0.75)
Sweden	0.2786	0.7808	0.1098	0.0422	0.0312
	(0.98)	(14.96)	(2.39)	(0.85)	(3.16)
Switzerland	1.4937	0.6292	0.1872	-0.0664	0.0321
	(1.09)	(2.43)	(2.17)	(-0.80)	(1.16)
UK	0.5617	0.7656	0.1806	0.0376	0.0077
	(1.87)	(14.83)	(3.34)	(0.55)	(1.66)

Table 7: GJR GARCH-in-Mean Model with Lagged Exchange Rates

This table reports the results from the following modified GJR-GARCH-in-Mean model using excess returns of the 16 countries.

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + a_3 R_{us,t} + a_4 R_{i,t-1} + a_5 \sigma^2_{us,t} + a_6 \sigma^2_{us,t-1} + a_7 r^f_{us,t} + a_8 r^f_{i,t} + a_9 EX_{i,us,t-1} + \epsilon_{i,t} \quad (15)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon^2_{i,t-1} + b_3 I^-_{i,t-1} \epsilon^2_{i,t-1} + b_4 r^f_{i,t} \quad (16)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return at month *t*. $\sigma^2_{us,t}$ and $\sigma^2_{us,t-1}$ denote the contemporaneous and lagged US market return variance respectively. $r^f_{us,t}$ is the US risk-free rate at month *t*. $r^f_{i,t}$ is the home market risk-free rate at month *t*. $EX_{i,us,t-1}$ is the lagged monthly exchange rate between the home country currency and the US dollar. It is measured as units of home currency per US dollar. I^- is an indicator variable where it takes the value of 1 if the residual ϵ_{t-1} is negative and zero otherwise. The Bollerslev and Wooldridge robust *t*-statistics are reported in parenthesis.

Table 7

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9
Australia	-0.0053	0.6071	0.0672	0.1933	0.0372	-2.3014	2.9635	1.8812	-2.5605	0.0065
	(-0.57)	(0.93)	(2.27)	(3.12)	(1.27)	(-1.54)	(1.13)	(1.82)	(-2.51)	(1.25)
Belgium	-0.0119	9.2912	0.1484	0.5857	0.0974	-3.0478	0.5520	2.9210	-3.4976	0.0104
	(-2.13)	(1.18)	(3.37)	(7.54)	(2.74)	(-0.78)	(0.17)	(4.96)	(-5.12)	(1.03)
Canada	-0.0067	1.7592	0.1276	0.7544	0.0124	-2.5893	2.5478	2.6081	-3.1612	0.0025
	(-0.63)	(0.86)	(3.92)	(21.03)	(1.17)	(-1.03)	(0.87)	(2.14)	(-3.36)	(0.31)
Denmark	0.0178	-10.8933	0.1012	0.5930	-0.0763	-6.9930	7.1292	3.1242	-0.7641	-0.0011
	(1.20)	(-2.13)	(2.22)	(14.39)	(-1.08)	(-0.39)	(1.08)	(2.08)	(-0.41)	(-0.64)
France	-0.0329	16.0783	0.0901	0.8229	0.2074	-4.8963	3.8945	2.4045	-6.8561	0.0198
	(-2.80)	(0.95)	(2.00)	(11.59)	(0.68)	(-1.59)	(0.50)	(2.50)	(-2.75)	(1.97)
Germany	-0.0063	3.0585	0.1591	0.6736	0.1785	-0.9536	2.3505	1.5505	-4.0731	0.0236
	(-0.80)	(0.98)	(3.63)	(14.61)	(2.07)	(-0.51)	(1.10)	(1.80)	(-2.74)	(2.55)
Italy	-0.0337	1.2999	0.1562	0.7103	0.0354	-0.1103	-3.2156	2.9956	-2.5474	0.0349
	(-2.81)	(0.67)	(3.06)	(5.27)	(0.63)	(-0.27)	(-0.23)	(3.23)	(-2.18)	(0.42)
Japan	-0.0211	1.6163	0.1302	0.5273	0.0874	-3.5773	1.7590	0.2590	0.4797	0.0002
	(-1.56)	(0.84)	(2.64)	(10.03)	(1.96)	(-1.03)	(1.05)	(1.05)	(0.59)	(1.23)

Table 7: (continued)

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9
Netherlands	-0.0055	0.3596	0.1144	0.7474	-0.0674	-7.6579	6.3479	2.7921	-3.5510	0.0119
	(-0.68)	(0.06)	(2.52)	(16.84)	(-1.52)	(-2.76)	(2.07)	(2.45)	(-3.24)	(0.98)
New Zealand	-0.0064	27.0208	0.1328	0.4120	-0.1246	-10.2796	7.8645	2.9681	-12.4912	0.0110
	(-0.36)	(9.23)	(3.26)	(10.33)	(-2.07)	(-3.33)	(1.63)	(2.54)	(-8.63)	(1.55)
Norway	-0.0074	19.6542	0.1032	0.9014	0.0963	-6.2312	4.8696	2.0512	-7.2014	0.0214
	(-0.87)	(3.04)	(1.47)	(18.23)	(1.32)	(-1.51)	(1.23)	(1.54)	(-3.25)	(1.38)
Portugal	-0.0687	1.6401	0.1920	0.6331	0.1796	-1.8513	0.2069	4.2069	-3.3419	0.0373
	(-2.78)	(0.39)	(3.24)	(11.56)	(1.34)	(-0.56)	(1.13)	(2.13)	(-2.28)	(0.75)
Singapore	-0.0057	2.8754	0.0587	1.0128	0.0132	-6.0851	5.9146	-4.5713	8.2439	0.0304
	(-1.42)	(0.94)	(0.69)	(11.24)	(0.23)	(-1.08)	(1.37)	(-1.58)	(1.41)	(1.46)
South Africa	0.0418	2.7733	0.0425	0.5708	0.0638	2.9008	-4.9782	0.7082	-1.0876	-0.0006
	(2.17)	(1.56)	(0.72)	(10.08)	(0.98)	(1.18)	(-1.36)	(0.46)	(-3.53)	(-0.40)
Spain	-0.0313	1.3895	0.1373	0.8739	0.0368	-5.8739	1.3250	3.6750	-2.3688	0.0204
	(-2.29)	(0.93)	(2.39)	(15.39)	(0.63)	(-1.39)	(0.62)	(1.92)	(-1.72)	(1.43)
Sweden	-0.0201	2.7553	0.0621	0.9876	0.0413	-9.6478	11.2049	4.0582	-3.2965	0.0049
	(-1.31)	(2.50)	(0.98)	(20.06)	(1.37)	(-2.99)	(3.71)	(3.41)	(-2.68)	(2.36)
Switzerland	-0.0062	5.8207	0.0923	0.6212	-0.0075	-5.7919	4.0128	0.7640	-2.5676	0.0064
	(-0.93)	(0.99)	(2.68)	(14.85)	(-0.17)	(-1.85)	(0.98)	(1.90)	(-2.06)	(1.31)
UK	0.0014	3.0308	0.0757	0.7877	-0.0497	-0.7884	0.2793	0.8762	-1.2250	0.0060
	(0.17)	(2.25)	(3.19)	(6.96)	(-1.28)	(-0.37)	(0.74)	(1.05)	(-1.72)	(2.46)

Table 7: (continued)

Panel B: Parameter Estimates for the Conditional Variance Equation

	b_0	b_1	b_2	b_3	b_4
Australia	0.0000	0.8428	0.1643	-0.1276	0.0134
	(-0.11)	(16.04)	(2.38)	(-1.74)	(1.23)
Belgium	0.0001	0.9110	-0.0788	0.1907	0.0082
	(2.67)	(45.67)	(-4.27)	(5.10)	(2.37)
Canada	0.0001	0.6541	0.1332	-0.0084	0.0062
	(2.29)	(5.66)	(2.08)	(-0.11)	(1.17)
Denmark	0.0000	1.0042	-0.0273	-0.0055	0.0031
	(1.90)	(48.62)	(-1.38)	(-0.32)	(4.56)
France	0.0002	0.6239	0.0354	0.0456	0.0811
	(2.53)	(5.79)	(1.54)	(1.43)	(2.68)
Germany	0.0001	0.7969	0.1335	-0.0322	0.0163
	(0.96)	(7.65)	(2.35)	(-0.34)	(1.36)
Italy	0.0001	0.8569	0.1139	-0.0681	0.0225
	(1.54)	(14.25)	(2.27)	(-1.03)	(1.30)
Japan	0.0000	0.9941	-0.0530	0.0677	0.0150
	(4.83)	(50.94)	(-2.20)	(3.03)	(3.22)
Netherlands	0.0001	0.8858	0.0521	-0.0041	0.0078
	(0.87)	(11.15)	(1.26)	(-0.08)	(1.40)
New Zealand	0.0000	1.0077	-0.0164	-0.0443	0.0105
	(-1.68)	(59.55)	(-1.06)	(-1.97)	(2.14)
Norway	0.5541	0.8012	0.0654	-0.0182	0.0637
	(1.48)	(12.28)	(2.69)	(-0.39)	(2.83)
Portugal	0.0011	0.1760	0.4316	-0.3269	0.0331
	(4.76)	(2.06)	(2.61)	(-2.49)	(0.82)
Singapore	1.5741	0.8096	0.2046	0.0608	0.0092
	(1.20)	(13.07)	(1.07)	(0.63)	(0.30)
South Africa	-0.0001	0.7630	0.0054	0.0699	0.0562
	(-1.21)	(10.74)	(0.23)	(1.90)	(2.38)
Spain	0.0001	0.8511	-0.0011	0.1552	0.0162
	(1.89)	(17.47)	(-0.04)	(3.12)	(1.60)
Sweden	0.0000	0.8583	0.1575	-0.2098	0.0552
	(0.08)	(15.08)	(2.34)	(-2.45)	(2.04)
Switzerland	0.0001	0.6526	0.1837	-0.0495	0.0280
	(2.26)	(6.04)	(2.34)	(-0.59)	(1.88)
UK	0.0000	0.9866	-0.0693	0.1075	0.0030
	(1.60)	(14.23)	(-2.45)	(2.63)	(1.53)

Table 8: The adjusted $\bar{R}^2$ for GJR Models with US Returns and Interest Rates

$$R_{i,t} = a_0 + a_1 h_{i,t} + \epsilon_{i,t} \quad \text{(a)}$$

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + \epsilon_{i,t} \quad \text{(b)}$$

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + a_3 r_{us,t}^f + a_4 r_{i,t}^f + \epsilon_{i,t} \quad \text{(c)}$$

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + a_3 R_{us,t} + a_4 r_{us,t}^f + a_5 r_{i,t}^f + \epsilon_{i,t} \quad \text{(d)}$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^- \epsilon_{i,t-1}^2 + b_4 r_{i,t}^f \quad \text{(e)}$$

Here $\bar{R}^2_{(a)}$, $\bar{R}^2_{(b)}$, $\bar{R}^2_{(c)}$, and $\bar{R}^2_{(d)}$ represent the adjusted R-Square of the conditional mean equation (a), (b), (c) and (d) respectively and they are measured in % form. Equation (e) is the conditional variance equation for each conditional mean equation.

	$\bar{R}^2_{(a)}$ (%)	$\bar{R}^2_{(b)}$ (%)	$\bar{R}^2_{(c)}$ (%)	$\bar{R}^2_{(d)}$ (%)
Australia	-0.52	0.84	1.10	33.2
Belgium	-1.79	0.57	1.23	34.1
Canada	-0.51	1.78	2.04	65.2
Denmark	2.47	4.32	3.93	27.1
France	-0.13	0.76	0.95	40.4
Germany	-0.46	2.61	3.10	36.1
Italy	-0.33	1.48	1.73	17.9
Japan	-0.48	2.14	2.84	19.9
Netherlands	0.37	2.04	2.82	48.1
New Zealand	2.18	4.15	5.66	27.3
Norway	0.33	1.74	2.05	36.6
Portugal	0.35	3.34	5.82	24.7
Singapore	0.25	2.35	1.54	37.9
South Africa	-1.24	1.62	12.3	32.1
Spain	-0.69	2.03	2.75	42.2
Sweden	0.27	0.48	3.78	55.9
Switzerland	0.18	3.32	4.08	46.9
UK	-1.19	0.91	2.49	39.7
US	0.38			

Table 9: GJR GARCH-in-Mean Model with US January and Negative Return

This table reports the results from the following modified GJR-GARCH-in-Mean model using excess returns of the 18 countries.

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + a_3 R_{us,t} + a_4 R_{i,t-1} + a_5 \sigma^2_{us,t} + a_6 \sigma^2_{us,t-1} + a_7 r^f_{us,t} + a_8 r^f_{i,t} + a_9 I^{Jan}_{us,t} + a_{10} I^{Neg}_{us,t} + \epsilon_{i,t} \quad (17)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon^2_{i,t-1} + b_3 I^-_{i,t-1} \epsilon^2_{i,t-1} + b_4 r^f_{i,t} \quad (18)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return at month *t*. $\sigma^2_{us,t}$ and $\sigma^2_{us,t-1}$ denote the contemporaneous and lagged US market return variance respectively. $r^f_{us,t}$ is the US risk-free rate at month *t*. $r^f_{i,t}$ is the home market risk-free rate at month *t*. $I^{Jan}_{us,t}$ is an indicator variable where it takes the value of 1 if the US prior January return is non-negative and zero otherwise. $I^{Neg}_{us,t}$ is an indicator variable where it takes the value of 1 if the US market return is negative and zero otherwise. I^- is an indicator variable where it takes the value of 1 if the residual ϵ_{t-1} is negative and zero otherwise. The Bollerslev and Wooldridge robust *t*-statistics are reported in parenthesis.

