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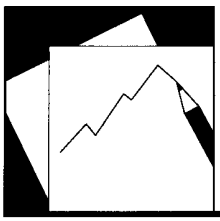

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Bond Yields in Emerging Economies: It Matters What State You Are In

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Bond Yields in Emerging Economies: It Matters What State You Are In[1]

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Abstract

While many studies have looked into the determinants of yields on externally issued sovereign bonds of emerging economies, analysis of domestically issued bonds has hitherto been limited, despite their growing relevance. This paper finds that the extent to which fiscal variables affect domestic bond yields in emerging economies depends on the level of global risk aversion. During tranquil times in global markets, fiscal variables do not seem to be a significant determinant of domestic bond yields in emerging economies. However, when market participants are on edge, they pay greater attention to country-specific fiscal fundamentals, revealing greater alertness about default risk.

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I. INTRODUCTION

Domestic sovereign debt markets in emerging economies have grown markedly since the mid-1990s and currently represent governments' main source of financing. While many studies have looked into the determinants of the yields of externally issued sovereign bonds of emerging economies, the analysis of domestically issued bonds has hitherto been limited, despite their growing relevance.

This paper attempts to fill this gap by investigating how the extent to which fiscal variables affect domestic bond yields in emerging economies depends on the level of global risk aversion, proxied by the VIX. [2] It makes several contributions to the existing literature. First, in contrast to previous papers that focus on annual data and observed outcomes for the explanatory variables, this paper develops a novel high-frequency panel dataset for 26 emerging economies between 2005 and 2011. In addition to monthly observations for long-term emerging market domestic bond yields, it includes market expectations of fiscal variables (deficit and debt-to-GDP ratio), inflation, and real GDP, which are expected to be more relevant than ex-post outcomes in driving bond yields. Second, drawing on the more extensive literature on advanced economies, the paper uses this dataset to explore the determinants of emerging market domestic bond yields, focusing on the role of fiscal variables. Third, the paper then extends the basic model specification using a panel threshold model to better account for the effect that a shift in global market sentiment can have on investors' assessment of credit risk. This model allows the explanatory variables to have differing regression slopes depending on whether global risk aversion is above or below a certain threshold, endogenously chosen to maximize the fit of the model. To the best of our knowledge, this paper is the first one to apply a panel threshold model in this particular context.

Results show that, when global risk aversion is low, domestic bond yields are mostly influenced by inflation and real GDP growth expectations. This suggests that, in tranquil times, markets focus more prominently on risk stemming from sensitivity to macroeconomic shocks. However, when global risk aversion is high, creditors' concern with default risk takes center stage and expectations regarding fiscal deficits and government debt play a significant role in determining domestic bond yields. Every additional percentage point in the expected debt-to-GDP ratio raises domestic bond yields by 6 basis points; and every percentage point expected worsening in the overall fiscal balance-to-GDP ratio raises yields by 30 basis points. In view of the ebb and flow of global conditions, these findings underscore the need for emerging economies to remain fiscally prudent in good times, as the favorable conditions they face could shift unexpectedly.

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[2] The Chicago Board Options Exchange Volatility Index (VIX) is a measure of the market's expectation of stock-market volatility over the next 30-day period. It is a weighted blend of prices for a range of options on the S&P 500 index. See http://www.cboe.com/micro/VIX/vixintro.aspx.

The remainder of this paper is structured as follows. Section II reviews the existing literature on the effect of fiscal policy on domestic bond yields, with a particular emphasis on emerging markets. Section III discusses stylized facts about domestic sovereign bond markets. Section IV provides background on the estimation methodology while Section V provides details on data and estimation results. Section VI presents the main conclusions and policy implications.

II. Background and Literature Review

Since the theoretical literature is inconclusive about the sign of the effect of fiscal policy on long-term domestic bond yields, the question of its impact becomes very much an empirical one (Friedman, 2005). In theory, the effect of a fiscal expansion on domestic interest rates depends on the reaction of domestic private saving and the size and openness of the economy. If households are Ricardian, then a rise in government debt that leads to an anticipation of future tax hikes would be offset by a rise in private savings, thereby leaving long-term rates unchanged (Barro, 1974). If non-Ricardian features are instead incorporated, then an increase in the fiscal deficit and public debt would, all else equal, drive up long term bond-yields (Modigliani, 1961; Blinder and Solow, 1973). Another approach stresses the importance of international capital mobility, claiming that in an open economy fiscal policy will not affect interest rates except indirectly through its impact on the risk premium (Mundell, 1963): In an environment where there is a large amount of uncertainty relating to the growth prospects of the economy, larger deficits and public debt could also raise concerns about the ability of the sovereign to repay its debts, lifting risk premia and therefore the government's long-term financing costs.

A vast empirical literature exists on the determinants of long-term bond yields in advanced economies, with a majority of papers finding that higher fiscal deficits and public debt raise interest rates. While many studies employ U.S. data, there is now also an increasing literature that focuses on European and OECD data. Gale and Orszag (2003) report that out of 59 studies, 29 find that weaker fiscal variables increase interest rates, while 11 had mixed results and 19 found that the effect was not significant. Moreover, a majority of studies finds that the effect of fiscal policy on interest rates is larger when the fiscal deficit rather than public debt is included as an explanatory variable (Faini, 2006; Laubach, 2009). In addition, the effects of fiscal policy are larger when expectations of future fiscal policy rather than actual values of the debt and deficit are used (Laubach, 2009) and when single country studies rather than cross country studies are performed. The estimated impact on interest rates of a change of one percent of GDP in the fiscal deficit ranges from 10 basis points to 60 basis points (Laubach, 2009).

