

# Boosting Data Transparency

## A Shared Incentive for Borrowers and Investors

*Megumi Kubota*



**WORLD BANK GROUP**

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## Abstract

This paper shows that enhancing data transparency can help increase sovereign bond returns in countries with medium to higher levels of institutional quality. Bond returns are lower in countries with high levels of debt. However, the findings from the fixed effect instrumental variables for panel data analysis highlight that enhancing data transparency can mitigate the negative impact of debt even in a highly indebted country. The novelty of the study is that it examines the relationship between sovereign bond returns and data transparency, and then calculates the benefits

accrued by external creditors from improved data transparency in the borrowing country. The determinants differ from the those of sovereign bond spreads. The paper also introduces S&P sovereign credit ratings and total reserves as additional explanatory variables. There are thresholds beyond which data transparency has a positive impact on bond returns. The estimated threshold effect levels show that a country needs to have an International Country Risk Guide score greater than 4.15 in logs for international creditors to reap the benefits from enhancing data transparency.

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# Boosting Data Transparency: A Shared Incentive for Borrowers and Investors\*

Megumi Kubota

*The World Bank*

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\*Kubota, The World Bank, Office of the Chief Economist of the Africa Region (AFRCE). Email: [mkubota@worldbank.org](mailto:mkubota@worldbank.org). The views expressed in this paper are of hers, and do not necessarily reflect any of the World Bank or its Boards of Directors.

## 1. Introduction

This paper examines whether enhancing data and economic transparency benefit investors' interests—as proxied by increasing sovereign bond returns. So far, most of the literature focuses on the benefits of sovereign borrowers from investing in data transparency—and, more specifically, its impact on external borrowing costs (as proxied by sovereign spreads). To the best of my knowledge, there has been no empirical evidence of the benefits of greater transparency of the borrowing country for global investors. Hence, this paper is one of the first studies to investigate the relationship between data transparency and sovereign bond returns and estimate the gains from transparency of private creditors—more specifically, international bondholders.

It is important to assess not only the borrowers' benefits (as many research papers have examined before), but also creditors' benefits; therefore, investors will be active in participants in domestic economic activities. In this paper, I ask whether global investors' (i.e. the creditor's side) can also reap the benefits from greater transparency. Greater returns would make sovereign bonds more attractive. A strand of the empirical literature provides evidence on the determinants of short- and long-term sovereign bond yields (Poghosyan 2014; Afonso et al. 2015; Salem et al. 2016). Some argue that the fiscal position in emerging economies is a significant determinant of sovereign bond yields when global risk aversion is high (Jaramillo and Weber 2013). There is also evidence that government debt, inflation, interest rates, oil prices and the Chicago Board Options Exchange's volatility index (VIX) can influence the US 10-year bond yield (Naidu et al. 2016). The novelty of my study is, therefore, to examine the relationship between sovereign bond returns and data transparency from the external creditors' point of view, including the sovereign credit ratings of the borrowing countries as a likely determinant of sovereign bond returns, and calculating the creditors' benefits from improving data transparency. Consequently, this paper studies the benefits to international investors from improvements in data and economic transparency in the borrowing country.

In contrast, Kubota and Zeufack (2020) focus on the impact of data and economic transparency from the debtors' standpoint. Therefore, both papers show that benefits resulting from investing in transparency of the issuance country can be reaped by both debtors and creditors. The results from both papers suggest that institutional quality amplifies the impact of transparency on sovereign bond spreads and returns. This paper finds that: 1) improving data transparency in countries with higher PPG debts tends to attract more global investors, and hence increase sovereign bond returns, and 2) unlike the estimates with sovereign bond spreads in Kubota et al. (2020), the improvement of data transparency conditional on higher PPG debts may increase bond returns. My results also show that sovereign credit ratings (as proxied by S&P sovereign credit ratings) are a useful signal for investors' decision making. My estimated coefficients would calculate and measure how much international creditors could additionally benefit from improving data transparency in the borrowing country (see Table 7).

My main message is that improved data transparency increases sovereign bond returns with medium to higher levels of institutional quality, and bond returns are lower in a country with high levels of debts. However, enhancing data transparency can mitigate the negative impact of debts even if a country is highly indebted. The novelty of my study is, therefore, examining the

relationship between sovereign bond returns and data transparency, and then calculating the creditors' benefits from improving data transparency. The impact is non-linear: there are thresholds that signal the level of data transparency under which positive impacts on sovereign bond returns start to kick in.

The paper uses the Fixed Effect Instrumental Variables (FE-IV) for panel data to estimate the impact on sovereign bond returns caused from data transparency through the levels of institutional quality and the government public debts or PPG external debts. Internal instrumental variables (lagged values of explanatory variables and/or lagged dependent variable) and external variables (Freedom of Information) are used to control for endogeneity in the regressions. The explanatory variables are macro and financial variables that can be classified as push and pull factors driving sovereign bond returns. I avoid clustering errors in regressions where my variable of interest (data transparency) is proxied by a binary or a categorical indicator. For instance, the IMF indicator of transparency used in this analysis is a binary variable, and I treat S&P sovereign credit ratings as a categorical indicator.

The remainder of the paper is organized as follows. Section 2 describes the estimation technique and data, and Section 3 investigates the relationship between sovereign bond returns and data transparency variables while controlling for a set of macroeconomic and financial variables. Section 4 calculates creditors' benefits from improving data transparency. Section 5 concludes.

## **2. Estimation Technique and Data**

### **2.1 Econometric Methodology**

This paper regresses sovereign bond returns on pull and push factors—including indicators of data transparency—using instrumental variables (IV) estimations. External (push) factors and internal (pull) factors can impact sovereign bond returns through investors' behavior. The Fixed Effect Instrumental Variables (FE-IV) estimations for panel data overcome two main challenges: one, they control for the presence of unobserved period- and country-specific effects, and another, data transparency is highly likely to be jointly endogenous with shocks to sovereign bond returns. For instance, it is likely that future shocks to borrowing costs can have an impact on transparency. Arellano and Bond (1991) and Arellano and Bover (1995) propose a methodology that accounts for endogeneity or reverse causality by using lags of the explanatory variables in the regression analysis.

