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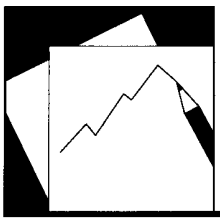

IMF Working Paper

Determinants of Sovereign Bond Spreads in Emerging Markets: Local Fundamentals and Global Factors vs. Ever-Changing Misalignments

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Determinants of Sovereign Bond Spreads in Emerging Markets: Local Fundamentals and Global Factors vs. Ever-Changing Misalignments

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Abstract

We analyze the relationship between global and country-specific factors and emerging market debt spreads from three different angles. First, we aim to disentangle the effect of global and country-specific developments, and find that while both country-specific and global developments are important in the long-run, global factors are main determinants of spreads in the short-run. Second, we investigate whether and how the strength of fundamentals is related to the sensitivity of spreads to global factors. Countries with stronger fundamentals tend to have lower sensitivity to changes in global risk aversion. Third, we decompose changes in spreads and analyze the behavior of explained and unexplained components over different periods. To do so, we break down fitted changes in spreads into the contribution of country-specific and global factors, as well as decompose changes in the residual into the correction of initial misalignment and an increase/decrease in misalignment. We find that changes in spreads follow periods of tightening/widening, which are well-explained by the model; and the dynamics of the components of the unexplained residual follow all the major developments that impact market sentiment. In particular, we find that in the periods of severe market stress, such as during the intensive phase of the Eurozone debt crisis, global factors tend to drive changes in the spreads and the misalignment tends to increase in magnitude and its relative share in actual spreads.

JEL Classification Numbers: E43, G12, G15

Keywords: Emerging market debt, spreads, misalignment

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Contents Page

I. Introduction

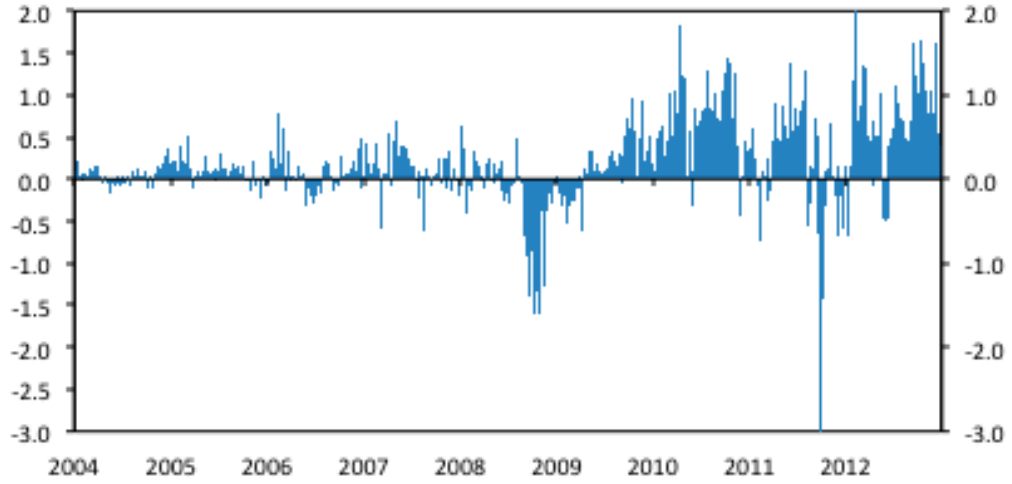
After an extended period of heightened volatility, emerging market sovereign spreads narrowed steadily in the second half of 2012 (**Figure 1**). The strengthening of the emerging market debt performance came on the back of improving global market sentiment against the backdrop of exceptionally low yields and ample liquidity provision in the industrial countries. Market sentiment improved dramatically as concerns decreased about the Euro Area debt crisis resolution and central banks in the developed countries announced several additional liquidity-enhancing measures. Specifically, the European Central Bank announced the Outright Monetary Transactions (OMT) program in September that includes the conditional purchase of the Euro Area sovereign bonds in unlimited amounts at the secondary market. The Federal Reserve started a new bond purchase program and committed to keep interest rates at exceptionally low levels at least until the mid-2015. The Bank of Japan also announced further monetary easing. Market sentiment was also supported by the outcome of Greek elections in the middle of the year and the favorable ruling of the German constitutional court regarding the European Stability Mechanism in September.

As a result of exceptionally low yields in the industrial countries and ample liquidity, emerging markets experienced a significant inflow of funds, pushing emerging market sovereign debt costs down. During the second half of 2012–beginning of 2013 emerging market bond funds experienced an inflow of almost US$ 1 billion per week on average (**Figure 2**), while the EMBI Global spread decreased by around 180 basis points between early June 2012 and late January 2013. However, this was followed by a small correction due to increasing risk aversion related to uncertainty in Cyprus.

Figure 1. Emerging Market Bond Spreads
(EMBI Global, percentage point)

Source: J.P. Morgan

Figure 2. Emerging Market Bond Fund Flows
(weekly net flows in billions of US$)



Source: EPFR Global

In this paper, we analyze the relationship between global and country-specific factors and country spreads from three different angles.

First, we analyze the changes in emerging market debt spreads with the aim to disentangle the effect of global and country-specific developments. We find that while both country-specific and global developments are important determinants of spreads in the long run, it is mostly the global factors that determine spreads in the short run. This finding is intuitive, consistent with the literature, and sheds lights with the recent developments described above. First, the asset-pricing theory predicts that all relevant information shall be included in asset prices (or spreads) and hence both global factors and the strength of country-specific fundamentals should be reflected in the long-run, equilibrium, level of bond prices (spreads). Second, since country-specific fundamentals change slowly over time—as macroeconomic policies and structural reforms take time to bear fruit—it is the variation in global factors that should be more important in driving country spreads in the short run. This finding may explain why during the second half of 2012-beginning of 2013 all emerging markets experienced significant narrowing in sovereign bond spreads, seemingly irrespective of country-specific fundamentals. The liquidity boat lifted all boats, both sturdy and shaky ones, in the short-term, but leaves shaky ones vulnerable to eventual correction when spreads revert to their long-term fundamental values.

Second, we investigate whether and how the strength of fundamentals is related to the sensitivity of spreads to global factors. In order to do so, we employ two approaches. First, in the fixed effects panel estimation, we split the sample into countries with weak and strong fundamentals. Second, in the pooled mean group estimation, we analyze whether country-specific short-term coefficients of global conditions are related to country-specific fundamentals. We find that countries with stronger fundamentals tend to have lower sensitivity to changes in global risk aversion. This finding not only supports the results described above, but is also important from the policy-making perspective as it highlights the premium on good policies, suggesting

that solid domestic fundamentals do provide some cushion against sudden shifts in the global market sentiment.

Third, we also decompose changes in spreads in seven periods over the last decade in order to understand whether they are driven by improving fundamentals and/or global factors, and what role the unexplained part of changes plays. To our knowledge, such a comprehensive analysis has not been performed in the existing literature. For example, Hartelius et al. (2008) and Dumicic and Ridzak (2011) decomposed changes in spreads for one and two periods, respectively, but compared actual and fitted changes without analyzing changes in residuals. In this paper, in addition to the breakdown of fitted changes in spreads into the contribution of fundamentals and global factors as common in the literature, we also decompose changes in the residual into correction of initial misalignment and increase/decrease in misalignment in the given period.

Based on the average results across all emerging markets, the sample period can be divided into 7 sub-periods characterized by a general decrease or increase in spreads across countries, as compared to the previous period. Specifically, we find that models explain about half of the tightening of spreads during the pre-crisis period (up to August 2007), with both global factors and country-specific fundamentals playing an important role. The unexplained part of the tightening was driven both by the correction of earlier misalignment (in this case, underpricing of emerging market debt) left over after the crises that plagued markets in the late 1990s–early 2000s, as well as an accumulation of misalignment during the boom years.

The changes in spreads during the crisis follow periods of tightening and widening which are well-explained by the model and are intuitive. In addition, the dynamics of the components of the unexplained residual intuitively follow all the major developments of the current crisis that in turn impact market sentiment: the 2007–early Fall 2008 period when the crisis was mostly contained to the mature financial systems; the period after the Lehman bankruptcy when the "mature market crisis" turned into a full-blown "confidence and growth crisis" and spilled over to the emerging markets, especially in Europe; some thawing of market conditions and improvement in fundamentals in 2009–early 2010; followed by the many nerve-wrecking twists and turns of the Eurozone debt crisis from the spring 2010 to mid-2012; and the spectacular improvement in global market sentiment between mid-2012 and early 2013 as monetary policy decision-makers relieved concerns about the tail risk of the Eurozone debt crisis.

In general we find that in periods of severe market stress and general lack of public understanding of country-specific developments, such as during the intensive phase of the Eurozone debt crisis, global factors tend to drive the changes in spreads and misalignment tends to increase in magnitude and its share in actual spreads increases. We also find that a spectacular performance of emerging market sovereign debt in 2012 was mainly driven by an improvement in global factors, both risk perception and liquidity. The small unexplained part mostly reflected the correction of the undervaluation of emerging market debt, but some misalignment started to build up by early 2013; however, the latter broadly disappeared due to increasing uncertainty related to Cyprus. The detailed results are presented and explained later in the paper.

The rest of the paper is organized as follows. Section II reviews the literature on the determinants of emerging market bond spreads. Section III describes the data, and Section IV presents the estimation methodologies. Section V estimates the models, using two different methodologies for the whole sample, as well as split across regions, Section VI analyses the dynamic of actual versus fitted spreads, Section VII analyses the decomposition of changes in spreads, and Section VIII concludes.

II. Related Literature

Over the past two decades a vast number of empirical studies examined the relationship between emerging market sovereign debt spreads and both country-specific and global factors. The studies could be grouped along the following lines: (i) what estimation technique is used (i.e. factor or principal component analysis, individual country or panel regressions), and (ii) what is the choice of country-specific and global explanatory variables. The literature is also split in how the dependent variable, the country risk premium or spread, is measured (i.e. local or foreign currency).

The literature has established several explanatory variables, both global and country-specific, which affect spreads. Specifically:

Applying panel estimation, the seminal paper of Edwards (1985) finds that key drivers of spreads are country-specific fundamentals such as external debt, debt service and investment ratio[2]. In addition to the effect of country fundamentals, Eichengreen and Mody (1998) show that the external interest rate environment is also an important determinant of spreads. Luengnaruemitchai and Schadler (2007) and Hartelius et al. (2008) further expand the list of global factors and county-specific fundamentals that have significant effect on spreads. As regards global factors, in addition to the level of international interest rates they find that the uncertainty about the level of rates and global risk aversion are also important determinants of spreads. Specifically, they find that an increase (decline) in either the level or the volatility of the U.S. Federal fund futures rates and a higher (lower) global risk aversion are associated with higher (lower) country risk premium. As regards country-specific factors, they find that country fundamentals—as captured by economic, financial and political indicators—as well as a sovereign credit rating outlook also significantly affect spreads. Jaramillo and Tejada (2011) also find credit rating to be a significant determinant of spreads even after accounting for fundamentals, with movements across the investment grade threshold having a bigger effect on spreads than rating changes within each asset class. Peiris (2010) finds that tighter (looser) global liquidity, weaker (stronger) domestic fundamentals and tighter (looser) domestic monetary conditions are associated with higher (lower) country spreads, while higher (lower) foreign participation in the domestic bond market tends to result in lower (higher) yields. In this paper global liquidity is measured by the level of long-term U.S. Treasury yields while the country-specific fundamentals include inflation, fiscal

[2] Investments have an impact on spreads through their impact on growth outlook. However, as the coefficient of debt and investment is of roughly the same magnitude in the bank loans spread equation, it is also concluded that debt-financed investments do not result in lower spreads.

deficit and current account balance. Levy-Yeyati and Williams (2010) find that global risk aversion, liquidity and U.S. Treasury supply shocks that result in the steepening of the U.S. yield curve all affect country bond spreads, while the U.S. Federal funds rate does not have a significant direct impact in the baseline specification.

Using country regressions, Arora and Cerisola (2001) and Nickel et al. (2009) find that while global factors are important drivers of spreads in almost every country, the significance of fundamentals differs across countries. Similarly, Ebner (2009) shows that the effect and importance of country-specific factors varies across countries and concludes that external risk aversion is "the single most important explanatory factor" of spreads.

There is also an extensive literature that analyzes whether the coefficient of the impact of the country-specific and global factors on spreads is in turn a function of global market conditions and the strength of country fundamentals, and whether this relation changes depending on the time horizon. To summarize, the studies find that: (i) global liquidity and risk factors do affect the strength and sometimes the direction of the effect which country-specific fundamentals have on spreads; (ii) stronger country-specific fundamentals reduce the effect of the global factors on spreads; (iii) country fundamentals determine spreads in the long-term, while global factors are important drivers of spreads both in the short- and the long-term.

- To assess the effect of global conditions on the strength of the country-specific coefficients, the studies use two techniques. They either split the sample into periods of low and high global risk aversion or include the interaction of fundamentals with dummies of high global risk perception. Baldacci et al (2008) show that the impact of fiscal indicators increases during high-volatility periods. Dumicic and Ridzak (2011) find that macroeconomic indicators and global factors drive spreads in the CEE countries at all times, while sovereign risk and external solvency indicators become significant only during crisis periods. Applying a panel threshold estimation, Jaramillo and Weber (2012) find that fiscal variables determine spreads in the periods of high risk aversion, while macro variables become important determinants of spreads during low risk-aversion periods. Comelli (2012) finds that the size and significance of the coefficient of country fundamentals and global factors varies across regions and over time. In particular, he shows that in the period of "abundant global liquidity" the coefficient of the short-term U.S. Treasury yield turns negative, possibly because low global interest rate environment leads to an excess supply of bonds and hence higher spreads. This paper also finds that the long-term U.S. yield has become insignificant post-2003 suggesting that investors' focus switched to country-specific factors.

- To evaluate the effect of the strength of country fundamentals on the sensitivity of spreads to explanatory variables, the studies usually split the sample into countries with weak and strong fundamentals or use the interaction of explanatory variables with dummy variables capturing the strength of fundamentals. Alexopoulou et al. (2009) find that the importance of country-specific and global factors differs among countries with weak and strong fundamentals. Spreads are driven by a different set of country-specific factors in the two groups of countries, while the common factor of Euro Area

equity market volatility is a significant determinant of spreads in both groups of countries, albeit with different sign: it has negative and positive coefficient in countries with strong and weak fundamentals, respectively. Levy-Yeyati and Williams (2010) find that the magnitude and sometimes the sign of the coefficient of global factors differ between investment-grade and speculative-grade countries, and between distressed and tranquil times. Investment-grade countries tend to have lower sensitivity of spreads to changes in long-run U.S. rates and global liquidity preferences than speculative-grade countries. They also find that the coefficient of the U.S. Federal funds rate switches from negative in distressed periods to positive in tranquil times, while it increases and decreases in the case of long-run U.S. rates and VIX, respectively, during tranquil periods. Baldacci and Kumar (2010) analyze the possible non-linear impact of fiscal policy on spreads. They find that the size of the impact depends on initial fiscal, institutional and structural conditions, as well as spillovers from global financial markets. For example, the coefficient of fiscal balance becomes larger in absolute terms for countries that had high initial deficit or debt, low private saving ratios or faster population aging, while it is mitigated by lower global risk aversion or better global liquidity conditions. Jaramillo and Tejada (2011) find that investment-grade countries have lower spreads, lower sensitivity to external debt and reserves, and a higher sensitivity to growth than speculative-grade countries. They also show that the effect on coefficients is higher when the country's credit rating is moving between the investment grade and speculative-grade asset classes than when the rating is changing within each asset class.