Table 9

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}
Australia	0.0072	0.7562	0.0852	0.1022	0.0430	-1.9307	2.1167	1.7841	-2.1021	0.0036	-0.0080
	(2.53)	(0.49)	(3.51)	(1.92)	(0.86)	(-1.17)	(1.37)	(1.89)	(-2.82)	(1.59)	(-2.44)
Belgium	-0.0038	12.2263	0.1099	0.5277	0.0921	-2.7427	0.2677	2.1323	-3.3985	-0.0006	0.0041
	(-0.53)	(1.39)	(2.70)	(5.01)	(2.14)	(-0.65)	(0.06)	(1.91)	(-2.57)	(-0.23)	(0.71)
Canada	0.0031	2.2625	0.2240	0.6819	-0.0717	-2.8195	2.3155	3.3187	-3.4638	-0.0030	0.0014
	(0.96)	(0.64)	(6.77)	(15.00)	(-2.22)	(-0.81)	(0.73)	(3.22)	(-4.41)	(-1.56)	(0.46)
Denmark	0.0204	-17.4692	0.1308	0.6174	-0.0709	-7.1227	7.4018	3.1580	-0.3340	-0.0021	0.0023
	(1.71)	(-2.07)	(2.02)	(7.62)	(-1.03)	(-1.001)	(1.14)	(2.29)	(-0.28)	(-0.46)	(0.40)
France	-0.0063	8.9960	0.0635	0.7807	0.0693	-2.8734	0.9194	2.0793	-3.2745	-0.0046	0.0071
	(-1.18)	(3.69)	(1.36)	(12.36)	(1.68)	(-0.71)	(0.24)	(1.81)	(-2.53)	(-1.74)	(1.47)
Germany	0.0043	2.8911	0.1325	0.5655	0.0990	-1.1579	-0.3842	1.4389	-2.7726	-0.0030	0.0018
	(0.71)	(0.89)	(3.21)	(6.77)	(2.10)	(-0.33)	(-0.11)	(1.53)	(-2.08)	(-0.99)	(0.37)
Italy	0.0008	1.8495	0.1542	0.6854	0.0216	0.6319	-4.7886	2.4758	-2.1642	-0.0015	0.0109
	(0.14)	(1.29)	(2.77)	(7.88)	(0.54)	(0.13)	(-1.07)	(1.71)	(-2.05)	(-0.41)	(1.97)

Table 9: (continued)

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}
Japan	0.0022	1.1928	0.0993	0.3787	0.0798	-3.1244	1.5452	0.2228	0.3504	-0.0031	0.0001
	(0.17)	(0.30)	(2.12)	(4.89)	(1.82)	(-0.82)	(0.41)	(0.29)	(0.31)	(-0.85)	(0.02)
Netherland	0.0030	2.0307	0.1229	0.7214	-0.0379	-7.4170	6.4339	3.5326	-4.0142	-0.0018	-0.0002
	(0.44)	(0.43)	(2.92)	(12.02)	(-1.04)	(-2.20)	(1.95)	(3.56)	(-3.61)	(-0.68)	(-0.05)
New Zealand	0.0300	37.0189	0.1381	0.3914	-0.0941	-12.0334	7.6146	2.6164	-14.7583	0.0003	-0.0032
	(3.33)	(8.69)	(2.37)	(4.50)	(-1.70)	(-2.53)	(1.61)	(1.64)	(-8.19)	(0.06)	(-0.49)
Norway	-0.0086	20.7849	0.1099	0.9162	0.0808	-5.6985	4.8866	1.9234	-8.5319	0.0002	0.0038
	(-0.75)	(2.66)	(1.25)	(11.35)	(1.14)	(-1.26)	(1.11)	(1.19)	(-2.74)	(0.03)	(0.54)
Portugal	-0.0012	-6.7040	0.1243	0.6811	0.1336	4.5807	-3.9665	3.1591	-1.8496	0.0075	0.0082
	(-0.11)	(-0.71)	(1.38)	(6.45)	(1.95)	(0.43)	(-0.42)	(1.38)	(-0.99)	(1.30)	(1.04)
Singapore	-0.0041	1.9942	0.0502	0.7831	0.0082	-5.9950	5.8741	-2.5094	6.1016	-0.0012	-0.0017
	(-0.58)	(0.76)	(0.64)	(6.22)	(0.13)	(-0.65)	(0.74)	(-1.09)	(1.15)	(-0.27)	(-0.20)
South Africa	0.0193	2.8046	0.0135	0.4516	0.0429	1.7368	-5.1912	0.0248	-1.8594	-0.0035	0.0001
	(2.84)	(1.66)	(0.28)	(5.29)	(1.01)	(0.41)	(-1.30)	(0.02)	(-3.06)	(-0.83)	(0.01)
Spain	-0.0012	1.0703	0.1671	0.8489	0.0238	7.4681	-7.4382	3.8138	-3.2706	0.0026	0.0027
	(-0.15)	(0.25)	(1.99)	(8.67)	(0.40)	(1.10)	(-1.33)	(2.06)	(-2.00)	(0.54)	(0.39)
Sweden	0.0035	4.0071	0.0443	0.5518	0.0295	-11.1957	10.6070	3.1403	-3.5620	-0.0029	0.0017
	(0.41)	(2.05)	(1.09)	(7.75)	(0.78)	(-2.93)	(2.81)	(2.58)	(-3.06)	(-0.96)	(0.36)
Switzerland	0.0080	4.3579	0.1017	0.6320	-0.0098	-6.2220	2.9775	1.3868	-2.7215	-0.0042	-0.0004
	(1.41)	(0.67)	(2.15)	(8.42)	(-0.17)	(-1.85)	(0.86)	(2.09)	(-2.02)	(-1.45)	(-0.08)
UK	0.0012	3.2133	0.0818	0.3562	-0.0399	-0.6761	0.2966	0.8365	-0.8342	0.0005	-0.0049
	(0.35)	(1.92)	(2.53)	(4.69)	(-1.09)	(-0.36)	(0.15)	(0.76)	(-0.91)	(0.25)	(-1.14)

Table 9: (continued)

Panel B: Parameter Estimates for the Conditional Variance Equation

	b_0	b_1	b_2	b_3	b_4
Australia	0.2596	0.7171	0.1743	0.0209	0.0387
	(1.30)	(10.01)	(2.56)	(0.23)	(1.92)
Belgium	0.5837	0.8632	0.0068	0.0735	0.0126
	(0.89)	(7.80)	(0.23)	(1.55)	(1.48)
Canada	0.4797	0.8218	0.1259	-0.0295	0.1259
	(1.45)	(9.98)	(3.40)	(-0.70)	(3.40)
Denmark	1.8827	0.7734	-0.0186	0.0927	0.0242
	(1.84)	(7.14)	(-0.67)	(2.21)	(2.03)
France	0.1357	0.9453	-0.0235	0.0922	0.0101
	(1.14)	(48.95)	(-1.12)	(2.58)	(2.02)
Germany	1.4312	0.7709	0.1254	0.0019	0.0125
	(1.69)	(12.39)	(3.09)	(0.03)	(0.86)
Italy	0.8471	0.8015	0.1698	-0.0590	0.0244
	(1.67)	(19.80)	(3.89)	(-1.23)	(2.57)
Japan	1.1291	0.8407	0.0631	0.0935	0.0041
	(0.30)	(2.45)	(0.37)	(1.26)	(0.46)
Netherlands	0.7614	0.8673	0.0624	-0.0160	0.0087
	(1.85)	(19.18)	(1.65)	(-0.41)	(1.57)
New Zealand	-0.2300	0.8154	-0.0010	0.0145	0.0489
	(-0.81)	(9.48)	(-0.09)	(0.48)	(2.15)
Norway	0.5570	0.7850	0.0805	-0.0145	0.0469
	(1.06)	(10.90)	(2.01)	(-0.34)	(2.23)
Portugal	0.7798	0.8807	0.0806	-0.0099	0.0027
	(1.09)	(11.41)	(1.51)	(-0.14)	(0.44)
Singapore	1.0695	0.8152	0.1088	0.0613	0.0105
	(1.10)	(12.56)	(0.90)	(0.57)	(0.26)
South Africa	0.2230	0.8465	0.1367	-0.0156	0.0093
	(0.54)	(12.72)	(2.91)	(-0.29)	(1.07)
Spain	0.6497	0.8213	0.0550	0.1133	0.0203
	(0.37)	(3.11)	(0.42)	(1.14)	(0.94)
Sweden	0.2710	0.7799	0.1111	0.0400	0.0315
	(0.96)	(15.35)	(2.49)	(0.79)	(3.19)
Switzerland	1.4242	0.6402	0.1873	-0.0690	0.0305
	(1.22)	(2.84)	(2.22)	(-0.90)	(1.29)
UK	0.6056	0.7654	0.1731	0.0453	0.0078
	(1.83)	(14.20)	(3.10)	(0.64)	(1.61)

Table 10: GARCH-in-Mean Model with US Market Variables

This table reports the results from the following GARCH-in-Mean model using excess returns of the 18 countries.

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 R_{us,t-1} + a_3 R_{us,t} + a_4 R_{i,t-1} + a_5 \sigma^2_{us,t} + a_6 \sigma^2_{us,t-1} + a_7 r^f_{us,t} + a_8 r^f_{i,t} + \epsilon_{i,t} \qquad (19)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon^2_{i,t-1} + b_3 r^f_{i,t} \qquad (20)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return at month *t*. $\sigma^2_{us,t}$ and $\sigma^2_{us,t-1}$ denote the contemporaneous and lagged US market return variance respectively. $r^f_{us,t}$ is the US risk-free rate at month *t*. $r^f_{i,t}$ is the home market risk-free rate at month *t*. The Bollerslev and Wooldridge robust *t*-statistics are reported in parenthesis.

Table 10

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8
Australia	0.0069	0.6092	0.0912	0.1716	0.0371	-2.7584	2.7601	1.6335	-2.0095
	(4.08)	(0.40)	(3.40)	(4.07)	(0.80)	(-1.37)	(1.47)	(1.67)	(-2.68)
Belgium	-0.0006	10.0073	0.1212	0.4830	0.0502	-2.3323	0.5050	1.6992	-3.0358
	(-0.11)	(1.63)	(3.15)	(9.03)	(1.29)	(-0.49)	(0.10)	(1.79)	(-2.95)
Canada	0.0012	1.8109	0.2179	0.6659	-0.0677	-2.5760	2.3576	3.3014	-3.4032
	(0.55)	(0.53)	(6.58)	(23.00)	(-2.09)	(-0.75)	(0.76)	(3.21)	(-4.40)
Denmark	-0.0015	4.9538	0.1136	0.6029	-0.0076	-6.6188	6.7137	3.2409	-3.0201
	(-0.13)	(0.47)	(1.65)	(10.78)	(-0.15)	(-0.94)	(1.01)	(2.62)	(-2.12)
France	-0.0088	13.4872	0.0624	0.6993	0.0462	-4.5418	3.2789	2.1313	-4.6685
	(-1.27)	(1.85)	(1.25)	(14.52)	(1.12)	(-0.83)	(0.61)	(1.67)	(-2.25)
Germany	0.0027	2.9015	0.1278	0.5471	0.0998	-1.0185	-0.3008	1.3870	-2.6398
	(0.48)	(0.90)	(3.21)	(9.21)	(2.23)	(-0.30)	(-0.09)	(1.56)	(-2.05)
Italy	0.0042	1.7446	0.1453	0.5646	0.0306	-0.4587	-3.5541	2.4993	-2.1823
	(0.94)	(1.17)	(2.66)	(9.35)	(0.75)	(-0.10)	(-0.81)	(1.81)	(-2.14)
Japan	-0.0027	2.2430	0.1055	0.3796	0.0634	-3.6214	2.4758	0.3961	0.3723
	(-0.46)	(1.35)	(2.27)	(7.38)	(1.44)	(-0.98)	(0.71)	(0.57)	(0.33)

Table 10: (continued)

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8
Netherlands	0.0009	2.5497	0.1178	0.7203	-0.0354	-7.4014	6.5058	3.4905	-3.9858
	(0.15)	(0.52)	(2.81)	(19.08)	(-0.97)	(-2.17)	(1.95)	(3.56)	(-3.61)
New Zealand	0.0291	36.7551	0.1458	0.4184	-0.1078	-11.9062	7.4872	2.6887	-14.8116
	(3.95)	(9.54)	(2.45)	(7.93)	(-1.81)	(-2.55)	(1.59)	(1.62)	(-8.00)
Norway	-0.0066	20.3959	0.0997	0.8825	0.0905	-5.8092	4.7744	1.9084	-8.3093
	(-0.92)	(2.85)	(1.44)	(17.69)	(1.61)	(-1.30)	(1.10)	(1.29)	(-2.97)
Portugal	-0.0008	1.9029	0.1557	0.5781	0.1385	-2.1360	-0.4955	3.1652	-2.6095
	(-0.08)	(0.42)	(1.87)	(7.69)	(1.84)	(-0.19)	(-0.05)	(1.35)	(-2.63)
Singapore	-0.0052	1.8758	0.0491	0.8029	0.0180	-5.5334	5.6725	-2.7229	6.4166
	(-0.91)	(0.84)	(0.62)	(10.12)	(0.27)	(-0.58)	(0.70)	(-1.24)	(1.27)
South Africa	0.0160	2.7207	0.0083	0.4495	0.0458	2.0209	-5.0419	0.1030	-1.8542
	(3.49)	(1.83)	(0.17)	(7.86)	(1.08)	(0.48)	(-1.26)	(0.09)	(-3.21)
Spain	-0.0019	3.4992	0.1847	0.8198	0.0000	6.7318	-6.4844	3.8011	-3.5726
	(-0.17)	(0.75)	(2.32)	(12.49)	(0.00)	(1.07)	(-1.17)	(1.82)	(-2.24)
Sweden	0.0026	4.3150	0.0418	0.5372	0.0247	-10.9812	10.6082	3.2034	-3.7399
	(0.80)	(2.22)	(1.04)	(10.64)	(0.66)	(-2.83)	(2.75)	(2.49)	(-3.18)
Switzerland	0.0057	2.5873	0.0882	0.6353	0.0062	-5.6863	2.8230	1.2848	-2.4554
	(1.29)	(0.43)	(1.87)	(12.80)	(0.12)	(-1.67)	(0.82)	(1.96)	(-1.94)
UK	0.0000	3.1372	0.0805	0.3999	-0.0434	-0.7639	0.2637	0.7652	-0.7634
	(0.02)	(2.20)	(2.56)	(8.42)	(-1.17)	(-0.39)	(0.13)	(0.68)	(-0.82)