To address those challenges, I include country and time effects in the regression, and then I control for biases due to the presence of simultaneous or reverse causality in the regression analysis. The IV approach in this paper accounts for the likely endogeneity of data transparency by using the external instrumental variable of 'Freedom of Information' (FOI) and internal instrumental variables (lagged values of the explanatory variables). Data transparency instrumented with the lagged sovereign returns and other lagged explanatory variables can predict bond returns and cannot predict future shocks to bond returns because the instrumental variables are correlated with data transparency and uncorrelated with shocks to sovereign bond returns.

I avoid clustering some regressions which include the IMF data transparency indicators because these regression specifications involve a binary or a categorical indicator. The IMF indicator of transparency used in this paper is a binary variable.

My baseline regression equation of returns of sovereign bond flows presents the following specification:

$$\Phi_{it} = \alpha_i + \beta_t + \gamma'X_{it} + \mu_{it}$$

where the dependent variable  $\Phi_{it}$  represents the sovereign bonds return for country  $i$  in period  $t$ .  $\alpha_i$  is a country effect and  $\beta_t$  is a time effect. In my regression analysis, time effects are captured by the US 10-year Treasury bond yield and the VIX index, while country dummies are used to proxy country effects. The matrix  $X_{it}$  contains information on the pull and/or push factors including data transparency variables while  $\gamma$  is its coefficient vector.  $\mu_{it}$  captures the residuals.

## 2.2 Data Description

I gathered annual data of sovereign bond returns for an effective sample of 76 countries from 1995 to 2020<sup>1</sup> from the JPMorgan Markets database (please see Table 1). My dependent variable is the sovereign return index, which is measured by the emerging market bond index (EMBI), a benchmark that captures the performance of international government bonds. The JP Morgan Emerging Market Bond Index is an unmanaged index that tracks total returns for dollar-denominated Brady Bonds, Eurobonds, traded loans and local market debt instruments issued by sovereign and quasi-sovereign entities of emerging market countries.

The explanatory variables consist of pull (internal) and push (external) factors. Pull factors include the GDP per capita (in US dollars at 2010 prices), CPI inflation (average percentage change in consumer prices), general government primary balance (as percentage of GDP), current account balance (as a percentage of GDP), general government gross debt (as percentage of GDP), public external debt stocks (as percentage of GDP), and the total reserves minus gold to GDP ratio from the World Bank's World Development Indicators (WDI).

My paper introduces S&P sovereign credit ratings and total international reserves as additional explanatory variables. The S&P sovereign ratings are the sovereign credit rating on long-term foreign currency debt for emerging markets. The ratings scale runs from AAA to D (default). I record these categories from 1 as default (D) to 21 (AAA). Note that higher values indicate better ratings. Consequently, this variable is considered as a categorical indicator. The quality of institutions is proxied by the International Country Risk Guide (ICRG) index from the PRS group, which captures the level of the quality of domestic institutions. Push factors include the VIX index (which measures the implied volatility computed from S&P 500 index options) as an indicator of global risk aversion, and the US 10-year Treasury bond yield from the Federal Reserve Bank of St. Louis's FRED database. My instrumental variables are the lag of sovereign bond returns and lagged values of the ICRG index, public or external debts, the interaction terms of ICRG with data

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<sup>1</sup> Time series availability in this paper is constrained by data on transparency that is currently available up to 2020.

transparency indicator and (public or external) debt with data transparency indicator as instrumental variables.

### *Transparency data*

Data transparency indicators are proxied by public data transparency indices from the World Bank and IMF. The World Bank's statistical capacity indicator (SCI) captures the availability, collection and practices in the production of official statistics by the country, and the IMF's subscription and compliance to the Special Data Dissemination Standard (SDDS) are binary variables. I refer to the indicator of the World Bank as the WB data transparency and the indicator of the IMF as the IMF data transparency.

The World Bank's Statistical Capacity Indicator (SCI) measures a country's ability to collect, analyze, and disseminate high quality public data of an economy. This indicator is a composite score that evaluates the capacity of a country's statistical system. It is based on a diagnostic framework assessing the following areas: (i) methodology, (ii) data sources, and (iii) periodicity and timeliness. Countries are scored against 25 criteria in these areas, using publicly available information and/or country input. Therefore, the overall Statistical Capacity score is calculated as the simple average of all three dimensions (i.e. practice, collection, availability) with a scale of 0-100. Higher scores mean that a country has a stronger statistical capacity. The methodology indicator (or practice score) measures the country's ability to adhere to internationally recommended standards and methods. This score is calculated from the weighted average of 10 underlying indicator scores. The data source indicator (or collection score) quantifies whether a country conducts data collection activity in line with internationally recommended periodicity, and whether data from administrative systems are available. Its score is computed from the weighted average of 5 underlying indicator scores. The periodicity and timeliness indicator (or availability score) assesses the availability and periodicity of key socioeconomic indicators if data is available to the public users in time. The score is based on the weighted average of 10 underlying indicator scores.

The IMF's Special Data Dissemination Standard (SDDS) measures if a country releases more frequent, timely and accurate macroeconomic statistics. This indicator captures the timing of subscribing to SDDS and/or the data when the subscribing country meets the SDDS specification (and first posted its e-GDDS national data summary data page) which varies across countries and is primarily determined by internal IMF procedures that are not associated to events in these countries. Once a country adopts this standard of data transparency, the country has less incentive to reverse this system and, consequently, this becomes a long-term commitment. In my empirical analysis, I use two binary data transparency indicators from the IMF: (a) a dummy variable that takes the value of 1 for the years after the country subscribes with the SDDS, and (b) a dummy variable that takes the value of 1 when country comes into compliance with SDDS specifications (and/or posts its first national data summary page).

### 3. Empirical Analysis

This section analyzes the empirical results from the Fixed Effect Instrumental Variable (FE-IV) estimations for panel data. My IV estimations show that data transparency instrumented with IV variables can predict bond spread returns and that my IV variables cannot predict future shocks to bond returns. My regressions produce robust results when the interaction term between data transparency and ICRG is included in the specification: a negative and significant coefficient estimate for data transparency and a positive and significant for the interaction term. My empirical results prove my main findings: 1) improving data transparency increases sovereign bond returns in countries with medium to higher levels of institutional quality; 2) bond returns are lower when a country holds high levels of debts; 3) despite the fact that the sovereign is highly leveraged, enhancing data transparency can mitigate the negative effects on bond returns caused from debts; and 4) there are thresholds beyond which the positive impact of transparency on bond returns kicks in.

