Economics Letters 172 (2018) 138–142

Contents lists available at ScienceDirect

Economics Letters

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

High trend inflation and passive monetary detours

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HIGHLIGHTS

- With high trend inflation the Long Run Taylor Principle breaks down.
- With high inflation the Taylor Principle breaks down, irrespective of fiscal policy.
- Monetary–fiscal coordination problems worsen with high inflation.
- A low inflation target enabled the Great Moderation, irrespective of fiscal policy.
- Raising the inflation target to exit the crisis impairs the return to an AM/PF mix.

ARTICLE INFO

Article history:
Received 26 February 2018
Received in revised form 21 August 2018
Accepted 24 August 2018
Available online xxxx

JEL classification:
E52
E63

Keywords:
Trend inflation
Monetary–fiscal policy interactions
Markov-switching
Determinacy

ABSTRACT

Does the long-run Taylor principle (Davig and Leeper, 2007) hold when both monetary and fiscal policies can switch and there is positive trend inflation? We find that with high trend inflation passive monetary detours are no longer possible, whatever fiscal policy is in place. This has important policy implications in terms of flexibility and monetary–fiscal authorities coordination.

1. Introduction

During the Great Recession, different proposals were put forth to stimulate the major economies stuck at the zero lower bound. The most common entailed an active role for fiscal policy and the suggestion, by some influential economists, to increase the inflation target.[1] We want to investigate the implications of these proposals to return to an era such as the Great Moderation characterised by a monetary led policy regime, where the central bank respects the Taylor principle while the government implements the fiscal adjustments necessary to stabilise debt.

Davig and Leeper (2007) introduce the so-called long-run Taylor principle: when fiscal policy is passive, a central bank can deviate to a passive monetary policy and still obtain determinacy if a sufficiently aggressive monetary policy is expected for the future.[2] We extend the work by Ascari et al. (2016), which studies determinacy under monetary–fiscal interactions in a Markov-switching model, to include trend inflation. That paper modifies Davig and Leeper (2007) placing fiscal policy in the foreground; here we want to check whether the long-run Taylor principle holds once trend inflation is introduced. The enlarged determinacy region found by Davig and Leeper with respect to the fixed-coefficient case could be to some extent offset by a higher level of trend inflation if, as Ascari and Ropele (2009) find, an increase in trend inflation makes the determinacy area shrink.

This paper contributes to the growing literature on monetary–fiscal policy interactions (see Davig and Leeper, 2006, 2011; Bianchi and Melosi, 2013; Bianchi and Ilut, 2017) adding determinacy

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1 Blanchard et al. (2010), Ball (2014).

2 We follow Leeper (1991)'s terminology. Active monetary (AM) policy arises when the central bank respects the Taylor principle. Otherwise it is passive (PM). Analogously, passive fiscal (PF) policy occurs when taxes respond sufficiently to debt to prevent its explosion; otherwise it is active (AF). In many fixed-coefficient models, a unique bounded equilibrium requires one active and one passive policy.

https://doi.org/10.1016/j.econlet.2018.08.030
0165-1765/

analysis and trend inflation. Foerster (2016), in a model with predetermined variables, considers inflation target switching that leaves determinacy unaffected thanks to full price indexation. In our model there is no indexation and even fiscal policy can switch. Florio and Gobbi (2015) use a similar model with fixed-coefficients under learning to study expectation anchoring.

We find that passive monetary detours are no longer possible when trend inflation is moderately high. And this is true both under a constantly passive fiscal regime or when fiscal policy fluctuates between active and passive. The impossibility of switching between active and passive monetary policy regimes has relevant policy implications in terms of flexibility and monetary–fiscal authorities coordination. Furthermore, we find that increasing the inflation target during the Great Recession could seriously impair the return to an expected AM/PF regime, once the passive monetary regime is abandoned.

2. Model and methodology

Our analysis builds on Ascari et al. (2016), studying the case of positive trend inflation. We employ their non-linear version of a basic New Keynesian model with fiscal policy (see also Ascari and Ropele, 2009; Bhattarai et al., 2014):

$$1 = \beta \mathbb{E}_t \left(\frac{Y_t - G}{Y_{t+1} - G} \frac{R_t}{\Pi_{t+1}} \right), \tag{1}$$

$$\phi_t \left(1 - \alpha \Pi_t^{\theta-1}\right)^{\frac{1}{1-\theta}} = \frac{\mu\theta\left(1-\alpha\right)^{\frac{1}{1-\theta}}}{\theta - 1} Y_t + \alpha\beta\mathbb{E}_t \left[\phi_{t+1} \Pi_{t+1}^{\theta} \left(1 - \alpha \Pi_{t+1}^{\theta-1}\right)^{\frac{1}{1-\theta}} \right], \tag{2}$$

$$\phi_t = \frac{Y_t}{Y_t - G} + \alpha\beta\mathbb{E}_t \left[\Pi_{t+1}^{\theta-1} \phi_{t+1} \right], \tag{3}$$

$$\frac{b_t}{R_t} = \frac{b_{t-1}}{\Pi_t} + G - \tau_t, \tag{4}$$

$$\tau_t = \tau \left(\frac{b_{t-1}}{b} \right)^{\gamma_{\tau,t}} e^{u_{\tau,t}}, \tag{5}$$

$$R_t = R \left(\frac{\Pi_t}{\Pi} \right)^{\gamma_{\pi,t}} e^{u_{m,t}}. \tag{6}$$