Table 10: (continued)

Panel B: Parameter Estimates for the Conditional Variance Equation

	b_0	b_1	b_2	b_3
Australia	0.2525	0.7243	0.1865	0.0360
	(1.34)	(12.22)	(3.60)	(2.34)
Belgium	0.5263	0.8655	0.0536	0.0107
	(0.67)	(6.60)	(1.33)	(0.94)
Canada	0.5291	0.8098	0.1175	0.0015
	(1.72)	(11.53)	(3.24)	(0.64)
Denmark	1.1053	0.8640	0.0140	0.0155
	(1.67)	(12.52)	(0.33)	(1.54)
France	1.6901	0.6690	0.0859	0.0623
	(1.51)	(3.90)	(2.10)	(1.60)
Germany	1.4594	0.7708	0.1238	0.0128
	(1.73)	(13.22)	(3.06)	(0.86)
Italy	0.7385	0.7928	0.1547	0.0258
	(1.37)	(17.47)	(3.80)	(2.49)
Japan	2.2443	0.7392	0.1678	0.0036
	(0.96)	(4.36)	(1.80)	(0.26)
Netherlands	0.7898	0.8664	0.0526	0.0088
	(1.93)	(18.94)	(1.95)	(1.60)
New Zealand	-0.2211	0.8317	0.0027	0.0454
	(-0.84)	(13.01)	(0.21)	(2.36)
Norway	0.6087	0.7860	0.0685	0.0470
	(1.16)	(11.39)	(2.41)	(2.24)
Portugal	6.1900	0.4415	0.2318	0.0139
	(0.83)	(1.03)	(1.79)	(0.52)
Singapore	1.0237	0.8101	0.1488	0.0097
	(1.13)	(15.16)	(2.62)	(0.27)
South Africa	0.2348	0.8501	0.1251	0.0090
	(0.60)	(14.19)	(2.92)	(1.12)
Spain	1.2797	0.7716	0.1388	0.0173
	(0.46)	(2.79)	(1.02)	(0.78)
Sweden	0.2461	0.7859	0.1284	0.0309
	(0.89)	(16.32)	(3.02)	(3.18)
Switzerland	1.7148	0.5888	0.1612	0.0370
	(1.07)	(2.06)	(1.93)	(1.15)
UK	0.5106	0.7694	0.2013	0.0075
	(1.96)	(16.18)	(4.24)	(1.68)

Table 11: GJR GARCH-in-Mean Model with Conditional Standard Deviation

This table reports the results from the following GJR GARCH-in-Mean model using excess returns of the 18 countries.

$$R_{i,t} = a_0 + a_1\sqrt{h_{i,t}} + a_2 R_{us,t-1} + a_3 R_{us,t} + a_4 R_{i,t-1} + a_5 \sigma^2_{us,t} + a_6 \sigma^2_{us,t-1} + a_7 r^f_{us,t} + a_8 r^f_{i,t} + \epsilon_{i,t} \quad (21)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon^2_{i,t-1} + b_3 I^-_{i,t-1}\epsilon^2_{i,t-1} + b_4 r^f_{i,t} \quad (22)$$

where $\sqrt{h_{i,t}}$ is the conditional standard deviation for country *i* at month *t*. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return at month *t*. $\sigma^2_{us,t}$ and $\sigma^2_{us,t-1}$ denote the contemporaneous and lagged US market return variance respectively. $r^f_{us,t}$ is the US risk-free rate at month *t*. $r^f_{i,t}$ is the home market risk-free rate at month *t*. I^- is an indicator variable where it takes the value of 1 if the residual ϵ_{t-1} is negative and zero otherwise. The Bollerslev and Wooldridge robust *t*-statistics are reported in parenthesis.

Table 11

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8
Australia	0.0059	0.0601	0.0909	0.1695	0.0388	-2.7121	2.7107	1.6269	-2.0843
	(1.84)	(0.43)	(3.44)	(3.47)	(0.78)	(-1.35)	(1.43)	(1.68)	(-2.61)
Belgium	-0.0136	0.7098	0.1054	0.4874	0.0916	-2.7390	0.6451	2.2059	-3.2472
	(-1.50)	(2.23)	(2.75)	(8.03)	(2.16)	(-0.66)	(0.15)	(1.94)	(-3.39)
Canada	-0.0012	0.1534	0.2185	0.6679	-0.0695	-2.5225	2.2314	3.2651	-3.3817
	(-0.24)	(0.67)	(6.68)	(23.20)	(-2.15)	(-0.75)	(0.72)	(3.17)	(-4.33)
Denmark	0.0311	-0.9093	0.1168	0.5967	-0.0467	-7.1091	7.6988	3.2274	-1.0800
	(1.36)	(-1.32)	(1.77)	(10.97)	(-0.66)	(-0.99)	(1.15)	(2.41)	(-0.87)
France	-0.0110	0.4101	0.0567	0.7178	0.0684	-3.1174	1.4233	2.0531	-2.3665
	(-1.66)	(2.40)	(1.21)	(15.62)	(1.65)	(-0.76)	(0.35)	(1.90)	(-2.13)
Germany	-0.0028	0.2627	0.1277	0.5469	0.1006	-1.0117	-0.3431	1.3836	-2.6804
	(-0.26)	(0.89)	(3.15)	(9.02)	(2.13)	(-0.29)	(-0.10)	(1.49)	(-1.97)
Italy	-0.0065	0.3567	0.1504	0.5768	0.0217	-0.4430	-3.7799	2.6078	-2.5217
	(-0.74)	(1.68)	(2.70)	(9.24)	(0.55)	(-0.09)	(-0.82)	(1.75)	(-2.27)
Japan	-0.0058	0.1792	0.0959	0.3771	0.0797	-3.0463	1.6131	0.3130	0.3502
	(-0.13)	(0.22)	(2.05)	(5.98)	(1.80)	(-0.72)	(0.35)	(0.32)	(0.28)

Table 11: (continued)

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8
Netherlands	-0.0012	0.1520	0.1189	0.7219	-0.0375	-7.3543	6.4884	3.4990	-3.9851
	(-0.13)	(0.55)	(2.83)	(19.18)	(-1.02)	(-2.20)	(1.98)	(3.50)	(-3.60)
New Zealand	-0.0151	2.5485	0.1530	0.4279	-0.1133	-11.7180	7.2000	0.4833	-12.7380
	(-0.99)	(4.81)	(2.48)	(8.05)	(-2.03)	(-2.45)	(1.36)	(0.21)	(-5.79)
Norway	-0.0276	1.1885	0.0869	0.8852	0.1036	-5.4862	4.4401	1.2464	-5.6855
	(-1.94)	(2.10)	(1.04)	(17.44)	(1.54)	(-1.24)	(1.03)	(0.78)	(-2.48)
Portugal	0.0221	-0.6811	0.1318	0.6139	0.1348	4.6201	-4.4034	3.6812	-1.6761
	(0.81)	(-0.73)	(1.45)	(8.86)	(1.91)	(0.43)	(-0.47)	(1.79)	(-0.79)
Singapore	-0.0086	0.1466	0.0452	0.7995	0.0120	-5.2485	5.4456	-2.4700	6.0615
	(-0.82)	(0.48)	(0.58)	(10.30)	(0.19)	(-0.56)	(0.68)	(-1.04)	(1.15)
South Africa	0.0090	0.3171	0.0096	0.4515	0.0409	2.1655	-5.1977	-0.1172	-1.9045
	(1.57)	(1.81)	(0.20)	(7.97)	(0.96)	(0.52)	(-1.30)	(-0.08)	(-3.14)
Spain	0.0050	-0.0711	0.1717	0.8289	0.0232	7.5110	-7.6159	3.8115	-2.7852
	(0.18)	(-0.09)	(2.09)	(12.27)	(0.40)	(1.15)	(-1.36)	(1.99)	(-0.98)
Sweden	-0.0020	0.2560	0.0392	0.5310	0.0325	-10.8432	10.5858	3.1220	-3.4213
	(-0.41)	(1.57)	(0.96)	(10.97)	(0.86)	(2.93)	(2.88)	(2.51)	(-3.09)
Switzerland	0.0025	0.1992	0.0924	0.6346	-0.0022	-5.9780	3.1147	1.2963	-2.5125
	(0.26)	(0.51)	(1.97)	(13.02)	(-0.04)	(-1.78)	(0.91)	(1.98)	(-1.96)
UK	-0.0053	0.2790	0.0810	0.3981	-0.0360	-0.7312	0.2172	0.7726	-0.8605
	(-1.15)	(1.94)	(2.57)	(8.08)	(-1.01)	(-0.37)	(0.11)	(0.68)	(-0.90)

Table 11: (continued)

Panel B: Parameter Estimates for the Conditional Variance Equation

	b_0	b_1	b_2	b_3	b_4
Australia	0.2522	0.7222	0.1805	0.0118	0.0368
	(1.29)	(10.76)	(2.71)	(0.14)	(1.96)
Belgium	0.5758	0.8623	0.0105	0.0758	0.0119
	(0.82)	(7.66)	(0.39)	(1.57)	(1.29)
Canada	0.4608	0.8285	0.1225	-0.0285	0.4608
	(1.46)	(10.66)	(3.34)	(-0.72)	(1.46)
Denmark	1.8256	0.7755	-0.0138	0.0830	0.0247
	(1.48)	(5.85)	(-0.39)	(1.38)	(1.77)
France	0.1237	0.9434	-0.0164	0.0824	0.0104
	(0.87)	(40.43)	(-0.94)	(3.01)	(1.97)
Germany	1.4473	0.7704	0.1239	0.0019	0.0129
	(1.66)	(12.16)	(2.95)	(0.03)	(0.88)
Italy	0.8486	0.8055	0.1674	-0.0635	0.0246
	(1.55)	(19.98)	(3.82)	(-1.35)	(2.45)
Japan	1.3539	0.8237	0.0703	0.0939	0.0040
	(0.18)	(1.27)	(0.24)	(1.00)	(0.38)
Netherlands	0.7606	0.8677	0.0635	-0.0176	0.0084
	(1.88)	(19.85)	(1.74)	(-0.46)	(1.56)
New Zealand	-0.2173	0.8279	0.0045	0.0141	0.0431
	(-0.68)	(4.94)	(0.25)	(0.35)	(0.99)
Norway	0.5355	0.7930	0.0844	0.0031	0.0387
	(1.13)	(13.00)	(2.32)	(0.06)	(2.04)
Portugal	0.8047	0.8848	0.0813	-0.0242	0.0025
	(1.11)	(8.63)	(1.35)	(-0.32)	(0.33)
Singapore	1.0722	0.8159	0.1093	0.0591	0.0106
	(1.09)	(12.65)	(0.94)	(0.54)	(0.80)
South Africa	0.1995	0.8565	0.1310	-0.0175	0.0081
	(0.52)	(14.70)	(3.07)	(-0.33)	(1.08)
Spain	0.4888	0.8419	0.0486	0.1118	0.0175
	(0.31)	(3.57)	(0.46)	(1.18)	(0.78)
Sweden	0.2821	0.7824	0.1105	0.0445	0.0299
	(0.99)	(15.12)	(2.37)	(0.90)	(3.24)
Switzerland	1.4823	0.6305	0.1881	-0.0662	0.0317
	(1.06)	(2.37)	(2.09)	(-0.80)	(1.15)
UK	0.5305	0.7709	0.1794	0.0350	0.0076
	(1.89)	(15.85)	(3.40)	(0.57)	(1.68)

Table 12: Descriptive Statistics for the International Investor Sentiment Index

This table reports descriptive statistics for the consumer confidence index of the 16 countries as well as for the Baker-Wurgler US investor sentiment index (B-W index). The last column reports the correlations of the international consumer confidence index with the Baker-Wurgler US investor sentiment index

	Sample Period	Mean	Std.Dev.	Min	Max	Correlation with BW
Australia	01/1975 - 12/2014	99.984	2.138	92.971	103.990	-0.079
Belgium	01/1973 - 12/2014	99.957	2.874	94.276	107.423	0.362
Canada	01/1980 - 12/2014	99.964	3.211	92.357	106.028	0.517
Denmark	01/1974 - 12/2014	100.061	3.422	91.770	105.510	0.242
France	01/1973 - 12/2014	100.007	2.600	94.578	107.412	-0.159
Germany	01/1973 - 12/2014	99.922	3.197	90.647	107.085	0.438
Italy	06/1982 - 12/2014	100.051	3.575	89.961	108.516	-0.073
Japan	01/1988 - 12/2014	99.917	4.111	86.466	106.934	0.259
Netherlands	01/1973 - 12/2014	99.959	2.362	94.376	105.407	0.283
New Zealand	06/1988 - 12/2014	100.047	2.169	93.860	103.688	0.019
Portugal	06/1986 - 12/2014	100.075	2.268	94.502	104.453	-0.255
South Africa	03/1990 - 12/2014	99.892	3.075	92.360	106.457	0.457
Spain	06/1986 - 12/2014	100.012	3.242	88.455	106.259	0.144
Sweden	10/1995 - 12/2014	99.765	3.912	90.274	109.298	0.366
Switzerland	11/1972 - 12/2014	100.010	3.225	92.380	105.808	-0.011
UK	01/1974 - 12/2014	100.069	2.361	93.716	105.843	0.355
US (BW)	07/1965 - 12/2014	-0.032	0.965	-2.548	2.422	1.000

