The Effects of US Macroeconomic Surprises on the Term Structure of Emerging-market Sovereign Credit Default Swaps

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Abstract

Our primary aim in this study is to examine whether US macroeconomic surprises affect the slope of the term structure of national 'sovereign credit default swap' (SCDS) spreads in the emerging markets, with our empirical results revealing that positive (negative) US macroeconomic surprises are likely to reduce (increase) the term structure slope of SCDS spreads in the emerging countries. We find that a 1% increase in the slope value of SCDS term structures forecasts a reduction in annual GDP growth at an average rate of 0.0035%, with the slope values in the emerging markets being positively related to future market returns over one-, three- and six-month horizons. Following adjustment by the three global factors of Fama-French (1993), a monthly long-short rebalancing portfolio based upon SCDS slopes in the emerging markets is found to generate an average monthly return of 1.60%. Our results provide general support for the future informational role played by SCDS slopes for national economies within the emerging markets.

Keywords: Credit default swaps; Term structure; Spillover effect; Financial crisis.

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1. Introduction

Serious sovereign risks associated with high levels of market uncertainty have occurred over recent years, including the global financial crisis, the China-US trade war, the Eurozone sovereign debt crisis and the withdrawal of the UK from the EU, leading to a boom in the markets for 'sovereign credit default swaps' (SCDS).[1] The sell side of SCDSs provides protection against default losses when the reference entity cannot afford to repay the interest or the principal, with SCDS buyers periodically paying premiums – calculated as the SCDS spread multiplied by the notional amount – in order to receive protection during the contract period. According to the Depository Trust and Clearing Corporation, the gross notional amount of SCDSs outstanding was roughly US$ 2.2 trillion at the end of May 2010, and subsequently reached US$ 3.0 trillion in June 2012. The SCDS market has shown stable growth ever since the gross notional amount of SCDS outstanding reached US$ 1.7 trillion in July 2017.

The various financial crises that have occurred over the past two decades – including the technology bubble of 2000, the subprime crisis of 2008, the Eurozone debt crisis/bankruptcy in Greece in 2010 and Brexit in 2017 – have resulted in the financial markets becoming more volatile, severely affecting both regulators and

[1] An SCDS is a type of credit derivative that is created between two counterparties providing risk management for buyers against any sovereign debt losses arising from sovereign credit events, such as default or debt restructuring.

investors alike; thus, there has been rapid growth in interest in hedging against risk over recent years, with SCDSs standing out as a derivative that is capable of gauging the likelihood of future market deterioration.

We follow the work of Kim, Salem and Wu (2015) to investigate the spillover effects of US macroeconomic news on credit default swap spreads within the emerging markets, and find that good (bad) news has the effect of reducing (increasing) the mean and variance of the credit default swap term structures among our sample of emerging countries. Our research also provides evidence to show that SCDSs function not only as a signal of a forthcoming economic recession (thereby enabling investors to hedge their risk in advance), but that they can also be used by investors to earn profits. The interest rate yield curves are found to contain information relating to expected future economic conditions; for example, when the interest rate yield curve is inverted, an economic depression occurs within two years. Since the SCDS spread quotes have varying times to maturity, we aim to investigate whether or not any relevant information is embedded in the SCDS spread curve.

The focus within the prior related literature has not only been placed on SCDS spreads, but also on the term structure of these spreads; for example, Aizeman, Hutchison and Jinjarak (2013) demonstrated that fiscal space and certain macroeconomic factors were important determinants of SCDS spreads, whilst Chiarella, ter Ellen, He and Wu

(2015) found that SCDS spreads were determined by country-specific fundamentals. Attinasi, Checherita-Westphal and Nickel (2009) demonstrated that the bank bailout packages provided during the subprime crisis led to an increase in SCDS spreads, whilst Pan and Singleton (2008) showed that the term structures of the SCDS spreads contained information on both the arrival rates of credit events and the loss rates of given credit events. Augustin (2018) subsequently noted that the SCDS spread slope contained information on cross-sectional differences in domestic risks.

We contribute to the existing SCDS literature in the present study by exploring whether US macroeconomic surprises affect the term structures of SCDS spreads in the emerging markets, with our sample including a total of 18 emerging countries, six in the Asia-Pacific region, five in the Americas and seven in the European, Middle Eastern and African regions over a 13-year sample period. Our research is motivated by a specific strand within the related literature where it has been demonstrated that the macroeconomic announcements of the major economies will not only affect their domestic financial markets, but also the financial markets of other countries, particularly if these countries are in the emerging markets.[1]

Furthermore, global integration can also cause the uncertainties of major economies to have spillover effects on such emerging economies. As argued by

[1] Examples include Becker, Finnerty and Friedmam (1995), Bekaert and Harvey (1997), Kim (2003), Nikkinen and Sahlström (2004), Hanousek, Kocenda and Kutan (2009) and Hayo, Kutan and Neuenkirch (2010).

Longstaff, Pan, Pedersen and Singleton (2011) and Dieckmann and Plank (2012), there are commonalities between SCDS spreads and the influence of common global risk factors relating to economic performance in the US; it is, therefore, natural for us to consider whether there are occurrences of spillover effects from US macroeconomic surprises on SCDS pricing within the emerging markets. In order to enhance our understanding of such spillover effects, we examine the effects of the information content of the term structures on future country-specific economies, including 'gross domestic product' (GDP) and market index returns.

We consider five types of US macroeconomic news surprises, comprising of trade balances, unemployment rates, GDP growth, non-farm payroll and leading indicators; these are based upon individually collected forecast values of macroeconomic news announcements obtained from Econoday.com and Briefing.com. We follow the approach of Kim et al. (2015) to categorize the macroeconomic surprises into good or bad news, as exogenous variables, and then go on to specify an 'exponential generalized autoregressive conditional heteroscedastic' (EGARCH) model to determine whether these good or bad US macroeconomic news announcements influence the term structures of the SCDS spreads in each of the emerging countries examined. Our empirical results reveal that good (bad) news surprises from US macroeconomic news announcements reduce (increase) the level and variance of

SCDS spread slopes, thereby providing support for the argument that macroeconomic news surprises do indeed have spillover effects on the term structures of SCDS spreads in the emerging markets.

We go on to further investigate the relationship between the slope of the SCDS spread and the real economy in our sample of emerging countries. If the slope of the SCDS spread represents the difference between long- and short-term premiums, then a steeper slope would imply a tendency for a worsening of the economy over the long term, along with a corresponding decline in the GDP growth rate. According to our empirical results, a 1 bp increase in the slope will be accompanied by respective declines of 0.0062% and 0.0035% in the simultaneous and subsequent GDP growth rates.

In addition to examining GDP growth rates, we also refer to Hjalmarsson (2010) to apply a panel regression model to investigate the ways in which the slope of the SCDS term structure can predict stock market index returns over one-, three-, six- and twelve-month periods.[2] Our empirical results reveal a general association between a steeper slope and higher index returns, thereby indicating that the term structures do indeed contain information on future GDP and market returns in the emerging countries.

Given our finding of the informational role of the term structures on future national economic conditions, we also use the term structures to construct portfolio strategies in

[2] Although Norden and Weber (2009) demonstrated that stocks drive the CDS spread, they could provide no significant evidence of the CDS spread driving the stock market.

an attempt to determine whether they can generate positive abnormal returns. We divide our sample of emerging countries into three groups based upon their slope values for each month, and then apply a monthly rebalancing strategy which involves selling long (short) in the market indices of the highest (lowest) slope group for one month. Our empirical results reveal that the long-short portfolio return is roughly 1.35% per month, with a t-statistic of 5.04. After carrying out risk adjustment using the 'capital asset pricing model' (CAPM), the three-factor model of Fama-French (1993) and the four-factor model of Carhart (1997), the monthly returns are still found to be significantly positive, ranging from 1.50% to 1.67%, with significance at the 1% level.

Our study contributes to the extant literature in at least three ways. Firstly, our evidence shows that US macroeconomic news surprises are important determinants of the pricing of SCDSs in the emerging markets; we extend the work of Kim et al. (2015) by not only providing support for the existence of spillover effects over a longer sample period, but also by placing greater focus on national SCDSs in eighteen emerging countries.[3] Secondly, we demonstrate the informational role of changes in the term structures of the emerging-market SCDS spreads on future GDP growth and market returns. Thirdly, information content can also be used in practice by developing a cross-

[3] Kim et al. (2015) used a five-year sample of nineteen countries around the world to analyze the impact on SCDS spreads arising from macroeconomic news from the US, Eurozone countries and China. They found that macroeconomic news relating to these three major economies had significant macroeconomic spillover effects on the SCDS spreads of the other countries.

country portfolio strategy. To the best of our knowledge, our study represents the first attempt to construct significantly positive risk-adjusted portfolio returns based upon information contained in the term structures of emerging-market SCDS spreads.

The remainder of this paper is organized as follows. A review of the extant literature on the term structures of SCDS spreads is presented in Section 2, followed in Section 3 by descriptions of the data sample and the methodology adopted for this study. Our empirical results are subsequently presented and discussed in Section 4. Finally, the conclusions drawn from this study are presented in Section 5.

