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# Does the IMF Program Implementation Matter for Sovereign Spreads? The Case of Selected European Emerging Markets

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## Abstract

The paper analyzes the impact of International Monetary Fund (IMF) programs, in conjunction with country-specific fundamentals and global factors, on the sovereign spreads in selected European emerging market economies (EMEs) from 2000 to 2016. For this purpose, we construct IMF indexes to capture the size of financial resources and the degree of implementation of IMF programs. Our sample is limited to countries belonging to the same region and having IMF programs and data on sovereign spreads over the same period. Our findings are unique in the current literature. They suggest that the size of financial resources and the degree of implementation of IMF programs matter for sovereign spreads, whereas the mere presence of IMF programs does not seem to affect them. Available IMF financial resources and a good implementation of IMF programs are associated with lower sovereign spreads in our panel. In addition, our results show that country-specific fundamentals and global factors remain the primary drivers of sovereign spreads.

**JEL Classification:** E44, F33, G15.

**Keywords:** Sovereign spreads, emerging markets, IMF arrangements, global risk.

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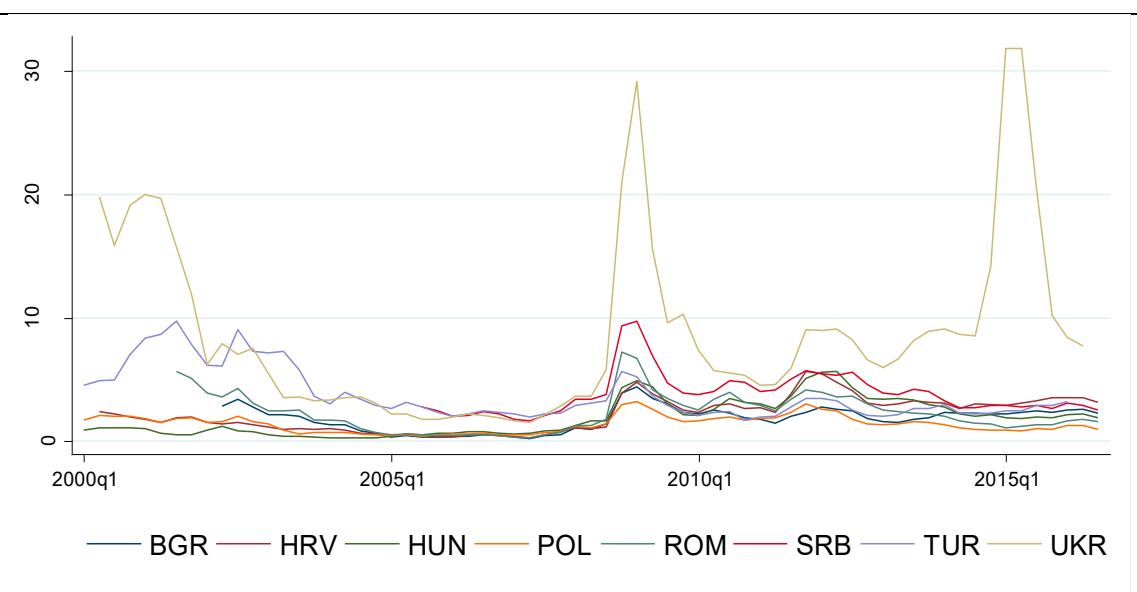
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# 1. Introduction

Since the beginning of the 2000s, sovereign spreads in some European EMEs (Bulgaria, Croatia, Hungary, Poland, Romania, Serbia, Turkey, and Ukraine) have exhibited a high degree of volatility (Chart 1). The Emerging Market Bond Index (EMBI) spreads for Bulgaria, Turkey, Ukraine and Croatia began in the early 2000s with relatively high levels on the back of high volatility due to crises in different large EMEs and debut issuances in international markets.<sup>1</sup> Starting in late 2002, spreads declined and comfortably reached lower levels by the end of 2007. However, close to 2008, the buildup of macroeconomic imbalances in the selected countries began to manifest itself in higher sovereign borrowing, increasingly exposing these countries to shocks (IMF 2008). When the global financial crisis unfolded, sovereign spreads of these countries jumped and remained volatile. After reaching their peak during the first half of 2009 and until 2016, sovereign spreads have declined. This trend was somewhat interrupted by the Fed’s tapering remarks in late May 2013. Between 2000 and 2016, every one of these countries requested IMF programs to address their financial difficulties.

**Chart 1: EMBI Global Spreads (Percentage Points)**



Source: Thomson Reuters Datastream

Given the significant macroeconomic and policy implications of sovereign yield movements, it is important to identify and understand the driving forces of sovereign spread dynamics in European EMEs. As demonstrated by the most recent crisis, reliance on borrowing, including external financing, exposes EMEs to sudden changes in global financial market sentiment. In

<sup>1</sup> The EMBI spread is the yield premium paid by an emerging market on its traded external debt instruments that meet specific liquidity and structural requirements over a U.S. government bond with comparable maturity features.

extreme cases, sovereign spreads will widen to financially unsustainable levels, giving countries a difficult choice of whether to default or continue spending an increasingly large share of their revenues to service sovereign debt.<sup>2</sup>

In this context, an IMF program can restore confidence in capital markets by providing resources and by endorsing the authorities' policies included in the program.<sup>3</sup> Immediate resources disbursed by the IMF feature lower interest rates than what countries would pay to borrow from financial markets. Therefore, IMF lending mitigates the negative impact of borrowing on the national budget when the market's borrowing cost is extremely high. At the same time, IMF lending acts as a "seal of approval" for national economic policies, catalyzing private investment (Erce and Riera-Crichton (2015)). Ultimately, the Fund's presence is expected to reduce sovereign spreads and attenuate a country's fiscal burden. However, the empirical evidence is mixed.

This paper analyzes the impact of IMF programs, global and country-specific determinants on sovereign spreads in selected European EMEs. For this purpose, we employ a fixed-effects panel estimation on an empirical model of sovereign spreads. Here, as is often the case, data availability limits the number of countries in our sample. Our study uses a panel dataset of the abovementioned eight European EMEs, which had IMF programs and available EMBI sovereign spreads during the same timeframe. Its novelty relies on the use of IMF indexes, which capture the size of financial resources and the degree of implementation of IMF programs, and not merely the presence of an IMF program. To construct our IMF indexes, we use quarterly data starting from the first quarter of 2000 to the end of 2016, when most of the IMF programs in these countries were completed. We chose quarterly data because the assessment by the IMF Executive Board of IMF programs occurs on a quarterly basis. After the assessment, the public is informed about the key policies that were implemented by the authorities and the IMF resources available to the country. This assessment allows us to compute the degree of implementation of the program and its size in a specific quarter.

We first examine the effect of global and country-specific factors and the presence of an IMF program on sovereign debt spreads. Second, we analyze to what extent movement in sovereign debt spreads could be attributed not only to the impact of these variables but also to how the IMF program is implemented and to how many resources the IMF makes available through its program.

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<sup>2</sup> Borensztein and Panizza (2009) investigate the economic and political costs of sovereign default.

<sup>3</sup> See Session 4 for more details regarding IMF programs.

Overall, our results suggest that the spread dynamics are affected not only by country-specific fundamentals and global factors but also by the size and the degree of implementation of the IMF program. Higher amounts of financial resources made available by the IMF and the good implementation of the IMF program are associated with lower spreads for our panel. In contrast, the mere presence of an IMF program does not have a statistically significant impact on spreads. Country-specific fundamentals and global variables are the main drivers of sovereign spreads, while the impact of the IMF-related variables is relatively small.