Table 13: Descriptive Statistics for Monthly Excess Return of Different Sentiment Periods (Whole sample, High sentiment and Low sentiment Periods)

		Mean (%)	Std. Dev. (%)	Skewness	Kurtosis
Australia	Whole sample	0.5472	0.4949	-1.4633	12.6723
	High sentiment	0.6306	0.4040	-0.0971	1.2569
	Low sentiment	0.4082	0.6183	-1.9370	13.0383
Belgium	Whole sample	0.3981	0.4843	-0.6113	5.6214
	High sentiment	-0.0988	0.4728	-0.3461	3.5109
	Low sentiment	0.9997	0.4922	-0.9531	8.5402
Canada	Whole sample	0.3395	0.4579	-0.9452	3.4972
	High sentiment	0.5724	0.4303	-1.2316	6.0825
	Low sentiment	0.0930	0.4853	-0.7047	1.8050
Denmark	Whole sample	0.4230	0.4988	-0.2745	1.0893
	High sentiment	0.4439	0.5035	-0.7185	1.3315
	Low sentiment	0.3961	0.4940	0.3332	0.8282
France	Whole sample	0.4654	0.5813	-0.1843	1.2730
	High sentiment	0.2751	0.5917	-0.0771	1.4055
	Low sentiment	0.6385	0.5722	-0.2871	1.2068
Germany	Whole sample	0.4377	0.5346	-0.5944	2.4653
	High sentiment	0.0421	0.5359	-0.7347	2.0664
	Low sentiment	0.9166	0.5303	-0.4303	3.0080
Italy	Whole sample	0.2186	0.6849	0.2926	1.0615
	High sentiment	0.5581	0.6790	0.2381	0.9461
	Low sentiment	-0.1547	0.6907	0.3592	1.2652
Japan	Whole sample	0.3515	0.5488	-0.1654	1.0266
	High sentiment	0.5164	0.5407	-0.1835	1.5974
	Low sentiment	0.1805	0.5579	-0.1443	0.5584
Netherlands	Whole sample	0.6146	0.5197	-0.4490	2.2752
	High sentiment	0.1961	0.5536	-0.9957	2.1293
	Low sentiment	0.9935	0.4850	0.3526	1.8421
New Zealand	Whole sample	0.2127	0.4401	0.2551	2.6620
	High sentiment	0.6061	0.3583	-0.0447	0.4814
	Low sentiment	-0.2968	0.5246	0.5265	2.7203
Portugal	Whole sample	-0.0719	0.5581	-0.0848	1.7273
	High sentiment	-0.5780	0.6564	0.4611	1.3447
	Low sentiment	0.2233	0.4912	-0.6906	1.9874

Table 13: (continued)

		Mean (%)	Std. Dev. (%)	Skewness	Kurtosis
South Africa	Whole sample	0.4206	0.5522	-0.5742	2.5082
	High sentiment	0.5037	0.4392	-0.1191	0.4957
	Low sentiment	0.3734	0.6082	-0.6414	2.3772
Spain	Whole sample	0.5243	0.6128	-0.3636	1.4501
	High sentiment	0.7618	0.5506	-0.4576	1.5356
	Low sentiment	0.1756	0.6946	-0.2305	1.1086
Sweden	Whole sample	0.8006	0.5921	-0.3318	1.2781
	High sentiment	0.3249	0.5785	-0.2888	0.8973
	Low sentiment	1.1389	0.6014	-0.3788	1.6282
Switzerland	Whole sample	0.5997	0.4465	-0.9233	3.4069
	High sentiment	0.0827	0.4831	-1.0775	4.0178
	Low sentiment	1.1471	0.3982	-0.4660	0.9396
UK	Whole sample	0.5562	0.5680	1.1925	16.5746
	High sentiment	0.4857	0.4484	-1.2046	5.5457
	Low sentiment	0.6302	0.6719	1.8437	15.8906
US	Whole sample	0.6476	0.4510	-0.7720	2.2774
	High sentiment	0.5139	0.4440	-0.9647	3.2639
	Low sentiment	0.8231	0.4607	-0.5608	1.1863

Table 14: GJR GARCH-in-Mean Model with Investor Sentiment

This table reports the results from the following modified GJR-GARCH-in-Mean model using excess returns of the 16 countries as well as the US

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} + a_3 D_{i,t}^{Sen} h_{i,t} + \epsilon_{i,t} \quad (23)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^- \epsilon_{i,t-1}^2 + b_4 r_{i,t}^f \quad (24)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. $D_{i,t}^{Sen}$ is a dummy variable where it takes the value of 1 if the month *t* in country *i* is in the high sentiment period and 0 otherwise. I^- is an indicator variable where it takes the value of 1 if the residual ϵ_{t-1} is negative and zero otherwise. $r_{i,t}^f$ is the risk free rate of country *i* at month *t*.

	a_0	a_1	a_2	a_3	b_0	b_1	b_2	b_3	b_4
Australia	0.0045	-0.0604	0.0022	0.1018	0.0021	0.5505	0.1191	-0.1434	-0.0232
	(0.26)	(-0.01)	(0.40)	(0.04)	(0.82)	(1.09)	(0.61)	(-0.69)	(-0.46)
Belgium	0.0113	1.3254	-0.0001	-5.9723	0.0004	0.6427	-0.0147	0.2953	0.0226
	(1.91)	(0.35)	(-0.01)	(-1.85)	(1.40)	(2.72)	(-0.24)	(1.61)	(1.05)
Canada	0.0108	-4.6142	-0.0009	3.7930	0.0002	0.5703	0.0540	0.2456	0.0507
	(2.06)	(-1.56)	(-0.13)	(0.91)	(2.27)	(4.10)	(0.82)	(1.58)	(1.57)
Denmark	-0.0199	8.5334	0.0643	-26.2988	0.0001	0.8593	0.0655	0.0402	0.0031
	(-2.33)	(2.38)	(5.15)	(-2.80)	(1.42)	(18.25)	(1.75)	(0.79)	(0.81)
France	0.0094	-0.6970	0.0019	-1.3703	0.0003	0.6505	0.0609	0.2602	0.0589
	(1.86)	(-0.38)	(0.23)	(-0.54)	(2.38)	(8.08)	(1.13)	(2.61)	(2.77)
Germany	0.0026	2.8756	-0.0014	-3.2135	0.0003	0.7902	0.1749	-0.0412	-0.0171
	(0.49)	(1.35)	(-0.18)	(-1.62)	(1.84)	(14.63)	(2.92)	(-0.53)	(-1.02)
Italy	0.0086	-2.0934	-0.0028	1.8951	0.0004	0.6376	0.1934	0.0410	0.0601
	(1.30)	(-1.30)	(-0.29)	(0.82)	(2.24)	(7.28)	(2.22)	(0.38)	(2.19)
Japan	0.0386	-12.9367	-0.0229	9.6777	0.0009	0.5592	-0.0527	0.2868	0.0225
	(2.01)	(-1.27)	(-0.97)	(1.10)	(3.20)	(4.53)	(-2.03)	(2.68)	(0.53)

Table 14: (continued)

	a_0	a_1	a_2	a_3	b_0	b_1	b_2	b_3	b_4
Netherlands	0.0055	1.5954	0.0081	-5.3853	0.0002	0.7660	0.0532	0.0933	0.0287
	(0.69)	(1.09)	(0.77)	(-1.28)	(1.82)	(8.26)	(0.87)	(1.18)	(1.65)
New Zealand	0.0180	-9.4906	-0.0129	9.8708	-0.0001	0.8884	0.0335	-0.0027	0.0332
	(3.02)	(-2.35)	(-1.81)	(2.08)	(-1.33)	(16.81)	(1.30)	(-0.07)	(1.70)
Portugal	0.0237	-7.2314	-0.0411	11.6079	0.0007	0.5384	0.2055	0.0467	0.0096
	(3.28)	(-2.53)	(-3.35)	(2.75)	(2.99)	(4.94)	(2.58)	(0.39)	(0.43)
South Africa	0.0097	-1.2380	0.0069	-4.3499	0.0002	0.6435	0.0917	0.1784	0.0820
	(2.06)	(-0.79)	(0.64)	(-1.10)	(-1.07)	(6.59)	(1.46)	(1.46)	(1.93)
Spain	-0.0326	8.4955	0.0331	-6.5184	0.0004	0.7354	0.1543	0.0458	0.0019
	(-2.92)	(2.92)	(2.81)	(-2.14)	(2.55)	(13.95)	(2.42)	(0.64)	(0.16)
Sweden	-0.0007	2.5613	0.0154	-5.8634	-0.0001	0.9912	-0.1084	0.1414	0.0719
	(-0.11)	(1.36)	(1.89)	(-1.64)	(-3.42)	(49.78)	(-2.88)	(3.13)	(3.11)
Switzerland	0.0223	-5.2409	-0.0178	2.8942	0.0002	0.6817	0.2157	-0.0637	0.0513
	(3.84)	(-1.49)	(-2.32)	(0.72)	(2.10)	(7.64)	(1.78)	(-0.42)	(1.86)
UK	-0.0025	4.1404	0.0063	-3.6965	0.0002	0.6574	0.0347	0.2416	0.0401
	(-0.57)	(2.65)	(1.23)	(-2.05)	(2.51)	(8.47)	(0.55)	(3.43)	(1.81)
US (B-W)	0.0036	1.6198	0.0192	-7.7616	0.0001	0.8300	-0.0907	0.3208	0.0164
	(1.27)	(1.71)	(2.92)	-(3.05)	(2.95)	(18.02)	-(5.10)	(5.64)	(2.00)

Table 15: GJR GARCH-in-Mean Model with Investor Sentiment and US Market Returns

This table reports the results from the following modified GJR-GARCH-in-Mean model using excess returns of the 16 countries.

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} + a_3 D_{i,t}^{Sen} h_{i,t} + a_4 R_{us,t-1} + a_5 R_{us,t} + \epsilon_{i,t} \quad (25)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^- \epsilon_{i,t-1}^2 + b_4 r_{i,t}^f \quad (26)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. $D_{i,t}^{Sen}$ is a dummy variable where it takes the value of 1 if the month *t* for country *i* is in the high sentiment period and 0 otherwise. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return at month *t*. $r_{i,t}^f$ is the international market risk-free rate at month *t*. I^- is an indicator variable where it takes the value of 1 if the residual ϵ_{t-1} is negative and zero otherwise.

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5
Australia	-0.0036	1.4666	0.0062	-1.2246	0.0624	0.5859
	(-0.79)	(0.45)	(1.19)	(-0.53)	(2.03)	(17.04)
Belgium	-0.0118	3.2203	0.0208	-2.5906	0.1576	0.6009
	(-2.25)	(2.92)	(3.45)	(-4.52)	(3.52)	(10.94)
Canada	-0.0036	-2.1319	0.0053	0.0682	0.1242	0.7577
	(-0.85)	(-0.39)	(1.20)	(0.03)	(3.71)	(21.19)
Denmark	0.0066	2.5451	0.0245	-11.1885	0.0848	0.5976
	(0.72)	(1.71)	(2.78)	(-3.98)	(2.19)	(15.51)
France	-0.0084	6.4925	0.0091	-6.3259	0.0991	0.8442
	(-2.06)	(1.55)	(1.23)	(-1.62)	(2.18)	(21.95)
Germany	0.0081	-2.1837	-0.0104	1.0245	0.1501	0.6878
	(1.68)	(-0.80)	(-1.88)	(0.57)	(3.50)	(14.30)
Italy	-0.0037	-0.0791	-0.0022	0.8784	0.1410	0.7848
	(-0.87)	(-0.06)	(-0.30)	(0.52)	(2.96)	(15.00)
Japan	-0.0217	8.6737	0.0077	-2.6884	0.1286	0.5459
	(-5.85)	(3.68)	(0.43)	(-0.41)	(2.43)	(10.94)

Table 15: (continued)

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5
Netherlands	-0.0053	5.3356	0.0047	-2.2726	0.1086	0.7518
	(-0.84)	(1.71)	(0.87)	(-1.82)	(2.36)	(16.69)
New Zealand	0.0079	-8.8982	-0.0053	6.6299	0.1272	0.4049
	(1.41)	(-1.82)	(-0.76)	(1.60)	(2.76)	(8.70)
Portugal	-0.0094	3.1614	-0.0215	3.5160	0.2304	0.6093
	(-0.57)	(0.37)	(-1.18)	(0.45)	(2.84)	(9.43)
South Africa	0.0158	-6.5194	0.0022	-2.4251	-0.0593	0.6485
	(4.59)	(-3.09)	(0.28)	(-0.80)	(-1.08)	(11.11)
Spain	-0.0063	0.2954	0.0174	-2.3882	0.1304	0.8755
	(-0.97)	(1.69)	(2.48)	(-1.82)	(2.31)	(15.90)
Sweden	0.0030	1.2635	-0.0019	-2.1209	0.0621	0.9654
	(0.66)	(0.42)	(-0.33)	(-1.04)	(0.94)	(19.40)
Switzerland	0.0026	2.9299	-0.0012	-3.1015	0.0956	0.6230
	(0.58)	(0.66)	(-0.25)	(-1.27)	(2.82)	(15.20)
UK	-0.0032	3.7014	-0.0010	-3.8600	0.7658	0.7688
	-(1.45)	(2.96)	-(0.45)	(-2.24)	(3.17)	(24.27)

Table 15: (continued)

