# Containing Bond Spreads:
# Do Fiscal Rules Matter in Emerging Markets?

By

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# Abstract

In the last 20 years, an increasing number of emerging countries have adopted numerical fiscal rules, as a way to promote fiscal discipline and build credibility with the market. Nevertheless, while the empirical literature on how fiscal rules can help countries achieve better fiscal outcomes has grown in the period, it remains an open question if the market actually does take in consideration the existence and stringency of fiscal rules when defining the risk premium of emerging economies. In this study, we argue that, due to the nature of fiscal rules, they are not an indicator internalized by investors when assessing a country's default risk. Counting with a unique index to measure Fiscal Rules Strength across 14 emerging economies, we investigate what part does the strength of fiscal rules play in defining sovereign bond spreads. Using panel data from 1998 to 2014, we were able to confirm that strengthening fiscal rules has no direct effect on spreads. However, we also uncovered that stronger fiscal rules make a small difference when a country faces changes in other fundamentals. First, they can have a dampening effect on how much spreads increase in times of deteriorating debt. Second, they can increment the negative effect that accumulating Reserves has on spreads. Both effects are small, but statistically significant.



Keywords: numerical fiscal rules, sovereign risk, bond spreads, emerging markets,

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# Introduction

In the past 20 years, the number of emerging markets making use of fiscal rules have increased exponentially. After the crises in the late 1990s, shifting from a discretionary fiscal policy to a rules-based one seemed to be the lesson learned by these economies. The message was that numerical fiscal rules were necessary to avoid deficit, debt and pro-cyclical biases that have lead emerging markets to macroeconomic volatility and, consequently, several crises.

Numerical fiscal rules are defined as permanent constraints on fiscal policy, determined on overall indicators of fiscal performance, such as debt, balance, or other major component (Kopits and Symansky 1998, 2). The logic behind fiscal rules is simple. Properly designed rules should promote fiscal discipline, as well as build credibility (Drazen 2002), working as an indicator of a country's commitment to pursue sound fiscal policies. Kopits (2004) is clear in what features define a well-designed rule. Political will, context awareness, high legal basis, transparency, accountability, independent monitoring and enforcement mechanisms, and flexibility are all listed as vital characteristics.

Additionally to promoting better fiscal outcomes, employing fiscal rules should also lead to reduced costs of borrowing for these countries. As Hausmann (2004) points out, due to the history of macroeconomic stability in emerging markets, investors demand a much higher risk premium from them than from advanced countries, even with the same level of fundamentals, such as debt-to-GDP ratio or balance. Based on that, it is defended that fiscal rules could mitigate the market's mistrust on the repaying ability of emerging economies by promoting predictable and time-consistent economic policies (Kopits 2004).

Despite the logic behind this theory, the fact is that little is known about the connection between fiscal rules and market behavior on an empirical level, especially in emerging markets. This is exactly the gap that this thesis aims to fill: how emerging markets sovereign bond spreads are affected by fiscal rules and their stringency. Our analysis will assess the existence of both a direct and an indirect link between them.

To build our study, we start by exploring the extensive literature on the determinants of bond spreads in emerging markets, both on the global and on the country-individual levels. We also go over empirical and theoretical studies, which have assessed how fiscal rules can affect economic indicators. These two sections form Chapter 1. Chapter 2 details the theoretical foundations of our inquiry, as well as describing our dataset and model. Chapter 3 offers an overview of the results of our model, while Chapter 4 discusses them. Chapter 5 outlines the policy recommendations that can be gathered from our findings and concludes.

# 1. Literature Review

## 1.1. Drivers of Spreads

Understanding what drives sovereign debt spreads in emerging markets has been the goal of several empirical studies in the last two decades. These studies vary significantly on the variables chosen. Some are more focused on global factors, such as international investment appetite and global liquidity, while others give more attention to country specific factors, basically macroeconomic and fiscal fundamentals. Other studies use a temporal approach, establishing different periods, in which market sentiment shifts the dynamic between explanatory factors and spreads.

The literature points Edwards (1985) as the seminal paper in using panel data to determine and quantify the effect of fundamentals such as external debt, debt service and investment ratio[1], on spreads. Adding to this analysis, Eichengreen and Mody (1998) employ US states data to show that, on top of fundamentals, the international interest rate is also a key factor. Luengnaruemitchat and Schadler (2007) and Hartelius et al (2008) are able to find additional relevant variables in both local and global dimensions. On the global level, uncertainty (measured by volatility in the US Federal Fund rates) and global risk aversion are the main factors. Peiris (2010) find that high liquidity in global terms can be associated with lower spreads. On the country level, not only financial and economic indicators are found to affect spreads, but also political ones (e.g. Csonto and Ivaschenko 2013). Sovereign credit ratings were also shown to be relevant, but as a summary of the information contained in macroeconomic indicators (Cantor and Packer 1996), a finding also confirmed by Jaramillo and Tejada (2011). This extensive list of factors is crucial for our

[1] By affecting growth expectations, investments can influence spreads. However, the paper also finds that debt-financed investment do not contain spreads, as debt and investment coefficients cancel each other out.

study, as they indicate the variables which we have to account for if we are willing to establish how Fiscal Rules fit in the dynamic that dictates sovereign bond spreads in emerging markets.

Arora and Cerisola (2001) and Nickel et al (2009) make important contributions, as they find that, while global factors are key drivers of spreads for all countries, the importance of country fundamentals varies across countries. In the same line, Ebner (2009) categorize external risk aversion as the most important explanatory factor for spreads, as fundamentals affect countries differently. These findings underline the importance of splitting the sample in our study, as grouping countries differently can affect our results.

Studies that focus on establishing different periods, based on global financial conditions, also offer interesting insights. These studies defend that the impact of country level and global factors varies over time. Periods of higher or lower global liquidity and risk factors are found to lead to different dynamics: the relationship between country fundamentals and spreads are found to differ according to the level of global liquidity and risk aversion in the period, for example. Baldacci et al (2011) show that fiscal indicators are more relevant in periods of high volatility. Similarly, Jaramillo and Weber (2011) find that in low risk aversion periods, macro variables are the most important, and, in times of high risk aversion, fiscal variables are the main determinants.

In the same temporal approach, studies such as Ferucci (2003) and Bellas et al (2010) have found that, in the long run, both country fundamentals and global factors are key aspects. However, in the short run, global factors are the main explanatory variables. This result is also shown by Csonto and Ivaschenko (2013).

Despite different approaches throughout the literature, the apparent consensus is that both country-specific fundamentals and global factors are drivers of sovereign bond spreads. A

considerable number of studies consider global factors the most important out of the two. However, studies that considered both factors also found that strong fundamentals make economies less sensitive to changes in global risk aversion (e.g. Baldacci et al 2008). The concluding message is that, even if global factors are the main drivers, strong fundamentals can dampen the volatility and the size of changes in spreads, which means maintaining sustainable fiscal policies pay off.

## 1.2. The Impact of Fiscal Rules

In this context, the first intuition is to expect fiscal rules to affect spreads through an improvement in a country fiscal fundamentals. In fact, empirical research has linked fiscal rules to sounder public finance. The early works explored the experience in the US states, but empirical studies mostly shifted to Europe, as the rise of the European Monetary Union led to the adoption of supranational fiscal rules. Debrun et al (2008) have shown that Budget Balance and Debt rules are the types of fiscal rules that are the most efficient in reaching desirable fiscal outcomes. Inman (1996) and Ayuso-i-Casals et al (2009) also find positive impact of rules on finances, but with the caveat that enforcement mechanisms are crucial for their effectiveness.

Additionally, in the context of sovereign bond spreads, fiscal rules can theoretically have an impact that goes beyond the country specific fundamentals. They also have an expectation setting nature, which signals to investors the credibility of a country's fiscal policies, and its commitment to correct unsustainable policies. Through this mechanism, fiscal rules could help contain sovereign bond spreads, as they can lead investors to trust more in the country's ability to pay back their debt.

This potential is the topic of a number of empirical studies. Eichengreen and Bayoumi (1994) have shown the negative impact of fiscal rules on borrowing costs for US states. Also in the US context, Poterba and Rueben (1999) offer interesting results, showing how fiscal rules can contain the jump in spreads during times of turbulence – which is an indication of a credibility effect. Outside the US, the studies are mostly limited to the EU area. Iara and Wolff (2010) used the European Commission's Fiscal Rule Index to analyze the relationship between the strength of a fiscal rule and sovereign bond spreads. Their study does not show a significant relationship, unless when fiscal rules are interacted with global risk aversion. In other words, fiscal rules are important to contain spreads in times of uncertainty. Feld (2012) show more optimistic results, finding a robust negative impact of fiscal rules on bond spreads in Swiss cantons. Heinemann et al (2014) shed a more cautious light on the role of fiscal rules through a panel analysis of selected EU countries, as they find fiscal rules to have a limited effect on spreads. However, they also show fiscal rules to hold a remarkable potential in restoring market confidence, which is especially useful to countries that have historically lacked stable economic policies. The authors reach this result by interacting a Fiscal Rules Index with proxies for stability culture, including surveys and economic history.

In the theoretical level, Hatchondo et al. (2012) use a model of sovereign default to discuss the link between fiscal rules and risk premium. Their study corroborates the intuitive conclusion that fiscal rules (specifically debt ceilings in this case) have significant effects on yields, both on their volatility and level. Alfaro and Kanczuc (2016) also build a model based on the Brazilian economy to show that an optimal fiscal rule is economically relevant, and has the potential to stop pro-cyclical fiscal policies.

Despite the rapid expansion of the number of emerging countries employing fiscal rules[2], no published work (to the extent of our knowledge) has investigated if employing strong fiscal rules has a direct effect on sovereign bond spreads, specifically in emerging markets. Understanding the reaction of the market to fiscal rules in these countries is especially important considering their overall credibility problem. This paper aims to contribute to the literature here discussed by investigating if it exists, in fact, a relationship between strong fiscal rules and financing costs for emerging markets.

The expectation is that this direct effect should be small or insignificant. Despite having a legal mandate, whether and how countries follow these rules is not as straightforward as their level of fundamentals, for example. To add to the issue, emerging markets are notoriously heterogeneous, which makes internalizing the characteristics of the fiscal rules even more complicated for the market.



[2] According to the IMF Fiscal Rules Database, 30 emerging countries employed fiscal rules in 2015 compared to 5 in 1999.

# 2. Theory and Empirical Approach

## 2.1. Data

We have an unbalanced panel dataset of 266 observations, accounting for 18 yearly observations between 1998 and 2015 for 14 emerging countries from 4 regions[3]. The country selection was done by seeking a combination of economies from Latin America, South Asia, and emerging Europe. To capture the effect of the implementation of fiscal rules, we seek to find a time series starting before most countries had any in effect. This excluded some countries such as India or Indonesia for which data was not available back then. Other countries such as Czech Republic and Slovakia were not included because they are not considered emerging economies by the IMF anymore[4].

As our dependent variable, we use yearly averages of daily emerging Market Bond Index Global (EMBIG) spreads, a measure widely accepted by the literature for foreign currency determined debt spread (Csonto et al. 2013; Baldacci et al. 2011; Ciarlone et al. 2009; Ferrucci 2003; González and Levy Yeyati 2008; among others). The EMBIG index contemplates US$ denominated Brady bonds, traded loans, Eurobonds, and local market debt instruments issued by sovereign and quasi-sovereign entities, and is the most comprehensive emerging markets benchmark for foreign currency debt.

The EMBIG spreads measure the premium of securities in the index against a comparable U.S. government bond. More specifically, the EMBIG spread is a "market-capitalization-weighted



[3] Countries in the sample are: Africa: South Africa; Asia: China, Malaysia, Philippines; Central and Eastern Europe: Hungary, Poland, Russia, Turkey; Latin America: Argentina, Brazil, Chile, Colombia, Mexico, and Peru.

[4] The distinction between advanced economies (AEs) and emerging market and developing economies (EDMEs) here used follows the IMF World Economic Outlook (WEO).

average of spreads on US$ denominated Brady bonds, loans, and Eurobonds, issued by sovereign and quasi-sovereign entities" (Csonto and Ivaschenko 2013, 9). Based on the total index, a specific EMBIG spread index is calculated for each country participating in it. This individual index is commonly used by the market as a measure for a country's sovereign default risk, also known as country risk.

As our independent variable of interest, we use a Fiscal Rules Strength Index (FRSI), to measure the strength of fiscal rules across the analyzed countries. This index was built based on the IMF Fiscal Rules database. The IMF data ranges from 1985 to 2015, and includes both the existence of national rules and their main characteristics. This database was put together in the aftermath of the Great Recession, as Fiscal Rules were seen as a key aspect of stronger fiscal frameworks. The IMF based it on a systematic compilation and comparison of fiscal rules and their design elements. The goal was to make the rules comparable across countries, so good practices could be named. Unfortunately, the database does not contain the degree of compliance to each of these rules. However, there were instances when rules were classified as *de facto* inexistent, even when they still existed *de jure*. To be included in the database, a fiscal rule must be numerical and their targets must be fixed, or only able to be revised on a low-frequency basis (e.g., as part of the electoral cycle) (Schaechter et al 2012). Four types of rules are included in the database: Expenditure Rule (ER), Budget Balance Rule (BBR), Revenue Rule (RR), and Debt Rule (DR).

To build our index, we used scores attributed to each individual fiscal rule based on four different facets available in the IMF database. These are Legal Basis, Coverage, Enforcement and Flexibility. Box 1 details the components of each dimension.

