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EMERGING MARKETS SOVEREIGN BOND SPREADS, CREDIT RATINGS AND GLOBAL FINANCIAL CRISIS[1]

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ABSTRACT

This paper investigates the impacts of sovereign credit ratings and global financial conditions on the evolution of EMBI spreads for a panel of 23 developing countries by using daily data for the period between 1998 and 2012. To this end, we employ not only the conventional panel estimation procedures, but also the recent methods tackling with either cross-sectional dependence stemming from common global shocks or a potential endogeneity. Our results suggest that credit ratings along with global financial conditions are the main determinants of EMBI. The determinants of EMBI are not invariant to speculative and investment grading episodes and transitions between them. The recent global crisis changed the determinants of EMBI and led to credit ratings impact to converge between speculative and investment grading episodes.

Keywords: Emerging Market Economies, EMBI Spreads, Sovereign Credit Ratings, Global Financial Crisis, Common Correlated Effects

JEL Classification: E44, G11, G15

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1. Introduction

The emerging market bond index (EMBI) spread[2] as a measure of sovereign default risk and financial fragility of emerging market economies (EME) is one of the basic macroeconomic variables which is closely monitored by financial markets and economic policy makers. Understanding the determinants of EMBI spreads has crucial policy implications. Consequently, there is now a substantial and growing literature on this issue.

One strand of the literature maintains that not only the domestic factors but also external factors stemming from advanced countries, such as global liquidity conditions and international interest rates, are the main drivers of the EMBI spreads (Kamin and von Kleist, 1999; Calvo, 2002; Gonzalez-Rozada and Levy-Yeyati, 2008; Özatay, Özmen and Sahinbeyoğlu, 2009). Another strand of the literature focuses on the effects of domestic fundamentals in the determination of the country spreads (Arora and Cerisola, 2001 and Kamin, 2002). According to the pioneering study by Cantor and Packer (1996, pp.49), "sovereign ratings effectively summarize and supplement the information contained in macroeconomic indicators". Consequently, sovereign credit ratings have often been taken as one of the basic determinant of the EMBI spreads especially for high frequency data.

In this study, we aim to investigate the relationship between sovereign credit ratings and borrowing costs (EMBI Global spreads) for a panel of 23 EME by using daily data for the January 5, 1998 and December 14, 2012 period. We investigate also whether the determinants of EMBI spreads are invariant to speculative and investment grading episodes. Furthermore, the implications of transitions between investment and speculative grade ratings for EMBI spreads are analysed. This study also aims to investigate whether the impact of credit ratings on sovereign bond spreads changed during and after the recent global financial crisis.

The literature often employs conventional panel data estimation procedures which do not allow for cross-section dependence. However, omitted common variables or global shocks stemming from contagion induce cross-section dependence and lead to inconsistent coefficient estimates. Therefore, we consider not only the conventional panel data procedures but also the common correlated effects pooled (CCEP) method

[2] The EMBI spread by J.P. Morgan is the difference between the yields on emerging country sovereign bonds and bonds issued by a government of the industrialized world with identical currency denomination and maturity.

proposed by Pesaran (2006). The CCEP procedure is known to yield the most efficient and robust estimator in a general non-stationary framework when there is cross-section dependence. Considering the potential endogeneity of ratings for EMBI spreads, we estimate the basic equation also by employing fully modified OLS (FM-OLS) procedure of Phillips and Hansen (1990) and Pedroni (2001). In order to empirically analyse short-run dynamics along with the long-run relationship, we consider the panel autoregressive distribute lag (PARDL) procedure (Pesaran *et al*., 2001), which is valid even if the regressors are not weakly-exogenous and the variables of interest are stationary, non-stationary or mutually cointegrated.

The plan of the rest of the paper is as follows. In Section 2, we present a brief literature review about the determinants of EMBI spreads. Section 3 presents our empirical results. This section first presents the results of the estimations of our baseline static equation by the conventional (panel fixed effects) along with the recent CCEP and FM-OLS procedures. The implications of augmenting the equations with cross-sectional means of the variables for the existing global financial conditions variables in the CCEP equations are also discussed in this section. Section 3 presents also the evidence that the cross-sectional means of EMBI spreads co-moves with global financial conditions. The implications of this evidence are found to be important for our postulations and findings. Section 3.1 presents the results of our panel co-integration and PARDL based error-correction mechanism equations. In Section 3.2, we analyse the asymmetric impact of investment and speculative grading episodes on the evolution of EMBI spreads. This section also investigates the consequences of a transition from a speculative grade to an investment grade, or vice versa, by one or more credit agency on the evolution of the EMBI spreads. Section 3.3 examines the effect of global financial crisis on the determinants of sovereign spreads. Finally, Section 4 concludes.

2. The Determinants of the EMBI Spreads: A Brief Review of the Literature

EMBI spreads reflect the additional borrowing cost that an EME has to bear in international financial markets relative to the risk-free country due to credit and liquidity risks. In market analyses and academic studies, EME sovereign bond spreads are often represented by EMBI spreads. A general model on the determinants of emerging market sovereign bond spreads (S) can be written as:

$$S_{it} = c + \alpha X_{it} + \beta Z_{it} + u_{it} \qquad (1)$$

where c is a constant term, X and Z are, respectively, the vectors of domestic and external variables, α and β are the transposes of the corresponding coefficient vectors and u is the disturbance term. The subscripts i and t stand for country and time.

The set of variables in Z contains domestic economic fundamentals indicating country default risk or creditworthiness. Sovereign debt indicators (external debt/GDP, interest payments/international reserves, net foreign asset position, fiscal positions etc.), GDP growth, size and depletion rate of international reserves, trade openness, current account and default history are the most commonly used variables to represent domestic economic fundamentals. Eichengreen and Mody (1998), Kaminsky and Schmukler (2002), Dailami *et al.* (2008), Felices *et al*. (2008), Hartelius *et al.* (2008), Martinez *et al.* (2013) and Kennedy and Palerm (2014) are among the studies finding that domestic fundamentals are significant in determining the sovereign spreads.

According to Cantor and Packer (1996), sovereign credit ratings efficiently summarize the macroeconomic conditions and policy variables affecting the solvency of sovereigns. Consequently, a strand of literature, especially studies using high frequency data for which many macroeconomic variables are not available, prefers to use credit ratings as a proxy for macroeconomic condition and policy variables. According to an event study by Cantor (2013), positive rating changes have no considerable effect whilst negative rating changes have a small but not impressive effect on spreads. This is consistent with a view that financial markets are efficient and ratings do reflect domestic fundamentals so that rational market participants forecast and behave accordingly before rating changes[3]. The results by Cavallo, Powell and Rigobon (2013), on the other hand,

[3] Note that, credit rating agencies have been criticized extensively especially during and after the recent global financial crisis due to the accusation of being failed to accurately and timely assess the risks in financial and public sectors. Consequently, both the market efficiency under rational expectations and ratings as a summary of domestic fundamentals postulations along with a need for regulation of the ratings sectors has become an

suggest that ratings and spreads are noisy signals of domestic fundamentals and ratings add information beyond what is already imbedded in market prices. Consistent with this, the empirical literature often finds that ratings do matter for spreads (Kaminsky and Schmukler; 2002, Powell and Martinez, 2008; Gonzalez-Rozada and Levy-Yeyati, 2008; Özatay *et al*., 2009; Levy-Yeyati and Williams, 2010; Cavallo *et al.*, 2013).

In the literature, the set of variables in Z contains industrial country (mainly U.S.) interest rates or the FED target rate to proxy global liquidity and some alternative measures, including high yield corporate bonds in advanced economies and volatility implicit in U.S. stock options (VIX), to capture global risk appetite or financial conditions. Increases in international interest rates are expected to increase EME default probability and risk premium, decrease the demand for risky assets and consequently increase EME sovereign spreads (Kamin and von Kleist, 1999).

Following Calvo, Leiderman and Reinhart (1993), there is now a growing literature suggesting that external factors such as global financial conditions are amongst the main determinants of the business cycles in EME (Kose, Otrok and Prasad, 2012 and Erdem and Özmen, 2015). The results by Gonzalez-Rozada and Levy-Yeyati (2008), Özatay *et al*. (2009), Powell and Martinez (2008) and Levy-Yeyati and Williams (2010) suggest that sovereign default risks and thus spreads in EME are significantly triggered by global financial conditions proxied by a subset of variables including the VIX index, US Treasury bond yields, US High Yield spreads and USD libor rates.