2. Literature Review

2.1 US Macroeconomic News Announcements in the Financial Markets

Numerous prior related studies have argued that announcements of macroeconomic news can transmit information in different types of financial markets. For example, Balduzzi, Elton and Green (2001) and Goeij and Marquering (2006) noted that macroeconomic news events had asymmetric impacts on the bond market, whilst Gande and Parsley (2005) found that macroeconomic and ratings news had spillover effects on the international debt markets. Kim, McKenzie and Faff (2004) and Andersen, Bollerslev, Diebold and Vega (2007) investigated the effects of macroeconomic news announcements on the bond, stock and foreign exchange markets, with Christiansen and Ranaldo (2007) and Brenner, Pasquariello and Subrahmanyam (2009) subsequently

further exploring the impacts of macroeconomic news on co-movement in the different financial markets.

The literature on US macroeconomic news announcements and their effects on the financial markets is already well established, with the prior related studies having clearly demonstrated the spillover effects of such announcements on other countries and financial markets. Dooley and Hutchison (2009) noted that the emerging markets tended to respond strongly to deteriorating conditions in the US financial system and the real economy. Conversely, however, Kilian and Vega (2011) were unable to find any compelling evidence on spillover effects from US macroeconomic news on energy prices at either daily or monthly horizons. Gurgul and Wójtowicz (2014) subsequently noted that US macroeconomic news announcements had diverse effects on large, medium and small stocks in Poland, whilst from their analyses of the US and Finland, Nikkinen and Sahlström (2015) identified an increase (reduction) in implied volatility prior to (after) US macroeconomic news announcements.

A few studies have explored spillover effects on the SCDS market. For example, Baum and Wan (2010) observed that both the first and second instances of traditional factors of macroeconomic uncertainty – the risk-free rates and the treasury term spreads – had significant explanatory power on the SCDS spread. Focusing on credit ratings news in the Eurozone, Arezki, Candelon and Sy (2011) found that Greece, a

relatively large economy, had been downgraded to a near speculative grade rating and that the resultant spillover effects across the Eurozone were systematic. Using the EGARCH model to capture the spillover effects from the US, the Eurozone and China, Kim et al. (2015) found that good news from these three major economies was found to reduce both the SCDS spread and volatility, whereas bad news was found to increase the SCDS spread. However, the effects on volatility were quite varied; whilst bad news from China and the Eurozone generally increased the volatility of other SCDS spreads, bad news from the US tended to reduce volatility and have a stabilizing effect.

The above literature review reveals that numerous prior related studies have examined the ways in which the effects of US macroeconomic news announcements can spill over to other countries and financial markets; nevertheless, there appears to have been very limited focus on the spillover effects of such news announcements on the term structures of SCDS spreads in the emerging markets; hence, our work in the present study is intended to address this gap within the extant literature.

2.2 The Term Structures of SCDS Spreads

Significant focus has been placed on the term structures of SCDS spreads within the recent literature; for example, Pan and Singleton (2008) explored the nature of default arrival and recovery implicit in the term structures of SCDS spreads through a reduced-form model, with their results revealing that co-movement in the term structures of the

SCDS spreads across countries was induced by changes in the appetites of investors for credit exposure on a global level, rather than by reassessments of the fundamental strength of specific sovereign economies.

Augustin (2018) used SCDS data on 44 countries, covering the January 2001 to February 2012 period, to investigate the relationship between risk and the term structures of the SCDS spreads, with the slope of an SCDS term structure being defined as the difference between 10- and 1-year SCDS spreads; the results showed that when the SCDS term structure slope was positive, global shocks were the main force behind changes in the price of the sovereign credit risk, but when the SCDS term structure slope was negative, there was a marked increase in the importance of domestic shocks. Thus, it was determined that the SCDS term structure slope could predict quarterly real GDP growth, but only when the slope was negative.

In their examinations of the term structure slope in the US corporate SCDS market, Han and Zhou (2015) and Han, Subrahmanyam and Zhou (2017) defined the SCDS term structure slope as the difference between five- and one-year SCDS spreads. Han and Zhou (2015) examined the slope of the term structure of US corporate SCDS spreads, with their empirical results showing that steeper term structures increased with firm leverage and volatility, but decreased with the level and slope of the Treasury yield curve. Using US corporate SCDS data covering the August 2002 to December

2012 period, Han et al. (2017) found that the flat term structure of SCDS spread forecasts was reduced with default risk, whereas it was increased with future earnings surprises, and also predicted negative future stock returns. The predictive ability of the credit spread slope on stock returns was found to be stronger for firms with higher arbitrage costs, thereby indicating that the SCDS term structure slope includes information on the future financial health of a firm.

Analyzing a sample of 29 countries, Calice and Zeng (2019) calculated the slope of the term structure of the SCDS spreads as the log difference between ten- and one-year SCDS spreads, with their empirical results revealing that countries with a steeper term structure could predict their currency appreciation against the US dollar. They also claimed that the value of the SCDS spread reflected the global risk, whereas the term structure of the spreads reflected the degree of risk in a given country.

3. Data and Methodology

3.1 Data Sources and Sample Selection

Our SCDS data were obtained from Markit, a global SCDS information database in current widespread use. Mayordomo, Peña and Schwartz (2014) compared five SCDS databases and found that Markit offered composite quotes with continual daily quotes. We use monthly data covering a sample period running from January 2001 to August 2013, with our list of emerging markets being based upon the constituents of the MSCI

emerging markets index, excluding countries with low SCDS quotes, such as Taiwan, and PIIGS also being included in our sample. We selected data from 18 sample countries, including six from the Asia-Pacific region (China, Indonesia, South Korea, Malaysia, the Philippines and Thailand), five from the Americas (Brazil, Chile, Colombia, Mexico and Peru) and seven from the European, Middle Eastern and African regions (the Czech Republic, Egypt, Greece, Poland, Qatar, Russia and South Africa).

We then processed the necessary data filters, with our analysis measuring the following types of observations: (i) government sector-represented derivatives of sovereign debt; (ii) US dollar-denominated quotes (since SCDSs are primarily traded in the US, and US dollar-denominated sovereign debts are more liquid than local currency-denominated bonds); and (iii) full restructuring and senior unsecured debt tiers, since these tiers provide the most sufficient observations.

3.2 Measurement of SCDS Term Structures

For our construction of the SCDS term structures, we follow Han and Zhou (2015) and Han et al. (2017) to define the slope of the term structures of the SCDS spreads as the five-year spread minus the one-year spread. We estimate the slope of the sovereign credit term structures (*Slope*) of each country for each month, with this slope implying different short- and long-term expectations relating to sovereign credit defaults. An

increase in the SCDS spread slope is attributable to a higher long-term spread, thereby implying potential deterioration over the long-term, whilst a steeper slope is mainly attributable to a reduction in the short-term spread, which provides a signal that a short-term economy is expected to be better than one with a flatter slope.

The descriptive statistics of the SCDS term structure (*Slope*) are reported in Table 1, with Panel A reporting the countries in the Asia-Pacific region, Panel B reporting those in the Americas, and Panel C reporting those in Europe, the Middle East and Africa. Panel A shows that Indonesia had the greatest extreme term structure values, with a minimum (maximum) of -91 bp (375 bp), whilst the most volatile term structure value in the Asia-Pacific region was the 93.61 bp value for the Philippines, and the most stable value was that of 20.48 bp for South Korea. With the exceptions of the SCDS term structure values for Malaysia, the Philippines and Thailand, the remaining values for the Asia-Pacific region reveal positive skewness and positive kurtosis.

<Table 1 is inserted about here>

Panel B of Table 1 reports the descriptive statistics of the SCDS spread slopes for the Americas, from which we can see that the average value of the standard deviations is higher than that for the Asia-Pacific region, thereby indicating a less stable economic environment in the Americas, as compared to the Asia-Pacific region. The most volatile (stable) SCDS term structure value for the Americas was the 231.69 bp (33.02 bp)

value for Brazil (Chile), with a minimum SCDS spread slope of -693 bp (8 bp) and a maximum SCDS spread slope of 698 bp (165 bp). Furthermore, most of the SCDS slopes are found to be associated with positive skewness (with the exception of Brazil) and positive kurtosis (with the exception of Colombia).

Panel C of Table 1 reports the descriptive statistics of the SCDS spread slopes for the European, Middle Eastern and African regions. Greece (the Czech Republic) is found to have the most volatile (stable) SCDS term structure value, with a minimum SCDS spread slope of -16,261 bp (2 bp), a maximum SCDS spread slope of 71 bp (79 bp) and a standard deviation of 4,951.98 bp (20.58 bp).

Overall, the results reveal that SCDS term structures are found to be more volatile in Greece and Brazil, but less volatile in South Korea and China. The most volatile SCDS term structure values are found in the European, Middle Eastern and Africa regions, ranging from 20.58 to 4951.98, whilst the most stable term structures are found in the Asia-Pacific regions, ranging from 20.48 to 93.61.

