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Transparency and emerging market bond spreads

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Transparency and Emerging Market Bond Spreads

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CFS Working Paper No. 2011/14

Transparency and Emerging Market Bond Spreads

Laura Moretti[1]

June 2011

Abstract:
I investigate the effect of transparency on the borrowing costs of Emerging Markets Economies. Transparency is measured by whether or not the countries publish the IMF Article IV Staff report and the Reports on the Observance of Standards and Codes (ROSC). Using difference-in-difference estimation, I study the effect on the sovereign credit spreads for 18 Emerging Market Economies over the period 1999-2007. I show that the effect of publishing the Article IV reports is negligible while publishing the ROSC matters, leading to a reduction in the spreads of over 15% in the samples 1999-2006 and 1999-2007.

JEL Classification: F33, F34, G15

Keywords: Sovereign Bond Markets, Transparency, Emerging Market Economies

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1 Introduction

The importance of transparency for financial markets has been emphasized by policy makers, scholars and market professionals and it has been reiterated as a consequence of the recent financial crisis.[1] Raising transparency is seen by policy makers as a way to reduce borrowing costs, increase access to international financial markets and reduce volatility.[2]

Despite the widespread view that enhancing transparency is desirable, there is still limited empirical evidence demonstrating that doing so has beneficial effects, especially on government borrowing costs. One reason for that might be the elusiveness of the term transparency and the difficulty in measuring it objectively.[3] This is problematic because countries that have adopted very different degrees of transparency may be incorrectly classified by the econometrician as equally transparent. Needless to say, this measurement error reduces the correlation between observed differences in yields and measures of transparency.

In recent years, the IMF has launched a series of initiatives in order to promote transparency, especially among Emerging Markets Economies (EME), aiming at improving these countries' access to international financial markets. The Special Data Dissemination Standard (SDDS) was developed after the 1994-1995 Mexican crisis and was further strengthened in response to the Thai crisis in 1997. SDDS sets consistent definitions for macroeconomic data and, in particular, provides a detailed template for compiling central bank reserve data.

Furthermore, in 1999 the IMF introduced a pilot program of voluntary publication of the Article IV Staff report.[4] The Article IV Staff reports, once considered highly confidential, are produced after the regular visit by a staff team to IMF members. They follow a standard format with a description of recent economic developments, short-term macroeconomic forecasts, standard tables of macro data and policy suggestions.

The last initiative is the introduction of the IMF's Code of Good Practices and the publication, at individual countries' request, of the Reports on the Observance of Standards and Codes (ROSC). ROSC were introduced to assess countries' compliance with internationally accepted standards of good practice in the areas of fiscal transparency, monetary and financial policy transparency, market regulation and corporate governance.

In this paper I study the effect of these transparency enhancements on sovereign credit spreads, as measured by J.P. Morgan's Emerging Market Bond Index (EMBI) Global, for 18 EME with monthly data for different samples from 1999 to 2007. The main contribution

[1] For recent work, see Stiglitz (2010), Reinhart and Rogoff (2009).

[2] See the IMF Manual on Fiscal Transparency (2007).

[3] See Bellver and Kaufmann (2005) for a survey.

[4] See www.imf.org/external/ns/cs.aspx?id=51 for the list of published Article IV Staff reports, and www.imf.org/external/np/sec/aiv/indexc.htm for a list of recent Article IV Consultations.

of the paper is to estimate carefully the effect using a Difference-in-Difference (DID) Panel data model, taking into account the high persistence of the dependent variable. In order to mitigate this problem, I estimate the model with clustered standard errors at the group level, as suggested in Bertrand et al. (2004), and with Feasible Generalized Least Square (FGLS) with bias-corrected AR(2) errors, as proposed by Hansen (2007).

I analyze whether the enhancement of transparency is perceived as a signal by the markets, leading to a reduction of the countries' borrowing costs. I find that the effect of the publication of the Article IV Staff reports is negligible when the autocorrelation of the errors is taken into account, while the effect of the publication of the ROSC is statistically significant in the longer samples, 1999-2006 and 1999-2007. The results suggest that the markets perceive the publication of ROSC as a stamp of approval by the IMF on the reliability of the available information, and as an important signal of the trustworthiness of the data provided.

I also conduct an event study in order to assess the effect on the spreads of countries' decision to publish the Article IV reports at the first opportunity. This preliminary analysis suggests that the effect is detected 6 months after the decision to publish.

My results differ from those in Glennerster and Shin (2008) whose work is closely related. In fact, they find a large and statistically significant effect of the publication of the Article IV reports and of the SDDS, and only to a lesser extent of the ROSC, on the borrowing costs of EME for a sample of 23 countries from 1999 to 2002. These findings are compatible with the previous literature claiming that more transparent countries enjoy a reduction in the spreads both in EME (see Christofides et al. (2003), Cady (2004) and Glennerster and Shin (2008)), and in the EU (see Bernoth and Wolff (2008)). However, Glennerster and Shin (2008) do not take into account the bias in the standard errors due to the autocorrelation of the residuals which I show is substantial and which is likely to bias the estimated standard errors. Needless to say, this difference in results show the difficulties in estimating the effect of transparency enhancements on borrowing costs.

The rest of the paper is organized as follows: Section 2 discusses the related literature. Section 3 describes the dataset. Section 4 presents the event study, section 5 explains the estimation methodology and summarizes the results. Section 6 concludes.

2 Related Literature

Despite the widespread debate on the importance and the benefits of more transparency for the functioning of financial markets, there is limited empirical research on its effect on government bond spreads. However, the existing literature points to the importance of transparency in reducing borrowing costs.

