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Escaping expectation traps: How much commitment is required?

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ABSTRACT

We study the degree of precommitment that is required to eliminate multiplicity of policy equilibria, which arise if the policy maker acts under pure discretion. We apply a framework developed by Schaumburg and Tambalotti (2007) and Debertoli and Nunes (2010) to a standard New Keynesian model with government debt. We demonstrate the existence of expectation traps under limited commitment and identify the minimum degree of commitment which is needed to escape from these traps. We find that the degree of precommitment which is sufficient to generate uniqueness of the Pareto-preferred equilibrium requires the policy maker to stay in office for a period of two to five years. This is consistent with monetary policy arrangements in many developed countries.

1. Introduction

In this paper we study the existence and uniqueness properties of monetary policy in a limited commitment framework in the Blanchard and Kahn (1980) class of linear quadratic rational expectation models (LQ RE). This class of models is typically used to study aggregate fluctuations in macroeconomics. Building on research in Schaumburg and Tambalotti (2007) and Debertoli and Nunes (2010) we show the existence of multiple equilibria under limited commitment policy.[1] Similar to the case of pure discretion, under limited commitment policy makers cannot manage private sector expectations which can lead to expectation traps and coordination failures. We investigate the question of how much precommitment is needed to escape such expectation traps and to coordinate on the Pareto-preferred equilibrium. We find that the necessary degree of precommitment to eliminate multiplicity is relatively small – from two to five years – which is consistent with tenure terms of monetary policy makers in many countries.

It is well known that in LQ models with rational expectations policies under commitment and discretion may imply very different dynamics for the economy. With full commitment the policy maker has complete control over the private sector's expectations about future policy and steers them in a way that furthers his stabilization goals. The policy maker can coordinate all future actions of consequent policy makers, which allows him to choose once, and apply indefinitely, an

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[1] Originally, their framework is based on Roberds (1987). Lohmann (1992) studied limited commitment policies in a one-period setting.

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intertemporal contingency plan (Kydland and Prescott, 1977). In linear quadratic models a commitment policy, if it exists, is always unique (Kwakernaak and Sivan, 1972; Backus and Driffill, 1986).

With no commitment at all, i.e. under pure discretion, the policy maker does not control the expectations of the private sector and fails to coordinate the actions of consequent policy makers. Under discretion the policy maker optimizes in each period of time and the private sector knows that future policy makers will implement the same decision process in subsequent periods (see e.g. Oudiz and Sachs, 1985; Backus and Driffill, 1986; Currie and Levine, 1993). However, under pure discretionary policy expectation traps and multiple equilibria can arise because the expectations of the private sector are shaped by anticipations about future policy actions. Since the policy maker cannot fully control private sector expectations, those expectations may trap the policy maker into implementing a policy that validates them. The trap is closed if it is less costly for the policy maker to validate the private sector beliefs about future policy than to ignore those expectations, see King and Wolman (2004).[2]

Under limited commitment a new policy maker arrives in office with an exogenous probability α every period, reneges on the past policy plan of its predecessor and credibly commits to a new policy plan that is optimal at this point in time. Clearly, this framework has elements of both discretion and commitment. However, the policy maker can neither completely control the expectations of the private sector, nor can he coordinate the actions of all future policy makers. Therefore, coordination failures between the sequence of policy makers and the private sector can occur and may result in multiple equilibria and expectation traps. Models with expectation traps can help us to explain the observed excess volatility of macroeconomic data.[3] These models should also be used to improve macroeconomic policy to avoid such traps.

Our contribution is twofold. First, we demonstrate, by example, that similar to discretion expectation traps also exist under limited commitment.[4] We use a simple New Keynesian (NK) model with government debt accumulation which describes an economic behavior that is familiar from the literature on the fiscal theory of the price level (see e.g. Leeper, 1991). Second, we obtain the minimum degree of policy precommitment that is required to select the best equilibrium. We demonstrate that a small degree of precommitment is enough to select the best equilibrium; a tenure of about 2–5 years is sufficient to eliminate all equilibria except the Pareto-preferred.

The paper is organized as follows. In Section 2 we introduce the NK model with debt accumulation. We first review properties of discretion and commitment policies for this model and demonstrate the existence of expectation traps under quasi-commitment. Then we find the minimum length of precommitment that is required to select the best equilibrium in our model. Section 5 concludes. Finally, the appendix presents a numerical algorithm to find policy with limited commitment.

2. The model with government debt

This section demonstrates the existence of multiple equilibria under limited commitment by example. We present a simple NK model with government debt accumulation in the spirit of Leeper (1991). This model is well suited to use as an example to demonstrate the existence of expectation traps and to study the dynamic properties of an economy under monetary policy with limited commitment. First, unlike the model in Schaumburg and Tambalotti (2007) this model has an endogenous predetermined state variable, government debt, which is affected by policy. The presence of such a variable is crucial to generate multiple equilibria under discretionary policy in LQ RE models (Blake and Kirsanova, forthcoming). A necessary condition for multiplicity is the existence of strategic complementarities between the decisions of agents. An endogenous state variable ensures that the current policy maker reacts (indirectly) to the past actions of the private sector and his predecessors. Therefore, the policy maker can be trapped into implementing an undesired policy, if it is less costly to validate the expectations formed in the past, than sticking to his initial policy plan. Second, the model is simple enough to derive most of our results analytically.[5]

We adopt the model from Benigno and Woodford (2003).[6] The economy consists of a representative household, a representative firm that produces the final good, a continuum of intermediate goods producing firms and a monetary and fiscal authority. The intermediate goods producing firms act under monopolistic competition and produce according to a production function that depends only on labor. Goods are combined via a Dixit and Stiglitz (1977) technology to produce aggregate output. Firms set their prices subject to a Calvo (1983) price rigidity. Households choose consumption and leisure and can transfer income through time through their holdings of government bonds. All agents can observe and affect the accumulation of real government debt. The accumulation of government debt must depend on a fiscal stance. Hence, there is a non-optimizing fiscal authority facing a stream of exogenous public consumption. These expenditures are financed by levying income taxes and by issuing one-period risk-free nominal bonds. We assume that the fiscal authority imposes a simple proportional rule for the tax rate: if real debt is higher (lower) than in the steady state the tax rate rises (falls). We shall refer to the tax rate as 'taxes' and to the parameter

[2] Dynamic RE models with multiple discretionary equilibria are presented in King and Wolman (2004) and Blake and Kirsanova (forthcoming). Lockwood and Philippopoulos (1994) and Albanesi et al. (2003) give examples of multiplicity in models with static expectations.

[3] Discretionary policy with multiple equilibria generates data series which can be observed as satisfying a Markov-switching regime (Blake and Kirsanova, forthcoming). There is much empirical evidence on such regimes; for one example which uses a similar model as we study here see Davig and Leeper (2006).

[4] Schaumburg and Tambalotti (2007) term limited commitment 'quasi-commitment' and Debertoli and Nunes (2010) use 'loose commitment'. In this paper we use these terms interchangeably.

[5] Debertoli and Nunes (2010) use a non-linear model to illustrate a generalization of the quasi-commitment equilibrium concept to a non-linear setting. Their model is not suitable for our analysis because of the assumption of non-linearity.

[6] It was also used in Blake and Kirsanova (forthcoming) to demonstrate existence and investigate the properties of multiple equilibria under discretionary policy.