The resulting total of each of these characteristics was then merged using the random weights technique, as per Sutherland et al (2005) and Iara and Wolff (2010). The choice for this

method is due to the lack of theoretical guidelines on the relative importance of each of these measures in the construction of an index for the strength of fiscal rules. By using weights derived from averages of 10,000 randomly drawn numbers from a uniform distribution, the final index is a reflection of the possible range of values even with no a priori information on how to assign weights to each of the criterions.

For countries with more than one rule at the same time, the final score of each rule was added up to form their index. Finally the index was rescaled to a number between 0 (no rule in effect) and 1. An increase (decrease) of the index score occurs when a country adds (removes) a fiscal rule or strengthens (weakens) one of the criterions.

**Box 1: Fiscal Rule Strength Index – Scores Assigned by Dimension**

Based on the 4 criterions below, the index was created for each national Fiscal Rule:

1. **Legal Basis of the Rule:**
   1: Political Commitment;
   2: Coalition Agreement;
   3: Statutory;
   4: Constitutional.

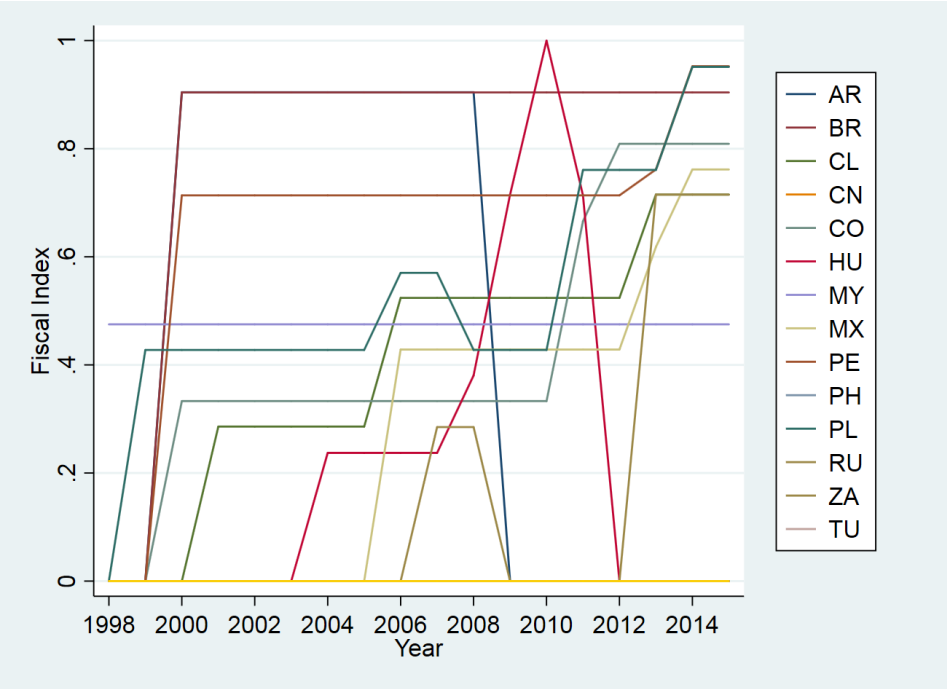
2. **Coverage of the Rule:**
   1: Central Government;
   1.5: Similar rules applying to different levels;
   2: General government or wider;

3. **Enforcement Mechanisms:**
   - Formal Enforcement Procedure – 1: Yes, 0: No;
   - Independent monitoring of compliance – 1: Yes, 0: No;

4. **Flexibility**
   - Clearly-defined escape clauses – 1: Yes, 0: No;
   - Fiscal balances defined in cyclically adjusted terms – 1: Yes, 0: No;

After establishing the method behind the Fiscal Rules Strength Index (FRSI), we were able to assess how fiscal rules in the selected emerging economies changed from 1998 to 2015. As we can see in Figure 1, most countries started adhering to numerical constraints on fiscal policy in the late 1990s and early 2000s. The average score for the whole period is around 0.3, pulled down by countries that never implemented fiscal rules at a national level (China, The Philippines, South Africa, and Turkey), or have abolished it at some point, not to mention the years before implementation. On the other side of the range, Poland (2014 to 2015) and Hungary (2010) have the highest scores. Figure A.1 in the Appendix shows a country-specific version of Figure 1.

**Figure 1: Fiscal Rules Strength Index – 1998-2015**




*AR: Argentina: BR: Brazil; CL: Chile; CN: China; CO: Colombia; HU: Hungary; MY: Malaysia; MX: Mexico; PE: Peru; PH: Philippines; PO: Poland; RU: Russia; ZA: South Africa; and TU: Turkey.*

The majority of the scores was relatively stable during the time scope of this study. However, there are examples of countries that gave up on their fiscal rules after some years

(Argentina 2009, Hungary 2012, and Russia 2009-2012). Most of these backtrackings occurred as a result of financial crises.

For Argentina, the abandonment happened on the de facto level, as in the de jure level, fiscal rules still exist. This happened in the context of the reduced growth and worsened fiscal results resulting from the Great Recession, which put the maintenance of the existing rules in risk. Additionally, the decisions following the June 2009 Parliamentary elections lead to a permanent increase in expenditures, which made unfeasible to reach the targets established in the legislation (Rivas 2013). Even though the Argentinean compliance with fiscal constraints imposed by law had been inconsistent throughout the years, this permanent increase in expenditures led the IMF to classify fiscal rules as *de facto* inexistent in the country (Schaechter et al 2012).

In the Russian case, the 2007 Budget Balanced Rule was suspended in 2009, in the aftermath of the Global Financial Crisis, when the Russian GDP contracted sharply falling by 8 percent. The law was finally abolished in 2012. From 2013 on, Russia reestablished a fiscal rule, but an oil-price based one (Gray et al 2012).

The Hungarian case is the most peculiar. Even though the 2008 Financial Crisis put intense pressure on the Hungarian economy and finances (which actually led to an IMF loan program), there is also seem to be a political factor to changes in the rule. First, the Budget Balance Rule that existed from 2004 was replaced by "transition" Expenditure and Budget Balance rules that limited real expenditure growth in 2010 and 2011. These transition rules were then abolished with the Economic Stability Law (December 2011), which also implemented a Debt Rule that came in effect in 2016. Additionally, the same law radically restructured the existing Fiscal Council (established in 2009), reducing its budget and staff. In other words, by weakening the Fiscal Council, the government has made it less independent and more prone to rule in favor of

government budgetary actions (Odor and Kiss 2011). As our data ends in 2015, it is still to be seen how Hungary's fiscal rule will be described by the IMF fiscal rules database.

The experience of these three countries poses as an important reminder of the limitations of fiscal rules, and it fits one of the most common criticisms against them: despite them being permanent by law, laws can be changed. In other words, the potential for fiscal constraints to ensure fiscal sustainability and build credibility might be limited (e.g. Anderson and Minarik 2006; Schick 2004).

It is important to notice that Supranational Rules were not included in the index. The main reason is because only two of the selected economies have supranational rules in effect, Hungary and Poland. As this rule is tied to their membership to the EU (which in itself affects bond spreads), adding it to the index would be counterproductive. For this reason, the index only takes national rules in consideration.

Following the existing literature, both global and local factors are used as controls. Previous studies regarding bond spreads and their drives have widely uncovered global risk aversion as the most important global factor. In this study, we follow Csonto and Ivasschenko (2013) and employ the Chicago Board Options Exchange Volatility Index (VIX) to measure it. Because VIX captures the implied volatility of S&P index options, its use as a proxy for global risk aversion is generally accepted in the literature. The data was downloaded directly from CBOE.

The other global variable used in the model was the U.S. Federal Rate funds rate, as a proxy for global liquidity. While VIX also captures part of global liquidity conditions, the Fed funds rates are commonly used in the literature, as they are associated with higher liquidity, and

consequentially, are expected to have a positive relationship with spreads (Csonto and Ivasschenko 2013).

To account for the most possible country-specific factors that influence EMBIG spreads, we gathered data on an extensive list of variables, based on the findings of the existing literature. Gross Debt as Percentage of GDP, Inflation, International Reserves, Current Account Balance, Fiscal Balance, GDP per capita, and GDP growth. The data was downloaded from the World Bank and IMF. These variables are components of both fiscal and macroeconomic fundamentals and have all been at some point in the previous literature associated with sovereign bond spreads, as seen in the previous chapter. We chose not to use Credit Ratings, as they were found to be only a derivative factor of fiscal variables, not a fundamental driver (Szczypińska 2012). The expected relationship is that better fundamentals lead to smaller spreads.

To also account for Political Risk factors we use most of the World Bank Worldwide Governance Indicators as proxies. Control of Corruption is supposed to measure the perception of the extent to which public power is used for public interest. Government Effectiveness denotes the perception of the quality of public services and their independence from political pressure. Political Stability and Absence of Violence measures the prospect of political instability and/or politically-motivated violence, including terrorism. Regulatory Quality should capture how able the government is perceived to be in the formulation and implementation of policies that permit and promote private sector development. Finally, Rule of Law measures the quality of contract enforcement, the justice system, and the likelihood of crime. Political Risk measures can have an important effect on spreads, as they can gauge factors that make the payment of outstanding obligations less likely. Higher scores denote better performance in each of these dimensions.

The descriptive statistics for all variables are displayed on Table 1. All our variables are displayed in annual frequency. Even though our dependent variable, EMBIG spreads, is available even in daily frequency, using a frequency smaller than annual could obscure the possible effects of fiscal rules we are aiming to investigate. Because the characteristics of fiscal rules do not fluctuate in other frequency than yearly, its presence would be practically ignored in a panel data regression using monthly data, for example. We understand that this choice represents a tradeoff between establishing the explanatory power of Fiscal Rules and those of most remaining independent variables. On the other hand, the yearly average EMBIG spreads is capable of capturing the changes throughout the year, as drastic changes in spreads are always upwards.

The pairwise correlation matrix is shown in Table 2. Correlation levels are overall low, with the biggest results being for the positive correlation between EMBIG levels and Inflation and Gross Debt, which is intuitive. EMBIG also shows a strong negative correlation with our indicators of Political Risk, which is also expected. Surprisingly, EMBIG also shows positive correlation with the FRSI, but this can be traced to the fact that many countries experienced high EMBIG spread levels even with Fiscal Rules in effect. In fact, this can already be considered an indicator of the limited effect of the FRSI on spreads.

Variables for fiscal and macroeconomic fundamentals consistently show positive correlation with the political risk variables, which indicates that countries with stronger institutions also tend to have better fundamentals. Also, expectedly, there is a strong correlation among the governance variables, as countries with a good result in one of them is expected to score high in the others as well.

**Table 1. Descriptive Statistics**

| Variables | | Source | Mean | Standard Dev. | Min. | Max. |
|---|---|---|---|---|---|---|
| EMBI | EMBIG Spread in basis points | Thomson Reuters | 399.7 | 676.2 | 24.07 | 5,774 |
| Fiscal Index | Fiscal Index | Own Calculations | 0.317 | 0.345 | 0 | 1 |
| **Global Factors** | | | | | | |
| VIX | VIX (%) | CBOE | 21.12 | 6.068 | 12.81 | 32.69 |
| Fed Rate | US Federal Funds Rate (%) | Federal Reserve | 2.232 | 2.175 | 0.09 | 6.24 |
| **Country Factors** | | | | | | |
| GDPpc | GDP per capita (USD) | IMF | 6,868 | 4,036 | 827.6 | 15,997 |
| GDP Growth | GDP Growth (%) | IMF | 3.709 | 3.555 | -13.13 | 11.11 |
| Inflation | Inflation CP (%) | World Bank | 6.947 | 10.44 | -1.4 | 85.74 |
| Current Acc. | Current Acc. Balance (% of GDP) | IMF | 0.0493 | 5.008 | -8.94 | 16.53 |
| Reserves | Int'l Reserves (months of imports) | World Bank | 6.553 | 4.134 | 1.37 | 25.68 |
| Balance | Overall Balance (% of GDP) | IMF | -2.244 | 2.968 | -11.76 | 7.91 |
| Gross Debt | Gross Debt (% of GDP) | IMF | 43.22 | 20.48 | 3.88 | 152.3 |
| **Governance** | | | | | | |
| Corruption | Corruption Control (Index) | World Bank | -0.0498 | 0.592 | -1.13 | 1.59 |
| Gvt. Eff. | Government Efficient (Index) | World Bank | 0.244 | 0.498 | -0.73 | 1.28 |
| Pol. Stab. | Political Stability (Index) | World Bank | -0.355 | 0.782 | -2.37 | 1.26 |
| Reg. Qual. | Regulatory Quality (Index) | World Bank | 0.304 | 0.568 | -1.07 | 1.54 |
| Rule of Law | Rule of Law (Index) | World Bank | -0.0614 | 0.63 | -1.1 | 1.43 |