Christofides et al. (2003) analyze the effect of the adherence to standards on the cost of borrowing for EME and on the ratings.[5] Using a sample of 24 EME and semi-annual data from 1992 to 2001, they find a large and significant effect of compliance with a set of IMF standards (especially accounting standards, anti-corruption and property-right related standards) on spreads and ratings. However, their attempt to control for the autocorrelation of the spreads with lagged dependent variables leads to bias in the estimates of the coefficients, as noted by the authors.

Cady (2004) analyzes the effect of compliance with the SDDS on the borrowing costs of EME. Using data from the primary market for sovereign debt in seven countries for the period 1990 to 2002, he compares spreads before and after the subscription to SDDS, controlling for several macroeconomic variables[6] and accounting for specific bond characteristics. He finds a large, about 75 basis points, and statistically significant effect. However, the within-country comparison between before and after the compliance with SDDS is problematic. In fact, it is subject to the risk of confounding the effect of the treatment with that of unobserved variables that move all countries at the same time.

Glennerster and Shin (2008) analyze the effect of transparency, measured by the publication of Article IV reports, the compliance with the SDDS and the publication of the ROSC on the borrowing costs, using a panel of 23 EME for the period 1999-2002. They find that sovereign spreads fall with the implementation of either of the three transparency reforms, although the evidence is weak for the ROSC. However, by running panel regressions controlling only for country and time-fixed effects, they disregard the effect of country-specific time-varying components such as default-risk and liquidity risk. Moreover, they do not take into account the autocorrelation of the residuals that leads to overestimation of the t-statistics, as pointed out by Bertrand et al. (2004).

Using the same measure of transparency, Gelos and Wei (2005) find that investment funds tend to invest less in less transparent countries. Moreover, there is some evidence that, during crisis periods, international investors are more inclined to withdraw from more opaque markets.

In a related literature, Bernoth and Wolff (2008) study whether financial markets take into account creative accounting in pricing government bonds. They show that fiscal transparency, by reducing the uncertainty about the degree of cheating, reduces the risk premia.

There is also a literature providing evidence that transparency lowers the cost of borrow-

[5]The list of standards include Transparency Standards (SDDS, the IMF's Code of Good Practices on Fiscal Transparency, the IMF's Code of Good Practices on Transparency in Monetary and Financial Policies); Financial Sectors Standards; and Market Integrity Standards. For a detailed list see the paper.

[6]Real GDP growth, the external public debt stock relative to exports, US federal funds rate and the yield on the 10-year US treasury bonds.

ing at the firm-level. Lang et al. (2010) provide international evidence that more transparent firms enjoy lower transaction costs and greater liquidity. They argue that transparency matters more in countries with greater opacity and in time of greater uncertainty.

In order to analyze the effect of the transparency policies, it is crucial not to neglect the importance of global factors as determinants of the government bonds' spreads. In fact, Gonzalez-Rozada and Levy-Yeyati (2005) find that the combination of global risk appetite and global liquidity explain over 30% of the variation of spreads, and as much as 60% when including also credit ratings. Hund and Lesmond (2008) emphasize the crucial importance of liquidity risk in explaining the yield spread on both corporate and sovereign bonds in EME. Borri and Verdelhan (2010) explain the EMBI bond excess returns only with the default risk and the correlation with a common risk factor.

Taken together, these results for government bond spreads suggest that becoming more transparent can be an effective way for countries to benefit from international financial integration while avoiding excess volatility during turbulent times. However, the empirical evidence shows that default risk and global factors are the main determinants of the government bonds spreads in EME and they need to be taken into account when analyzing the effects of the transparency enhancement policies. I return to this subject in the next section.

3 Data

3.1 Measuring Transparency

As noted in the introduction, the increasing attention paid to the role of transparency of macroeconomic and financial statistics was prompted by the widely shared view that the EME crises in the 1990s were partly due to the lack of reliable information. The IMF started a series of initiatives in order to improve transparency in EME and to promote their access to international financial markets. The subscription to SDDS started between 1996 and 1998, that is, after the Mexican Crisis in 1994. Apart from setting consistent definitions for macroeconomic data, SDDS Provides a detailed template for compiling central bank reserve data, a key input into international investors' decisions about country risk. This was designed to end the practice of manipulating reserve figures that previously had occurred on a regular basis in many advanced and emerging market economies. I do not analyze the effect of this reform since almost all countries adopted it within a short period of time, making it difficult to study its effect.

The Article IV Staff reports contain assessments of economic and policies developments

in individual IMF member countries and are written after a visit[7] by a staff team. They were generally regarded as highly confidential, but after the Asian financial crisis the IMF started to offer countries the opportunity to make them public.[8] The date when countries agreed to publish the reports are taken from the IMF's website and are reported in Table [1].[9]

Of the 18 countries in the sample, five published the reports at the first opportunity (Bulgaria, Colombia, Croatia Peru and Poland), five at the second (Chile, Ecuador, Mexico, Panama and Turkey), five at the third or later occasion and three never published them (China, Malaysia and Venezuela). Given the fact that the first opportunity to publish the Article IV depended on the schedule of the IMF's visit, the first round of publication can be considered a nearly randomized experiment.