Table 2 presents the baseline regression analysis of sovereign bond returns on domestic and global factors using FE-IV estimation. The regressions results prove that enhancing data transparency leads to higher bond returns if a country has medium to higher levels of institutional quality. The regressions in columns [2] to [6], for instance, show positive and significant coefficients of the interaction term between the World Bank data transparency and ICRG. Consequently, greater data transparency coupled with better institutional quality would increase bond returns—thus, benefitting investors. The estimated threshold levels of institutional quality (as measured by the ICRG index in logs) from the estimated coefficients for [2] ~ [6] are, for instance, 4.15, 4.14, 4.22, 4.12 and 4.09, respectively. Consequently, the average threshold level is quite stable around 4.15 which lies between 4.09 and 4.22. For example, international private creditors will enjoy the benefits from enhancing transparency in the issuing country when its level of institutional quality is at least 4.15 (that is, medium to high quality of institutions). Figure 1a plots the conditional sensitivity of sovereign bond returns to overall data transparency conditional on the level of institutional quality (using the coefficient estimates in Table 2, column [2]). The exponential of threshold of data transparency against the level of institutional quality is 64 basis points. Therefore, if a country needs a level of institutional quality of at least 63.66 to kick-in the data transparency to start working, this means improving data transparency to obtain higher bond returns.

Column [3] in Table 2 shows that bond returns are lower when levels of public debt are high, but the estimated coefficient of the latter variable is not statistically significant. Despite being a highly leveraged country, enhancing data transparency can mitigate the negative effects on bond returns caused by elevated government debt. The regression in column [4] of Table 2 shows that better data transparency can still make a highly indebted country attractive, and hence increase bond returns in such a highly leveraged sovereign.



Table 3 shows the estimation results for the components of the WB transparency index; namely, the methodology assessment, periodicity and timeliness assessment, and data source assessment, as well as the IMF indicators of transparency—i.e. subscription and standard compliance—in my baseline regression specification. Significant and positive coefficient estimates of the interaction terms between each WB transparency components and ICRG corroborate the main finding that enhancing all the components of data transparency raises bond returns as long as a certain threshold is met. According to my estimated coefficients, the estimated threshold levels from [1] ~ [5] are 4.13, 4.13, 4.11, 4.14, and 4.08, respectively. The average level from the significant coefficients is 4.12, a threshold level that is very close to the one calibrated in Table 2. This implies that a country needs to have a certain level of institutional quality—more specifically, an ICRG score that lies above an interval around 4 to enjoy benefits from improving transparency. Figures 1b and 1c depict the conditional sensitivity of sovereign bond returns to each WB data transparency component conditional to the level of institutional quality. The exponential of thresholds for WB methodology assessment, WB periodicity and timeliness assessment, WB data source assessment are 62.1, 61.97, and 61.11, respectively. Accordingly, a country needs at least a score in the level of institutional quality of 61.5 to kick-in the positive effects on sovereign bond returns while improving the WB methodology assessment of data transparency.

Table 4 presents the regression analysis for the different components of the aggregate World Bank data transparency index, including either government debt or external public debt. The estimated coefficients for the relationship with the institutional quality is robust: greater data transparency leads to higher bond returns if a country has medium to higher levels of institutional quality. The transparency assessment components of methodology, and periodicity and timeliness show relatively significant coefficients to prove that bond returns are lower when levels of public debt are high. However, these coefficient estimates are not statistically significant. The same can be said of the interaction term between the different components of transparency and (either government or external public) debt. Overall, the regression analysis suggests that there is a weak (and not significant) nonlinear relationship between (overall or external) public debt and bond returns.

Table 5 shows the baseline regressions with the IMF data transparency. The relationship between IMF data transparency, institutional quality, and sovereign bond returns is qualitatively similar to that found with the WB transparency indicator; and it is statistically significant in columns [5] and [6]. The coefficients from government debts and external debts show better significance, proving that improving data transparency leads to higher bond returns if a country has medium to higher levels of institutional quality. Regressions [5] and [6] of Table 5 suggest that: (a) countries with a higher (PPG external) debt burden tend to show lower sovereign bond returns and, (b) better data transparency can alleviate the effect in (a) and increase bond returns even if a country holds a debt burden.

Table 6 includes the ratio of total reserves minus gold to GDP in the baseline regressions from Table 2. Therefore, I can examine the impact of a country's creditworthiness on the sovereign bond returns. The coefficients of total reserves are robust. I can conclude that if a country has a higher capacity to repay its debts, bond returns increase by attracting more investors. A higher level of a country's reserves—which imply higher external liquidity buffers—increases sovereign bond returns. In this case, investors consider that a greater amount of reserves implies that the borrowing country has a higher capacity to repay its external obligations and, hence, investors receive higher market returns thanks to the issuing country's creditworthiness.

#### **4. Calculating the Creditors' Benefits from Improving Data Transparency**

My regression estimates can help assess how much international creditors could additionally benefit from improving data transparency in the borrowing country. First, I calculate the impact of data transparency on returns conditional on the level of PPG bonds by region and by country of issuance. Then I compute how much international creditors could gain in terms of greater returns by improving their data transparency of the borrowing country to levels determined by a certain benchmark. Finally, I estimate how much international investors could gain from investing in PPG bonds issued in the domestic country by improving data transparency. I use the FE-IV estimated coefficients from column [6] of Table 2 to calculate those impacts. Those calculations are shown in Table 7: how much international investors could gain from investing in sovereign international bonds—in terms of change in sovereign bond returns—if data transparency in the borrowing country improves to the level of the top decile in an upper-middle-income country. In Table 7, I calculate the gains from improving data transparency to the global benchmark level: the top decile (90th percentile) of upper-middle-income countries. For example, for the SSA region as a whole, improvements in data transparency to the level of a country in the top decile of the upper middle-income category could render gains for global investors' by investing in bonds issued by a sovereign African government: bond returns will increase by 825 basis points, and hence increase their benefits by US\$112.62 billion (6.61 percent of GDP). In Gabon, returns from international government bonds could increase by 3,885 basis points (US\$9.46 billion), while in South Africa it could improve by 572 basis points (US\$45.55 billion).