The impacts of domestic and external variables on EME sovereign bonds may not be invariant to investment and speculative grade ratings. These impacts may also be different at tranquil periods than episodes of financial stress. Kaminsky and Schmukler (2002), for instance, finds that credit ratings have stronger effects during crisis. On the other hand, Comelli (2012) finds that the impact of country-specific variables weakened during the recent global financial crisis period. The results by Levy-Yeyati and Williams (2010) suggest that the impact of Fed fund rate changes is positive in tranquil times but becomes negative in times of turmoil. Levy-Yeyati and Williams (2010) also finds that the effect of long-term interest rates and liquidity preferences are significantly stronger for low grade EME. Compared to low and medium volatility periods of the global markets, the impact of global financial conditions is found to be higher in high-volatility

important policy and research topic. IMF (2010) and articles contained in BIS (2013) provide important contributions to these and related issues.

periods (Csontó, 2014). According to Jaramillo and Tejada (2011), reaching investment grade lowers sovereign spreads substantially beyond the level implied by domestic fundamentals. The results by Özatay *et al*. (2009) suggest that along with global financial conditions, crises contagion and sovereign ratings, EMBI spreads also respond substantially to U.S. macroeconomic news and changes in the FED target interest rate. The magnitude and the sign of the effect of U.S. news are found to crucially depend on the state of the U.S. economy, such as the presence of inflation dominance.

3. Empirical Analysis

As already discussed, EMBI spreads can be specified as determined by domestic fundamentals X and variables representing global financial or external conditions Z. In this study, we use daily observations. Therefore, following the literature using high frequency data (Gonzales-Rozada and Levy-Yeyati, 2008; Özatay *et al*., 2009), we consider country credit ratings as a proxy for domestic fundamentals. Global financial conditions are proxied by the volatility implicit in US stock options (VIX) compiled by the Chicago Board Options Exchange as a measure of international risk appetite of international investors – or the price of risk (Gonzalez-Rozada and Levy-Yeyati, 2008). According to Rey (2015) global financial cycles co-moves with VIX, which is important in creating boom and bust cycles in EME. We consider 3-month USD libor rate to proxy global liquidity conditions[4]. Our panel sample contains daily observations for the January 5, 1998 and December 14, 2012 period for 23 EME[5].

We start by estimating the following equation:

$$embi_{it} = c + \alpha_1(rat_{it}) + \alpha_2(vix_t) + \alpha_3(libor_t) + u_{it} \qquad (2)$$

where embi is the natural log. of EMBIG spread of the country i, c is the constant term, rat is the log. of average of outlook and watch augmented credit ratings of country i

[4] According to IMF (2004), the three-month dollar LIBOR rate is an indicator of international liquidity conditions and serves as a benchmark in determining borrowing costs. IMF (2004, p.68) also notes that, "other measures of short-term rates, such as the Fed Funds target rate or three-month treasury bill rates, are very closely correlated with the three-month LIBOR rate".

[5] The countries in the sample are selected based on their market share in the composite EMBIG index, where countries with a market share of less than 1% are excluded from the analysis. Our sample contains an unbalanced panel data for the following EME: These countries are Argentina, Brazil, Chile, China, Colombia, Croatia, Hungary, Indonesia, Kazakhstan, Lebanon, Lithuania, Malaysia, Mexico, Panama, Peru, Philippines, Poland, Russia, South Africa, Turkey, Ukraine, Uruguay and Venezuela. Figure A1 in the Appendix plots the individual country observations for EMBI spreads and credit ratings for our sample of countries.

assigned by the three major rating agencies (Moody's, Standard and Poor's and Fitch)[6], vix is the natural log. of VIX index and libor is the natural log. of 3-month USD libor rate.

The literature often employs conventional panel data estimation procedures in investigating the determinants of EMBI spreads. Eq. (1.1) in Table 1 presents the results of the panel fixed effects (PFE) regression[7] for our data. The results suggest an increase in sovereign ratings (rat) representing better domestic fundamentals leads to a decrease in EMBI spread. An increase in VIX (an increase in the price of risk or a decrease in the risk appetite in international financial markets) substantially and significantly increases the EMBI spreads. The impact of international interest rates appears to be positive.

Table 1. The Determinants of EMBI Spreads

Equation Procedure	(1.1) PFE	(1.2) FM-OLS	(1.3) CCEP
constant	7.764 (0.039)***		1.617 (0.025)***
rat_t	-2.020 (0.013)***	-1.801 (0.025)***	-1.738 (0.084)***
vix_t	0.891 (0.008)***	0.913 (0.097)***	0.093 (0.003)***
$libor_t$	0.0095 (0.0033)***	0.0124 (0.0034)***	0.020 (0.0006)***
csm_embi_t			0.913 (0.002)***
csm_rat_t			1.130 (0.010)***
Statistics	R^2 = 0.81 F = 13110 N=23 NT=77105 PCD = 331.2 [0.00] Pedroni= -16.7^{+++} Kao= -12.4^{+++} IPS = -12.67^{+++}	R^2 = 0.79 LRV = 0.86 N=23 NT=77082 IPS = -12.72^{+++}	R^2 = 0.90 F = 24846 N=23 NT=77105 PCD = 331.2 [0.00] Pedroni= -6.21^{+++} Kao= -9.55 $^{+++}$ IPS = -7.85^{+++}

Notes: The values in parentheses are robust standard errors. N and NT are, correspondingly, the numbers of countries and observations for the sample. *** denotes significance at 1% level. Pedroni and Kao represent the panel ADF test statistics proposed by Pedroni (2004) and Kao (1999) respectively, to test the null hypothesis of "no panel co-integration". IPS shows the results of the panel unit root tests suggested by Im, Pesaran and Shin (2003) to test for the stationarity of the residuals from the related equations. The optimum lag lengths for these tests are determined by Schwarz Information Criteria (SIC). $^{+++}$ indicates that null of "no panel co-integration" is rejected at the 1% level.

[6] Following Kamin and von Kleist (1999), the ratings from the three agencies are transformed into a numeral scale with 1 being the worst credit risk and 21 the best. We interpret the outlook as a five-notch grading scale around the credit rating as in Gonzalez-Rozada and Levy-Yeyati (2008) and Ozatay et al. (2009). The outlook-augmented ratings are computed by adding 0.4, 0.2, 0.0, -0.2 and -0.4 respectively for the positive, positive watch, neutral, negative watch, and negative notches. Our numerical ranking of outlook and watch decisions differ from that of Gonzalez-Rozada and Levy-Yeyati (2008) and Ozatay et al. (2009) since we interpret credit-watch decisions as signaling a higher probability of rate change in a shorter period of time than outlook decisions and thereby asign a higher (lower) numerical value to positive (negative) credit-watch than the positive (negative) outlook. Table A1 of Appendix presents our numerical scale.

[7] Both the redundant fixed effects and Hausman tests (not reported to save the space) strongly preferred the fixed effects specifications in this paper.

Considering the potential endogeneity of the ratings for EMBIG spreads, we estimate eq. (1) also by employing fully modified OLS (FM-OLS) procedure of Phillips and Hansen (1990) and Pedroni (2001). The FM-OLS procedure takes into account the potential heterogeneity in the long-run relationships (Pedroni, 2001) along with endogeneity and serial correlation. The FM-OLS results presented by (1.2) of Table 1 are essentially the same with those for the PFE. Consequently, our results may be interpreted as not significantly contaminated by a potential simultaneity bias.

The conventional panel fixed effects procedures maintain that the cross-country innovations for the evolution of sovereign spreads are independent of each other. The presence of cross-sectional dependence, however, may lead to inconsistent coefficient estimates as shown by Pesaran (2006). Common global shocks, which are not fully represented by the global conditions variables such as VIX or libor, potentially arising from contagion of a crisis or from global shocks such as the recent global financial crisis may induce cross-section dependence in the equation[8] and thus lead to inconsistent regression coefficient estimates if they are correlated with the explanatory variables. To account for the cross-sectional dependence in the data, we employ the common correlated effects pooled (CCEP) estimator by Pesaran (2006), which yields consistent estimates also in the presence of common factors. In this case, the CCEP estimator appears to be the most efficient (Kapetanios and Pesaran, 2007) and robust to alternative hypotheses of non-stationarity of variables (Coakley *et al.*, 2006 and Kapetanios *et al.*, 2011). Furthermore, Pesaran and Tosetti (2011) show that the CCEP estimators are robust to both possible serial correlations and cross-sectional dependence.