The last measure of transparency I use below captures whether the Reports on the Observance of Standards and Codes (ROSC) are published. ROSC summarize the extent to which countries observe certain internationally recognized standards and norms. The IMF has recognized twelve areas[10] and associated standards as useful for the operational work of the Fund and the World Bank. Reports summarizing countries' observance of these standards are prepared and published at the request of the member countries. They are used to help sharpen these institutions' policy discussions with national authorities, and in the private sector (including rating agencies) for risk assessment.[11]

The ROSC provide the assessment of the compliance with a number of codes that apply to different areas of government policy. The IMF endorsed the "*Code of Good Practices on Fiscal Transparency*", which provides a set of guidelines in order to guarantee the easily assessment of the country fiscal soundness, in April 1998. Moreover, the "*Code of Good Practices on Transparency in Monetary and Financial Policies: Declaration of Principles*" was developed in cooperation with the Bank for International Settlements (BIS), and in consultation with a group of central banks, financial agencies and selected academic experts to foster a better communication to the public and the markets of objectives, rationale and methods of implementation of policies. Banking Supervision is covered by the *Core Principles for Effective Banking Supervision* endorsed by the Basel Committee in September 1997.

[7]The IMF country visits follow a 12 months' schedule with a few months grace period.

[8]The Executive Board approved it on April 9, 1999. The policy for publication of Article IV staff reports under the pilot project allows for the deletion of market sensitive information.

[9]See www.imf.org/external/country/index.htm.

[10]These comprise accounting and auditing; anti-money laundering and countering the financing of terrorism (AML/CFT); banking supervision; corporate governance; data dissemination; fiscal transparency; insolvency and creditor rights; insurance supervision; monetary and financial policy transparency; payments systems; and securities regulation.

[11]From the IMF webpage: www.imf.org/external/np/rosc/rosc.asp?sort=date.

It provides a set of criteria against which compliance is assessed. Securities Regulation is regulated by the *Objectives and Principles of Securities Regulation and Disclosure Standards to Facilitate Cross-Border Offering and Initial Listings by Multinational Issuers* which were endorsed by the International Organization of Securities Commission (IOSCO) in September 1998.

I collect the date when the compliance began with the single categories of the ROSC from the IMF's website.[12] I focus my attention on the compliance with Fiscal Transparency, and I summarize in one single measure, named Financial Transparency, the compliance with the remaining codes.[13] The adoption dates for the sample countries are reported in Table [1]. For the empirical analysis, I construct dummies for the Fiscal and Financial Transparency that are equal to 1 from the month of publication onward.[14]

3.2 Sample

In this section I describe the sample and the choice of control variables.

I select the countries included in the J.P. Morgan's EMBI Global index from 1999, the year in which the policies were implemented. Due to missing spread data or unavailable ratings, I narrow the sample to 20 countries. I further excluded Argentina and Russia since they adopted transparency measures during a period in which they were in default, making it difficult to disentangle the effects of greater transparency from the recovery from default.

The data on the spreads are from the J.P. Morgan's EMBI Global index, which is a traditional, market-capitalization-weighted index. It includes U.S.-dollar-denominated Brady bonds, Eurobonds, traded loans, and local market debt instruments issued by sovereign and quasi-sovereign entities. The EMBI Global index only considers for inclusion emerging markets issues denominated in U.S. dollars with a minimum current face outstanding of US$500 million and at least $2\frac{1}{2}$ years to maturity (at the time of addition to the index). Moreover, it requires easily accessible and verifiable daily prices for the given instrument, either from an interdealer broker or J.P. Morgan source, with no additional liquidity requirements.[15] The

[12] www.imf.org/external/np/rosc/rosc.asp

[13] Financial Transparency summarize the compliance with Banking Supervision, Monetary and Financial Policy Transparency and Securities Regulation. I assume the compliance with Financial Transparency when the country publishes the assessments of at least 2 out of the 3 previous categories. I exclude Insolvency and Creditor Right, Corporate Governance for lack of valuable data; AML/CFT and Payments Systems for lack of relevance and Accounting and Auditing because I prefer to focus on policy transparency and financial market supervision. Data Dissemination is based on a series of reviewed versions: the Special Data Dissemination Standard (SDDS) established in 1996, the General Data Dissemination System (GDDS) established in 1997, and the Data Quality Reference (DQRS) making the comparison difficult.

[14] Whenever the compliance has been publish for at least simple 2/3 of the month.

[15] The EMBI+, instead, requires a minimum bid/ask price spread and a specific number of interdealer broker quotes.

data are the natural logarithms of the monthly average of daily data.

As pointed out in the previous section, the literature has emphasized the importance of global factors as determinants of bonds spreads. In the estimations I control not only for country-specific default risk but also for global factors such as global liquidity and risk appetite. As a proxy for default risk I use credit ratings from Standard and Poor's (S&P). S&P's credit ratings take the form of a letter grade from AAA to SD (selective default). The letter grades are converted into a numerical ordering from 1 (corresponding to AAA) to 22 (corresponding to SD). I collected the data from the S&P's website and I use the average ratings for each month in the sample.[16]

As a proxy for global liquidity, I select the TED spread, the difference between the interest rates on interbank loans and short-term (3-month) U.S. government debt ("T-bills"), the LIBOR (London Interbank Offered Rate) and the Eurodollar deposit, U.S. dollars on deposit outside the United States and the Eurodeposit rate. In order to control for global components of risk, I select the VIX (Chicago Board Options Exchange Market Volatility Index), a popular measure of the implied volatility of S&P 500 index options, often referred to as the *fear index*.

4 Event Study

To gather some preliminary evidence of the effect of higher transparency, I first conducted an event study in order to assess the effect on the spreads of an IMF's member decision to publish the Article IV reports at the first opportunity.