Panel B: Parameter Estimates for the Conditional Variance Equation

	b_0	b_1	b_2	b_3	b_4
Australia	0.0000	0.8179	0.1860	-0.1491	0.0172
	(-0.13)	(13.55)	(2.33)	(-1.73)	(1.44)
Belgium	0.0001	0.8500	-0.0122	0.1415	0.0131
	(1.66)	(12.10)	(-0.45)	(2.47)	(1.82)
Canada	0.0001	0.6359	0.1383	-0.0280	0.0107
	(1.93)	(4.33)	(2.17)	(-0.34)	(1.34)
Denmark	0.0000	1.0087	-0.0224	-0.0243	0.0031
	(8.80)	(68.74)	(-1.39)	(-1.65)	(38.22)
France	0.0001	0.7906	0.0718	0.0406	0.0309
	(1.71)	(9.63)	(1.78)	(0.56)	(1.77)
Germany	0.0001	0.8119	0.1026	-0.0202	0.0209
	(0.85)	(7.19)	(2.02)	(-0.25)	(1.41)
Italy	0.0000	0.8575	0.1013	-0.0335	0.0224
	(1.47)	(15.91)	(1.95)	(-0.55)	(1.35)
Japan	0.0025	-0.4253	0.2300	-0.1609	0.2601
	(7.12)	(-2.92)	(3.16)	(-1.23)	(2.22)
Netherlands	0.0001	0.8939	0.0496	-0.0028	0.0068
	(0.93)	(14.07)	(1.39)	(-0.06)	(1.59)
New Zealand	0.0000	0.9085	0.0186	-0.0377	0.0241
	(-0.63)	(17.71)	(1.17)	(-1.24)	(1.41)
Portugal	0.0011	0.2946	0.3055	-0.2734	0.0029
	(3.71)	(1.80)	(2.20)	(-1.87)	(0.09)
South Africa	-0.0003	0.3679	0.1768	-0.1654	0.1711
	(-3.40)	(2.69)	(2.27)	(-1.89)	(7.14)
Spain	0.0001	0.8876	-0.0052	0.1537	0.0083
	(1.77)	(19.07)	(-0.17)	(2.90)	(0.96)
Sweden	0.0000	0.8473	0.1526	-0.2017	0.0577
	(0.61)	(10.65)	(1.99)	(-1.87)	(1.53)
Switzerland	0.0001	0.6473	0.1961	-0.0673	0.0270
	(2.25)	(6.01)	(2.54)	(-0.77)	(1.84)
UK	0.0000	0.9913	-0.0542	0.0919	0.0006
	(1.25)	(10.29)	(-2.18)	(2.26)	(0.60)

Table 16: GJR GARCH-in-Mean Model with Investor Sentiment, US Market Returns and Risk-free Rate

This table reports the results from the following modified GJR-GARCH-in-Mean model using excess returns of the 16 countries.

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} + a_3 D_{i,t}^{Sen} h_{i,t} + a_4 R_{us,t-1} + a_5 R_{us,t} + a_6 r_{us,t}^{f} + a_7 r_{i,t}^{f} + \epsilon_{i,t} \quad (27)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^{-} \epsilon_{i,t-1}^2 + b_4 r_{i,t}^{f} \quad (28)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. $D_{i,t}^{Sen}$ is a dummy variable where it takes the value of 1 if the month *t* in country *i* is in the high sentiment period and 0 otherwise. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return at month *t*. $r_{us,t}^{f}$ is the US risk-free rate at month *t*. $r_{i,t}^{f}$ is the international market risk-free rate at month *t*. I^{-} is an indicator variable where it takes the value of 1 if the residual ϵ_{t-1} is negative and zero otherwise.

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7
Australia	0.0026	5.2339	0.0073	-3.3542	0.0659	0.5909	2.0901	-2.8421
	(0.46)	(1.03)	(1.12)	(-1.14)	(2.23)	(17.03)	(2.09)	(-2.75)
Belgium	-0.0010	6.9756	0.0052	-6.6716	0.1391	0.5970	3.2246	-3.4406
	(-0.32)	(2.87)	(1.41)	(-4.73)	(3.17)	(10.82)	(5.10)	(-4.88)
Canada	-0.0037	5.8389	0.0046	-0.6823	0.1267	0.7543	2.6856	-3.2056
	(-0.83)	(0.87)	(1.03)	(-0.85)	(3.90)	(21.24)	(2.29)	(-3.50)
Denmark	0.0160	2.0950	0.0062	-7.4632	0.0989	0.5991	3.5715	-2.8139
	(1.40)	(1.80)	(0.57)	(-2.45)	(2.39)	(15.02)	(2.69)	(-3.53)
France	-0.0188	5.3715	0.0071	-6.3763	0.1001	0.8198	3.7787	-8.2672
	(-3.06)	(3.32)	(0.98)	(-1.57)	(2.06)	(21.31)	(2.88)	(-3.69)
Germany	0.0084	-0.8408	-0.0160	2.1285	0.1555	0.6791	3.3231	-4.2038
	(1.82)	(-0.27)	(-2.37)	(1.00)	(3.57)	(14.47)	(2.92)	(-2.78)
Italy	-0.0060	1.0267	-0.0061	-1.8574	0.1532	0.7951	5.2053	-3.2191
	(-1.33)	(0.50)	(-0.81)	(-0.84)	(3.04)	(15.06)	(3.29)	(-2.67)
Japan	-0.0211	9.6481	0.0072	-1.5039	0.1332	0.5503	-0.4832	-3.0093
	(-4.07)	(3.73)	(0.42)	(-0.85)	(2.48)	(10.98)	(-0.37)	(-1.30)

Table 16: (continued)

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7
Netherlands	-0.0377	44.4940	0.0025	-12.9455	0.1290	0.7375	3.5963	-8.3069
	(-4.64)	(5.45)	(0.49)	(-1.92)	(4.13)	(25.81)	(4.43)	(-7.63)
New Zealand	0.0131	2.6005	-0.0002	2.6846	0.1129	0.4083	1.6689	-5.0880
	(1.19)	(0.34)	(-0.03)	(1.18)	(2.70)	(10.02)	(0.74)	(-2.59)
Portugal	-0.0350	12.2762	0.0075	-17.3964	0.2169	0.6223	4.5182	-2.8045
	(-2.51)	(2.46)	(0.74)	(-2.77)	(2.80)	(9.45)	(2.39)	(-2.32)
South Africa	0.0352	23.7137	0.0074	-4.3249	-0.0364	0.5783	5.8145	-11.0547
	(3.17)	(2.25)	(0.89)	(-1.80)	(-0.63)	(10.13)	(3.53)	(-3.52)
Spain	-0.0213	10.7589	0.0303	-13.6486	0.1413	0.8711	2.6060	-2.9114
	(-3.31)	(2.53)	(3.92)	(-3.46)	(2.48)	(15.53)	(1.67)	(-2.22)
Sweden	0.0131	2.2743	-0.0100	-3.2013	0.0441	0.9499	6.1135	-8.6317
	(2.53)	(1.57)	(-1.59)	(-1.33)	(0.67)	(19.19)	(3.60)	(-3.08)
Switzerland	-0.0001	6.6851	-0.0010	-3.5511	0.0934	0.6224	1.4488	-2.7199
	(-0.02)	(1.13)	(-0.21)	(-1.46)	(2.73)	(14.98)	(2.15)	(-2.14)
UK	-0.0025	2.6265	-0.0007	-3.0508	0.8365	0.7785	1.1785	-1.4380
	(-1.99)	(3.77)	(-0.19)	(-2.43)	(2.26)	(31.30)	(2.27)	(-6.33)

Table 16: (continued)

Panel B: Parameter Estimates for the Conditional Variance Equation

	b_0	b_1	b_2	b_3	b_4
Australia	0.0000	0.8359	0.1642	-0.1231	0.0144
	(-0.11)	(15.89)	(2.39)	(-1.69)	(1.30)
Belgium	0.0000	0.9180	-0.0727	0.1954	0.0085
	(2.46)	(53.93)	(-4.71)	(5.20)	(2.29)
Canada	0.0001	0.6546	0.1329	-0.0092	0.0061
	(2.29)	(5.69)	(2.07)	(-0.12)	(1.16)
Denmark	0.0000	1.0066	-0.0242	-0.0150	0.0031
	(18.93)	(62.23)	(-1.23)	(-0.85)	(5.56)
France	0.0002	0.6242	0.0299	0.0451	0.0834
	(2.51)	(5.67)	(1.42)	(1.52)	(2.67)
Germany	0.0001	0.7943	0.1346	-0.0393	0.0174
	(0.96)	(7.17)	(2.36)	(-0.45)	(1.34)
Italy	0.0001	0.8557	0.1117	-0.0634	0.0232
	(1.55)	(14.70)	(2.20)	(-0.98)	(1.36)
Japan	0.0023	-0.3762	0.2467	-0.1775	0.3362
	(7.32)	(-3.12)	(3.37)	(-1.41)	(2.50)
Netherlands	0.0000	0.9510	-0.0342	0.0465	0.0071
	(12.26)	(286.64)	(-104.72)	(10.92)	(14.47)
New Zealand	0.0000	1.0093	-0.0187	-0.0250	0.0086
	(-3.44)	(66.08)	(-1.72)	(-1.41)	(2.56)
Portugal	0.0011	0.1751	0.4459	-0.3434	0.0325
	(4.70)	(2.03)	(2.65)	(-2.54)	(0.80)
South Africa	-0.0001	0.7621	0.0076	0.0625	0.0570
	(-1.24)	(10.64)	(0.33)	(1.78)	(2.42)
Spain	0.0000	0.8857	-0.0171	0.1562	0.0158
	(1.65)	(21.93)	(-0.58)	(3.59)	(1.70)
Sweden	0.0000	0.8406	0.1699	-0.2069	0.0587
	(0.22)	(12.27)	(2.13)	(-2.00)	(1.86)
Switzerland	0.0001	0.6614	0.1893	-0.0652	0.0277
	(2.26)	(6.35)	(2.41)	(-0.80)	(1.88)
UK	0.0000	0.9884	-0.0658	0.1022	0.0027
	(15.06)	(102.31)	(-2.32)	(2.46)	(1.45)

Table 17: The adjusted $\bar{R}^2$ for GJR Models with Investor Sentiment

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} + a_3 D_{i,t}^{Sen} h_{i,t} + \epsilon_{i,t} \quad \text{(f)}$$

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} + a_3 D_{i,t}^{Sen} h_{i,t} + a_4 R_{us,t-1} + \epsilon_{i,t} \quad \text{(g)}$$

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} + a_3 D_{i,t}^{Sen} h_{i,t} + a_4 R_{us,t-1} + a_5 r_{us,t}^{f} + a_6 r_{i,t}^{f} + \epsilon_{i,t} \quad \text{(h)}$$

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} + a_3 D_{i,t}^{Sen} h_{i,t} + a_4 R_{us,t-1} + a_5 R_{us,t} + a_6 r_{us,t}^{f} + a_7 r_{i,t}^{f} + \epsilon_{i,t} \quad \text{(i)}$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^{-} \epsilon_{i,t-1}^2 + b_4 r_{i,t}^{f} \quad \text{(e)}$$

Here, $\bar{R}_{(f)}^2$, $\bar{R}_{(g)}^2$, $\bar{R}_{(h)}^2$ and $\bar{R}_{(i)}^2$ represent the adjusted R-Square of the equation (f), (g), (h) and (i) respectively. Equation (e) is the conditional variance equation of the GJR model.

	$\bar{R}_{(f)}^2$ (%)	$\bar{R}_{(g)}^2$ (%)	$\bar{R}_{(h)}^2$ (%)	$\bar{R}_{(i)}^2$ (%)
Australia	-0.50	-0.03	-1.1	32.9
Belgium	0.30	2.10	2.13	32.4
Canada	-0.50	1.95	2.01	65.3
Denmark	2.40	4.41	4.93	28.7
France	-0.70	0.28	0.29	40.6
Germany	-0.02	2.75	3.03	36.6
Italy	-0.62	1.17	1.65	17.9
Japan	-0.76	2.01	1.56	19.6
Netherlands	0.39	1.93	2.21	49.9
New Zealand	2.75	4.96	5.39	26.6
Portugal	3.20	7.10	6.32	27.8
South Africa	-1.43	-1.74	11.6	32.1
Spain	1.27	5.46	1.41	42.6
Sweden	1.75	2.10	4.11	56.7
Switzerland	1.04	3.59	1.15	47.8
UK	-3.02	2.42	3.62	38.6
US	0.61			

Table 18: GJR GARCH-in-Mean Model with Local Sentiment & US Sentiment

This table reports the results from the following modified GJR-GARCH-in-Mean model using excess returns of the 16 countries.

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} h_{i,t} + a_3 D_{us,t}^{Sen} h_{i,t} + a_4 R_{us,t-1} + a_5 R_{us,t} + a_6 r_{us,t}^{f} + a_7 r_{i,t}^{f} + \epsilon_{i,t} \quad (29)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 I_{i,t-1}^{-} \epsilon_{i,t-1}^2 + b_4 r_{i,t}^{f} \quad (30)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. $D_{i,t}^{Sen}$ is a dummy variable where it takes the value of 1 if the month *t* in country *i* is in the high sentiment period and 0 otherwise. $D_{us,t}^{Sen}$ is a dummy variable where it takes the value of 1 if the month *t* in US is in the high sentiment period and 0 otherwise. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return at month *t*. $r_{us,t}^{f}$ is the US risk-free rate at month *t*. $r_{i,t}^{f}$ is the international market risk-free rate at month *t*. I^{-} is an indicator variable where it takes the value of 1 if the residual ϵ_{t-1} is negative and zero otherwise.