Far fewer studies have focused on emerging market domestic sovereign bonds, notwithstanding their growing relevance as a source of government financing.[3] Peiris (2010) conducts a panel analysis of 10 emerging market economies and finds that the annualized impact on long-term bond yields of a one percent increase in the fiscal balance-to-GDP ratio is about 20 basis points, while domestic monetary aggregates and real economic activity do not have a significant impact. Moreover, long term yields are found to respond to changes in policy interest rates, inflationary expectations, and foreign participation in domestic bond markets. Baldacci and Kumar (2010) estimate a panel of 31 advanced and emerging economies over the period 1980-2007 and also find that higher fiscal deficits and public debt raise long-term nominal bond yields in both advanced and emerging markets, with an impact similar to that found by Peiris (2010). Baldacci and Kumar (2010) also find that countries with higher initial fiscal deficits and public debt experience larger increases in bond yields when the fiscal position deteriorates.

Meanwhile, the effect of global factors on financing costs in emerging economies has hitherto typically been analyzed within the context of the literature on the determinants of sovereign foreign currency spreads. McGuire and Schrijvers (2003) find that global risk aversion is a significant factor driving spreads, while Eichengreen and Mody (2000) and Bellas and others (2010) show that changes in market sentiment affect spreads. Gonzales-Rozada and Levy-Yeyati (2008) find that in addition to global risk aversion, global liquidity plays a central role. Hartelius and others (2008) and Dailami and others (2008) provide similar results when looking at U.S. interest rates. For domestic bond yields, Baldacci and Kumar (2010) find that in periods of financial distress—defined as periods of high levels of the VIX index, high inflationary pressures, and more adverse global liquidity conditions—fiscal deterioration has a larger impact on bond yields. The VIX threshold used in their analysis is chosen exogenously.

III. STYLIZED FACTS

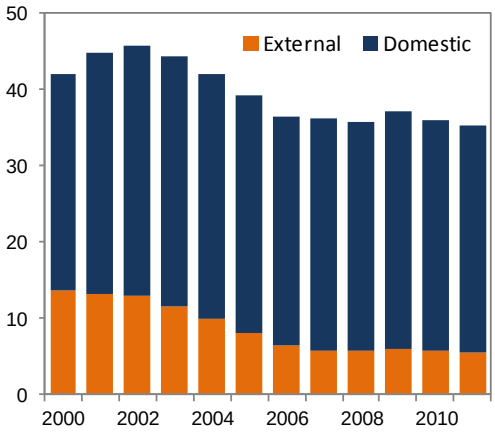
Domestic debt markets in emerging economies have grown markedly since the mid-1990s, driven by domestic and global factors. Implementation of sound macroeconomic policies has been crucial for the development of these markets, including fiscal adjustment, the reduction of inflation, and banking and corporate sector reform adopted in the wake of the Asian crisis.[4] Furthermore, the emergence of current account surpluses in many emerging economies reduced the need for external issuance. In addition, growing interest from local

[3] Studies using sovereign foreign currency spreads are more widespread. Many empirical studies have focused on the impact of domestic factors, including indicators of external vulnerability like external debt, debt service or current account (Edwards, 1984; Cantor and Packer, 1996); fiscal variables, like fiscal debt and deficits (Cantor and Packer, 1996; Rowland and Torres, 2004) or their composition (Akitobi and Stratmann, 2008); and other macroeconomic variables like inflation, the terms of trade and the real exchange rate (Min, 1998).

[4] The development of the institutional structure and microstructure of bond markets, as well as the improvement of financial markets more generally, has also played a key role. See Mihaljek and others (2002).

investors—particularly from pension funds—has played a key role in the development of domestic debt markets. The global economic environment over the past years has also helped as emerging market local currency bonds have attracted increasing interest from foreign investors, partly because declining interest rates in major currencies have prompted international investors to seek higher yields in emerging debt markets. [5]

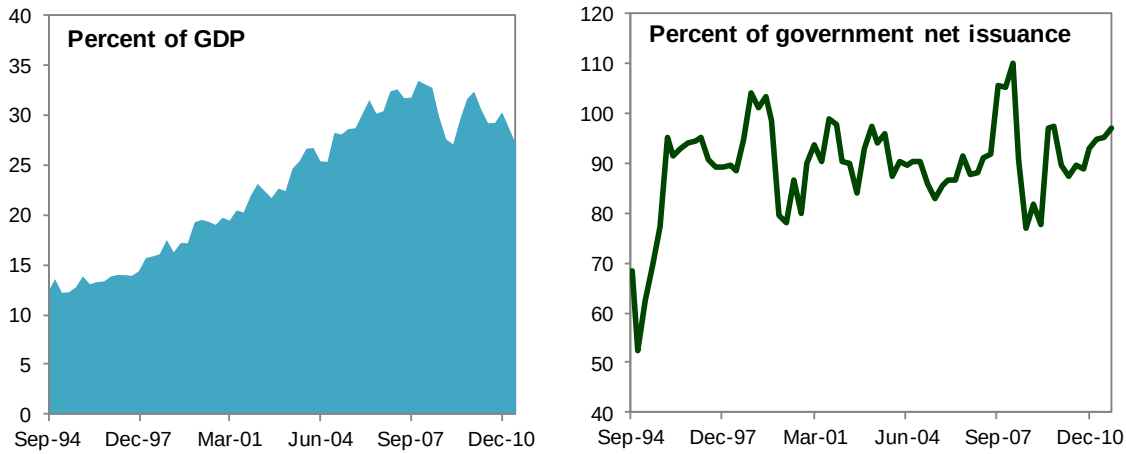
Figure 1. Emerging Economies: Government Debt *(Percent of GDP)*



Source: World Economic Outlook, and authors' calculations.