- To analyze whether the effect of country-specific and global factors differs in the short and long term, the literature uses error correction model and pooled mean group estimator, with the latter also allowing for different short-term coefficients across countries. Ferrucci (2003) finds that both country-specific and global factors are significant in the long term. As regards the latter, he finds that the slope of the US yield curve is the main driver of spreads: spreads increase when the curve flattens suggesting that leveraged investors tend to decrease their demand for emerging market bonds when global borrowing costs are high. Alexopoulou et al. (2009) find that fundamentals and global factors are significant both on the short- and the long-term in the CEE countries. Bellas et al (2010), applying both fixed-effects and pooled mean group estimation, find that country fundamentals are significant only in the long-term, while the global risk aversion affects spreads both in the short- and the long-term. González-Rozada and Levy-Yeyati (2005), using an error correction model to separate short- and long-term drivers of spreads, show that credit rating and global factors are significant determinants in both time horizons. They also conclude that fundamentals are determinants of the exposure to external shocks rather than that of borrowing costs.

III. DATA

We have an unbalanced panel dataset of 147 monthly observations between January 2001 and March 2013 for 18 emerging markets in three regions[3]. As the measure of sovereign risk/spread, we calculated monthly averages of daily Emerging Market Bond Index Global (EMBIG) sovereign spreads downloaded from J.P. Morgan's research and market data website (MorganMarkets) for each country in the sample. The EMBIG spread is a market-capitalization-weighted average of spreads on US$-denominated Brady bonds, Eurobonds and traded loans issued by sovereign and quasi-sovereign entities. It is a widely accepted measure of spread on foreign currency denominated public debt in the literature.

We use the following country-specific fundamentals and global factors as explanatory variables:

1. Country-specific fundamentals:[4] Like Luengnaruemitchai and Schadler (2007) and Comelli (2012), we use risk indicators of the International Country Risk Guide (ICRG) database that contains monthly data on economic, financial and political risk in 140 countries[5]. Based on 22 variables, the following three composite ratings are available:
    - *Economic Risk Rating (ERR):* the weighted average of risk points assigned to GDP per capita, real GDP growth, inflation, fiscal balance (percent of GDP) and current account balance (percent of GDP).
    - *Financial Risk Rating (FRR):* the weighted average of risk points related to foreign debt (percent of GDP), foreign debt service (percent of exports), current account (percent of exports), official reserves (months of imports) and exchange rate stability (appreciation/depreciation against the US$ over the most recent 12-month period).
    - *Political Risk Rating (PRR):* the weighted average of the risk rating of the following components: government stability, socioeconomic conditions, investment profile, internal conflict, external conflict, corruption, military in politics, religious tensions, law and order, ethnic tensions, democratic accountability, and bureaucracy quality.

    The ERR, the FRR, and the PRR can take any value between 0–50, 0–50, and 0–100, respectively. Low values signal higher risk. As such, these indicators are expected to have a negative relationship with spreads.

[3] Countries included in the sample are the following: Asia: China, Indonesia, Malaysia, Pakistan, Philippines; Central and Eastern Europe: Bulgaria, Hungary, Poland, Russia, Turkey, Ukraine; Latin America: Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela.

[4] In principle, the market infrastructure characteristics—such as depth, liquidity or turnover—could also influence the sensitivity of spreads to global factors. This is taken care of, in part, by the inclusion criteria for debt instruments applied in constructing the EMBIG spreads. For example, only issuances larger than US$ 500 million are included, which in part takes care of the depth and liquidity.

[5] The ICRG composite risk ratings have the advantage of being readily available and capturing several economic, financial and political variables. A detailed description of the methodology is available at PSR Group's website (http://www.prsgroup.com/PDFS/icrgmethodology.pdf).

2. Global factors:
    - *Global risk aversion:* The Chicago Board Options Exchange Volatility Index (VIX), which measures the implied volatility of S&P index options, is used as a proxy for investors' risk appetite. The source of data is Bloomberg. VIX is expected to be positively associated with spreads.
    - *Global liquidity conditions:* The U.S. Federal funds rate is used as a proxy for global liquidity conditions. Data was downloaded from the website of Federal Reserve. As lower Fed funds rate is assumed to be associated with higher liquidity, it is expected to have a positive relationship with spreads. To some extent VIX also captures global liquidity conditions, especially during crisis periods and especially near the zero-bound when non-conventional monetary policy is being employed. In fact, massive liquidity provision via the balance sheet expansion by major central banks (the Fed, the ECB, BOE, and BoJ) during the recent crisis helped to moderate market risk aversion. In addition, VIX is forward-looking because it tends to react to the announcements of the future measures by the central banks—for example, the VIX moderated dramatically after the ECB announced its OMT program, although this program has not been utilized as of now.

Table 1 shows descriptive statistics of the variables, while Table 2 contains their correlation matrix. The correlation matrix reveals that EMBIG spreads are negatively correlated with each risk rating variable and the U.S. Federal funds rate, while they are positively correlated with VIX, with correlations being significantly different from zero in each case. The correlation between risk rating indicators is always positive, albeit insignificant between FRR and PRR, suggesting that countries with higher economic risk tend to have higher financial and political risk as well. VIX has a significant negative correlation with each risk rating variable, suggesting that higher (lower) global risk aversion is associated with worse (better) country fundamentals.

Table 1. Descriptive Statistics

Variable		Mean	Standard Deviation	Min	Max
embig	EMBI Global spread (percentage point)	4.42	7.30	0.14	68.47
err	Economic Risk Rating	36.27	4.01	17.50	45.50
frr	Financial Risk Rating	38.24	4.89	15.50	48.50
prr	Political Risk Rating	65.10	9.31	40.00	84.50
vix	VIX (percentage point)	21.70	9.19	10.82	62.64
us ffr	U.S. Federal funds rate (percent)	1.92	1.85	0.07	6.01

Source: J.P. Morgan, ICRG, Bloomberg, Fed, authors' calculations

Table 2. Pairwise Correlations

	embig	err	frr	prr	vix	us ffr
embig	1.0000					
err	-0.4440 (0.0000)	1.0000				
frr	-0.4686 (0.0000)	0.5363 (0.0000)	1.0000			
prr	-0.5298 (0.0000)	0.3410 (0.0000)	0.0183 (0.3464)	1.0000		
vix	0.3822 (0.0000)	-0.2002 (0.0000)	-0.1798 (0.0000)	-0.0566 (0.0036)	1.0000	
us ffr	-0.1606 (0.0000)	0.2135 (0.0000)	-0.0583 (0.0027)	0.0805 (0.0000)	-0.3326 (0.0000)	1.0000

Note: Correlations are calculated between the logs of these variables. P-values are in parenthesis.
Source: authors' calculations

IV. MODEL

As a common practice in the literature[6], we follow Edwards (1985) to construct the empirical model on sovereign debt spreads. The equilibrium condition for a risk-neutral investor lending to a country that has non-zero probability of default and is a price-taker in global debt markets is the following[7]:

$$(1-p)(1+i^*+s) = (1+i^*) \tag{1}$$

where p, i^* and s denote the probability of default by the borrowing country, the global risk-free interest rate and the country-risk premium, respectively. Based on the equilibrium condition, the investor requires the borrower to provide compensation for the non-zero probability of default in the form of country-risk premium calculated as follows:

$$s = \frac{p}{1-p}(1+i^*) \tag{2}$$

where the country-risk premium is positively related to the probability of default and the global risk-free interest rate. Assuming that the probability of default has the following logistic form:

$$p = \frac{\exp\left(\sum_i \beta_i X_i\right)}{1+\exp\left(\sum_i \beta_i X_i\right)} \tag{3}$$

[6] See Akitoby and Stratmann (2006), Comelli (2012), Jaramillo and Tejada (2011), and Luengnaruemitchai and Schadler (2007).

[7] The equation assumes zero recovery rate in the case of default.

where the X_i and β_i are the determinants of the probability of default and the corresponding coefficients, respectively, the spread equation take the following form:

$$\ln(s) = \ln(1 + i^*) + \sum_i \beta_i X_i \tag{4}$$

where X_i is assumed to capture both country-specific fundamentals and global market conditions. We use two different techniques to estimate equation (4): the fixed effects and the pooled mean group estimation.

A. Fixed Effects Estimation

Following the literature, we first use the most widely applied method of estimating the spread equation, the fixed effects panel regression[8]:

$$\ln(embig_{it}) = \gamma'_1 \ln(X_{it}) + \gamma'_2 \ln(Z_t) + \mu_i + \varepsilon_{it} \tag{5}$$

where $embig_{it}$, X_{it}, and Z_t denote EMBIG spread, and a $(k_1 \times 1)$ and a $(k_2 \times 1)$ vector of country-specific (ERR, FRR and PRR) and global explanatory variables (VIX and U.S. Fed funds rate), respectively, while μ_i, γ_1 and γ_1 are the country fixed effect, and $(k_1 \times 1)$ and $(k_2 \times 1)$ vectors of coefficients, respectively.

B. Pooled Mean Group Estimation

In order to accommodate the heterogeneity in the panel and the possible dynamic nature of the problem, we then also use the pooled mean group (PMG) estimator developed by Pesaran, Shin and Smith (1999).

As an intermediate technique between panel and individual country regressions, the pooled mean group estimator has several advantages. First, in contrast with panel regressions, it allows short-run coefficients to differ among countries. This is crucial when explaining spreads across a heterogeneous set of countries. Second, as the variation in time of country-specific fundamentals is usually much lower than that of sovereign spreads, individual country regressions tend to underestimate the role of fundamentals in explaining spreads. By constraining long-run coefficients to be homogeneous across countries, the pooled mean group estimator involves the cross-country dimension as well, thereby capturing the impact of different country-specific fundamentals on the level of spreads in a given point of time.

Following Pesaran, Shin and Smith (1999), our starting point is an ARDL (p,q,…,q) model:

[8] The Hausman test rejected the random effects model in each specification.

$$\ln(embig_{it}) = \sum_{j=1}^{p} \lambda_{ij} \ln\left(embig_{i,t-j}\right) + \sum_{j=0}^{q} \delta'_{1ij} \ln\left(X_{i,t-j}\right) + \sum_{j=0}^{q} \delta'_{2ij} \ln\left(Z_{t-j}\right) + \mu_i + \varepsilon_{it} \qquad (6)$$

where λ_{ij}, δ_{1ij} and δ_{2ij} are a scalar, a $(k_1 \times 1)$ and a $(k_2 \times 1)$ vector of coefficients, respectively.

The ARDL model can be re-parameterized in the following way:

$$\begin{aligned} \Delta \ln(embig_{it}) = \phi_i \left[\ln\left(embig_{i,t-1}\right) - \beta'_{1i} \ln\left(X_{it}\right) - \beta'_{2i} \ln\left(Z_t\right)\right] + \sum_{j=1}^{p-1} \lambda^*_{ij} \Delta \ln\left(embig_{i,t-j}\right) \\ + \sum_{j=0}^{q-1} \delta^{*}_{1ij}{}' \Delta \ln\left(X_{i,t-j}\right) + \sum_{j=0}^{q-1} \delta^{*}_{2ij}{}' \Delta \ln\left(Z_{t-j}\right) + \mu_i + \varepsilon_{it} \end{aligned} \qquad (7)$$

where

$$\begin{gathered} \phi_i = -\left(1 - \textstyle\sum_{j=1}^{p} \lambda_{ij}\right), \\ \beta_{1i} = \frac{\sum_{j=0}^{q} \delta_{1ij}}{1 - \sum_{j=1}^{p} \lambda_{ij}}, \\ \beta_{2i} = \frac{\sum_{j=0}^{q} \delta_{2ij}}{1 - \sum_{j=1}^{p} \lambda_{ij}}, \\ \lambda^*_{ij} = -\textstyle\sum_{m=j+1}^{p} \lambda_{im} \text{ for } j = 1,2,\ldots,p-1, \text{ and} \\ \delta^*_{ij} = -\textstyle\sum_{m=j+1}^{p} \delta_{im} \text{ for } j = 1,2,\ldots,q-1. \end{gathered}$$

Introducing homogeneity restrictions on the long-run coefficients ($\beta_{1i} = \beta_1$ and $\beta_{2i} = \beta_2$) yields the following equation:

$$\begin{aligned} \Delta \ln(embig_{it}) = \phi_i \left[\ln\left(embig_{i,t-1}\right) - \beta'_{1} \ln\left(X_{it}\right) - \beta'_{2} \ln\left(Z_t\right)\right] + \sum_{j=1}^{p-1} \lambda^*_{ij} \Delta \ln\left(embig_{i,t-j}\right) \\ + \sum_{j=0}^{q-1} \delta^{*}_{1ij}{}' \Delta \ln\left(X_{i,t-j}\right) + \sum_{j=0}^{q-1} \delta^{*}_{2ij}{}' \Delta \ln\left(Z_{t-j}\right) + \mu_i + \varepsilon_{it} \end{aligned} \qquad (8)$$

By setting $p = 1$ and $q = 1$, we estimate the following model:

$$\begin{aligned} \Delta \ln(embig_{it}) = \phi_i \left[\ln\left(embig_{i,t-1}\right) - \beta'_{1} \ln(X_{it}) - \beta'_{2} \ln\left(Z_t\right)\right] + \delta^{*}_{1i}{}' \Delta \ln(X_{it}) + \delta^{*}_{2i}{}' \Delta \ln(Z_t) \\ + \mu_i + \varepsilon_{it} \end{aligned} \qquad (9)$$

Before estimating equations (5) and (9), we first test whether the variables are stationary. Results of the Im-Pesarad-Shin and the Fisher-type augmented Dickey-Fuller tests are mixed for the EMBIG spread, while they reject the null hypothesis that all panels contain unit roots for each country-specific explanatory variable. As regards global factors, VIX is found to be stationary, while the U.S. Federal funds rate appears to follow a unit root process. When applying the cointegration test developed by Westerlund (2008), however, we find that there is no cointegrating relationship among these variables. As Phillips and Moon (2000) show, the pooled regression of two nonstationary variables that are not cointegrated is not spurious but yields

consistent estimates of the long-run average regression coefficient as N and T become large. Therefore, following the literature, we proceed first with the fixed effects estimation.

V. Estimation and Results

A. Fixed Effects Estimation

Whole-sample estimates

First, we estimate equation (5) on the whole sample. The regression results indicate that both country-specific fundamentals and global factors are significant drivers of sovereign bond spreads (Table 3).