Following Özatay *et al*. (2009), we estimate eq. (1) also employing the CCEP procedure. The CCEP procedure suggests approximating the linear combinations of the unobserved factors by cross section averages of the dependent and explanatory variables and then estimating the regressions of interest augmented with these cross section averages. Therefore, to obtain the CCEP estimator, we estimate the following equation:

$$embi_{it} = c_i + \alpha_1(rat_{it}) + \alpha_2(vix_t) + \alpha_3(libor_t) + \alpha_4(csm\_embi_t) + \alpha_5(csm\_rat_t) + u_{it} \qquad (3)$$

where, csm_embi and csm_rat are the cross-sectional averages of log. EMBI spreads and log. ratings, respectively.

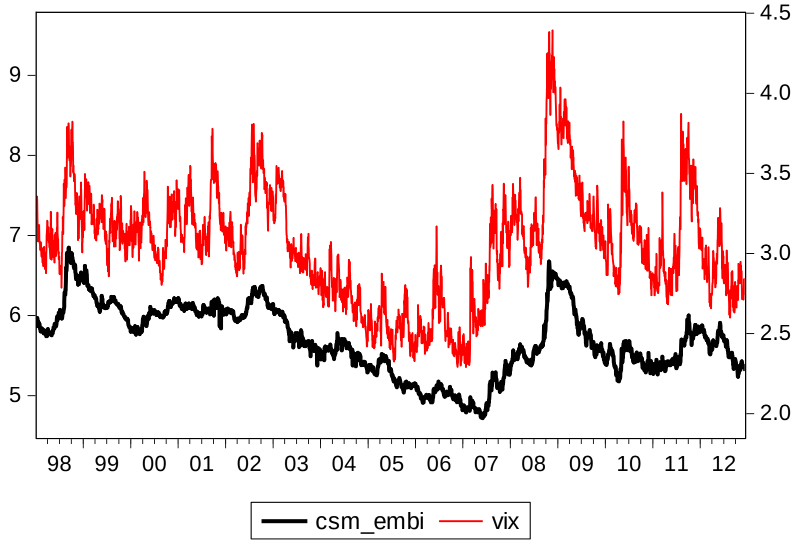
[8] The Pesaran (2004) test, for instance, yielded 331.2 and thus strongly rejected the cross-sectional independence of the residuals from Eq. (1.1).

Eq. (1.3) in Table 1 reports the results of the CCEP procedure. The impacts of ratings and libor are virtually the same with the PFE and FM-OLS estimation results. However, the VIX coefficient substantially decreases albeit remaining statistically significant in the CCEP estimation. Although they do not necessarily propose an economic interpretation, the significant cross-sectional means of sovereign spreads and ratings potentially offer some important information on the evolution of EMBI spreads. An increase in mean spreads, potentially reflecting worsening global financial conditions and contagion, increases individual country spreads.

A decrease in the VIX, representing an improvement in global financial conditions, often leads to surges in capital inflows to emerging market economies and thus higher growth and better macroeconomic conditions. According to Rey (2015) there is a global financial cycle in capital inflows and this cycle co-moves with the VIX. The plots of vix (right axis) and csm_embi (left axis) in Figure 1 show that these two variables tend to move together during both tranquils and turmoils of international financial conditions[9]. During global financial tranquility phases of the international financial cycle, such as observed during the post-2002 period until the recent global crisis, demand for sovereign bonds increases leading to an increase (decrease) in their prices (yields). During the financial stress periods of the financial cycle, on the other hand, just the reverse tends to occur as observed during the recent crisis. In this context, in a regression containing both of the variables (vix and csm_embig), the impact of global financial cycles may be decomposed into two, the vix representing the global risk appetite in general and the csm_embig representing the risk appetite solely towards EME assets. In the absence of one of these two variables, the remaining variable may be interpreted as proxying the global financial cycle albeit being potentially biased due to their high positive correlation with the other. Consistent with these interpretations, the coefficient of VIX considerably decreases with the inclusion of cross-section mean of spreads.

[9] A time series regression of mean EMBI (csm_embi) on vix for the period yielded csm_embi = 2.8 + 0.94vix with an R^2 = 0.6.

Figure 1. The VIX and CSM of EMBI Spreads



According to Rey (2015) the global financial cycle, which indeed co-moves with the VIX, is not aligned with countries' specific conditions. Consequently, we may expect an insignificant impact of VIX on sovereign ratings. Supporting this argument, a regression of csm_rat on vix yielded an insignificant slope coefficient with R^2=0.0 (not reported). An increase (decrease) in the cross-section average of ratings (csm_rat) may be reflecting a general improvement (deterioration) in the fundamentals of EME. A change in a group of EME ratings may trigger expectations that a corresponding change may occur for similar EME. In such a case, due to their "spill-over" effects, increases in average ratings may be expected to decrease EMBI spreads. According to Kaminsky and Schmukler (2002), a rating downgrade in one country may be perceived by financial markets as a warning signal for countries alike, coordinating investors towards a bad equilibrium and leading to financial instability. On the other hand, a decrease in the cross-sectional average of ratings can also be interpreted as an improvement in the relative creditworthiness of countries with better macroeconomic fundamentals. Consequently, due to such "flight to quality" effect, a decrease in the average EME ratings may lead to a fall in individual country spreads. Arezki *et al*. (2011) investigates effects of credit ratings during the European debt crisis and finds that a rating downgrade in one country is associated with a positive spill-over in countries perceived as more credible, which can be explained by "flight-to-quality". Supporting also the findings of Özatay *et al*. (2009), the positive and significant csm_rat_t coefficient may be interpreted as the "flight to quality" impact is dominating the "spill-over" impact.

3.1 Panel Cointegration and ECM Estimations

Table 2 reports the results of Im *et al.* (2003) panel unit root tests for rat and embi along with augmented Dickey-Fuller tests for libor and vix. The results of unit root tests presented suggest that all the variables in eq. (1) are integrated of order one (I(1))[10]. Consequently, we need to test whether these I(1) variables are not cointegrated. The results from the Kao (1999), Pedroni (2004) and Im *et al*. (2003) panel co-integration tests, shown in Table 1, all suggest that there is a co-integration relationship between the variables and the equation residuals are stationary. Consequently, the coefficients of the static equations in Table 1 may be interpreted as representing long-run equilibrium relationships between EMBI spreads and the explanatory variables.

Table 2. Unit Root Tests

Variables	IPS	
	Levels	First Differences
embi	-1.45	-245.9**
rat	4.14	-279.5**
Variables	ADF	
$libor_t$	-1.54	-13.31**
vix_t	-0.63	-42.1**
csm_embi	-1.79	-64.1**
csm_rat	0.09	-61.6**

IPS and ADF are Im *et al* (2003) panel unit root and augmented Dickey-Fuller tests, respectively. ** denotes the rejection of the unit root null at the 5% level. The lag lengths determined by Schwarz Information Criteria.

We now proceed by the estimation of the following reparametrised panel version of autoregressive distributed lag (PARDL) model (Pesaran *et al*., 2001):

$$\Delta embi_{it} = \Theta ec_{t-1} + \varphi_1 \Delta embi_{it-1} + \varphi_2 \Delta rat_{it} + \varphi_3 \Delta rat_{it-1} + \varphi_4 vix_t + \varphi_4 vix_{t-1} + \varphi_5 libor_t + \varphi_6 libor_{t-1} + u_{it} \quad (3)$$

where Δ is the first difference operator and ec (error correction term) are the stationary residuals from the estimations of the corresponding static equations in Table 1 with Θ representing the speed of adjustment. The PARDL model is preferred since it enables to analyze empirically the long-run relationship along with short-run dynamics even when it

[10] The results from the other commonly used unit root tests essentially yielded the same results and not reported to save the space.

is not known with certainty whether variables of interest are stationary (I(0)), non-stationary (I(1)) or mutually cointegrated (Pesaran *et al*., 2001). The PARDL model is valid even if the regressors are not weakly-exogenous (Chudik and Pesaran , 2013).

