



# Macroeconomic effects on emerging-markets sovereign credit spreads



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## ABSTRACT

This paper investigates the explanatory and forecasting power of macroeconomic fundamentals on emerging market sovereign credit spreads. We pay special attention to a new set of macroeconomic factors related to market values that reflect investor expectations concerning future economic performance. The model we propose captures a significant part of the empirical variation in spreads. Importantly, it also includes a powerful forecasting component that extends up to 12 months outside the sample period. The forward-looking variables that we construct are significant and complement and enhance the explanatory content of the conventional variables found in the extant literature.

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## 1. Introduction

This paper examines the explanatory and forecasting power of forward looking macro variables on sovereign credit spreads. While intuition and financial theory suggest that these variables should affect spreads, they have not been used in this type of study before.

The variables we construct follow Clark and Kassimatis (2011) (hereafter C&K), who have developed a theoretical framework and practical methodology for calculating the expected (forward-looking) macroeconomic market value of a sovereign country's economy. They show that a value weighted index composed of the individual country values can be used to generate explanatory information, incremental to what is available in traded asset prices, that is significant for explaining individual asset returns over an asset universe that includes stocks, bonds, money markets and commodities. They also show that the individual macroeconomic market values that they calculate are analogous to the market values of private companies quoted on the world's stock markets. Corporate market values and the information they provide, such as rates of return and volatility are standard inputs in corporate credit models. Following this intuition we follow C&K to estimate the market values and rates of return of each economy in our sample.

We then use this information to construct other macroeconomic variables analogous to those that figure in the corporate credit literature. First, from the country's rate of return we calculate the economy's volatility that we use along with the country's macroeconomic value in the Merton (1974) structural model to estimate a theoretical financial risk premium for each country. Second, we estimate the correlation coefficient between returns to the economy and exchange rates. This correlation coefficient is a variable that has been shown to have important explanatory power in the corporate credit spread literature.<sup>2</sup> Finally, we test the relevance of these forward looking variables for explaining and forecasting sovereign credit spreads.

In the absence of appropriate forward looking macroeconomic market values, researchers focusing on fundamentals have had to rely on proxies to fill the gap. For example, firm value is an important variable in the corporate credit literature, but its macroeconomic analog, country market value, which is a relatively recent innovation, has not been used before. Most studies use GDP or the change in GDP as a proxy measure for the size and productivity of a country. Although related to the market value of a country's productive apparatus, GDP is a very imperfect proxy. It is a flow variable gross of depreciation and provisions for loss that does not distinguish between production costs and the value of output, while the market value of financial theory is a stock variable that incorporates the effects of production costs, output value, depreciation and

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<sup>2</sup> See, for example, Galai and Wiener (2012).

expected losses. Similarly, besides GDP, the main variables used in the literature for the effectiveness of a country to generate the foreign currency necessary to service the external debt are the trade balance or the current account balance. While these variables are related to the profitability of a country, they provide only a partial and potentially misleading view of a country's performance. For example, a country's profits can be positive when the current account balance is negative and vice versa.<sup>3</sup>

The innovation of our paper is that we introduce for the first time a set of macroeconomic variables that financial theory suggests should be important determinants of credit risk to explain sovereign credit spreads. The contribution of the paper takes two directions. First, by using the concept of forward looking macroeconomic market values, we have moved the sovereign debt literature closer to the literature on corporate debt and the financial models that drive the analysis. Second, we reinforce the evidence that, in spite of some perceived shortcomings,<sup>4</sup> macroeconomic fundamentals are important determinants of sovereign credit spreads in emerging markets.<sup>5</sup> We show that when macroeconomic fundamentals are correctly specified they play a more significant role in the determination of sovereign credit spreads than previously thought. We find that the new set of macroeconomic factors related to market values that reflect investor expectations concerning future economic performance are statistically significant determinants of sovereign spreads and their significance is robust to the inclusion of the other conventional macro and financial variables found elsewhere in the literature. Standing alone they explain more than 41% of sovereign credit spreads. Combined with other conventional variables the explanatory power increases to 78%. Moreover, we find that they have forecasting power that extends up to 6 months outside the sample period. The model we propose can explain 80% of sovereign spreads six months into the future and the new set of macroeconomic factors increases the accuracy of predicting large jumps in the spread over a 6 month horizon.

The paper is organized as follows: Section 2 reviews the literature on the determinants of sovereign bond yields, Section 3 presents the procedure used to derive the new macroeconomic factors, Section 4 discusses the data and estimation methodology. Section 5 reports our results, which we discuss in Section 6.