The rest of the paper is organized as follows: Section 2 reviews the current literature on the determinants of emerging market bond spreads. Section 3 describes the data, whereas section 4 presents in detail the construction of IMF indexes. Section 5 elaborates on the methodology used for the estimations. Section 6 interprets the results, and Section 7 concludes.

## **2. Literature review**

Despite a growing body of literature on the determinants of EMEs' sovereign bond spreads, few papers treat the impact of an IMF program. To our knowledge, no study has explored the impact of the size and the degree of implementation of IMF programs on sovereign spreads.

Most of the studies focus on the role of global and country-specific determinants on spreads. For instance, Cantor and Packer (1996) relate changes in sovereign bond spreads to country-specific factors such as GDP growth, inflation, fiscal balance, external balance and investment ratings. Eichengreen and Mody (1998) show that the external interest rate environment, in addition to these country-specific explanatory variables, affects spreads. Hartelius (2006) expands the list of external factors by including the implied volatility of S&P index options, VIX, as a proxy for investors' perception of global financial risk and uncertainty about future U.S. monetary policy, as measured by the volatility of the Federal funds futures. Furthermore, Bellas and al. (2010) find that financial sector vulnerabilities, measured by the EME Financial Stress Index developed by the IMF, and global liquidity conditions are a more important determinant of spreads in the short run than fundamental factors that are significant determinants of spreads in the long run.

Some studies also assess how country-specific factors can strengthen or attenuate the effect of global conditions on sovereign spreads. Alexopoulou et al. (2009) study the case of new EU countries and conclude that common external risk factors, as captured by the euro area equity market volatility, seem to have different impacts in these countries. This volatility has a positive and statistically significant impact in the short run for countries with strong fundamentals (which are perceived as less risky) and a negative impact for those with weak fundamentals (which are perceived as risky).

Others explore how the impact of global and country-specific variables changes during crisis periods compared to non-crisis periods. Dumicić and Ridzak (2011) find that the spread dynamics in European EMEs were affected by both market sentiment and macroeconomic fundamentals at all times. In turn, external imbalances did not seem to have any significant effect on spreads prior to the global financial crisis but became increasingly significant during the crisis. Ebner (2009) finds significant differences in government bond spreads in Central and Eastern Europe during crisis and non-crisis periods. According to his work, market volatility, political instability or uncertainty, and global factors explain the rise in spreads during crisis periods, when macroeconomic variables lose some of their importance. Similarly, Jaramillo and Weber (2013) show that in tranquil times, domestic bond yields are influenced mostly by inflation and real GDP growth expectations, while fiscal deficits and government debt determine spreads during periods of high-risk aversion.

Many authors expand their focus by assessing the impact of weak or strong institutions on the sensitivity of spreads to country-specific indicators. In their study, Nickel and al. (2009) find that in their investment decisions, government bond investors assign different weights to macroeconomic and fiscal variables across countries. This approach probably reflects the fact that the factors driving sovereign risks are much wider than the set of macroeconomic variables conventionally employed in empirical analysis, all the more so for EMEs. In particular, internal and external political risks are likely to play a role. Csonto and Ivaschenko (2013) elaborate further in this vein and find that countries with stronger fundamentals, defined in terms of lower economic, financial and political risks, tend to have lower sensitivity to changes in global risk aversion.

Among all these studies, only a few focus on the impact of IMF programs on EME sovereign spreads. Eichengreen, Kletzer and Mody (2005) find that spreads of sovereign bonds are lower when they are issued in conjunction with IMF programs, as if the existence of an IMF program conveys positive information to bondholders. Hayo and Kutan (2005) study the impact of the IMF program or IMF-related news on the bond market of emerging markets. They conclude that neither good nor bad IMF-related news seems to affect bond spreads. Evrensel and Kutan (2008) reach different results when analyzing the changes in sovereign bond spreads of Indonesia and Korea, where news associated with negotiations and approval of the IMF program decreases bond spreads. More recently, the IMF (2014a) investigates the impact of a Flexible Credit Line (FCL) arrangement on spreads and on bond flows for the group of all FCL users and for countries considered by the investment community to be FCL qualifiers. The results suggest that FCL-eligible members tend to have higher portfolio debt inflows and lower spreads.

In this paper, we contribute to the literature by assessing the effect of IMF programs captured by their size and degree of implementation on sovereign spreads of selected European EMEs in addition to country-specific variables and global factors.

### **3. Data**

This section reports the data used in the analysis, their sources and their treatment. Empirical analysis relies on a panel dataset of eight European EMEs that had IMF programs (Bulgaria, Croatia, Hungary, Poland, Romania, Serbia, Turkey and Ukraine). As is often the case, data availability limits the number of countries in our sample. Therefore, our sample is based on quarterly data starting from the first quarter of 2000 to the end of 2016, when most of the IMF programs in these countries were completed. We choose quarterly data because reviews, including lending and policy reforms of IMF programs, have been conducted on a quarterly basis for a large part of the period. As in many empirical studies, our panel dataset is unbalanced. In particular, for Serbia and Ukraine, there are some missing observations. For the remaining countries, the number of missing observations is rather modest. The data availability for each country is summarized in Table A1, while Tables A2 and A3 contain summary statistics.

Data for our dependent variable are taken from Thomson Reuters DataStream. More precisely, we use the quarterly average of daily blended spreads of JP Morgan's Emerging Markets Bond Index Global (EMBIG).<sup>4</sup>

The list of macroeconomic and financial factors that can affect sovereign bond spread can be long, but we will limit our analysis to the country-specific and global variables presented in the following subsections.

#### **3.1. Country-specific variables**

In line with the literature, we consider the following idiosyncratic fundamentals: political stability and regulatory risks, the ratio of fiscal balance to GDP; the ratio of public debt (external and domestic) to GDP; the ratio of current account to GDP; the rate of change of the local currency exchange rate against the U.S. dollar; CPI inflation; and real GDP growth.<sup>5</sup>

The political stability and regulatory risks are measured by a yearly index computed by Oxford Economics and are available through Thomson Reuters Datastream. These indexes have the value 7 when the risk is the lowest and 1 when the risk is the highest. The political stability risk index (PRI) gauges the stability of the current government and the overall political system. The regulatory risk index (RRI) underscores the probability of a government's adverse action against businesses operating within its territory (i.e. i.e., notably, the general uncertainty regarding foreign investors and the risk of

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<sup>4</sup> We use the EMBI Global because it includes a larger set of countries. The results are similar if stripped spreads are used.

<sup>5</sup> See, for instance, Bellas and al. (2010), and Csonto and Ivaschenko (2013).



expropriation). Both risk indexes are expected to have an inverse relationship with spreads.

Quarterly public debt and fiscal balance data for Bulgaria, Croatia, Hungary, Poland and Romania are retrieved from Eurostat. They refer to the general government's consolidated gross debt and to net lending or borrowing from the general government respectively. For Turkey, Serbia and Ukraine, data are provided by Thomson Reuters in Datastream. All data are in local currencies.

Current account data are retrieved from the IMF BOPS database. All values are denominated in U.S. dollars. They are then converted back to local currencies using period average exchange rates of the International Financial Statistics (IFS) database.

GDP data (in local currency units) used to compute public debt, current account and fiscal balance-to-GDP ratios are taken from the World Bank's WDI and from the IFS database. Seasonally adjusted quarter-on-quarter real GDP growth data are provided by national statistics offices through Thomson Reuters Datastream. Real GDP growth data for Ukraine were not available. We computed them using quarterly nominal GDP data from the IFS database and the quarterly GDP deflator obtained from Thomson Reuters Datastream. We subsequently applied a standard Holt-Winters seasonal adjustment.

The CPI data are retrieved from Thomson Reuters Datastream, which gives access to monthly data published by the national statistics office of Bulgaria, Romania, Serbia and Ukraine. The remaining countries' CPI data come from the World Bank's WDI. Then, we compute CPI inflation as the log difference of indexes of two subsequent quarters.