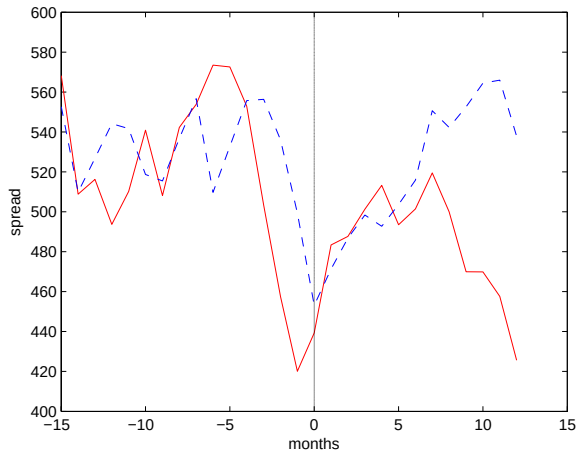
Figure [1] shows the dynamics of government bond spreads for the countries that decided to publish the Article IV reports at the first opportunity and those that waited. Date 0 represents the first opportunity to publish the IMF Staff reports.[17] I plot the spreads for the 15 months before and the 12 months after the first opportunity to publish. In fact, afterwards the effect is confounded by the subsequent yearly IMF country visits and renewed offer to make public the report. Between 2000 and 2001, five countries in my sample (Bulgaria, Colombia, Croatia, Peru and Poland) published at the first opportunity to do so while the rest declined.

The figure suggests that there is temporary reduction in the spreads around the IMF visit for both groups. However, while the average spreads for the countries that did not publish revert to the initial level after 5-6 months, the average spreads for the countries

[16]There are no available S&P ratings data for Ecuador. However, I converted the Fitch ratings into S&P's using the BIS Long-Term Rating Scales Comparison available at www.bis.org/bcbs/qis/qisrating.htm.

[17]The conclusions of the Article IV Consultations.

Figure 1: **Average Spreads for countries adopting and not adopting Art.IV at first attempt**



Notes: The solid line shows the average spreads for the countries electing to publish the Article IV reports at the first opportunity (Bulgaria, Colombia, Croatia, Peru and Poland). The dashed line shows the average spreads of the countries declining to do so at the first opportunity (Brazil, Chile, Ecuador, Hungary, Lebanon, Malaysia, Mexico, Panama, Philippines, South Africa and Turkey), China and Venezuela are not included. For the dates of the adoption see table [1]. Monthly data, from 15 months before the IMF visit to 12 months after.

that published remain lower. Of course, this is only a preliminary analysis of the effect of transparency on the spreads. In order to obtain more accurate results, I analyze the issue using a panel data model.

5 Panel Data Analysis

5.1 Methodology

I study the effect of the transparency reforms on the borrowing costs of EME with a panel data model, which allows me to exploit both the time and cross-country variation. Following the microeconometric literature, I define the countries that become more transparent as the "treatment group", and the countries that never implemented the reform as the "control group". I estimate the causal effect of the reform with Difference-In-Difference (DID) estimation, where the subscript i refers to country and t to months:

$$y_{it} = c_i + \gamma x_{it} + \theta z_t + \delta treatment_{it} + \epsilon_{it} \tag{1}$$

where y_{it} is the interest rate spread, c_i are the individual fixed effects, x_{it} contains observable variables that change across i and t, z_t some observable variables that change across

t but not i, $treatment_{it}$ is a dummy variable that takes the value of 1 in the months after the reform in the treated country and 0 otherwise. The coefficient δ measures the average effect of the treatment on the variable of interest, y.

The DID technique has become an increasingly popular method for the estimation of causal relationships.[18] However, it can lead to potential biases in the coefficient estimates if the treatment is endogenous, and in the standard errors if the residuals are autocorrelated. I analyze these issues below.

In the absence of a fully randomized experiment, the potential endogeneity of the treatment might be an issue. As explained in Besley and Case (2000), a solution is to include in the regression any variable that potentially influence not only the policy decision but also the outcome. In this study I control, aside from the country fixed effects and time varying common factor, also for the S&P ratings. In fact, the decision to become more transparent might be also partially driven by the desire to improve a country's rating.[19]

Even when excluding any bias in the estimation of the treatment, there is still the potential bias in the estimation of the standard errors. Bertrand et al. (2004) point out that most papers use DID to analyze long time series of serially correlated outcomes with persistent treatments. These factors reinforce each other and they might lead to a severe underestimate of the standard deviations of the estimated parameters. This study is not immune to this issue since I use time series of monthly data for an highly correlated dependent variable, such as government bond spreads, and a persistent treatment, since the decision to become transparent is never reversed.

Bertrand et al. (2004) argue that there are two viable solutions to this problem. The first method is to ignore the time series information and to average the data before and after the intervention and run regression (1) in a panel of length 2. However, this solution can be applied only if the treatment is implemented at the same time, otherwise the "before" and "after" are not the same between the treated and they are not defined for the controls. Needless to say, this is not the case in this study. The second method is to use an arbitrary Variance-Covariance Matrix, a generalized White-like formula, to compute the standard errors.[20] However, this correction works well only in large samples.

[18] See Bertrand et al. (2004) for a recent survey on studies using DID and their econometric issues.