## 2. Literature review

The empirical literature on sovereign credit spreads considers local and global factors. Local factors can be divided into macroeconomic fundamentals and solvency and liquidity factors. We begin the review of the literature with the local factors.

### 2.1. Local factors

#### 2.1.1. Macroeconomic determinants

Since a higher level of output means improved capacity to service the economy's debt, many studies find that GDP growth or some similar activity based indicator is a significant determinant of sovereign spreads (e.g. Baek et al., 2005; Beck, 2001; Gibson et al., 2012; Eichler and Maltritz, 2013). The terms of trade (i.e. price of exports relative to the price of imports) are another important determinant of sovereign spreads because they affect the economy's capacity to generate the foreign currency income necessary to service foreign debt (Bulow and Rogoff, 1989). Hilscher and Nosbusch (2010) empirically examine this relationship and find that the terms of trade as well as the volatility of the terms of trade are significant factors affecting sovereign spreads for 31 emerging economies. Min (1998), Baldacci et al. (2011) and Gibson et al. (2012) among others, also report that the terms of trade have a significant, inverse relationship with sovereign spreads.

The trade balance and the current account balance are more general measures of the economy's capacity to generate foreign income to service the country's debt. The empirical results on their effect on sovereign spreads, however, are ambiguous. Eichler and Maltritz (2013) find that the trade balance affects only medium-to-long term spreads but not short term spreads. They argue that in the short run, capital inflows alleviate solvency problems. However, a capital account surplus means a current account deficit, which is why the effect of the current account on spreads is ambiguous. Beck (2001), counter-intuitively, finds that current account surpluses are associated with higher spreads.

Given its well known effects on relative prices, resource allocation and exchange rates, inflation is a source of increased economic and financial uncertainty that can also affect spreads. Min (1998), for example, finds that inflation is one of the macro variables driving spreads for a number of Latin American and Asian countries. He argues that inflation can serve as a proxy for economic management in the sense that well-managed economies experience low inflation rates. Beck (2001) also finds that inflation is a significant determinant of spreads but in his framework it is expected inflation that matters. On the other hand, Diaz and Gemmill (2006) who examine the global and local determinants of the creditworthiness of four Latin American economies, find that inflation is not a significant determinant of sovereign spreads.

#### 2.1.2. Solvency, Liquidity and other factors

Debt to GDP is the main solvency indicator that figures in most empirical studies on the determinants of sovereign spreads (Hilscher and Nosbusch, 2010; Edwards, 1986; Min, 1998; Eichengreen and Mody, 2000; Eichler and Maltritz, 2013). The main liquidity factor is reserves to GDP. Hilscher and Nosbusch (2010), Min (1998), Diaz and Gemmill (2006), Baldacci et al. (2011), Cline and Barnes (1997), among others, find that reserves to GDP is a significant explanatory variable for sovereign spreads. Other studies, such as Bandiera et al. (2010), Bernoth et al. (2012), and Min (1998), use time to maturity as a determinant of a bond's risk.

Other factors include political risk indicators, currency mismatches and default history. For political risk indicators, most authors consider ratings provided by an agency such as Standard and Poor's or the Institutional Investor magazine. Empirical studies find that they add explanatory power beyond that of other macro variables. For example, Kamin and von Kleist (1999) find that emerging economies with relatively favorable credit ratings, experience spreads which differ considerably to those with less favorable ratings. Gonzalez-Rozada and Levy-Yeyati (2008) find that the long-term foreign debt S&P ratings have explanatory power for spreads in 33 emerging economies. Baldacci et al. (2011) employ

<sup>3</sup> See, for example, Eq. (4) and footnote 9.

<sup>4</sup> Much of this literature is related to the behavior of Eurozone countries in the recent financial crisis. For example, De Grauwe and Ji (2013) find that models perform poorly mainly for Eurozone countries because they cannot issue currency and thus, cannot guarantee payment of their debt obligations. Dell'Erba et al. (2013) find that spreads are affected not only by debt levels but debt currency composition as well. They argue that Eurozone countries issuing euro-denominated debt effectively borrow in foreign currency because they have no control over currency issuance. Ang and Longstaff (2013) find that there is a systemic component in sovereign credit risk that is attributed to financial markets rather than fundamentals. Similarly, Arghyrou and Kontonikas (2012), and Philippas and Siriopoulos (2013) find a contagion effect in the Euro sovereign bond market, unrelated to fundamentals, while Janus et al. (2013) find that trading in CDSs is driven by heterogeneous investor beliefs and overconfidence.

<sup>5</sup> Dell'Erba et al. (2013), for example, find that the correlation between spreads and debt levels in foreign currency is much stronger for emerging economies than advanced economies.

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