Higher fiscal and current account deficits and higher debt should lead to wider spreads. In contrast, a higher GDP growth rate should lead to tighter spreads. Higher CPI inflation can lead to higher spreads because it reduces the real value of local bonds. Exchange rate appreciation is expected to have a negative impact on spreads, contrary to exchange rate depreciation.

### **3.2. Global factors**

In our study, we consider two main global factors: global risk aversion and the U.S. Federal funds rate.

We use VIX as a proxy for global risk aversion. VIX measures the implied volatility of S&P index options and is widely employed as an indicator of investors' risk appetite. The daily series are retrieved from the Chicago Board Options Exchange. Higher VIX values should lead to higher spreads.

The U.S. Federal funds rate is extensively used in the literature as a proxy for global liquidity conditions. Data are retrieved from the Board of Governors of the Federal Reserve System and are averaged to quarterly values. A lower Federal funds rate is expected to lead to lower spreads due to enhanced liquidity in financial markets.

## 4. The IMF

When a country faces balance of payment needs, its authorities can ask for an IMF program. A typical program lasts one to four years, and it can be followed by another program. IMF programs are tailored to different types of balance of payment needs (actual, prospective, or potential; short-term or medium-term) and countries' specific circumstances.<sup>6</sup> They include two important elements: IMF financial resources and economic reforms to be implemented by the country in exchange for these resources. IMF resources help countries to rebuild their international reserves, stabilize their currencies, continue paying for imports, and restore conditions for economic growth while undertaking reforms to correct underlying causes of their balance of payment problems.<sup>7</sup> The IMF can also make financial resources available on a precautionary basis for countries with very strong fundamentals through *insurance-like* programs, such as FCL. The precautionary nature of these IMF programs means that because of their strong fundamentals, these countries have access to IMF resources without future specific conditions. These countries should, however, continue to fulfill a number of qualification criteria during the length of FCL, which prove that the country has strong economic fundamentals and institutional frameworks, a sustained track record of implementing strong policies and remains committed to maintain such policies in the future. If the IMF assesses that, these criteria are not met then the country loses access to the FCL credit line. This loss is also a sign that country's economic fundamentals are weakening and would likely affect its sovereign spreads.

Our paper analyzes the impact of the IMF presence on sovereign spreads, the size of IMF resources and the degree of implementation of reforms related to IMF programs in eight European EMEs. For this purpose, we use a dummy variable to capture the IMF presence and construct two IMF indexes to capture the size of financial resources and the degree of implementation of IMF programs. To compute these indexes, we studied all country reports published on the website of the IMF between 2000 and the end of 2016.<sup>8</sup> These variables are explained in detail in the following sections.

### 4.1. The IMF's presence

The presence of an IMF program in a country is captured by a dummy. For country  $i$ , the dummy takes a value of 1 during quarter  $t$  if there is an IMF program and 0 if there is no IMF program.

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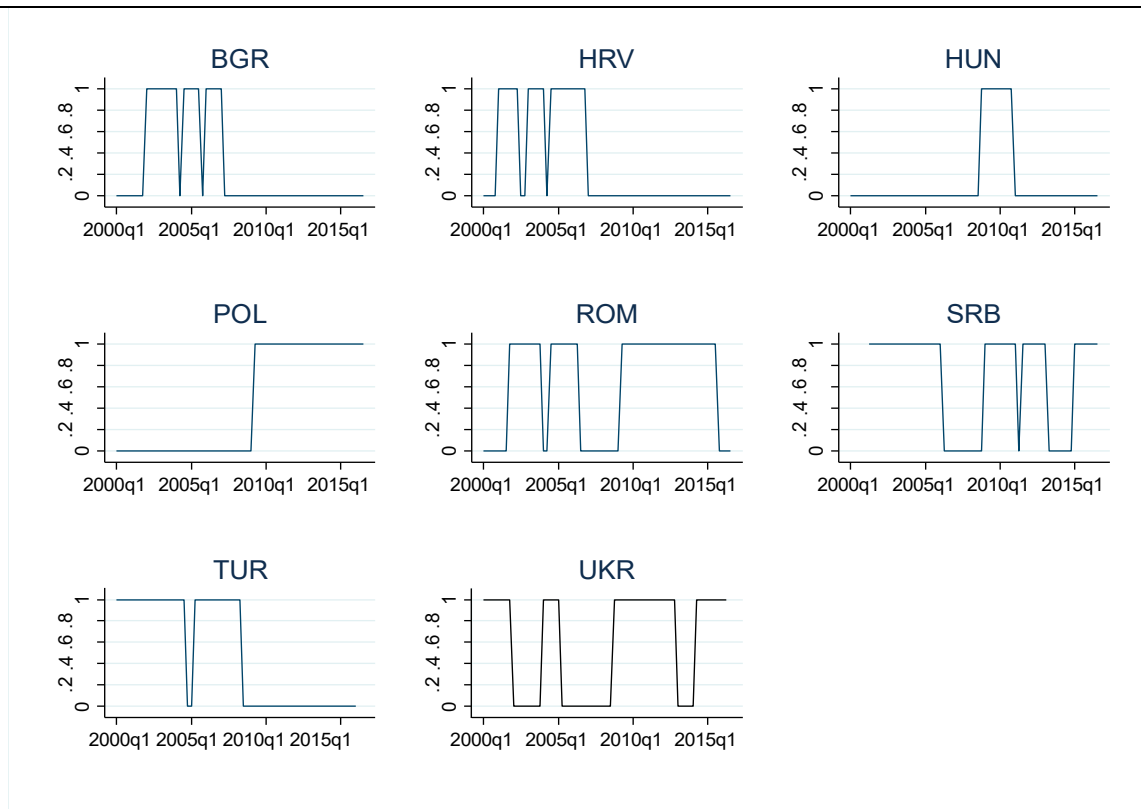
<sup>6</sup> During the period covered by our study, the IMF's instruments for loans to emerging market economies were Stand-By Arrangements (SBA), the Flexible Credit Line (FCL), the Precautionary and Liquidity Line (PLL), Extended Fund Facility (EFF), and – for emergency assistance to members facing urgent balance of payments needs – the Rapid Financing Instrument (RFI).

<sup>7</sup> See [www.imf.org](http://www.imf.org), *About, Factsheets IMF-Lending* for a more detailed description of IMF lending.

<sup>8</sup> All country reports for our countries (Bulgaria, Croatia, Hungary, Poland, Romania, Serbia, Turkey and Ukraine) during the 2000 – 2016 period are available in [www.imf.org](http://www.imf.org).

Qualifying IMF programs are all IMF-supported programs requested by the selected European EMEs during the investigated period. It is expected that the presence of an IMF program has a negative relationship with the spreads. Values of this variable for countries in our panel are presented in Chart 2.

**Chart 2: The IMF Presence**



Source: Authors' computations

#### 4.2. The size of the IMF's financial resources available

The amount of resources needed by the country to bridge its financial gap is the first element of an IMF program. This amount is negotiated during the IMF staff's consultation with the authorities. After the consultations, the IMF staff writes a report about the country's program, which is presented to the IMF Executive Board. Once the IMF Executive Board approves the program, it also approves the total amount of resources to be disbursed upon the implementation of the program's conditions over time. The monitoring of the program's implementation is done through quarterly reviews. After each review, the IMF program makes available a share of the total financial resources, or a tranche in the IMF terminology, to the country if the expected conditions for the respective quarter are met (see 4.3 below). The size of the IMF lending to country  $i$  during quarter  $t$  is captured as a share of the IMF tranche of resources to the total resources of the IMF program. The variable  $IMF\ size_{i,t}$  thus takes values within the interval  $[0, 1]$ .