The negative and statistically significant coefficients of error correction (ec) terms in Table 3 suggest that sovereign spreads adjust to achieve the long-run equilibrium. The impact of sovereign ratings on the spreads appears to be considerably lower in the short-run than in the long-run. This may be plausible with a postulation that expectations and thus behaviour of rational agents are already contained by the long-run coefficients and thus the short-run coefficients mainly reflect the impact of surprises not represented by the existing variables. This may also consistent with an explanation that portfolio reallocations following a rating event take some time and reserve managers can opt for a gradual reallocation in order not to suffer from fire-selling etc. The impacts of common global shocks proxied by the cross-section averages of ratings and spreads appear to be essentially the same in the long-run and short-run.

Table 3. The Determinants of EMBI Spreads: PARDL Results

Equation	(3.1)	(3.2)	(3.3)
constant	0.000 (0.003)	0.000 (0.002)	0.000 (0.002)
ec_{t-1}	-0.0049*** (0.0008)	-0.0052*** (0.0008)	-0.0034*** (0.0007)
$\Delta embi_{it-1}$	-0.031 (0.012)***	-0.031 (0.013)***	-0.072 (0.015)***
Δrat_{it}	-0.129 (0.040)***	-0.129 (0.040)***	-0.128 (0.042)***
Δrat_{it-1}	-0.083 (0.030)***	-0.084 (0.030)***	-0.089 (0.030)***
Δvix_t	0.156 (0.008)***	0.156 (0.008)***	0.046 (0.005)***
Δvix_{t-1}	0.055 (0.007)***	0.055 (0.007)***	0.014 (0.003)***
$\Delta libor_t$	0.0069 (0.058)	0.069 (0.058)	0.055 (0.026)**
$\Delta libor_{t-1}$	0.009 (0.065)	0.009 (0.065)	-0.035 (0.027)
Δcsm_embi_t			0.758 (0.029)***
Δcsm_embi_{t-1}			0.111 (0.024)***
Δcsm_rat_t			0.473 (0.243)**
Δcsm_rat_{t-1}			0.078 (0.095)
Statistics	R^2 = 0.09 F = 257 N=23 NT=77059 DW= 2.01	R^2 = 0.09 F = 258 N=23 NT=77059 DW= 2.01	R^2 = 0.41 F = 1554 N=23 NT=77059 DW = 2.01

Notes: The values in parentheses are robust t-statistics. ** and ***, respectively, denote significance at 5 % and 1% levels. N and NT are, correspondingly, the numbers of countries and observations for the sample.

3.2 Asymmetric Impacts of Investment and Speculative Grade Ratings on EMBI Spreads

The reaction of sovereign spreads may not be symmetric to negative and positive changes in ratings. To investigate this, we augment the general model with rat_down and rat_up dummies taking unity respectively for rating downgrades and upgrades (including the outlook and credit watch decisions), and 0 otherwise. The results from CCEP presented by eq. (4.1) of Table 4 suggest that EMBI spreads react asymmetrically to negative and positive changes in credit ratings. A rating downgrade leads to substantially higher impact on spreads than an upgrade.

Sovereign credit ratings are in general divided into two risk groups as investment and speculative grade ratings[11]. Equations (4.2) and (4.3) present the estimation results for episodes of speculative and investment grade ratings, respectively. The impact of ratings appears to be considerably higher for investment (IGE) than speculative (SGE) grading episodes. The impact of rating downgrades is almost the same for IGE and SGE. An upgrade, on the other hand, significantly influences the spreads only for SGE[12] beyond the level warranted by the level of ratings itself. The effect of global conditions, as represented by vix and libor coefficients, is higher under for IGE than SGE. Furthermore, the coefficients of csm_rat reflect that while the flight-to-quality impact dominates the spill-over impact in IGE, spill-over effect is stronger in SGE.

A transition from a speculative grade to an investment grade, or vice versa, may be important for the evolution of the EMBI spreads. This is because many institutional investors such as retirement and insurance funds are subject to internal rules that allow them to invest solely in securities with investment-grade ratings. Furthermore, many regulations such as the Basel rules are often based on credit ratings leading to increase the importance of a distinction between different rating groups.

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[11] Grades higher than or equal to BBB-, BB- and Baa3 are classified as “Investment grade” respectively by Standard & Poor's, Fitch’s and Moody’s. In this study, an episode is defined as “investment grade” when, at least, two of these agencies agree on this.

[12] Jaramillo and Tejada (2011) considers interaction of investment grade status with the major macroeconomic variables and finds that only investment grade matters “above and beyond what is implied by macroeconomic fundamentals” for the spreads. Our result, on the other hand, suggest that also the speculative grade matter for downgrades. Our results, however, present a support to the Jaramillo and Tejada (2011) finding that global financial conditions play a central role in determining spreads.

Table 4. Ratings and EMBI Spreads

Equation	(4.1)	(4.2)	(4.3)	(4.4)
sample	All	Speculative	Investment	All
constant	1.633 (0.025)***	4.612 (0.053)***	-0.711 (0.088)***	1.619 (0.025)***
rat_{it}	-1.738 (0.008)***	-1.515 (0.009)***	-2.094 (0.029)***	-1.738 (0.008)***
vix_t	0.092 (0.003)***	-0.064 (0.005)***	0.230 (0.006)***	0.093 (0.003)***
$libor_t$	0.056 (0.001)***	0.003(0.001)**	0.007 (0.001)***	0.020 (0.001)***
rat_down_{it}	0.220 (0.019)***	0.176 (0.023)***	0.163 (0.028)***	
rat_up_{it}	-0.054 (0.009)***	-0.036 (0.010)***	-0.012 (0.012)	
csm_embi_t	0.912 (0.002)***	0.963 (0.005)***	0.860 (0.006)***	0.913 (0.002)***
csm_rat_t	1.126 (0.001)***	-0.260 (0.023)***	2.449 (0.021)***	1.130 (0.010)***
d_si1_{it}				-0.135 (0.034)***
d_si2_{it}				-0.117 (0.035)***
d_si3_{it}				-0.059 (0.041)
d_is1_{it}				0.366 (0.177)**
d_is2_{it}				0.515 (0.092)***
d_is3_{it}				0.693 (0.133)***
Statistics	R^2 = 0.90 F = 23233 N=23 NT=77105	R^2 = 0.88 F = 14087 N=16 NT=42521	R^2 = 0.92 F = 16215 N=18 NT=34584	R^2 = 0.90 F = 20339 N=23 NT=77105

Notes: The values in parentheses are robust standard errors. *** and ** denote significance at 1% and 5 % levels, respectively. N and NT are, correspondingly, the numbers of countries and observations for the sample.

To investigate the reaction of EMBIG spreads to transitions from one risk group to another by one or more major rating agency, the general CCEP model is augmented with dummy variables for rating transitions by each of the three rating agencies. Rating changes of the major agencies may not be contemporaneous. In this context, d_si1 takes the value of 1, when a country upgraded to an investment grade from just one agency, whilst the other two ratings of the country remain at speculative grade. Similarly, d_si2 takes the value of 1 on the day when a country get an investment grade rating from a second rating agency leaving the country with just one speculative grade rating and d_si3 takes the value of 1 on the day when all the three credit rating agencies classify the country as investment grade. On the other hand, d_is1 takes the value of 1 when only one of the agencies downgrades to speculative grade. In the same vein, d_is2 is unity when a second agent downgrades a country to a speculative grade rating and d_is3 takes the value of 1 on the day when all the three agencies agree to define the grade as speculative.

