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Debt and deficit fluctuations and the structure of bond markets

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Abstract

We analyse the implications of optimal taxation for the stochastic behaviour of debt. We show that when a government pursues an optimal fiscal policy under complete markets, the value of debt has the same or less persistence than other variables in the economy and it *declines* in response to shocks that cause the deficit to increase. By contrast, under incomplete markets debt shows more persistence than other variables and it *increases* in response to shocks that cause a higher deficit. Data for US government debt reveals diametrically opposite results from those of complete markets and is much more supportive of bond market incompleteness.
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1. Introduction

As shown by Aiyagari, Marcet, Sargent and Seppälä [1] the structure of debt is a critical ingredient for determining the properties of optimal taxes. Optimal taxes under incomplete markets (where governments cannot achieve full insurance) display a near-unit root component that is

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absent under complete markets. However, it is far from obvious how to determine whether complete or incomplete markets offer the best paradigm for issues in public finance. Advocates of incomplete markets appeal to alleged moral hazard difficulties as well as the problems of limited commitment and transaction costs that government face. All of these features combine to reduce the range of contingent securities at the government's disposal. However, it is well known that when markets are incomplete some properties of the aggregate real allocations and asset prices are close to the first best.[1] Further, it has been shown that various policy instruments effectively complete the markets even when assets insuring for all contingencies do not exist.[2] These results suggest that it is not possible to discriminate between the relevance of complete or incomplete market models by looking at the range of securities governments can issue.

The aim of this paper is to consider the properties of debt under a variety of optimal tax models and use these results to propose tests for the empirical importance of complete versus incomplete markets. In particular we suggest two specific tests for market incompleteness based on comparing the properties of debt and deficit in the data with the behavior of these variables in the model. The first concerns the relative persistence of debt and deficits. That debt is highly persistent under incomplete markets has been commented on before (the analysis of Barro [3], Aiyagari et al. [1] suggests that debt contains a unit root). The idea of this paper is to test for market incompleteness by studying the *relative* persistence of debt compared to the primary deficit: under incomplete markets debt is much more persistent than deficits. By contrast, we show that deficit and debt tend to have a similar persistence under complete markets.

Our second test for incomplete markets has to do with the co-movement of debt and deficits and it builds on an insight that has, to our knowledge, not been discussed before. We argue that under complete markets, government debt should *fall* in response to shocks that cause the primary deficit to *increase*. This is because under complete markets the optimal debt portfolio held by the government to achieve smooth taxes involves an apparent "over-insurance," in the sense that the optimal portfolio pays much more than the income loss experienced in the period where a bad shock occurs. By contrast, the optimal policy under incomplete markets entails using debt as a buffer stock so that a bad shock brings about both a higher deficit and a higher debt.

Evaluating US post WW II data using these two criteria suggests strongly the importance of incomplete markets: the relative persistence of debt is very high and deft and deficits co-move in the same direction. We also show that other aspects of a simple incomplete markets model fit important aspects of the data.

Justifying and implementing these two tests is the core of our paper. Aside from the importance of the hypothesis being investigated the strength of these tests is their sharpness. Applying classical unit root tests to either debt or taxes is subject to well-known size and power problems, as well as the sensitivity of asymptotic distributions to small changes in the null hypothesis. Furthermore, strictly speaking, a model of complete markets with capital accumulation does have a near-unit root, so existence or not of a unit root is not a good way to discriminate between complete and incomplete markets.

The plan of the paper is as follows. Section 2 examines US post-1950 data and documents a number of facts on the stochastic properties of debt and deficits. Section 3 begins our theoretical analysis of the behaviour of debt when governments pursue an optimal taxation approach. It uses the canonical Lucas and Stokey [21] model and considers the dynamic behaviour of debt under

[1] See, for example, Telmer [27], Heaton and Lucas [18], Krusell and Smith [20] and Marcet and Singleton [22].

[2] See Angeletos [2], Buera and Nicolini [5] and Chari, Christiano and Kehoe [9].

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