## Table 2. Pairwise Correlation

| | EMBI | Fiscal Index | VIX | Fed Rate | GDPpc | GDP Growth | Inflation | Current Acc. | Reserves | Balance | Gross Debt | Corruption | Gov. Eff. | Pol. Stab. | Reg. Qual. | R. of Law |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EMBI | 1 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Fiscal Index | 0.13 | 1 | | | | | | | | | | | | | | |
| | (0.03) | | | | | | | | | | | | | | | |
| VIX | 0.12 | -0.11 | 1 | | | | | | | | | | | | | |
| | (0.05) | (0.09) | | | | | | | | | | | | | | |
| Fed Rate | 0.07 | -0.17 | 0.04 | 1 | | | | | | | | | | | | |
| | (0.24) | (0.01) | (0.57) | | | | | | | | | | | | | |
| GDPpc | -0.18 | 0.26 | -0.18 | -0.46 | 1 | | | | | | | | | | | |
| | (0) | (0) | (0.01) | (0) | | | | | | | | | | | | |
| GDP Growth | -0.18 | 0.04 | -0.36 | 0.03 | 0.09 | 1 | | | | | | | | | | |
| | (0) | (0.51) | (0) | (0.66) | (0.17) | | | | | | | | | | | |
| Inflation | 0.37 | -0.2 | 0.16 | 0.22 | -0.16 | -0.12 | 1 | | | | | | | | | |
| | (0) | (0) | (0.01) | (0) | (0.01) | (0.05) | | | | | | | | | | |
| Current Acc. | 0.15 | -0.03 | -0.01 | 0.05 | -0.23 | 0.04 | 0.08 | 1 | | | | | | | | |
| | (0.02) | (0.59) | (0.87) | (0.39) | (0) | (0.54) | (0.24) | | | | | | | | | |
| Reserves | -0.03 | 0.1 | 0 | -0.16 | -0.15 | -0.17 | -0.11 | -0.1 | 1 | | | | | | | |
| | (0.64) | (0.13) | (0.98) | (0.01) | (0.01) | (0.01) | (0.09) | (0.11) | | | | | | | | |
| Balance | 0.02 | 0.03 | -0.2 | 0.08 | -0.08 | 0.2 | -0.18 | 0.28 | 0 | 1 | | | | | | |
| | (0.77) | (0.63) | (0) | (0.2) | (0.24) | (0) | (0) | (0) | (0.97) | | | | | | | |
| Gross Debt | 0.59 | 0.22 | 0 | -0.03 | -0.08 | 0.01 | 0.26 | -0.03 | 0.05 | -0.4 | 1 | | | | | |
| | (0) | (0) | (0.99) | (0.61) | (0.23) | (0.93) | (0) | (0.65) | (0.42) | (0) | | | | | | |
| Corruption | -0.19 | 0.16 | 0 | 0.05 | 0.3 | 0.14 | -0.2 | -0.25 | -0.33 | -0.07 | -0.12 | 1 | | | | |
| | (0) | (0.02) | (0.96) | (0.5) | (0) | (0.04) | (0) | (0) | (0) | (0.33) | (0.07) | | | | | |
| Gov. Eff. | -0.25 | 0.02 | -0.01 | -0.05 | 0.33 | 0.18 | -0.25 | 0.02 | -0.33 | -0.17 | -0.09 | 0.83 | 1 | | | |
| | (0) | (0.8) | (0.91) | (0.44) | (0) | (0.01) | (0) | (0.81) | (0) | (0.01) | (0.18) | (0) | | | | |
| Pol. Stab. | -0.1 | 0.18 | -0.01 | -0.02 | 0.46 | 0.2 | -0.21 | -0.1 | -0.55 | -0.25 | 0.1 | 0.69 | 0.7 | 1 | | |
| | (0.12) | (0.01) | (0.85) | (0.75) | (0) | (0) | (0) | (0.15) | (0) | (0) | (0.15) | (0) | (0) | | | |
| Reg. Qual. | -0.38 | 0.17 | -0.01 | 0.01 | 0.31 | 0.16 | -0.19 | -0.3 | -0.24 | -0.11 | -0.19 | 0.85 | 0.78 | 0.57 | 1 | |
| | (0) | (0.01) | (0.94) | (0.89) | (0) | (0.02) | (0) | (0) | (0) | (0.1) | (0.01) | (0) | (0) | (0) | | |
| R. of Law | -0.27 | 0.1 | -0.01 | -0.04 | 0.4 | 0.15 | -0.16 | -0.19 | -0.36 | -0.21 | -0.06 | 0.92 | 0.89 | 0.75 | 0.87 | 1 |
| | (0) | (0.16) | (0.91) | (0.54) | (0) | (0.02) | (0.02) | (0) | (0) | (0) | (0.37) | (0) | (0) | (0) | (0) | |

## 2.2. Model

Our goal is to expand the existing literature on the determinants of sovereign bond spreads in emerging markets by evaluating whether the stronger fiscal rules can help reduce borrowing costs. To investigate this, we take the same approach as most of previous studies by following Edwards (1985). Departing from a simple no-arbitrage condition, a country with non-zero default probability default and that is price-taker in global debt markets will face the following condition from a risk-neutral investor:

$$(1 + r^*) = (1 - \rho)(1 + r) \tag{1}$$

where $r^*$ is the interest rate a risk-free asset bears, $\rho$ is the probability of default, and $r$ is the interest rate a debtor country will face for financing. This interest rate can be expanded as such:

$$(1 + r^*) = (1 - \rho)(1 + r^* + s) \tag{2}$$

where s denotes the premium investors require from that country. In other words, the investor requires a compensation for the non-zero default probability. The premium is positively related to global risk-free interest rate, and the probability of default:

$$s = \frac{\rho}{1 - \rho}(1 + r^*) \tag{3}$$

The probability of default is assumed to have the following logistic form:

$$\rho = \frac{\exp(\sum_i \beta_i X_i)}{1 + \exp(\sum_i \beta_i X_i)} \tag{4}$$

where $X_i$ represents the determinant of the probability of default and $\beta_1$ is its respective coefficient. Based on that, a country's sovereign bond spread is expressed by the following equation, where the factors that affect spreads, both global and local, are captured by $X_i$:

$$\ln(s) = \ln(1+r*) + \sum \beta_i X_i \quad (5)$$

To estimate equation 4, we use the Fixed Effectss panel regression technique[5], following the majority of the existing literature. A Fixed Effectss model will allow us to control for the fixed differences among individual countries, a feature that is essential when dealing with emerging markets, a notoriously heterogeneous group. The regression is as follows:

$$\ln(embig_{it}) = \beta_1 X_{it} + \beta_2 Z_t + \mu_i + \varepsilon_i \quad (6)$$

where $embig_{it}$ stands for the EMBIG spread, $X_{it}$ for a (k1 x 1) vector of the selected country-specific variables, including the FRSI, and $Z_t$ for a (k2 x 1) vector of the selected global variables. $\beta_1$ and $\beta_2$ denote a (k1 x 1) and a (k2 x 1) vector of coefficients respectively, while $\mu_i$ denotes the country Fixed Effectss.

In a theoretical context, how could rules-based constraints to fiscal policy directly influence the pricing of default probability? The rationale is that more stringent fiscal rules would work as an indicator of a commitment to stability and sound fiscal policy which, when in place, increases the investor's trust in the country's ability to pay back their debt. In other words, by signaling their commitment to responsible fiscal behavior, countries that employ stronger fiscal rules would have



[5] The Random Effects model was rejected by the Hausman test, for all specifications.

a more positive assessment by the financial markets. Following this, we include the Fiscal Rules Strength Index among the country-specific factors denoted in $X_{it.}$

Before running the baseline model, we tested the variables for stationarity. For the EMBIG spread, the Fisher-type augmented Dickey-Fuller tests rejected the hypothesis that all panels contain unit roots at a 5% level. However, some country-specific factors fail the test, as well as both VIX and the US Federal Funds rate. Following Csonto and Ivaschenko (2013), we employ the cointegration test developed by Westerlund (2008). The test returns no cointegration among these explanatory variables. Based on Phillips and Moon (2000), the results from a pooled regression of nonstationary variables that are not cointegrated can successfully estimate the long-run average regression coefficient, as N and T grow larger, and do not denote a spurious relationship.

In addition, we also considered the possibility that the FRSI is endogenous to EMBIG spreads, as policy makers may tighten the rules as a response to increasing spreads. To test for this we follow Gochoco-Bautista et al (2010) and regress the FRSI on up to five period lags of (log of) EMBIG spreads, as instrumental variables. None of the coefficients are significant, which indicates there is no problem of endogeneity.

We also added modifications in order to clarify the dynamics between fiscal rules and spreads. First, we add an interaction between global risk aversion and the strength of fiscal rules, so we can check if the findings by Iara and Wolff (2010), that fiscal rules' stringency matters in times of high volatility, hold for emerging countries. Second, we also study the interaction between fiscal rules and the most consistently significant fundamentals in our study, namely Gross Debt and Reserves. By doing so, we can try to answer two questions: one, if stronger fiscal rules can help contain the growth of spreads in front of a deterioration of fundamentals (i.e. have a

dampening effect). Two, if stronger fiscal rules can play a role when the countries strengthen their ability to soften shocks and demonstrates payment capacity by accumulating reserves (i.e. have an incrementing effect). These questions will shed light on the hypothesis that spreads can be affected by the strength of fiscal rules, but only in association with other factors.

# 3. Estimation Results

## 3.1. Whole Sample

First, we run the regression denoted in equation 6 on the whole sample. The results can be seen in Table 3, and they show that both global and country-specific factors play an important role in driving spreads up and down, in a significant level. This result is consistent with most of the previous literature. The role of fiscal rules, however, is found to be mixed.

In Regression 1a, we use all the global and country-level variables, without including interactions. Regarding global factors, VIX is the one that rises as the most important. As expected, in times of higher global risk aversion, spreads are expected to be higher. More specifically, a one percent increase in the VIX index is associated with a 0.678 percent increase in bond spreads. On the other hand, our measure of global liquidity is not found to be statistically significant. For individual country variables, the results are also as expected: better fundamentals are associated with better spreads. Even though all factors show this direction, only two of them have significant coefficients: Debt, and Reserves. When Gross Debt as % of GDP is increased by 1 unit, it is associated with spreads 2.6 percent higher, while for Reserves, an increase of equivalent to one month of imports leads to a 6.6 percent smaller spread. Surprisingly, the variables that served as proxy for political stability and institutional quality do not display significant results. Finally, for the FRSI, this regression does not show a significant result, albeit showing a negative relationship with spreads.

To investigate further possible properties of fiscal rules, we employ three different combinations of interactions with the FRSI. Regression 1b, 1c, and 1d include interactions with VIX, Debt and Reserves respectively. By interacting with VIX, we follow the intuitive possibility

that stronger fiscal rules may help push spreads down only in case of high global risk aversion, as Iara and Wolff (2010) uncovered for countries in the EMU. In our study, however, this relationship is not statistically significant.

Our second interaction is with Debt. The goal of this interaction is to uncover if stronger fiscal rules might be able to mitigate deteriorating fiscal results, thus acting with a dampening effect. This hypothesis was confirmed, with 95% significance, albeit with a small magnitude. The coefficients tell us that a country with stronger rules will suffer a smaller increase in spreads when Debt goes up. For example, comparing two countries, one with a FRSI score of 0.2 and another with one of 0.4, the one with the stronger index will face an increase in spreads of 3.12 percent, while the country with the weaker score will face an increase of 3.16 percent, when Debt-to-GDP ratio goes up by one unit.

Finally, by adding an interaction between the FRSI and International Reserves, we found a strongly significant result (at a 99% level) indicating that fiscal rules have an effect on spreads when a country increases their International Reserves. The negative effect on spreads of increasing Reserves by one unit will be 0.13 percentage points bigger for a country with a 0.1 higher FRSI. In other words, fiscal rules can increment the effect of accumulating Reserves. R-squared for this case is slightly higher than previous specifications.

The overall R-squared of our models for the whole sample regressions ranges from 0.61-0.62. This denotes that the chosen variables have a strong explanatory power for spreads in all specifications.

### 3.2. Split-samples estimates

Considering studies previously mentioned that found that countries are affected differently by the explanatory variables, and the heterogeneity of our sample, we also ran regressions for different groups of countries. First, we excluded China from the regression. Considering the size of its economy, the amount of reserves accumulated, and its peculiar relation to financial markets, we investigate if the previous results hold when the country is not considered. These results can be seen in Table 4.

Most of the results were unchanged without China: higher volatility, and debt are associated with higher spreads, while higher levels of Reserves are associated with lower spreads. The coefficients are very similar to the ones in the regression with the whole sample. FRSI also remains with a negative sign, but statistically insignificant. Additionally, the exclusion of China leads to a better fit of the model: comparing the specifications without the interaction between Reserves and the Fiscal Index (1a and 2a), we see an increase in R-squared from 0.61 to 0.63, however it is not a significant improvement.

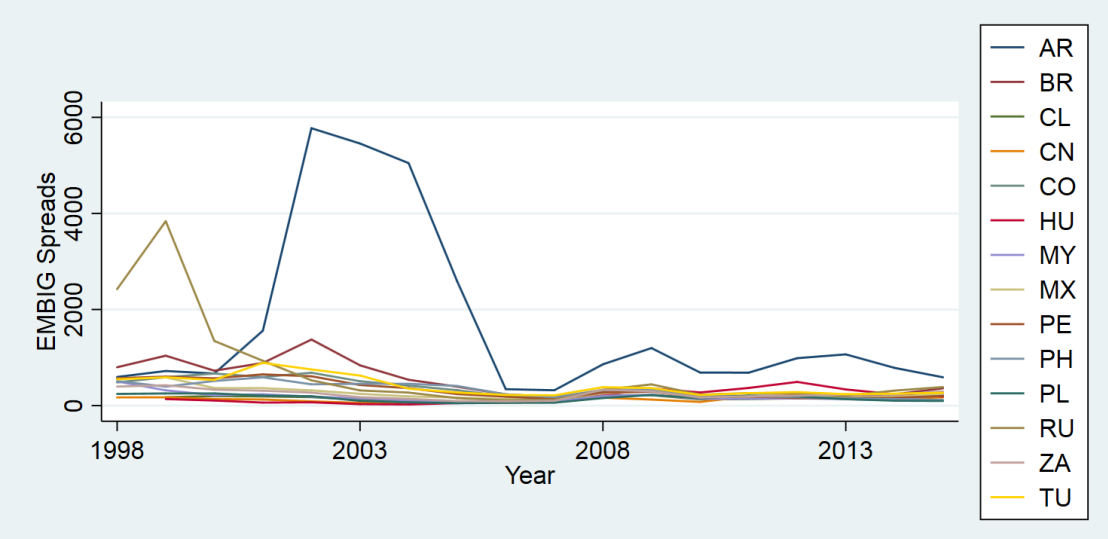
The models with the interactions show similar results. The coefficient for the interaction between VIX and the FRSI is insignificant, while the one between Reserves and the FRSI is negative, significant at a 95% level. The effect of the interaction between Reserves holds at virtually the same level as in the previous specification. Regarding the interaction between Debt and Fiscal Rules, the specification without China does not produce a significant result.