Figure 2 shows the impact of data transparency on sovereign bond returns conditional on the level of PPG bonds in 2020 for six regions: Sub-Saharan Africa, Latin America and the Caribbean, East and Central Europe, the Middle East and North Africa, South Asia, and East Asia. I use the 2020 average bond returns for each region to calculate the change of returns in basis points. I take the coefficient of the World Bank data transparency index of -254.2 in Table 2 [6] and the interaction with external debt (while holding constant for the level of institutional quality). My estimates suggest that if there is, for instance, a 10 percent improvement in data transparency, the average marginal benefit is 217.4 basis points for international creditors investing in Latin America and the Caribbean sovereign bonds from 2010 to 2020. This region registers the largest gain across different regions. Sub-Saharan Africa could increase about 99.4 basis points when data transparency improves by 10 percent. The Middle East and North Africa and South Asia regions show the smallest gains of 79.6 and 77.1 basis points, respectively.

## 5. Conclusion

The originality of my empirical study is to examine the benefits for external creditors (in terms of higher sovereign bond returns) of improving data transparency on the borrowing country, introducing credit ratings as part of the investors' decision-making, and to measure how much international creditors could additionally benefit from improving data transparency in the borrowing country. Few studies present empirical evidence on the benefits to global investors from greater transparency in the borrowing country. This paper is, to the best of my knowledge, one of the first examining creditors' gains from improved transparency in a debtor country. In other words, greater transparency in the country that issues sovereign bonds can enhance the returns of the bondholders. As global investors benefit from higher transparency of the sovereign bond issuer country, they have an incentive to shift their portfolio to those countries with greater levels of transparency and stronger institutions. The results from the present research paper, jointly with the findings from Kubota et al. (2000), show that both creditors and debtors could potentially benefit from improved transparency in the borrowing country.

My empirical findings robustly prove that improved data transparency increases bond returns in countries with medium to higher levels of institutional quality. Bond returns are lower in a country with high levels of debts. However, greater data transparency can mitigate the negative impact of debts even if a country is highly leveraged. These empirical findings are the novelty of my study. According to my estimated threshold levels, creditors will enjoy the benefits from enhancing data transparency when the issuing country has an ICRG score (in logs) that is greater than 4.15 in logs (equivalent to 63.66 for an index that takes values from 0 to 100).

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**Table 1: Sample of Countries, 1995-2020**

1 Argentina	27 Mexico	53 Costa Rica
2 Bulgaria	28 Malaysia	54 Ethiopia
3 Belarus	29 Nigeria	55 Guatemala
4 Belize	30 Pakistan	56 Honduras
5 Brazil	31 Panama	57 India
6 Chile	32 Peru	58 Kenya
7 China	33 Philippines	59 Kuwait
8 Côte d'Ivoire	34 Poland	60 Mongolia
9 Colombia	35 Russian Federation	61 Mozambique
10 Dominican Republic	36 Senegal	62 Namibia
11 Ecuador	37 El Salvador	63 Oman
12 Egypt, Arab Rep.	38 Serbia	64 Papua New Guinea
13 Gabon	39 Trinidad and Tobago	65 Paraguay
14 Georgia	40 Tunisia	66 Qatar
15 Ghana	41 Türkiye	67 Romania
16 Croatia	42 Ukraine	68 Saudi Arabia
17 Hungary	43 Uruguay	69 Suriname
18 Indonesia	44 Venezuela, RB	70 Slovak Republic
19 Iraq	45 Viet Nam	71 Tajikistan
20 Jamaica	46 South Africa	72 Zambia
21 Jordan	47 Angola	73 Korea, Rep.
22 Kazakhstan	48 Armenia	74 Thailand
23 Lebanon	49 Azerbaijan	75 Latvia
24 Sri Lanka	50 Bahrain	76 Tanzania
25 Lithuania	51 Bolivia	
26 Morocco	52 Cameroon	

**Table 2: Sovereign Bond Returns: IV Baseline Regressions (FE-IV regressions)**

Variables	Return 1995-2020					
	[1]	[2]	[3]	[4]	[5]	[6]
Transparency Index (WB)	-0.756*** (0.201)	-43.57*** (6.374)	-68.07** (33.28)	-26.91*** (5.436)	-93.30** (42.24)	-254.2*** (53.77)
GDP per capita (constant 2010 US\$)	0.950*** (0.117)	0.683*** (0.121)	0.614*** (0.154)	0.816*** (0.116)	0.617*** (0.192)	-0.0663 (0.480)
CPI Inflation (average consumer prices)	-0.0544*** (0.0185)	-0.0549*** (0.0183)	-0.0583*** (0.0215)	-0.0453** (0.0187)	-0.0379 (0.0280)	-0.0614 (0.0682)
Primary Balance to GDP (%)	0.000706 (0.00560)	-0.00519 (0.00564)	-0.00958 (0.00922)	-0.00593 (0.00578)	-0.0111 (0.0101)	-0.0336 (0.0212)
Current Account Balance to GDP (%)	0.0192*** (0.00348)	0.0164*** (0.00342)	0.0156*** (0.00404)	0.0191*** (0.00368)	0.0229*** (0.00580)	0.0177 (0.0146)
VIX Index	-0.242*** (0.0377)	-0.306*** (0.0385)	-0.317*** (0.0474)	-0.258*** (0.0385)	-0.318*** (0.0570)	-0.418*** (0.139)
US 10-year Treasury Bond Yield	-0.324*** (0.0406)	-0.333*** (0.0392)	-0.322*** (0.0479)	-0.336*** (0.0427)	-0.285*** (0.0637)	-0.188 (0.146)
Difference in Real Effective Exchange Rate (in log)	-0.533*** (0.166)	-0.470*** (0.171)	-0.534** (0.224)	-0.605*** (0.171)	-0.535** (0.260)	-1.000* (0.606)
S&P Sovereign Ratings	0.0201** (0.00881)	0.0234*** (0.00894)	0.0214* (0.0122)	0.0167* (0.0101)	0.0199 (0.0138)	0.0151 (0.0330)
ICRG Index	0.419 (0.263)	-45.40*** (6.783)	-71.43** (35.34)	-27.45*** (5.846)	-98.38** (44.93)	-271.6*** (57.74)
Transparency (WB) x ICRG		10.49*** (1.548)	16.44** (8.084)	6.371*** (1.334)	22.64** (10.28)	62.21*** (13.20)
Public Debt to GDP (%)			-0.000405 (0.00198)	-0.0328* (0.0178)		
Transparency Index (WB) x public debt				0.00746* (0.00419)		
External Debt to GDP (%)					-0.000600 (0.00301)	0.287** (0.126)
Transparency Index (WB) x external debt						-0.0685** (0.0297)
Constant	-0.0160 (1.618)	189.3*** (28.05)	297.1** (146.1)	115.6*** (24.03)	406.8** (185.3)	1,118*** (237.1)
Observations	478	457	454	452	413	393
Number of countries	41	41	41	40	37	36