The results presented by eq. (4.4) of Table 4 suggest that a rating downgrade from investment to speculative status by even only one rating agency substantially increases EMBIG spreads beyond the level suggested by the rating change alone. The confirmation of this downgrade by the second and the third agencies leads to a further significant increase in the spreads. Given the investment and risk management rules by institutional investors and regulatory bodies, a downgrade to a speculative grade sharply shrinks the potential investor base and precludes a country to reach ampler and cheaper external financing (Kanlı and Barlas, 2012). Therefore, the results for downgrades may not be unexpected. Financial markets, however, tends to be much cautious for upgrades from speculative grade to investment grade. An upgrade by a single rating agency appears to have a significant additional effect on spreads. An upgrade by a second agency also leads to a decrease in EMBI spreads. A third agency may be interpreted as being late to have a significant impact when joins the other two, which already upgraded the country to investment status. The results by Eq. (4.4) also suggest that EMBIG spreads are more sensitive to transitions from investment to speculative grade ratings than transitions from speculative to investment grade ratings. This result is consistent with the earlier findings suggesting that financial markets are more sensitive to negative rating changes than positive changes. Above all, the results show that having an investment-grade rating even from just one rating agency makes a real difference for that country’s borrowing costs.

3.3 Global Financial Crisis and the Determinants of EMBI Spreads

In this section we investigate whether the recent global financial crisis (GFC) of 2008-2009 has led to a change in the determinants of sovereign spreads. Figure 2 plots the Spearman’s rank correlations (inverted scale) between credit ratings and EMBIG spreads for the years between 1998 - 2012. The correlation tends to increase after the Asian crisis of 1997-98 and remains high (around 0.8-0.95) until the recent GFC. With the GFC, the correlation declines sharply to 0.68 in 2008 and continues to weaken afterwards.

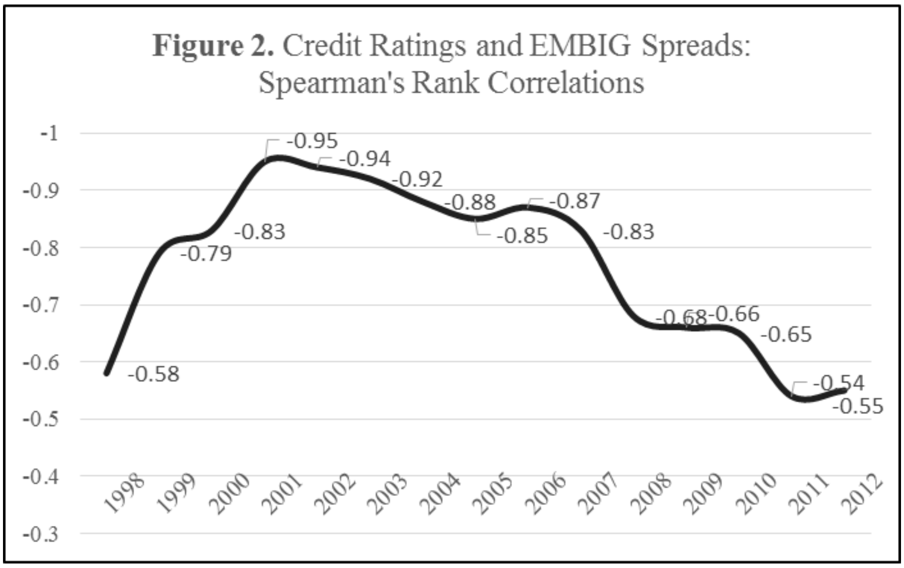
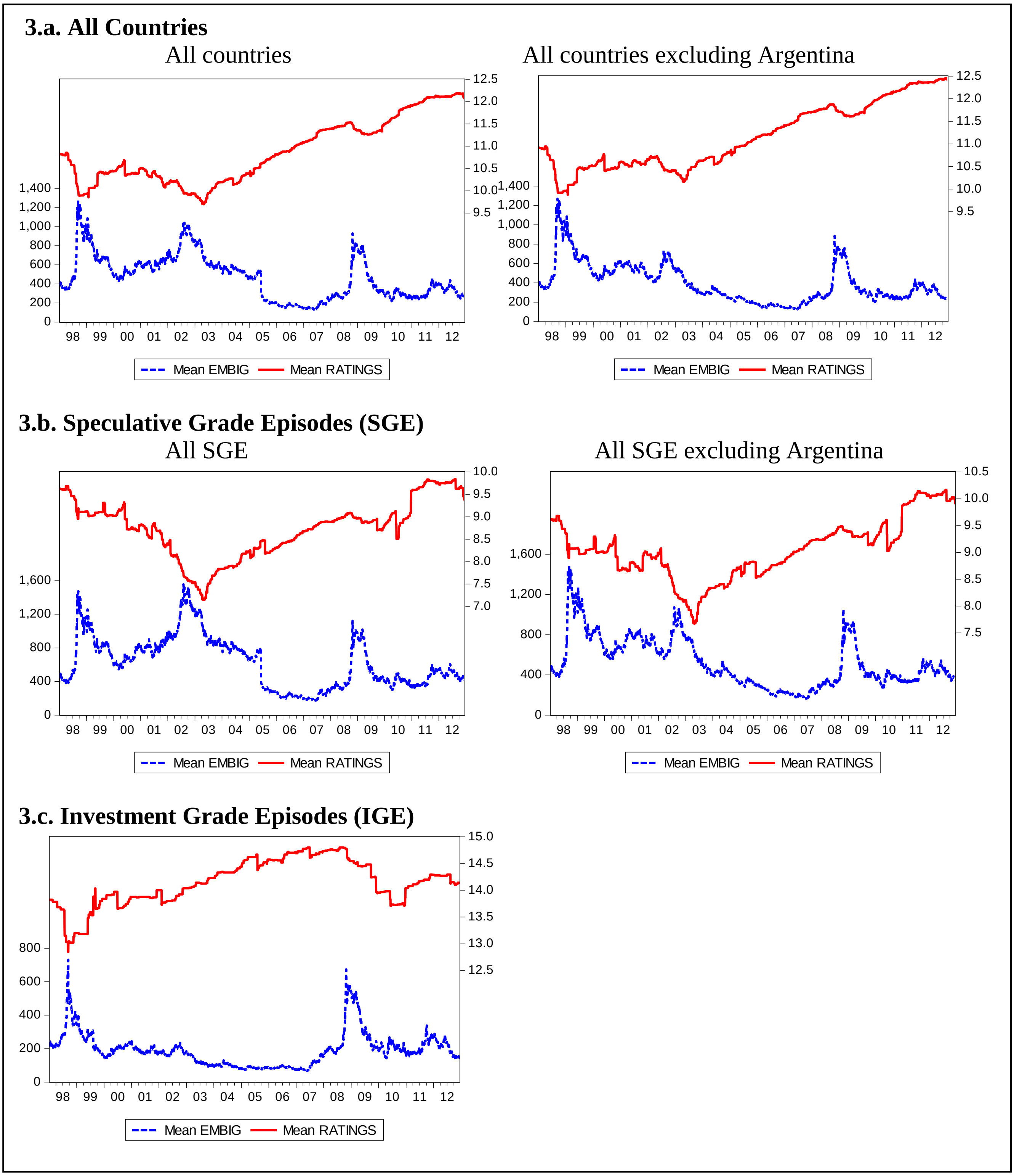


Figure 3 plots daily cross-section means of sovereign ratings and EMBI spreads during the period. The EMBI data for Argentina found to be an outlier especially during the Argentinian crisis of 2002, therefore the figures in the right panel does not contain Argentina. From Figure 3a, it may be inferred that there is a strong opposite movement of credit ratings and EMBIG spreads and until the GFC this (negative) correlation tended to be much higher during the periods of financial stress than tranquil periods. This observation provides a support to Kaminsky and Schmukler (2002) finding that credit ratings have stronger effects during episodes of financial stress. After the Asian crisis of 1997-1998 and the Russian crisis of 1999, mean credit ratings steadily fluctuate around 11 (likely to fulfill obligations, ongoing uncertainty) corresponding to EMBIG spreads fluctuating around 500 basis points (bp). On the other hand, after 2002, during the ample global liquidity and international financial tranquility, the credit ratings follow an upward trend with a corresponding downward trend in the EMBIG spreads until the GFC.

Figure 3. Cross-Sectional Means of EMBI Spreads and Ratings



The GFC of 2008-2009 led to a decline in ratings but the corresponding increase in the spreads appears to be substantially much higher. After the GFC, the upward trend in the ratings continues, whilst the mean spreads, fluctuating around 300 bp, suggests a considerable decrease in the relationship between them. This observation is also compatible with Comelli (2012) who finds that the impact of country-specific variables weakened during the recent GFC. These results can be interpreted as that international investors give more importance to domestic fundemantals during EME crises, while during GFC, the effect of global factors on EMBI spreads increase.