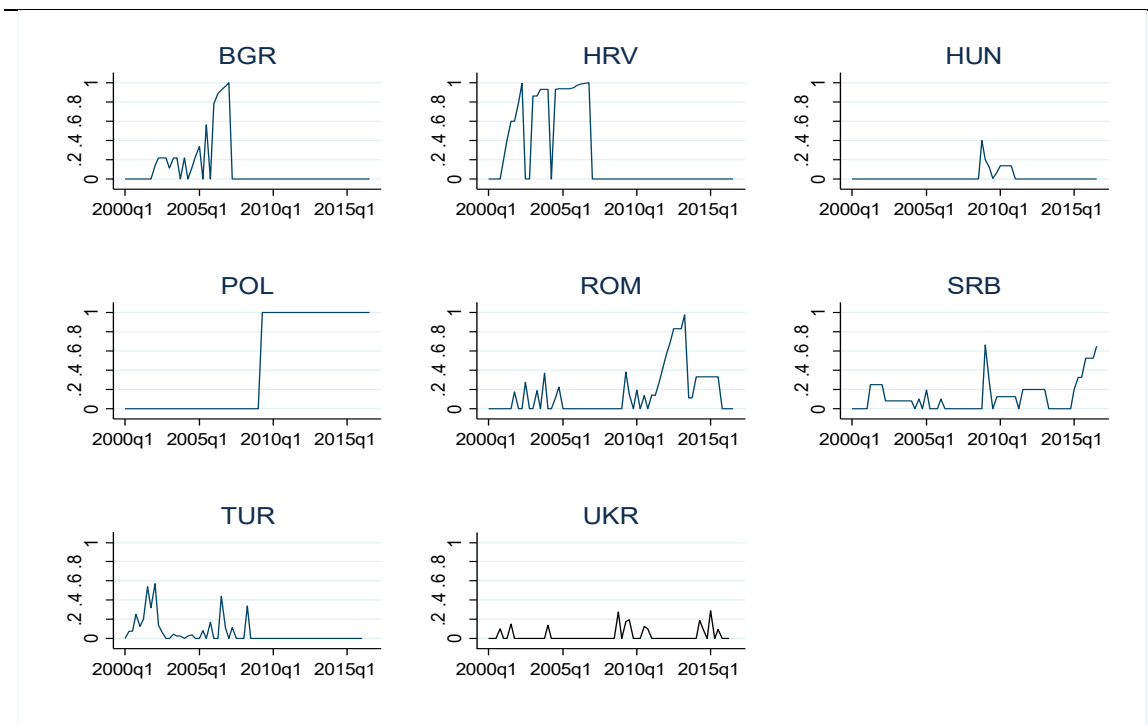
$$IMF\ size_{i,t} = \frac{Tranche\ of\ resources_{i,t}}{Total\ resources\ of\ the\ IMF\ program}$$

For a program with country  $i$ , the variable  $IMF\ size_{i,t}$  during quarter  $t$  has a positive value if the review is completed. A review is not completed if the country has not met the IMF conditions. The variable  $IMF\ size_{i,t}$  equals zero if the review is not completed and/or it has been postponed.

For insurance-like IMF programs, the amount of resources equals the sum of previous undrawn resources and the amount that becomes available by the end of the review. If the review is postponed, the related amount of resources for this review is 0, but the sum of previous undrawn resources at the completion of previous reviews is still available to the country. If the review is not completed and there is no agreement to continue in the future, then the program is left to expire. In this case, the undrawn resources approved by the IMF Executive Board upon the completion of previous reviews are still available to the country.<sup>9</sup> It is expected that the variable  $IMF\ size_{i,t}$  has a negative relationship with sovereign spreads, i.e., a higher value should correspond to lower spreads.

Values of the  $IMF\ size_{i,t}$  for countries in our panel are presented in Chart 3.

**Chart 3: IMF size**



Source: Authors' computations

<sup>9</sup> This example occurred in the case of the Romanian Exceptional Access Under the 2013 Stand-By Arrangement, which was considered as a precautionary Arrangement by the authorities. See IMF Country Report No. 17/135.

### 4.3. The degree of implementation of the IMF program

The set of conditions that need to be met in order to receive the IMF's financial resources is the second element of an IMF program. In all but *insurance-like* programs, IMF resources to countries are released at the completion of the review, which includes conditions to be met by a certain deadline. The IMF conditions encompass a set of structural benchmarks and performance criteria that specify economic policies and measures a country agrees to implement to resolve its balance of payments problem.

The degree of implementation of the IMF program for country  $i$  during quarter  $t$  ( $IMF\ degree_{i,t}$ ) is measured by the number of performance criteria that are met by the authorities as a share of the total number of performance criteria.  $IMF\ degree_{i,t}$  is of course computed only for quarters when there is an IMF program. For the quarters where there is no ongoing IMF program, or the program is off-track, this variable will take a zero value, since the country is not implementing policies or reforms prescribed by the IMF.

The focus is on the performance criteria, as they are the key piece (macro economically relevant) of IMF programs. Indeed, if one or many performance criteria are not met, the authorities will ask the IMF Executive Board to forego the fulfillment of key conditions of the review and present a plan including how and when these conditions will be met. Precisely, these unmet performance criteria will be disclosed in the IMF documents for discussion by the Executive Board. In other words, a high share of unmet performance criteria implies a weak degree of implementation, whereas a low share implies a high degree of implementation.

The Board will then decide whether the review including the unmet performance criteria could be completed or not. If the IMF Executive Board agrees upon these criteria and the review is completed, then the IMF resources related to this review are made available to the country. After this decision, the IMF will inform the authorities and make this information public on its website.

Obviously, the number of unmet performance criteria is zero at the moment the IMF Executive Board approves a country's program request. The country's authorities commit to meet all the performance criteria included in the program.<sup>10</sup> As a result, the degree of implementation equals 1. In this case, the first tranche of resources of the IMF program is available. If the review is completed and there are no unmet performance criteria, then the degree of implementation is 1. If the review is completed but there are unmet performance criteria, then the program is partially implemented. The degree of implementation takes values in the interval  $[0, 1]$ . If the review for the current quarter is delayed and completed in the next quarter, then the degree

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<sup>10</sup> In specific cases, the country has to undertake prior actions, such as to approve a certain law or a budgetary measure. The IMF (2014b) states that "prior actions may be implemented without genuine ownership of the program, and that implementation may be nominal or temporary as a result".