As domestic bond markets have developed, governments have been able to shift from external to local currency financing to reduce exchange rate vulnerabilities. In 2011, domestic debt represented close to 85 percent of general government debt on average, compared to 67 percent in 2000 (Figure 1). Most domestic debt is in the form of government securities, reaching 27 percent of GDP on average and representing the bulk of new issuances (Figure 2). International investors are also increasingly drawn to emerging market local currency bonds. Assets of dedicated emerging market fixed-income funds exceeded US$180 billion at end-2011, almost two-fold higher than five years earlier (Figure 3).

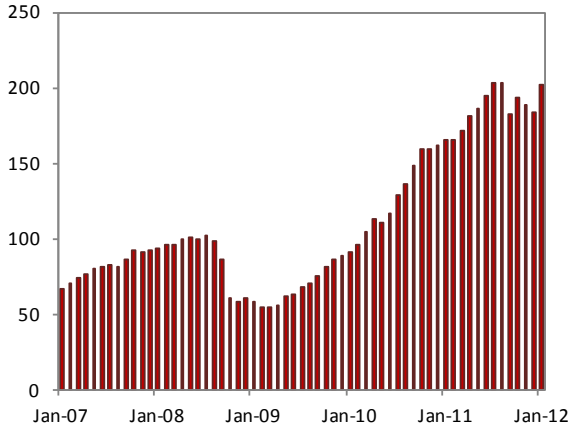
Figure 2. Emerging Economies: Domestic Government Debt Securities



Sources: Bank of International Settlements, IFS, and authors' calculations.

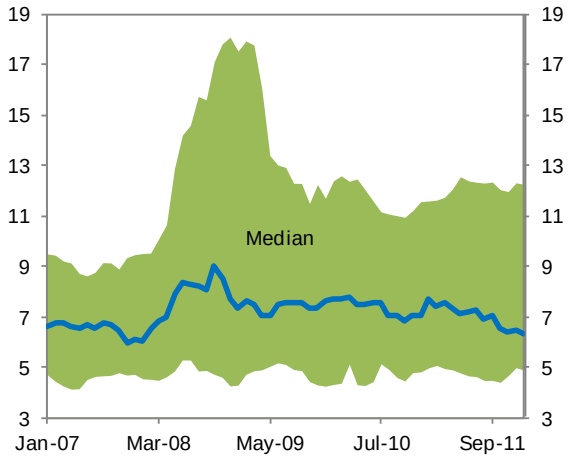
[5] See Bank for International Settlements (2007).

Figure 3. Emerging Market Fund Assets
(US$ billion)



Source: EPFR

Figure 4. Sovereign Domestic Bond Yields
(Percent)



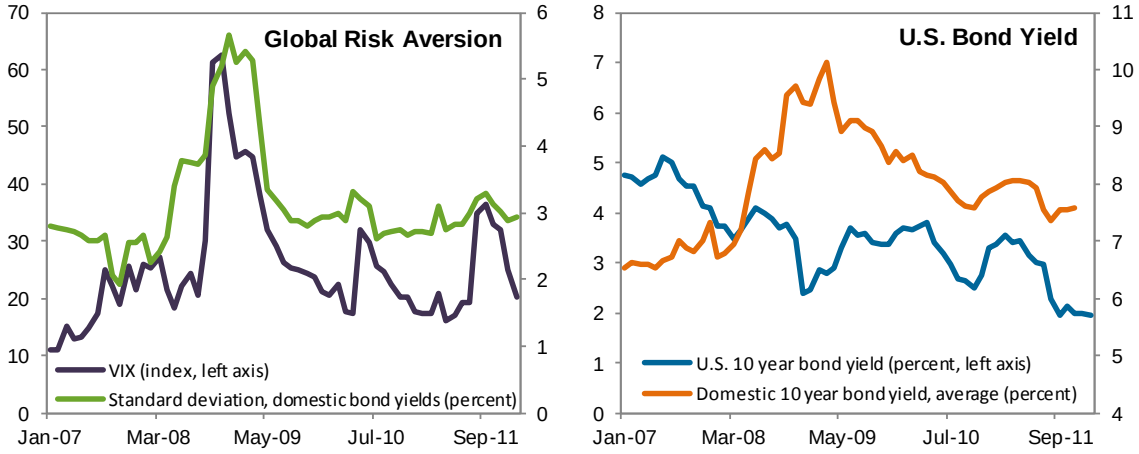
Sources: Bloomberg L.P.; IMF, International Financial Statistics; and authors' calculations.
Note: Green shading represent 10-90th percentile of the distribution of domestic bond yields in emerging economies.

Following a considerable decline in the early 2000s, sovereign domestic bond yields have remained relatively stable for the median emerging economy. However, this masks considerable volatility for a number of countries. Figure 4 shows the distribution of bond yields across emerging economies. The financial crisis brought a considerable amount of differentiation across countries, with interest rates jumping to double digits in some cases. While this differentiation narrowed by early 2009, the distance between countries did not return to its pre-crisis margin, suggesting market discrimination across countries.