The simple correlation (negative) between the spreads and the ratings appears to be higher for SGE (Figure 3b) than IGE (Figure 3.c). For the SGE the mean ratings tend to show a strong upward trend after 2002 until the GFC. We observe a similar but downward movement in the EMBIG spreads decreasing to a level around 300 bps. During the GFC, the spreads jump to very high level of around 1000 bps despite a modest decrease in ratings. After the GFC the average ratings of these countries jumps to around 10 (just two notches below the investment grade) and EMBIG spreads fluctuates steadily around 400 bps. The picture for the IGE, however, is somewhat different. The upward trend in the ratings began just after the Asian and the Russian crises, much earlier than for the SGE. The average EMBI spreads was around 200 bps during the earlier phase of the ample global liquidity and was just around 100 bps thereafter until the GFC. During the GFC, spreads jump to around 600 bps. Opposite to the SGE, credit ratings tend to decrease after the GFC with average EMBI spread fluctuates around 200 bps. From Figure 3, it may be inferred that, the episodes of turmoils and tranquils along with IGE and SGE all matter for both the levels and fluctuations of EMBI spreads and their relations with the ratings. We now proceed with investigating empirically whether the determinants of EMBI spreads are invariant to the recent GFC for both IGE and SGE.

Table 5 presents the results of the panel fixed effects and CCEP estimations for our baseline equation (1) augmented with the interactions of the variables with crisis dummy variables. In the equations the dummy variable "crisis" takes unity for the GFC and post-GFC periods and zero otherwise[13]. The results by eqs. (5.1) and (5.2) suggest that the impact of ratings considerably decreases after the recent GFC. The international interest

[13] September 15, 2008, on which Lehman Brothers announced its bankruptcy, is taken as the beginning date of global financial crisis. Consequently, January 5, 1998-September 12, 2008 and September 15, 2008-December 14, 2012 periods are, respectively, defined as pre-crisis and post-crisis periods.

rate variable (libor) coefficient, on the other hand, increases significantly whilst the VIX coefficient decreases after the crisis.

Table 5. Global Financial Crisis and the Determinants of EMBIG Spreads

Sample	All		Investment Grade		Speculative Grade	
Equation	(5.1)	(5.2)	(5.3)	(5.4)	(5.5)	(5.6)
constant	7.428 (0.048)***	1.154 (0.049)***	12.116 (0.183)***	-0.214 (0.185)	6.807 (0.049)***	5.957 (0.105)***
rat_{it}	-2.084 (0.013)***	-1.753 (0.009)***	-3.790 (0.062)***	-2.649 (0.045)***	-1.644 (0.013)***	-1.464 (0.010)***
vix_t	1.000 (0.010)***	0.073 (0.004)***	0.887 (0.011)***	0.222 (0.009)***	0.953 (0.012)***	-0.048 (0.006)***
$libor_t$	0.057 (0.006)***	-0.001 (0.002)	0.124 (0.005)***	-0.027 (0.004)***	-0.085 (0.006)***	0.029 (0.003)
Crisis*rat_{it}	0.264 (0.007)***	0.214 (0.007)***	1.653 (0.046)***	0.838 (0.037)***	-0.687 (0.018)***	-0.906 (0.017)***
Crisis*vix_t	-0.619 (0.021)***	-0.060 (0.004)***	-0.455 (0.018)***	-0.120 (0.010)***	-0.650 (0.029)***	0.002 (0.002)
Crisis*$libor_t$	0.219 (0.018)**	0.029 (0.002)***	0.130 (0.015)***	0.045 (0.005)**	0.325 (0.021)**	-0.013 (0.005)***
Crisis	1.620 (0.084)***	1.817 (0.066)***	-2.312 (0.143)***	4.893 (0.191)***	3.533 (0.121)***	-6.121 (0.173)***
csm_embig_t		0.922 (0.003)***		0.836 (0.010)***		0.917 (0.007)***
csm_rat_t		1.364 (0.021)***		2.958 (0.050)***		-0.821 (0.038)***
Crisis*csm_embig_t		0.075 (0.005)***		0.061 (0.012)***		0.127 (0.012)***
Crisis*csm_rat_t		-1.079 (0.025)***		-2.948 (0.054)***		3.112 (0.061)***
Statistics	R^2 = 0.83 F = 13111 N=23 NT=77105	R^2 = 0.90 F = 20577 N=23 NT=77105	R^2 = 0.88 F = 10455 N=18 NT=34584	R^2 = 0.93 F = 15116 N=18 NT=34584	R^2 = 0.74 F = 5402 N=16 NT=42521	R^2 = 0.89 F = 13081 N=16 NT=42521

Notes: The values in parentheses are robust standard errors. *** and ** denote significance at 1% and 5 % levels, respectively. N and NT are, correspondingly, the numbers of countries and observations for the sample.

Consistent with the results already presented by Table 4, the rating coefficients are much higher (in absolute value) for IGE (Eqs. 5.3 and 5.4) than SGE (Eqs. 5.5 and 5.6) before the GFC. After the GFC, the rating coefficients significantly change for both IGE and SGE, but in opposite directions. After the GFC, the impact of the ratings substantially decreases (increases) for IGE (SGE). These opposite movements may better be understood by the help of information provided by Figure 3. The figure shows that the cross-sectional means of ratings considerably increased for SGE and the decline in the IGE ratings was relatively modest. Despite this difference, EMBI spreads for IGE and SGE tended to co-move, albeit around different mean levels (Figures 3b and 3c). Consequently, the impacts of ratings for IGE and SGE converged[14] after the GFC.

The impact of VIX appears to decline for both IGE and SGE after the GFC. The libor coefficients, on the other hand, increase considerably for both IGE and SGE especially in the PFE equations (5.3) and (5.5). As discussed in the earlier sections, the coefficients of the global financial conditions variables vix and libor decline substantially with the inclusion of the cross-sectional means in the CCEP equations (5.4) and (5.6).

The reasons for these results may be explained by the important developments in the global economic landscape especially after the GFC. The global economy witnessed a double-speed recovery from the GFC with sluggish growth in advanced economies and rapid growth in EME. The rapid recovery from the GFC was not restricted to investment-graded EME but also contained some other EME with relatively better domestic fundamentals albeit graded as SGE. Unconventional monetary policy in advanced economies after the GFC, including the zero-bound interest rate policy and quantitative easing improved the so-called "push" factors. Credible monetary policies along with fiscal discipline, reserve accumulation and financial system reforms in many EME not only reduced their exposure to the GFC but also provided an important "pull" factors[15]. The improvements in both domestic pull and global push factors surged capital inflows to EME, the bulk of which was short-term, after the GFC. With the ample global liquidity, especially before the "taper tantrum" not only the investment grade countries but also the speculative grade countries with better domestic fundamentals observed a surge in capital inflows. Consequently, the country ratings became much more important for SGE after the GFC.

[14] The ratings coefficient declined (in absolute value) from 3.8 to 2.1 (Eq. 3) or from 2.7 to 1.8 (Eq. 4) for the IGE. For the SGE, the coefficient increased from 1.6 to 2.3 (Eq. 2.5) or from 1.5 to 2.4 (Eq. 2.6).

[15] See, Kose and Prasad (2010) and Alvarez and De Gregorio (2014) for the growth performance of EME during and after the GFC. According to Frankel, Vegh and Vuletin (2013) a substantial number of emerging and developing countries "have graduated" from fiscal procyclicality.

4. Concluding Remarks

Credit ratings and global financial conditions both matter for EMBI spreads in the long-run and short-run. Our results support the robustness of this postulation to different empirical modelling procedures including CCEP and FM-OLS. This paper, however, also finds that the determinants of EMBI spreads are not invariant to investment and speculative episodes, the transitions between them and to the recent global financial crisis.