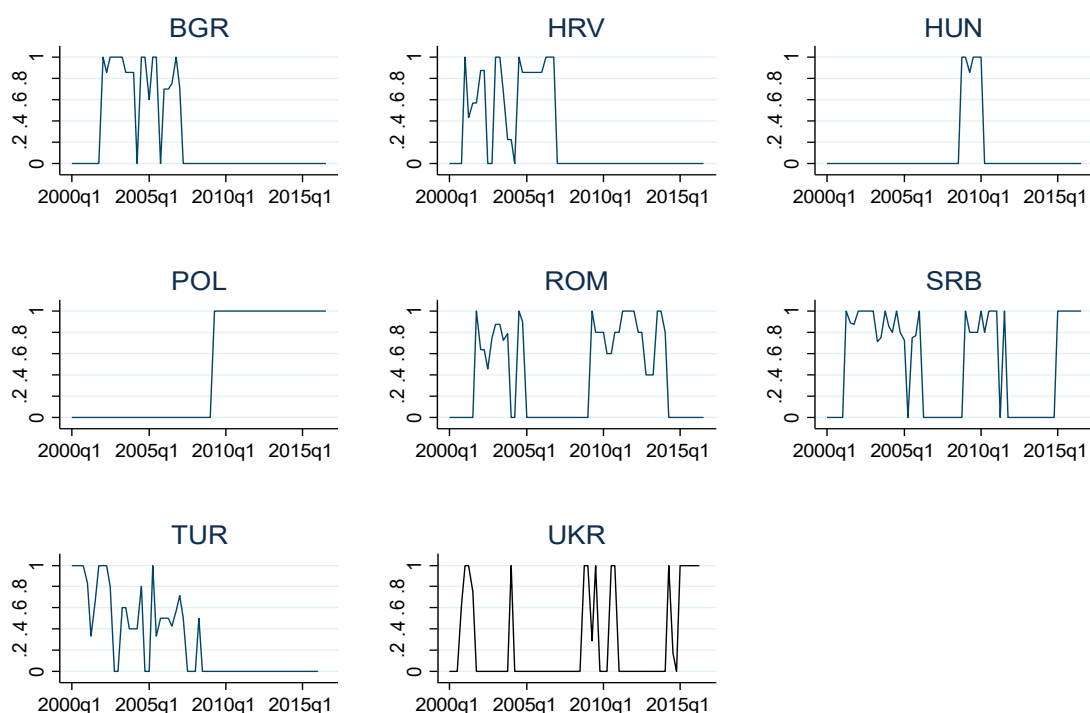
of implementation for the current quarter is the same as that in the previous quarter. If the IMF program is interrupted or the review is delayed and is not completed during the next quarter as planned, then the degree of implementation is zero.

In the case of FCL, the IMF assesses whether the country meets the qualifications criteria throughout the duration of the program. Hence, the *IMF degree* will take the value of 1 as long as the FCL is in place.

The time of discussion of the IMF country report by the IMF Board is a determinant of the data for our variables. For instance, if the IMF report was circulated on 26 June but discussed on 10 July, data for both variables – *IMF size* and *IMF degree* – will be available only for the third quarter because the final assessment from the IMF Executive Board on the IMF financial resources available and the degree of implementation of the IMF program are included in the press release to the public, which, in turn, will be available only during the third quarter. In these cases, investors have access only to the previous degree of implementation of the program when they make their investment decisions.

It is expected that the degree of implementation of IMF reforms has a negative relationship with sovereign spreads, i.e., a higher value of the degree of implementation should correspond to lower spreads. Values of the *IMF degree* variable for countries in our panel are presented in Chart 4.

**Chart 4: The IMF's degree of implementation**



Source: Authors' computations

## 5. Empirical model

We use a common empirical model for the determination of sovereign spreads following other authors, such as Csonto and Ivaschenko (2013) and Bellas et al. (2010). These authors have based their analyses on a model by Edwards (1985), where investors decide to invest in sovereign bonds based on the country-risk premium, they receive over investing in risk free interest rates. This risk premium is related to global risk-free interest rates and the probability of default, which in turn is determined by country-specific fundamentals and global market conditions. Hence, the model we use for our empirical analysis takes the following form:

$$y_{i,t} = \alpha_i + \theta_t + \beta_i IMF_{i,t} + \gamma x_{i,t-k} + \delta z_t + u_{i,t}$$

where  $y_{i,t}$  is the quarterly average of EMBIG spreads for country  $i$  during quarter  $t$ ,  $IMF_{i,t}$  are the three IMF variables described in the section above,  $x_{i,t-k}$  is the vector with country-specific controls, and  $z_t$  is a set of global variables. The explanatory variables lagged by one quarter will be marked with an L1 prefix in the results table.  $\alpha_i$  is a country fixed effect,  $\theta_t$  is a year fixed effect, and the remaining error term  $u_{i,t}$  is assumed to be independent and identically distributed with a mean 0 and variance  $\sigma_u^2$ .

Country-specific macroeconomic variables are lagged by one quarter (i.e.,  $k = 1$ ).<sup>11</sup> The rationale for the use of lagged country-specific variables is that when individuals make their investment decisions, they only have information about the value of variables for the past quarter. The use of lags also eliminates potential endogeneity in the model. Political and institutional risks, the rate of change of the exchange rate, VIX and the U.S. Federal funds rate enter into the estimations without lags because their actual values are immediately observed by the market. The case for the use of lags for the IMF presence and the size of financing variables is weak. Market participants are expected to react immediately to the announcement of an IMF program or to the conclusion of the program review, which means that some program funds (the financial tranche) will become available. The size of the tranche is also immediately observable because it is presented in the program document and in the press release to the public. Consequently, we use these two variables without lags. We use the *IMF degree* without lags and with one lag. The lagged variable is used to capture the impact of the past records of program implementation, which indicates the country's propensity to fulfill its commitments or, in other words, to meet the performance criteria for which it received a waiver in the current review.

Fixed effects are used to account for countries' unobserved heterogeneity. In our model, we control for both time-invariant differences between countries (i.e.,  $\alpha_i$ ) and time effects (i.e.,  $\theta_t$ ). While the use of unit fixed effects is an inherent feature of fixed effects models, the addition of time fixed effects is completely optional.

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<sup>11</sup> We find that the results do not change substantially even if two lags are used.

However, it became common to control for the latter in macroeconomic studies because it captures the potential trends in aggregate data and therefore mitigates the risk of spurious findings. We use Driscoll and Kraay's (1998) robust standard errors to account for both the spatial and temporal dependence of error terms.<sup>12</sup>

## 6. Estimations

The results from the panel estimations are presented in Tables 1 and 2. Each table contains four different specifications. All specifications include country-specific and global variables, but each specification contains one different IMF-related variable. The first specification contains the *IMF presence*, the second and third specifications contain the *IMF degree* in present and lagged form, and the fourth specification contains the *IMF size*. We first present the results for all the countries and then exclude Ukraine from the sample because the amplitude of movements of its EMBI spread and real GDP growth rates are markedly higher compared to other countries in our sample.

### 6.1. Whole-sample estimates

Our objective is to determine whether the presence, the size and the degree of implementation of IMF programs in our sample countries have an impact on sovereign spreads, in addition to the impact of the country-specific and global variables. The results, presented in Table 1, show that for IMF-related variables, only the coefficient of the *IMF size* is significant at the 1 percent level. It has a negative sign, which indicates that higher IMF financing leads to lower spreads. However, this impact is relatively small, with one-tenth of the total program financing disbursement reducing spreads by 2.2 percent. The degree of implementation coefficient, however, is not significant and has a very low value. When the lagged value of this variable is used, the sign becomes negative, indicating a positive impact on spread (lower spread), but the coefficient remains insignificant. The *IMF presence* dummy also has a negative sign, but it is not significant, which could indicate that the mere presence of an IMF program is not enough to reduce sovereign spreads. It appears that movements in spreads are driven by country-specific and global variables. Indeed, the results of the regressions show the important impact of global risk aversion, as measured by VIX, regulatory and political risks, government debt, fiscal balance and exchange rate movements.

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<sup>12</sup> Correcting for temporal dependence only – as is the case for Newey and West (1987) – might be insufficient due to the potentially nonrandom nature of our sample. This approach would ultimately result in the inadequate estimation of standard errors and therefore erroneous statistical inferences. Furthermore, Driscoll and Kraay (1998) provide interesting finite-sample properties, as they do not impose restrictions on the asymptotical behavior of  $N$  (i.e., size of the panel's cross-sectional dimension). The only caveat is that the method relies on large asymptotic  $T$  (i.e., size of the panel's time dimension). This situation might become a problem for panels with a large number of countries and a limited number of quarters, which is not the case in our panel.