Part of this greater differentiation appears to be linked to global factors, in particular international investors' appetite for risk. In recent years, the standard deviation across domestic bond yields in emerging economies has increased with upward movements in the VIX, as investors discriminate more among sovereigns when global risk aversion is high (Figure 5). Global liquidity, as proxied by the U.S. 10 year bond yield, also appears to be playing a role.[6]

[6] The literature is inconclusive regarding the effects of the global interest rate environment on international spreads in emerging economies. Arora and Cerisola (2000) and Hartelius and others (2008) find a positive correlation, Eichengreen and Mody (2000), McGuire and Schrijvers (2003), and Uribe and Yue (2006) find a negative relationship, while Kamin and von Kleist (1999), Sløk and Kennedy (2004), and Baldacci and others (2008) find the relationship insignificant. The existing literature on domestic bond yields in emerging economies has not focused on the effects of global interest rates.

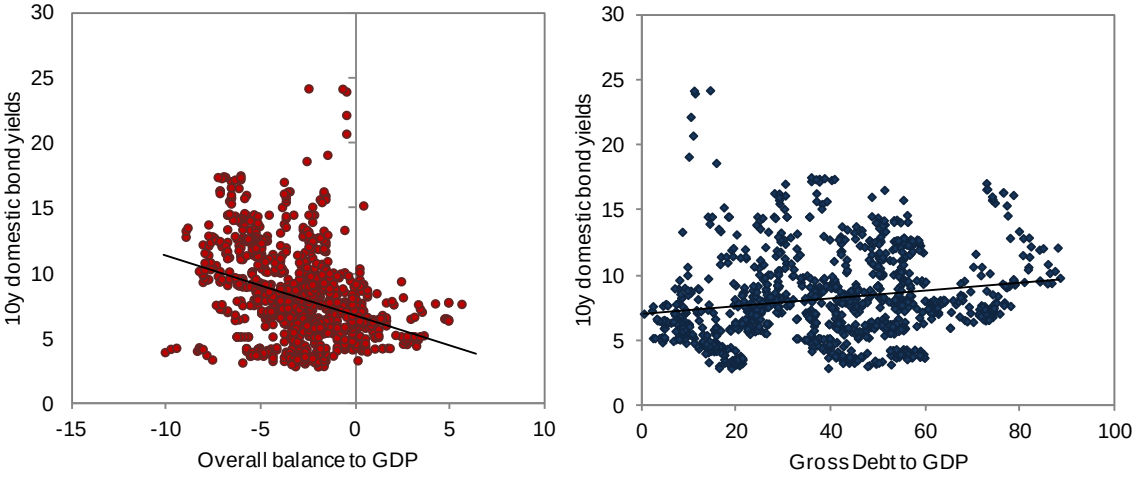
Figure 5. Sovereign Domestic Bond Yields and Global Factors



Sources: Bloomberg L.P.; IMF, International Financial Statistics; and authors' calculations.
Note: Yields on domestic 10 year government bonds.

Domestic bond yields are also closely linked to countries' macroeconomic fundamentals, in particular their fiscal position. Countries with higher overall balances tend to have lower domestic bond yields, while countries with higher debt tend to have higher domestic bond yields (Figure 6).

Figure 6. Domestic Bond Yields and Fiscal Fundamentals, 2007-2011



Sources: Economist Intelligence Unit; World Economic Outlook, and authors' calculations.
Note: Monthly one-year ahead expectations of fiscal variables from Economist Intelligence Unit.

IV. EMPIRICAL MODEL SPECIFICATION

In line with the standard methodology used for advanced economies (see for example, Reinhart and Sack, 2000), the following fixed effects panel model with robust standard errors is estimated[7]:

$$r_{it} = \alpha_i + \beta' x_{it} + \varepsilon_{it} \quad (1)$$

where r_{it} denotes nominal yields on the long term domestic bond yields for country i ($i = 1, \ldots, N; t = 1, \ldots, T$) and x_{it} is a vector of explanatory variables, which includes fiscal variables for ($i = 1, \ldots, N; t = 1, \ldots, T$).

Some heterogeneity between countries is allowed by introducing time-invariant country characteristics in the form of fixed effects (α_i). There are many institutional peculiarities in domestic bond markets that are country specific. For example, financial markets in emerging economies are still developing in many cases, and financial repression has been experienced in the past, helping to keep interest rates low. It is expected that fixed effects would control for these institutional issues, in particular given the relatively short time frame discussed in the paper and the gradual process that is typically involved in institutional change.

In choosing which explanatory variables to use in the estimation of equation (1), we follow the literature on domestic bond yields in advanced economies that has typically included fiscal variables (public debt and the fiscal deficit) as well as real GDP growth and inflation as explanatory variables. Following Laubach (2009), and in order to avoid potential endogeneity issues, we use market expectations of the fiscal variables, real GDP growth and inflation. We also include a measure of the short-term nominal interest rate to control for the effects of monetary policy on the term structure and the U.S. long-term bond yield to account for global liquidity conditions. We account for foreign capital inflows into emerging markets by including the size of bond fund flows into domestic bond markets.[8] Finally, we control for sovereign bonds' sensitivity to local market risk by including the change in the local stock market index.

The basic econometric approach is then extended with a panel threshold estimation to investigate whether the extent to which fiscal variables affect domestic bond yields in emerging economies depends on the level of global risk aversion, proxied by the VIX.[9] This

[7] A Hausman (1978) test was conducted to check whether a fixed effects model is preferable to a random effects model. The hypothesis that the individual-level effects are adequately captured by a random effects model can be rejected at the 1 percent level of significance.

[8] Due to data limitations, this variable does not distinguish between flows into sovereign and corporate bonds.