Table 3. Fixed Effects Estimation Results[9]: All Countries
(Dependent variable: Log of EMBIG spread)

	(1)	(2)	(3)	(4)	(5)
err	-0.4973**	-0.6039**	-0.5929**	-1.8791***	
	(0.2249)	(0.2516)	(0.2841)	(0.3707)	
frr	-2.9078***	-2.7956***	-3.5403***		-3.1331***
	(0.3315)	(0.2937)	(0.3636)		(0.3015)
prr	-2.3547***	-2.5079***	-2.3432***	-2.9620***	-2.4202***
	(0.4038)	(0.4371)	(0.4726)	(0.4622)	(0.3995)
vix	0.6553***	0.6849***		0.8186***	0.6593***
	(0.0714)	(0.0553)		(0.0787)	(0.0713)
us ffr	-0.0242		-0.0836**	0.0339	-0.0332
	(0.0254)		(0.0348)	(0.0271)	(0.0254)
constant	21.1792***	21.7060***	25.7334***	17.6065***	20.4759***
	(1.9737)	(2.2921)	(2.1013)	(2.1823)	(1.8857)
Overall R-Squared	0.57	0.57	0.49	0.46	0.57
Observations	2,587	2,587	2,587	2,587	2,587

Note: *, ** and *** indicate significance at the 1, 5 and 10 percent level, respectively. Driscoll-Kraay robust standard errors are in parenthesis. Explanatory variables are in logs.
Source: authors' calculations

As expected, each country-specific risk rating indicator has a significantly negative coefficient, indicating that stronger country-specific fundamentals are associated with lower spreads. The size of the coefficients of country-specific fundamentals suggests that country spread is the most sensitive to changes in financial and political risk. Specifically, a 1 percent increase (i.e. improvement) in the financial risk rating lowers spreads by 2.8–3.5 percent, while a 1 percent increase in the political risk rating lowers spreads by 2.3–2.5 percent, compared with a 0.5–0.6 percent impact of the

[9] As the LM test developed by Breusch and Pagan (1980) suggests the presence of error cross-sectional dependence, we follow Comelli (2012) and estimate regressions with Driscoll and Kraay (1998) standard errors that are robust to heteroskedasticity, serial correlation and cross-sectional dependence.

economic risk rating in the specifications (1)–(3). This result may not be fully explained by the lower variability of ERR, as it is only somewhat lower across countries and, for some countries, over time (Tables 1 and 4). Hence the results suggest that, at least in the short-term, investors tend to pay more attention to the country's political risk and liquidity situation such as reserve coverage and foreign debt service (captured by PRR and FRR, respectively) than to solvency indicators such as growth, fiscal and current account balance (captured by ERR). As the run-up to the current crisis illustrated that it usually takes long time for the worsening macroeconomic performances to build up into full-fledged market concerns about sovereign solvency, there may be possibility for non-linear relation between ERR and the spreads. We explore it in our next paper.

The results show that an increase in the global risk aversion drives country spreads up, and this relationship is strongly significant. The coefficient of VIX is positive and significant: a 1 percent increase in global risk aversion is associated with a 0.7 percent increase in spreads. Liquidity conditions have a negative sign, albeit significant in one specification only: the coefficient on the U.S. Federal funds rate is negative but becomes insignificant when VIX is included. This result suggests that the U.S. monetary policy decisions at least partially reflect global risk aversion, in addition to domestic economy considerations, hence U.S. Federal funds rate becomes insignificant when the measure of risk aversion is included (as we discussed earlier, the U.S. Federal funds rate has negative and significant correlation with VIX). We also checked 3-month and 10-year US Treasury yields as proxies for global liquidity conditions but none of them was found to be a significant driver of spreads. This may be due to that Treasury yields are driven by both U.S. monetary policy and global risk aversion, thus the effect of Treasury yields is already captured by the inclusion of the U.S. Federal funds rate and VIX. The sign of the impact of U.S. Treasury yields may also be switching depending on the risk aversion regime, with a negative sign during the high risk aversion periods, as markets flock to save heavens, and a positive sign during the low risk aversion periods when markets search for yield.

The chosen country-specific and global factors explain spreads well. The model's explanatory power is satisfactory with an overall R-squared around 0.5–0.6 in the three specifications.

To test for the possibility that country-specific explanatory variables may be a function of spreads, we test the model as follows. We regress the spreads on the up to five lags of each explanatory variable in order to control for possible endogeneity between spreads and country-specific risk ratings. We also include lags of global variables, although the intuition would suggest that global variables are not dependent on emerging markets country spreads. The sign, magnitude and significance of all variables, except U.S. Federal funds rate, remained broadly the same, suggesting no endogeneity.

As ERR and FRR are strongly correlated (Table 2), we also estimate equation (5) with one of the two explanatory variables omitted to analyze whether it affects estimation results. When FRR is excluded the sensitivity of spreads to PRR and VIX increases somewhat, while the U.S. Federal funds rate remains insignificant. The coefficient on ERR increases four-fold, albeit its significance weakens, while the model's overall explanatory power falls. In contrast, the exclusion of ERR does not affect

substantially either the magnitude of the coefficients of other explanatory variables or the model's explanatory power. This suggests that while ERR and FRR contain a similar set of fundamentals, the information content of FRR, relevant for the determination of the country credit risk, is broader and/or has more variation. In fact, an analysis of the composition of the two indices reveals that while the ERR, naturally, contains slowly-changing economic variables, the FRR contains both slow-changing and more volatile components such as exchange rate, which must be an important factor in investor's decision-making process.

To test for the possibility that country-specific fundamentals could be at least partially explained by the global factors, we proceed in two steps. First, we regress domestic fundamentals on the global factors; the results indicate that global factors, while being significant, explain only a very small fraction of the variation in the domestic fundamentals. Nevertheless, in the second step we estimate equation (5) replacing country-specific fundamentals with respective residuals from the previous step (plus the country-specific fixed effects). The results are broadly the same as in Table 3.

Split-sample estimates

In order to check whether the sensitivity of spreads to global factors depends on the strength of country-specific fundamentals, we split the sample into two groups of countries according to whether they have low or high risk rating indicators and estimate equation (5) for both groups[10]. The results are presented in Table 5.

Both FRR and PRR remain significant with negative coefficients in each specification, while ERR loses its significance in *high ERR* and *high PRR* specifications. The size of the coefficients of FRR and PRR is of roughly the same magnitude as in the baseline specification (model 2 in **Table 3**), which suggests that investors remain sensitive to political risk and liquidity factors once country fundamentals have been taken into account and classified as either strong or weak. The insignificance of the macroeconomic fundamentals in *high ERR* and *high PRR* specifications suggests that either the economic conditions do not differ significantly across countries with strong economic fundamentals and low political risk or that markets may not be paying attention to small variations in fundamentals for the countries perceived as strong and politically stable. The lower significance of the economic fundamentals for the countries with high liquidity risk suggests that markets concerns about liquidity could entail increases in funding costs for even economically solid and solvent sovereigns—which is consistent with recent experiences in Europe.

[10] Similarly Alexopoulou et al. (2009), we split countries based on whether the average value of their fundamentals are better or worse than the median of the individual country averages. However, instead of constructing two groups of countries based on the overall strength of fundamentals, we construct two groups based on each country-specific factor. A shortcoming of the methodology is that it assumes constant grouping of countries based on average fundamentals, while fundamentals change continuously that could thus lead to different grouping each year. However, we found that time-varying grouping based on annual average ERR, FRR and PRR is the same as grouping based on total average ERR, FRR and PRR in the case of 82, 78 and 88 percent of total observations, respectively. We also estimated the model using "dynamic grouping methodology" that allows the grouping to change every month for each country based on its fundamentals. However, due to the changing groups every month the results are inconclusive.

Table 4. Country-specific Variables: Descriptive Statistics

	EMBIG				ERR				FRR				PRR			
	Mean	Standard Deviation	Min	Max	Mean	Standard Deviation	Min	Max	Mean	Standard Deviation	Min	Max	Mean	Standard Deviation	Min	Max
Argentina	21.05	21.34	2.02	68.47	36.89	4.48	24.00	41.50	33.44	7.06	15.50	41.50	66.21	4.40	54.50	77.50
Brazil	4.63	4.00	1.43	20.57	36.06	2.22	31.50	41.00	35.71	5.24	23.50	45.50	66.74	2.09	60.00	70.50
Bulgaria	2.51	1.81	0.56	7.81	34.08	2.54	27.50	37.50	34.74	2.61	27.50	38.50	70.10	3.04	64.50	76.00
Chile	1.39	0.63	0.55	3.83	40.19	2.71	33.00	45.00	38.64	1.79	34.00	41.00	78.14	2.43	73.00	83.00
China	1.10	0.61	0.37	2.87	39.86	1.31	36.50	42.00	46.74	1.34	44.50	48.50	66.28	3.39	58.50	70.50
Colombia	3.31	1.91	1.08	9.86	34.97	1.87	29.50	38.50	37.76	2.33	31.50	42.00	57.20	3.50	46.00	63.00
Hungary	1.78	1.70	0.14	6.50	34.42	2.08	29.00	40.00	34.25	2.51	28.00	38.00	77.72	3.28	71.50	84.50
Indonesia	2.88	1.50	1.44	8.91	36.47	1.34	33.50	38.50	37.44	2.99	29.50	41.50	55.48	5.62	40.00	63.00
Malaysia	1.50	0.67	0.68	4.28	40.50	2.32	31.50	43.00	42.40	0.99	40.00	44.00	73.36	2.49	66.00	77.50
Mexico	2.21	0.86	0.98	4.63	36.63	2.82	26.50	40.00	39.57	2.40	34.50	43.00	71.21	2.60	67.00	77.50
Pakistan	7.06	4.88	1.38	21.37	32.71	2.51	27.00	37.50	37.12	3.33	28.00	42.50	46.54	2.07	41.50	51.50
Peru	3.05	1.83	1.04	8.16	37.87	2.18	32.50	42.00	40.34	2.39	37.00	44.00	63.56	1.93	61.00	72.50
Philippines	3.30	1.43	1.20	6.58	37.25	1.52	33.00	40.00	39.01	2.79	34.00	44.50	63.39	2.67	57.00	69.00
Poland	1.40	0.77	0.39	3.25	36.25	1.79	33.00	40.00	36.89	2.80	28.50	40.00	77.27	2.32	73.00	81.50
Russia	3.26	2.35	0.95	10.80	39.52	4.85	24.00	45.50	43.50	2.56	38.00	47.50	63.99	3.28	54.00	69.00
Turkey	4.00	2.36	1.62	10.55	31.60	4.37	17.50	36.00	31.87	2.97	23.50	37.00	60.92	4.46	53.00	70.50
Ukraine	6.72	5.96	1.40	31.58	33.84	4.24	21.50	39.50	37.34	3.32	28.50	42.50	63.53	3.93	54.50	70.50
Venezuela	8.28	3.82	1.87	17.89	33.83	5.60	24.50	41.50	41.59	4.06	33.00	47.00	50.15	3.80	44.50	63.00

Source: J.P. Morgan, ICRG, authors' calculations

The coefficient of VIX is positive and significant in each group. Countries with higher economic and financial risk (low ERR and low FRR) tend to have higher sensitivity to changes in global risk aversion. This finding is important from the policy-making perspective as it highlights the premium on good policies, suggesting that solid domestic fundamentals do provide some cushion against shifts in the global market sentiment. The coefficient of VIX is of the same magnitude for countries with low and high political risk.

Table 5. Fixed Effects Estimation Results: Different Groups of Countries
(Dependent variable: Log of EMBIG spread)

	All	Low ERR	High ERR	Low FRR	High FRR	Low PRR	High PRR
err	-0.6039**	-0.9754***	0.0036	-0.5382*	-0.6913**	-1.1058***	0.5969
	(0.2516)	(0.2951)	(0.3186)	(0.3205)	(0.3277)	(0.3326)	(0.4492)
frr	-2.7956***	-2.6009***	-2.9929***	-2.7626***	-2.8675***	-2.6523***	-2.9567***
	(0.2937)	(0.2590)	(0.4011)	(0.3599)	(0.3325)	(0.2724)	(0.3710)
prr	-2.5079***	-2.7513***	-2.1863***	-2.7863***	-2.1910***	-1.4701***	-4.4165***
	(0.4371)	(0.5659)	(0.5183)	(0.5330)	(0.5671)	(0.3936)	(0.7095)
vix	0.6849***	0.7475***	0.6378***	0.7035***	0.6709***	0.6926***	0.6963***
	(0.0553)	(0.0723)	(0.0619)	(0.0654)	(0.0579)	(0.0759)	(0.0454)
constant	21.7060***	22.9787***	19.1682***	22.3910***	21.0794***	18.7949***	26.0062***
	(2.2921)	(3.1251)	(3.0612)	(2.7252)	(2.3816)	(1.9357)	(3.4532)
Overall R-Squared	0.57	0.58	0.68	0.50	0.69	0.49	0.66
Observations	2,587	1,304	1,283	1,264	1,323	1,264	1,323

Note: *, ** and *** indicate significance at the 1, 5 and 10 percent level, respectively. Driscoll-Kraay robust standard errors are in parenthesis. The groups with low and high risk ratings include countries with average risk rating below and above the median of country-average ratings, respectively. Explanatory variables are in logs.
Source: authors' calculations

We also split the sample into three groups of countries based on their location in order to analyze whether the valuation of debt differs across regions (Table 6). While ERR is not significant in Europe, it remains significant in other regions. At the same time, FRR and PRR are significant in each region, but their relative importance differs across regions: FRR is more important driver of spreads in Asia and Europe, while it is of roughly the same magnitude of importance as PRR in Latin America, which is intuitive. The coefficient of VIX remains broadly the same, with European countries being the most exposed to changes in global risk aversion. The U.S. Federal funds rate is significant with negative coefficient in Asia.

Table 6. Fixed Effects Estimation Results: Regional Differences
(Dependent variable: Log of EMBIG spread)

	Asia	Europe	Latin America
err	-1.1189**	-0.3287	-0.7036*
	(0.4324)	(0.2751)	(0.3843)
frr	-4.2037***	-3.2113***	-2.4535***
	(0.5809)	(0.4365)	(0.3544)
prr	-1.9832***	-2.7213***	-2.4988***
	(0.5723)	(0.8213)	(0.6545)
vix	0.5981***	0.7576***	0.5738***
	(0.0709)	(0.0980)	(0.0909)
us ffr	-0.0704***	-0.0279	0.0211
	(0.0202)	(0.0368)	(0.0272)
constant	26.7862***	22.7008***	21.3576***
	(4.5149)	(4.0136)	(2.6008)
Overall R-Squared	0.81	0.46	0.62
Observations	676	882	1,029

Note: *, ** and *** indicate significance at the 1, 5 and 10 percent level, respectively. Driscoll-Kraay robust standard errors are in parenthesis. Explanatory variables are in logs.
Source: authors' calculations

B. Pooled Mean Group Estimation

Whole-sample estimates

We estimate equation (9) on the whole sample. We find that both country-specific and global developments are important determinants of spreads in the long run, while it is mostly the global factors that determine spreads in the short-run (Table 7). These findings are intuitive and are consistent with market behavior in the run-up to and during the recent crisis.

In the long run, both country-specific fundamentals and global factors are important drivers of spreads. The long-run coefficients of FRR and PRR remain negative and significant in the baseline specification (model 1 in Table 7), indicating that stronger fundamentals are associated with lower equilibrium risk premia. Surprisingly, the coefficient of ERR changed its sign in each model compared to the results of the fixed effects estimation, and now suggests that stronger economic fundamentals are associated with higher spreads in the long-term. However, ERR's short-term coefficient is negative, which is consistent with previous results, albeit not significant.