The results of this paper suggest that EMBI spreads react asymmetrically to negative and positive changes in credit ratings. A rating downgrade leads to substantially higher impact on the spreads than an upgrade. For both the speculative (SGE) and investment (IGE) grading episodes, the EMBI spreads react similarly to rating downgrades. An upgrade, on the other hand, significantly influences the spreads only for SGE beyond the level warranted by the level of ratings itself. Furthermore, the effect of global conditions is higher under for IGE than SGE. Another important finding of this study is that, a rating downgrade from investment to speculative status substantially increases EMBIG spreads beyond the level suggested by the rating change alone. This is not surprising since investment rules of many institutional investors allows only to invest in bonds with investment grade ratings and risk management rules by regulatory bodies favor investing in such bonds. Consequently, a downgrade to a speculative grade sharply shrinks the potential investor base. Similarly, an upgrade to investment grade rating also leads to an additional decrease in EMBI spreads, albeit its effect is lower than the effect of transitions from investment to speculative ratings. Above all, the estimation results have shown that having an investment-grade rating even from just one credit rating agency makes a real difference for that country’s borrowing costs. All these results are also in line with our finding that financial markets are more sensitive to negative rating changes than positive changes.

The impact of credit ratings is found to significantly decrease after the recent global financial crisis (GFC). Given the fact that credit agencies have been extensively criticised during and after the GFC, this may lend a support to an argument that their credibility and influence have decreased recently. However, our findings suggest that the impact of ratings decreases only for IGE. Their impact, on the other hand, is found to be substantially increased for SGE after the GFC. Therefore, a postulation which does not differentiate the SGE and IGE after the GFC may be misleading. The convergence of the reaction of EMBI spreads to credit ratings by IGE and SGE after the GFC may, indeed, be explained by the important developments in the global economic landscape including the double-speed recovery from the GFC with sluggish growth in advanced economies and rapid growth in EME and unconventional monetary policy in advanced economies. The rapid recovery from the GFC was not restricted to investment-graded EME but also contained some other EME with relatively better domestic fundamentals albeit graded as SGE. The improvements in both domestic pull and global push factors surged capital inflows to EME with IGE or SGE, the bulk of which was short-term, after the GFC. With the ample global liquidity, especially before the "taper tantrum" not only the investment grade countries but also the speculative grade countries with better domestic fundamentals observed a surge in capital inflows. Consequently, the country ratings became much more important for SGE after the GFC. An important policy question, in this context, whether the convergence of the impacts of ratings for SGE and IGE after the GFC has prevailed after the "taper tantrum" of mid-2013 or will survive under expected monetary tightening by the Fed. Our data, unfortunately, does not contain the post-2012 observations, but we believe that the relevance of our question will survive for both the post-taper tantrum and the forthcoming monetary tightening periods.

References

Alvarez, R. and J. De Gregorio (2014). Understanding Differences in Growth Performance in Latin America and Developing Countries between the Asian and the Global Financial Crises. IMF Economic Review, 62, 494–525.

Arezki, R., Candelon, B. and A.N.R. Sy (2011). Sovereign Rating News and Financial Market Spillovers: Evidence from the European Debt Crisis. IMF Working Paper, No. 11/68.

Arora, V. and M. Cerisola (2001). How Does U.S. Monetary Policy Influence Sovereign Spreads in Emerging Markets?. IMF Staff Papers, 48(3), 474-98.

Barlas, Y. and İ.N.B. Kanlı (2012). Credit Rating Upgrade to "Investment" Level: Trends Before and After the Upgrade. CBT Research Notes in Economics 1225, Research and Monetary Policy Department, Central Bank of the Republic of Turkey.

BIS (2013). Sovereign Risk: A World without Risk-free Assets?. BIS Working Paper No. 72.

Calvo, G. A., Leiderman, L. and C.M. Reinhart (1993). Capital Inflows and Real Exchange Rate Appreciation in Latin America - The Role of External Factors. IMF Staff Papers, 40(1), 108-51.

Calvo, G.A. (2002). Globalization Hazard and Development Reform in Emerging Markets. *Economia*, 2, 1-29.

Cantor, R. (2013). Ratings and Regulation. in *Sovereign risk: a world without risk-free assets?*, BIS Working Paper No. 72, 27-33.

Cantor, R. and F. Packer (1996). Determinants and Impact of Sovereign Credit Ratings. Federal Reserve Bank of New York Economic Policy Review, October, 37-53

Cavallo, E., Powell, A. and R. Rigobon (2013). Do Credit Rating Agencies Add Value? Evidence from the Sovereign Rating Business. *International Journal of Finance and Economics*, 18,3, 240-265.

Chudik, A. and M.H. Pesaran (2013). Common Correlated Effects Estimation of Heterogeneous Dynamic Panel Data Models with Weakly Exogenous Regressors. Federal Reserve Bank of Dallas, Globalization and Monetary Policy Institute Working Paper No. 146

Coakley, J., Fuertes A.M. and R. Smith (2006). Unobserved Heterogeneity in Panel Time Series Models. *Computational Statistics & Data Analysis*, 50, 2362-2380.

Comelli, F. (2012). Emerging Market Sovereign Bond Spreads: Estimation and Back-Testing. IMF Working Paper, No. 12/212.

Csonto, B. (2014). Emerging Market Sovereign Bond Spreads and Shifts in Global Market Sentiment. *Emerging Markets Review*, 20, 58-74.

Dailami, M., Masson, P.R. and J.J. Padou (2008). Global Monetary Conditions versus Country-Specific Factors in the Determination of Emerging Market Debt Spreads. *Journal of International Money and Finance*, 27, 1325–1336.

Eichengreen, B. and A. Mody (1998). What Explains Changing Spreads on Emerging Market Debt. NBER Working Paper, No. 6408.

Erdem, F. and E. Özmen (2015). Exchange Rate Regimes and Business Cycles: An Empirical Investigation. *Open Economies Review*, 26, 1041-1058.

Felices, G., Hoggarth, G. and V. Madouros (2008). Capital Inflows into EMEs since the Millennium: Risks and the Potential Impact of a Reversal. BoE Quarterly Bulletin 2008Q1, London: Bank of England, 26-36.

Frankel, J.A., Vegh, C.A. and G. Vuletin (2013). On Graduation from Fiscal Procyclicality. *Journal of Development Economics*, 100(1), 32-47.

Gonzalez-Rozada, M. and E. Levy-Yeyati (2008). Global Factors and Emerging Market Spreads. *The Economic Journal*, 118(533), 1917-1936.

Hartelius, K., Kashiwase, K. and L.E. Kodres (2008). Emerging Market Spread Compression: Is it Real or is it Liquidity?. IMF Working Paper, No: 08/10.

Im, K. S., Pesaran, M.H. and Y. Shin (2003). Testing for Unit Roots in Heterogeneous Panels. *Journal of Econometrics*, 115, 53–74.

IMF (2004). Global Financial Market Developments. in *Global Financial Stability Report*, April, Ch. 2., IMF.

IMF (2010). The Uses and Abuses of Sovereign Credit Ratings. in *Global Financial Stability Report*, October, Ch. 3., IMF.

Jaramillo, L. and C.M. Tejada (2011). Sovereign Credit Ratings and Spreads in Emerging Markets: Does Investment Grade Matter?. IMF Working Paper, No. 11/44.

Kanlı, İ.B. and Y. Barlas (2012). Credit Rating Upgrade to "Investment" Level: Trends Before and After the Upgrade. Central Bank of Turkey Research Notes in Economics, No: 2012-25.

Kao, C. (1999). Spurious Regression and Residual-based Tests for Cointegration in Panel Data, *Journal of Econometrics*, 90, 1–44.

Kamin, S.B. and K. von Kleist (1999). The Evolution and Determinants of Emerging Market Credit Spreads in the 1990s. BIS Working Paper, No. 68.

Kamin, S.B. (2002). Identifying the Role of Moral Hazard in International Financial Markets. Board of Governors of the Federal Reserve System International Finance Discussion Paper No. 736.

Kaminsky, G. and S.L. Schmukler (2002). Emerging Market Instability: Do Sovereign Ratings Affect Country Risk and Stock Returns. World Bank Economic Review, 16, 2, 171-195.

Kapetanios, G., and M.H. Pesaran (2007). Alternative Approaches to Estimation and Inference in Large Multifactor Panels: Small Sample Results with an Application to Modelling of Asset Returns. in Phillips, G., Tzavalis, E. (Eds.,), *The Refinement of Econometric Estimation and Test Procedures: Finite Sample and Asymptotic Analysis*, Cambridge University Press, Cambridge.