[9] The VIX has been traditionally used in the literature as measure of global risk aversion. See for example McGuire and Schrijvers (2003) , IMF (2004), Gonzales-Rozada and Levy-Yeyati (2008), Hartelius and others (2008), Bellas and others (2010), Caceres and others (2010), Baldacci and Kumar (2010), and Longstaff and others (2011).

approach allows the model to account for the effect that a shift in global market sentiment can have on investors' assessment of credit risk, evidence of which has been found in the finance literature.[10] The estimation allows the explanatory variables to have differing regression slopes depending on whether the chosen threshold variable, the VIX, is above or below a certain threshold, chosen to maximize the fit of the model. Rather than specifying the threshold in a purely ad-hoc way, we use the methodology developed by Hansen (1996, 2000) to determine the threshold value endogenously, based on maximum likelihood methods. While this methodology has been used in the past in the economic growth literature, to the best of our knowledge, this paper is the first one to apply it to an estimation of the determinants of domestic bond yields[11].

Based on Hansen (1996, 2000), the following threshold regression is estimated:

$$r_{it} = \alpha_i + \beta_1' x_{it} + \varepsilon_{it} \qquad if\ VIX \leq \gamma$$

$$r_{it} = \alpha_i + \beta_2' x_{it} + \varepsilon_{it} \qquad if\ VIX > \gamma \tag{2}$$

where $\beta_i, i = 1,2$ is a state dependent vector of regression coefficients and γ is the endogenously determined threshold value of the VIX that splits the sample into two regimes; r_{it} and x_{it} are defined as in equation (1). The error term ε_{it} is assumed to be independent and identically distributed with mean zero and finite variance σ^2. Equation (2) can be rewritten in more compact form as:

$$r_{it} = \alpha_i + \beta' x_{it}(\gamma) + \varepsilon_{it} \tag{3}$$

where $\beta = (\beta_1'\ \beta_2')'$ and $x_{it}(\gamma) = \begin{cases} x_{it} I(VIX \leq \gamma) \\ x_{it} I(VIX > \gamma) \end{cases}$

where I(.) is the indicator function (Hansen, 2000).

The estimation of equation (3) involves two main steps (Hansen, 2000, Afonso and Jalles, 2011). First, the endogenously determined sample split threshold value is estimated by minimizing the sum of mean squared errors. The least squares estimator of γ is:

$$\hat{\gamma} = \underset{\gamma}{argmin}\ \hat{e}(\gamma)'\hat{e}(\gamma) \tag{4}$$

[10] The motivation for exploring the behavior of bond yields in low and high global risk environments draws on the financial literature and the estimation of time-varying βs (the asset's sensitivity to market risk) when determining an optimal portfolio under the capital asset pricing model (CAPM). Evidence on the state dependency of the βs has been found for both advanced (Huang, 2001; Brooks and others, 2002; Galagedera and Faff, 2004; Audrino and De Giorgi, 2007) and emerging economies (Chen and Huang, 2007; Johansson, 2009; Korkmaz and others, 2010).

[11] While this paper uses data only for emerging market economies, we are not aware of any study that uses this threshold methodology in the context of domestic bond yields in advanced countries.

where $\hat{e}$ denotes the estimated residuals of an estimation of equation (3) after averages have been subtracted from the dependent and independent variables, that is $e = \varepsilon_{it} - \frac{1}{T}\sum_{t=1}^{T} \varepsilon_{it}$.

Second, it is important to test whether the threshold estimated in (4) is statistically significant. In principle, the significance of the sample split could be established with conventional structural break tests (Chow test). However, Davies (1977) has shown that such a procedure is invalid in the context of our study since it assumes that the sample split value of γ is known with certainty, whereas in this case it is estimated endogenously. Hansen (1996) therefore develops a Supremum F-, LM- or Wald-test, with a non-standard distribution dependent on the sample of observations. The critical values are then obtained by a bootstrap methodology.

V. Data and Estimation Results

A. Data Sources

One of the contributions of the paper is to construct an unbalanced panel dataset of monthly observations for 26 emerging economies between January 2005 and April 2011. The novelty is that this dataset contains expectations of inflation, real GDP growth, and expectations of the fiscal balance and public debt-to-GDP ratio for the current year as well as one to five years ahead whose source is the Economic Intelligence Unit (EIU). It also includes long-term (typically 10-year) domestic bond yields, the domestic Treasury bill rate and money market rates obtained from Bloomberg, Haver, and International Financial Statistics. To capture global conditions, the U.S. long-term bond yield is included, obtained from Bloomberg. Foreign capital inflows are drawn from Haver, based on bond funds flows data available from EPFR Global. Stock market indices are based on MSCI emerging market indices by Morgan Stanley Capital International, available from Haver, and the 12-month change is computed. Additional market expectations of growth, inflation, and budget deficits, obtained from Consensus Economics, were used when performing the robustness checks, though the fiscal data are only available for a small group of countries. Table 1 provides descriptive statistics and the Appendix provides more details on data sources by country.

Table 1. Descriptive Statistics

	Mean	Median	Standard deviation	10th percentile	90th percentile
Long-term domestic bond yield (percent)	7.7	7.3	3.2	4.0	12.4
Expected gross debt t+1 (percent of GDP)	38.7	40.6	20.0	10.1	62.2
Expected overall balance t+1 (percent of GDP)	-2.5	-2.5	2.5	-5.9	0.3
Expected inflation rate t+1 (percent)	5.8	4.7	4.9	2.5	9.3
Expected real GDP growth rate t+1 (percent)	4.7	4.8	2.1	2.6	7.2
Domestic Treasury bill rate (percent)	6.8	6.6	4.0	2.2	12.0
Change in the stock market index (percent)	22.5	22.9	40.5	-33.4	69.3
Foreign bond fund flows (percent of GDP)	13.9	3.9	36.9	-13.6	55.7

B. Estimation Results

Basic fixed effects regression

We first estimate the basic fixed effects model outlined in equation (1), which does not take account of a possible nonlinear impact of fiscal policy on bond yields.[12] Two specifications are presented in Table 2 below. The first includes one-year-ahead expectations of both public debt and the fiscal deficit. Because expected public debt data are only available since 2007, the number of observations is significantly smaller than in the second specification, which includes only the expected fiscal deficit, for which data are available since 2005. The results are broadly similar in both specifications. Since data are very unbalanced for some countries, with many observations missing, the number of countries included in the regression analysis decreases to 15.

