Sovereign debt maturity structure under asymmetric information

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A B S T R A C T

This paper studies the optimal choice of sovereign debt maturity when investors are unaware of the government’s willingness to repay. Under a pooling equilibrium there is a wedge between the borrower’s true default risk and the default risk priced in debt, and its size differs with the maturity of debt. Safe borrowers tilt their debt maturity towards short-term – relative to the optimal choice under perfect information – since long-term debt pools more default risk that is not inherent to them. Risky borrowers mimic their behavior of safe borrowers to preclude the market from identifying their type. In times of financial distress, spreads increase and the default risk wedge of long-term debt relative to short-term debt increases, which makes borrowers shorten their debt maturity. Data on bond issuances for a panel of countries show that, consistent with the model, maturities co-vary negatively with spreads and that this co-movement is stronger in those situations in which informational asymmetries are larger.

1. Introduction

Governments actively manage the maturity composition of their debt by issuing debt with multiple maturities. A recent strand of academic research argues that debt maturity management can constitute a relevant macro policy for preventing debt crises and smoothing debt payments. This literature studies optimal sovereign debt maturity under the assumption of perfect information among all contracting parts. However, in the case of sovereigns, debt contracts are non-enforceable and the repayment decisions depend on the benefits and costs of default perceived by the government in office. Often these subjective benefits and costs are not fully observable by investors and informational asymmetries emerge in the market of sovereign debt.

This paper analyzes the optimal choice of sovereign debt maturity in the presence of asymmetric information between the government and creditors regarding the government’s willingness to repay debt. In the model investors are unaware of the repayment capacity of borrowers – that can exogenously choose to default on their debt – and extract information about it from the borrower’s choices of debt allocations. The model thus features a signaling game in which debt is not only used to transfer consumption across time but also as a signal to reveal the type of the borrower. Bond prices – that compensate investors for the expected loss from default – are jointly determined in equilibrium with the maturity structure of debt and play a key role in determining the optimal choices of debt issuance and maturity profile.

The paper focuses on a pooling equilibrium in which both safe and risky borrowers choose the same levels of debt with the same maturity profile. Under this equilibrium safe borrowers issue lower levels of debt relative to the amount of debt they would issue if investors were aware of their type. They do so because debt prices are excessively low for them. Safe borrowers also choose a shorter maturity structure – relative to the optimal maturity structure they would choose if investors were aware of their type – since the price distortion stemming from the presence of asymmetric information is higher in long-term debt relative to short-term debt. Long-term debt is less attractive to safe borrowers since it pools more default risk that is not inherent to them.

Risky borrowers, on the other hand, issue low levels of debt with a short maturity structure to mimic the behavior of safe borrowers and thus preclude the market from identifying their type. This way borrowers can gain a positive misinformation value by accessing debt at higher prices than those they should access if debt were priced according to their true fundamentals.
Times of financial distress in this model are characterized by periods where the ex-ante expected repayment capacity of borrowers deteriorates. In these periods, prices of long and short term debt fall and spreads increase. The deterioration in the expected repayment capacity affects debt prices in an asymmetric way: long-term debt prices decay more than short-term debt prices as the former reflect default risk during a longer period of time. Given this asymmetric price effect, it becomes optimal for safe borrowers, and also for risky borrowers that gain from pooling with safe borrowers, to shorten the maturity composition of debt. Therefore, if the ex-ante expected repayment capacity of borrowers varies over the cycle, the model predicts a negative co-movement between average maturities and spreads.

We show that the shortening of debt maturity is also the equilibrium response to a temporary deterioration of the expected repayment capacity. We also show that an important assumption behind our results is the presence of cross-default: when a government defaults it does so on all outstanding debt. We study a variant of our model in which default only applies to the debt that is maturing on that period and find that, under specific circumstances, our main result is not robust to this alternative environment. However, empirical studies suggest that the environment with cross-default is a better representation of current sovereign debt markets. Sovereign bonds often include cross-default clauses (see IMF (2002)) and post-default debt restructuring episodes typically embrace outstanding bonds of various maturities (see Sturzenegger and Zettelmeyer (2008)).

We then test the predictions of the model in the data. To study how the choice of maturity structure of sovereign debt is related with movements in debt prices we construct and analyze a database of sovereign debt maturities of new bond issuances and country spreads – defined as the interest rate premium that bonds from a particular country pay in excess of the interest paid on the US Treasury – for a representative sample of 34 financially integrated emerging economies.