[19] Glennerster and Shin (2008) are also concerned for the possible bias due to the potential policy endogeneity. However, when estimating the effect with 2SLS they find no significant difference in results. Abadie (2005) suggests a semiparametric methodology using "propensity score", the probability of complying with the treatment. However, he suggests the use of pre-determined observable variables in order to estimate the propensity score, a characteristic that might not fit well in a macroeconomic context. Besley and Case (2000) propose also to take account of the endogeneity of policy decisions suggesting the use of political economy instruments, such as the women's political involvement in the adoption of health and family related issues. However, this might be difficult to implement in this context.

[20] This procedure is easily implemented in Stata with the cluster (robust) standard errors option, or in

The inclusion of a lagged dependent variable on the right-hand side is not a solution because it is well known that it leads to biased estimates in the presence of fixed effects and when the time dimension is small.[21] Hansen (2007), on the other hand, proposes a FGLS-based estimator that improves on Bertrand et al. (2004), and which delivers accurate and powerful inference in the presence of the "clustering problem" and the "autocorrelation problem".[22]

Hansen's procedure aims at reducing the bias in the estimation of the standard errors in the presence of autocorrelated residuals. In fact, given the model in equation (1), let $\widetilde{\epsilon}_{it}$ be the residuals from the estimation. Suppose that the variance-covariance matrix, $\Omega = \Omega(\alpha)$, is characterized by a finite dimensional parameter α. If so, an obvious approach would be to use the fitted residuals $\widetilde{\epsilon}_{it}$ to get an estimate of α. However, in a fixed effect model, the residuals do not behave like the underlying errors, but like the difference between these errors and their within-group means ($\tilde{\epsilon}_{it} \approx \epsilon_{it} - \bar{\epsilon}_i$, where $\bar{\epsilon}_i = (1/T)\sum_{t=1}^{T} \epsilon_{it}$). This behavior alters the correlation structure of the residuals when T is small, and results in the inconsistency of conventional estimators, which fail to account for this difference. Intuitively this bias is introduced by the subtraction of the group means from the data to eliminate the fixed effects which alters the variance structure of the data when the time dimension is short. As a result, conventional estimators of the parameters of the underlying time series model that fail to account for this distortion of the variance structure will be biased. To alleviate this bias, Hansen (2007) proposes a bias correction for the coefficient of the AR(p) model for the residuals simply by removing an estimate of this bias from the OLS estimator.[23]

In this study I adapt Hansen's bias correction procedure to the data of interest[24], and I model the residuals as an AR(2) process.[25] I also report the regression results from the use of OLS as a benchmark and OLS using clustered standard errors.

Matlab thanks to the codes kindly provided by Daniel Taylor on his webpage.

[21]See Nickell (1981), Judson and Owen (1999) and Phillips and Sul (2007). Judson and Owen (1999) show that even with a time dimension as large as 30, the bias may be equal to as much as 20% of the true value of the coefficient of interest.

[22]Where the "clustering problem" is caused by the presence of a common unobserved random shock at the group level that leads to a correlation between all the observations within each group, and which does not arise in the present analysis since I use only group level data. The "autocorrelation problem", instead, arises if the groups are followed over time and the group level shocks are serially correlated, and it might be severe in this context since I use monthly data of an highly correlated variable. Neglecting these correlation will bias conventional least squares standard errors.

[23]For more details of the methodology see Hansen (2007) section 3.

[24]I skip the first step of aggregating the data at the group level since I analyze country-level data.

[25]I verify that there is no residual autocorrelation in the residuals.

5.2 Panel Estimation

Next, I analyze the effect of the transparency policies promoted by the IMF on the sovereign bond spread using a Panel Data model with monthly data for a sample of 18 EME.

5.2.1 Publication of Article IV Reports

I first study the effect of the publication of Article IV reports. The first opportunity to publish the Article IV reports was given in the second half of 1999, and by the end of 2002 ten countries in the sample had agreed to do so. Moreover, as pointed out previously, the opportunity to publish follows the IMF country-visit schedule. Hence, even though the decision to publish depends on the single country, the timing of the opportunity is exogenous. In order to exploit the quasi-randomized nature of the data, I estimate the effect of *I attempt*, the decision to publish at the first opportunity. I carry out the analysis only for the period 1999-2002. I run the following regression:

$$\ln spread_{i,t} = c_i + \delta Iattempt_{i,t} + \gamma x_{i,t} + \theta z_t + \varepsilon_{i,t} \tag{2}$$

where $\ln spread_{i,t}$ is the natural logarithm of the monthly average of daily spreads; $Iattempt$ is the dummy variable that is equal to 1 after the decision to publish the Article IV Staff reports at the first opportunity. While c_i represents the country fixed effects, $x_{i,t}$ the country-specific time-varying set of covariates and z_t the common time-varying controls. Due to lack of data on country-specific liquidity, I include in $x_{i,t}$ only S&P ratings. As common time-varying controls, z_t, I include the TED spread as a proxy for global liquidity and the VIX as a proxy for global risk appetite.[26]

In Table [2], I compare the effect on the spreads of the publication of the Article IV reports at the first attempt, *I attempt*, with the average effect of publishing the report, *Article IV*[27], without distinguishing between countries that agreed to publish at the first occasion or those that did so later.

The estimated effect of *I attempt* is large and statistically significant when estimated using OLS (see first column of the table) and when clustering the standard errors at the group level (see the second column), as suggested in Bertrand et al. (2004). However, when controlling for the policy autocorrelation as suggested in Hansen (2007), the significance of

[26]TED spreads is a common proxy for global liquidity, see Hilscher and Nosbusch (2010), other proxy are Libor, 10-year US Treasury rate as in González- Rozada and Levy-Yeyati (2005). VIX is used as a proxy for global factors also in Hilscher and Nosbusch (2010), another proxy is the high yield spreads also used by Fostel and Kaminsky (2007), Longstaff et al.(2007) and Hilscher and Nosbusch (2010).