As regards the long-run impact of global factors, VIX has significant and positive effect on spreads. The result is again intuitive and consistent with expectations, suggesting that higher risk aversion is associated with higher equilibrium level of spreads. The U.S. Federal funds rate is not found to be a significant driver of spreads in specifications (1)-(3), which is largely consistent with the results of the fixed effects estimation.

The error correction coefficient is significant, albeit low, implying that the spread's deviation from its long-run equilibrium value is corrected at a slow rate.

In the short-run, the estimations show that each global factor has a significant effect on spreads. While VIX has positive effect both in the short- and long-run, the U.S. Federal funds rate has insignificant long-run impact with ambiguous sign and significantly negative short-run effect, i.e. a monetary policy tightening in the U.S. lowers spreads in the short-run but does not fundamentally affect them in the long-run in the specifications where all country-specific fundamentals are accounted for. Regarding country-specific fundamentals, the ERR is not significant in any specification, while the FRR and the PRR are found to be significant drivers of spreads in only one specification. The relative importance of global factors in the short-term may be due to the fact that country-specific fundamentals change slowly over time, as macroeconomic policies and structural reforms take time to bear fruit — therefore, it is the variation in global factors that should be more important in driving country spreads.

In order to assess whether the strong correlation of ERR and FRR affects their estimated coefficients, we run regressions excluding one of these variables. After the exclusion of FRR, the sign of ERR remains positive. At the same time in the specification excluding ERR, FRR becomes not significant in the long term, while remaining significant in the short term. In addition, in this specification the coefficient of the U.S. Federal funds rate becomes significantly positive in the long term, perhaps due to the fact that global liquidity conditions are partially reflected in the now-omitted country-specific fundamentals.

As the pooled mean group estimation yields country-specific short-term coefficients, it also allows for analyzing whether the sensitivity of spreads depends on country-specific fundamentals. Figure 3 plots the country-specific short-term coefficient of VIX against country average risk ratings. It shows that countries with higher average risk ratings (i.e. better fundamentals) tend to have lower sensitivity to changes in global risk aversion, which is in line with the previous section's findings.

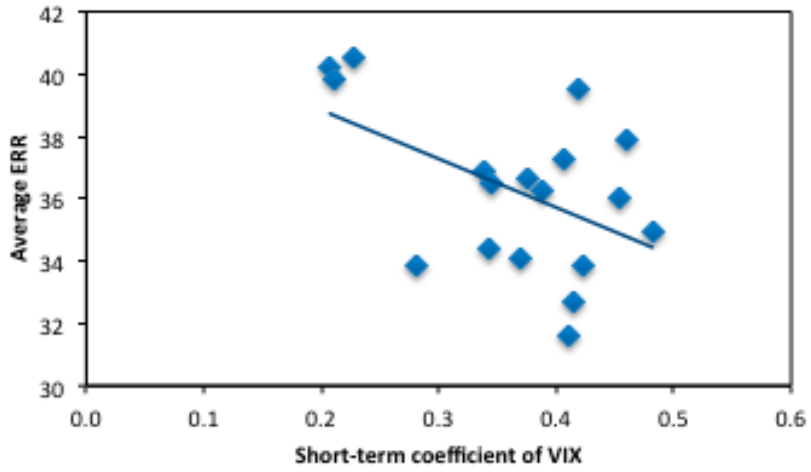
The estimation results suggest that countries could benefit by improving their fundamentals in the form of both lower spreads and lower sensitivity to adverse changes in the global market sentiment.

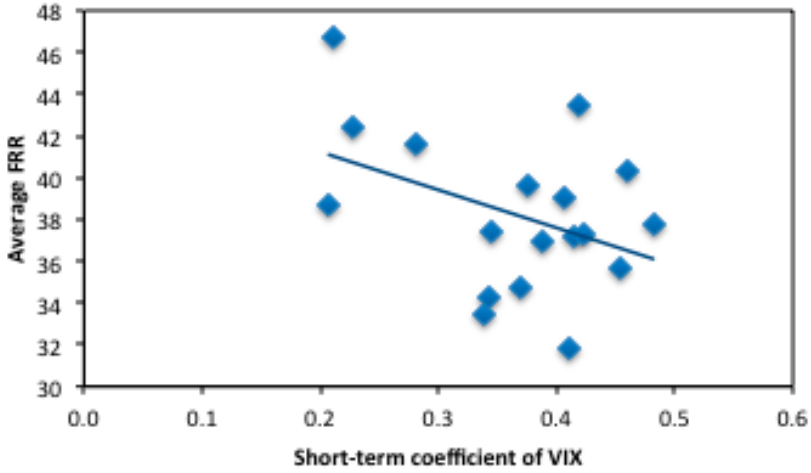
Table 7. Pooled Mean Group Estimation Results
(Dependent variable: Log of EMBIG spread)

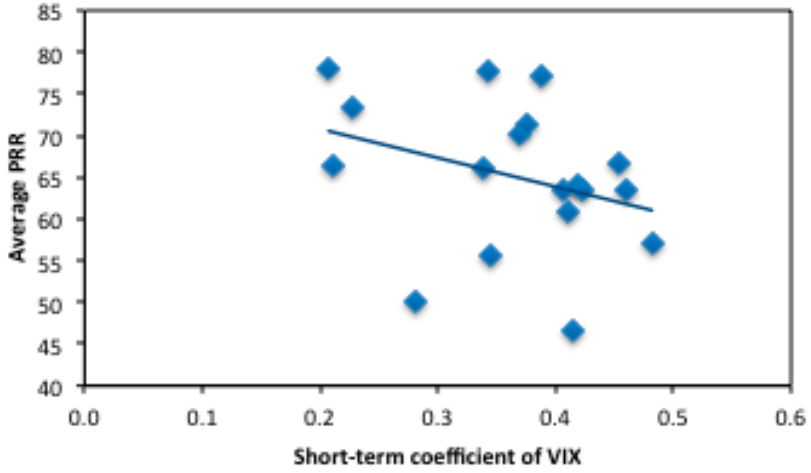
	(1)	(2)	(3)	(4)	(5)
Long-term coefficients					
err	1.1523***	1.7997***	2.4315***	1.2230***	
	(0.3686)	(0.4558)	(0.8617)	(0.3825)	
frr	-0.9512*	-1.4589***	-3.2735***		-0.5276
	(0.5024)	(0.5385)	(0.7720)		(0.4669)
prr	-2.3541***	-0.4515	-0.1350	-2.7111***	-2.4120***
	(0.5367)	(0.7301)	(1.0524)	(0.5453)	(0.5098)
vix	1.0921***	1.8636***		1.1641***	1.0529***
	(0.0795)	(0.1366)		(0.0772)	(0.0710)
us ffr	0.0288		-0.0102	0.0446**	0.0357**
	(0.0191)		(0.0340)	(0.0188)	(0.0169)
Average short-term coefficients					
error correction	-0.0620***	-0.0514***	-0.0480***	-0.0587***	-0.0650***
	(0.0109)	(0.0070)	(0.0057)	(0.0110)	(0.0118)
d.err	-0.1668	-0.1911	-0.2393	-0.2207	
	(0.1664)	(0.1701)	(0.2055)	(0.1597)	
d.frr	-0.2517	-0.1894	-0.4079**		-0.3499***
	(0.1647)	(0.1774)	(0.1704)		(0.1244)
d.prr	-0.2079	-0.3410**	-0.3454	-0.1728	-0.1740
	(0.1523)	(0.1597)	(0.2245)	(0.1509)	(0.1622)
d.vix	0.3645***	0.3539***		0.3681***	0.3673***
	(0.0198)	(0.0184)		(0.0205)	(0.0204)
d.us ffr	-0.1546***		-0.2028***	-0.1530***	-0.1571***
	(0.0164)		(0.0169)	(0.0145)	(0.0160)
constant	0.4090***	-0.2057***	0.2124***	0.2410***	0.6229***
	(0.0704)	(0.0311)	(0.0261)	(0.0439)	(0.1120)
Observations	2,568	2,568	2,568	2,568	2,568

Note: *, ** and *** indicate significance at the 1, 5 and 10 percent level, respectively. Explanatory variables are in logs.
Source: authors' calculations

Figure 3. Risk Rating Indicators and the Short-term Coefficient of VIX







Note: The charts plot country-average risk ratings against country-specific short-term coefficients of VIX (see Table A1 for country-specific short-term coefficients). The exclusion of the three most risky countries according to the ERR (top panel) would make the relationship less negative, as expected.
Source: authors' calculations

Table 8. Pooled Mean Group Estimation Results: Regional Differences
(Dependent variable: Log of EMBIG spread)

	Asia	Europe	Latin America
Long-term coefficients			
err	-0.2052	2.7300***	2.1076***
	(0.4975)	(0.7625)	(0.7175)
frr	1.6726	-2.1669**	-0.4138
	(1.1565)	(0.8989)	(0.8712)
prr	-3.5921***	2.2175*	-2.8207**
	(0.6739)	(1.3144)	(1.3914)
vix	1.0017***	1.7064***	1.0864***
	(0.0883)	(0.1887)	(0.1501)
us ffr	0.0601**	-0.0747	0.0120
	(0.0236)	(0.0459)	(0.0392)
Average short-term coefficients			
error correction	-0.0937***	-0.0611***	-0.0478***
	(0.0347)	(0.0155)	(0.0169)
d.err	-0.7103	0.0931	-0.0086
	(0.4702)	(0.1840)	(0.0984)
d.frr	-0.3029	-0.2088	-0.2517***
	(0.5357)	(0.2595)	(0.0949)
d.prr	-0.3928	-0.2232	-0.0886
	(0.3836)	(0.2931)	(0.2102)
d.vix	0.3128***	0.3648***	0.3767***
	(0.0507)	(0.0173)	(0.0384)
d.us ffr	-0.1392***	-0.1595***	-0.1413***
	(0.0185)	(0.0391)	(0.0230)
constant	0.6570**	-0.9639***	0.1551***
	(0.2541)	(0.2517)	(0.0499)
Observations	670	876	1,022

Note: *, ** and *** indicate significance at the 1, 5 and 10 percent level, respectively. Explanatory variables are in logs.
Source: authors' calculations

Split-sample estimates

Although the pooled mean group estimation allows short-term coefficients to differ across countries, we split the sample to three regions of countries in order to assess whether the long-term valuation of sovereign debt is also different across these regions (Table 8). In the long run, VIX is significant in each region, with the highest coefficient in Europe, while the U.S. Federal funds rate becomes significantly positive in Asia, suggesting that a U.S. monetary loosening tends to be associated with declining spreads of Asian countries. The FRR is significant only in Europe, while the

PRR has a significantly negative coefficient in Asia and Latin America and a surprisingly positive, albeit weakly significant, coefficient in Europe. The results suggest that investors pay more attention to liquidity indicators in Europe and to political risk factors in Asia and Latin America. The coefficient of ERR remains positive similarly to the baseline specification and loses significance in Asia. In the short run, both VIX and the U.S. Federal funds rate are significant in each specification with positive and negative coefficient, respectively, i.e. increasing global risk aversion and loosening U.S. monetary policy conditions are associated with rising spreads. The size of the coefficients of global factors is broadly the same across regions. As regards country-specific fundamentals, only FRR is significant in Latin America. The error correction term suggests that misalignment is corrected at the highest speed in Asia followed by Europe and Latin America.

VI. Comparison of Actual and Estimated Spreads

To analyze the misalignment in the valuation of emerging market sovereign debt, we compare actual and fitted spreads for each country, using the coefficients obtained from the fixed effects (model 2, Table 3) and pooled mean group estimation (model 1, Table 7). The latter estimates spreads based on the long-term coefficients of equation (9). The actual and fitted spreads from the fixed effect model are presented on Figure A1 and a similar chart for pooled mean group estimation is presented on Figure A2.

This comparison has interesting practical application, as it allows us to investigate whether emerging market bond prices were in line with their fundamentals at any given moment in time and see whether model-generated predictions of misalignment overlap with anecdotally well-established market risk-on and risk-off periods, periods of exuberance and crises. For this purpose we define misalignment as the difference between actual and fitted spreads. We expect that during risk-on periods there would be more country examples with negative misalignment—that is, countries where bond spreads were tighter than would be suggested by fundamentals. Conversely, during persistent risk-off periods, or crisis periods, there could be more cases with positive misalignment, suggesting a more cautious market pricing behavior.

Visual analysis of results in Figures A1 and A2 suggest that for the entire emerging market universe we can establish three main sub-periods, which are in line with our initial hypothesis and with the actual market experience in the recent decade:

a) *Pre-crisis period, before 2007*: our estimates show that most emerging markets had positive residuals with the exception of Bulgaria, Chile, China, Hungary, Poland, and Ukraine where markets tended to require lower spreads than justified by domestic and global factors. An example of Hungary is a notable case of misalignment, as the country was running twin deficits well into high single digits for the good part of mid-2000s, while enjoying low spreads on market financing.

b) *Crisis mostly confined to industrial country financial systems, 2007– fall 2008*: most emerging market countries had negative residuals. This is possibly reflecting the fact that during the initial part of the crisis, up until the fall of

2008, it was believed that the crisis could be confined to the industrial country financial systems and emerging markets were successfully decoupling. Hence markets put a positive premium on emerging market sovereign debt.

c) *Broad-based crisis, since late 2008*: the majority of emerging market countries has had positive residuals, suggesting an increasingly cautious pricing behavior of market participants.[11] In the fall of 2008, or roughly after the Lehman collapse, the crisis that was initially confined to industrial country financial systems has broadened dramatically: global growth tumbled and crisis spread to emerging markets, especially Emerging Europe due to its strong trade and financial ties with Developed Europe as well as accumulated domestic imbalances in many countries. Again, there were a few countries such as Indonesia and Turkey that had negative residuals in this period based on the results of both models, consistent with anecdotal evidence that markets were placing positive premiums on perceived top performers or safe heavens within the emerging market universe.

The emerging market universe, however, is rather heterogeneous in terms of fundamentals and experiences in the run-up to the crisis. In particular, while most emerging markets enjoyed strong growth pre-crisis, Emerging Europe was one of the fastest-growing regions, on the back of strong capital inflows, which boosted domestic demand, and in many cases increased public and/or private sector leverage. As a result, many European countries entered the crisis with significant macroeconomic imbalances, weak public finances, and relatively modest reserve coverage (Figure 4) and were hit hard by a sudden stop in capital inflows. At the same time, emerging markets in Asia and Latin America were running current account and fiscal surpluses and accumulating fiscal and external buffers and thus were more sheltered from the crisis (Figure 5).