Table 18

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7
Australia	0.0049	0.8116	-2.8327	-3.5427	0.0654	0.5911	2.2481	-2.6746
	(1.20)	(0.32)	(-1.86)	(-1.66)	(2.22)	(17.37)	(2.16)	(-2.43)
Belgium	0.0172	3.8365	-5.6660	3.0256	0.1391	0.5788	1.9970	-2.4740
	(3.35)	(4.28)	(-3.45)	(1.44)	(3.91)	(22.11)	(2.69)	(-3.32)
Canada	0.0101	4.1363	-3.3725	-0.2363	0.1334	0.7571	2.1336	-2.8019
	(2.42)	(2.37)	(-2.55)	(-0.10)	(3.92)	(20.95)	(1.53)	(-2.71)
Denmark	0.0553	2.4723	-4.5121	-2.9147	0.1233	0.5919	2.9686	-2.4408
	(3.22)	(1.55)	(-1.77)	(-1.10)	(2.49)	(12.75)	(2.33)	(-2.32)
France	0.0112	1.7989	-1.7286	-1.0205	0.0851	0.8197	3.7915	-9.0887
	(2.73)	(1.91)	(-1.71)	(-0.70)	(1.90)	(21.57)	(2.70)	(-2.70)
Germany	0.0006	-4.5406	3.6975	-2.3611	0.1520	0.6833	3.6577	-4.2717
	(0.13)	(-1.12)	(1.25)	(-1.34)	(3.55)	(14.53)	(3.04)	(-2.82)
Italy	0.0104	3.1452	-1.2196	-1.4223	0.1559	0.8014	4.4660	-2.9501
	(1.96)	(0.98)	(-1.01)	(-1.09)	(3.00)	(15.20)	(2.62)	-(2.33)
Japan	0.0287	-8.4650	1.7758	2.3788	0.1325	0.5145	0.5184	0.1762
	(2.09)	(-1.17)	(0.79)	(1.13)	(2.77)	(10.64)	(0.34)	(0.10)

Table 18: (continued)

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7
Netherlands	0.0168	33.7188	-3.4925	3.2039	0.1215	0.7586	2.8733	-6.2543
	(2.64)	(2.20)	(-1.93)	(1.48)	(3.71)	(25.28)	(3.25)	(-3.91)
New Zealand	0.0121	5.2882	-4.3407	-6.0951	0.1339	0.4105	1.4878	-4.5476
	(2.93)	(0.68)	(-1.52)	(-1.31)	(3.18)	(9.92)	(0.61)	-(2.07)
Portugal	-0.0219	9.2363	-10.1592	-2.9733	0.2281	0.6067	4.5450	-3.3535
	(-2.31)	(2.56)	(-1.89)	(-2.12)	(3.32)	(10.19)	(2.26)	(-2.63)
South Africa	0.0093	20.1110	-1.5798	-1.9755	-0.0196	0.5942	3.9001	-11.4754
	(1.99)	(2.06)	(-0.76)	(-1.06)	(-0.35)	(10.68)	(1.90)	(-4.62)
Spain	0.0033	1.0422	-1.2584	2.3819	0.1430	0.8756	1.5448	-2.5505
	(0.59)	(0.56)	(-2.66)	(1.33)	(2.49)	(15.48)	(1.81)	(-1.93)
Sweden	0.0133	-0.5062	-2.1502	-2.2132	0.0437	0.9543	5.0063	-7.9903
	(3.19)	(-0.24)	(-0.84)	(-1.03)	(0.65)	(19.23)	(2.12)	(-2.73)
Switzerland	0.0087	3.3944	-4.4797	-3.7420	0.0923	0.6217	1.5646	-2.8011
	(2.26)	(1.19)	(-1.54)	(-1.58)	(2.67)	(14.96)	(1.95)	(-2.18)
UK	0.0003	4.1978	-5.4470	-2.8558	0.3787	0.7830	0.7082	-0.9927
	(0.11)	(3.04)	(-3.35)	(-1.32)	(2.29)	(23.95)	(3.66)	(-2.25)

Table 18: (continued)

Panel B: Parameter Estimates for the Conditional Variance Equation

	b_0	b_1	b_2	b_3	b_4
Australia	0.0000	0.8476	0.1590	-0.1193	0.0126
	(-0.12)	(16.47)	(2.53)	(-1.77)	(1.14)
Belgium	0.0000	0.9640	-0.0943	0.1630	0.0064
	(2.95)	(66.32)	(-71.01)	(8.27)	(2.73)
Canada	0.0001	0.6506	0.1320	-0.0045	0.0062
	(2.30)	(5.59)	(2.06)	(-0.06)	(1.17)
Denmark	0.0019	-0.9765	0.0329	-0.0146	0.2260
	(6.61)	(-63.86)	(1.56)	(-0.83)	(5.03)
France	0.0002	0.6249	0.0295	0.0503	0.0823
	(2.53)	(5.76)	(1.39)	(1.59)	(2.68)
Germany	0.0001	0.8091	0.1351	-0.0541	0.0164
	(0.98)	(8.59)	(2.53)	(-0.68)	(1.40)
Italy	0.0001	0.8557	0.1116	-0.0630	0.0229
	(1.57)	(14.71)	(2.22)	(-0.96)	(1.34)
Japan	0.0000	1.0100	-0.0510	0.0451	0.0136
	(2.86)	(55.60)	(-2.42)	(2.20)	(3.85)
Netherlands	0.0000	0.9560	-0.0311	0.0463	0.0052
	(2.58)	(57.10)	(-3.15)	(3.02)	(2.63)
New Zealand	0.0000	0.9975	-0.0082	-0.0779	0.0121
	(-3.41)	(50.56)	(-0.86)	(-2.52)	(9.01)
Portugal	0.0011	0.1994	0.3714	-0.2670	0.0272
	(4.31)	(11.77)	(2.50)	(-2.31)	(0.69)
South Africa	-0.0001	0.7337	0.0006	0.0798	0.0629
	(-1.21)	(9.59)	(0.03)	(1.97)	(2.66)
Spain	0.0001	0.8595	-0.0051	0.1603	0.0158
	(1.88)	(17.74)	(-0.16)	(3.29)	(1.57)
Sweden	0.0000	0.8353	0.1790	-0.2204	0.0644
	(-0.10)	(12.47)	(2.23)	(-2.05)	(2.05)
Switzerland	0.0001	0.6553	0.1930	-0.0664	0.0283
	(2.27)	(6.20)	(2.41)	(-0.80)	(1.89)
UK	0.0000	0.9800	-0.0597	0.1002	0.0031
	(1.05)	(68.31)	(-2.58)	(2.88)	(1.58)

Table 19: GJR GARCH-in-Mean Model with Cardinal Investor Sentiment Index

This table reports the results from the following modified GJR-GARCH-in-Mean model using excess returns of the 16 countries.

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 Sen_{i,t} + a_3 Sen_{i,t} h_{i,t} + a_4 R_{us,t-1} + a_5 R_{us,t} + a_6 r^f_{us,t} + a_7 r^f_{i,t} + \epsilon_{i,t} \quad (31)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon^2_{i,t-1} + b_3 I^-_{i,t-1} \epsilon^2_{i,t-1} + b_4 r^f_{i,t} \quad (32)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. $Sen_{i,t}$ is the international investor sentiment index. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return at month *t*. $r^f_{us,t}$ is the US risk-free rate at month *t*. $r^f_{i,t}$ is the international market risk-free rate at month *t*. I^- is an indicator variable where it takes the value of 1 if the residual ϵ_{t-1} is negative and zero otherwise.

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7
Australia	-0.1425	4.4639	0.0015	-0.0154	0.0544	0.5822	1.7583	-1.9927
	(-1.85)	(0.75)	(1.95)	(-0.58)	(1.87)	(16.98)	(1.75)	(-1.86)
Belgium	0.1299	10.9159	-0.0013	-0.0479	0.1228	0.5914	2.7986	-3.6738
	(2.98)	(2.47)	(-2.99)	(-2.41)	(2.91)	(10.51)	(3.26)	(-4.00)
Canada	-0.1234	23.7349	0.0012	-0.1511	0.1314	0.7509	2.1558	-2.6405
	(-2.66)	(3.72)	(2.67)	(-2.16)	(3.97)	(21.66)	(1.58)	(-2.48)
Denmark	0.1286	3.3012	-0.0011	-0.0777	0.1047	0.5930	2.8341	-2.5477
	(1.34)	(0.51)	(-1.21)	(-2.50)	(2.45)	(13.90)	(2.05)	(-2.94)
France	0.0888	25.4146	-0.0010	-0.0125	0.0756	0.8110	3.5363	-8.4181
	(1.29)	(2.18)	(-1.51)	(-0.97)	(2.49)	(20.83)	(2.83)	(-2.98)
Germany	0.1585	5.5243	-0.0016	0.0166	0.1377	0.6726	2.7422	-5.0892
	(2.88)	(1.34)	(-2.81)	(0.87)	(3.09)	(14.44)	(2.54)	(-3.04)
Italy	-0.0006	0.3086	-0.0001	0.0153	0.1589	0.7964	5.4837	-3.3614
	(-0.01)	(0.13)	(-0.15)	(1.04)	(3.11)	(15.26)	(3.39)	(-2.75)
Japan	-0.0463	8.0626	0.0005	-0.0686	0.0766	0.5050	-0.2361	-1.2449
	(-0.73)	(1.14)	(0.81)	(-1.29)	(2.17)	(10.05)	(-2.19)	(-0.59)

Table 19: (continued)

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7
Netherlands	-0.0098	48.8440	-0.0003	-0.0273	0.1190	0.7428	3.3500	-8.0692
	(-1.36)	(5.60)	(-6.16)	(-2.12)	(3.50)	(25.62)	(4.55)	(-6.28)
New Zealand	-0.2899	25.3463	0.0030	-0.0187	0.1001	0.4321	1.1994	-7.2745
	(-14.63)	(2.60)	(1.62)	(-2.37)	(2.33)	(9.39)	(0.52)	(-2.99)
Portugal	0.4983	8.4886	-0.0052	-0.0766	0.2530	0.6216	5.6310	-0.8355
	(3.30)	(2.80)	(-3.40)	(-2.59)	(3.03)	(9.99)	(3.27)	(-1.71)
South Africa	0.0120	6.7237	0.0002	-0.0391	0.0161	0.6017	4.6834	-7.5661
	(0.70)	(1.19)	(10.01)	(2.51)	(0.28)	(12.09)	(2.47)	(-4.62)
Spain	0.0605	20.9548	-0.0006	-0.1813	0.1886	0.8519	3.9438	-4.1831
	(14.38)	(4.19)	(-4.01)	(-4.09)	(4.59)	(17.33)	(4.89)	(-3.16)
Sweden	0.1362	-1.8337	-0.0013	0.0267	0.0579	0.9352	7.2290	-11.6165
	(2.18)	(-0.45)	(-2.10)	(1.67)	(0.84)	(18.20)	(3.65)	(-3.77)
Switzerland	0.1535	12.4301	-0.0015	-0.0539	0.0913	0.6230	1.6943	-3.0462
	(2.90)	(1.70)	(-2.92)	(-2.57)	(2.68)	(15.40)	(2.42)	(-2.23)
UK	0.0673	4.3467	-0.0007	-0.1178	0.2263	0.7785	1.6417	-1.6880
	(1.22)	(1.65)	(-1.33)	(-3.02)	(2.79)	(25.48)	(2.59)	(-1.91)

Table 19: (continued)

Panel B: Parameter Estimates for the Conditional Variance Equation

	b_0	b_1	b_2	b_3	b_4
Australia	0.0000	0.8354	0.1730	-0.1350	0.0143
	(-0.15)	(15.25)	(2.53)	(-1.83)	(1.24)
Belgium	0.0001	0.8474	-0.0189	0.1606	0.0131
	(2.46)	(19.12)	(-1.08)	(3.38)	(2.06)
Canada	0.0001	0.6642	0.1452	-0.0386	0.0063
	(2.10)	(5.52)	(2.14)	(-0.50)	(1.20)
Denmark	0.0000	1.0051	-0.0214	-0.0137	0.0028
	(4.97)	(72.22)	(-1.01)	(-0.62)	(6.52)
France	0.0002	0.6465	0.0378	0.0463	0.0747
	(2.63)	(6.66)	(1.68)	(1.44)	(2.75)
Germany	0.0001	0.7747	0.1187	-0.0096	0.0198
	(1.17)	(7.35)	(2.12)	(-0.13)	(1.37)
Italy	0.0001	0.8529	0.1137	-0.0670	0.0237
	(1.59)	(14.55)	(2.26)	(-1.05)	(1.37)
Japan	0.0008	0.4833	0.0383	0.1738	0.0655
	(2.18)	(2.22)	(0.66)	(1.60)	(1.11)
Netherlands	0.0001	0.9459	-0.0292	0.0438	0.0070
	(5.92)	(49.98)	(-4.12)	(4.46)	(6.44)
New Zealand	0.0000	0.9950	-0.0253	0.0219	0.0064
	(-8.04)	(59.85)	(-1.09)	(1.26)	(52.22)
Portugal	0.0011	0.3132	0.1751	-0.1625	0.0073
	(4.23)	(1.82)	(1.57)	(-1.50)	(0.24)
South Africa	0.0000	1.0065	-0.0471	0.0234	0.0114
	(-21.37)	(46.95)	(-2.07)	(0.93)	(4.68)
Spain	0.0001	0.8551	0.0014	0.1593	0.0167
	(1.62)	(15.19)	(0.03)	(2.59)	(1.57)
Sweden	0.0000	0.8258	0.1935	-0.2144	0.0596
	(0.14)	(10.64)	(2.29)	(-2.38)	(1.70)
Switzerland	0.0001	0.6662	0.1897	-0.0681	0.0269
	(2.42)	(7.34)	(2.48)	(-0.97)	(1.94)
UK	0.0000	0.9916	-0.0382	0.0556	0.0017
	(0.77)	(85.40)	(-1.14)	(1.01)	(1.39)

Table 20: GARCH-in-Mean Model with Investor Sentiment

This table reports the results from the following modified GJR-GARCH-in-Mean model using excess returns of the 16 countries.

$$R_{i,t} = a_0 + a_1 h_{i,t} + a_2 D_{i,t}^{Sen} + a_3 D_{i,t}^{Sen} h_{i,t} + a_4 R_{us,t-1} + a_5 R_{us,t} + a_6 r_{us,t}^{f} + a_7 r_{i,t}^{f} + \epsilon_{i,t} \quad (33)$$

$$h_{i,t} = b_0 + b_1 h_{i,t-1} + b_2 \epsilon_{i,t-1}^2 + b_3 r_{i,t}^{f} \quad (34)$$

where $h_{i,t}$ is the conditional variance for country *i* at month *t*. $D_{i,t}^{Sen}$ is a dummy variable where it takes the value of 1 if the month *t* in country *i* is in the high sentiment period and 0 otherwise. $R_{us,t-1}$ is the lagged US market return. $R_{us,t}$ is the contemporaneous US market return at month *t*. $r_{us,t}^{f}$ is the US risk-free rate at month *t*. $r_{i,t}^{f}$ is the international market risk-free rate at month *t*.