[27]*Article IV* is a dummy variable which is equal to 1 after a country decided to publish the IMF Staff reports and zero otherwise. I run regression (2) using *Article IV* instead.

the effect disappears (see third column).

The estimated effect of *Article IV* is statistically significant when OLS is used (fourth column), but it is statistically not significant when using clustered standard errors or FGLS (fifth and sixth column).

The results indicate that the bias in the standards errors due to the autocorrelation in the residuals is severe and this explains the main difference with Glennerster and Shin's (2008) results. The regression analysis shows that the effect of the publication of the Article IV reports has not influenced the spreads for the EME in the sample considered. Moreover, it suggests that the publication of Article IV is not perceived as an important signal by financial markets. One reason for this may be that they are more concerned with the accuracy of the data available for a country than with the availability of more data.

5.3 Publication of ROSC

The next step is to analyze the effect of the publication of the *ROSC*. I initially estimate the average effect of publishing at least one between the ROSC on Fiscal Transparency or the ROSC on Financial Transparency.[28] I run the following regression:

$$\ln spread_{i,t} = c_i + \delta_1 ROSC_{i,t} + \gamma x_{i,t} + \theta z_t + \varepsilon_{i,t} \tag{3}$$

where *ROSC* is the dummy variable equal to 1 after the country requested the publication of either the ROSC on Fiscal Transparency or on Financial Transparency. c_i, x_{it} and z_t are as previously defined.

I do not report the results for the samples 1999-2003, 1999-2004 and 1999-2005. The effect of the publication of *ROSC* is small and statistically not significant in the first two samples, regardless the estimator used, and it is statistically significant at the 10% level when estimated with FGLS in the longer sample.

In Table [3], I report the results for the samples 1999-2006 and 1999-2007 (left and right block respectively). I present in the top panel the results of the regression (3), which I compare to the results using *ArticleIV* in lieu of *ROSC* (presented in the middle panel), and the ones that include both (bottom panel). The effect of the publication of *ROSC* is large and statistically significant in both samples even when estimated with FGLS (see columns three and six). The average effect of the compliance with ROSC leads to more than 15% decrease in the spreads. However, this effect seems to be captured also by the dummy *ArticleIV* in these samples. I fact, the coefficients of *ArticleIV* (middle panel) are statistically significant for both samples. However, when the two reforms are included in the

[28] See Section 3 for details and Table 1 for the publication dates.

same regression (bottom panel), only the $ROSC$ coefficient remains statistically significant (third column). The results indicate how publishing ROSC enhances transparency.

Next, I analyze in more details the effect of the publication of ROSC. I disentangle the compliance with Fiscal Transparency, $ROSC\ fisc$, from the compliance with Financial Transparency, $ROSC\ finl$. In Table [4] I report the regression results, in the top panel with $ROSC\ fisc$, while in the bottom with $ROSC\ finl$. There is evidence that only Fiscal Transparency influences government bonds spreads. In fact, in both samples the estimated effect of $ROSC\ fisc$ is statistically significant (third and sixth columns, top panel). The average effect of publishing the ROSC on Fiscal transparency is a reduction of the spreads of over 12%.

The main difference with the results in Glennersten and Shin (2008) is the use here of the bias-corrected FGLS procedure that takes into account the autocorrelation of the error terms. Moreover, I use longer samples and exploit new information due to the adoption of more countries of the transparency policies.

Overall, the results show that the publication of the Article IV reports does not have an effect on government bonds spreads, however, the publication of the ROSC have an important effect of signaling the reliability of the data provided to the markets. Some effects of the publication of the Article IV reports and ROSC are probably incorporated in the risk assessments of the credit ratings agencies. However, the publication of ROSC appears to have a signaling effect to the markets above the country's default risk particularly relevant in the longer samples.

6 Conclusion

In this paper I analyze the effect on EME government bond spreads of the decision to publish the Article IV Staff reports and of the ROSC. I estimate the effect with a DID Panel Data model correcting the bias in the standard errors with the methodology proposed by Hansen (2007). I find that the effect of the publication of Article IV on government bond spreads is negligible when the bias in the standard errors is corrected. However, there is evidence of a relevant effect of the publication of ROSC on the spreads in longer samples. In fact, the effect of the publication of ROSC leads to an average reduction of the spreads of over 15% in the 1999-2007 sample.

My results differs from Glennerster and Shin's (2003) because I correct the bias in the standard errors with Hansen's (2007) methodology and because I analyze longer samples. However, they are supportive of the findings in the previous literature that more transparent countries enjoy lower spreads.

Furthermore, the results suggest that the publication of the ROSC has an important effect of signaling the reliability of the data provided to the markets. Some effects of the publication of the Article IV and ROSC are probably incorporated in the risk assessments of the credit ratings agencies. However, the publication of ROSC appears to have a signaling effect above the country's default risk and the global factors. One reason may be that more transparency in the form of the compliance with internationally recognized standards and codes, as stated in the ROSC, signals to the markets a lower probability of dramatic adjustments of the budget in the future and the discovery of window dressing in the government accounting. More confidence in a country's ability and willingness to service its obligations leads to a reduction in the spreads. The results suggest that, despite the difficulties in the estimation, transparency enhancements have a relevant effect on the borrowing costs of EME.