A regression excluding Argentina is also implemented. Due to its history of macroeconomic instability in the period here addressed, its presence might skew the model. As we can see in Figure 2, the Argentinean EMBGI spread has constantly been above the others.

Additionally, in the period between 2002 and 2005, EMBIG spreads reacted violently to the simultaneous Debt and Currency crises in the country. The results of this regression are seen on Table 5.

Comparing the estimates without Argentina to the one with the whole sample, we see that global risk aversion and Debt maintain practically the same coefficients, as we can see in Regression 3a. The coefficient for GDP Growth is significant now, at a 99% level, and denotes that a growth rate 1 unit higher leads to a 5.2 percent smaller spread. This is in line with previous empirical studies on drivers of spreads in emerging markets (e.g. Presbitero et al. 2016). The result for Reserves is practically the same as before. Surprisingly, the indicator for Regulatory Quality now becomes significant at a 5% level, indicating that higher perceived regulatory quality leads to smaller spreads. Argentina is also a consistent outlier for Regulatory Quality, almost always scoring lower than the remaining countries, which explains why this coefficient is significant now. The coefficient for Fiscal Rules remains insignificant.

**Figure 2. EMBIG spreads for selected EMEs – 1998-2015**




*AR: Argentina: BR: Brazil; CL: Chile; CN: China; CO: Colombia; HU: Hungary; MY: Malaysia; MX: Mexico; PE: Peru; PH: Philippines; PO: Poland; RU: Russia; ZA: South Africa; and TU: Turkey.*

**Table 3. Fixed Effects Estimation, dependent variable: Log of EMBIG Spread (Whole Sample)**

| | (1a) | (1b) | (1c) | (1d) |
|---|---|---|---|---|
| Fiscal Index | -0.159 | 0.070 | 0.305 | 0.226 |
| | (0.182) | (0.714) | (0.260) | (0.170) |
| Ln(Vix) | 0.678 | 0.706 | 0.701 | 0.663 |
| | (0.097)** | (0.135)** | (0.111)** | (0.092)** |
| Fed Rate | -0.010 | -0.010 | -0.009 | -0.013 |
| | (0.020) | (0.020) | (0.020) | (0.021) |
| Gross Debt | 0.026 | 0.026 | 0.032 | 0.026 |
| | (0.005)** | (0.005)** | (0.004)** | (0.005)** |
| Ln(GDPpc) | -0.025 | -0.023 | -0.049 | -0.030 |
| | (0.163) | (0.163) | (0.152) | (0.158) |
| Reserves | -0.066 | -0.066 | -0.066 | -0.046 |
| | (0.012)** | (0.012)** | (0.013)** | (0.008)** |
| Rule of Law | -0.236 | -0.244 | -0.225 | -0.124 |
| | (0.482) | (0.487) | (0.474) | (0.493) |
| Reg. Qualit. | -0.153 | -0.151 | -0.170 | -0.120 |
| | (0.337) | (0.339) | (0.306) | (0.327) |
| Pol. Stability | -0.078 | -0.077 | -0.093 | -0.039 |
| | (0.093) | (0.094) | (0.087) | (0.100) |
| Gov. Efficiency | 0.022 | 0.017 | 0.088 | -0.018 |
| | (0.479) | (0.484) | (0.460) | (0.452) |
| Corruption Control | 0.004 | 0.011 | 0.008 | -0.069 |
| | (0.429) | (0.429) | (0.420) | (0.429) |
| GDP Growth | -0.022 | -0.022 | -0.024 | -0.021 |
| | (0.017) | (0.017) | (0.016) | (0.017) |
| Current Acc. | 0.008 | 0.008 | 0.008 | 0.006 |
| | (0.024) | (0.024) | (0.024) | (0.023) |
| Balance | -0.012 | -0.012 | -0.005 | -0.009 |
| | (0.018) | (0.017) | (0.018) | (0.018) |
| Inflation | 0.004 | 0.004 | 0.002 | 0.003 |
| | (0.007) | (0.007) | (0.007) | (0.007) |
| vixXindex | | -0.019 | | |
| | | (0.059) | | |
| debtXindex | | | -0.002 | |
| | | | (0.001)* | |
| reserveXindex | | | | -0.013 |
| | | | | (0.004)** |
| _cons | 3.090 | 2.985 | 2.981 | 3.079 |
| | (1.730) | (1.726) | (1.686) | (1.667) |
| $R^2$ | 0.61 | 0.61 | 0.62 | 0.62 |
| *N* | 215 | 215 | 215 | 215 |

* $p<0.05$; ** $p<0.01$

**Table 4. Fixed Effects Estimation, dependent variable: Log of EMBIG Spread (without China)**

| | (2a) | (2b) | (2c) | (2d) |
|---|---|---|---|---|
| Fiscal Index | -0.065 | 0.213 | 0.322 | 0.342 |
| | (0.202) | (0.813) | (0.277) | (0.198) |
| Ln(Vix) | 0.672 | 0.710 | 0.697 | 0.656 |
| | (0.106)** | (0.156)** | (0.122)** | (0.100)** |
| Fed Rate | -0.023 | -0.023 | -0.021 | -0.027 |
| | (0.021) | (0.022) | (0.021) | (0.022) |
| Gross Debt | 0.022 | 0.022 | 0.028 | 0.022 |
| | (0.005)** | (0.005)** | (0.006)** | (0.006)** |
| Ln(GDPpc) | -0.194 | -0.192 | -0.194 | -0.204 |
| | (0.204) | (0.204) | (0.197) | (0.192) |
| Reserves | -0.065 | -0.065 | -0.066 | -0.044 |
| | (0.013)** | (0.013)** | (0.014)** | (0.009)** |
| Rule of Law | -0.087 | -0.091 | -0.074 | 0.034 |
| | (0.438) | (0.439) | (0.439) | (0.457) |
| Reg. Qualit. | -0.122 | -0.122 | -0.143 | -0.093 |
| | (0.377) | (0.378) | (0.348) | (0.365) |
| Pol. Stability | -0.082 | -0.082 | -0.100 | -0.040 |
| | (0.098) | (0.099) | (0.093) | (0.099) |
| Gov. Efficiency | -0.083 | -0.090 | 0.004 | -0.126 |
| | (0.524) | (0.530) | (0.506) | (0.497) |
| Corruption Control | -0.221 | -0.213 | -0.208 | -0.297 |
| | (0.440) | (0.441) | (0.430) | (0.430) |
| GDP Growth | -0.023 | -0.023 | -0.025 | -0.022 |
| | (0.016) | (0.016) | (0.016) | (0.016) |
| Current Acc. | 0.010 | 0.010 | 0.009 | 0.006 |
| | (0.029) | (0.029) | (0.029) | (0.028) |
| Balance | -0.006 | -0.005 | 0.000 | -0.002 |
| | (0.018) | (0.017) | (0.018) | (0.018) |
| Inflation | 0.002 | 0.002 | 0.001 | 0.001 |
| | (0.007) | (0.007) | (0.007) | (0.007) |
| vixXindex | | -0.023 | | |
| | | (0.065) | | |
| debtXindex | | | -0.002 | |
| | | | (0.001) | |
| reserveXindex | | | | -0.014 |
| | | | | (0.003)** |
| _cons | 4.838 | 4.711 | 4.515 | 4.860 |
| | (2.208)* | (2.195) | (2.235) | (2.074)* |
| $R^2$ | 0.63 | 0.63 | 0.64 | 0.64 |
| *N* | 199 | 199 | 199 | 199 |

* $p<0.05$; ** $p<0.01$

Regarding the interactions, the ones with VIX and Debt are insignificant. The interaction between Reserves and the FRSI remains negative and significant, at very similar level as in the previous regressions. Finally, excluding Argentina provides a better fit: the resulting R-squared is considerably larger both for the regression with no interaction (0.66) and for the ones with it (0.67).

Finally, we also run the regression excluding the two EU-member countries in the sample, Hungary and Poland, as the effects of EU membership on bond spreads have been documented by empirical studies (e.g. Luengnaruemitchai and Schadler 2007; Szczypinska 2014). This effect was especially relevant before the 2008 Financial Crisis, as bond spreads declined even in the face of alarming fundamentals. An underlying idea that the EU would bail these countries out, made investors willing to finance its member countries at lower yields.

Even after the recent financial crisis had passed and bonds spiked, the effect of membership should not be completely disregarded. EU membership equips these countries with an assumed political and economic stability that might influence investors' trust. In summary, the dynamics that guide the relationship between global and local factors and sovereign bond spreads can be different for Hungary and Poland, in comparison to the other emerging markets in our sample.

The results for this specification can be seen in Table 6. The coefficient for global risk aversion drops, the effect of a 1 percent increase in VIX on spreads goes from 6.78 percent in the whole sample (Regression 1a) to 5.60 percent. The Debt coefficient becomes slightly lower (the effect on spreads of a one unit increase in the Debt-to-GDP ratio goes from 2.6 to 2.3 percent). Reserves maintain practically the same coefficient.

**Table 5. Fixed Effects Estimation, dependent variable: Log of EMBIG Spread (without Argentina)**

| | (3a) | (3b) | (3c) | (3d) |
|---|---|---|---|---|
| Fiscal Index | 0.058 | -0.266 | -0.120 | 0.418 |
| | (0.166) | (0.675) | (0.357) | (0.166)* |
| Ln(Vix) | 0.677 | 0.638 | 0.665 | 0.670 |
| | (0.086)** | (0.136)** | (0.089)** | (0.081)** |
| Fed Rate | 0.006 | 0.006 | 0.006 | 0.005 |
| | (0.017) | (0.017) | (0.017) | (0.016) |
| Gross Debt | 0.038 | 0.038 | 0.037 | 0.039 |
| | (0.007)** | (0.007)** | (0.008)** | (0.007)** |
| Ln(GDPpc) | -0.032 | -0.034 | -0.026 | -0.040 |
| | (0.119) | (0.119) | (0.117) | (0.115) |
| Reserves | -0.069 | -0.069 | -0.070 | -0.051 |
| | (0.013)** | (0.014)** | (0.013)** | (0.010)** |
| Rule of Law | -0.347 | -0.335 | -0.362 | -0.213 |
| | (0.510) | (0.517) | (0.512) | (0.548) |
| Reg. Qualit. | -0.607 | -0.608 | -0.637 | -0.520 |
| | (0.212)* | (0.214)* | (0.218)* | (0.236)* |
| Pol. Stability | -0.070 | -0.072 | -0.063 | -0.049 |
| | (0.116) | (0.119) | (0.119) | (0.134) |
| Gov. Efficiency | 0.427 | 0.430 | 0.448 | 0.387 |
| | (0.374) | (0.372) | (0.384) | (0.348) |
| Corruption Control | 0.064 | 0.055 | 0.056 | -0.023 |
| | (0.388) | (0.386) | (0.392) | (0.392) |
| GDP Growth | -0.052 | -0.053 | -0.053 | -0.052 |
| | (0.014)** | (0.014)** | (0.014)** | (0.014)** |
| Current Acc. | 0.005 | 0.005 | 0.004 | 0.003 |
| | (0.016) | (0.016) | (0.016) | (0.015) |
| Balance | 0.012 | 0.011 | 0.012 | 0.015 |
| | (0.024) | (0.024) | (0.024) | (0.023) |
| Inflation | 0.008 | 0.008 | 0.009 | 0.007 |
| | (0.008) | (0.008) | (0.008) | (0.008) |
| vixXindex | | 0.027 | | |
| | | (0.057) | | |
| debtXindex | | | 0.001 | |
| | | | (0.001) | |
| reserveXindex | | | | -0.012 |
| | | | | (0.003)** |
| _cons | 2.726 | 2.862 | 2.773 | 2.684 |
| | (1.258) | (1.341) | (1.267)* | (1.183)* |
| $R^2$ | 0.66 | 0.66 | 0.66 | 0.67 |
| *N* | 201 | 201 | 201 | 201 |