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3: Sovereign Bond Returns: Baseline Regressions (FE-IV regressions) with WB Data Transparency Decompositions and IMF Data Transparency**

Variables	Return 1995-2020				
	[1]	[2]	[3]	[4]	[5]
Methodology Assessment	-24.31*** (6.622)				
Periodicity and Timeliness Assessment		-36.43** (15.48)			
Data Source Assessment			-25.56*** (3.662)		
Transparency (IMF) Subscription				-31.13 (23.83)	
Transparency (IMF) Standard compliance					-11.01* (6.545)
GDP per capita (constant 2010 US\$)	0.610*** (0.130)	0.721*** (0.118)	0.567*** (0.126)	0.384** (0.191)	0.573*** (0.104)
CPI Inflation (average consumer prices)	-0.0622*** (0.0196)	-0.0475*** (0.0183)	-0.0565*** (0.0200)	-0.0592** (0.0286)	-0.0593*** (0.0222)
Primary Balance to GDP (%)	-0.00361 (0.00603)	0.00182 (0.00554)	-0.00971 (0.00618)	0.00168 (0.00884)	0.00499 (0.00652)
Current Account Balance to GDP (%)	0.0142*** (0.00371)	0.0189*** (0.00348)	0.0157*** (0.00373)	0.0166*** (0.00513)	0.0126*** (0.00483)
VIX Index	-0.297*** (0.0408)	-0.321*** (0.0389)	-0.330*** (0.0418)	-0.416*** (0.0759)	-0.335*** (0.0463)
US 10-year Treasury Bond Yield	-0.354*** (0.0411)	-0.407*** (0.0408)	-0.325*** (0.0426)	-0.607*** (0.0560)	-0.585*** (0.0478)
Difference in Real Effective Exchange Rate (	-0.452** (0.181)	-0.426** (0.170)	-0.549*** (0.188)	-0.155 (0.246)	-0.105 (0.188)
S&P Sovereign Ratings	0.0278*** (0.00973)	0.0180** (0.00901)	0.0232** (0.00974)	0.0308* (0.0158)	0.0244 (0.0162)
ICRG Index	-24.83*** (6.940)	-38.61** (16.75)	-26.38*** (3.894)	-5.319 (4.660)	-0.505 (0.776)
Transparency (each component) x ICRG	5.888*** (1.608)	8.828** (3.767)	6.215*** (0.895)	7.512 (5.729)	2.699* (1.586)
Constant	103.9*** (28.81)	160.0** (68.84)	110.3*** (16.13)	25.90 (20.89)	4.038 (3.430)
Observations	457	457	457	604	604
Number of countries	41	41	41	44	44

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1



**Table 4: Sovereign Bond Returns: Baseline Regressions (FE-IV Regressions) with Government or External Debts on WB Data Transparency Decompositions**

Variables	Return 1995-2020					
	[1]	[2]	[3]	[4]	[5]	[6]
Methodology Assessment	-225.7** (102.1)	-157.7*** (55.06)				
Periodicity and Timeliness Assessment			-220.3*** (53.96)	-219.1*** (54.48)		
Data Source Assessment					-25.39*** (3.866)	-29.16*** (4.321)
GDP per capita (constant 2010 US\$)	-0.299 (0.834)	-0.226 (0.654)	0.533** (0.236)	0.561** (0.248)	0.548*** (0.129)	0.631*** (0.136)
CPI Inflation (average consumer prices)	-0.132 (0.111)	-0.0825 (0.0853)	-0.0332 (0.0351)	-0.0305 (0.0382)	-0.0575*** (0.0200)	-0.0405* (0.0226)
Primary Balance to GDP (%)	-0.0617 (0.0429)	-0.0202 (0.0254)	0.00551 (0.0107)	0.00912 (0.0113)	-0.00891 (0.00633)	-0.00944 (0.00674)
Current Account Balance to GDP (%)	0.00152 (0.0215)	0.00482 (0.0191)	0.0274*** (0.00733)	0.0334*** (0.00845)	0.0154*** (0.00376)	0.0228*** (0.00471)
VIX Index	-0.423* (0.226)	-0.282* (0.167)	-0.438*** (0.0828)	-0.420*** (0.0820)	-0.329*** (0.0428)	-0.350*** (0.0465)
US 10-year Treasury Bond Yield	-0.416* (0.233)	-0.260 (0.176)	-0.576*** (0.0970)	-0.542*** (0.0929)	-0.314*** (0.0446)	-0.293*** (0.0478)
Difference in Real Effective Exchange Rate (in log)	-1.227 (1.053)	-0.516 (0.714)	-0.499 (0.331)	-0.556* (0.337)	-0.538*** (0.193)	-0.559*** (0.203)
S&P Sovereign Ratings	0.0183 (0.0568)	0.0695 (0.0439)	0.00905 (0.0197)	-0.00978 (0.0199)	0.0238** (0.0111)	0.0171 (0.0112)
ICRG Index	-236.4** (107.3)	-165.6*** (58.09)	-236.7*** (58.36)	-237.0*** (59.30)	-26.18*** (4.147)	-30.28*** (4.624)
Transparency (each component) x ICRG	55.00** (24.91)	38.52*** (13.46)	53.23*** (13.10)	53.31*** (13.30)	6.162*** (0.957)	7.171*** (1.075)
Public Debt to GDP (%)	0.0330 (0.0447)		-0.0804 (0.0506)		-0.00358 (0.0111)	
Transparency Index (each component) x public debt	-0.0128 (0.0121)		0.0179 (0.0115)		0.00105 (0.00265)	
External Debt to GDP (%)		0.141* (0.0837)		-0.0243 (0.0958)		0.0297 (0.0201)
Transparency Index (each component) x external debt		-0.0323 (0.0197)		0.00459 (0.0217)		-0.00747 (0.00491)
Constant	980.2** (444.4)	685.7*** (240.5)	982.4*** (241.0)	977.1*** (243.6)	109.8*** (17.03)	124.7*** (18.82)
Observations	432	393	432	393	455	413
Number of countries	40	36	40	36	41	37