Hence it would be interesting to analyze market pricing behavior across different regions:

a) In the case of the *Latin American* countries, we see two distinct periods for Brazil, Colombia and Peru: actual spreads were higher than predicted ones between 2001 and 2006, with the difference turning into negative or decreasing to around zero in the FE and PMG estimation, respectively, between 2006 and 2012. Comelli (2012) argues that the switch of misalignment from negative to positive in the CEE region and from positive to negative in these Latin American countries between the first and second half of the decade may suggest that international bond investors shifted their portfolio from the first to the latter region. Neither Chile nor Mexico had sizeable misalignment throughout the whole period. Estimation results are inconclusive for Argentina in 2002 and 2003, i.e. at the beginning of the debt restructuring period, and show positive residual in the second part of the this period. The residual becomes negative between 2005 and 2011 in line with the

[11] According to the fixed effects estimation, roughly half of the countries had positive residuals, while the pooled mean group estimation found an overwhelming majority of countries to have positive misalignment.

valuation of the sovereign debt of other regional countries; before turning into positive territory again in 2012, possibly reflecting increased uncertainty about domestic policies. Like most Latin American countries, Venezuela also had negative residual in 2006 and 2007; however, it followed Argentina with sizeable positive residual at the end of the estimation period. Estimation results are inconclusive in other periods.

Figure 4. Emerging Europe: Pre-Crisis Imbalances

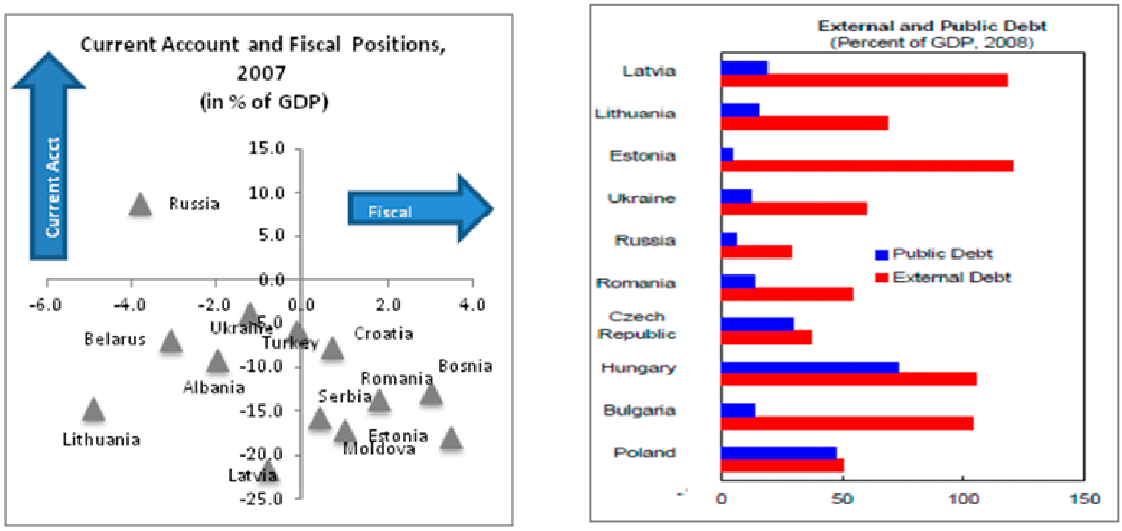
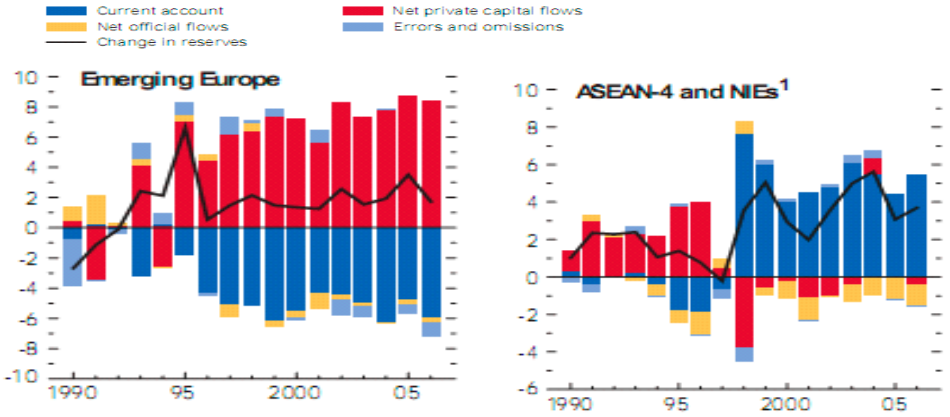


Figure 5. Balance of Payments: Emerging Markets in Asia and Europe



[1]ASEAN-4 countries include Indonesia, Malaysia, the Philippines, and Thailand. Newly industrialized Asian economies (NIEs) include Hong Kong SAR, Korea, Singapore, and Taiwan Province of China.

b) In *Asia*, Indonesia and Malaysia did not have substantial misalignment in the estimation period. Philippines followed the same pattern as Brazil, Colombia and Peru, i.e. the residual was strongly positive and negative/slightly positive in the first and second half of the decade, respectively. China and Pakistan had lower than predicted spreads in the period preceding the crisis, while their spreads increased to above the level implied by fundamentals and global factors between 2010 and 2012.

c) In the *CEE region*, Bulgaria, Hungary and Poland had lower spreads than the fitted ones in the 3-4-year period before the crisis. Luengnaruemitchai and Schadler (2007) call this phenomenon the "EU Halo" effect suggesting that risk perception was lowered by several benefits that market participants associated with the European Union membership. Since 2007, the results are inconclusive as regards the sign of misalignment in Bulgaria, while Poland and Hungary had positive residuals during this period. An important difference is that while the misalignment was small in Poland, Hungary showed substantial residual in the short period following the bankruptcy of Lehman and after 2010. In the first period, there was an intense market pressure on Hungary that resulted in the country resorting to the EU and the IMF. In the second period, the authorities introduced a set of unorthodox policy measures that resulted in an uncertain business environment, an important factor that is not easily incorporated into conventional measures of economic or political fundamentals.[12] Developments in spreads in Turkey were similar to those in Brazil, Colombia, Peru and Philippines in terms of the sign of misalignment. The results are inconclusive for Russia and Ukraine with the two models showing opposite signs of residuals since 2009.

The results show that the sign of misalignment is similar in the case of the fixed effects and pooled mean group estimations in most countries[13], but the magnitude of misalignment is sometimes different.

VII. DECOMPOSITION OF CHANGES IN SPREADS

Based on the estimated models, we also decompose changes in spreads in order to understand whether the substantial decline in the second half of 2012 was due to improving fundamentals and/or global factors. In addition to the breakdown of fitted changes in spreads into the contribution of fundamentals and global factors as common in the literature, we also decompose changes in the residual into correction of initial misalignment and increase in misalignment. The rationale is that the change

[12] For example, there was a spike in misalignment in the autumn of 2011 when a scheme was introduced that allowed households to repay their foreign currency denominated mortgage loans at preferential exchange rate, thereby causing a sizeable loss for the banking sector. Due to retroactive unilateral revisions of private contracts, the scheme raised concerns about the rule of law in Hungary. Such a development would not be captured by either ERR, which includes economic indicators only, or PRR, which includes such conventional measures of political risk as, for example, government instability or the risk of internal or external conflicts, all of which are low in Hungary.

[13] The sign of misalignment is the same in the case of 72 percent of total observations.

in residual can reflect either an increase in the absolute value of the residual (increase in misalignment), a decrease in the absolute value of the residual (correction of misalignment), or their combination (see Table 9). For example, the interpretation of a decrease in the residual is different if it declines from a higher to a lower positive value or if it falls from positive to negative territory: debt remains undervalued in the previous case, while it becomes overvalued from undervalued in the latter case.

Table 9. Decomposition of Changes in the Residual

Sign of the regression residual			Contribution to change in spread	
Base period		Current period	Correction of misalignment	Increase in misalignment
+	>	+	$e_t - e_0$	0
+	<	+	0	$e_t - e_0$
-	>	-	0	$e_t - e_0$
-	<	-	$e_t - e_0$	0
+		-	$-e_0$	e_t
-		+	$-e_0$	e_t

Note: e_0 and e_t denote the difference between actual and fitted spreads in the base and current period, respectively.

Table 10 and 11 show the decomposition of changes in spreads based on the FE and the PMG estimation, respectively. The country-by-country decompositions of changes in spreads are presented in the Appendix (Tables A2 and A3). We divided the sample period into 7 sub-periods characterized by a general decrease or increase in spreads across countries, as compared to the previous period (incidentally, the periods identified in this analysis also correspond to the periods in the previous section). Specifically:

- *In the pre-crisis period (January 2001–August 2007),* the models explain just above half of the average compression in emerging market spreads. The model-based spread decline was driven by both improving domestic and global factors, with FE estimate associating larger improvement with country-specific and PMG with global factors. The excessive spread compression—the part not explained by either fundamentals or global factors or misalignment—reflected: (i) a correction of a significant undervaluation of emerging market debt that existed at the beginning of 2001, most probably related to events such as the burst of the dotcom bubble and/or emerging market crisis episodes of the end-1990s, and (ii) an overvaluation that emerged during an extended period of favorable global market environment, which lasted until the unfolding of the sub-prime crisis in the middle of 2007.

- *Between July 2007 and late summer of 2008*, emerging market spreads increased somewhat, most likely reflecting the then-existing expectation that the emerging markets would be immune to the sub-prime crisis that engulfed industrial country financial markets. The two models explain between 30 and 50 percent of spread increases, driven by both deteriorating global factors and

domestic fundamentals. The unexplained part of the increase in spreads was driven by the elimination of the initial overvaluation and the emergence of undervaluation, with the latter likely explained by increasing market concerns about the riskiness of emerging market debt.

- *The default of Lehman Brothers in 2008* marked a pivotal turn in the global crisis, turning it from a mature-market crisis to a global growth crisis. Amid soaring global risk aversion, rapidly collapsing financial flows and import demand from industrial countries depressed growth prospects in emerging markets, especially in Europe. This, coupled with accumulated macroeconomic imbalances in many emerging markets economies, led to sharp increases in borrowing costs and, in some cases, market dislocations, banking sector problems and concerns about sovereign solvency. Emerging market spreads increased sharply. Our two models explain 76 and 93 percent of this increase, respectively, driven mostly by the sharp deterioration in global factors as well as worsening country fundamentals. The small unexplained part was mostly due to increasing undervaluation, perhaps as most of the earlier misalignment was corrected in the previous period.

Table 10. Fixed Effects Estimation: Decomposition of Changes in Spreads
(percentage points)

	01/2001-07/2007	07/2007-08/2008	08/2008-12/2008	12/2008-04/2010	04/2010-07/2011	07/2011-06/2012	06/2012-03/2013
Actual	-4.83	1.65	5.50	-6.18	0.62	1.32	-1.14
Model	-2.46	0.83	4.18	-4.19	-0.29	0.50	-0.88
Fundamentals	-1.64	0.50	1.05	-0.55	-0.49	0.30	0.07
Global factors	-0.82	0.33	3.13	-3.64	0.20	0.20	-0.95
Residual	-2.37	0.81	1.32	-2.00	0.90	0.82	-0.26
Correction of misalignment	-1.79	0.45	0.19	-1.44	0.47	0.13	-0.30
Increase of misalignment	-0.58	0.36	1.13	-0.55	0.44	0.69	0.05

Note: The decomposition is based on model 2 in Table 3 and is calculated as the average of the contribution of fundamentals and global factors across countries. Changes in spreads are calculated as compared to the previous period.
Source: authors' calculations

Table 11. Pooled Mean Group Estimation: Decomposition of Changes in Spreads
(percentage points)

	01/2001-07/2007	07/2007-08/2008	08/2008-12/2008	12/2008-04/2010	04/2010-07/2011	07/2011-06/2012	06/2012-03/2013
Actual	-4.83	1.65	5.50	-6.18	0.62	1.32	-1.14
Model	-1.59	0.48	5.13	-5.84	0.23	0.50	-1.19
Fundamentals	-0.33	0.03	0.36	-0.45	0.03	0.17	0.03
Global factors	-1.25	0.45	4.77	-5.39	0.20	0.33	-1.22
Residual	-3.24	1.17	0.37	-0.34	0.39	0.82	0.05
Correction of misalignment	-2.69	0.57	-0.08	-0.55	-0.05	0.12	-0.33
Increase of misalignment	-0.55	0.60	0.44	0.21	0.44	0.70	0.39

Note: The decomposition is based on model 1 in Table 7 and is calculated as the average of the contribution of fundamentals and global factors across countries. Changes in spreads are calculated as compared to the previous period.
Source: authors' calculations

- *The period from early 2009 to April 2010* is characterized by substantial spreads tightening, retracting from the post-Lehman peaks. The two models explain 70 and over 90 percent the tightening, respectively. The correction reflected mostly an improvement in global market sentiment, with some impact of improving fundamentals. In fact, during that period many countries in Emerging Europe—the emerging region most affected by the crisis—were making progress at correcting macroeconomic imbalances and reducing vulnerabilities, several of them under the EU-IMF programs. As regards the unexplained part, it was mostly driven by the reduction in the undervaluation, which is also intuitive.

- During the following period, *April 2010 to June 2012*, the emerging markets experienced a substantial increase in spreads. This period coincides with flaring up of the Eurozone debt crisis, with its many ups and downs. During the first half of this period, up to mid-2011, the spreads increased more moderately driven by deteriorating global risk perception and country-specific fundamentals. In fact, during this period the European debt crisis took on many different turns, with Greece, Ireland, and Portugal all asking for the EU-IMF assistance, which at first supported market confidence albeit at already weak levels. Starting mid-2011, the spreads increased sharply, driven by the worsening global risk perception and weakening domestic fundamentals as well as a substantial increase in misalignment. It is notable that the share of the increases in spreads explained by the model is lower in this period, around forty percent, while the importance of misalignment is the highest. This may be due to the fact that the Eurozone crisis took on many cliff-hanging twists and turns, especially during the period between April 2011 and June 2012. In fact, during that period, Greece was increasingly underperforming in its first official bailout program and eventually needing a second IMF-EU program, which was negotiated in February 2012; this turbulent period was followed by the restructuring of the private sector debt to Greece, then by the elevated uncertainty about Greek euro-membership after inconclusive elections in May 2012; and by Spain requesting an EU program to deal with its banking sector issues by mid-2012.

- *Starting from June 2012 up to the end of our sample in March 2013*, spreads narrowed substantially across emerging markets. The fixed effects estimation explains around three quarters of the decrease in spreads while the PMG model explains the entire tightening. It is notable that, according to both models, this tightening is almost entirely driven by an improvement in the global factors. As regards the small unexplained part of the fall, it mostly reflected the correction of the misalignment (in this case undervaluation) of emerging market debt but also led to a slight overvaluation in some countries (Table A2 and A3). These results are in line with an observed improvement in global market sentiment reflecting decreasing worries about the Euro Area debt crisis and several liquidity-enhancing measures by developed countries' central banks. In particular, the European Central Bank's announced of the Outright Monetary Transactions (OMT) program in September that includes the conditional purchase of Euro Area sovereign bonds in an unlimited amount

at the secondary market. The Federal Reserve also resorted to a new bond purchase program and to keeping rates at exceptionally low level at least until the middle of 2015. The Bank of Japan also announced further monetary easing. Market sentiment was also supported by the outcome of Greek elections in the middle of the year and the ruling of the German constitutional court regarding the European Stability Mechanism in September. As a result of improving market sentiment and ample global liquidity due to the easy monetary policy stance in industrial countries, emerging market debt experienced a remarkable rally. At the very end of the sample, in January-March 2013, there was a small increase in spreads, most likely due to the rising concerns about the situation in Cyprus.

