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Sovereign debt spread and default in a model with self-fulfilling prophecies and asymmetric information

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ABSTRACT

The euro area sovereign debt crisis has renewed interest in government credibility and the risk of default. Recent empirical evidence has shown that the sharp increase in government bond yields cannot be attributed entirely to changes in macroeconomic fundamentals. Contagion effects can occur, and self-fulfilling speculation may arise. In this paper, we develop a theoretical model in the spirit of the second-generation currency crisis models developed by Obstfled (1996). The model describes a strategic game between governments and private investors. Euro area countries face a trade-off as governments may either commit to and implement restrictive fiscal policies or default on debt. The commitment strategy may not be optimal if the fundamentals deteriorate. The policy maker lose part of their credibility, and governments are forced to default. In addition, we introduce uncertainty about the cost of default in the model, which is then able to account for a greater variety of equilibrium. Thus, when the evaluation of the cost of default is asymmetric, prophecies are not always realized and default does not occur. Simulations of the model then show that it offers insights, and can help to account for the situations of Greece and Italy during the sovereign debt crisis.

1. Introduction

The sovereign debt crisis in the euro area has renewed interest in the credibility of government and the risk of default. Whereas sovereign spreads did not exceed 60 basis points in the pre-crisis period, they started to rise moderately for some countries (mainly from southern Europe plus Ireland) during the financial crisis and increased more significantly after the newly elected Greek government revised its deficit figures strongly upward in autumn 2009. This news triggered a regime switch (Gibson et al., 2012) since the financial markets suddenly realized that a default on public debt could not be excluded. Yet a default has not occurred so far, except for Greece where private investors have agreed to accept a significant haircut. The EMU countries nevertheless felt compelled to reduce public deficits to show their commitment to fiscal sustainability. Fiscal consolidation was perceived as the only solution to ensure credibility and to bring down the risk premium. Credibility did not improve despite the measures taken by governments in 2011 to improve their fiscal position. Spreads kept rising and started to fall only in July 2012.

This episode raises the question of why a debt crisis occurs and why the credibility of policy makers may suddenly jump from a situation of full credibility to a situation of deteriorated credibility. In this paper, we develop a theoretical model representing the interactions between a policy maker, who may default on debt, and private investors who allocate wealth between a risk-free asset and the domestic debt. It shows that credibility and sovereign default result from complex factors. Fundamentals matter but self-fulfilling prophecies may drive up risk premiums and force the government to default. Besides, by introducing imperfect

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information on the cost of default, we show that risk premiums may increase but not always trigger a default; prophecies are not always realized. We then provide numerical solutions of the model and show that it is able to explain why Greece has *de facto* defaulted on its public debt (the fundamentals deteriorated) and why some other countries have been driven into the zone of increased risk without defaulting (Spain and Italy, for example).

The literature on sovereign debt and the risk of default has resurfaced. New empirical analyses have shed light on the main determinants of interest rate spreads. The role of fundamentals is notably put forward[1] and Schucknecht et al. (2009) suggest that a reduction of the fiscal space increases government bond yields, imposing discipline on governments. Beyond fiscal space, other macroeconomic variables influence spreads: external imbalances (Alessandrini et al., 2012) and business cycles (Grandes, 2007) notably. Thus, fiscal consolidation may not always improve credibility if it has a strong negative effect on growth.[2] However, recent evidence indicates that the dynamics of sovereign spreads during the crisis are hardly explained by fundamentals. Substantial mispricing has been highlighted by De Grauwe and Ji (2012) and De Grauwe and Ji (2013),[3] who conclude that equilibrium may be driven by self- fulfilling prophecies, jumping from the "good" equilibrium to the "bad" equilibrium.[4] De Grauwe (2012) suggests that this situation is even more likely in a monetary union. Members are more prone to liquidity squeeze since they are indebted in a currency that they do not completely control. There is a direct analogy with the "original sin" problem emphasized by Eichengreen et al. (2005). The rise in spreads may also result from contagion effects. Arghyrou and Kontonikas (2012) suggest indeed that the rise in the spread on Greek bonds has been passed through the sovereign debt spread for most EMU countries during the crisis. Hence the relation between sovereign debt spreads and fundamentals may be nonlinear, reflecting changes in the general risk pricing (Bernoth et al., 2012), contagion (Favero and Missale 2012) or the markets' perception of risk or of the cost of default.