The results in Table 2 suggest that higher public debt and fiscal variables raise nominal bond yields in emerging markets. An increase in the expected fiscal deficit of 1 percent of GDP pushes up nominal bond yields by about 13 to 15 basis points, depending on the specification used. This is of a similar magnitude as in Baldacci and Kumar (2010) and Peiris (2010), the only two studies that so far have analyzed the determinants of domestic bond yields in

[12] A common criticism of the fixed effects model when estimating long-term bond yields has been that it treats data as if they are cross-sectionally independent although in open economies with integrated capital markets, common factors are likely present, affecting all interest rates simultaneously (Dell'Erba and Sola, 2011). We run the cross section dependence (CD) test (Pesaran, 2004) and find significant evidence of cross sectional dependence. We therefore estimated equation (1) with the common correlated effects mean group (CCEMG) estimator (Pesaran, 2006), we found that the results are very similar, except that the expectations of the public debt-to-GDP ratio become insignificant. The CCEMG estimator may however not be well suited for our analysis, since the sample is very unbalanced and T and N are relatively small. This is why we did not give it more prominence in the paper.

emerging markets. It is also at the lower end of the range of findings of the literature on advanced economies (where the estimated impact of a change of one percent of GDP in the fiscal deficit on interest rates ranges from 10 to 60 basis points (Laubach, 2009)). An increase in the one-year-ahead expected gross public debt-to-GDP ratio of 1 percentage point increases nominal yields by 4 basis points. The impact of other significant explanatory variables is as expected and in line with the previous literature (Baldacci and Kumar, 2010). Higher inflation expectations raise long-term bond yields. Higher expected growth, on the other hand, leads to a compression in yields. As mentioned above, the regression controls for capital inflows into emerging markets as well as the sensitivity to local market risk[13]. Neither of these two variables is found to be significant, but excluding either of them decreases the overall fit of the regression.[14]

Panel threshold estimation[15]

Estimating the fixed effects panel threshold model outlined in Section IV and summarized in equation (3) yields an estimated threshold value (γ) of the VIX of 25.56, which is found to be statistically significant.[16] This threshold variable of the VIX is then used to divide the sample into two regimes: high and low global risk aversion. The number of observations in each sub-sample is 177 and 333 respectively. The next step involves estimating fixed effects regressions with robust standard errors for these two regimes separately.

The fixed effects regression results differ significantly depending on whether the VIX is above (the high risk aversion regime) or below the estimated threshold (the low risk aversion regime). At times of low global risk aversion, domestic bond yields are mostly influenced by inflation and real GDP growth expectations (Table 3). This suggests that, in tranquil times, markets focus more prominently on risk stemming from sensitivity to macroeconomic shocks, which could translate into loss of value for bondholders through above-trend

[13] Peiris (2010) shows that foreign participation in the local bond markets, measured by the share of the outstanding stock of government securities held by non residents, is a significant determinant of long-term yields. These data are only available quarterly, so that they could not be used as a robustness check in the above regression.

[14] Global liquidity, proxied by the US 10 year bond yield is also not found to be significant. This could be due to collinearity with domestic treasury bills, since in small open economies monetary policy is affected by external liquidity. This does not affect the reliability or predictive power of the model as a whole. Furthermore, we included exchange rate expectations one-year ahead from Consensus Forecasts, but did not find that it was significant. This could be due to the fact that inflation is capturing part of this effect.

[15] We thank Joao Tovar Jalles for making his STATA codes for the Hansen panel threshold methodology available to us (see Afonso and Jalles, 2011).

[16] The corresponding Supremum Wald-test is 70.76, with a p-value is 0.018, indicating a significant sample break for the full sample. This threshold is robust to adding different dependent variables, including money market rates instead of T-bill rates.

inflation or devaluation. However, during times characterized by high global risk aversion, creditors' concern with default risk takes center stage and expectations regarding fiscal deficits and government debt play a significant role in determining domestic bond yields. Every additional percentage point in the expected debt-to-GDP ratio raises domestic bond yields by 6 basis points (in the upper range of estimates found in previous studies for advanced economies); and every percentage point expected worsening in the overall fiscal balance-to-GDP ratio raises yields by 30 basis points (in the mid range of estimates found in previous studies for advanced economies). As in the baseline model, the coefficients on the stock market index and bond fund flows were not significant, but excluding either of them decreases the overall fit of the regression.