VIII. CONCLUSIONS

Using a database consisting of 18 emerging markets around the world, we find that both country-specific fundamentals and global factors are important determinants of spreads on foreign currency denominated sovereign debt; however, the relative importance of global factors is much more important in the short run. We also find that beyond its impact on the level of spreads, the strength of fundamentals also affects the sensitivity of the given country's risk premium to global factors: countries with stronger economic and financial indicators tend to have lower sensitivity to changes in global risk aversion.

The analysis of the decomposition of changes in spreads into model-based part and misalignment shows that improvements in global factors and country-specific fundamentals explain just more than a half of the tightening of the spreads during the pre-crisis period. The other half of the tightening was driven both by the correction of the earlier misalignment (in this case, underpricing of emerging market debt), as well as an accumulation of misalignment during the boom years.

The changes in spreads during the crisis follow periods of tightening and widening which are well-explained by the model and are intuitive. In addition, the dynamics of the components of the unexplained residual intuitively follow all the major developments of the current crisis that in turn impact market sentiment. We find that in periods of severe market stress and general lack of understanding of country-specific developments, such as during the intensive phase of the Eurozone debt crisis, global factors tend to drive the changes in spreads and misalignment tends to increase in magnitude and drive actual spreads.

We also analyzed whether the decline in emerging market spreads in the second half of 2012 was driven by an improvement in country-specific or global factors. On average across emerging markets, the decrease in spreads implied by the pooled mean group estimation is broadly in line with actual decline between the middle of 2012 and the beginning of 2013. The fixed effects estimation explains around three quarters of the decrease in spreads and reveals that the unexplained fall mostly reflected the correction of the undervaluation of emerging market debt at the beginning of this period but also led to a small overvaluation in some countries. These countries should therefore be cautious when interpreting the recent massive inflow of funds and the decline in spreads, as (i) the fall in spreads reflects an improvement in fundamentals

only up to a small extent; (ii) spreads are lower than implied by domestic and global conditions in some countries; (iii) the sensitivity of spreads to global factors is high, especially in the case of countries with weak fundamentals, implying that an eventual withdrawal of monetary stimulus by the industrial central banks and/or sentiment reversal can lead to a reversal of the decline in spreads. Despite recent favorable global conditions, countries should thus continue to focus on improving their fundamentals that can be beneficial in the form of both lower sovereign spreads and lower sensitivity of spreads to possible adverse changes in the global environment.

REFERENCES

Alexopoulou, I., I. Bunda, and A. Ferrando, 2009, "Determinants of Government Bond Spreads in New EU Countries", ECB Working Paper No. 1093

Arora, V., and M. Cerisola, 2001, "How Does U.S. Monetary Policy Influence Sovereign Spreads in Emerging Markets?", IMF Staff Papers, Vol. 48, No. 3

Baldacci, E., S. Gupta, and A. Mati, 2008, "Is it (Still) Mostly Fiscal? Determinants of Sovereign Spreads in Emerging Markets", IMF Working Paper, WP/08/259

Baldacci, E., and M. S. Kumar, 2010, "Fiscal Deficits, Public Debt, and Sovereign Bond Yields", IMF Working Paper, WP/10/184

Bellas, D., M. G. Papaioannou, and I. Petrova, 2010, "Determinants of Emerging Market Sovereign Bond Spreads: Fundamentals vs Financial Stress", IMF Working Paper, WP/10/281

Breusch, T. S., and A. R. Pagan, 1980, "The Lagrange Multiplier Test and its Applications to Model Specification in Econometrics", The Review of Economic Studies, Vol. 47, No. 1, pp. 239-253

Comelli, F., 2012, "Emerging Market Sovereign Bond Spreads: Estimation and Back-testing", IMF Working Paper, WP/12/212

Driscoll, J. C., and A. C. Kraay, 1998, "Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data", The Review of Economics and Statistics, Vol. 80, No. 4, pp. 549–560

Dumicic, M., and T. Ridzak, 2011, "Determinants of Sovereign Risk Premia for European Emerging Markets", Financial Theory and Practice, Vol. 35, No. 3, pp. 277–299

Ebner, A., 2009, "An empirical analysis on the determinants of CEE government bond spreads", Emerging Markets Review, Vol. 10, pp. 97-121

Edwards, S., 1985, "The Pricing of Bonds and Bank Loans in International Markets: An Empirical Analysis of Developing Countries' Foreign Borrowing", NBER Working Paper No. 1689

Eichengreen, B., and A. Mody, 1998, "What Explains Changing Spreads on Emerging Market Debt: Fundamentals or Market Sentiment?", NBER Working Paper No. 6408

Ferrucci, G., 2003, "Empirical Determinants of Emerging Market Economies' Sovereign Bond Spreads", Bank of England Working Paper No. 205

González-Rozada, M., and E. Levy-Yeyati, 2005, "Global Factors and Emerging Market Spreads", Centro de Investigación en Finanzas, Documento de Trabajo 07/2005

González-Rozada, M., and E. Levy-Yeyati, 2011, "Risk Appetite and Emerging Market Spreads", Centro de Investigación en Finanzas, Documento de Trabajo 03/2011

Hartelius, K., K. Kashiwase, and L. E. Kodres, 2008, "Emerging Market Spread Compression: Is it Real or is it Liquidity?", IMF Working Paper, WP/08/10

Jaramillo, L., and C. M. Tejada, 2011, "Sovereign Credit Ratings and Spreads in Emerging Markets: Does Investment Grade Matter?", IMF Working Paper, WP/11/44

Jaramillo, L., and A. Weber, 2012, "Bond Yields in Emerging Economies: It Matters What State You Are In", IMF Working Paper, WP/12/198

Levy-Yeyati, E., and T. Williams, 2010, "US Rates and Emerging Markets Spreads", Universidad Torcuato Di Tella, Business School Working Papers 02/2010

Luengnaruemitchai, P., and S. Schadler, 2007, "Do Economists' and Financial Markets' Perspectives on the New Members of the EU differ?", IMF Working Paper, WP/07/65

Nickel, C., P. C. Rother, and J. C. Rülke, 2009, "Fiscal Variables and Bond Spreads: Evidence from Eastern European Countries and Turkey", ECB Working Paper No. 1101

Peiris, S. J., 2010, "Foreign Participation in Emerging Markets' Local Currency Bond Markets", IMF Working Paper, WP/10/88

Pesaran, M. H., Y. Shin, and R. P. Smith, 1999, "Pooled Mean Group Estimation of Dynamic Heterogeneous Panels", Journal of the American Statistical Association, Vol. 94, No. 446, pp. 621–634

Phillips, P. C. B., and H. R. Moon, 2000, "Linear Regression Limit Theory for Nonstationary Panel Data", Cowles Foundation Paper No. 986

Westerlund, J., 2007, "Testing for Error Correction in Panel Data", Oxford Bulletin of Economics and Statistics 69, pp. 70–748

APPENDIX

Table A1. Pooled Mean Group Estimation: Short-term Coefficients[14]

	error correction	d.err	d.frr	d.prr	d.vix	d.us ffr	constant
Argentina	-0.0341*	-0.0359	0.0587	-0.1592	0.3381***	-0.2127**	0.2807
	(0.0195)	(0.3989)	(0.2747)	(1.1768)	(0.1031)	(0.1015)	(0.1974)
Brazil	-0.0151	-0.1775	-0.4762**	-0.4626	0.4545***	-0.1095***	0.0989
	(0.0120)	(0.2914)	(0.1888)	(0.4644)	(0.0418)	(0.0405)	(0.0996)
Bulgaria	-0.0792***	0.2835	-0.6380	0.0667	0.3699***	-0.2327***	0.5151**
	(0.0186)	(0.4321)	(0.4219)	(0.7597)	(0.0568)	(0.0516)	(0.2585)
Chile	-0.1436***	0.3307	-0.4784	-0.5964	0.2075***	-0.0576	0.9229*
	(0.0332)	(0.2360)	(0.3679)	(0.7455)	(0.0484)	(0.0404)	(0.4944)
China	-0.0643**	-2.1903**	1.9864	-0.2759	0.2121***	-0.1284*	0.3813
	(0.0285)	(0.8643)	(2.0029)	(1.0022)	(0.0755)	(0.0716)	(0.2591)
Colombia	-0.0326**	0.2504	-0.3178	1.0391***	0.4817***	-0.1216***	0.2039
	(0.0161)	(0.3642)	(0.2949)	(0.3751)	(0.0469)	(0.0446)	(0.1482)
Hungary	-0.0130	0.9061*	-0.9982*	0.9586	0.3433***	-0.2096**	0.0867
	(0.0176)	(0.5317)	(0.5455)	(1.3662)	(0.0954)	(0.0923)	(0.1192)
Indonesia	-0.1585***	-1.4993***	-0.7302**	-0.3172	0.3450***	-0.1030**	1.0486*
	(0.0350)	(0.5043)	(0.3602)	(0.6165)	(0.0582)	(0.0434)	(0.5449)
Malaysia	-0.1504***	-0.1233	-0.1420	-0.0564	0.2279***	-0.1064***	0.9655*
	(0.0330)	(0.1813)	(0.6147)	(0.6801)	(0.0479)	(0.0389)	(0.5219)
Mexico	-0.0797***	-0.0402	-0.2199	-0.5356	0.3767***	-0.0811**	0.5403*
	(0.0233)	(0.1489)	(0.2841)	(0.5687)	(0.0387)	(0.0330)	(0.2951)
Pakistan	-0.0310*	-0.0157	-0.9851*	-1.8320***	0.4154***	-0.1844***	0.2043
	(0.0187)	(0.5582)	(0.5227)	(0.5791)	(0.0650)	(0.0608)	(0.1562)
Peru	-0.0288*	-0.4364	-0.4216	0.0803	0.4602***	-0.1857***	0.1828
	(0.0160)	(0.3944)	(0.7271)	(0.6635)	(0.0504)	(0.0491)	(0.1405)
Philippines	-0.0148	0.1454	-0.7360*	0.4070	0.4062***	-0.1524***	0.0912
	(0.0123)	(0.2756)	(0.3891)	(0.4471)	(0.0386)	(0.0372)	(0.0958)
Poland	-0.0693***	-0.7298	-0.0442	-0.6312	0.3872***	-0.1313**	0.4390*
	(0.0234)	(0.6561)	(0.2877)	(0.9727)	(0.0670)	(0.0612)	(0.2516)
Russia	-0.0701***	0.0831	-0.8702**	-0.1741	0.4198***	-0.2058***	0.4661*
	(0.0161)	(0.1271)	(0.4006)	(0.5395)	(0.0436)	(0.0382)	(0.2535)
Turkey	-0.0308**	-0.0647	-0.2720	-0.8384**	0.4105***	-0.0458	0.2071
	(0.0136)	(0.1015)	(0.1772)	(0.3758)	(0.0471)	(0.0456)	(0.1323)
Ukraine	-0.0563***	0.1011	0.6211*	-0.3909	0.4227***	-0.3216***	0.4075*
	(0.0187)	(0.2211)	(0.3763)	(0.5452)	(0.0648)	(0.0641)	(0.2262)
Venezuela	-0.0437***	0.2097**	0.1326	-0.0246	0.2819***	-0.1938***	0.3195*
	(0.0136)	(0.1010)	(0.1582)	(0.2930)	(0.0416)	(0.0388)	(0.1681)

[14] Model 1 in Table 7

Table A2. Fixed Effects Estimation: Decomposition of Changes in Spreads[15]