* $p<0.05$; ** $p<0.01$

**Table 6. Fixed Effects Estimation, dependent variable: Log of EMBIG Spread (without Hungary and Poland)**

| | (4a) | (4b) | (4c) | (4d) |
|---|---|---|---|---|
| Fiscal Index | -0.238 | 0.306 | 0.104 | 0.108 |
| | (0.199) | (0.730) | (0.233) | (0.197) |
| Ln(Vix) | 0.560 | 0.626 | 0.570 | 0.559 |
| | (0.087)** | (0.148)** | (0.094)** | (0.086)** |
| Fed Rate | 0.002 | 0.002 | 0.002 | -0.001 |
| | (0.022) | (0.022) | (0.022) | (0.023) |
| Gross Debt | 0.023 | 0.023 | 0.029 | 0.023 |
| | (0.005)** | (0.005)** | (0.005)** | (0.005)** |
| Ln(GDPpc) | -0.163 | -0.158 | -0.183 | -0.154 |
| | (0.213) | (0.216) | (0.196) | (0.209) |
| Reserves | -0.069 | -0.069 | -0.069 | -0.054 |
| | (0.012)** | (0.012)** | (0.013)** | (0.008)** |
| Rule of Law | -0.286 | -0.306 | -0.342 | -0.202 |
| | (0.340) | (0.353) | (0.349) | (0.358) |
| Reg. Qualit. | -0.259 | -0.256 | -0.261 | -0.206 |
| | (0.206) | (0.210) | (0.197) | (0.202) |
| Pol. Stability | -0.175 | -0.173 | -0.171 | -0.141 |
| | (0.105) | (0.109) | (0.104) | (0.118) |
| Gov. Efficiency | 0.389 | 0.386 | 0.467 | 0.310 |
| | (0.340) | (0.342) | (0.323) | (0.320) |
| Corruption Control | -0.105 | -0.086 | -0.146 | -0.130 |
| | (0.303) | (0.304) | (0.291) | (0.303) |
| GDP Growth | -0.016 | -0.017 | -0.020 | -0.015 |
| | (0.013) | (0.013) | (0.013) | (0.014) |
| Current Acc. | -0.031 | -0.031 | -0.032 | -0.031 |
| | (0.009)** | (0.010)** | (0.010)** | (0.010)* |
| Balance | -0.028 | -0.026 | -0.019 | -0.027 |
| | (0.013) | (0.012) | (0.014) | (0.012) |
| Inflation | 0.004 | 0.004 | 0.002 | 0.004 |
| | (0.006) | (0.005) | (0.005) | (0.005) |
| vixXindex | | -0.045 | | |
| | | (0.060) | | |
| debtXindex | | | -0.002 | |
| | | | (0.001)* | |
| reserveXindex | | | | -0.010 |
| | | | | (0.003)* |
| _cons | 4.753 | 4.513 | 4.683 | 4.595 |
| | (2.151)* | (2.228) | (2.024)* | (2.111) |
| $R^2$ | 0.71 | 0.72 | 0.72 | 0.72 |
| *N* | 184 | 184 | 184 | 184 |

* $p<0.05$; ** $p<0.01$

Interestingly, now the coefficient for Current Account Balance becomes statistically significant at a 1% level. Without EU countries, we find that a one point increase in the Current Account Balance as percentage of GDP leads to a 3.1 percent decrease in the EMBIG spread. Considering Hungary and Poland are both among the countries with the lowest Current Account Balance values throughout the period, this is not surprising.

The interactions with Reserves and Debt both show negative signs, with 95% statistical significance. The dampening effect related to Debt remains the same as in the whole sample, while the incrementing effect related to Reserves seems to be lower without the EU countries.

With this modification, the explanatory power of our variables is considerably increased. Comparing this model to the one with the whole sample, the R-squared goes from 0.61 to 0.71 for the specifications without interactions (1a and 4a), and from 0.62 to 0.72 for the ones with interactions (1d and 4d).

Finally, we also build a specification taking in consideration only the Latin American countries. This is the only region for which we have enough data to pursue an estimation on a regional level. Considering only countries from the same region has a series of advantages. It reduces the heterogeneity problem that is expected when dealing with emerging markets in a global level. For historical reasons, these countries tend to have more comparable institutional basis and economies. Another advantage is their similarity on how they are perceived by the market, which has a tendency of categorize countries by their regions, either for trust or distrust. Finally, it also addresses the interconnectedness, both economic and financial, stimulated by the geographical proximity, which leads to contagion issues in times of crises.

Table 7 displays the results for this regression. In the specification with no interactions (5a), global risk aversion remains important at a 1% significance level, but with a lower coefficient than the one found for the whole sample: for Latin America, a 1 percent increase in VIX is associated with a 4.64 percent increase in spreads. Debt also remains statistically significant, but with a smaller coefficient. The coefficient for the FRSI is still negative, but not statistically significant.

Including interactions do not impact the other coefficients much. All interaction coefficients are insignificant. The R-squared improves significantly, showing that our variables have a strong explanatory power for EMBIG spreads in Latin America. It goes to 0.82 for the model with no interactions, and peaks at 0.83 for the model interacting Debt and Fiscal Rules strength.

Especially in this case, it is important to test if these results are skewed by the presence of Argentina in the sample. In fact, the outlying values of some of the variables for the country would have a much stronger effect on this model, considering the sample is smaller. To test this hypothesis, we also run the regression for all Latin American countries but Argentina. The results can be seen under 5e through 5h.

As expected, without Argentina, the model has a strikingly superior fit, going from an R-squared of 0.82 to one of 0.89 for the regression without interactions, and from 0.82 to 0.91 for the one with interactions. Without interactions, the FRSI remains insignificant, and global risk aversion still plays an important role, but with a slightly lower coefficient when compared to the whole sample regression. The biggest change is that Inflation is now significant at a 5% level,

denoting that a 1% increase inflation leads to a 3.2 percent increase in spreads. This is not an unexpected as inflation has historically been a warning flag of crisis in Latin American countries.

These results remain almost the same when including interactions (Regression 6f). Contrary to the regressions with Argentina, the coefficient for the interaction between reserves and the fiscal rules index is significant now, as well as the one between fiscal rules and debt. Both effects are considerably higher for the selected Latin American countries than for the whole sample. A stronger fiscal rule by 0.1 points (as measured by our index), has a dampening effect of -0.08 percentage points for marginal increases in Debt, and an incrementing effect of -0.18 percentage points for marginal increases in Reserves.

## Table 8. Fixed Effects Estimation, dependent variable: Log of EMBIG Spread (LATAM)

| | (5a) | (5b) | (5c) | (5d) | (5e) | (5f) | (5g) | (5h) |
|---|---|---|---|---|---|---|---|---|
| Fiscal Index | -0.329 | 0.855 | 0.580 | 0.091 | -0.244 | 0.776 | 1.005 | 0.456 |
| | (0.171) | (1.074) | (0.626) | (0.267) | (0.308) | (0.961) | (0.358)* | (0.227) |
| Ln(Vix) | 0.464 | 0.698 | 0.467 | 0.450 | 0.523 | 0.726 | 0.523 | 0.519 |
| | (0.111)** | (0.284) | (0.113)** | (0.121)* | (0.070)** | (0.209)* | (0.065)** | (0.085)** |
| Fed Rate | -0.036 | -0.037 | -0.027 | -0.037 | 0.004 | 0.003 | 0.008 | 0.006 |
| | (0.042) | (0.040) | (0.044) | (0.043) | (0.023) | (0.022) | (0.024) | (0.024) |
| Gross Debt | 0.021 | 0.021 | 0.044 | 0.023 | 0.036 | 0.036 | 0.054 | 0.043 |
| | (0.003)** | (0.003)** | (0.014)* | (0.004)** | (0.008)* | (0.007)** | (0.005)** | (0.004)** |
| Ln(GDPpc) | -0.551 | -0.545 | -0.582 | -0.482 | -0.252 | -0.267 | -0.432 | -0.160 |
| | (0.375) | (0.368) | (0.325) | (0.354) | (0.280) | (0.279) | (0.284) | (0.188) |
| Reserves | -0.069 | -0.075 | -0.060 | -0.043 | -0.068 | -0.070 | -0.048 | -0.026 |
| | (0.031) | (0.034) | (0.029) | (0.018) | (0.025) | (0.025)* | (0.027) | (0.012) |
| Rule of Law | -0.481 | -0.437 | -0.447 | -0.460 | -0.032 | 0.016 | 0.050 | -0.091 |
| | (0.463) | (0.484) | (0.410) | (0.482) | (0.450) | (0.461) | (0.376) | (0.512) |
| Reg. Qualit. | 0.051 | -0.006 | 0.121 | 0.023 | 0.171 | 0.167 | 0.289 | -0.026 |
| | (0.287) | (0.288) | (0.232) | (0.302) | (0.471) | (0.459) | (0.444) | (0.381) |
| Pol. Stability | -0.064 | -0.060 | -0.065 | 0.007 | -0.167 | -0.183 | -0.188 | -0.025 |
| | (0.143) | (0.140) | (0.109) | (0.125) | (0.145) | (0.138) | (0.136) | (0.138) |
| Gov. Efficiency | -0.083 | -0.063 | 0.008 | -0.056 | 0.212 | 0.233 | 0.210 | 0.341 |
| | (0.388) | (0.391) | (0.399) | (0.380) | (0.349) | (0.361) | (0.291) | (0.340) |
| Corruption Control | -0.495 | -0.452 | -0.614 | -0.561 | -0.229 | -0.213 | -0.365 | -0.307 |
| | (0.343) | (0.354) | (0.260) | (0.334) | (0.174) | (0.184) | (0.160) | (0.118) |
| GDP Growth | -0.012 | -0.013 | -0.010 | -0.010 | -0.026 | -0.026 | -0.018 | -0.026 |
| | (0.007) | (0.007) | (0.006) | (0.008) | (0.010) | (0.010) | (0.008) | (0.007)* |
| Current Acc. | -0.084 | -0.084 | -0.080 | -0.084 | -0.026 | -0.026 | -0.024 | -0.027 |
| | (0.042) | (0.042) | (0.046) | (0.040) | (0.017) | (0.018) | (0.014) | (0.013) |
| Balance | -0.009 | -0.007 | 0.001 | -0.012 | -0.029 | -0.025 | -0.026 | -0.018 |
| | (0.039) | (0.035) | (0.032) | (0.034) | (0.019) | (0.018) | (0.020) | (0.018) |
| Inflation | -0.002 | -0.003 | 0.003 | -0.007 | 0.032 | 0.030 | 0.033 | 0.028 |
| | (0.020) | (0.019) | (0.021) | (0.019) | (0.008)* | (0.007)* | (0.006)** | (0.004)** |
| vixXindex | | -0.093 | | | | -0.082 | | |
| | | (0.078) | | | | (0.058) | | |
| debtXindex | | | -0.006 | | | | -0.008 | |
| | | | (0.004) | | | | (0.002)** | |
| reserveXindex | | | | -0.013 | | | | -0.018 |
| | | | | (0.006) | | | | (0.002)** |
| _cons | 8.950 | 8.259 | 8.293 | 8.199 | 5.174 | 4.734 | 5.872 | 3.898 |
| | (3.763) | (4.169) | (3.729) | (3.603) | (2.956) | (3.021) | (2.880) | (2.085) |
| $R^2$ | 0.82 | 0.82 | 0.83 | 0.82 | 0.89 | 0.89 | 0.90 | 0.91 |
| *N* | 91 | 91 | 91 | 91 | 77 | 77 | 77 | 77 |

* $p<0.05$; ** $p<0.01$;

Countries: Argentina, Brazil Chile, Colombia, Peru, Mexico (N=91); Brazil Chile, Colombia, Peru, Mexico (N=77)

# 4. Discussion

The results found in the previous section offer interesting insights for the analysis of the drivers of sovereign spreads in emerging markets. Our study works with a longer time-series than most of the existing literature, and is able to confirm a lot of their findings, that will be discussed in this section.

The whole sample regression shows that the measure of global risk aversion is the most important of the global variables. This reflects a known fact in financial markets: when risk aversion goes up, investors flock to safe assets, pushing yields of emerging market securities up. Additionally, the role of fundamentals in determining spreads follow the logic established in the Theory and Empirical Approach chapter. In other words, better fundamentals decrease the probability of default, thus lowering spreads.

On top of being coherent with previous findings, the results also guide us to confirm our hypothesis: the effect of stronger fiscal rules is, at most, limited. First, the direct effect of adopting or strengthening fiscal rules is not statistically different from zero. Thinking back to our theoretical approach, this is not unexpected: sovereign bond spreads are connected to country's probability of default, and fiscal rules are not necessarily internalized as a reducing factor of that probability. This happens for several reasons and most of them are connected to the very own nature of fiscal rules.

Fiscal rules are, fundamentally, a legal tool, and, as such, they are more subjective than interpreting straightforward numerical results, such as debt or balance. Additionally, fiscal rules must be tailored according to a specific country's economy, institutional tradition, and stability culture. This complicating factor makes it even harder for foreign investors to calculate how a

certain fiscal rule should contribute for a country's financial resilience and ability to honor its commitments. Finally, there is the compliance factor. Having a *de jure* rule, no matter how strong based on our index or any other measure, does not necessarily mean that the country will comply with it. Argentina is a prime example of a country where a fiscal rule was in activity for a long period of time, legally, but compliance was inconsistent. To add to this issue, previous studies have found that fiscal rules can lead to a significant deployment of creative accounting to fulfill the requirements of the rule (von Hagen and Wolff 2006; Buti et al 2006). This means that even when the fiscal policy process officially follows the rules, it might be able to circumvent them in a way that is not easily traceable, and surely not visible. This was the case in Brazil, which used creative accounting measures for years before President Rousseff was impeached over it. Even if there were legal consequences, the country was able to mask its fiscal situation for years (Orair and Gobetti 2017).

Even though these limitations exist, it is intuitive to expect that fiscal rules' strength and existence can be taken in consideration when investors evaluate a country's position as a whole, as one of many proxies of sound economic policy making. This means that Fiscal Rules may be relevant under certain conditions. Following this rationale, the regressions also included interactions between our fiscal rule index and global risk aversion, gross debt, and reserves.

Before getting into the effects of these interactions, it is important to turn to the interesting insights offered by the modifications applied to the sample. In the regression without China, the model was able to have a better fit, which shows us that the regression explains the model better for the remaining countries. Even so, the coefficients told us virtually the same dynamic between these variables and spreads, which is an indication of the robustness of our study.