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 5: Sovereign Bond Returns: Baseline Regressions (FE-IV Regressions) with IMF Data Transparency**

Variables	Return 1995-2020					
	[1]	[2]	[3]	[4]	[5]	[6]
Transparency Index (IMF)	0.346*** (0.0841)	-12.79 (10.02)	-4.156 (10.46)	-7.323 (12.05)	-18.24* (10.30)	-21.28* (11.15)
GDP per capita (constant 2010 US\$)	0.465*** (0.102)	0.497*** (0.118)	0.695*** (0.134)	0.717*** (0.125)	0.365*** (0.128)	0.331** (0.136)
CPI Inflation (average consumer prices)	-0.0836*** (0.0180)	-0.0724*** (0.0200)	-0.0759*** (0.0182)	-0.0779*** (0.0183)	-0.0647*** (0.0228)	-0.0610** (0.0238)
Primary Balance to GDP (%)	0.00646 (0.00590)	0.00529 (0.00643)	0.00621 (0.00577)	0.00669 (0.00581)	0.00980 (0.00758)	0.00957 (0.00782)
Current Account Balance to GDP (%)	0.0189*** (0.00389)	0.0177*** (0.00408)	0.0184*** (0.00376)	0.0178*** (0.00391)	0.0251*** (0.00513)	0.0230*** (0.00548)
VIX Index	-0.344*** (0.0425)	-0.375*** (0.0496)	-0.362*** (0.0505)	-0.359*** (0.0494)	-0.413*** (0.0575)	-0.410*** (0.0590)
US 10-year Treasury Bond Yield	-0.576*** (0.0435)	-0.599*** (0.0451)	-0.594*** (0.0456)	-0.579*** (0.0449)	-0.631*** (0.0510)	-0.617*** (0.0530)
Difference in Real Effective Exchange Rate (in log)	0.0172 (0.149)	-0.0333 (0.168)	-0.338** (0.160)	-0.335** (0.162)	-0.229 (0.180)	-0.224 (0.185)
S&P Sovereign Ratings	0.0458*** (0.00942)	0.0386*** (0.0107)	0.0112 (0.0110)	0.0152 (0.0109)	0.0206* (0.0122)	0.0202 (0.0125)
ICRG Index	0.810*** (0.265)	-1.743 (1.973)	0.202 (2.121)	-0.385 (2.405)	-2.722 (2.048)	-3.314 (2.211)
Transparency (IMF) x ICRG		3.104 (2.408)	1.000 (2.524)	1.693 (2.859)	4.427* (2.483)	5.146* (2.682)
Public Debt to GDP (%)			-0.00455*** (0.00114)	-0.00861** (0.00369)		
Transparency Index (IMF) x public debt				0.00508 (0.00428)		
External Debt to GDP (%)					-0.00815*** (0.00213)	-0.0107*** (0.00251)
Transparency Index (IMF) x external debt						0.00341* (0.00193)
Constant	-0.819 (1.497)	9.889 (8.883)	0.713 (9.734)	3.136 (10.86)	15.67* (9.166)	18.44* (9.924)
Observations	604	604	589	589	541	541
Number of countries	44	44	44	44	37	37

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

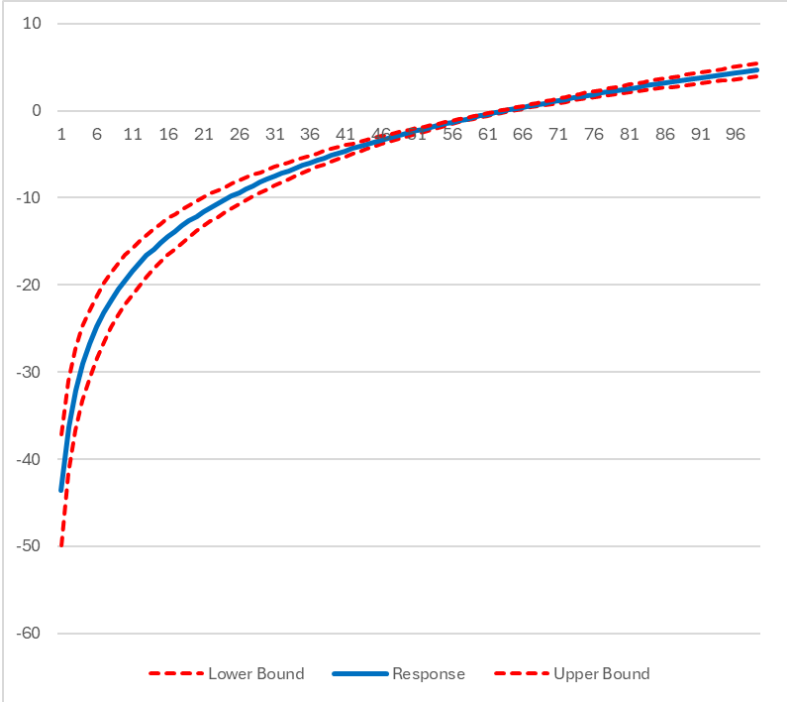
**Table 6: Sovereign Bond Returns: Baseline Regressions (FE-IV Regressions) with Reserves**

