Journal of Economic Dynamics & Control 37 (2013) 1097–1109

Contents lists available at SciVerse ScienceDirect

Journal of Economic Dynamics & Control

journal homepage: www.elsevier.com/locate/jedc

Public debt, discretionary policy, and inflation persistence

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ARTICLE INFO

Article history:
Received 12 September 2011
Received in revised form
19 June 2012
Accepted 23 January 2013
Available online 13 February 2013

JEL classifications:
E52
E61
E63

Keywords:
Inflation dynamics
Persistence
Optimal fiscal and monetary policy
Lack of commitment

ABSTRACT

We describe a simple mechanism that generates inflation persistence in a standard sticky-price model of optimal fiscal and monetary policy. Key to this mechanism is that policies are implemented under discretion. The government's discretionary incentive to erode the real value of nominal public debt by means of surprise inflation renders inflation expectations and, in further consequence, equilibrium inflation rates highly correlated with the stock of public debt. Debt, in turn, is highly persistent, allowing for tax-smoothing in the face of disturbances. Due to the aforementioned correlation, the persistence in debt carries over to inflation. Our analysis uncovers a non-monotonic effect of nominal rigidities on inflation persistence and shows that government debt under discretion does *not* display the near random walk property familiar from the Ramsey literature. A calibrated version of the model that incorporates a moderate degree of monopolistic competition and price stickiness is quantitatively consistent with the inflation dynamics experienced in the USA since the Volcker disinflation of the early 1980s.

1. Introduction

Ramsey models of optimal fiscal and monetary policy typically predict inflation rates that are negative on average and display almost zero persistence (Chari et al., 1991; Khan et al., 2003; Schmitt-Grohe and Uribe, 2004, 2010; Siu, 2004). This empirically implausible prediction has recently been stressed by Chugh (2007), who shows that an otherwise standard model augmented with habits-in-consumption and physical capital accumulation can generate substantial inflation persistence under Ramsey policies. In his model, an increased preference or ability to smooth consumption over time leads to a highly persistent real interest rate; a persistent real interest rate, in turn, implies a persistent inflation rate by the Fisher relationship.

The present paper describes an alternative mechanism that generates realistic inflation persistence. We study a fairly standard sticky-price model and argue that optimal inflation rates are highly persistent if policies are implemented under discretion rather than commitment. Key to this result is the government's discretionary incentive to erode the real value of outstanding liabilities by means of surprise inflation. This incentive renders inflation expectations and, in further consequence, equilibrium inflation rates correlated with the level of outstanding debt. Since optimal policies use public debt as a means to smooth tax distortions over time, it displays a high degree of persistence. Due to the aforementioned correlation, this persistence carries over to inflation.

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http://dx.doi.org/10.1016/j.jedc.2013.01.014

Nominal rigidities affect optimal inflation persistence in a non-monotonic way, as two opposing effects are at work. On the one hand, the correlation between debt and inflation becomes weaker as price variations become more costly. On the other hand, the persistence of debt under optimal policies increases in the presence of nominal rigidities: When price adjustments are costly, the policy-maker refrains from using inflation as a shock absorber but uses persistent changes in debt to smooth the effects of shocks over time. Whether an increase in price stickiness raises or lowers inflation persistence therefore depends on which of the two effects is stronger. For a calibrated economy, we show that at very low levels of price stickiness the *reduced correlation effect* dominates, such that inflation persistence decreases in the amount of price stickiness. At higher levels of price stickiness, the *debt persistence effect* dominates and inflation persistence accordingly increases. The inflation dynamics generated from our calibrated economy are quantitatively consistent with empirical data for the USA since the Volcker disinflation.

Our results also indicate that the dynamic properties of debt under optimal discretionary policy are qualitatively different from those under commitment. Under commitment, debt is used by the government to smooth the distortionary effects of shocks over time and displays a near-random walk property, i.e., temporary innovations to the public budget are financed by permanent changes in taxes and debt (Schmitt-Grohe and Uribe, 2004). Under discretion, variations in the stock of debt in response to adverse shocks are costly, as they induce increased inflation expectations. These, in turn, lead to higher realized inflation rates in equilibrium and therefore higher price adjustment costs and higher nominal interest rate distortions. In light of these costs, the government optimally decides to keep debt in close vicinity of its steady state level. Importantly, this implies that unlike in the Ramsey framework temporary innovations in the public budget are *not* financed by permanent changes in taxes and debt, i.e., the near-random walk behavior of taxes and debt observed under commitment is overturned under discretion.

The remainder of this paper is organized as follows. Section 2 lays out the model economy and characterizes the private-sector equilibrium for given policies. Section 3 presents the optimal policy problem. Section 4 discusses the calibration and numerical solution of the model. Section 5 presents our main findings and confronts the model's predictions regarding inflation dynamics with the empirical evidence in the USA since the Volcker disinflation of the early 1980s. Section 6 discusses the related literature, and Section 7 concludes.

2. The model

Similar to Schmitt-Grohe and Uribe (2004), we consider an infinite-horizon production economy populated by a large number (a continuum of measure one) of identical private agents and a government. The private agents act both as consumers and as producers; they operate under imperfect competition and set nominal prices subject to price adjustment costs. A demand for money arises due to its role in facilitating consumption transactions. Time evolves in discrete periods $t \in \{0,1,2,\ldots\}$.

2.1. The private sector

The preferences of the representative private agent are defined over sequences of consumption, $(c_t)_{t=0}^{\infty}$, and labor effort, $(h_t)_{t=0}^{\infty}$, and are given by

$$E_0 \sum_{t=0}^{\infty} \beta^t [u(c_t) - \alpha h_t], \tag{1}$$

where E_0 denotes the mathematical expectation operator conditional on information available in period 0, $\beta \in (0,1)$ is the time-preference factor, and $\alpha > 0$ is the constant marginal utility of leisure. We assume that the function u satisfies standard monotonicity, curvature and smoothness properties.

The agent enters period t holding M_t units of money and B_t units of one-period risk-free bonds issued by the government. Each of these bonds pays one unit of money when it matures at the end of period t. The agent has two sources of income in period t. First, it supplies h_t units of labor to a perfectly competitive labor market, earning the nominal after-tax wage income $(1-\tau_t)W_t h_t$, where τ_t and W_t denote the tax rate and the nominal wage rate in period t. Second, it earns profits from producing a differentiated intermediate good, which forms an input for the production of the final consumption good. Each agent has access to a linear production technology $\tilde{y}_t = a_t \tilde{h}_t$, which takes labor $\tilde{h}_t$ as the only input and is subject to a stochastic productivity a_t. Notice that, while h_t is the agent's own labor supply, $\tilde{h}_t$ is the amount of labor it demands on the labor market to produce the intermediate good. Labor productivity a_t is the same for all agents and evolves according to

$$\log a_{t+1} = \rho_a \log a_t + \varepsilon^a_{t+1},$$

where ρ_a measures the autocorrelation of labor productivity and $\varepsilon^a_{t+1} \sim N(0,\sigma^2_{\varepsilon^a})$ denotes the period-$(t+1)$ innovation.

The final consumption good is a Dixit–Stiglitz aggregate of all intermediate goods. We denote by $\theta > 1$ the constant elasticity of substitution between any two intermediate inputs. When $\theta \to \infty$, the economy approaches the limiting case of perfectly competitive product markets. Denoting by $\tilde{P}_t$ the price of an intermediate good charged by its monopolistic producer and by P_t the aggregate price level, the demand for the intermediate good depends on aggregate output y_t and the