Table 2. Determinants of 10-year Domestic Bond Yields in Emerging Economies

	[1]		[2]	
Expected gross debt t+1 *(percent of GDP)*	0.04	****		
	(0.01)			
Expected overall balance t+1 *(percent of GDP)*	-0.13	*	-0.15	*
	(0.09)		(0.09)	
Expected inflation rate t+1 *(percent)*	0.24	***	0.34	****
	(0.10)		(0.05)	
Expected real GDP growth rate t+1 *(percent)*	-0.22	****	-0.22	***
	(0.06)		(0.08)	
Domestic Treasury bill rate *(percent)*	0.48	****	0.45	****
	(0.13)		(0.09)	
U.S. 10 year bond yield *(percent)*	0.28		0.28	
	(0.20)		(0.22)	
Change in the stock market index (*percent*)	-0.00		-0.00	*
	(0.00)		(0.00)	
Foreign bond fund flows (*percent of GDP*)	0.38		1.99	
	(2.15)		(1.70)	
Constant	1.38		2.74	*
	(1.93)		(1.50)	
Number of observations	510		732	
R^2	0.72		0.77	
Number of countries	15		15	

Note: Robust standard errors in parentheses.
**** p<0.01, *** p<0.05, ** p<0.1, *p<0.15
Specification (1) covers the period of 2007M1-2011M6 and Specification (2) covers the period from 2005M1-2011M6.
MSCI denotes an index created by Morgan Stanley Capital International (MSCI) that is designed to measure equity market performance in global emerging markets.

Table 3. Threshold Model: Determinants of 10-year Domestic Bond Yields

in Emerging Economies

	Risk Aversion (VIX)			
	High		Low	
Expected gross debt t+1 *(percent of GDP)*	0.06	***	0.02	
	(0.02)		(0.01)	
Expected overall balance t+1 *(percent of GDP)*	-0.31	***	-0.04	
	(0.09)		(0.11)	
Expected inflation rate t+1 *(percent)*	0.19		0.38	***
	(0.19)		(0.05)	
Expected real GDP growth rate t+1 *(percent)*	0.10		-0.35	**
	(0.08)		(0.12)	
Domestic Treasury bill rate *(percent)*	0.60	***	0.37	***
	(0.10)		(0.12)	
U.S. 10 year bond yield *(percent)*	0.23		0.42	*
	(0.29)		(0.20)	
Change in the stock market index (*percent*)	0.00		0.00	
	(0.00)		(0.00)	
Foreign bond fund flows (*percent of GDP*)	0.16		0.41	
	(1.78)		(1.92)	
Number of observations	177		333	
Constant	-1.98		2.329	
	(1.52)		(2.16)	
R^2	0.58		0.53	
Number of countries	14		15	

Note: Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

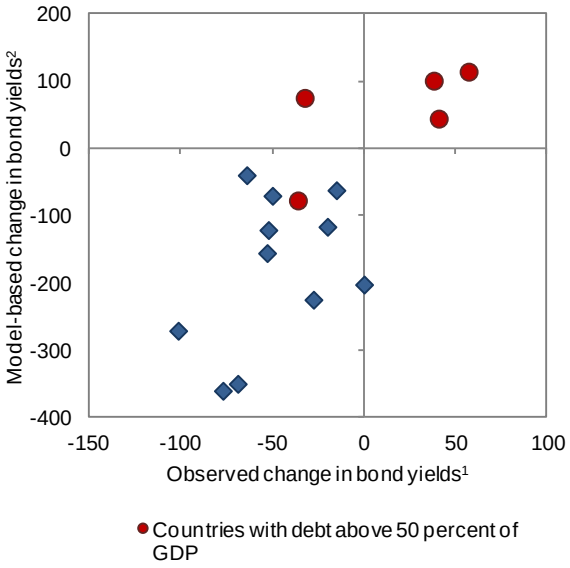
The results were robust to alternative specifications. The size, sign, and significance of the coefficients remain broadly the same when using expectations of the growth, inflation and budget deficits available from Consensus Economics (which is not used as the baseline model as its data coverage is more limited than EIU). Similarly, the results are also robust to the use of long-term expectations data (4 years ahead) instead of one-year ahead expectations. The results also remain broadly unchanged if debt and deficits are included only one at a time instead of jointly, if the money market rate is used instead of the Treasury bill rate, and if the US Treasury bill rate was used instead of the U.S 10 year bond rate. [17]

[17] Results of robustness checks are available from the authors upon request.

Out-of-sample prediction

The model performs relatively well in capturing trends when used for out-of-sample forecasting. Between May and August 2011 (the model sample ends in April), the VIX began to rise following a lull earlier in the year and crossed the threshold identified in the model. Figure 7 plots the actual change in the 10-year bond yield over this period against the change estimated by the model. In general terms, the figure shows that bond yields decreased for most countries in the sample while rising for countries with weaker fiscal positions (i.e. high debt-to-GDP ratios). This heightened differentiation among countries by markets based on their fiscal position is captured by the model, reiterating that market sensitivity to default risk (itself linked to weak fiscal positions) is heightened when global risk aversion is high.

Figure 7. Actual Change in Bond Yields Compared to Out-of-Sample Prediction
(*Basis points)*



Sources: Bloomberg and authors' calculations.
Note: Chart compares the actual change in bond yields between May 2011 and August 2011--when the VIX surpassed the threshold of 25.56 found in the model--with the out-of-sample prediction of the model.
[1] Change in the 10 year domestic bond yield .
[2] Difference between the model prediction based on May 2011 values of the determinants and the model prediction based on August 2011 data.

VI. SUMMARY AND CONCLUSIONS

The present paper sheds new light on the determinants of domestic bond yields in emerging markets. It makes several contributions to the existing literature. It develops a new high frequency dataset with wide country coverage. It also takes into account the effect that a shift in global market sentiment can have on investors' assessment of credit risk by extending the basic fixed effects model to allow the explanatory variables to have differing regression slopes depending on whether global risk aversion is above or below a certain threshold, which is chosen endogenously to maximize the fit of the model.

The results show that it does matter what state you are in, both in terms of the global environment as well as the health of a country's fiscal position. During tranquil times in global markets, bond yields are mainly influenced by inflation and real GDP growth projections, showing markets' greater concern with risk stemming from sensitivity to macroeconomic shocks. However, when global risk aversion is high, market participants pay

more attention to country-specific fiscal fundamentals, revealing greater alertness about default risk.