3.3 Summary Statistics

In an attempt to provide a better understanding of the information content of SCDS spreads, we first use the GDP growth rate (*GDPGR*) to capture real economic activity and annual GDP growth rates, details of which were obtained from the World Bank. We then use a stock index to calculate stock market index returns (*IndexRet*) essentially

because the stock index is a common proxy of a country's economy and reflects the expectations of investors with regard to future economic trends. When investors forecast economic growth in a specific country, there tends to be an increase in the future returns of that index market. In those countries that have more than one stock market index, we consider only the main index used by foreign institutional investors; for example, we study the Bangkok Set Stock Index of Thailand, the Bovespa Index of Brazil and the EGX30 Index of Egypt. The data on the stock market indices were sourced from Bloomberg and Investing.com.[2]

Data on the US Dollar Index were collected from the Taiwan Economic Journal (TEJ) database, with the monthly change in the US Dollar Index (*USDI*) being calculated as our control variable, since we only consider US dollar-denominated SCDS contracts; this is essentially because SCDS contracts denominated in US dollars are the most common and the most liquid. Appreciation and depreciation of the US dollar will obviously lead to changes in the SCDS spread quotes, and indeed, during our sample period, the US Dollar Index increased by 120.59 in January 2002 and decreased by 72.72 in January 2008.

The implied volatility index is the most widely used market-based investor sentiment proxy for the US market. Whaley (2000) posited that the implied volatility

[2] Refer to Appendix 1 for a list of the stock market indices used in this study.

index was an effective gauge of investor fear; that is, when investors have greater uncertainty about the future returns of the underlying assets, the demand for put options will rise, increasing both implied volatility and the VIX. Simon and Wiggins (2001) also argued that since market-based measures of sentiment are observed in real time, they reflect both the market power of the participants and the intensity of the bullishness or bearishness. For example, the VIX increased to 59.89 points in October 2008 and to 42.96 points in September 2011, thereby reflecting the subprime financial crisis and the European debt crisis, the two most severe financial events during our sample period. We therefore calculate the monthly change in the VIX, obtained from the TEJ database, as our market-based sentiment variable to capture investor expectations.

We examine the macroeconomic variables on the US, including trade balance, unemployment rates, GDP growth, non-farm payroll and leading indicators. The data used to measure the forecast values for pre-scheduled macroeconomic announcements were individually collected from Briefing.com and Econoday.com. Briefing.com provides two types of forecasts: (i) the median of the surveys distributed to economists and practitioners to elicit their forecasts of upcoming announcements; and (ii) the consensus forecasts of future releases. We average these two types of forecasts obtained from Briefing.com with the forecast values provided by Econoday.com to calculate the macroeconomic news surprises.

We follow the Kim et al. (2015) approach to categorize the macroeconomic news surprises into good and bad news indices; it should be noted that each news indicator was standardized and divided by its standard deviation over the sample period.[4] The news variables were then separated into good and bad news indices; when the announced value was greater (less) than the forecast value, then it was considered to be good (bad) news, and when the announced value was equal to the forecast value, it was considered to be neither good nor bad news. The lower the unemployment rate, then the more prosperous the economy, such that a lower announced unemployment rate was considered to be good news. Finally, for each macroeconomic indicator, we calculated the average values of the good and bad news indices for the US as our respective variables for good and bad news. *Good* (*Bad*) represents the average value of the good (bad) news index for the US, where a good (bad) news index indicates that the announced value was greater (less) than the forecasted value.

The values of the SCDS slope, GDP growth rate, stock market index return, changes in the US Dollar Index and changes in the VIX index are reported in Table 2, where *Slope* is found to have a mean of -0.0025, with a median of 0.0059 and a standard deviation of 0.1264, whilst the mean of *IndexRet* is 0.0104, ranging from -0.8229 to

[4] When a news indicator is expressed in percentage form (for example, unemployment rates), then the absolute difference between the forecasted and announced value is used; when a news indicator is expressed in numeric form (for example, non-farm payroll), then the log difference between the forecasted and announced value is used.

2.4594, and the mean of *GDPGR* is 4.7717 with a standard deviation of 4.0587. The respective means of the two market condition variables, *USDI* and *VIX*, are -0.0022 and -0.0026. As regards the US macroeconomic news variables, the mean of *Good* is found to be 0.3071, with a standard deviation of 0.2803, whilst the mean of *Bad* is 0.3003, ranging from 0.000 to 0.9869, with a standard deviation of 0.2587.

<Table 2 is inserted about here>

The correlation matrix of all of the important variables used in the study is provided in Table 3, with the empirical results revealing a significantly negative correlation between *Good* and *Slope*, and a significantly positive correlation between *Bad* and *Slope*. These results clearly indicate significant correlations between US macroeconomic news announcements and the SCDS slopes in the emerging markets. We also find significantly positive correlations between *IndexRet* and *Slope* and between *VIX* and *Slope*, and a significantly negative correlation between the change in the *VIX* and *IndexRet*. These results indicate that stronger fears are associated with an increase in the sovereign slope and a reduction in stock market index returns.

<Table 3 is inserted about here>

4. Empirical Results

In this section we begin by presenting our results on the spillover effects of US macroeconomic news announcements on SCDS spreads in the emerging countries, and

then go on to examine the ways in which the SCDS spread slopes affect economic conditions and stock market returns, as well as portfolio strategy performance.

4.1 Effects of US Macroeconomic News on SCDS Spread Term Structures

Our analysis starts with an examination of whether US macroeconomic news surprises affect the slope of the term structures of the SCDS spreads in the emerging markets. We follow Braun, Nelson and Sunier (1995), Booth, Martikainen and Tse (1997) and Kim et al. (2015) to use an asymmetric volatility model, the EGARCH model, to explore the effects of US macroeconomic good and bad news on SCDS spread slopes for each country examined.[5] The good and bad news indices are considered to be exogenous variables, with the stock market index returns, the implied volatility index and the US dollar index being used as our control variables. The regression model is specified as follows:

$$Slope_d = \alpha + \alpha_l Slope_{d-1} + \alpha_i IndexRet_d + \alpha_v VIX_d + \alpha_u USDI_d + \alpha_g Good_d + \alpha_b Bad_d + \varepsilon_d \quad (1a)$$

$$lnh_d = \beta + \beta_h lnh_{d-1} + \beta_{\varepsilon 1} \frac{\varepsilon_{d-1}}{\sqrt{h_{d-1}}} + \beta_{\varepsilon 2} \frac{|\varepsilon_{d-1}|}{\sqrt{h_{d-1}}} + \beta_g Good_d + \beta_b Bad_d \quad (1b)$$

where $Slope_d$ refers to the slope of the SCDS spread term structure in month d for each country; $Good_d$ (Bad_d) is good (bad) US macroeconomic news in month d; $IndexRet_d$

[5] The EGARCH model is derived from the GARCH model, a heteroscedasticity model in which it is assumed that the positive and negative effects are equivalent; however, the EGARCH model is capable of capturing the asymmetric effects on variance resulting from good and bad news.

is the stock market index return in month d for each country; VIX_d denotes the change in the VIX index in month d; $USDI_d$ is the change in the US Dollar Index in month d; and $Slope_{d-1}$ refers to the one-period lagged slope of the SCDS spread term structures. US macroeconomic news refers to trade balances, unemployment rates, GDP growth rates, non-farm payroll and leading indicators, with good news including announcements that are more favorable than the forecasts, and bad news including announcements that are less favorable than the forecasts.

lnh_{d-1}, which is the natural logarithm of the lagged error parameter, is allowed to vary over time as a function of the lagged error terms, rather than lagged squared errors; β_h measures the persistence of shocks to the variance; $\frac{\varepsilon_{d-1}}{\sqrt{h_{d-1}}}$ is the lagged conditional variance; $\beta_{\varepsilon 1}$ captures the asymmetric component; when $\beta_{\varepsilon 1} > 0$, then positive shocks (good news) generate more volatility than negative shocks (bad news), and vice versa; and $\beta_{\varepsilon 2}$ captures the effect of the conditional shock on the conditional variance. The summary statistics on the mean values for the individual countries obtained from Equation (1) are presented in Table 4, with Panels A, B and C providing the respective mean results for the Asia-Pacific (APA), the Americas (AME) and Europe, the Middle East and Africa (EMEA).[6]

<Table 4 is inserted about here>

[6] Refer to Appendix Tables 2-1 and 2-2 for more detailed empirical results on the individual countries.

The mean summary statistics relating to the Asia-Pacific region (Malaysia, China, Indonesia, Korea, the Philippines and Thailand), shown in Panel A of Table 4, reveal that the mean values are α_i = -0.0011, α_v = 0.0004 and α_u = 0.0001, with these results indicating that a higher stock market index return and lower changes in the VIX and the US dollar index are associated with a reduction in the slope of SCDS spread term structures. The mean value of α_g is -0.0003, with most of the α_g values for countries in the Asia-Pacific region being significantly negative at the 1% or 5% levels, and reductions in SCDS slope values being discernible for Thailand (-2 bp), China (-3 bp), Indonesia (-9 bp) and the Philippines (-5 bp). Our empirical results generally indicate that a higher *Good* variable is associated with a lower SCDS spread slope, essentially because a higher *Good* variable indicates that the outlook for the US economy is more positive than expected, thereby signaling a reduced likelihood of future sovereign credit defaults, resulting in a reduction in the SCDS spread slope.