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7
Australia	0.0049	1.6304	0.0017	-0.7909	0.0615	0.6077	2.5363	-2.7548
	(0.89)	(0.43)	(0.29)	(-0.31)	(2.05)	(16.80)	(2.77)	(-2.83)
Belgium	-0.0152	3.6703	0.0044	-3.5114	0.1285	0.6083	1.8012	-4.9514
	(-1.17)	(2.60)	(0.59)	(-2.14)	(3.05)	(11.32)	(2.63)	(-2.24)
Canada	-0.0083	12.1501	0.0165	-17.2260	0.1290	0.7562	2.6701	-3.1178
	(-1.56)	(1.54)	(1.98)	(-1.35)	(3.83)	(21.06)	(2.23)	(-3.27)
Denmark	-0.0105	15.2121	0.0245	-12.4795	0.0957	0.5837	2.6942	-3.6686
	(-0.56)	(1.33)	(1.69)	(-3.04)	(1.97)	(12.50)	(2.13)	(-3.44)
France	-0.0103	3.7635	0.0001	-4.7120	0.0867	0.8283	4.1107	-5.7446
	(-1.92)	(2.12)	(0.01)	(-2.76)	(1.87)	(21.61)	(2.72)	(-3.18)
Germany	0.0077	-0.5785	-0.0153	1.9502	0.1534	0.6719	3.2640	-4.1757
	(1.65)	(-0.18)	(-2.26)	(0.91)	(3.49)	(14.36)	(2.90)	(-2.76)
Italy	-0.0046	0.5745	-0.0067	1.2961	0.1579	0.7959	4.8059	-2.9885
	(-1.10)	(0.31)	(-0.90)	(0.74)	(3.33)	(15.57)	(2.85)	(-2.33)
Japan	-0.0353	18.0677	0.0302	-9.4052	0.1175	0.5192	-0.8770	-2.8674
	(-1.11)	(1.09)	(1.05)	(-0.87)	(2.12)	(9.89)	(-0.57)	(-2.80)

Table 20: (continued)

Panel A: Parameter Estimates for the Conditional Mean Equation

	a_0	a_1	a_2	a_3	a_4	a_5	a_6	a_7
Netherlands	0.0006	3.4915	-0.0045	-0.0416	0.1158	0.7480	3.4784	-4.0723
	(0.10)	(0.70)	(-1.33)	(-0.68)	(2.54)	(16.79)	(3.33)	(-3.80)
New Zealand	0.0118	-0.0725	-0.0028	2.9062	0.0891	0.4452	1.2059	-3.1893
	(1.74)	(-0.01)	(-0.35)	(0.57)	(1.83)	(9.25)	(2.53)	(-1.88)
Portugal	-0.0226	9.4681	0.0146	-8.5445	0.2251	0.6146	5.6063	-2.9994
	(-2.61)	(2.32)	(1.22)	(-2.34)	(3.16)	(9.84)	(3.25)	(-3.51)
South Africa	0.0190	14.1130	0.0153	-9.7491	-0.0069	0.6502	4.5844	-3.9162
	(5.93)	(2.46)	(1.58)	(-2.31)	(-0.12)	(11.10)	(2.61)	(-2.19)
Spain	-0.0088	5.1798	0.0555	-12.7462	0.1218	0.8583	1.4934	-2.2724
	(-1.22)	(2.42)	(1.05)	(-1.87)	(2.03)	(13.83)	(1.70)	(-1.67)
Sweden	-0.0023	14.3017	0.0012	-2.9741	0.0623	0.9030	3.6347	-8.7859
	(-0.15)	(1.53)	(0.14)	(-1.06)	(1.13)	(19.28)	(1.55)	(-3.56)
Switzerland	0.0005	5.5253	-0.0011	-3.4847	0.0939	0.6221	1.4620	-2.6217
	(0.11)	(1.01)	(-0.23)	(-1.48)	(2.77)	(14.68)	(2.21)	(-2.14)
UK	-0.0028	4.6817	0.0029	-5.2500	0.2037	0.7662	1.4357	-1.3418
	(-0.99)	(2.60)	(0.82)	(-3.94)	(2.11)	(24.33)	(2.18)	(-2.32)

Table 20: (continued)

Panel B: Parameter Estimates for the Conditional Variance Equation

	b_0	b_1	b_2	b_3
Australia	0.0000	0.8363	0.1089	0.0146
	(-0.38)	(16.27)	(2.65)	(1.45)
Belgium	0.0001	0.7587	0.0551	0.0260
	(2.12)	(9.98)	(1.59)	(1.70)
Canada	0.0001	0.6499	0.1291	0.0062
	(2.32)	(5.56)	(2.46)	(1.16)
Denmark	0.0001	0.8450	0.0235	0.0154
	(1.21)	(7.71)	(1.05)	(1.41)
France	0.0001	0.7242	0.0826	0.0494
	(2.13)	(7.30)	(2.41)	(2.13)
Germany	0.0001	0.7832	0.1152	0.0197
	(0.95)	(6.42)	(2.34)	(1.36)
Italy	0.0000	0.8615	0.0928	0.0204
	(0.97)	(16.29)	(2.51)	(1.27)
Japan	0.0003	0.7548	0.0695	0.0499
	(1.70)	(5.80)	(1.49)	(1.22)
Netherlands	0.0001	0.8850	0.0470	0.0086
	(0.89)	(11.02)	(1.73)	(1.50)
New Zealand	0.0000	0.8938	0.0334	0.0115
	(0.69)	(5.98)	(1.38)	(0.35)
Portugal	0.0007	0.3629	0.2640	0.0136
	(3.25)	(2.67)	(2.95)	(0.58)
South Africa	-0.0002	0.1241	0.1271	0.2009
	(-1.25)	(0.63)	(1.88)	(8.18)
Spain	0.0001	0.8223	0.1019	0.0109
	(1.62)	(11.90)	(2.38)	(0.82)
Sweden	0.0000	1.0144	-0.0357	0.0185
	(-15.40)	(56.48)	(-1.75)	(3.69)
Switzerland	0.0001	0.6248	0.1684	0.0322
	(2.41)	(5.74)	(2.52)	(2.04)
UK	0.0000	0.9139	0.0442	0.0051
	(1.27)	(36.04)	(2.43)	(2.24)