**Table 1: Fixed effects estimations with Ukraine****Dependent variable: log of EMBI spread**

|                        | (1)                  | (2)                  | (3)                  | (4)                  |
|------------------------|----------------------|----------------------|----------------------|----------------------|
| VIX                    | 0.650***<br>(0.141)  | 0.653***<br>(0.143)  | 0.642***<br>(0.144)  | 0.641***<br>(0.142)  |
| US Ffr                 | -0.136<br>(0.084)    | -0.135<br>(0.084)    | -0.137<br>(0.085)    | -0.137<br>(0.084)    |
| PRI                    | -3.380***<br>(0.857) | -3.371***<br>(0.860) | -3.344***<br>(0.853) | -3.212***<br>(0.859) |
| RRI                    | -0.809***<br>(0.293) | -0.786***<br>(0.280) | -0.818***<br>(0.285) | -0.826***<br>(0.309) |
| L1. Real GDP growth    | -0.076<br>(0.275)    | -0.078<br>(0.274)    | -0.077<br>(0.275)    | -0.051<br>(0.275)    |
| L1. Public debt/GDP    | 0.564***<br>(0.108)  | 0.541***<br>(0.100)  | 0.560***<br>(0.103)  | 0.549***<br>(0.091)  |
| L1. CA/GDP             | 0.871***<br>(0.298)  | 0.875***<br>(0.297)  | 0.867***<br>(0.296)  | 0.810***<br>(0.291)  |
| Exchange rate          | 1.270***<br>(0.383)  | 1.254***<br>(0.389)  | 1.263***<br>(0.375)  | 1.281***<br>(0.372)  |
| L1. Fiscal balance/GDP | -2.570***<br>(0.912) | -2.574***<br>(0.918) | -2.588***<br>(0.904) | -2.660***<br>(0.881) |
| CPI inf.               | -1.961<br>(1.942)    | -2.000<br>(1.958)    | -2.056<br>(2.001)    | -1.683<br>(1.888)    |
| IMF presence           | -0.035<br>(0.052)    |                      |                      |                      |
| IMF degree             |                      | 0.008<br>(0.048)     |                      |                      |
| L1.IMF degree          |                      |                      | -0.039<br>(0.045)    |                      |
| IMF size               |                      |                      |                      | -0.221***<br>(0.054) |
| Constant               | 10.316***<br>(1.333) | 10.227***<br>(1.300) | 10.299***<br>(1.313) | 10.140***<br>(1.318) |
| R-squared within       | 0.790                | 0.790                | 0.789                | 0.797                |
| Number of countries    | 8                    | 8                    | 8                    | 8                    |
| Number of observations | 436                  | 436                  | 436                  | 436                  |

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01. Driscoll-Kraay robust standard errors in parentheses. VIX, US Ffr, PRI, RRI, and Public debt/GDP are in logs. Exchange rate and CPI inf. are in log differences.

All these variables are significant at the 1 percent level and with the expected sign. The current account coefficient is also statistically significant but with a positive sign, which is counterintuitive. In terms of the impact on spreads, the political risk variable and the fiscal balance (on GDP) play the most important role. A one-percent increase in PRI reduces spreads by 3.4 percent, while a one-percentage-point increase in the fiscal balance reduces spreads by 2.6 percent. Finally, exchange rate

depreciation also has a non-negligible impact. A one-percent depreciation of local currency against the U.S. dollar increases spreads by 1.3 percent.

## 6.2. Sample estimates without Ukraine

The results of the estimations without Ukraine, presented in Table 2, contain some noteworthy differences. First, even though the *IMF degree* coefficient at the current value remains not statistically significant, its lagged value becomes significant at the 5 percent level.<sup>13</sup> As explained in section 5, this result may indicate that investors pay attention to past track records of the IMF program implementation by the authorities. The *IMF presence* coefficient remains statistically insignificant, suggesting that for investors, the quality of the IMF program implementation seems to matter more than the mere presence of an IMF program. However, it should be noted that the impact of the *IMF degree* is relatively low, with a 10-percentage-point improvement in the degree of implementation reducing spreads by only 1 percent. The *IMF size* has a similar impact as the regression with Ukraine, where one-tenth of the total program financing disbursement reduces spreads by 2.4 percent. Turning to country-specific and global variables, the main difference from the regression that included Ukraine is that the real GDP growth rate and the U.S. Federal funds rate become significant, although the latter does so at only a 10% level.

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<sup>13</sup> The coefficient of IMF degree remains statistically significant and has a similar value when two lags are used.

**Table 2: Fixed effects estimations without Ukraine**  
**Dependent variable: log of EMBI spread**

| VARIABLES              | (1)                  | (2)                  | (3)                  | (4)                  |
|------------------------|----------------------|----------------------|----------------------|----------------------|
| VIX                    | 0.642***<br>(0.132)  | 0.639***<br>(0.133)  | 0.617***<br>(0.133)  | 0.638***<br>(0.134)  |
| US Ffr                 | -0.144*<br>(0.075)   | -0.146*<br>(0.075)   | -0.151**<br>(0.075)  | -0.145*<br>(0.075)   |
| PRI                    | -4.996***<br>(0.826) | -4.958***<br>(0.860) | -4.867***<br>(0.836) | -4.660***<br>(0.816) |
| RRI                    | -0.721**<br>(0.334)  | -0.734**<br>(0.346)  | -0.810**<br>(0.353)  | -0.835**<br>(0.365)  |
| L1. Real GDP growth    | -3.650**<br>(1.750)  | -3.622**<br>(1.730)  | -3.729**<br>(1.697)  | -3.353**<br>(1.662)  |
| L1. Public debt/GDP    | 0.688***<br>(0.110)  | 0.687***<br>(0.108)  | 0.712***<br>(0.111)  | 0.690***<br>(0.100)  |
| L1. CA/GDP             | 0.510*<br>(0.277)    | 0.503*<br>(0.273)    | 0.489*<br>(0.267)    | 0.422<br>(0.266)     |
| Exchange rate          | 0.662<br>(0.465)     | 0.667<br>(0.467)     | 0.673<br>(0.465)     | 0.666<br>(0.442)     |
| L1. Fiscal balance/GDP | -1.419*<br>(0.834)   | -1.407*<br>(0.831)   | -1.415*<br>(0.813)   | -1.512*<br>(0.788)   |
| CPI inf.               | -2.482<br>(1.926)    | -2.535<br>(1.933)    | -2.554<br>(1.959)    | -2.165<br>(1.818)    |
| IMF presence           | -0.035<br>(0.047)    |                      |                      |                      |
| IMF degree             |                      | -0.044<br>(0.039)    |                      |                      |
| L1.IMF degree          |                      |                      | -0.089**<br>(0.040)  |                      |
| IMF size               |                      |                      |                      | -0.236***<br>(0.048) |
| Constant               | 12.735***<br>(1.265) | 12.711***<br>(1.224) | 12.801***<br>(1.219) | 12.491***<br>(1.260) |
| R-squared within       | 0.810                | 0.810                | 0.812                | 0.819                |
| Number of countries    | 7                    | 7                    | 7                    | 7                    |
| Number of observations | 383                  | 383                  | 383                  | 383                  |

\* p<0.1; \*\* p<0.05; \*\*\* p<0.01. Driscoll-Kraay robust standard errors in parentheses. VIX; US Ffr; PRI; RRI; Public debt/GDP are in logs. Exchange rate and CPI inf. are in log differences.

The real GDP growth coefficient is negatively correlated with spreads, as expected, and has an important impact across all specifications. One-percentage-point higher growth reduces spreads by 3.6 percent on average, whereas the sign of the U.S. Federal funds rate appears counterintuitive if we consider only its impact on market liquidity. However, this inverse relationship could be related to the fact that the U.S.

monetary policy decisions reflect increased tensions in financial markets to a certain degree (see Csonto et al., IMF (2013)). Another explanation could be that EMEs increased bond issuance during times of abundant liquidity when the U.S. Federal funds rate was low to take advantage of the search for yield from investors. This increased supply of EME bonds may have led to higher EME sovereign spreads. Other variables, which seemed to have an important influence on spreads for all countries (political and institutional risks, the ratio of public debt to GDP and VIX) remain highly significant and with the expected signs, whereas the coefficients of the rate of change of the exchange rate turn insignificant. The fiscal balance coefficient remains significant at the 10% level.