The mean value of α_b is found to be 0.0001, with most of the α_b values for countries within the Asia-Pacific region being significantly positive at the 1% or 5% levels, and higher SCDS slope values being discernible for Thailand (2 bp), Malaysia (3 bp) and South Korea (3 bp). Most of our empirical results show that a higher *Bad* variable is associated with a higher SCDS spread slope, since a higher *Bad* variable indicates that the outlook for the US economy is less positive than expected, thereby

indicating a greater likelihood of future sovereign credit defaults; thus, it is reasonable to observe an increase in the slope.

The mean summary statistics relating to the Americas (Brazil, Colombia, Chile, Peru and Mexico) are reported in Panel B of Table 4, which shows that the mean values are α_i = -0.0021, α_v = 0.0001 and α_u = 0.0068, thereby essentially echoing the results reported in Panel A, and indicating that stock market index returns and changes in both the VIX and the US dollar index have significant impacts on the slope of the term structures of SCDS spreads. The mean value of α_g is 0.0001, with only 40% of the α_g values for countries in the Americas being significantly positive at the 1% level, and increases in SCDS term structure slopes being discernible for Brazil (3 bp) and Colombia (0 bp). However, α_g is found to have a negative effect on the slope of the term structures of the SCDS spreads for Peru (2 bp) and Mexico (0 bp). The Americas exhibit the weakest positive relationship between *Good* and the slope of the term structures of the SCDS spreads.

As regards bad news, the mean value of α_b is found to be 0.0001, with most of the α_b values for countries in the Americas being significantly positive at the 1% or 5% levels, and increases in SCDS term structure slopes being discernible for Colombia (1bp), Peru (3 bp) and Mexico (2 bp). Most of our empirical results show a positive relationship between bad macroeconomic news from the US and the SCDS slopes.

The mean summary statistics relating to Europe, the Middle East and Africa (Egypt, the Czech Republic, Greece, Poland, South Africa, Russia and Qatar), shown in Panel C of Table 4, reveal that the mean value of α_g is -0.0002, with most of the α_g values for countries in these regions being significantly negative at the 1% or 5% levels, and reductions being discernible in the SCDS term structure slope for the Czech Republic (-1 bp), Greece (-13 bp), Poland (-1 bp) and Qatar (-3 bp). The mean value of α_b is 0.0001, with positive effects of bad news announcements being discernible for Greece (7 bp), Poland (1 bp) and Qatar (0 bp). Our empirical results generally indicate that good (bad) news from the US reduces (increases) the SCDS slope.

The results obtained from the variance equation are reported in Table 5, from which we can see that the mean variance value of $\beta_{\varepsilon 1}$ is 0.9367, with all of the $\beta_{\varepsilon 1}$ values being significantly positive, thereby indicating that positive shocks (or good news) generate more volatility than negative shocks (or bad news), and also suggesting an asymmetric effect. The mean variance value of $\beta_{\varepsilon 2}$ is 0.1560, with most of the $\beta_{\varepsilon 2}$ values being significantly positive, thereby suggesting an effect of the conditional shock on the conditional variance.

<Table 5 is inserted about here>

As shown in Panel A of Table 5, the mean variance value of β_g is -0.3664, with most of the β_g values for countries in the Asia-Pacific region (such as Indonesia, the Philippines

and Thailand) being significantly negative, ranging from -0.4073 to -0.7947. Our results indicate that when good news is announced, the SCDS spread slope changes dramatically during an erratic period, with investors then realizing that the outlook for the US economy is more positive than expected, ultimately stabilizing the variance in the SCDS slope. The mean variance value of β_b is 0.2915, which may be attributable to a higher *Bad* variable indicating that the outlook for the US economy is less positive than expected, leading to market participants being willing to pay higher premiums for sovereign credit protection, and as a result, increasing the variance of the SCDS term structure slope.

In Panel B of Table 5, the mean variance value of $\beta_{\varepsilon 1}$ is 0.9013, whilst that of $\beta_{\varepsilon 2}$ is 0.2259, with most of the coefficients being significantly positive, results which suggest an asymmetric effect in the Americas (Brazil, Colombia, Peru and Mexico). The mean value of β_g is -0.6829, with most of the β_g values for countries in this region being significantly negative, ranging from -0.3240 to -1.6718. The mean variance value of β_b is 1.3642, with all of the β_b values for countries in this region being significantly positive. These results echo those reported in Panel A, thereby suggesting that US macroeconomic news announcements have significant impacts on variance in the SCDS term structure slopes for the Americas.

In Panel C of Table 5, the mean variance value of β_g is found to be 0.5060, with a significantly positive relationship being discernible between *Good* and the SCDS term

structure slopes for the Czech Republic, Greece, Poland and Qatar. However, we also find a significantly negative relationship between *Good* and the SCDS term structure slopes for Egypt, South Africa and Russia, with values ranging from -0.6745 to -1.2516. The most inconsistent results and the weakest positive relationship between *Good* and the variance in the SCDS term structure slope are found in the European, Middle Eastern and African regions. The mean variance value of β_b is 0.7544, with most of the β_b values for countries in this region (the Czech Republic, Greece and Qatar) being significantly positive, ranging from 0.7522 to 2.9578.

The above empirical results show that US macroeconomic news announcements have significant impacts on both the mean and variance of the SCDS term structure slope in the emerging markets, with good and bad news having diverse effects on the SCDS spread slopes. A higher *Good* variable in the US indicates that the future economy is viewed favorably, which should result in a reduction in the likelihood of future sovereign credit defaults, thereby resulting in a lower SCDS slope value; however, a higher *Bad* variable signals negative future economic prospects, and thus, market participants will be willing to pay more for sovereign credit protection, leading to an increase in the variance in the SCDS slope. Our empirical findings complement the work of Longstaff et al. (2011), who showed that SCDS levels were best explained by global risk factors relating to the US economy.

4.2 GDP Growth Rates and SCDS Spread Term Structures

The empirical results presented in Tables 4 and 5 clearly indicate that macroeconomic news announcements made by the US have significant impacts on the SCDS term structure slopes of the emerging markets. In this section, we go on to further investigate whether the SCDS term structure slope can actually provide information reflecting the real economy. We follow Gilchrist and Zakrajsek (2012) to use the SCDS spread as the variable controlling for heteroscedasticity, since the distribution of raw credit spreads is highly skewed. We then examine the ways in which the SCDS term structure slope affects the GDP growth rate, and whether the former can predict the latter, using the following regression model:

$$GDPGR_{i,t} = \beta_0 + \beta_1 \overline{Slope}_{i,t} + \beta_2 \overline{CDS1}_{i,t} + \beta_3 VIX_t + \beta_4 USDI_t + \gamma_i + \mu_t + \epsilon_{i,t} \quad (2a)$$

$$GDPGR_{i,t+1} = \beta_0 + \beta_1 \overline{Slope}_{i,t} + \beta_2 \overline{CDS1}_{i,t} + \beta_3 VIX_t + \beta_4 USDI_t + \beta_5 GDPGR_{i,t} + \gamma_i + \mu_t + \epsilon_{i,t} \quad (2b)$$

where $GDPGR_{i,t}$ refers to the GDP growth rate for country i in year t; $\overline{Slope}_{i,t}$ is the average annual SCDS term structure slope for each country i in year t; $\overline{CDS1}_{i,t}$ denotes the average annual SCDS spread for each country i in year t; $USDI_t$ refers to the change in the US Dollar Index in year t; VIX_t is the change in the VIX index in year t; and γ_i (μ_t) are the country (year) dummy variables.

The empirical results of Equation (2a) are reported in Table 6, where the dependent variable is the annual GDP growth rate (*GDPGR*) for each country. The coefficient on $\overline{Slope}$ is found to be -0.0062, with significance at the 1% level, a result which indicates that for a 1 bp increase in the SCDS slope, there will be a corresponding decline of 0.0062% in the GDP growth rate for the emerging markets. Furthermore, the coefficient on $\overline{CDSI}$ is found to be -0.0028, with significance at the 1% level, thereby indicating an association between a higher SCDS spread and a lower GDP growth rate.

Next, we go on to explore whether the SCDS term structure slope includes information that may be of use in predicting the GDP growth rate, and then further examine the ways in which the SCDS term structure slope affects GDP growth rates in the subsequent year. The empirical results derived from Equation (2b) are shown in Table 6, where the dependent variable is the GDP growth rate in the subsequent year, with the GDP growth rate in the current year being used as our control variable.

<Table 6 is inserted about here>

The empirical results show that an increase in *GDPGR* has a significantly positive impact on the GDP growth rate in the subsequent year, thereby suggesting a significantly positive autocorrelation between $GDPGR_t$ and $GDPGR_{t+1}$. The coefficient on $\overline{Slope}$ is -0.0035, with significance at the 5% level, thereby indicating that a 1 bp increase in the SCDS term structure slope leads to a 0.0035% decline in the

GDP growth rate within the emerging markets. The coefficient on $\overline{CDS1}$ is -0.0001, with significance at the 5% level, thereby suggesting an association between a higher SCDS spread and a lower GDP growth rate in the subsequent year.