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Table 1: **Transparency Adoption**

EME	**Article IV**	**Attempt**	**ROSC (Fiscal Transparency)**	**ROSC (Financial Transparency)**
Brazil			Dec 6, 01	
Bulgaria	Apr 19, 00	I	Mar 17, 00	Mar 17, 00
Chile	Jul 27, 01	II	Aug 5, 03	Aug 18, 04
China				
Colombia	Dec 29, 99	I	May 15, 03	
Croatia	Jan 30, 00	I	Nov 24, 04	Aug 12, 02
Ecuador	Apr 7, 03	II		
Hungary	Jun5, 02	III	Apr 18, 01	Apr 1, 01
Lebanon	Jun 9, 06	IV	May 16, 05	
Malaysia	Aug 14, 09	VIII		
Mexico	Oct 21, 01	II	Sept 16, 02	Oct 25, 01
Panama	Feb 20, 01	II		Feb 15, 07
Peru	Mar 19, 01	I	Apr 16, 04	
Philippines	Mar 20, 05	V	Oct 4, 02	
Poland	Mar 31, 00	I	Feb 22, 01	
South Africa	Jan 23, 03	IV		
Turkey	Jul 5, 02	II	Jun 27, 00	
Venezuela				

Notes: Source: IMF Webpage. Date of the first publication of the Article IV reports and of the ROSC divided into Fiscal Transparency and Financial Transparency. Financial Transparency combines Banking Supervision, Monetary and Financial Policy Transparency and Securities Regulation, I report the date whenever there is compliance with at least two subcategories. Source: IMF (www.imf.org/external/np/rosc/rosc.asp#B).

Table 2: **The effect of the publication of Article IV, sample 1999-2002**

	I Attempt			Article IV		
	OLS	CLUST	FGLS	OLS	CLUST	FGLS
Iattempt	-0.380***	-0.380*	-0.009			
	(0.043)	(0.204)	(0.316)			
ArtIV				-0.119***	-0.119	0.004
				(0.027)	(0.093)	(0.096)
sp	0.206***	0.206***	0.046**	0.203***	0.203***	0.043**
	(0.012)	(0.063)	(0.018)	(0.012)	(0.063)	(0.019)
vix	0.016***	0.016***	0.010***	0.017***	0.017***	0.010***
	(0.002)	(0.003)	(0.000)	(0.002)	(0.003)	(0.000)
ted	-0.049***	-0.049	-0.035	-0.040***	-0.040	-0.035
	(0.010)	(0.039)	(0.026)	0.011	(0.043)	(0.026)
R^2	0.357	0.357	0.136	0.314	0.314	0.136

Notes: Dependent variable is the sovereign credit spreads (in logs) from J.P. Morgan's EMBI Global (source: Datastream). *I attempt*, is the dummy variables equal to 1 after the countries accepted to publish Article IV reports at the first occasion and *Art IV* after the country decided to publish the IMF staff report. In the 1999-2002 sample, 5 countries published at the first occasion (Bulgaria, Colombia, Croatia, Peru and Poland). A total of 10 countries published over the sample while a control group of 8 countries never published. *sp* is the monthly average of the S&P's ratings (source: Standard and Poor's website). *vix* and *ted* are the monthly average of daily data of TED spread and of VIX respectively.
The panel includes observations for Brazil, Bulgaria, Chile, China, Colombia, Croatia, Ecuador, Hungary, Lebanon, Malaysia, Mexico, Panama, Peru, Philippines, Poland, South Africa, Turkey and Venezuela. In columns (1) are reported the estimates performed with a panel ols estimator, in columns (2) the standard errors are clustered by group as suggested in Bertrand et al. (2004), while in columns (3) are reported the estimates using FGLS and the bias correction as in Hansen (2007). Monthly Data. The regressions include country FE. Number of Observations: 864.
***=significant at 1% level, **=significant at 5% level, *=significant at 10%.

Table 3: **The effect of the transparency**

	1999-2006			1999-2007		
	OLS	CLUST	FGLS	OLS	CLUST	FGLS
ROSC	-0.192***	-0.192***	-0.168**	-0.284***	-0.284***	-0.152**
	(0.021)	(0.062)	(0.078)	(0.021)	(0.068)	(0.075)
sp	0.192***	0.192***	0.064***	0.198***	0.198***	0.056***
	(0.007)	(0.028)	(0.007)	(0.007)	(0.026)	(0.006)
vix	0.039***	0.039***	0.014***	0.038***	0.038***	0.014***
	(0.001)	(0.004)	(0.000)	(0.001)	(0.003)	(0.000)
ted	-0.020***	-0.020	0.016	-0.011*	-0.011	0.025**
	(0.006)	(0.024)	(0.013)	(0.006)	(0.022)	(0.009)
R^2	0.677	0.677	0.190	0.678	0.678	0.192
	1999-2006			1999-2007		
	OLS	CLUST	FGLS	OLS	CLUST	FGLS
ArtIV	-0.260***	-0.260***	-0.134**	-0.274***	-0.274***	-0.110*
	(0.019)	(0.057)	(0.062)	(0.019)	(0.069)	(0.066)
sp	0.190***	0.190***	0.066***	0.196***	0.196***	0.055***
	(0.007)	(0.027)	(0.007)	(0.006)	(0.026)	(0.007)
vix	0.037***	0.037***	0.014***	0.040***	0.040***	0.016***
	(0.001)	(0.004)	(0.000)	(0.001)	(0.004)	(0.000)
ted	-0.013**	-0.013	0.014	-0.007	-0.007	0.029**
	(0.006)	(0.024)	(0.013)	0.006	(0.021)	(0.011)
R^2	0.693	0.693	0.188	0.700	0.700	0.188
	1999-2006			1999-2007		
	OLS	CLUST	FGLS	OLS	CLUST	FGLS
ArtIV	-0.226***	-0.226***	-0.106*	-0.236***	-0.236***	-0.093
	(0.020)	(0.056)	(0.064)	(0.020)	(0.070)	(0.066)
ROSC	-0.114***	-0.114*	-0.145*	-0.202***	-0.202***	-0.134*
	(0.021)	(0.062)	(0.081)	(0.021)	(0.069)	(0.077)
sp	0.186***	0.186***	0.062***	0.195***	0.195***	0.055***
	(0.007)	(0.028)	(0.007)	(0.006)	(0.025)	(0.006)
vix	0.036***	0.036***	0.014***	0.034***	0.034***	0.014***
	(0.001)	(0.004)	(0.000)	(0.001)	(0.004)	(0.000)
ted	-0.005	-0.005	0.018	0.004	0.004	0.026***
	(0.006)	(0.023)	(0.013)	(0.006)	(0.021)	(0.010)
R^2	0.698	0.698	0.196	0.699	0.699	0.196

