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The stock of external sovereign debt: Can we take the data at 'face value'?☆

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ABSTRACT

The stock of sovereign debt is typically measured at face value. Defined as the *undiscounted* sum of future *principal* repayments, face values are misleading when debts are issued with different contractual forms or maturities. In this paper, we construct alternative measures of the stock of external sovereign debt for 100 developing countries from 1979 through 2006 that correct for differences in contractual form and maturity. We show that our alternative measures: (1) paint a very different quantitative, and in some cases also qualitative, picture of the stock of developing country external sovereign debt; (2) often invert rankings of indebtedness across countries, which historically defined eligibility for debt forgiveness; (3) indicate that the empirical performance of the benchmark quantitative model of sovereign debt deteriorates by roughly 50% once model-consistent measures of debt are used; (4) show how the spread of aggregation clauses in debt contracts that award creditors voting power in proportion to the contractual face value may introduce inefficiencies into the process of restructuring sovereign debts; and (5) illustrate how countries have manipulated their debt issuance to meet fiscal targets written in terms of face values.

1. Introduction

With few exceptions, data on the stock of sovereign debt are presented at *face value*. Defined as the *undiscounted* sum of future *principal* repayments, face values can be a misleading measure of the stock of sovereign debt for two reasons. First, because face values only capture *principal*, two debt contracts that are equivalent–in the sense of having identical future cashflows–will have different face values if the otherwise identical cashflows are divided into principal and interest in different ways. Second, because face values are *undiscounted*, two debt contracts with the same total principal, but amortizing over different time horizons, will be treated as identical.

The emphasis on face values by statisticians and market participants creates at least five practical problems. First, the comparison of debt stocks at face value over time and across countries can generate misleading inferences as a result of significant differences in the contractual structure of debt portfolios over time and across countries. For example, low-income countries often borrow from official sources over a long time horizon and at low subsidized interest rates, while middle-income countries borrow at market interest rates over shorter horizons. Hence, face values may understate the indebtedness of middle-income countries relative to low-income countries. As another example, because international debt markets have shifted away from bank loans issued at par toward bonds issued at a discount, face values will tend to increase over time even in the absence of changes in underlying indebtedness. Second, as a consequence, analyses of debt sustainability based on face values will be misleading, with some relatively low debt countries receiving debt relief at the expense of more highly indebted countries. Third, face values inhibit the empirical assessment of the quantitative macroeconomic literature on sovereign debt, since the literature assumes that all sovereign debts are identical, typically taking the form of zero-coupon bonds, all of whose cashflows are treated as principal.

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Fourth, as face values are conventionally used to allocate creditor voting power in the event of a restructuring of sovereign debts, the restructuring process may not work efficiently because creditors with identical financial interests have different voting power. And fifth, if debt targets are specified in terms of face values or if budget deficit targets are specified excluding interest payments, the issuing country has both the ability and incentive to manipulate debt issuance to meet these targets. For example, countries can understate the face value of their debt stocks by issuing par bonds (with a high interest rate and low principal) instead of the equivalent discount bonds (with a lower interest rate and higher principal), or by issuing debts with lower face values amortized over a shorter time horizon.

In this paper we construct a new database of external sovereign debt stocks that sheds light on the extent of these problems. We construct several alternative measures of external indebtedness for a sample of more than 100 developing countries from 1979 through 2006 using previously unpublished data on the cashflows associated with these countries' respective portfolios of external sovereign debts from the World Bank's Debtor Reporting System (DRS). Each of our measures preserves the simplicity and transparency of face values, but corrects for differences in contractual structure that divide cashflows into principal and interest in different ways. Specifically, instead of looking at the face value of a country's actual portfolio of debt contracts–the *contractual face value*–we measure the face value of a synthetic portfolio of debts with a common contractual structure that has been constructed to replicate the cashflows of the country's actual debt portfolio. Our first measure, motivated by the extensive focus on zero-coupon bonds in the quantitative theoretical literature on sovereign debt, defines the face value of a country's portfolio of debts as the face value of a portfolio of zero-coupon bonds that has been constructed to match the actual portfolio of debts owed by the country. We refer to this measure as the *zero-coupon-equivalent* (*ZCE*) *face value* of a country's debt. This measure is particularly useful when assessing the empirical success of models in which all debts take a zero-coupon form, and when assessing the incentives of agents to vary contractual structure when creditor voting rights and debt targets are written interms of face values. Our other measures postulate a positive coupon rate ρ and hence correct for differences in both contractual structure *and* the maturity of debts by discounting *all* future cashflows. Exploiting a known result, these ρ *-coupon-equivalent face values* turn out to be equal to the *present value* of a debt discounted at ρ per-cent. These measures are especially useful in assessing differences in indebtedness across countries and over time, as well as in assessing the incentive to issue short term debt in order to hit debt targets written in terms of contractual face values.