These empirical results suggest that the SCDS slope does indeed provide information on future GDP growth rates, and that a higher SCDS slope is associated with a lower GDP growth rate in the subsequent year in the emerging markets. Our SCDS evidence also expands the scope of Han et al. (2017) who carried out analyses on US corporate CDSs and observed that those with flatter spread slopes had more standardized unexpected earnings in the subsequent three- and twelve-month periods.

4.3 SCDS Term Structures and Stock Market Index Returns

In an attempt to further investigate the information provided by the SCDS slope on stock market index returns, we follow Hjalmarsson (2010) to use a panel regression model to facilitate an investigation into the effects that the slope of the SCDS term structures have on stock market index returns in the subsequent one-, three-, six- and twelve-month periods, using the following regression model:

$$\sum_{j=1}^{m} IndexRet_{i,d+j} = \beta_0 + \beta_1 Slope_{i,d} + \beta_2 CDS1_{i,d} + \beta_3 IndexRet_{i,d} + \beta_4 VIX_d + \beta_5 USD_d + \gamma_i + \mu_d + \epsilon_{i,d} \quad (3)$$

The empirical results derived from Equation (3) are shown in Table 7 which reports the dependent variables and the subsequent one-, three-, six- and twelve-month

stock market index returns. The coefficient on *VIX* is found to have a significantly negative effect on subsequent-month stock market index returns, which clearly indicates that a higher degree of market uncertainty is associated with a lower stock market return in the subsequent one-month period. Our empirical results echo those of Whaley (2000) and Simon and Wiggins (2001), since they suggest that the VIX can predict stock market index trends. Furthermore, the coefficients on *IndexRet* and *USDI* are also found to have significantly negative impacts on stock market returns in the subsequent three- and twelve-month periods.

<Table 7 is inserted about here>

The regression coefficients on *Slope*, which are generally found to be positive and highly significant at the 1% level, range from 0.0029 to 0.0202, and show that information is indeed provided by the slopes on future one-, three- and six-month index returns. All of the coefficients on *CDS1* are found to be significantly positive, ranging from 0.0013 to 0.0092, with significance at the 1% or 5% levels.

The term structures of the SCDS spreads reveal different short- and long-term expectations. By definition, when a country has a higher SCDS term structure slope, this can be interpreted in two ways: (i) when the short-term spread is fixed, a higher slope can be derived from a greater long-term spread, thereby implying future deterioration; or (ii) when the long-term spread is fixed, a higher slope can be derived

from a lower short-term spread, thereby implying that a short-term economic horizon is expected to be better than one with a flatter slope.

A higher SCDS term structure slope may occur in a given market characterized by uncertainty and fragility. During such a period, the base level of the stock index will be relatively high and market participants will have pessimistic views of the future, ultimately leading to a reduction (increase) in short-term (long-term) default risk and generating a higher SCDS term structure slope. In such a period, given the higher risks involved, investors may require higher expected returns as compensation, leading to more positive returns in the subsequent one- to six-month periods; and indeed, the R^2 values for six-month returns are found to be higher than those for one- and three-month returns. The above empirical results suggest that the slope of the SCDS term structures can indeed predict future stock market index returns.

4.4 The Slope of the SCDS Spread Factor Portfolio

The empirical results presented in Table 7 reveal significantly positive relationships between the slope of the SCDS term structures and future stock market index returns within the emerging markets in the subsequent one-, three- and six-month periods. In this section, we go to use these relationships to construct a tradable portfolio strategy and examine whether the slope of the SCDS term structure factors are capable of generating significantly positive returns.

We begin by dividing the emerging countries into three groups according to their monthly SCDS term structure slopes (high, middle and low), and then calculate the equally-weighted monthly returns for the subsequent month, with monthly rebalancing being carried out for each group. This enables us to determine whether there are significant differences in subsequent-month returns between the highest- and lowest-slope groups. As shown in Table 8, the average raw return of the group with the highest slope is found to be 1.3092%, with a *t*-statistic of 2.92, whilst that of the group with the lowest slope is found to be -0.0454%, with a *t* statistic of -0.10; thus, the average subsequent-month return difference is 1.3547% per month, with a *t* statistic of 5.04.

<Table 8 is inserted about here>

We then go on to apply our portfolio raw returns to various asset pricing models, including the CAPM and the Fama-French three-factor and Carhart four-factor models. The common factor in the CAPM model is excess market returns calculated by the market over the risk-free rate. The Fama-French three-factor model includes excess market returns, a size factor and a book-to-market factor; the size factor reflects the excess returns of small-capitalization companies over large-capitalization companies, whilst the book-to-market factor denotes the excess returns of value stocks (high book-to-price ratio) over growth stocks (low book-to-price ratio). The common factors in the Carhart four-factor model, include the three factors of the Fama-French model and an

additional momentum factor; in the present study, we use the Fama-French global three-factor variables and the global momentum factor variable as the common factor variables. We then regress the time series of the portfolio raw returns on these common factors using the following regression model.

$$R_{p,d} = \alpha_p + \beta_p\left(R_{m,d} - R_{f,d}\right) + \varepsilon_{p,d} \tag{4a}$$

$$R_{p,d} = \alpha_p + \beta_p\left(R_{m,d} - R_{f,d}\right) + \gamma_p SMB_d + \delta_d HML_d + \varepsilon_{p,d} \tag{4b}$$

$$R_{p,d} = \alpha_p + \beta_p\left(R_{m,d} - R_{f,d}\right) + \gamma_p SMB_d + \delta_d HML_d + \theta_d MOM_d + \varepsilon_{p,d} \tag{4c}$$

where $R_{p,d}$ refers to the monthly portfolio raw return for group p, in month d; $R_{m,d} - R_{f,d}$ denotes the global excess market return in month d; SMB_d is the global size factor in month d; HML_d refers to the global book-to-market factor in month d; and MOM_d denotes the global momentum factor in month d.[7] α_p is the intercept and the monthly average abnormal returns.

The α_p results for the different groups based upon the SCDS term structure slope are reported in Table 8, with the mean portfolio returns being adjusted based upon the risk factors using the CAPM and the Fama-French three-factor and Carhart four-factor models. After adjusting for the risk factors, we find that the coefficients on α_p are significantly positive for the 'high' group, ranging from 1.0528 to 1.2726, with

[7] The Fama-French global three-factor and global momentum factor variables are available from the Kenneth French website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html).

significance at the 1% or 5% levels. However, the coefficients on α_p are found to be insignificantly positive for the 'middle' group, ranging from 0.3226 to 0.5087, whilst those for the 'low' group are insignificantly negative, ranging from -0.2518 to -0.3051. These empirical results indicate that the monthly average abnormal returns for countries with high SCDS term structure slopes are positive, and different from zero, whereas those of countries that do not have high SCDS term structure slopes do not exhibit any significant abnormal returns.

Finally, the α_p coefficients on both the high and low groups are found to be significantly positive, ranging from 1.5024 to 1.6672, with significance at the 1% level, thereby indicating that strategies for the SCDS term structure slope that involve taking up long positions on the high-slope group and short positions on the low-slope group can generate significantly positive abnormal returns. These results suggest that the effects of the SCDS term structure slope cannot be fully explained by common factors alone, and that they exhibit monthly abnormal returns.

5. Conclusions

Our primary aim in this study is to examine sovereign credit default swap (SCDS) data on 18 countries within the emerging markets (six countries from the Asia-Pacific region, five from the Americas and seven from the European, Middle Eastern and African regions). Our data sample runs from January 2001 to August 2013, a dataset

which includes two periods of major financial turmoil, the subprime financial crisis and the European debt crisis. We estimated the monthly slope of the SCDS term structures as the difference between five- and one-year SCDS spreads, and then used an asymmetric volatility model, the EGARCH model, to explore the ways in which good and bad US macroeconomic news announcements have spillover effects on the SCDS term structure slopes, as well as their variability in the emerging markets. Our findings reveal that good US macroeconomic news announcements generally lead to a reduction in both the level and variance of the term structures of the SCDS spreads, whereas bad news announcements increase both the level and variance of the term structures of SCDS spreads in many of the emerging markets.

We then further explored whether the SCDS term structure slope provides information reflecting the real economies (long-term expectations) and financial markets (short-term expectations) of the emerging markets, with our empirical results suggesting that a high SCDS spread slope leads to a reduction in GDP growth in the current year and in subsequent years. We also carried out further analysis of whether investors may require higher expected returns to compensate for their risk-taking behavior, creating a positive relationship between the SCDS term structure slopes and future stock market index returns. We constructed an SCDS term structure slope portfolio strategy that involved taking up a long position in the high-slope group and a

short position in the low-slope group, and then applied portfolio raw returns to various asset pricing models, including the CAPM, the Fama-French three-factor model and the Carhart four-factor model.