Notes: Dependent variable is the sovereign credit spreads (in logs) from J.P. Morgan's EMBI Global (source: Datastream). *Art IV* is the dummy variable equal to 1 after a country accepted to publish the IMF staff reporst. In both samples, 14 countries were publishing Article IV reports, see table (1). *ROSC* is the dummy variable that is equal to 1 when a country publishes at least one between ROSC on Fiscal Transparency and on Financial Transparency as defined in section (3). *sp* is the monthly average of the S&P's rating (source: Standard and Poor's website). *vix* and *ted* are the monthly average of daily data of TED spreads and VIX respectively. The panel includes observations for Brazil, Bulgaria, Chile, China, Colombia, Croatia, Ecuador, Hungary, Lebanon, Malaysia, Mexico, Panama, Peru, Philippines, Poland, South Africa, Turkey and Venezuela. In columns (1) are reported the estimates performed with a panel ols estimator, in columns (2) the standard errors are clustered by group as suggested in Bertrand et al. (2004), while in columns (3) are reported the estimates using FGLS and the bias correction as in Hansen (2007). Monthly Data. The regressions include country Fixed Effects. Number of Observations for the 1999-2006 sample: 1728, for the 1999-2007 sample: 1944.
***=significant at 1% level, **=significant at 5% level, *=significant at 10%.

Table 4: **The effect of the compliance with ROSC**

	1999-2006			1999-2007		
	OLS	CLUST	FGLS	OLS	CLUST	FGLS
ROSC fisc	-0.141***	-0.141**	-0.140**	-0.195***	-0.195***	-0.127*
	(0.021)	(0.059)	(0.072)	(0.021)	(0.064)	(0.074)
sp	0.197***	0.197***	0.064***	0.204***	0.204***	0.055***
	(0.007)	(0.029)	(0.007)	(0.007)	(0.027)	(0.006)
vix	0.039***	0.039***	0.014***	0.039***	0.039***	0.014***
	(0.001)	(0.004)	(0.000)	(0.001)	(0.003)	(0.000)
ted	-0.029***	-0.029	0.014	-0.025***	-0.025	0.024**
	(0.006)	(0.026)	(0.013)	0.006	(0.024)	(0.010)
R^2	0.670	0.670	0.185	0.663	0.663	0.187
	1999-2006			1999-2007		
	OLS	CLUST	FGLS	OLS	CLUST	FGLS
ROSC finl	-0.158***	-0.158	-0.200	-0.188***	-0.188	-0.164
	(0.031)	(0.112)	(0.170)	(0.030)	(0.115)	(0.150)
sp	0.190***	0.190***	0.066***	0.199***	0.199***	0.058***
	(0.007)	(0.029)	(0.007)	(0.007)	(0.029)	(0.006)
vix	0.042***	0.042***	0.014***	0.043***	0.043***	0.014***
	(0.001)	(0.004)	(0.000)	(0.001)	(0.004)	(0.000)
ted	-0.032***	-0.032	0.014	-0.032***	-0.032	0.022**
	(0.006)	(0.023)	(0.013)	(0.006)	(0.020)	(0.009)
R^2	0.666	0.666	0.188	0.655	0.655	0.189

Notes: Dependent variable is the sovereign credit spreads (in logs) from J.P. Morgan EMBI Global (source: Datastream). *ROSC fisc* and *ROSC finl* are the dummy variable that are equal to 1 after a country publishes, respectively, the ROSC on Fiscal Transparency and on Financial Transparency, as defined in section (3). *sp* is the monthly average of the S&P's rating (source: Standard and Poor's website). *vix* and *ted* are the monthly average of daily data of TED spreads and VIX respectively. The panel includes observations for Brazil, Bulgaria, Chile, China, Colombia, Croatia, Ecuador, Hungary, Lebanon, Malaysia, Mexico, Panama, Peru, Philippines, Poland, South Africa, Turkey and Venezuela. In columns (1) are reported the estimates performed with a panel ols estimator, in columns (2) the standard errors are clustered by group as suggested in Bertrand et al. (2004), while in columns (3) are reported the estimates using FGLS and the bias correction as in Hansen (2007). Monthly Data. The regressions include country Fixed Effects. Number of Observations for the 1999-2006 sample: 1728, for the 1999-2007 sample: 1944.
***=significant at 1% level, **=significant at 5% level, *=significant at 10%.

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