These findings should, however, be taken with a grain of salt. On the one hand, even though the IMF financing (*IMF size*) and, in the case of regressions without Ukraine, the lagged *IMF degree* have a statistically significant impact on sovereign spreads, this impact is smaller than the impact of country-specific fundamentals, such as growth, fiscal balance and public debt, and a country's political and institutional risks. Global risk aversion also plays a more significant role. On the other hand, the IMF-related variables in our estimations do not fully capture the impact of an IMF program, which might go beyond the improvements of country's indicators during the periods when an IMF program is in place. For instance, the successful implementation of the policies contained in the program has helped countries improve their economic growth (Atoyan and Conway (2004)) and fiscal performance (Crivelli and Gupta (2014)) in the years following the program, and consequently, it has helped lower sovereign spreads. Unfortunately, due to a lack of data, we were not able to test for longer-term effects that the IMF programs could have on improving a country risk's profile and macroeconomic variables.

## 7. Conclusion

The objective of our paper is to analyze the impact of IMF programs on sovereign spreads in eight European EMEs from the beginning of 2000 to the end of 2016. For this purpose, we construct IMF indexes to capture the size and the degree of implementation of the IMF program. These indexes are added to the list of independent variables used to explain movements of spreads in our sample countries.

Our findings are novel to the current literature. They suggest that the size and the degree of implementation of the IMF program matter for sovereign spreads, whereas the mere presence of the IMF program does not seem to affect them.

With respect to the IMF's financial resources, the results indicate that the size of the financial resources available to the country has an impact on spreads: larger financial resources are associated with lower spreads. These results are valid even in an environment of extreme spread movement.

With respect to the implementation of the IMF program, our results suggest that a higher degree of program implementation by the authorities is associated with lower

spreads for the sample of countries that excludes Ukraine and, hence, episodes of extreme spreads movement. Moreover, it seems that the good implementation of IMF programs is more important than the mere presence of the IMF.

These results should be taken with a grain of salt. Overall, the impact of the IMF-related variables on spreads is relatively lower compared to other variables in our regressions. The key factors determining sovereign spreads for our sample countries are domestic macroeconomic fundamentals, with global risk aversion also playing a role. This latter finding is in line with the work of other authors, albeit with different countries' samples and timeframes. Among the fundamental variables, the public debt-to-GDP ratio, institutional variables and real GDP growth seem to be particularly important.

Our results are valid for a panel of selected European EMEs and could not be generalized. The lack of data on spreads and the limited presence of the IMF over a long period made it impossible to obtain results at the country level. Finally, for the same reason, we were not able to test for longer-term impacts of the IMF programs on improving country risks and macroeconomic fundamentals.

Looking ahead, considerations might be given to increasing the size of the sample and expanding it to other EMEs in other regions. In addition, it would be interesting to compare the interaction of explanatory variables with spreads during crisis and non-crisis periods.

## References

Alexopoulou, I., Bunda, I., and A. Ferrando, 2009, Determinants of government bond spreads in new EU countries, ECB Working Paper, No. 1093.

Atoyan, R., and P. Conway, 2006, Evaluating the impact of IMF programs: a comparison of matching and instrumental-variable estimators, *The Review of International Organizations*, Volume 1, Issue 2, pp 99–124.

Bellas, D., Papaioannou M. G., and I. Petrova, 2010, Determinants of emerging market sovereign bond spreads: fundamentals vs financial stress, IMF Working Paper, No. 10/281.

Borenszstein, E., and U. Panizza, 2008, The cost of sovereign default, IMF Working Paper, No. 08/238.

Breusch, T., and A. Pagan, 1980, The Lagrange multiplier test and its applications to model specification in econometrics, *The Review of Economic Studies*, Vol. 47, No. 1, pp. 239-253.

Cantor, R., and F. Packer, 1996, Determinants and impact of sovereign credit ratings, FRBNY Economic Policy Review, October, pp. 37-54.

Crivelli, E., and S. Gupta, 2014, Does conditionality in IMF-supported programs promote revenue reform? IMF Working Paper, No. 14/206.

Csonto, B., and I. Ivaschenko, 2013, Determinants of sovereign bond spreads in emerging markets: local fundamentals and global factors versus ever-changing misalignments, IMF Working Paper, No. 13/164.

Driscoll, J. C., and A. C. Kraay, 1998, Consistent covariance matrix estimation with spatially dependent panel data, *The Review of Economics and Statistics*, Vol. 80, No. 4, pp. 549–560.

Dumicic, M., and T. Ridzak, 2011, Determinants of sovereign risk premia for European emerging markets, *Financial Theory and Practice*, Vol. 35, No. 3, pp. 277–299.

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

Edwards, S., 1985, The pricing of bonds and bank loans in international markets: an empirical analysis of developing countries' foreign borrowing, NBER Working Paper, No. 1689.

Eichengreen, B., and A. Mody, 1998, What explains changing spreads on emerging markets debt: fundamentals or market sentiment? NBER Working Paper, No. 6408.

Eichengreen, B., Kletzer, K., and A. Mody, 2005, The IMF in a world of private capital markets, IMF Working Paper, No. 05/84.

Erce, A., and D. Riera-Crichton, 2015, Catalytic IMF? A gross flows approach, European Stability Mechanism Working Paper, No. 9/2015.

- Evrensel, A., and M. Kutan, 2008, Impact of IMF-related news on capital markets: further evidence from bond spreads in Indonesia and Korea, 2008, *Journal of International Financial Markets Institutions and Money* 18(2), pp. 147-160.
- Hartelius, K., 2006, Box 1.5, Global financial stability report, April, pp. 28-31, Washington, D.C.
- Hayo, B., and A. M. Kutan, 2005, IMF-related news and emerging financial markets, *Journal of International Money and Finance*, vol. 24 (7), pp. 126-1142.
- Jaramillo, L., and A. Weber, 2013, Bond yields in emerging economies: it matters what state you are in, *Emerging Markets Review*, vol 17, issue C, pp. 169-185.
- IMF 2008, Regional economic outlook: Europe, April, pp. 12, Washington, D.C.
- IMF 2014a, Review of the flexible credit line, the precautionary and liquidity line, and the rapid financing instrument, Policy Paper, Washington, D.C.
- IMF 2014b, Revised operational guidance to IMF staff on 2002 conditionality guidelines, Policy Paper, pp. 12, Washington, D.C.
- Newey, W. K., and K. D. West, 1987, A simple, positive-definite, heteroskedasticity and autocorrelation consistent covariance matrix, *Econometrica*, Vol. 55, No. 3, pp. 703–708.
- Nickel, C., Rother P. C., and J. C. Rülke, 2009, Fiscal variables and bond spreads: evidence from Eastern European countries and Turkey, ECB Working Paper No. 1101.