Our empirical results reveal that the slope of the SCDS term structure strategies is capable of generating a significantly positive abnormal return which cannot be fully explained by the common factors. Overall, our study findings provide an improved understanding of the information provided by the SCDS spread slope, as well as different short- and long-term expectations on the prediction of the real economic and financial market features of the emerging markets.

We make several contributions to both academia and industry in this study. Firstly, we address a gap in the literature by providing evidence on the spillover effects of US macroeconomic surprises on SCDS spreads in emerging countries. Secondly, we posit that the SCDS spread can be used by regulators and investors as a signal of forthcoming market deterioration when hedging their risk prior to any crises taking place. Thirdly, our proposed investment strategy based upon SCDS spread slopes provides investors with an opportunity to earn substantial profits. Overall, our study provides an improved understanding of the information provided by the SCDS spread slope, whilst outlining the differences in short- and long-term expectations for the prediction of the real economic and financial market conditions within the emerging markets.

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Table 1 Descriptive statistics

Region/Country	N	Min	Q1	Med	Mean	Q3	Max	S.D.	Skew	Kurt
Panel A: APA										
Thailand	149	16	25	51	49	68	96	23.09	0.177	-1.186
Malaysia	149	8	22	50	47	63	122	24.51	0.179	-0.672
China	152	6	17	28.5	34	43	93	21.39	1.031	0.441
Indonesia	139	-91	88	108	121	149	375	77.19	0.792	2.771
Korea	150	2	18	32	35	47	93	20.48	0.811	0.134
Philippines	150	-11	88	120	160	261	356	93.61	0.384	-1.151
Panel B: AME										
Brazil	152	-693	66	87	168	326	698	231.69	-0.482	2.419
Colombia	150	45	71	102	174	295	535	131.21	0.919	-0.504
Chile	139	8	16	43	47	62	165	33.02	1.147	1.309
Peru	139	43	68	92	154	175	655	139.59	1.883	2.912
Mexico	152	15	55	70	85	102	266	48.44	1.474	2.194
Panel C: EMEA										
Egypt	137	27	57	83	107	142	403	64.99	1.402	2.467
Czech	150	2	7	15	24	40	79	20.58	0.862	-0.343
Greece	151	-16261	-12	7	-1843	10	71	4951.98	-2.475	4.309
Poland	152	2	14	29.5	40	55	149	33.18	1.324	1.212
South Africa	151	18	46	78	76	100	134	29.48	-0.174	-0.963
Russia	144	-352	40	90.5	94	125	528	107.19	-0.015	6.592
Qatar	144	6	22	35.5	39	52	98	21.58	0.448	-0.688

Note: This table reports the descriptive statistics of the term structures of SCDSs for 18 countries covering a sample period running from 1 January 2001 to 31 August 2013, with Panels A, B and C respectively presenting the details on the Asia-Pacific (APA), Americas (AME) and Europe, Middle East and Africa (EMEA) regions. The column headings indicate the sample number (N), minimum value (Min), first quarter value (Q1), median value (Med), mean value (Mean), third quarter value (Q3), maximum value (Max), standard deviation (S.D.), skewness (Skew) and kurtosis (Kurt) of the sovereign CDS spread slope. The unit used in each panel is one basis point.

Table 2 Dependent variable and control variable values

Variables	Mean	Median	S.D.	Min.	Max.
Slope	-0.0025	0.0059	0.1264	-1.6261	0.0698
IndexRet	0.0104	0.0143	0.0909	-0.8229	2.4594
GDPGR	4.7717	4.8741	4.0587	-9.1325	26.1703
USDI	-0.0022	-0.0029	0.0249	-0.0642	0.0749
VIX	-0.0026	-0.0165	0.1810	-0.3851	0.6458
Good	0.3071	0.2322	0.2803	0.0000	1.6977
Bad	0.3003	0.2468	0.2587	0.0000	0.9869

Note: This table reports the values of the dependent and control variables, for a sample period running from 1 January 2001 to 31 August 2013.

Table 3 Correlation matrix

	Slope	*IndexRet*	*GDPGR*	*USDI*	*VIX*	*Good*
IndexRet	**0.01**					
GDPGR	**0.22**	0.01				
USDI	-0.02	**-0.26**	-0.02			
VIX	**0.01**	**-0.30**	0.04	**0.26**		
Good	**-0.03**	-0.01	**-0.16**	**0.17**	**-0.09**	
Bad	**0.04**	-0.03	-0.01	**-0.09**	**0.06**	**-0.37**

Note: This table reports the correlation statistics for the empirical variables, *Slope*, *IndexRet*, *GDPGR*, *USDI*, *VIX*, *Good* and *Bad* for a sample period running from 1 January 2001 to 31 August 2013. The correlations in bold face indicate statistical significance at the 5% level.

Table 4 Mean slope of CDS spreads and US macroeconomic news

Variables	Mean						
	α	α_l	*IndexRet*	*VIX*	*USDI*	*Good*	*Bad*
Panel A: APA							
Mean coeff	0.0093***	0.9666***	-0.0011***	0.0004***	0.0001	-0.0003***	0.0001***
(t-stat)	(28440.97)	(2758.56)	(-1648.45)	(1813.63)	(56.35)	(-2402.06)	(255.84)
Median coeff	0.0064	0.9867	-0.0012	0.0001	0.0004	-0.0003	0.0001
% Pos (Neg)	100.00	100.00	(100)	50.00	50.00	(83.33)	66.67
% Sig Pos (Neg)	100.00	100.00	(83.33)	50.00	33.33	(66.67)	50.00
Panel B: AME							
Mean coeff	0.0103	0.9034	-0.0021	0.0001	0.0068	0.0001	0.0001
(t-stat)	(2130.80)	(1149.32)	(-8339.60)	(2.63)	(91.56)	(45.96)	(38.35)
Median coeff	0.0074	0.9804	-0.0022	0.0001	0.0076	0.0001	0.0002
% Pos (Neg)	100.00	100.00	(80.00)	60.00	100.00	60.00	80.00
% Sig Pos (Neg)	100.00	100.00	(80.00)	60.00	80.00	40.00	60.00
Panel C: EMEA							
Mean coeff	0.0094	0.9618	-0.0006	0.0001	-0.0011	-0.0002	0.0001
(t-stat)	(98750.78)	(2861.64)	(-47.53)	(-1510.44)	(-65.94)	(-1621.46)	(0.05)
Median coeff	0.0016	0.9983	-0.0002	0.0001	0.0006	-0.0001	0.0001
% Pos (Neg)	100.00	100.00	(71.43)	57.14	(71.43)	(85.71)	57.14
% Sig Pos (Neg)	100.00	100.00	(57.14)	42.86	(57.14)	(57.14)	42.86

Notes: The EGARCH asymmetric volatility model is used to explore the effects of US macroeconomic good and bad news on the term structures of sovereign CDS spreads in each country in the emerging markets, describing the coefficients of the mean equation. % Pos (Neg) refers to the percentages of the countries in the different regions with positive (negative) coefficients, whilst % Sig Pos (Neg) refers to the percentages of the countries in the different regions positive (negative) significance at the 1% level. The regression model is as follows:

$$Slope_d = \alpha + \alpha_l Slope_{d-1} + \alpha_i IndexRet_d + \alpha_v VIX_d + \alpha_u USDI_d + \alpha_g Good_d + \alpha_b Bad_d + \varepsilon_d$$

$$lnh_d = \beta + \beta_h lnh_{d-1} + \beta_{\varepsilon 1} \frac{\varepsilon_{d-1}}{\sqrt{h_{d-1}}} + \beta_{\varepsilon 2} \frac{|\varepsilon_{d-1}|}{\sqrt{h_{d-1}}} + \beta_g Good_d + \beta_b Bad_d$$

where $Slope_d$ is the slope of sovereign CDS spreads in month d in each country; $Good_d$ (Bad_d) is the good (bad) news variable from US macroeconomic news in month d; $IndexRet_d$ is the stock market index return in month d in each country; VIX_d is the change in the VIX index in month d; and $USDI_d$ is the change in the US Dollar Index in month d. *** indicates significance at the 1% level. The unit in each panel is percentage.