	01/2001-07/2007	07/2007-08/2008	08/2008-12/2008	12/2008-04/2010	04/2010-07/2011	07/2011-06/2012	06/2012-03/2013	01/2001-07/2007	07/2007-08/2008	08/2008-12/2008	12/2008-04/2010	04/2010-07/2011	07/2011-06/2012	06/2012-03/2013
	Argentina							Brazil						
Actual	-3.46	3.13	11.60	-11.99	-0.35	5.34	0.78	-5.48	0.66	2.44	-3.03	-0.12	0.54	-0.39
Model	-10.10	2.94	9.49	-11.25	-1.50	1.68	-0.75	-4.78	0.49	4.89	-6.01	0.56	0.74	-1.52
Fundamentals	-7.58	2.05	1.24	-2.37	-1.93	1.27	1.51	-3.67	0.16	1.72	-2.91	0.42	0.57	-0.77
Global factors	-2.53	0.89	8.25	-8.88	0.42	0.41	-2.26	-1.11	0.33	3.17	-3.10	0.14	0.18	-0.75
Residual	6.64	0.19	2.11	-0.74	1.16	3.66	1.53	-0.70	0.16	-2.45	2.98	-0.69	-0.20	1.13
Correction of misalignment	6.64	0.19	2.11	0.00	0.74	0.00	0.00	0.00	0.16	0.00	2.98	0.00	0.00	0.93
Increase of misalignment	0.00	0.00	0.00	-0.74	0.42	3.66	1.53	-0.70	0.00	-2.45	0.00	-0.69	-0.20	0.20
	Bulgaria							Chile						
Actual	-6.31	1.60	4.63	-5.36	0.63	0.58	-1.81	-1.21	0.83	1.78	-2.40	0.18	0.48	-0.32
Model	-1.30	1.07	3.29	-3.54	0.29	-0.36	-0.71	-0.93	0.27	1.99	-2.09	0.39	0.12	-0.63
Fundamentals	-0.84	0.85	0.90	-0.84	0.14	-0.50	-0.17	-0.61	0.15	0.74	-0.65	0.31	0.02	-0.22
Global factors	-0.47	0.22	2.39	-2.70	0.15	0.14	-0.54	-0.32	0.12	1.26	-1.44	0.08	0.10	-0.40
Residual	-5.01	0.53	1.34	-1.82	0.34	0.94	-1.09	-0.28	0.56	-0.21	-0.31	-0.21	0.36	0.31
Correction of misalignment	-4.45	0.53	0.02	-1.33	0.34	0.15	-0.78	-0.28	0.00	-0.21	-0.31	-0.06	0.15	0.00
Increase of misalignment	-0.55	0.00	1.33	-0.50	0.00	0.78	-0.31	0.00	0.56	0.00	0.00	-0.15	0.21	0.31
	China							Colombia						
Actual	-0.84	0.91	0.79	-1.92	1.25	1.08	-1.23	-5.90	0.86	3.16	-3.65	-0.31	0.31	-0.31
Model	-0.67	0.13	0.75	-0.74	0.23	0.08	-0.35	-2.27	0.05	3.49	-4.40	-0.16	0.04	-0.38
Fundamentals	-0.42	0.03	0.00	0.16	0.17	0.01	-0.02	-1.29	-0.31	0.67	-1.56	-0.29	-0.08	0.17
Global factors	-0.25	0.10	0.75	-0.90	0.07	0.07	-0.33	-0.98	0.36	2.81	-2.84	0.13	0.12	-0.55
Residual	-0.17	0.78	0.04	-1.18	1.02	1.00	-0.89	-3.63	0.81	-0.33	0.75	-0.14	0.27	0.07
Correction of misalignment	-0.06	0.11	0.00	-0.70	0.48	0.00	-0.89	-2.14	0.81	0.00	0.75	0.00	0.27	0.07
Increase of misalignment	-0.11	0.67	0.04	-0.48	0.53	1.00	0.00	-1.50	0.00	-0.33	0.00	-0.14	0.00	0.00
	Hungary							Indonesia						
Actual	-0.54	0.87	3.34	-3.31	1.37	2.92	-2.07		1.67	4.87	-6.43	-0.08	1.04	-0.78
Model	-0.16	0.11	1.41	-1.20	-0.24	1.14	-0.98		0.31	3.23	-3.13	0.03	0.86	-1.28
Fundamentals	0.11	-0.02	0.30	0.22	-0.32	1.03	-0.42		0.04	0.89	-0.31	-0.13	0.68	-0.42
Global factors	-0.28	0.13	1.11	-1.42	0.08	0.10	-0.56		0.26	2.34	-2.82	0.16	0.18	-0.86
Residual	-0.37	0.75	1.92	-2.11	1.61	1.78	-1.09		1.37	1.64	-3.30	-0.11	0.18	0.50
Correction of misalignment	-0.06	0.31	0.00	-2.11	0.00	0.00	-1.09		0.16	0.00	-2.84	0.00	0.18	0.39
Increase of misalignment	-0.31	0.45	1.92	0.00	1.61	1.78	0.00		1.21	1.64	-0.46	-0.11	0.00	0.11
	Malaysia							Mexico						
Actual	-1.46	0.76	2.40	-2.74	0.21	0.39	-0.60	-2.66	0.82	2.63	-3.01	0.00	0.59	-0.42
Model	-1.04	0.28	1.40	-1.56	0.21	0.12	-0.41	-1.53	0.35	2.50	-2.46	-0.05	1.02	-1.26
Fundamentals	-0.66	0.14	0.18	-0.19	0.12	0.03	0.01	-1.03	0.16	0.76	-0.38	-0.16	0.88	-0.61
Global factors	-0.37	0.14	1.23	-1.37	0.08	0.09	-0.42	-0.50	0.18	1.73	-2.08	0.11	0.14	-0.65
Residual	-0.43	0.48	1.00	-1.18	0.00	0.27	-0.19	-1.14	0.47	0.13	-0.55	0.05	-0.43	0.84
Correction of misalignment	-0.19	0.23	0.00	-1.18	0.00	0.00	-0.19	-0.99	0.14	0.00	-0.46	0.05	0.00	0.47
Increase of misalignment	-0.23	0.25	1.00	0.00	0.00	0.27	0.00	-0.14	0.33	0.13	-0.09	0.00	-0.43	0.36
	Pakistan							Peru						
Actual		5.91	12.53	-16.57	3.89	2.53	-1.13	-5.30	0.66	3.28	-3.80	0.27	0.17	-0.49
Model		5.18	7.07	-12.16	0.55	0.69	-0.67	-1.87	0.49	2.46	-2.72	-0.08	0.17	-0.73
Fundamentals		4.34	-1.15	-5.06	0.22	0.34	1.15	-1.19	0.23	0.26	-0.25	-0.22	0.04	-0.13
Global factors		0.84	8.22	-7.10	0.33	0.36	-1.82	-0.68	0.26	2.20	-2.47	0.14	0.14	-0.60
Residual		0.73	5.46	-4.41	3.34	1.84	-0.46	-3.43	0.17	0.83	-1.08	0.35	0.00	0.25
Correction of misalignment		0.73	0.87	-4.41	0.00	0.00	-0.46	-2.84	0.17	0.42	-0.41	0.35	0.00	0.25
Increase of misalignment		0.00	4.60	0.00	3.34	1.84	0.00	-0.59	0.00	0.41	-0.67	0.00	0.00	0.00
	Philippines							Poland						
Actual	-4.65	0.94	3.03	-3.77	-0.21	0.56	-0.78	-1.59	0.69	1.78	-1.97	0.65	0.61	-1.11
Model	-3.61	0.23	4.61	-5.09	-0.44	0.30	-0.94	-0.35	0.17	1.56	-1.54	0.34	-0.24	-0.37
Fundamentals	-2.48	-0.15	1.35	-1.50	-0.60	0.14	-0.28	-0.07	0.04	0.42	-0.16	0.25	-0.33	-0.02
Global factors	-1.13	0.38	3.25	-3.59	0.16	0.15	-0.67	-0.28	0.13	1.14	-1.37	0.09	0.09	-0.35
Residual	-1.04	0.72	-1.57	1.33	0.23	0.27	0.16	-1.24	0.52	0.21	-0.44	0.31	0.85	-0.74
Correction of misalignment	0.00	0.72	0.00	1.33	0.23	0.27	0.16	-0.92	0.32	0.00	-0.41	0.03	0.00	-0.74
Increase of misalignment	-1.04	0.00	-1.57	0.00	0.00	0.00	0.00	-0.32	0.20	0.21	-0.03	0.29	0.85	0.00
	Russia							Turkey						
Actual	-9.69	1.00	6.45	-6.95	0.61	0.88	-1.18	-5.43	1.11	2.87	-3.86	0.12	1.14	-1.25
Model	-4.09	0.36	2.37	-2.37	0.09	0.98	-1.24	-2.62	0.70	6.59	-7.05	0.33	0.98	-2.26
Fundamentals	-3.20	0.11	0.27	0.12	-0.07	0.80	-0.37	-1.71	0.35	2.86	-2.91	0.13	0.75	-1.36
Global factors	-0.89	0.26	2.10	-2.48	0.15	0.18	-0.88	-0.91	0.35	3.73	-4.15	0.19	0.23	-0.90
Residual	-5.60	0.63	4.08	-4.58	0.52	-0.10	0.06	-2.81	0.41	-3.71	3.20	-0.21	0.16	1.01
Correction of misalignment	-4.82	0.63	0.14	-3.94	0.52	0.00	0.06	-2.30	0.41	0.00	3.20	0.00	0.16	0.66
Increase of misalignment	-0.78	0.00	3.94	-0.64	0.00	-0.10	0.00	-0.51	0.00	-3.71	0.00	-0.21	0.00	0.35
	Ukraine							Venezuela						
Actual	-17.15	3.73	20.31	-21.15	0.28	4.35	-3.67	-5.52	3.46	11.07	-9.37	2.67	0.26	-3.74
Model	-3.06	0.65	13.17	-12.23	0.91	0.65	-3.17	-0.92	1.21	4.96	4.20	-6.65	0.00	1.78
Fundamentals	-1.78	0.15	7.16	-4.53	0.52	0.23	-1.48	0.18	0.65	0.30	13.29	-7.36	-0.50	4.59
Global factors	-1.27	0.50	6.01	-7.70	0.39	0.42	-1.69	-1.09	0.56	4.66	-9.09	0.72	0.49	-2.81
Residual	-14.09	3.09	7.14	-8.92	-0.63	3.70	-0.50	-4.60	2.26	6.12	-13.57	9.32	0.26	-5.52
Correction of misalignment	-12.17	1.92	0.00	-8.30	0.00	1.25	-0.50	-4.04	0.57	0.00	-7.81	5.76	0.00	-3.82
Increase of misalignment	-1.92	1.16	7.14	-0.62	-0.63	2.45	0.00	-0.57	1.69	6.12	-5.76	3.56	0.26	-1.70

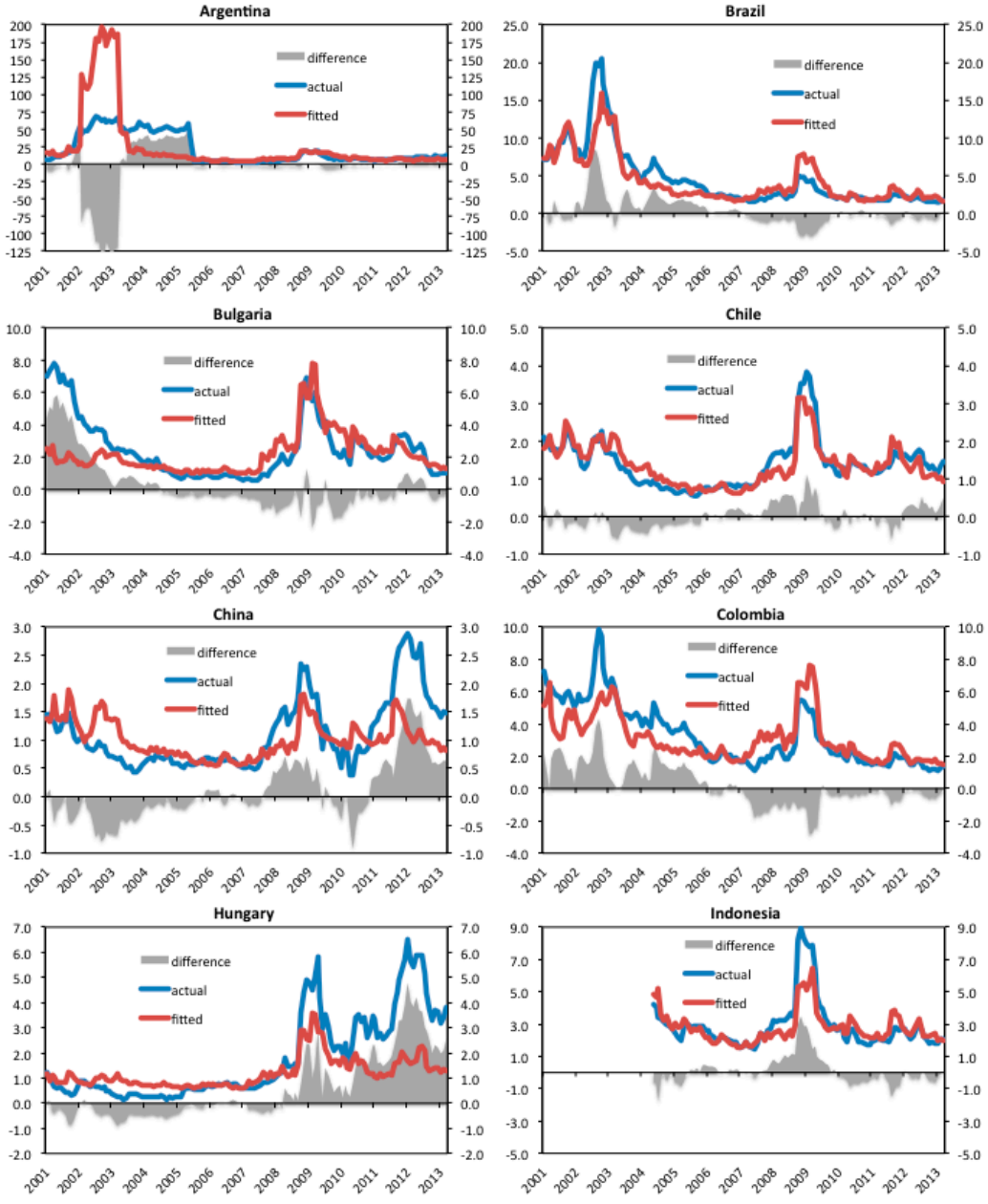
[15] Based on model 2 in Table 3

Table A3. PMG Estimation: Decomposition of Changes in Spreads[16]