Kapetanios, G., Pesaran, M.H. and T. Yagamata (2011). Panels with Nonstationary Multifactor Error Structures. *Journal of Econometrics*, 160, 326–348.

Kennedy, M. and A. Palerm (2014). Emerging Market Bond Spreads: The Role of Global and Domestic Factors from 2002 to 2011. *Journal of International Money and Finance*, 43, 70–87.

Kose, A. and E.S. Prasad (2010). Emerging Markets Come of Age. *Finance and Development*, 6, December, 7-10.

Kose, A., Otrok, C. and E.S. Prasad (2012). Global Business Cycles: Convergence or Decoupling?. *International Economic Review*, 87, 178-90.

Levin, A., Lin, C.F., and C. Chu (2002). Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties. *Journal of Econometrics*, 108, 1–24.

Levy-Yeyati, E. and T. Williams (2010). US Rates and Emerging Market Spreads. Business School Working Papers 2010-02, Universidad Torcuato di Tella.

Martinez, L. B., Terceño, A., and M. Teruel (2013). Sovereign Bond Spreads Determinants in Latin American Countries: Before and During the XXI Financial Crisis. *Emerging Markets Review*, *17*, 60-75.

Özatay, F., Özmen, E. and G. Şahinbeyoglu (2009). Emerging Market Sovereign Spreads, Global Financial Conditions and U.S. Macroeconomic News, *Economic Modelling*, 26, 526-531.

Pedroni, P. (2001). Purchasing Power Parity Tests in Cointegrated Panels. *The Review of Economics and Statistics*, 83, 727–731.

Pedroni, P. (2004). Panel Cointegration: Asymptotic and Finite Sample Properties of Pooled Time Series Tests with an Application to the Purchasing Power Parity Hypothesis. *Econometric Theory*, 20, 597-625.

Pesaran, H., Y. Shin, and R. Smith (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16, 3, 289-326.

Pesaran, M.H. (2004). General Diagnostic Tests for Cross Section Dependence in Panels. CESifo Working Paper Series No. 1229.

Pesaran, M.H. (2006). Estimation and Inference in Large Heterogenous Panels with Multifactor Error Structure. *Econometrica*, 74, 4, 967–1012.

Pesaran, M.H. and E. Tosetti (2011). Large Panels with Common Factors and Spatial Correlation. *Journal of Econometrics*, 161, 182-202.

Phillips, P., and B. Hansen (1990). Statistical Inference in Instrumental Variables Regression with I(1) Processes. *Review of Economic Studies*, 57, 99–125.

Powell, A. and J. Martinez (2008). On Emerging Economy Sovereign Spreads and Ratings. IDB Working Paper 629.

Rey, H. (2015). Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence, NBER WP No. 21162.

APPENDIX

Table A1. Numerical Ranking Scale of the Long Term Credit Ratings

Moody's		S&P		Fitch			
Aaa	21	AAA	21	AAA	21		
Aa1	20	AA+	20	AA+	20		
Aa2	19	AA	19	AA	19		
Aa3	18	AA-	18	AA-	18		
A1	17	A+	17	A+	17		
A2	16	A	16	A	16		
A3	15	A-	15	A-	15		
Baa1	14	BBB+	14	BBB+	14		
Baa2	13	BBB	13	BBB	13	Positive Watch	(+0.4)
Baa3	12	BBB-	12	BBB-	12	Positive Outlook	(+0.2)
Ba1	11	BB+	11	BB+	11	Stable Outlook	0
Ba2	10	BB	10	BB	10	Negative Outlook	(-0.2)
Ba3	9	BB-	9	BB-	9	Negative Watch	(-0.4)
B1	8	B+	8	B+	8		
B2	7	B	7	B	7		
B3	6	B-	6	B-	6		
Caa1	5	CCC+	5	CCC+	5		
Caa2	4	CCC	4	CCC	4		
Caa3	3	CCC-	3	CCC-	3		
Ca	2	CC	2	CC	2		
C	1	C SD	1	C DDD DD D	1		

Source: Bloomberg, Moody’s, S&P and Fitch

Figure A1. EMBI Spreads and Average Sovereign Ratings

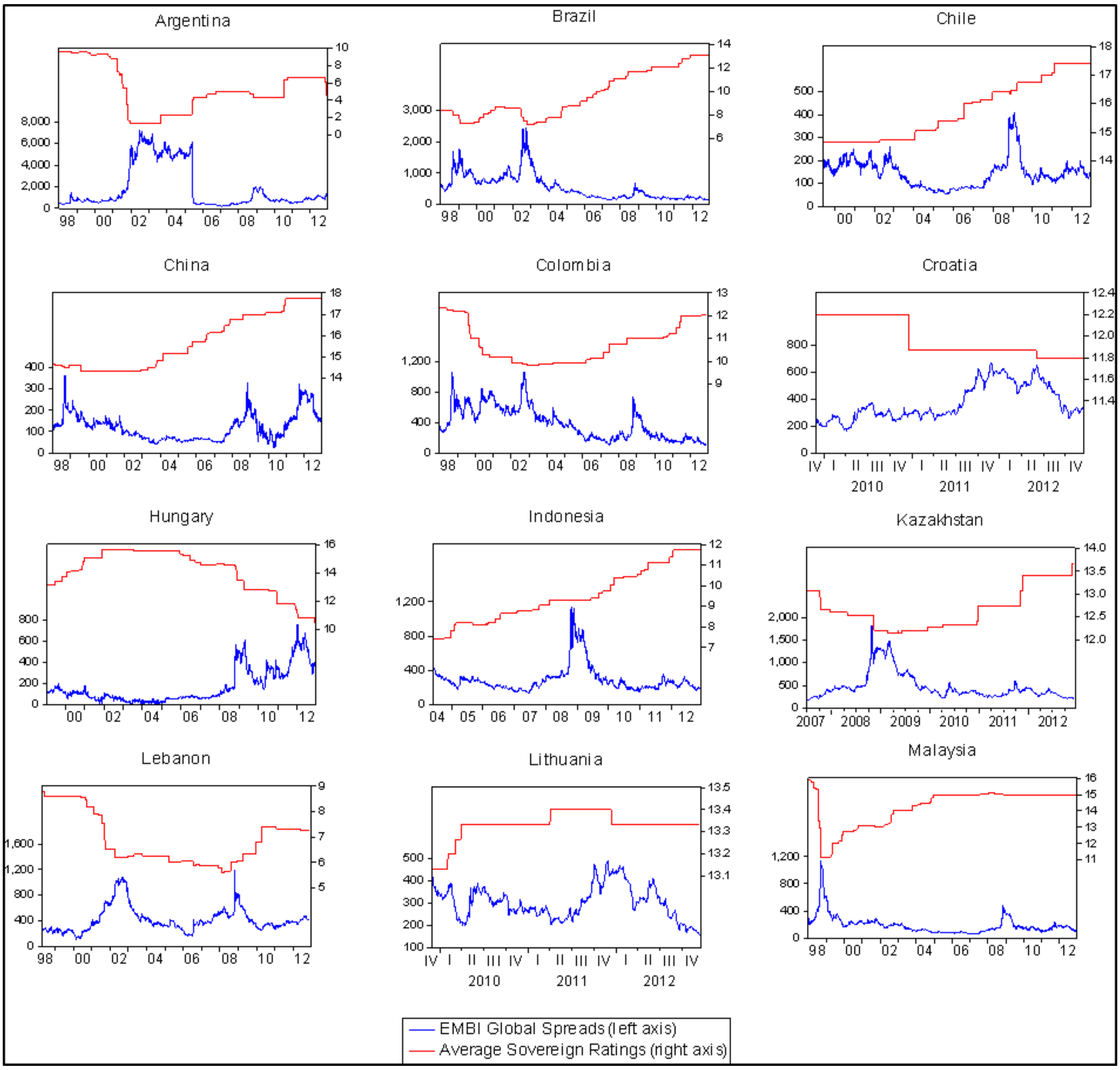


Figure A1(con.). EMBI Spreads and Average Sovereign Ratings