These findings have important policy implications. In view of the ebb and flow of global conditions, they underscore the need to remain fiscally prudent in good times, as the favorable conditions facing emerging markets could shift unexpectedly. Indeed, when the VIX crossed the model defined threshold in mid-2011, bond yields increased for those countries with the weakest fiscal position.

There are several directions for further research. In particular, it would be interesting to analyze if the negative spillovers from global risk aversion found in this paper are not homogenous across countries but rather are a function of country specific characteristics such as the strength of fiscal fundamentals and the size of trade and financial sector linkages. This topic, which goes beyond the scope of this paper, is left for future analysis.

APPENDIX

A. Data Sources and Differences in Coverage by Country

Table A.1. Overview of Data Sources

Description	Sample	Frequency	Source
Long-term (typically 10-year) nominal domestic bond yield (in percent)	Varies by country, see below	Monthly	Bloomberg, Haver, International Financial Statistics (IFS)
Interest Rate on Treasury Bills (in percent)	Varies by country, see below	Monthly	Bloomberg, Haver, IFS
Money Market Rate (in percent)	2005M1-2011M4	Monthly	IFS, Datastream (Hungary, Vietnam)
Forecasts of inflation (one year ahead) (in percent)	2005M1-2011M4	Monthly	Economist Intelligence Unit (EIU)
Forecasts of real GDP growth rate (in percent)	2005M1-2011M4	Monthly	EIU
Forecasts of public debt (in percent of GDP)	2007M1-2011M4 (for most countries)	Monthly	EIU
Forecasts of fiscal balance (in percent of GDP)	2005M1-2011M4 (for most countries)	Monthly	EIU
US long-term nominal domestic bond yield	2005M1-2011M4	Monthly	Bloomberg
Morgan Stanley Capital International (MSCI) Emerging Market Index	2005M1-2011M4	Monthly	Haver
Bond funds (ETFs and mutual funds) flows into emerging markets from EPFR Global	2005M1-2011M4	Monthly	Haver
VIX	2005M1-2011M4	Monthly	Bloomberg
Forecasts of inflation (one year ahead) (in percent)	2005M1-2011M4	Monthly	Consensus Economics
Forecasts of real GDP growth rate (in percent)	2005M1-2011M4	Monthly	Consensus Economics
Forecasts of overall fiscal deficit (in percent of GDP)	2007M1-2011M4 (for most countries)	Monthly	Consensus Economics

Table A.2 Data Sources for Domestic Long Term Bond Yields

Country	*Descriptor*	*Start Date**	*Gaps **	*Source*
Brazil	10 year	2007M1	yes	Bloomberg
Bulgaria	10 year	2005M1	no	Haver
Chile	10 year	2005M1	yes	Haver
China	10 year	2006M4	no	Bloomberg
Colombia	10 year	2009M12	no	Bloomberg
Estonia	10 year	2005M1	no	IFS
Hungary	10 year	2005M1	no	Bloomberg
India	10 year	2005M1	no	Bloomberg
Indonesia	10 year	2005M1	no	Bloomberg
Latvia	10 year	2005M1	no	IFS
Lithuania	10 year	2005M1	no	IFS
Malaysia	10 year	2005M7	no	Bloomberg
Mexico	10 year	2005M9	yes	Bloomberg
Pakistan	10 year	2005M1	no	Bloomberg
Peru	10 year	2007M12	no	Bloomberg
Philippines	10 year	2005M1	no	Bloomberg
Poland	10 year	2005M1	no	Bloomberg
Romania	10 year	2005M4	no	IFS
Russia	10 year	2005M3	no	Haver
South Africa	10 year	2005M1	no	Bloomberg
Sri Lanka	10 year	2008M5	no	Bloomberg
Thailand	10 year	2005M1	no	Bloomberg
Turkey	10 year	2010M1	no	Bloomberg
Ukraine	8 year	2008M7	yes	Bloomberg
Venezuela	10 year	2005M1	yes	IFS
Vietnam	10 year	2006M7	no	Bloomberg

*This is the start date in our dataset not the beginning of data availability
** This indicates that there are gaps in the data between the start date and April 2011.

Table A.3 Treasury Bill Rates

Country	*Start Date**	*Gaps ** *	*Source*
Brazil	2005M1	no	IFS
Bulgaria	2005M1	yes	IFS
Chile	2005M1	yes	Haver
China	No observations		
Colombia	2005M1	no	Bloomberg
Estonia	No observations		
Hungary	2005M1	no	Bloomberg
India	2005M1	no	Bloomberg
Indonesia	2005M1	yes	Bloomberg
Latvia	2005M1	yes	IFS
Lithuania	2005M1	yes	IFS
Malaysia	2005M6	no	Bloomberg
Mexico	2005M1	no	Bloomberg
Pakistan	2005M1	no	Bloomberg
Peru	2007M12	yes	Bloomberg
Philippines	2005M1	no	Bloomberg
Poland	2005M1	no	Bloomberg
Romania	2005M1	yes	IFS
Russia	No observations		
South Africa	2005M1	no	Haver
Sri Lanka	2005M1	no	IFS
Thailand	2005M1	no	Bloomberg
Turkey	2007M7	yes	Bloomberg
Ukraine	2010M3	no	Bloomberg
Venezuela	No observations		
Vietnam	2006M7	no	Bloomberg

*This is the start date in our dataset not the beginning of data availability
** This indicates that there are gaps in the data between the start and April 2011.

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