Our findings bring both good news and bad news for users of data on the stock of external sovereign debts. The good news is that much of our *qualitative* understanding of the market for external sovereign debt is preserved when examined in the light of these new data. The bad news is that much of our *quantitative* understanding of international debt markets needs to be revised. Most dramatically, our new measures of the stock of external sovereign debt reveal that the upper-middle-income countries, and the countries of Latin America and the Caribbean in particular, are more indebted relative to low-income countries. In some cases, such as Mexico, the revised measure shows a dramatic difference in the relative level of indebtedness.

Some of our worst news is reserved for the quantitative theoretical literature on sovereign debt and default. It is by now well known that the benchmark Eaton and Gersovitz (1981) model of sovereign debt and default, as explored quantitatively by Arellano (2008), Aguiar and Gopinath (2006), Hamann (2004), and many others, produces levels of the face value of external sovereign debt that are between 5 and 10 times smaller than the levels reported in traditional sovereign debt statistics. This empirical failure is all the more striking when it is noted that these theoretical models restrict attention to zero-coupon bonds in which all future debt service payments are regarded as principal, thus producing a maximal value for the model generated face value of sovereign debt. We show that when data on the stock of external sovereign debt is constructed using our theoretically consistent zero-coupon equivalent face value measure, it is almost one-and-one-half times as large as traditional estimates, implying that the benchmark model produces levels of the stock of sovereign debt between 7.5 and 15 times smaller than those observed in practice.

We also point to a potential problem associated with the more widespread adoption of aggregation clauses in sovereign debt instruments, as envisaged by the Eurogroup (2010). Since voting rights in the event of a sovereign debt restructuring are proportional to the contractual face value of a bond, creditors whose debts include a high interest rate will have fewer voting rights than those creditors holding instruments with identical cashflows but lower interest rates. We show using our data that this would have the largest impact on private sector creditors, indicating that more widespread use of aggregation clauses would lead to the relative subordination of private sector claims. This may explain the reluctance of bondholders to participate in bond issuances including aggregation clauses and, in the event that such clauses become widespread, may give private sector creditors an incentive to adopt contractual forms–such as zero-coupon bonds–that would maximize their voting power in the event of a future sovereign debt restructuring. Finally, we also use our data to document at least one prima facie case of a country varying the contractual form of its debt issuance in order to present its external debt position and budget deficit in a more favorable light.

It is important to stress a number of limitations of our analysis. We have little to contribute to the debate as to the appropriate *rate* at which the cashflows of debts coming due at different dates should be discounted in forming a measure of indebtedness. Any researcher attempting to construct discounted values of debt stocks must confront the fact that the absence of liquid markets for all but a small number of sovereign debts means it is not possible to extract discount rates from market data. Moreover, as established by Dias et al. (2013), it is not always appropriate to use market discount rates in constructing measures of the cost of servicing a debt to the issuing developing country that likely values debt flows on the margin at a different rate than do creditors. In this paper, which aims to evaluate differences in debt stocks across countries and over time, we follow a long tradition of using a time- and country-independent discount rate (see, for example, International Monetary Fund, 2004, 2010; Easterly, 2001, 2002; and the discussion in Dikhanov, 2006).

Data limitations mean that we focus entirely on *external* sovereign debts, despite the recent surge in interest in the domestic debts of developing countries (for example, Reinhart and Rogoff, 2011). Nonetheless, it is important to stress that the exact same measurement problem applies to existing estimates of the stock of domestic sovereign debt. Our study of the contractual structure of developing country sovereign debt, as well as the way it leads to misleading estimates of indebtedness, complements Hall and Sargent's (1997) analysis of the mismeasurement of interest payments by the U.S. Treasury. Our focus on the contractual structure of sovereign debt per se leads us to focus on a different set of summary measures of indebtedness than does Hall and Sargent's emphasis on the U.S. government's cost of borrowing.

The rest of this paper is organized as follows. Section 2 presents a simple framework that is useful in accounting for sovereign debts and illustrates, using a series of simple examples, the measurement problems associated with using contractual face values when aggregating debts with different contractual structures. Section 3 describes our data sources. Section 4 presents our quantitative and qualitative findings for the stock of developing country external sovereign debt. Among other things, we show through examples how different measures of indebtedness would have affected past eligibility for debt relief. Section 5 focuses on the policy implications of these data, emphasizing the incentives for countries to manipulate