Table 5 Variance in the slope of CDS spreads and US macroeconomic news

Variables	Variance					
	β	β_h	$\beta_{\varepsilon 1}$	$\beta_{\varepsilon 2}$	*Good*	*Bad*
Panel A: APA						
Mean coeff	-0.8498	0.1214	0.9367	0.1560	-0.3664	0.2915
(t-stat)	(3809.45)	(2119.66)	(3453.54)	(-7126.39)	(-13260.41)	(572.43)
Median coeff	-0.9186	0.1741	0.9373	0.3092	-0.3058	0.1969
% Pos (Neg)	(100.00)	83.33	100.00	66.67	(100.00)	50.00
% Sig Pos (Neg)	(100.00)	50.00	100.00	66.67	(50.00)	50.00
Panel B: AME						
Mean coeff	-1.4825	0.2050	0.9013	0.2259	-0.6820	1.3642
(t-stat)	(-896.23)	(-9600.45)	(1502.48)	(-17330.23)	(-20271.14)	(1588.64)
Median coeff	-1.2690	0.3117	0.9158	0.3237	-0.4762	1.4347
% Pos (Neg)	(100.00)	80.00	100.00	50.00	(100.00)	100.00
% Sig Pos (Neg)	(100.00)	40.00	100.00	50.00	(80.00)	100.00
Panel C: EMEA						
Mean coeff	-1.7803	-0.1018	0.8981	0.4617	0.5060	0.7544
(t-stat)	(-2942.32)	(2152.33)	(105013.85)	(-3720.15)	(-409.99)	(1794.54)
Median coeff	-1.7155	0.2454	0.8666	0.3197	0.0177	0.6400
% Pos (Neg)	(85.71)	(28.57)	100.00	71.43	57.14	71.43
% Sig Pos (Neg)	(85.71)	(14.29)	100.00	57.14	57.14	42.86

Notes: The EGARCH asymmetric volatility model is used to explore the effects of US macroeconomic good and bad news on the term structures of sovereign CDS spreads in each country in the emerging markets, describing the coefficients of the variance equation. % Pos (Neg) refers to the percentages of the countries in the different regions with positive (negative) coefficients, whilst % Sig Pos (Neg) refers to the percentages of the countries in the different regions positive (negative) significance at the 1% level. The regression model is as follows:

$$Slope_d = \alpha + \alpha_l Slope_{d-1} + \alpha_i IndexRet_d + \alpha_v VIX_d + \alpha_u USDI_d + \alpha_g Good_d + \alpha_b Bad_d + \varepsilon_d$$

$$lnh_d = \beta + \beta_h lnh_{d-1} + \beta_{\varepsilon 1} \frac{\varepsilon_{d-1}}{\sqrt{h_{d-1}}} + \beta_{\varepsilon 2} \frac{|\varepsilon_{d-1}|}{\sqrt{h_{d-1}}} + \beta_g Good_d + \beta_b Bad_d$$

where $Slope_d$ is the slope of sovereign CDS spreads in month d in each country; $Good_d$ (Bad_d) is the good (bad) news variable from US macroeconomic news in month d; $IndexRet_d$ is the stock market index return in month d in each country; VIX_d is the change in the VIX index in month d; and $USDI_d$ is the change in the US Dollar Index in month d. *** indicates significance at the 1% level. The unit in each panel is percentage.

Table 6 Slope of CDS spreads and GDP growth rate

Variables	$GDPGR_t$		$GDPGR_{t+1}$	
	Coeff.	t-stat.	Coeff.	t-stat.
Intercept	4.7571	0.76	4.7425	0.78
$\overline{Slope}$	-0.0062***	-3.81	-0.0035**	-2.21
$\overline{CDSI}$	-0.0028***	-4.10	-0.0001**	-3.33
VIX	0.0155	0.07	0.0673	0.30
USDI	0.0590	0.11	0.0292	0.06
$GDPGR_t$	–	–	0.2920***	4.82
Country effect	Yes		Yes	
Year effect	Yes		Yes	
Adj. R^2	0.6618		0.6845	

Notes: This table examines whether, and if so how, the slope of the sovereign CDS spreads affects the GDP growth rate based upon the following panel regression model:

$$GDPGR_{i,t} = \beta_0 + \beta_1 \overline{Slope}_{i,t} + \beta_2 \overline{CDS1}_{i,t} + \beta_3 VIX_t + \beta_4 USDI_t + \gamma_i + \mu_t + \epsilon_{i,t}$$

$$GDPGR_{i,t+1} = \beta_0 + \beta_1 \overline{Slope}_{i,t} + \beta_2 \overline{CDS1}_{i,t} + \beta_3 VIX_t + \beta_4 USDI_t + \beta_5 GDPGR_{i,t} + \gamma_i + \mu_t + \epsilon_{i,t}$$

where $GDPGR_{i,t}$ is the GDP growth rate for country i in year t; $\overline{Slope}_{i,t}$ is the average sovereign CDS spread slope per year for country i in year t; $\overline{CDS1}_{i,t}$ is the average sovereign CDS spread per year for country i in year t; $USDI_t$ is the change in the US Dollar Index in year t; VIX_t is the change in the VIX index in year t; and γ_i (μ_t) are the country (year) dummy variables. ** indicates significance at the 5% level; and *** indicates significance at the 1% level. The unit in each panel is one basis point.

Table 7 Slope of the CDS spreads and future stock market index returns

Variables	1 month		3 months		6 months		1 year	
	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Intercept	0.3582	0.34	2.2055	1.19	3.7654	1.34	7.2061*	1.75
Slope	0.0029**	2.21	0.0104***	4.39	0.0202***	5.55	0.0087	1.62
CDS1	0.0013**	2.32	0.0047***	4.69	0.0092***	6.08	0.0053**	2.32
R_m	0.0055	1.21	-0.0185**	-2.27	-0.1224***	-9.87	-0.1930***	-10.49
VIX	-0.0562***	-7.77	-0.0054	-0.42	0.0423**	2.13	0.0240	0.82
USDI	-0.0250	-0.46	-0.3034***	-3.16	-0.2258	-1.55	1.1168***	5.24
Country effect	Yes		Yes		Yes		Yes	
Year effect	Yes		Yes		Yes		Yes	
Adj. R^2	0.1174		0.2762		0.3606		0.4006	

Notes: This table reports the ways in which the slope of the sovereign CDS spreads affects stock market index return in the subsequent one, there, six and twelve-month periods based upon the following regression model:

$$\sum_{j=1}^{m} IndexRet_{i,d+j} = \beta_0 + \beta_1 Slope_{i,d} + \beta_2 CDS1_{i,d} + \beta_3 IndexRet_{i,d}$$

$$+\beta_4 VIX_d + \beta_5 USD_d + \gamma_i + \mu_d + \epsilon_{i,d}$$

where $IndexRet_{i,d}$ is the stock market index return for country i in month d; and j = 1, 3, 6, or 12. $Slope_{i,d}$ is the slope of sovereign CDS spread for country i in month d; $CDS1_{i,d}$ is the slope of sovereign CDS spread for country i in month d; VIX_d is the change in the VIX index in month d; $USDI_d$ is the change in the US Dollar Index in month d; and γ_i (μ_t) are the country (year) dummy variables. * indicates significance at the 10% level; ** indicates significance at the 5% level; and *** indicates significance at the 1% level.

Table 8 Portfolio strategy

Variables	1 (High)		2 (Middle)		3 (Low)		High – Low	
	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Average Return	1.3092***	2.92	0.5765	1.43	-0.0454	-0.10	1.3547***	5.04
CAPM Alpha	1.0528**	2.41	0.3226	0.83	-0.3051	-0.66	1.5024***	5.55
FF-3 Alpha	1.2064***	2.67	0.4679	1.16	-0.2518	-0.53	1.6000***	5.72
Carhart-4 Alpha	1.2726***	2.80	0.5087	1.25	-0.2533	-0.52	1.6672***	5.97

Notes: The countries are divided into three groups on a monthly basis according to the slope of the CDS spreads. The average return is computed for each group, with the high minus low portfolio being longed for the high-slope group and shorted for the low-slope group to calculate the High-Low portfolio return in the following month. The alphas from the CAPM, the Fama-French three-factor model and the Carhart four-factor model are computed based upon the following regression model:

$$R_{p,d} = \alpha_p + \beta_p\left(R_{m,d} - R_{f,d}\right) + \varepsilon_{p,d}$$

$$R_{p,d} = \alpha_p + \beta_p\left(R_{m,d} - R_{f,d}\right) + \gamma_p SMB_d + \delta_d HML_d + \varepsilon_{p,d}$$

$$R_{p,d} = \alpha_p + \beta_p\left(R_{m,d} - R_{f,d}\right) + \gamma_p SMB_d + \delta_d HML_d + \theta_d MOM_d + \varepsilon_{p,d}$$

where $R_{p,d}$ is the monthly portfolio raw return for group p in month d; $R_{m,d} - R_{f,d}$ are the global excess market returns in month d; SMB_d is the global size factor in month d; HML_d is the global book-to-market factor in month d; MOM_d is the global momentum factor in month d; and α_p is the intercept and the monthly average abnormal return. ** indicates significance at the 5% level; and *** indicates significance at the 1% level. The unit in each panel is one percentage.

APPENDIX TABLE 1

List of Stock Indices

Country	Index
Panel A: APA	
Thailand	Bangkok Set Stock Index
Malaysia	Kuala Lumpur-Stock Index
China	Shanghai Synthesis Index
Indonesia	Indonesia JSX-Stock Index
Korea	South Korea-KOSPI Index
Philippines	Manila Stock Index
Panel B: AME	
Brazil	Brazil Bovespa Index
Colombia	COLCAP Index
Chile	Chile IPSA Index
Peru	BVL Index
Mexico	Mexico IPC Index
Panel C: EMEA	
Egypt	EGX30 Index
Czech	PX Index
Greece	ASE Index
Poland	WIG Index
South Africa	Johannesburg Stock Index
Russia	Russian RTS Stock Index
Qatar	QE Index

Note: This table reports the stock indices selected to represent stock market performance in each of the emerging markets in the Asia-Pacific (APA), Americas (AME) and Europe, Middle East and Africa (EMEA) regions.