In the one without Argentina, the model was even better fitting, and it uncovered a relationship between GDP Growth and spreads. This finding is consistent with previous literature that found that better economic performance is an indicator that influences investor's trust in the country's payment capabilities (e.g. Presbitero et al. 2016). The logic behind the exclusion of Argentina leading to the unveiling of this relation is that the country went through sharp increases in the EMBIG spread, even under significant income growth. On top of it, it is a sound reminder of the limitations of our model, as there are dynamics that our control variables do no capture. Government announcements, defaults, or the election of "anti-market" Presidents can be used as examples.

The next modification was the exclusion of the EU countries we had in our sample. As previously explained, it is expected that EU membership will shape how spreads react to our explanatory variables for these countries (Szczypinska 2014). This effect was even more poignant before the Great Recession. Luengnaruemitchai and Schadler (2007) find that in the pre-crisis period the risk associated with these was underestimated relatively to other emerging markets, a phenomenon labeled by these authors as the "Halo Effect".

As the substantially bigger R-square shows, excluding EU countries leads to an increase in the explanatory power of the chosen variables. There is a considerable decrease in the negative effect of high global risk aversion. This is in line with previous literature, which established that emerging European countries are the most exposed to fluctuations in VIX (e.g. Csonto and Ivaschenko 2013). Thus, the exclusion of these countries brings the coefficient down.

Additionally, this modification of the sample makes Current Account statistically significant. Current Account Balance is supposed to affect spreads by offering a general measure of the economy's capacity to generate foreign income to service the country's debt (Clark and

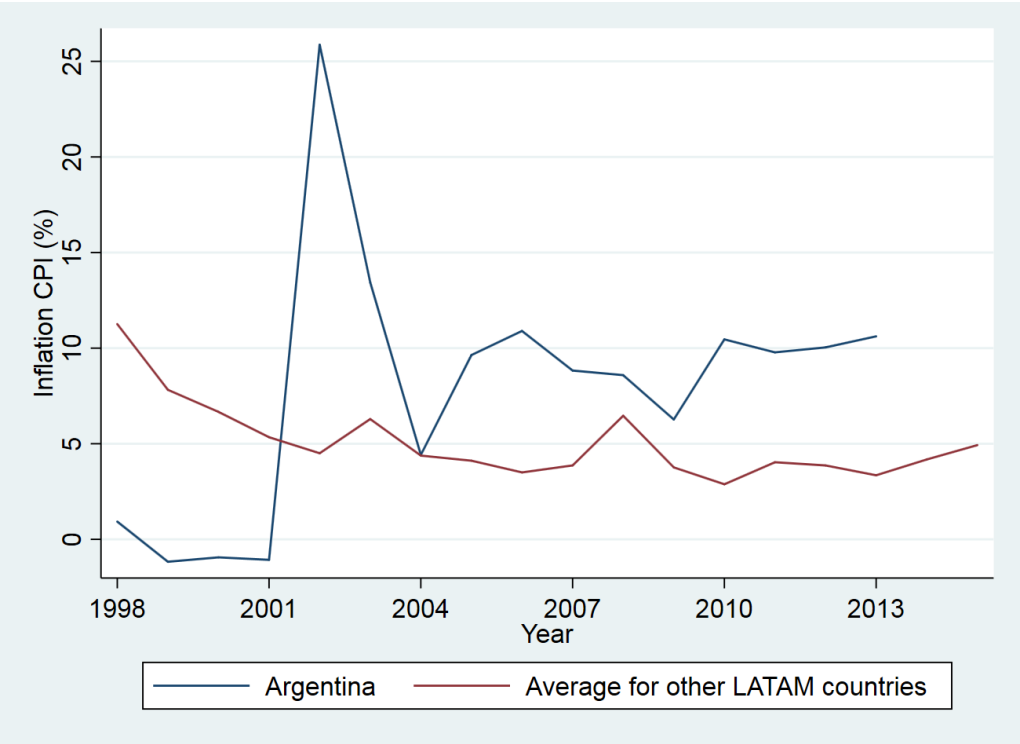
Kassimatis 2015). However, this is a variable that has shown contradictory effects in previous studies on the matter (Eichler and Maltritz 2013). Nevertheless, its effect being uncovered by the exclusion of Hungary and Poland makes sense, considering most of the other countries in the sample are heavily reliant on exporting commodities, and the situation of their terms of trade is captured by changes in the current account balance. Previous literature has identified that better terms of trades for commodities are associated with lower spreads (e.g. Presbitero et al. 2016). Thus, it is coherent that this effect is unveiled when the confounding presences of Hungary and Poland are removed.

Finally, the regression for Latin American countries is the one for which the model has the strongest explanatory power. Global risk aversion has a smaller effect when we take only Latin America in consideration, which is coherent with the findings on Csonto and Ivaschenko (2013) that denoted the region as the least affected by VIX. The coefficient for Reserves is now insignificant. The previous literature that focused on Latin America found that Reserves have a very limited effect on spreads (e.g. Martinez et al 2013). Because these authors were not focused on fiscal rules, they used monthly or quarterly data, which might explain why our model did not pick up this small effect, as it uses yearly data.

The best fit of all specifications deployed comes from the sample with Latin American countries other than Argentina. The effect of VIX is bigger without Argentina, but still smaller than for the whole sample, which is still in line with previous studies. Debt also goes up, leading us to conclude that the Argentinean turmoils are, in fact, capable of distorting the model. The biggest evidence is the fact that the Inflation coefficient is now positive. This is an intuitive conclusion for Latin American countries, which have historically suffered high inflation periods. As we can see in Figure 3, after the first three years of our time-series (when Argentina had a

currency board regime), inflation in Argentina is consistently and notably superior to the other countries in the sample, which can explain why the effect was not uncovered in the previous specification.

**Figure 3: Inflation in Latin America – 1998-2015**




*Other LATAM: Brazil Chile, Colombia, Peru, Mexico*

Turning back to our findings about the effect of Fiscal Rules when associated with other variables, our first finding is that the interactions with VIX were always insignificant. This tell us that, for emerging markets, fiscal rules are not effective in softening the rise in spreads associated with an increase in global risk aversion. This result is an interesting counterpoint to the findings of Iara and Wolff (2010) that uncovered this effect of strengthening fiscal rules in countries in the EMU. It is not surprising that the dynamics are different for emerging markets than for EMU countries. This might indicate that fiscal rules have more credibility in EMU countries, an extension of the "Halo effect" previously mentioned. On the other hand, it is important to note that

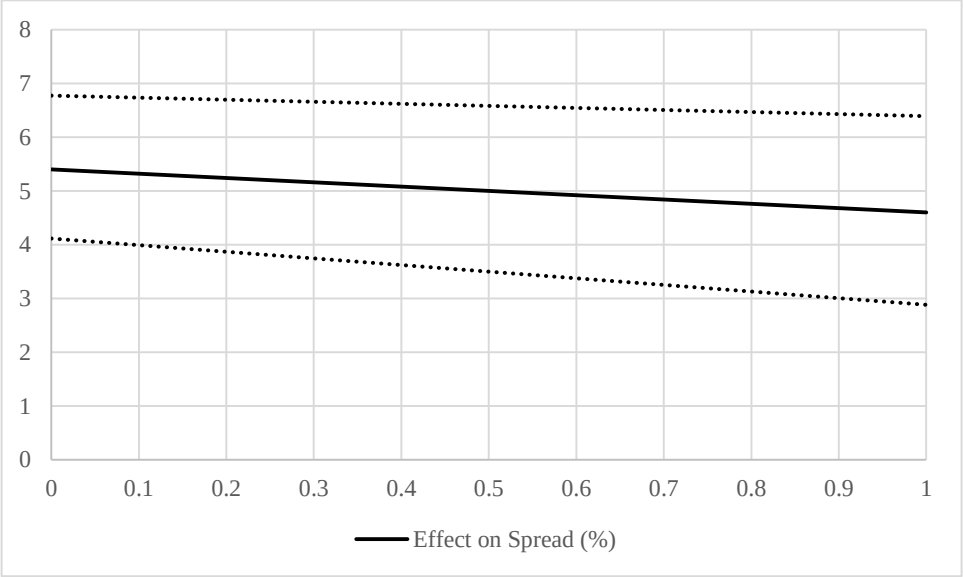
even though the methodology was similar, their work did not use EMBIG as a measure of sovereign bond spreads. Additionally, the Fiscal Index built by them was based on the European Commission Fiscal Rule Database. All these factors might contribute for the different results.

On the other hand, the specifications deployed were successful in uncovering a potential, though small, negative impact of Fiscal Rules Strength on spreads when it was interacted with Debt and Reserves. The interaction with Reserves was the most robust one, providing statistically significant coefficients in most specifications, while the interaction with Debt was significant only in two of them.

The interaction with Debt showed us that stronger fiscal rules do present a dampening effect in times of deteriorating debt. In the specification containing Latin American countries other than Argentina, the coefficient showed us that, a Fiscal Rules Strength Index bigger by 0.1, will reduce the impact of a 1 unit increase in the Debt-to-GDP ratio on spreads by 0.08 percentage points. This dampening effect can be visualized in Figure 4. In practical terms, it means that countries with stronger fiscal rules will be less punished by an increase in Debt than those with weaker ones.

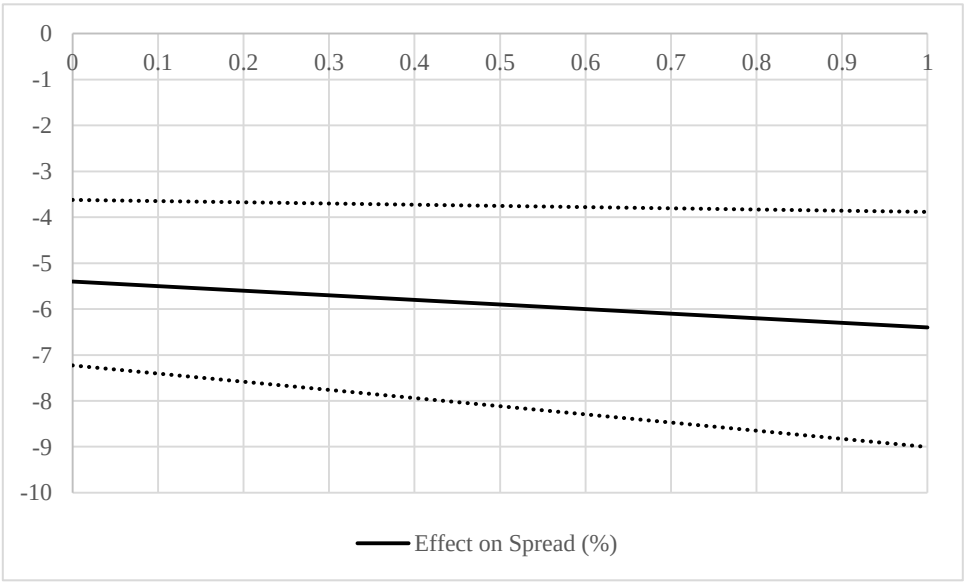
Interacting Fiscal Rules strength with Reserves, we were also able to uncover that their combination has a negative impact on spreads, even if small. The regression with the whole sample denoted an incrementing effect of the strength of fiscal rules on spreads. This effect means that countries with stronger Fiscal Rules will benefit from bigger reductions in spread when the amount of Reserves is increased: countries that score 0.1 higher in FRSI, will witness a 0.13 percentage points extra decrease in spreads, when marginally increasing Reserves. This incrementing effect can be seen in Figure 5.

**Figure 4: Marginal Effect of Debt on Sovereign Bond Spreads**




*Note: this figure represents the marginal effect of an increase in Gross Debt to GDP ratio as a function of FRSI, based on Regression 5g (Table 3). The dotted lines represent the 95% confidence interval. Source: own calculations.*

**Figure 5: Marginal Effect of Reserves on Sovereign Bond Spreads**



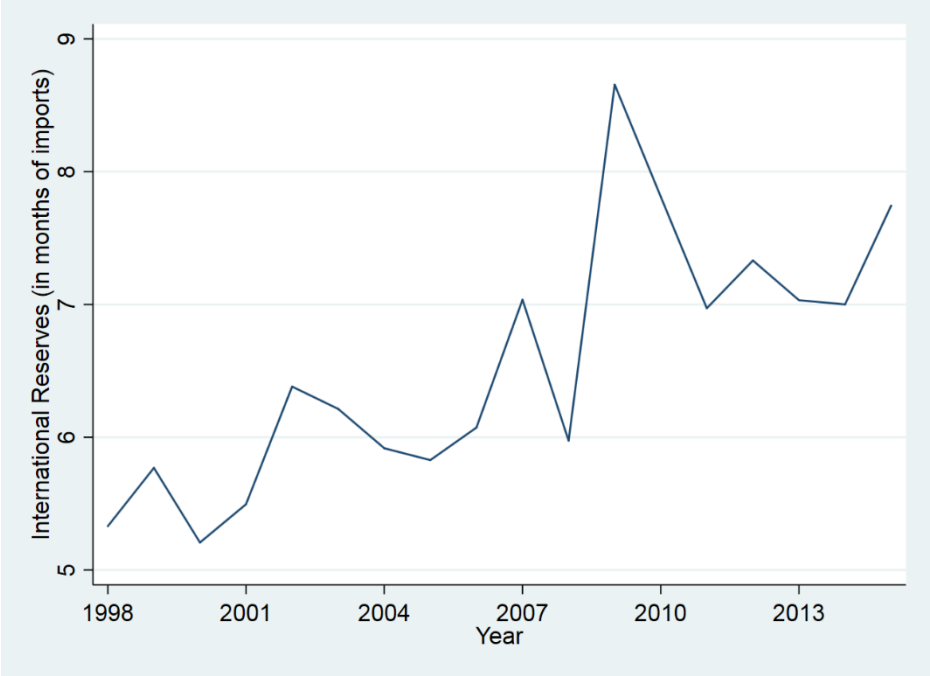

*Note: this figure represents the marginal effect of an increase in Reserves (as months of imports) as a function of FRSI, based on Regression 1d (Table 6). The dotted lines represent the 95% confidence interval. Source: own calculations.*

The rationale behind this finding is deeply related to the use of International Reserves as an economic policy tool. First, in a hedging role, protecting the country from capital sudden stops. Second, as an instrument for softening currency shocks. In other words, Reserves "provide a window of opportunity for policy change in advance of reserves imploding in the context of a full-blown crisis" (Bird and Rajan 2002, 888). Taking this policy approach in consideration, it is easy to understand how Fiscal Rules can strengthen the effect of accumulating Reserves. Fiscal Rules indicate the government is committed to sound economic policies, which, in turn, make the stock of Reserves more efficient.