The aim of this paper is to develop a theoretical model encompassing the several features highlighted by this empirical evidence. The model should not only account for the role of fundamentals (macroeconomic fundamentals, such as fiscal position and business cycle, and the risk aversion of private investors) but also allow for sunspot equilibria. Yet, in sunspot equilibria the bad equilibrium is characterized by self-fulfilling prophecies where market expectations of default drive up interest rates on debt and trigger the sovereign default. Reality is more complex. Defaults are possible events but do not occur systematically.[5] Conversely, there are situations where the increase in the risk premium is not followed by default, as illustrated in Italy, Spain, Ireland and Portugal during the recent crisis. The model should also be able to capture these situations.

Our approach follows the early literature on sovereign debt default from Calvo (1988), Cole and Kehoe (1996) and Cole and Kehoe (2000), pointing out that credibility matters and that the choice of default results from a strategic game. More recently, Tamborini (2014) and Gros (2012) have also dealt with the euro area sovereign debt crisis, emphasizing the role of the self-fulfilling mechanism and multiple equilibria. Tamborini (2014) notably introduces investors' heterogeneous beliefs about the level of debt for which the government loses credibility and may default. For Gros (2012), there is uncertainty on the final decision to default since it results from a long and complex political process. Other recent papers have drawn on the literature on exchange rate crises (Arghyrou and Tsoukalas, 2011; Bruneau et al., 2012). The second-generation currency crisis models are notably well suited, as they are based on the interactions between the expectations of market participants and the decisions made by the central bank regarding the peg (Obstfled, 1996; Sachs et al., 1996). Central banks face a trade-off between unemployment and devaluation. The incentive to exit the peg increases with the unemployment rate. Speculators are aware of this trade-off and may ask for higher interest rates to offset the risk of devaluation, which raises the unemployment rate and triggers the collapse of the exchange rate regime.

Our model is largely influenced by this literature, since we make the analogy between an exchange rate crisis and the European sovereign debt crisis. In the current context of a monetary union, the euro area countries face the same kind of trade-off. Governments may either commit to and implement restrictive fiscal policies or default on debt. The cost of the commitment strategy increases when interest rates increase or when the fiscal multipliers are high. Speculators may then drive the economy towards a bad equilibrium and force governments to default. The analogy with exchange rate crisis models is clearly made by De Grauwe and Ji (2014), who emphasize that speculative attacks occur on the bond market in a monetary union while they would occur in the foreign exchange markets in fixed-exchange rate regimes like the EMS. The optimal decision of investors arises endogenously in the model (see Cornand et al., (2014) for another example), contrary to most second-generation models of crises. One contribution of this paper is to introduce uncertainty about the cost of default, which is asymmetrically evaluated by private agents and the government. The model is then able to characterize other equilibria where a default is expected but does not occur, or conversely where a default is not expected but does occur.

[1] See Bernoth et al. (2012) and Haugh et al. (2009) for a synthesis of the impact of increases in the debt or deficit on interest rates.

[2] Conversely, the benefit of consolidation is amplified when the fiscal multiplier is negative. In this anti-Keynesian case, the deficit is reduced and output increases.

[3] See also Bruneau et al. (2012), who suggest that the probability of default is a nonlinear function of fundamentals and is driven by self-fulfilling speculation. They highlight the market perception of risks influenced notably by the sovereign CDS market.

[4] De Haan et al. (2013) suggest that misalignments depend on the choice of the estimated model, the sample. Aizenman et al. (2013) assert that it is hard to disentangle the misalignment hypothesis and investors' expectation of a future deterioration of fundamentals.

[5] According to Buiter and Rahbari (2013), defaults have been extremely rare for advanced economies since World War II. Das et al. (2012) do not actually list any restructuring of public debt for advanced countries from 1950 to 2010. In Europe, only East European countries have been concerned, after the fall of communist regimes.