The analysis of the data indicates that the maturity of debt covaries negatively with spreads. We regress average debt maturities of a given country in a given month on average country spreads and country and month fixed effects, and find a negative and statistically significant relationship between these two variables. This finding is in line with the empirical facts previously documented in Arellano and Ramanarayan (2012) and Broner et al. (2013) for a more reduced set of countries. The negative co-movement is a prediction that is also shared by other theories. The distinct feature of our theory is its reliance on the presence of asymmetric information between the government and investors.

We exploit this differential feature by testing whether the co-movement of maturities and spreads is stronger in contexts in which informational asymmetries are larger. To do so we construct two proxies of the degree of asymmetric information between the government and foreign investors and assess its effects on the co-movement between maturities and spreads. The first proxy for situations in which the degree of asymmetric information is higher is given by years of presidential elections or years that immediately follow one. In these years, in which the type of the new governments is presumably less revealed to foreign investors, the co-movement between spreads and debt maturity is also stronger. The second proxy is given by the volatility of credit ratings for a given country. We find that for those countries with more volatile credit ratings, indicative of more volatile government types and a more relevant role for asymmetric information, the co-movement between spreads and debt maturity is stronger.

1.1. Related literature

This paper relates to a growing literature on debt maturity choice. The availability of debt with multiple maturities is relevant in an economy with non-state-contingent debt. As shown in early work by Kreps (1982) and Duffie and Huang (1985), and more recently by Angeleitos (2002) and Buera and Nicolini (2004), a rich maturity structure of bonds can help replicating allocations of an Arrow–Debreu economy with complete markets. Additionally, in the context of an economy without stage-contingent securities, long-term debt has been shown to be helpful for hedging motives. Lustig et al. (2008) and Arellano and Ramanarayan (2012) argue that long-term debt helps hedge against future shocks. These two features highlighted by previous literature are present in the model presented in this paper. The existence of both short and long-term debt is essential for completing markets and long-term debt helps to hedge shocks to the risk-free interest rate.

A large strand of the literature has studied the interaction between maturity choice and sovereign default. In models of endogenous default short-term debt issuance can make a government more prone to suffering a roll-over crisis in which creditors fail to roll-over existing debt in the presence of coordination problems (Cole and Kehoe, 2000; Boccola and Dovis, 2016) or bad economic prospects (Fernandez and Martin, 2015). On the other hand, recent literature has shown that short-term debt is less subject to time inconsistency problems as, unlike long-term debt, its repayment – and thus its price – is not affected by future debt paths for which the government cannot commit (Arellano and Ramanarayan, 2012; Niepelt, 2014; Dovis, 2014; Aguilar and Amador, 2015). Given that the price of long-term debt can be affected by future debt paths, recent studies have highlighted how long-term debt can be subject to a debt dilution problem (for example, Hatchondo et al. (2012), Chatterjee and Eyigungor (2012) and Chatterjee and Eyigungor (2013)). Other factors that can affect the choice of maturity can come from lender’s conditions. Broner et al. (2013) argue that short-term debt may be more desirable to risk-averse creditors since they face more uncertainty when lending long-term. We abstract from these mechanisms in this paper, in order to focus on the role of maturity choice as a signal of private information.

The presence of asymmetric information has been used to study other topics related to sovereign debt. Sandleris (2008) analyzes how repayment decisions can serve as a signal of the fundamentals of the economy. Cole et al. (1995) study the role of asymmetric information in debt settlements after defaults. Catao et al. (2014) use asymmetric information to explain recent decoupling in sovereign yields in the Eurozone. The role of asymmetric information in determining optimal maturity debt structure has been previously explored in the corporate finance literature. The closest paper in this literature is Flannery (1986) which evaluates the extent to which a firm’s choice of risky debt maturity can signal insiders’ information about the firm’s quality. Flannery studies a pooling equilibrium in which firms with good projects finance a fixed amount of borrowing by issuing only short-term debt and rolling it over, since it benefits from better roll-over prices. In this paper the government cares about inter-temporal consumption smoothing and has a larger set of actions (maturity choice and level of debt) with which it can signal its type. The pooling equilibrium features an interior maturity choice that is shorter than that under full information. Here, the reason for the shortening of maturities is to engage in a consumption path that maximizes consumption in those periods in which the wedge between the value of consumption and the relative price of consumption is lower.

1 Other papers study the role of asymmetric information in the maturity structure of corporate debt. Kale and Noe (1990) show that Flannery’s pooling equilibrium satisfies signaling equilibrium refinements. Diamond (1991) analyzes debt maturity choice as a trade-off between a borrower’s preference for short-term debt due to private information about the future credit rating, and liquidity risk.
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