This finding is important in a context that emerging Economies have been pushing Reserves accumulation policy for a number of recent years. This policy started after the financial crises of the late 1990s, as emerging markets were still recovering from the consequences of the crises caused by growing financial integration. In this context, it is not surprising that these countries started building up reserves as "self-insurance against the volatility associated with financial globalization" (Aizenman et al 2014, 1). This policy direction can be seen in Figure 6.

Switching our perspective to how strengthening Fiscal Rules can directly affect spreads, not only on their dynamic related to a change in Debt and Reserves, the results were never numerically relevant. The coefficient of Fiscal Rules was consistently statistically insignificant, and displayed huge confidence intervals, probably caused by the low variance and the heterogeneity of the observations. In other words, even though our result has provided an indication that stronger fiscal rules can have a dampening effect in the case of Debt, and an incrementing effect in the case of Reserves, we were not able to identify a statically relevant direct effect of strengthening fiscal rules on spreads.

**Figure 6: Average Level of Reserves in Emerging Markets – 1998-2015**




*Countries: Argentina, Brazil, Chile, China, Colombia, Hungary, Malaysia, Mexico, Peru, Philippines, Poland, Russia, South Africa, and Turkey.*

# Conclusion and Policy Recommendations

Does the strength of fiscal rules matter when financial markets assess sovereign risk in emerging markets? This present study seems to give us every economist's favorite answer: it depends. On one hand, we find that the direct effect of strengthening fiscal rules is not statistically significant. On the other, we uncover that having stronger fiscal rules can make a (small) difference when taken in consideration along with other variables.

The inexistent of a measurable direct impact is not surprising and confirms our hypothesis. Fiscal rules and their characteristics are a domestic legal game. By their own nature, they do not provide the market with straightforward information about their impact on a country's ability to repay their debt. Additionally, investors would also need to differentiate between real fiscal rules and those which are not fully real (i.e. followed by domestic policy makers). In this context, it would be unwise to expect the market to internalize fiscal rules in their assessment of country risk.

Despite the lack of a direct impact, this study was able to uncover two effective ways through which fiscal rules can influence spreads. Our results showed that when Debt rises, having stronger fiscal rules in effect can dampen the rise of spreads. This dampening feature, however, only maintains its robustness for Latin American countries (other than Argentina): the significance of the coefficient was inconsistent in our other sample splits. Additionally, the effect is limited – for Latin American countries other than Argentina, the effect of having the strongest rule possible instead of no rule at all would only dampen the positive marginal impact of Debt on spreads by 0.80 percentage points (from 5.4 to 4.6 percent).

The second path of influence is through Reserves. Contrary to Debt, this effect was robust in almost all our specifications. Our study uncovers an incrementing effect of stronger fiscal rules.

In other words, countries with stronger fiscal rules will be rewarded with a higher reduction on spreads when accumulating more Reserves. Once again, this is a limited effect: having the strongest rule possible instead of no rule at all would increment the (negative) marginal effect of Reserves on spreads by 1.5 percentage points, on average.

What do these results adds to the debate on fiscal rules? The most important finding is that financial market actors do not show a clear preference for more stringent fiscal rules, other than to a very limited extent. A series of articles have claimed an alleged demand from investors for stronger fiscal rules, which suggests that their implementation should visibly please the market. Despite having a certain logic behind it, this argument fails to be empirically confirmed.

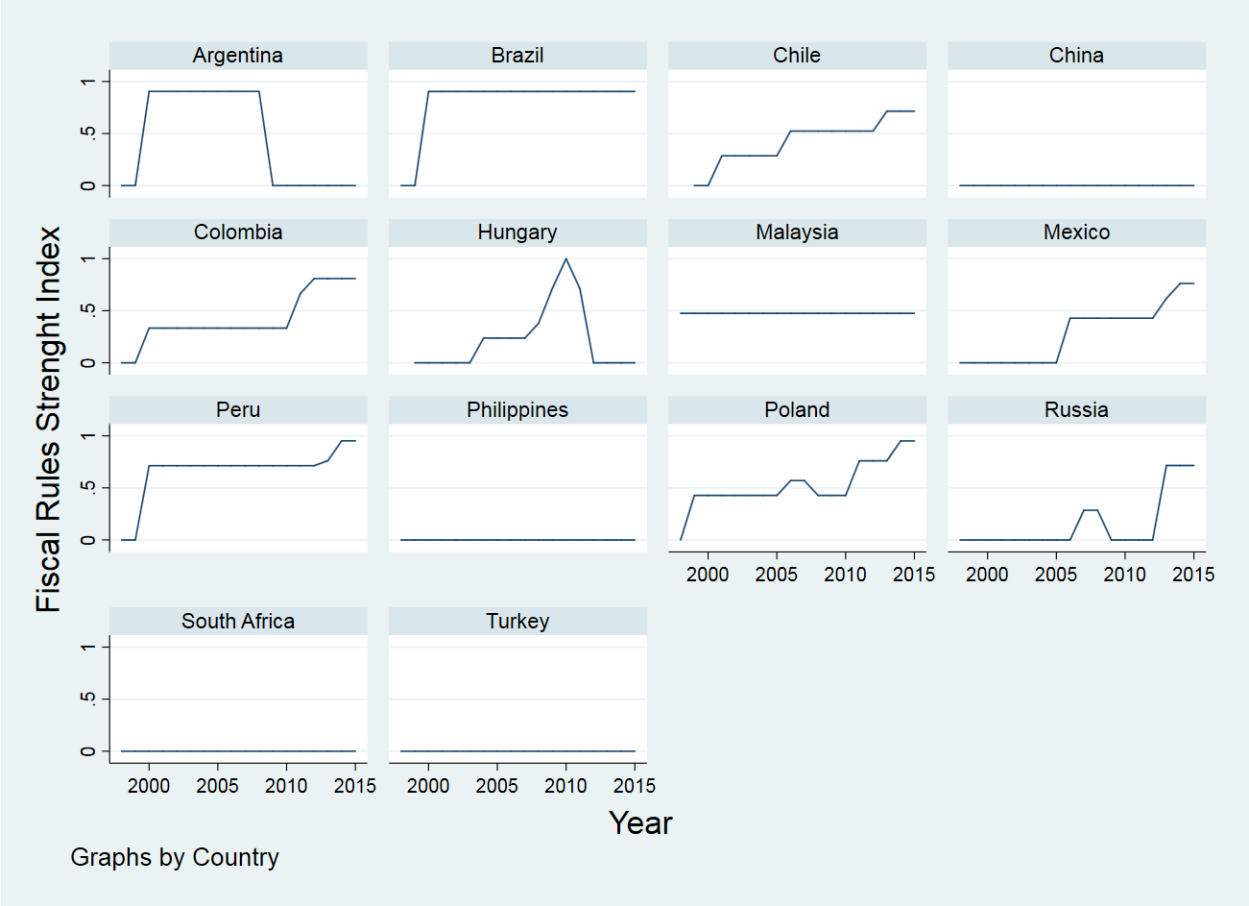
However, this does not mean fiscal rules should not be encouraged. The literature mentioned throughout this thesis has successfully denoted how fiscal rules can reduce pro-cyclical policies and induce better fiscal results. Perhaps, the most important policy recommendation our results offer us is that the effectiveness of fiscal rules should not be measured by sovereign bond spreads. In fact, what makes fiscal rules hard for the market to internalize is exactly what can make them successful: fiscal rules must be domestically grown, designed and implemented in a customized version for each individual country.

Finally, financing costs are a function of global factors (that are outside any individual emerging market's control) and fundamentals. Sound economic policy is the key to achieving healthy and sustainable fundamentals, and if stronger fiscal rules can help them accomplish this goal, they can matter.

# Appendix

## Appendix 1

**Figure A.1: Fiscal Rules Strength Index – 1998-2015**



## Appendix 2

### Figure A.2: Westerlund Test for Cointegration

Westerlund test for cointegration

Ho: No cointegration — Number of panels = 14
Ha: Some panels are cointegrated — Avg. number of periods = 17.071

Cointegrating vector: Panel specific
Panel means: Included
Time trend: Not included
AR parameter: Panel specific

| | Statistic | p-value |
|---|---|---|
| Variance ratio | 1.1463 | 0.1258 |

**Appendix 3**

**Table A.1: Endogeneity Testing**

| | Fiscal Index | Fiscal Index | Fiscal Index | Fiscal Index | Fiscal Index |
|---|---|---|---|---|---|
| L.ln(EMBI) | -0.059 | | | | |
| | (0.030) | | | | |
| Ln(Vix) | -0.014 | -0.021 | -0.003 | 0.004 | 0.010 |
| | (0.051) | (0.056) | (0.069) | (0.076) | (0.058) |
| Fed Rate | 0.012 | 0.017 | 0.023 | 0.024 | 0.025 |
| | (0.011) | (0.013) | (0.020) | (0.017) | (0.015) |
| Gross Debt | 0.009 | 0.009 | 0.009 | 0.009 | 0.010 |
| | (0.002)** | (0.002)** | (0.002)** | (0.002)** | (0.002)** |
| Ln(GDPpc) | 0.105 | 0.102 | 0.121 | 0.108 | 0.079 |
| | (0.093) | (0.095) | (0.113) | (0.115) | (0.119) |
| Reserves | -0.001 | 0.003 | 0.004 | 0.004 | 0.006 |
| | (0.009) | (0.009) | (0.009) | (0.009) | (0.010) |
| Rule of Law | 0.156 | 0.153 | 0.160 | 0.155 | 0.162 |
| | (0.213) | (0.201) | (0.247) | (0.272) | (0.247) |
| Reg. Qualit. | 0.311 | 0.292 | 0.214 | 0.227 | 0.220 |
| | (0.203) | (0.203) | (0.270) | (0.260) | (0.280) |
| Pol. Stability | -0.061 | -0.062 | -0.055 | -0.046 | -0.015 |
| | (0.085) | (0.085) | (0.093) | (0.090) | (0.095) |
| Gov. Efficiency | 0.351 | 0.364 | 0.494 | 0.524 | 0.610 |
| | (0.255) | (0.261) | (0.296) | (0.296) | (0.327) |
| Corruption Control | -0.256 | -0.242 | -0.305 | -0.312 | -0.305 |
| | (0.085)* | (0.092)* | (0.115)* | (0.136)* | (0.097)** |
| GDP Growth | 0.003 | 0.004 | 0.003 | 0.003 | 0.003 |
| | (0.005) | (0.004) | (0.003) | (0.003) | (0.003) |
| Current Acc. | 0.005 | 0.002 | 0.000 | -0.001 | -0.001 |
| | (0.006) | (0.007) | (0.007) | (0.007) | (0.008) |
| Balance | -0.007 | -0.006 | -0.003 | -0.004 | -0.004 |
| | (0.008) | (0.008) | (0.008) | (0.007) | (0.008) |
| Inflation | -0.005 | -0.005 | -0.007 | -0.007 | -0.005 |
| | (0.003) | (0.003) | (0.003)* | (0.003)* | (0.005) |
| L2. ln(EMBI) | | -0.039 | | | |
| | | (0.039) | | | |
| L3. ln(EMBI) | | | -0.011 | | |
| | | | (0.069) | | |
| L4. ln(EMBI) | | | | -0.006 | |
| | | | | (0.066) | |
| L5. ln(EMBI) | | | | | -0.014 |
| | | | | | (0.045) |
| _cons | -0.824 | -0.892 | -1.300 | -1.233 | -0.991 |
| | (1.005) | (1.076) | (1.480) | (1.498) | (1.328) |
| $R^2$ | 0.37 | 0.37 | 0.39 | 0.39 | 0.41 |
| *N* | 208 | 206 | 194 | 192 | 178 |

* $p<0.05$; ** $p<0.01$

# List of References


**Aizenman, Joshua, Yin-Wong Cheung, and Hiro Ito.** 'International Reserves Before and After the Global Crisis: Is There No End to Hoarding?' Working Paper. National Bureau of Economic Research, 2014. https://doi.org/10.3386/w20386.

**Alfaro, Laura, and Fabio Kanczuk.** 'Fiscal Rules and Sovereign Default'. Cambridge, MA: National Bureau of Economic Research, 2017. https://doi.org/10.3386/w23370.

**Anderson, Barry, and Joseph J. Minarik.** 'Design Choices for Fiscal Policy Rules'. *OECD Journal on Budgeting* 5, no. 4 (2006): 159–208.

**Arezki, Rabah, and Markus Brückner.** 'Resource Windfalls and emerging Market Sovereign Bond Spreads: The Role of Political Institutions', 2010, 12.

**Arora, Vivek, and Martin Cerisola.** 'How Does U.S. Monetary Policy Influence Sovereign Spreads in emerging markets?', 2001, 25.