**Table A1: Data availability**

| Country  | EMBIG           | Regulatory risk | Political risk | CPI           | Fiscal Balance | Public debt   | Current account | GDP growth    | Yearly GDP | Quarterly GDP | Exchange Rate |
|----------|-----------------|-----------------|----------------|---------------|----------------|---------------|-----------------|---------------|------------|---------------|---------------|
| Bulgaria | 2002Q2-2017Q2   | 2002-2017       | 2000-2017      | 2000Q1-2017Q2 | 2000Q1-2017Q1  | 2000Q1-2017Q1 | 2000Q1-2017Q2   | 2000Q1-2017Q2 | 2000-2016  | 2000Q1-2016Q4 | 2000Q1-2016Q4 |
| Croatia  | 2000Q2-2017Q2   | 2002-2017       | 2000-2017      | 2000Q1-2017Q2 | 2002Q1-2017Q1  | 2000Q1-2017Q1 | 2000Q1-2017Q2   | 2000Q1-2017Q2 | 2000-2016  | 2000Q1-2016Q4 | 2000Q1-2016Q4 |
| Hungary  | 2000Q1-2017Q2   | 2002-2017       | 2000-2017      | 2000Q1-2017Q2 | 2000Q1-2017Q1  | 2000Q1-2017Q1 | 2000Q1-2017Q2   | 2000Q1-2017Q2 | 2000-2016  | 2000Q1-2016Q4 | 2000Q1-2016Q4 |
| Poland   | 2000Q1-2017Q3   | 2002-2017       | 2000-2017      | 2000Q1-2017Q2 | 2000Q1-2017Q1  | 2000Q1-2017Q1 | 2000Q1-2017Q2   | 2000Q1-2017Q2 | 2000-2016  | 2000Q1-2016Q4 | 2000Q1-2016Q4 |
| Romania  | 2001Q3 - 2017Q2 | 2002-2017       | 2000-2017      | 2000Q1-2017Q2 | 2000Q1-2017Q1  | 2000Q1-2017Q1 | 2000Q1-2017Q2   | 2000Q1-2017Q2 | 2000-2016  | 2000Q1-2016Q4 | 2000Q1-2016Q4 |
| Serbia   | 2005Q3 - 2017Q3 | 2002-2017       | 2000-2017      | 2000Q1-2017Q2 | 2003Q1-2017Q2  | 2007Q3-2017Q2 | 2007Q1-2017Q2   | 2000Q1-2017Q2 | 2000-2016  | 2000Q1-2016Q4 | 2000Q4-2016Q4 |
| Turkey   | 2000Q1-2017Q2   | 2002-2017       | 2000-2017      | 2000Q1-2017Q2 | 2000Q1-2017Q2  | 2000Q1-2017Q2 | 2000Q1-2017Q2   | 2000Q1-2017Q2 | 2000-2016  | 2000Q1-2016Q4 | 2000Q1-2016Q4 |
| Ukraine  | 2000Q2-2017Q2   | 2002-2017       | 2000-2017      | 2000Q1-2017Q2 | 2003Q1-2017Q2  | 2002Q4-2017Q2 | 2000Q1-2017Q2   | 2001Q2-2017Q2 | 2000-2016  | 2000Q1-2016Q4 | 2000Q1-2016Q4 |

Source: Authors' compilation



**Table A2: Summary statistics (all countries)**

| VARIABLES          | (1)<br>Mean | (2)<br>SD | (3)<br>Min | (4)<br>Max | (5)<br>N |
|--------------------|-------------|-----------|------------|------------|----------|
| EMBI               | 321.9       | 371.9     | 22.07      | 3,185      | 494      |
| VIX                | 20.50       | 8.066     | 11.03      | 58.49      | 533      |
| US Ffr             | 1.834       | 2.071     | 0.0700     | 6.520      | 533      |
| PRI                | 4.165       | 0.571     | 2.983      | 5.224      | 533      |
| RRI                | 6.046       | 1.144     | 3          | 7          | 453      |
| Real GDP growth    | 0.0102      | 0.0545    | -0.220     | 0.290      | 521      |
| CA/GDP             | -0.0437     | 0.0809    | -0.351     | 0.323      | 504      |
| Public debt/GDP    | 0.422       | 0.196     | 0.0512     | 0.878      | 494      |
| Fiscal balance/GDP | -0.0113     | 0.0327    | -0.318     | 0.0599     | 501      |
| IMF presence       | 0.443       | 0.497     | 0          | 1          | 533      |
| IMF size           | 0.151       | 0.303     | 0          | 1          | 533      |
| IMF degree         | 0.304       | 0.428     | 0          | 1          | 533      |
| Exchange rate      | 0.00804     | 0.0607    | -0.115     | 0.395      | 519      |
| CPI inf.           | 0.0122      | 0.0282    | -0.0515    | 0.403      | 525      |

Source: Authors' compilation

**Table A3: Summary statistics (all countries but Ukraine)**

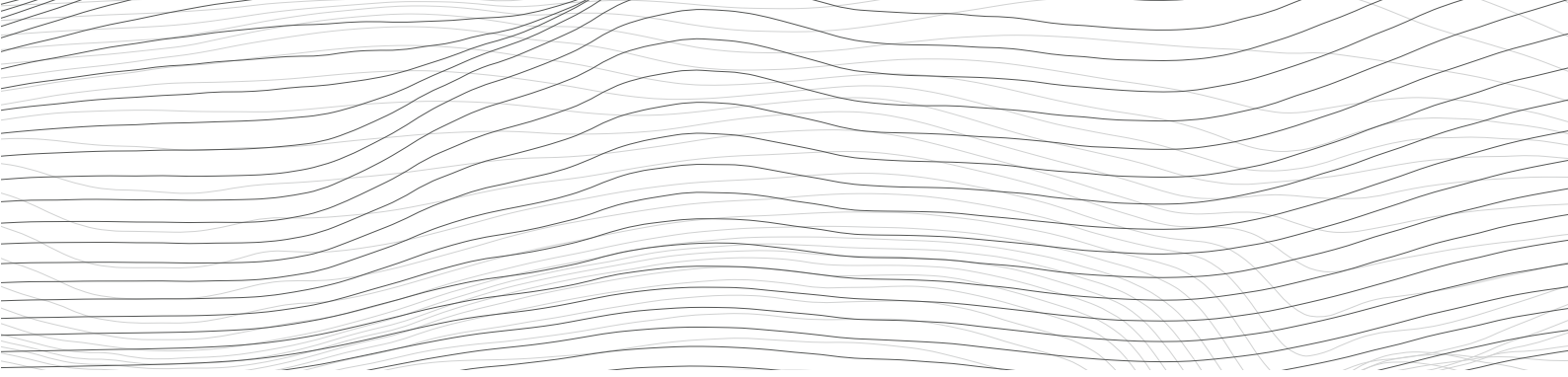
| VARIABLES          | (1)<br>Mean | (2)<br>SD | (3)<br>Min | (4)<br>Max | (5)<br>N |
|--------------------|-------------|-----------|------------|------------|----------|
| EMBI               | 238.9       | 168.4     | 22.07      | 976.0      | 429      |
| VIX                | 20.49       | 8.066     | 11.03      | 58.49      | 467      |
| PRI                | 4.296       | 0.481     | 2.983      | 5.224      | 467      |
| RRI                | 6.322       | 0.915     | 4          | 7          | 395      |
| GDP growth         | 0.00821     | 0.0163    | -0.0767    | 0.0786     | 456      |
| CA/GDP             | -0.0495     | 0.0817    | -0.351     | 0.323      | 438      |
| Public debt/GDP    | 0.434       | 0.194     | 0.0512     | 0.878      | 437      |
| Fiscal balance/GDP | -0.0137     | 0.0333    | -0.318     | 0.0291     | 447      |
| IMF presence       | 0.422       | 0.494     | 0          | 1          | 467      |
| IMF size           | 0.169       | 0.319     | 0          | 1          | 467      |
| IMF degree         | 0.311       | 0.429     | 0          | 1          | 467      |
| Exchange rate      | 0.00582     | 0.0583    | -0.115     | 0.395      | 454      |
| CPI inf.           | 0.0140      | 0.0294    | -0.0192    | 0.403      | 460      |

Source: Authors' compilation

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