The impact of monetary policy on bond returns: A segmented markets approach

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Abstract

This paper assesses the contribution of monetary policy to the dynamics of bond real returns. We assume that the monetary authority controls the short-term nominal interest rate. We then model exogenously the joint dynamics of the aggregate endowment and the monetary policy variable, and determine bond real returns endogenously. Market segmentation is introduced by permanently excluding a fraction of households from financial markets. When markets are segmented, monetary policy has a liquidity effect on the participants' consumption and marginal utility, on the stochastic discount factor, and on real returns. Data on bond returns strongly favor the segmented markets model over the full participation model. For maturities up to 2 years, the segmented markets model is able to replicate the sign and the size of the impulse response of bond returns to monetary policy shocks, it correctly predicts the sign of their autocorrelation, and it closely matches their volatility as a function of maturity.
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1. Introduction

This paper assesses the contribution of monetary policy to the dynamics of bond real returns. We assume that the monetary authority controls the short-term nominal interest rate. We then model exogenously the joint dynamics of the aggregate endowment and the monetary policy variable, and determine bond real returns endogenously.

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We adopt a heterogenous agents variant of the limited participation framework, the *segmented markets* model, previously studied by Alvarez and Atkeson (1996), Alvarez, Lucas, and Weber (2001), Occhino (2004), and Lahiri, Singh, and Vegh (2007). The central feature is that a set of households are permanently excluded from financial markets.

In the full participation version of the model, real returns are determined by the marginal utility of the representative household, and, therefore, by the aggregate consumption and endowment. Hence, monetary policy affects real returns through its effect on the aggregate endowment.

When markets are segmented, however, monetary policy has an additional liquidity effect. Changes in the stance of monetary policy affect the *distribution* of cash balances and consumption expenditures across households. An increase in interest rates induces traders to hold more bonds, to lower their holdings of cash balances, and to reduce their purchases of consumption goods. The traders' marginal utility of consumption rises, lowering the stochastic discount factor, and increasing expected real returns. The smaller the economic weight of traders in the economy, the larger this liquidity effect of monetary policy on bond real returns.

We take the full participation and segmented markets models to the data. Three empirical dimensions are explored: the response of bond returns to nominal interest rate shocks; the autocorrelation of bond returns; and the term structure of volatility. The evidence strongly favors the segmented markets model in each case.

The full participation model has incorrect predictions about the impact effect of monetary policy, with real returns rising after an increase in interest rates. Real returns fall in the segmented markets model and closely track the impulse responses in the data thereafter.

The segmented markets model also matches the declining positive autocorrelations and increasing volatilities of bond returns as time to maturity increases. The full participation model has negative autocorrelations and can only match the higher volatilities of longer term bond returns by overstating short-term bond volatility.

The paper is organized as follows: Section 2 describes the economy and defines the equilibrium; Section 3 explains the numerical solution method; Section 4 presents and comments on the empirical results; Section 5 concludes.

2. Model

The model is a cash-in-advance endowment economy, with a large number of households and a monetary authority. Time is discrete and is indexed by $t \geq 0$. There is a single non-durable consumption good, money, and one-period nominal bonds, which are claims to one unit of money payable at the end of the period. Households are of two types, traders and non-traders. Let $\omega > 0$ and $\omega^* \geq 0$ be respectively the number of traders and non-traders. We will refer to the case where $\omega^* = 0$ and $\omega^* > 0$, respectively as the full participation model and the segmented markets model.

Households of the same type are identical in all respects. The crucial difference between the two types of households is that non-traders spend all their money purchasing consumption goods, while traders can purchase bonds as well.

Households start each period with cash balances from the previous period. Then, two markets meet in sequence, a bond market and a goods market.

In the bond market, the monetary authority sells one-period nominal bonds to the traders, at the bond price $q_t > 0$. The monetary authority announces the bond price, and stands ready to issue and sell any number of bonds to clear the market at that price. Open market operations are