APPENDIX TABLE 2-1

The Mean Slope of CDS Spreads and US Macroeconomic News

Variables	Mean													
	α		α_l		α_i		α_v		α_u		α_g		α_b	
	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Panel A: APA														
Thailand	0.0067***	8019.78	0.9864***	10696.91	-0.0014***	-9710.2	0.0001***	122.16	0.0011***	590.14	-0.0002***	-1999.63	0.0002***	1807.5
Malaysia	0.0060***	6.92	0.9870***	81.57	-0.0019**	-2.57	-0.0001	-0.12	0.0015	1.13	-0.0001	-0.73	0.0003***	2.68
China	0.0034***	10.01	0.9788***	72.44	-0.0004**	-2.18	-0.0001***	-4.64	0.0014***	7.65	-0.0003***	-12.33	0.0001	1.11
Indonesia	0.0113***	12.94	0.8569***	18.14	-0.0001	-0.04	0.0016***	3.17	-0.0029	-0.77	-0.0009**	-2.02	-0.0004	-0.74
Korea	0.0011**	2.20	0.9932***	57.74	-0.0009***		-0.0001	-1.55	-0.0003	-0.54	0.0001	0.14	0.0003***	3.70
Philippines	0.0272***	162593.96	0.9970***	5624.55	-0.0019***	-167.47	0.0010***	10762.73	-0.0009***	-259.51	-0.0005***	-12397.8	-0.0002***	-279.23
Panel B: AME														
Brazil	0.0073***	129.92	0.8985***	29.18	-0.0019***	-5.75	-0.0004***	-3.91	0.0061***	4.28	0.0003***	8.16	-0.0001	-1.57
Colombia	0.0074***	6432.54	0.6484***	4237.96	-0.0045***	-41695.82	0.0003***	6.58	0.0076***	412.20	0.0000***	225.09	0.0001***	176.38
Chile	0.0066*	1.86	0.9942***	77.24	-0.0022***	-2.88	-0.0000	-0.42	0.0029	1.30	0.0001*	1.76	0.0002	1.34
Peru	0.0166***	4077.94	0.9804***	1345.96	0.0002***	10.59	0.0001***	8.80	0.0077***	32.95	-0.0002***	-5.09	0.0003***	12.42
Mexico	0.0135***	11.74	0.9956***	56.27	-0.0022***	-4.13	0.0003**	2.12	0.0095***	7.05	-0.0000	-0.13	0.0002***	3.17
Panel C: EMEA														
Egypt	0.0128***	17263.19	0.9518***	5914.78	0.0014***	453.08	0.0008***	493.89	-0.0084***	-75.4	0.0005***	54.25	-0.0004***	-116.24
Czech	0.0011***	21.5	1.0000***	105.55	0.0003***	7.68	0.0001***	2.69	0.0006***	3.67	-0.0001**	-2.21	-0.0002***	-5.7
Greece	0.0009***	302.41	0.7862***	843.74	-0.0032***	-361.77	-0.0010***	-11088.26	-0.0100***	-455.57	-0.0013***	-451.24	0.0007***	105.12
Poland	0.0015***	3.72	1.0000***	99.07	-0.0002***	-11.03	-0.0001***	-2.91	0.0014***	9.57	-0.0001***	-9.61	0.0001***	4.11
S. Africa	0.0051***	22.75	1.0000***	505.83	-0.0000	-0.02	0.0002	1.11	0.0032**	2.19	-0.0001	-0.49	0.0002	1.09
Russia	0.0431***	19.31	0.9983***	545.8	-0.0019***	-5.95	-0.0004***	-3.4	0.0049	0.88	-0.0000	-0.17	-0.0001	-0.25
Qatar	0.0016***	673622.57	0.9965***	12016.73	-0.0005***	-6.96	0.0003***	23.81	0.0006***	53.08	-0.0003***	-10940.72	0.0000***	12.25

APPENDIX TABLE 2-2

Variance in the Slope of CDS Spreads and US Macroeconomic News

Variables	Variance											
	β		β_h		$\beta_{\varepsilon 1}$		$\beta_{\varepsilon 2}$		β_g		β_b	
	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Panel A: APA												
Thailand	0.3321***	30674.94	0.2643***	16264.64	0.9999***	12297.9	-0.1658***	-39166.38	-0.7947***	-73751.27	-0.3412***	-2034.37
Malaysia	-0.6139**	-2.41	0.2612***	2.84	0.9506***	73.61	0.3618**	2.11	-0.2043	-0.88	-0.0898	-0.41
China	-0.7317***	-4.41	0.2415***	4.37	0.9434***	66.75	0.3195***	6.14	-0.0386	-0.19	-0.3367*	-1.83
Indonesia	-1.1054***	-3.49	0.0497	0.62	0.9269***	43.79	0.2989***	3.15	-0.4073**	-2.00	1.0779***	3.63
Korea	-1.1212*	-1.65	0.1066	0.89	0.9312***	25.96	0.5935***	4.52	-0.1327	-0.37	0.4836	1.35
Philippines	-1.8589***	-7806.31	-0.1948***	-3555.41	0.8682***	8213.22	-0.4718***	-3607.89	-0.6208***	-5807.73	0.9550***	5468.91
Panel B: AME												
Brazil	-1.1956*	-1.94	0.3117*	1.73	0.9171***	18.53	0.9023***	6.69	-0.4762*	-1.91	1.4347***	4.68
Colombia	-1.269***	-2768.70	-0.2757***	-60684.54	0.9158***	2895.98	-0.3533***	-2452.51	-1.6718***	-2761.2	2.6618***	7450.37
Chile	-2.2385***	-3.73	0.1220	1.27	0.8800***	27.15	0.4410***	2.87	-0.1125	-0.37	1.7611***	4.01
Peru	-0.3151***	-1696.54	0.3736***	12673.14	0.9691***	4239.65	-0.1842***	-84214.09	-0.3240***	-98585.69	0.0164***	481.94
Mexico	-2.3942***	-10.23	0.4935***	6.15	0.8247***	331.08	0.3237***	5.87	-0.8257***	-6.51	0.9471**	2.22
Panel C: EMEA												
Egypt	-0.101***	-4312.91	0.4325***	7011.76	0.9726***	368476.10	-0.1885***	-18065.84	-0.6745***	-13180.52	-0.0829***	-1755.35
Czech	-2.9871***	-2.94	0.0113	0.11	0.853***	16.37	1.1369***	6.53	1.6761***	3.58	0.8533*	1.96
Greece	-3.9509***	-7673.95	-2.1687***	-96.68	0.8317***	301281.49	0.3197***	24.55	3.5991***	159.53	2.9578***	115.18
Poland	-2.5280***	-3.26	0.4263***	3.90	0.8629***	20.81	0.9679***	5.13	0.9432**	2.29	0.6400	1.56
S. Africa	0.1368***	3.61	0.2454***	4.41	0.9948***	54760.03	0.0296	1.20	-0.7683***	-7.15	-0.0554	-0.59
Russia	-1.3164***	-3.16	-0.0569	-0.59	0.8666***	27.84	1.3659***	7.74	-1.2516***	-5.51	0.2159	0.55
Qatar	-1.7155***	-8603.66	0.3975***	8143.42	0.9050***	10514.32	-0.3993***	-8020.37	0.0177***	10157.82	0.7522***	14198.48

Notes: Appendix Tables 2-1 and 2-2 provide details on the US macroeconomic news effect on the slope of the CDS spread in each of the emerging markets in the Asia-Pacific (APA), Americas (AME) and Europe, Middle East and Africa (EMEA) regions based upon the use of the EGARCH asymmetric volatility model; Table 2-1 reports the coefficients of the mean equation, whilst Table 2-2 reports the coefficients of the variance equation. The regression model is expressed as follows:

$$Slope_d = \alpha + \alpha_l Slope_{d-1} + \alpha_i IndexRet_d + \alpha_v VIX_d + \alpha_u USDI_d + \alpha_g Good_d + \alpha_b Bad_d + \varepsilon_d$$

$$lnh_d = \beta + \beta_h lnh_{d-1} + \beta_{\varepsilon 1} \frac{\varepsilon_{d-1}}{\sqrt{h_{d-1}}} + \beta_{\varepsilon 2} \frac{|\varepsilon_{d-1}|}{\sqrt{h_{d-1}}} + \beta_g Good_d + \beta_b Bad_d$$

where $Slope_d$ is the slope of sovereign CDS spreads in month d in each country; $Good_d$ (Bad_d) is the good (bad) news variable from US macroeconomic news in month d; $IndexRet_d$ is the stock market index return in month d in each country; VIX_d is the change in the VIX index in month d; and $USDI_d$ is the change in the US Dollar Index in month d. *** indicates significance at the 1% level; ** indicates significance at the 5% level; and * indicates significance at the 10% level. The unit in each panel is percentage.