Variables	Return 1995-2020					
	[1]	[2]	[3]	[4]	[5]	[6]
Transparency Index (WB)	-0.692*** (0.201)	-48.70*** (6.896)	-48.46*** (7.030)	-46.92*** (7.253)	-52.04*** (7.194)	-40.09*** (6.265)
GDP per capita (constant 2010 US\$)	1.066*** (0.120)	0.816*** (0.128)	0.800*** (0.129)	0.813*** (0.129)	0.835*** (0.136)	0.925*** (0.130)
CPI Inflation (average consumer prices)	-0.0608*** (0.0191)	-0.0532*** (0.0191)	-0.0539*** (0.0192)	-0.0520*** (0.0191)	-0.0363* (0.0219)	-0.0370* (0.0219)
Primary Balance to GDP (%)	-0.00229 (0.00570)	-0.00524 (0.00572)	-0.00494 (0.00582)	-0.00422 (0.00582)	-0.00548 (0.00623)	-0.00653 (0.00627)
Current Account Balance to GDP (%)	0.0155*** (0.00354)	0.0128*** (0.00353)	0.0127*** (0.00355)	0.0130*** (0.00353)	0.0190*** (0.00452)	0.0203*** (0.00470)
VIX Index	-0.238*** (0.0374)	-0.280*** (0.0387)	-0.282*** (0.0393)	-0.274*** (0.0397)	-0.292*** (0.0424)	-0.273*** (0.0411)
US 10-year Treasury Bond Yield	-0.276*** (0.0424)	-0.301*** (0.0416)	-0.298*** (0.0439)	-0.297*** (0.0436)	-0.294*** (0.0456)	-0.298*** (0.0466)
Difference in Real Effective Exchange Rate (in log)	-0.489*** (0.165)	-0.409** (0.170)	-0.409** (0.175)	-0.387** (0.175)	-0.392** (0.182)	-0.597*** (0.176)
S&P Sovereign Ratings	0.00574 (0.00927)	0.0123 (0.00947)	0.0124 (0.0105)	0.0136 (0.0105)	0.00759 (0.0108)	-0.00494 (0.0106)
ICRG Index	0.350 (0.263)	-50.98*** (7.342)	-50.73*** (7.475)	-48.86*** (7.772)	-54.59*** (7.663)	-42.07*** (6.740)
Transparency (WB) x ICRG		11.71*** (1.671)	11.65*** (1.703)	11.22*** (1.773)	12.56*** (1.747)	9.685*** (1.535)
Public Debt to GDP (%)			0.000258 (0.00127)	-0.0205 (0.0173)		
Transparency Index (WB) x public debt				0.00492 (0.00411)		
External Debt to GDP (%)					-0.00192 (0.00227)	0.00796 (0.0327)
Transparency Index (WB) x external debt						-0.00330 (0.00767)
Total reserve minus Gold to GDP ratio	1.333*** (0.288)	1.192*** (0.294)	1.167*** (0.297)	1.148*** (0.295)	1.166*** (0.328)	1.570*** (0.323)
Constant	-1.115 (1.656)	211.5*** (30.43)	210.6*** (31.00)	203.8*** (31.98)	225.7*** (31.70)	173.1*** (27.76)
Observations	465	444	442	442	400	400
Number of countries	40	40	40	40	36	35

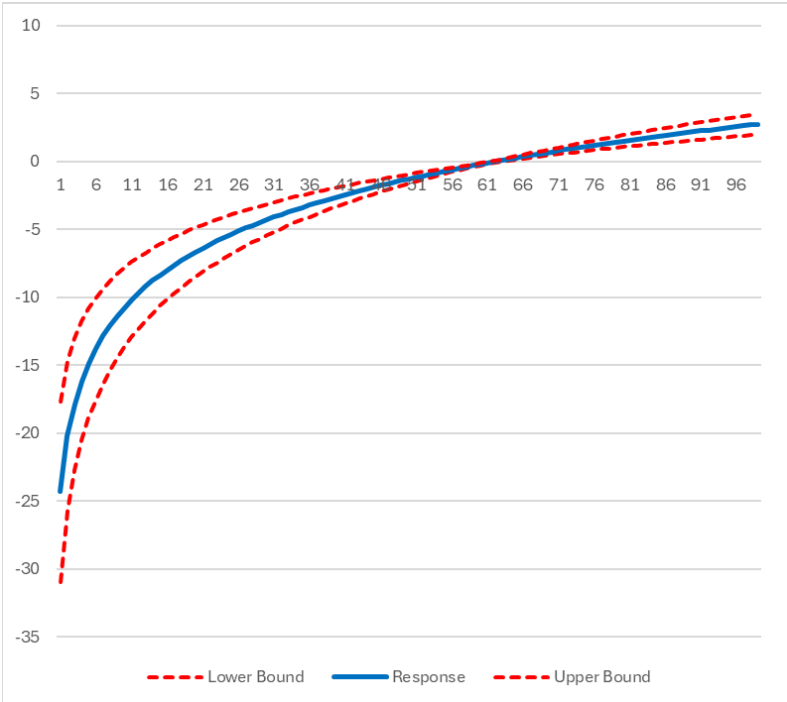
Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

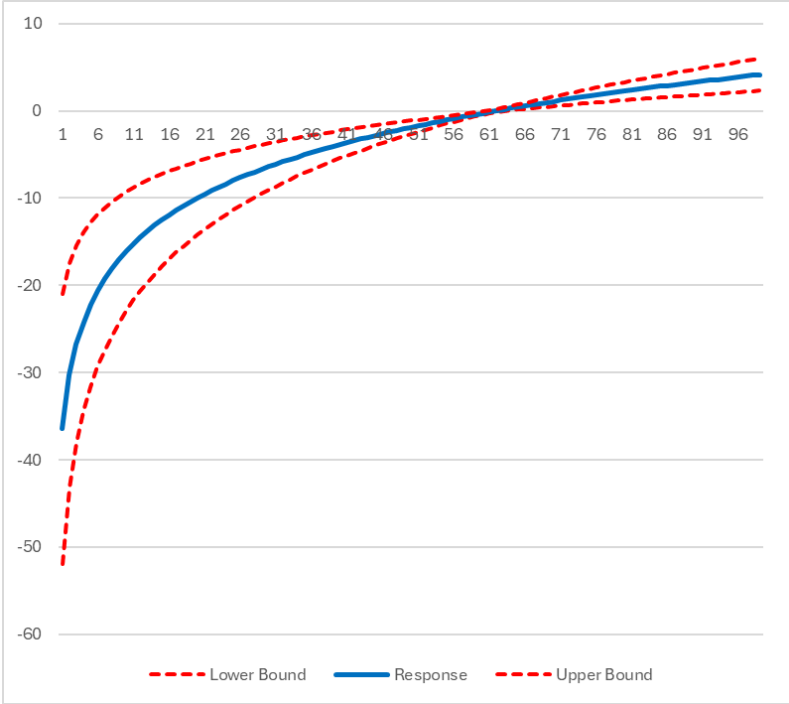
**Figure 1a: Response of Government Bond Yields to World Bank Overall Transparency Conditional on Institutional Quality**