	01/2001-07/2007	07/2007-08/2008	08/2008-12/2008	12/2008-04/2010	04/2010-07/2011	07/2011-06/2012	06/2012-03/2013	01/2001-07/2007	07/2007-08/2008	08/2008-12/2008	12/2008-04/2010	04/2010-07/2011	07/2011-06/2012	06/2012-03/2013
	Argentina							Brazil						
Actual	-3.46	3.13	11.60	-11.99	-0.35	5.34	0.78	-5.48	0.66	2.44	-3.03	-0.12	0.54	-0.39
Model	-6.61	2.41	19.41	-21.88	0.51	0.27	-3.24	-1.57	0.26	3.62	-4.32	0.28	0.29	-0.89
Fundamentals	-1.69	0.70	0.87	-0.59	-0.28	-0.93	1.11	-0.57	-0.06	0.30	-0.77	0.16	0.08	-0.15
Global factors	-4.92	1.71	18.54	-21.28	0.78	1.19	-4.35	-1.00	0.31	3.32	-3.55	0.12	0.21	-0.74
Residual	3.14	0.72	-7.81	9.89	-0.86	5.07	4.02	-3.91	0.40	-1.18	1.29	-0.40	0.25	0.50
Correction of misalignment	3.14	0.72	0.00	9.89	0.00	3.67	0.00	-3.84	0.07	-0.33	0.85	-0.40	0.00	0.00
Increase of misalignment	0.00	0.00	-7.81	0.00	-0.86	1.40	4.02	-0.07	0.33	-0.85	0.44	0.00	0.25	0.50
	Bulgaria							Chile						
Actual	-6.31	1.60	4.63	-5.36	0.63	0.58	-1.81	-1.21	0.83	1.78	-2.40	0.18	0.48	-0.32
Model	-1.28	0.18	2.53	-2.76	0.44	0.18	-0.86	-0.71	0.17	2.45	-2.75	0.29	0.13	-0.63
Fundamentals	-0.50	-0.06	0.09	0.13	0.32	-0.04	-0.08	-0.13	-0.03	0.29	-0.29	0.19	-0.04	-0.07
Global factors	-0.78	0.24	2.44	-2.89	0.13	0.22	-0.78	-0.58	0.20	2.16	-2.46	0.09	0.16	-0.56
Residual	-5.03	1.42	2.10	-2.60	0.19	0.39	-0.95	-0.50	0.66	-0.67	0.35	-0.11	0.35	0.31
Correction of misalignment	-4.41	0.63	0.00	-2.60	0.00	0.00	-0.88	-0.28	0.22	-0.44	0.23	-0.11	0.00	0.00
Increase of misalignment	-0.63	0.80	2.10	0.00	0.19	0.39	-0.07	-0.22	0.44	-0.23	0.12	0.00	0.35	0.31
	China							Colombia						
Actual	-0.84	0.91	0.79	-1.92	1.25	1.08	-1.23	-5.90	0.86	3.16	-3.65	-0.31	0.31	-0.31
Model	-0.61	0.19	1.48	-1.68	0.23	0.12	-0.47	-1.52	-0.06	3.02	-3.80	0.11	0.28	-0.51
Fundamentals	-0.19	0.05	0.00	0.02	0.16	-0.01	-0.02	-0.40	-0.40	-0.09	-0.57	0.00	0.10	0.22
Global factors	-0.42	0.14	1.48	-1.70	0.07	0.13	-0.45	-1.12	0.34	3.10	-3.22	0.11	0.18	-0.72
Residual	-0.24	0.71	-0.69	-0.25	1.02	0.96	-0.77	-4.39	0.91	0.14	0.14	-0.42	0.03	0.20
Correction of misalignment	-0.08	0.15	-0.56	0.00	0.38	0.00	-0.77	-3.67	0.71	0.00	0.00	-0.42	0.00	0.00
Increase of misalignment	-0.15	0.56	-0.13	-0.25	0.64	0.96	0.00	-0.71	0.20	0.14	0.14	0.00	0.03	0.20
	Hungary							Indonesia						
Actual	-0.54	0.87	3.34	-3.31	1.37	2.92	-2.07		1.67	4.87	-6.43	-0.08	1.04	-0.78
Model	-0.96	0.37	2.98	-3.39	0.44	0.37	-0.98		0.56	4.18	-4.89	0.32	0.91	-1.52
Fundamentals	-0.26	0.12	0.26	-0.33	0.32	0.14	-0.17		0.15	-0.07	-0.14	0.14	0.57	-0.23
Global factors	-0.70	0.24	2.72	-3.06	0.12	0.23	-0.80		0.41	4.25	-4.75	0.18	0.34	-1.29
Residual	0.42	0.50	0.36	0.09	0.93	2.55	-1.10		1.12	0.69	-1.55	-0.40	0.13	0.74
Correction of misalignment	0.42	0.50	0.08	0.00	0.00	0.00	-1.10		0.36	0.00	-1.45	0.00	0.13	0.37
Increase of misalignment	0.00	0.00	0.28	0.09	0.93	2.55	0.00		0.76	0.69	-0.10	-0.40	0.00	0.37
	Malaysia							Mexico						
Actual	-1.46	0.76	2.40	-2.74	0.21	0.39	-0.60	-2.66	0.82	2.63	-3.01	0.00	0.59	-0.42
Model	-1.34	0.34	2.41	-2.78	0.13	0.24	-0.62	-1.52	0.38	3.43	-3.72	0.21	0.48	-1.07
Fundamentals	-0.66	0.14	0.11	-0.21	0.03	0.08	-0.04	-0.64	0.10	0.30	-0.03	0.07	0.23	-0.16
Global factors	-0.67	0.21	2.29	-2.57	0.09	0.16	-0.58	-0.89	0.28	3.13	-3.69	0.14	0.25	-0.91
Residual	-0.12	0.42	-0.01	0.04	0.08	0.15	0.01	-1.14	0.43	-0.79	0.71	-0.21	0.11	0.64
Correction of misalignment	0.00	0.29	-0.01	0.00	0.00	0.00	0.00	-0.80	0.34	-0.09	0.70	-0.01	0.11	0.10
Increase of misalignment	-0.12	0.13	0.00	0.04	0.08	0.15	0.01	-0.34	0.09	-0.70	0.01	-0.20	0.00	0.55
	Pakistan							Peru						
Actual		5.91	12.53	-16.57	3.89	2.53	-1.13	-5.30	0.66	3.28	-3.80	0.27	0.17	-0.49
Model		1.16	6.66	-8.48	0.25	0.95	-1.71	-0.63	0.32	3.20	-3.66	-0.02	0.18	-0.66
Fundamentals		0.44	-0.67	-0.78	-0.02	0.48	0.10	0.13	0.03	0.16	-0.22	-0.14	0.00	-0.01
Global factors		0.72	7.34	-7.69	0.27	0.47	-1.81	-0.76	0.29	3.04	-3.43	0.12	0.18	-0.65
Residual		4.75	5.87	-8.09	3.64	1.58	0.59	-4.67	0.34	0.09	-0.14	0.30	-0.01	0.18
Correction of misalignment		0.86	0.00	-8.09	0.00	0.00	0.00	-4.39	0.28	0.00	-0.14	0.00	-0.01	0.00
Increase of misalignment		3.89	5.87	0.00	3.64	1.58	0.59	-0.28	0.06	0.09	0.00	0.30	0.00	0.18
	Philippines							Poland						
Actual	-4.65	0.94	3.03	-3.77	-0.21	0.56	-0.78	-1.59	0.69	1.78	-1.97	0.65	0.61	-1.11
Model	-1.33	0.15	3.01	-3.44	0.03	0.18	-0.57	-0.35	0.00	2.02	-2.23	0.09	0.09	-0.41
Fundamentals	-0.50	-0.11	0.33	-0.44	-0.07	0.02	0.00	0.16	-0.18	0.19	-0.10	0.01	-0.03	0.05
Global factors	-0.83	0.25	2.68	-3.00	0.10	0.16	-0.57	-0.51	0.18	1.83	-2.13	0.08	0.13	-0.45
Residual	-3.32	0.79	0.02	-0.33	-0.24	0.39	-0.21	-1.23	0.69	-0.25	0.26	0.57	0.52	-0.70
Correction of misalignment	-3.32	0.00	0.00	-0.33	-0.24	0.00	-0.21	-0.76	0.47	-0.22	0.03	0.00	0.00	-0.70
Increase of misalignment	0.00	0.79	0.02	0.00	0.00	0.39	0.00	-0.47	0.22	-0.03	0.23	0.57	0.52	0.00
	Russia							Turkey						
Actual	-9.69	1.00	6.45	-6.95	0.61	0.88	-1.18	-5.43	1.11	2.87	-3.86	0.12	1.14	-1.25
Model	-2.47	0.29	4.09	-4.70	0.29	0.69	-1.06	-1.55	0.75	6.77	-7.40	0.43	0.41	-1.73
Fundamentals	-1.23	-0.06	0.32	-0.49	0.13	0.41	0.05	-0.24	0.27	1.08	-0.79	0.19	0.01	-0.38
Global factors	-1.25	0.36	3.77	-4.21	0.15	0.28	-1.11	-1.31	0.48	5.69	-6.62	0.24	0.40	-1.35
Residual	-7.21	0.70	2.36	-2.25	0.32	0.19	-0.12	-3.87	0.37	-3.90	3.54	-0.31	0.73	0.48
Correction of misalignment	-6.31	0.70	0.20	-2.16	0.08	0.00	-0.12	-3.30	0.37	0.00	3.54	0.00	0.73	0.14
Increase of misalignment	-0.90	0.00	2.16	-0.08	0.24	0.19	0.00	-0.58	0.00	-3.90	0.00	-0.31	0.00	0.34
	Ukraine							Venezuela						
Actual	-17.15	3.73	20.31	-21.15	0.28	4.35	-3.67	-5.52	3.46	11.07	-9.37	2.67	0.26	-3.74
Model	-2.57	-0.09	8.16	-8.22	0.48	0.49	-1.69	-0.36	1.19	12.93	-15.10	-0.40	2.78	-2.87
Fundamentals	-0.83	-0.61	2.26	-0.81	0.21	0.04	-0.08	2.25	0.05	0.82	-1.76	-0.82	2.02	0.39
Global factors	-1.74	0.51	5.90	-7.41	0.27	0.45	-1.62	-2.61	1.14	12.11	-13.35	0.43	0.76	-3.27
Residual	-14.58	3.83	12.15	-12.93	-0.19	3.86	-1.97	-5.16	2.28	-1.86	5.73	3.07	-2.52	-0.87
Correction of misalignment	-13.20	1.37	0.00	-12.93	-0.19	0.00	-1.97	-2.22	2.28	0.00	2.52	0.00	-2.52	-0.87
Increase of misalignment	-1.37	2.45	12.15	0.00	0.00	3.86	0.00	-2.94	0.00	-1.86	3.21	3.07	0.00	0.00

[16] Based on model 1 in Table 7

Figure A1. Fixed Effects Estimation[17]: Actual and Fitted EMBIG Spreads
(percentage point)



[17] Based on model 2 in Table 3

Figure A2. Fixed Effects Estimation: Actual and Fitted EMBIG Spreads (Concluded)

(percentage point)

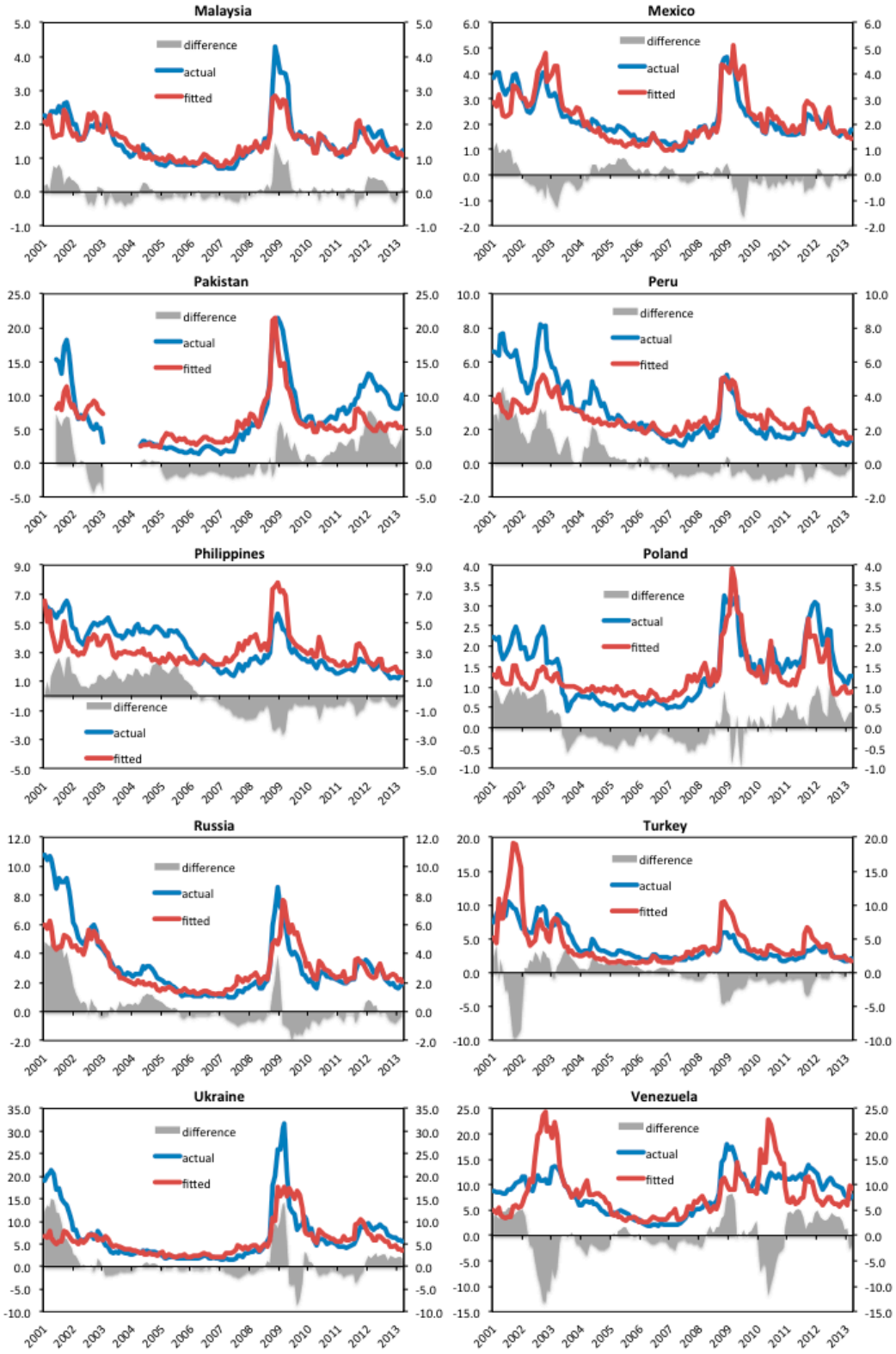
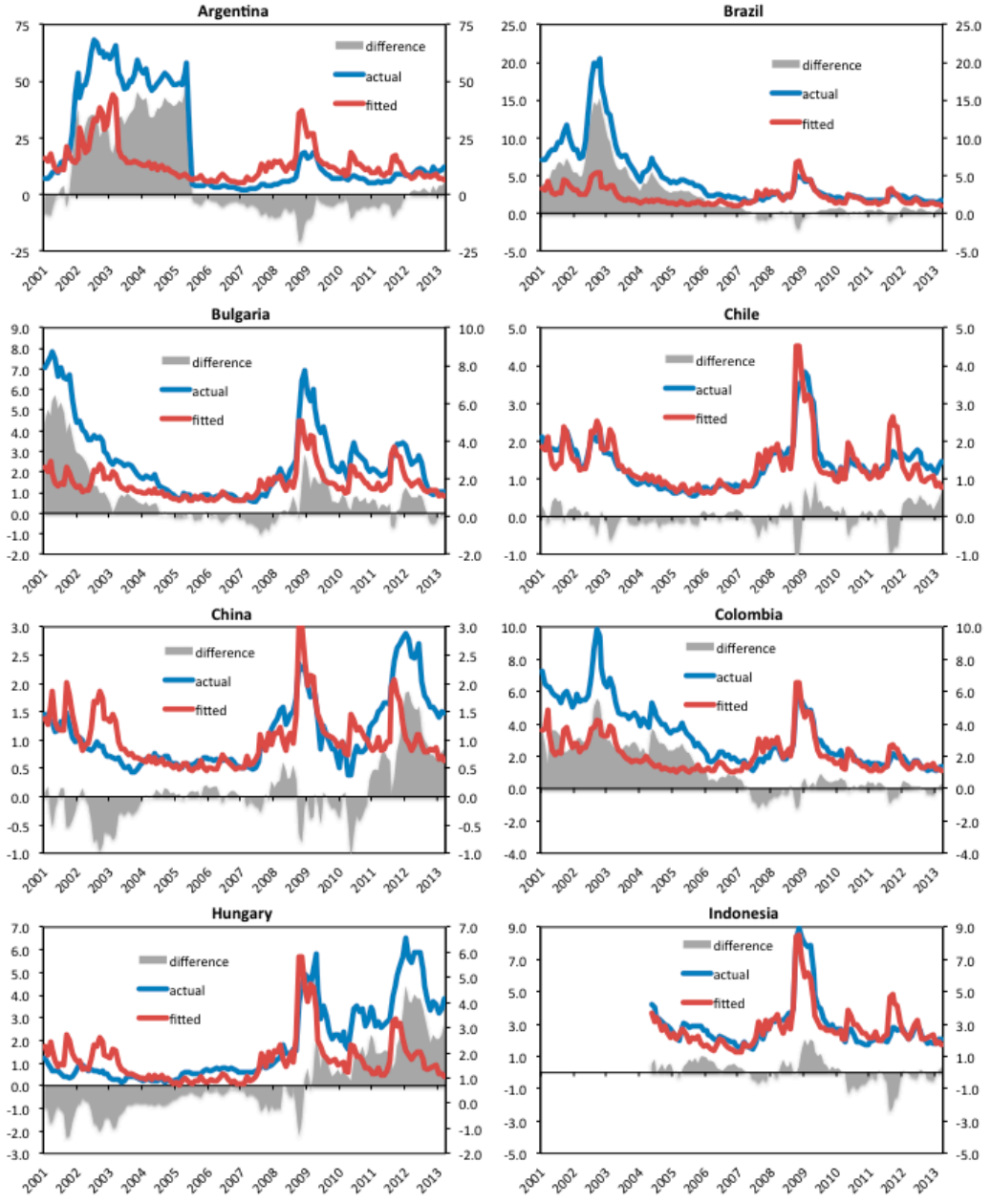


Figure A3. Pooled Mean Group Estimation[18]: Actual and Fitted EMBIG Spreads
(percentage point)



[18] Based on the long-term coefficients of model 1 in Table 7

Figure A4. Pooled Mean Group Estimation: Actual and Fitted EMBIG Spreads (Concluded)

(percentage point)