Figure 1: Australia, Belgium and Canada Consumer Confidence Index

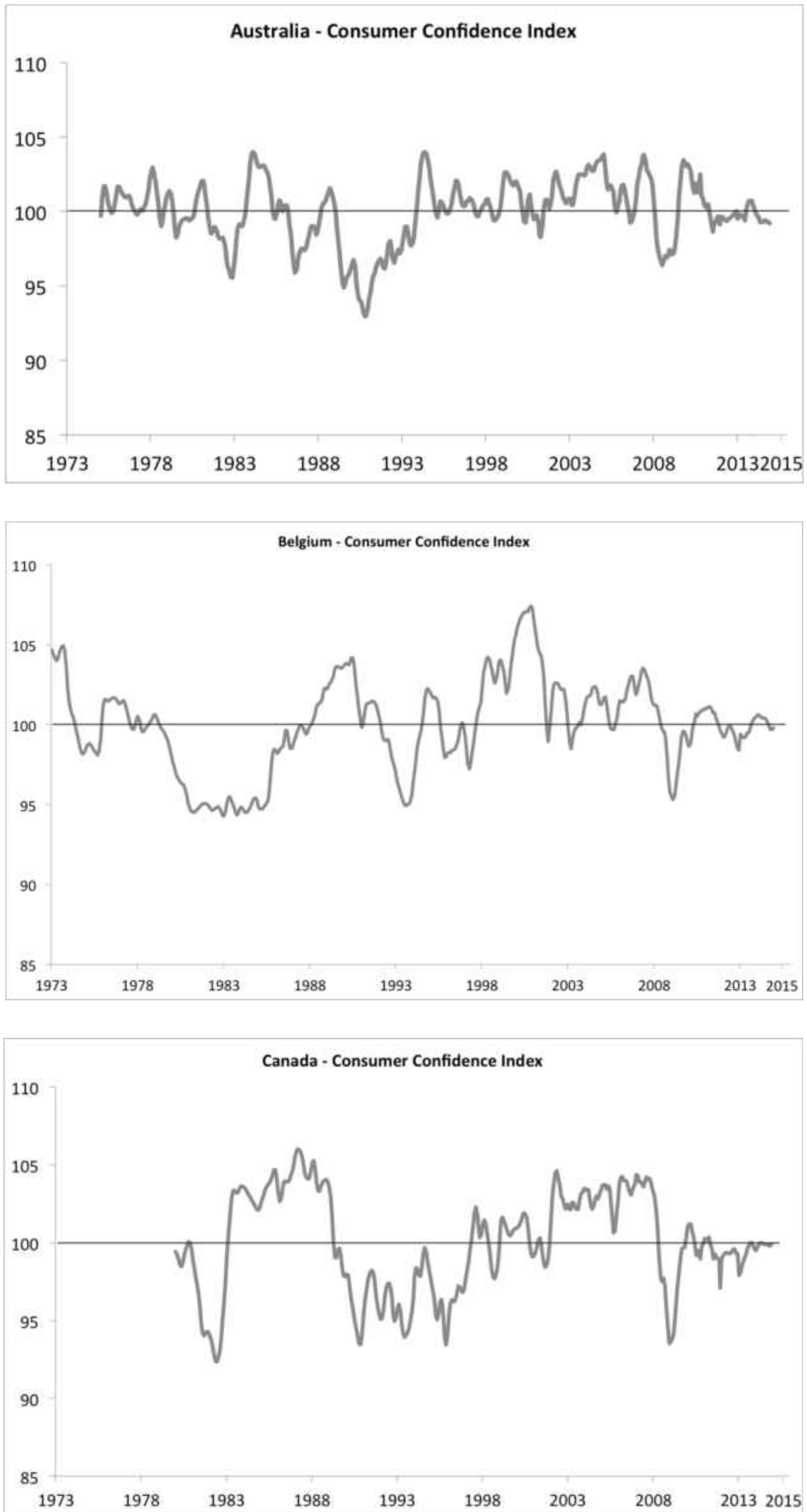


Figure 2: Denmark, France and Germany Consumer Confidence Index

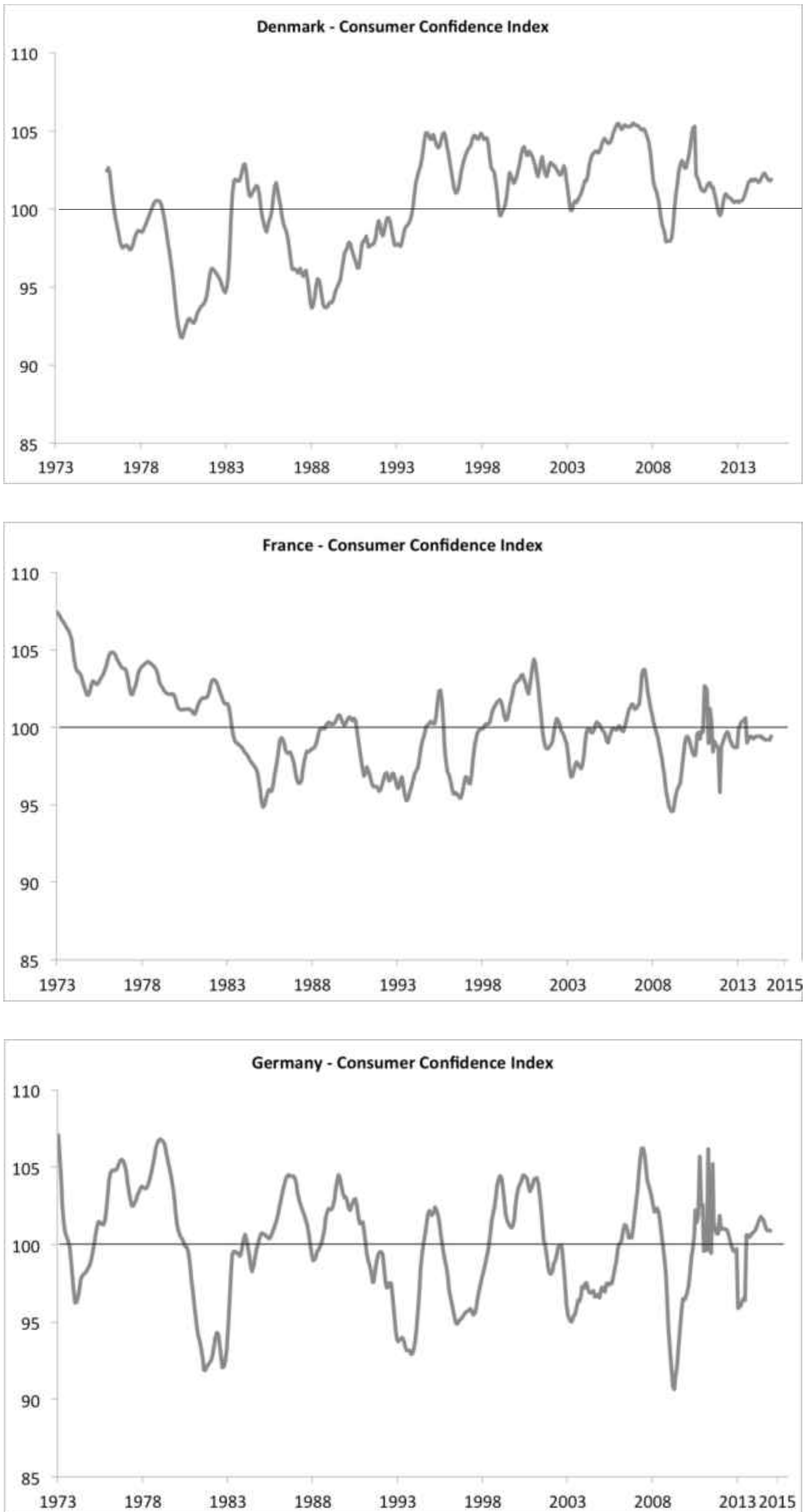


Figure 3: Italy, Japan and the Netherlands Consumer Confidence Index

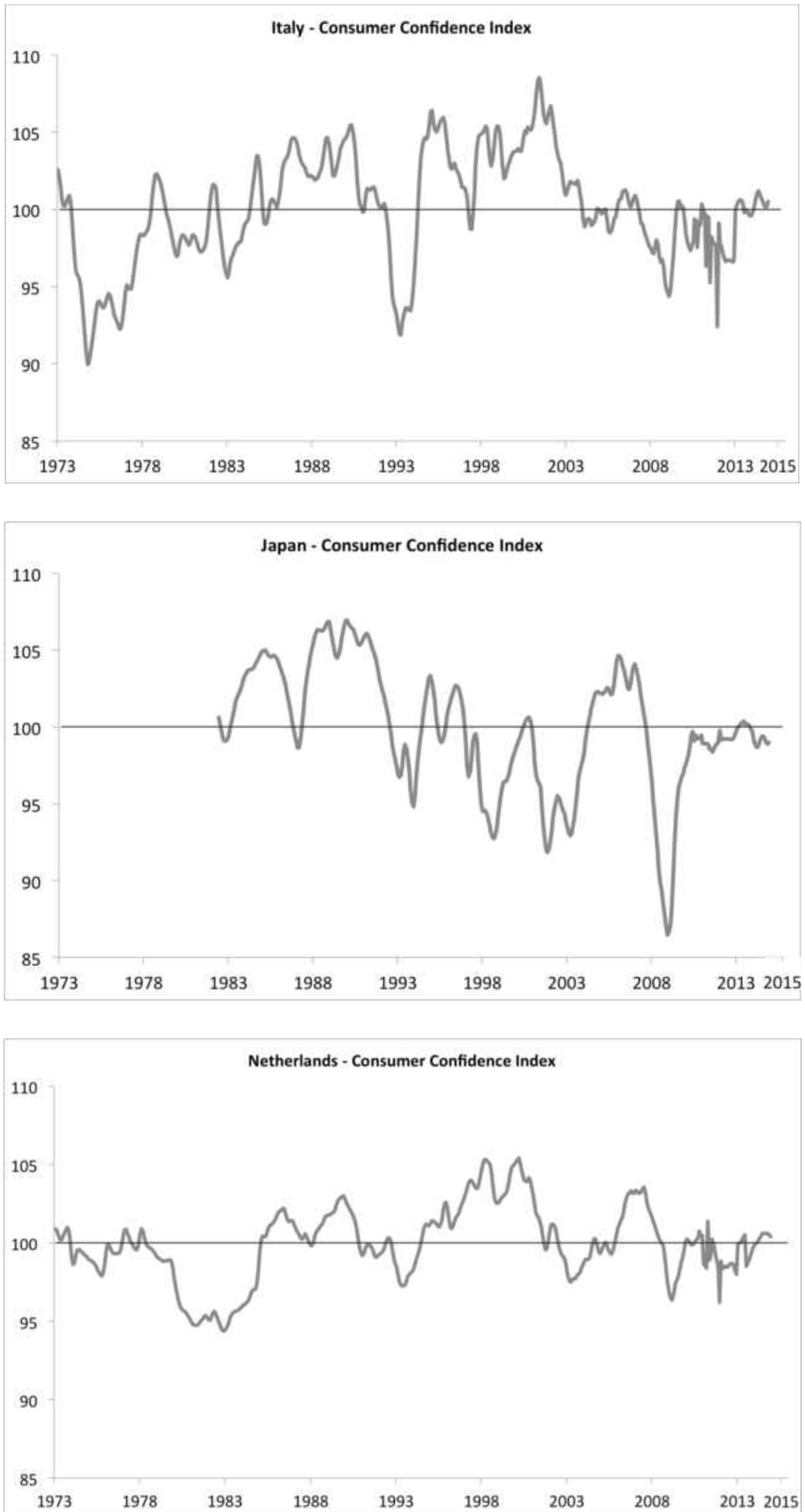


Figure 4: New Zealand, Portugal and South Africa Consumer Confidence Index

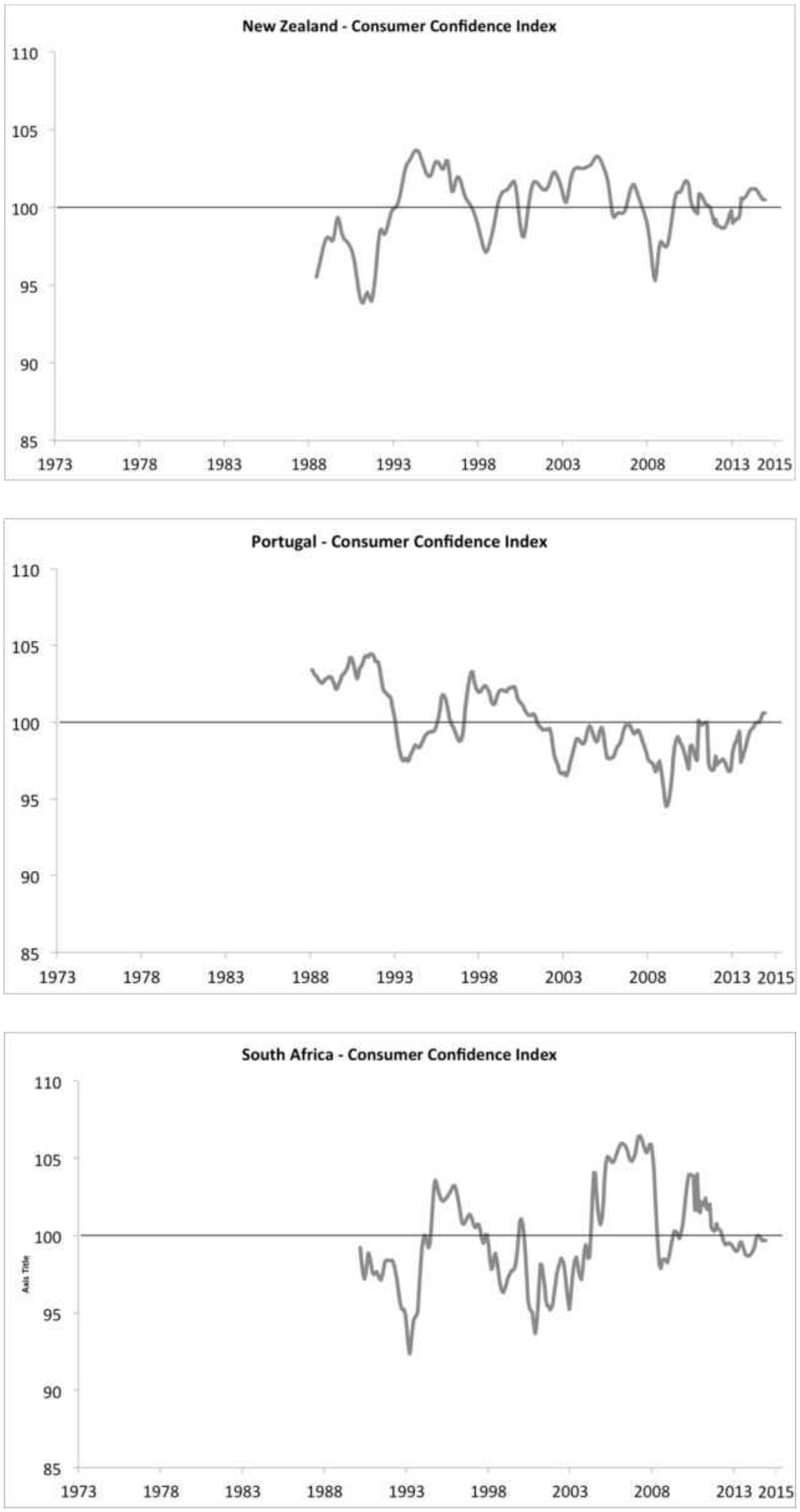


Figure 5: Spain, Sweden and Switzerland Consumer Confidence Index

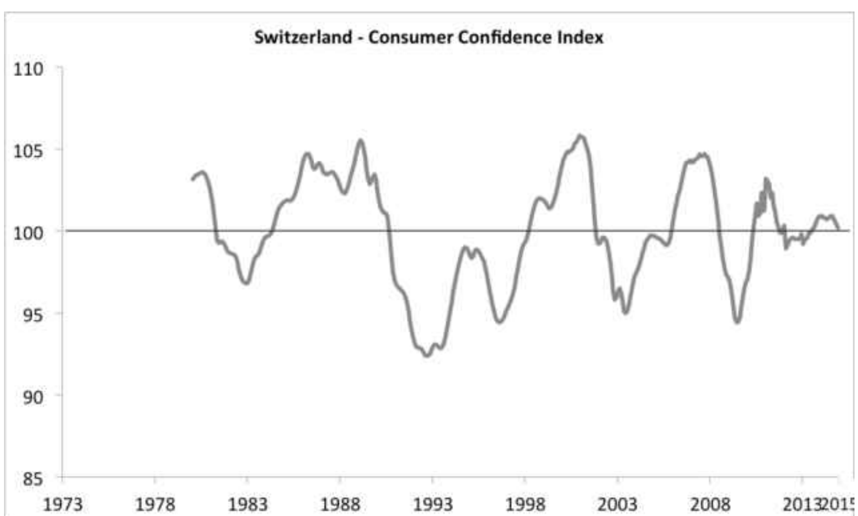
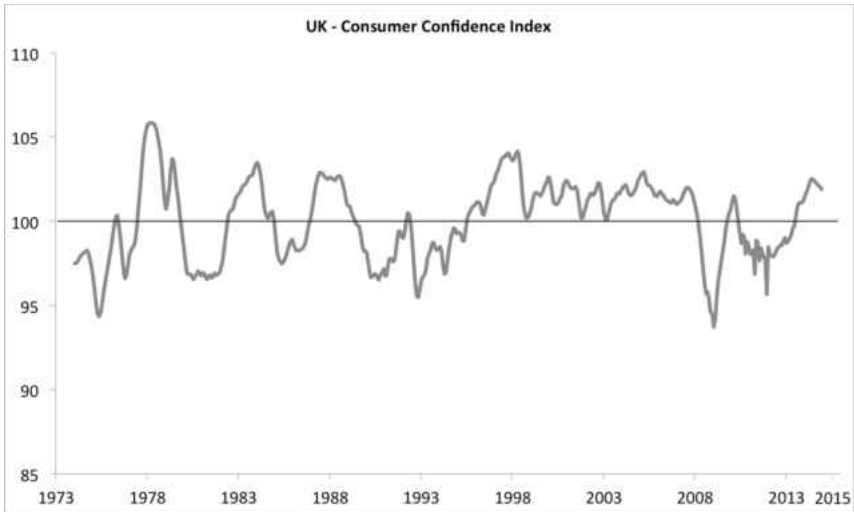
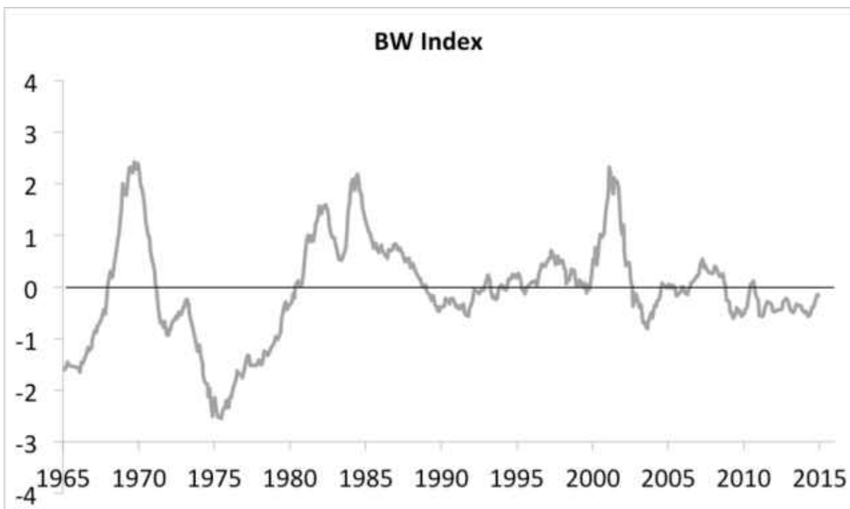


Figure 6: UK Consumer Confidence Index and US Baker-Wurgler Sentiment Index





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