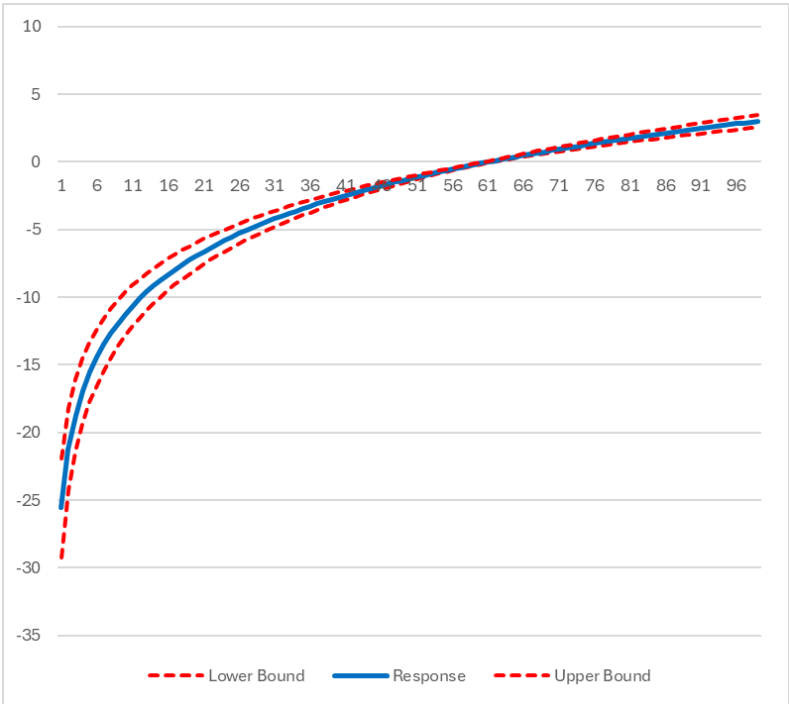
**Figure 1b: Response of Government Bond Yields to World Bank Methodology Transparency Conditional on Institutional Quality**



**Figure 1c: Response of Government Bond Yields to World Bank Periodicity and Timeliness Transparency Conditional on Institutional Quality**



**Figure 1d: Response of Government Bond Yields to World Bank Data Source Transparency Conditional on Institutional Quality**



**Table 7: Additional Benefits from Improving Data Transparency**

	<b>Additional Gains for Global Investors from PPG Bonds Issued in a Domestic Country: if data transparency improved to: Top decile of upper middle income</b>			
<b>Country</b>	<i>basis points</i>	<i>(US\$ billion)</i>	<i>(% GDP)</i>	<i>(% Export)</i>
<b>East Asia</b>	566	317.80	1.82	8.52
China	870	250.64	1.71	9.18
Indonesia	111	20.21	1.91	11.01
Mongolia	114	0.39	2.93	5.08
Philippines	344	8.96	2.48	9.83
Viet Nam	277	0.21	0.06	0.07
<b>South Asia</b>	193	17.53	0.50	3.00
India	96	6.82	0.26	1.36
Pakistan	337	1.79	0.59	6.39
Sri Lanka	150	2.10	2.49	16.15
<b>Latin America &amp; Caribbean</b>	527	292.82	7.32	30.96
Argentina	44	3.76	0.98	5.88
Belize	445	0.25	12.05	32.52
Brazil	680	32.57	2.21	13.41
Colombia	284	13.80	5.11	37.74
Costa Rica	74	0.52	0.83	2.60
Dominican Republic	632	14.01	17.76	97.10
Ecuador	593	10.49	10.57	48.36
El Salvador	111	0.68	2.71	11.15
Guatemala	133	0.78	1.00	6.12
Jamaica	379	2.12	15.33	63.64
Mexico	297	74.50	6.83	17.30
Peru	493	10.27	5.09	22.40
<b>East &amp; Central Europe</b>	161	49.47	1.66	5.65
Azerbaijan	142	0.53	1.25	3.50
Belarus	38	0.13	0.22	0.36
Georgia	45	0.03	0.21	0.57
Kazakhstan	11	0.19	0.11	0.37
Russia Federation	593	46.91	3.14	12.31
Serbia	172	1.08	2.03	4.21
Türkiye	365	32.79	4.55	15.84
Ukraine	327	8.35	5.33	13.73
<b>Middle East &amp; North Africa</b>	395	33.43	2.65	12.07
Egypt, Arab Rep.	84	2.18	0.57	4.56
Iraq	4065	8.13	4.49	16.19
Jordan	142	1.31	3.00	12.63
Lebanon	569	17.83	56.22	343.36
Morocco	120	1.31	1.08	3.50
Tunisia	147	1.01	2.38	6.28
<b>Sub Saharan Africa</b>	825	112.62	6.61	32.13
Angola	1195	9.56	19.03	50.04
Côte d'Ivoire	809	6.90	10.96	52.17
Gabon	3885	9.46	61.80	130.10
Ghana	556	5.68	8.11	39.14
Nigeria	350	3.90	0.90	11.13
Senegal	248	1.03	4.20	20.30
South Africa	572	45.55	13.49	48.88
Zambia	340	1.02	5.64	12.05

**Figure 2: Impact of a 10% Change in Data Transparency on Sovereign Bond Returns Conditional on the Level of PPG External Debt in 2020 by Region**