Eq. (1) is a standard Euler equation for consumption, where Y_t is output, R_t the nominal interest rate, Π_t the gross inflation rate and G (exogenous and constant) government spending. (2) and (3) describe the evolution of inflation. ϕ_t is an auxiliary variable that allows to write the model recursively. Eq. (4) is the government flow budget constraint, where $b_t = B_t/P_t$ is real government debt. Following Leeper (1991), (5) is a fiscal rule for lump-sum taxes τ that react to the deviation of lagged real debt from its steady-state level (b) according to the parameter $\gamma_{\tau,t}$. Eq. (6) is a simple Taylor rule whereby the central bank reacts to the deviations of current inflation from the target level (Π) according to the parameter $\gamma_{\pi,t}$. $u_{\tau,t}$ and $u_{m,t}$ are exogenous i.i.d. fiscal and monetary policy shocks. Steady state variables are without time index. β is the intertemporal discount factor; θ is the Dixit–Stiglitz elasticity of substitution between goods; μ is labor disutility and α is the Calvo probability not to re-optimise prices.

Our analysis' key parameters are $\gamma_{\pi,t}$ and $\gamma_{\tau,t}$, describing the time-varying stance of monetary and fiscal policy, respectively. We assume that they follow an underlying two-state Markov process and are equal to $(\gamma_{\pi,i}, \gamma_{\tau,i})$ when the economy is in regime i, for $i = 1, 2$. The transition probabilities of switching between regimes i and j is p_{ij}.

Table 1
Calibration.

Parameter	Value	Description
β	0.99	Discount factor
θ	12	Dixit–Stiglitz elasticity of substitution
α	0.75	Calvo parameter
μ	3.41	Labor disutility
$\bar{b}$	0.4	Debt-to-GDP ratio
$\bar{c}$	0.8	Consumption-to-GDP ratio
p_{11}	0.95	Probability to remain in regime 1
p_{22}	0.95	Probability to remain in regime 2

2.1. Solution method

As in Ascari et al. (2016), we adopt the perturbation method by Foerster et al. (2016) that retrieves all the existing minimal state variable solutions in models with Markov-switching parameters and predetermined variables. A solution is then deemed stable if it satisfies the conditions for *mean square stability* (Farmer et al., 2009).[3] Therefore, a given choice for the values of $\gamma_{\pi,i}$ and $\gamma_{\tau,i}$ in the two regimes can either lead to: (i) determinacy, when a unique stable solution exists; (ii) indeterminacy, when multiple stable solutions coexist; or (iii) explosiveness, when no stable solutions exist. We perform a grid search on the policy parameters to identify the regions corresponding to these three cases.

3. Determinacy analysis

We concentrate on the case where one of the two regimes is AM/PF. This is the benchmark mix in the New Keynesian literature and the policy regime that characterises the Great Moderation era. Fig. 1 reports the monetary frontiers – i.e., the combinations of monetary policy coefficients in the two regimes ($\gamma_{\pi,1}$ and $\gamma_{\pi,2}$) that deliver determinate equilibria – for different levels of trend inflation when fiscal policy stays passive in both regimes (with $\gamma_{\tau,1} = \gamma_{\tau,2} = 0.2$). Remaining parameters are calibrated according to Table 1.

When trend inflation is zero or 2% (top panel of Fig. 1), the well-known Davig and Leeper's (2007) long-run Taylor principle holds: a passive monetary policy, indeterminate in a static context, could return determinacy if, in the other regime, monetary policy is sufficiently aggressive. However, we get two important points as trend inflation goes to 4% or above. First, in line with Ascari and Ropele (2009), the Taylor principle breaks down because, to have determinacy, the central bank must become increasingly hawkish ($\gamma_\pi \gg 1$). Second, even the long-run Taylor principle breaks down. Therefore, with moderately high trend inflation (above 2%) and a constantly passive fiscal authority, there is no chance to reach determinacy with a detour into passive monetary policy. Furthermore, for the parameter space in the figure, there would never be determinacy for trend inflation larger than 6%.

The same comments apply when fiscal policy switches between active and passive, since monetary policy frontiers are qualitatively similar (see Fig. A.1 in the Appendix A).[4] So, with trend inflation at 4% or higher, one can never switch from PM/AF to AM/PF, both determinate under fixed-coefficients, and maintain determinacy.

[3] For additional details on the solution method and the stability criterion see the Online Appendix and Ascari et al. (2016).

[4] We use parameter values consistent with the estimates in Davig and Leeper (2007) and Bianchi and Melosi (2013).