**Ayuso-i-Casals, Joaquim, Diana González Hernandez, Laurent Moulin, and Alessandro Turrini.** 'Beyond the SGP: Features and Effects of EU National-Level Fiscal Rules'. In *Policy Instruments for Sound Fiscal Policies*, 204–40. Finance and Capital Markets Series. Palgrave Macmillan, London, 2009. https://doi.org/10.1057/9780230271791_10.

**Bernoth, Kerstin, and Guntram B. Wolff.** 'Fool the Markets? Creative Accounting, Fiscal Transparency and Sovereign Risk Premia'. *Scottish Journal of Political Economy* 55, no. 4 (2008): 465–87. https://doi.org/10.1111/j.1467-9485.2008.00462.x.

**Bird, Graham, and Ramkishen Rajan.** 'Too Much of a Good Thing? The Adequacy of International Reserves in the Aftermath of Crises'. *The World Economy* 26, no. 6 (2003): 873–91. https://doi.org/10.1111/1467-9701.00552.

**Budina, Nina, Andrea Schaechter, Anke Weber, and Tidiane Kinda.** 'Fiscal Rules in Response to the Crisis: Toward the "Next-Generation" Rules: A New Dataset'. *IMF Working Papers* 12, no. 187 (2012): 1. https://doi.org/10.5089/9781475505351.001.

**Buti, Marco, João Nogueira Martins, and Alessandro Turrini**. 'From Deficits to Debt and Back: Political Incentives under Numerical Fiscal Rules', 2006, 38.

**Cantor, Richard, and Frank Packer.** 'Determinants and Impact of Sovereign Credit Ratings', 1996, 18.

**Ciarlone, Alessio, Paolo Piselli, and Giorgio Trebeschi**. 'emerging markets' Spreads and Global Financial Conditions'. *Journal of International Financial Markets, Institutions and Money* 19, no. 2 (2009): 222–39.

**Clark, Ephraim, and Konstantinos Kassimatis.** 'Macroeconomic Effects on emerging-Markets Sovereign Credit Spreads'. *Journal of Financial Stability* 20 (1 October 2015): 1–13. https://doi.org/10.1016/j.jfs.2015.06.002.

**Csonto, Balazs, and Iryna Ivaschenko.** 'Determinants of Sovereign Bond Spreads in emerging markets: Local Fundamentals and Global Factors vs. Ever-Changing Misalignments'. *IMF Working Papers* 13, no. 164 (2013): 1. https://doi.org/10.5089/9781475573206.001.

**Debrun, Xavier, Laurent Moulin, Alessandro Turrini, Joaquim Ayuso-i-Casals, and Manmohan S. Kumar.** 'Tied to the Mast? National Fiscal Rules in the European Union'. *Economic Policy* 23, no. 54 (2008): 298–362. https://doi.org/10.1111/j.1468-0327.2008.00199.x.

**Dobrescu, Gabriela, Iva Petrova, Nazim Belhocine, and Emanuele Baldacci.** 'Assessing Fiscal Stress'. *IMF Working Papers* 11, no. 100 (2011): 1. https://doi.org/10.5089/9781455254316.001.

**Drazen, Allan.** 'Fiscal Rules from a Political Economy Perspective'. In *Rules-Based Fiscal Policy in emerging markets*, edited by George Kopits, 15–29. London: Palgrave Macmillan UK, 2004. https://doi.org/10.1057/9781137001573_2.

**Ebner, André.** 'An Empirical Analysis on the Determinants of CEE Government Bond Spreads'. *emerging markets Review* 10, no. 2 (1 June 2009): 97–121. https://doi.org/10.1016/j.ememar.2009.02.001.

**Edwards, Sebastian.** "The Pricing of Bonds and Bank Loans in International Markets: An Empirical Analysis of Developing Countries' Foreign Borrowing," *European Economic Review*, Vol. 30, No. 3, (June 1986), pp. 565-589.

**Eichengreen, Barry J., and Tamim Bayoumi.** 'Restraining Yourself: Fiscal Rules and Stabilization'. *IMF Working Papers* 94, no. 82 (1994): 1. https://doi.org/10.5089/9781451954708.001.

**Eichengreen, Barry, and Ashoka Mody.** 'What Explains Changing Spreads on emerging-Market Debt: Fundamentals or Market Sentiment?' Cambridge, MA: National Bureau of Economic Research, 1998. https://doi.org/10.3386/w6408.

**Eichler, Stefan, and Dominik Maltritz.** 'The Term Structure of Sovereign Default Risk in EMU Member Countries and Its Determinants'. *Journal of Banking & Finance* 37, no. 6 (1 June 2013): 1810–16. https://doi.org/10.1016/j.jbankfin.2012.02.002.

**Feld, Lars P., Alexander Kalb, Marc-Daniel Moessinger, and Steffen Osterloh.** 'Sovereign Bond Market Reactions to No-Bailout Clauses and Fiscal Rules – The Swiss Experience'. *Journal of International Money and Finance* 70 (1 February 2017): 319–43. https://doi.org/10.1016/j.jimonfin.2016.09.002.

**Ferrucci, Gianluigi.** 'Empirical Determinants of emerging Market Economies' Sovereign Bond Spreads'. *SSRN Electronic Journal*, 2003. https://doi.org/10.2139/ssrn.597422.

**George Kopits, and Steven A. Symansky.** 'Fiscal Policy Rules'. *IMF Occasional Papers*. 162., 1998.

**Gochoco-Bautista, Maria Socorro, Juthathip Jongwanich, and Jong-Wha Lee**. 'How Effective Are Capital Controls in Asia?', 2010, 37.

**Gochoco-Bautista, Maria Socorro, and Changyong Rhee**. 'Capital Controls: A Pragmatic Proposal', 2013, 25.

**Gonzalez-Rozada, Martin, and Eduardo Levy Yeyati**. 'Global Factors and emerging Market Spreads'. *Economic Journal* 118, no. 533 (2008): 1917–36.

**Grandes, Martín.** 'The Determinants of Sovereign Bond Spreads: Theory and Facts from Latin America'. *Cuadernos de Economía* 44, no. 130 (November 2007): 151–81. https://doi.org/10.4067/S0717-68212007000200002.

**Gray, Simon, Charleen Gust, and David Hofman.** 'Russian Federation: Selected Issues', 2012. https://www.imf.org/external/pubs/ft/scr/2012/cr12218.pdf.

**Gupta, Sanjeev, Amine Mati, and Emanuele Baldacci.** 'Is It (Still) Mostly Fiscal? Determinants of Sovereign Spreads in emerging markets'. *IMF Working Papers* 08, no. 259 (2008): 1. https://doi.org/10.5089/9781451871173.001.

**Hagen, Juergen von, and Guntram Wolff.** 'What Do Deficits Tell Us about Debt? Empirical Evidence on Creative Accounting with Fiscal Rules in the EU'. *Journal of Banking & Finance* 30, no. 12 (2006): 3259–79.

**Hartelius, Kristian, Kenichiro Kashiwase, and Laura E Kodres.** 'emerging Market Spread Compression: Is It Real or Is It Liquidity?', 2008, 37.

**Hatchondo, Juan Carlos, Leonardo Martinez, and Francisco Roch.** 'Fiscal Rules and the Sovereign Default Premium', 2012, 34.

**Hausmann, Ricardo.** 'Good Credit Ratios, Bad Credit Ratings: The Role of Debt Structure'. In Rules-Based Fiscal Policy in emerging markets, 30–52. Palgrave Macmillan, London, 2004.

**Heinemann, Friedrich, Steffen Osterloh, and Alexander Kalb.** 'Sovereign Risk Premia: The Link between Fiscal Rules and Stability Culture'. *Journal of International Money and Finance* 41 (1 March 2014): 110–27. https://doi.org/10.1016/j.jimonfin.2013.11.002.

**Iara, Anna, and Guntram Wolff.** *Rules and Risk in the Euro Area: Does Rules-Based National Fiscal Governance Contain Sovereign Bond Spreads?* Brussels, Belgium: European Commission, Directorate-General for Economic and Financial Affairs, 2010. http://ec.europa.eu/economy_finance/publications/economic_paper/2010/pdf/ecp433_en.pdf.

**Inman, Robert P.** 'Do Balanced Budget Rules Work? U.S. Experience and Possible Lessons for the EMU'. Working Paper. National Bureau of Economic Research, November 1996. https://doi.org/10.3386/w5838.

**Jaramillo, Laura, and Catalina Michelle Tejada.** 'Sovereign Credit Ratings and Spreads in emerging markets: Does Investment Grade Matter?' *IMF Working Papers* 11, no. 44 (2011): 1. https://doi.org/10.5089/9781455218981.001.

**Jaramillo, Laura, and Anke Weber.** 'Bond Yields in emerging Economies: It Matters What State You Are In', 2012, 25.

**Kopits, George.** 'Overview of Fiscal Policy Rules in emerging markets'. In Rules-Based Fiscal Policy in emerging markets, 1–11. Palgrave Macmillan, London, 2004.

**Kumar, Manmohan S., and Emanuele Baldacci**. 'Fiscal Deficits, Public Debt, and Sovereign Bond Yields'. *IMF Working Papers* 10, no. 184 (2010): 1. https://doi.org/10.5089/9781455202188.001.

**Lledó, Victor, Sungwook Yoon, Xiangming Fang, Samba Mbaye, and Young Kim.** 'Fiscal Rules at a Glance', 2017, 82.

**Luengnaruemitchai, Pipat and Schadler, Susan.** 'Do Economists' and Financial Markets' Perspectives on the New Members of the EU Differ?'. IMF Working Papers, Vol. , pp. 1-31, 2007.

**Martinez, Lisana B., Antonio Terceño, and Mercedes Teruel.** 'Sovereign Bond Spreads Determinants in Latin American Countries: Before and during the XXI Financial Crisis'. *emerging markets Review* 17, no. C (2013): 60–75.

**Nickel, Christiane, Philipp Rother, and Jan-Christoph Ruelke.** 'Fiscal Variables and Bond Spreads – Evidence from Eastern European Countries and Turkey'. *Applied Financial Economics* 21, no. 17 (2011): 1291–1307. https://doi.org/10.1080/09603107.2011.570711.

**Odor, Ludovit, and Gabor P. Kiss.** 'The Exception Proves the Rule? Fiscal Rules in the Visegrád Countries'. *MNB Bulletin (Discontinued)* 6, no. 2 (2011): 25–38.

**Orair, Rodrigo Octávio, and Sergio Wulff Gobetti.** 'Brazilian Fiscal Policy in Perspective: From Expansion to Austerity'. In *The Brazilian Economy since the Great Financial Crisis of 2007/2008*, 219–44. Palgrave Macmillan, Cham, 2017. https://doi.org/10.1007/978-3-319-64885-9_9.

**Peiris, Shanaka J..** 'Foreign Participation in emerging markets' Local Currency Bond Markets'. *IMF Working Papers* 10, no. 88 (2010): 1. https://doi.org/10.5089/9781451982602.001.

**Petrova, Iva, Michael G Papaioannou, and Dimitri Bellas.** 'Determinants of emerging Market Sovereign Bond Spreads: Fundamentals Vs Financial Stress'. *IMF Working Papers* 10, no. 281 (2010): 1. https://doi.org/10.5089/9781455210886.001.

**Phillips, Peter C. B., and Hyungsik R. Moon.** 'Linear Regression Limit Theory for Nonstationary Panel Data'. *Econometrica* 67, no. 5 (2000): 1057–1111. https://doi.org/10.1111/1468-0262.00070.

**Poterba, James M.** 'Do Budget Rules Work?' Working Paper. National Bureau of Economic Research, April 1996. https://doi.org/10.3386/w5550.

**Poterba, James M., and Kim S. Rueben**. 'State Fiscal Institutions and the U.S. Municipal Bond Market'. Working Paper. National Bureau of Economic Research, October 1997. https://doi.org/10.3386/w6237.

**Presbitero, Andrea F., Dhaneshwar Ghura, Olumuyiwa S. Adedeji, and Lamin Njie.** 'Sovereign Bonds in Developing Countries: Drivers of Issuance and Spreads'. *Review of Development Finance* 6, no. 1 (1 June 2016): 1–15. https://doi.org/10.1016/j.rdf.2016.05.002.

**Rivas, Carlos Gabriel**. 'Argentina: Preconditions for the Establishment of a Fiscal Rule Including a Structural Fiscal Balance Component'. Discussion Papers & Presentations. Inter-American Development Bank, 2013. http://publications.iadb.org/handle/11319/5762.

**Schick, Allen.** 'Fiscal Institutions versus Political Will'. In *Rules-Based Fiscal Policy in emerging markets*, 81–94. Procyclicality of Financial Systems in Asia. Palgrave Macmillan, London, 2004. https://doi.org/10.1057/9781137001573_6.

**Sutherland, Douglas, Robert W. R. Price, and Isabelle Joumard.** 'Fiscal Rules for Sub-Central Governments: Design and Impact'. OECD Economics Department Working Papers, 2005. https://doi.org/10.1787/606015633336.

**Szczypińska, Agnieszka.** 'Does the Halo Effect Still Hold? Implications for the Euro-Candidates from the Analysis of the EA Bond Market - the Crisis Perspective'. MF Working Papers. Ministry of Finance in Poland, 2012. https://ideas.repec.org/p/ris/mfplwp/0015.html.

**Westerlund, Joakim.** 'Testing for Error Correction in Panel Data*'. *Oxford Bulletin of Economics and Statistics* 69, no. 6 (2007): 709–48. https://doi.org/10.1111/j.1468-0084.2007.00477.x.