Economics Letters 157 (2017) 103–106

Contents lists available at ScienceDirect

Economics Letters

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

Fiscal policy and liquidity traps with heterogeneous agents

Alessandro Piergallini *

Department of Economics and Finance, University of Rome Tor Vergata, Via Columbia 2, 00133 Rome, Italy

HIGHLIGHTS

- The dynamic effects of fiscal policies under limited asset market participation are explored.
- The zero lower bound on nominal interest rates generates steady-state multiplicity.
- Transfers to non-Ricardian consumers financed by debt-based taxes to Ricardian consumers escape liquidity traps.
- Fiscal policy does not need to be potentially unsustainable to avoid disinflation.
- Results radically differ from the standard single representative agent setup.

ARTICLE INFO

Article history:
Received 30 March 2017
Received in revised form 20 May 2017
Accepted 22 May 2017
Available online 24 May 2017

JEL classification:
E31
E62
E63

Keywords:
Fiscal policy
Multiple equilibria
Global dynamics
Liquidity traps
Non-Ricardian consumers

ABSTRACT

This paper explores global dynamics in a monetary model with limited asset market participation and the zero lower bound on nominal interest rates. It is shown that a rise in government transfers to 'non-Ricardian' consumers financed by debt-based taxes to 'Ricardian' consumers is capable of escaping disinflationary paths typically convergent to a liquidity trap. Fiscal policy does not need to be unsustainable at the low inflation steady state to avoid liquidity traps, as argued in the context of the standard single representative agent setup.

1. Introduction

We explore the dynamic effects of budgetary policies in a monetary model with limited asset market participation. Multiplicity of steady state equilibria, due to the zero lower bound on nominal interest rates, affects global dynamics. We demonstrate that a rise in government transfers to 'non-Ricardian' consumers, financed by debt-based taxes to 'Ricardian' consumers, is capable of escaping disinflationary paths typically convergent to a liquidity trap. This result radically differs from what is commonly argued in the context of the single representative agent paradigm, *i.e.*, that fiscal policy needs to be unsustainable at the low inflation steady state to rule out the liquidity trap equilibrium (Benhabib et al., 2002; Woodford, 2003). In a setting with heterogeneous consumers, by contrast, we show that *intertemporally balanced* fiscal expansions – globally satisfying the Ricardian agents' transversality condition – do suffice to avoid liquidity traps.

The present paper is connected to both empirical and theoretical literature. Empirically, the share of non-Ricardian agents – intended as non-optimizing individuals who employ the 'rule-of-thumb' of consuming their current disposable income, without smoothing consumption overtime by recourse to financial markets – range from 26% to 40% in industrialized countries (Campbell and Mankiw, 1989; Coenen and Straub, 2005; Forni et al., 2009; Di Bartolomeo et al., 2011; Albonico et al., 2014). A systematic incorporation of non-Ricardian households within macroeconomic models for policy evaluation is therefore often advocated, at least since the seminal paper by Mankiw (2000).

Indeed, research in macroeconomics increasingly employs frameworks whereby non-Ricardian agents coexist with Ricardian agents, in order to examine the effects and the design of both monetary policy (Galí et al., 2004; Di Bartolomeo and Rossi, 2007; Bilbiie, 2008; Colciago, 2011; Ascari et al., 2017) and fiscal policy

* Fax: +39 062020500.
E-mail address: alessandro.piergallini@uniroma2.it.
URL: http://www.economia.uniroma2.it/piergallini.

http://dx.doi.org/10.1016/j.econlet.2017.05.025
0165-1765/

(Galí et al., 2007), as well as the issue of monetary–fiscal interrelationships (Motta and Tirelli, 2012, 2015; Rossi, 2014).[1]

Consistently with the business cycle literature, nevertheless, the foregoing 'New Keynesian' studies by construction rely on local dynamics, hence abstracting from global nonlinearities.[2] Our central focus, on the other hand, is to depart from local analysis, and concentrate on global nonlinear dynamics and possible multiplicities of steady-state equilibria.

In the traditional infinite-horizon representative agent setup, Benhabib et al. (2002) show that, once global dynamics are taken into account, interest rate rules locally ensuring inflation control typically give rise to multiple self-fulfilling decelerating inflation paths converging to a liquidity trap equilibrium. They demonstrate that avoiding liquidity traps requires 'making the low-inflation steady state fiscally unsustainable', that is, violating the intertemporal budget constraint of the government and thus the transversality condition should the economy embark on decelerating inflation trajectories. Our main contribution, on the other hand, is to show that *sustainable* fiscal expansions, respecting the government's intertemporal budget constraint for *any* inflation path, may well escape liquidity traps when the economy is populated by both Ricardian and non-Ricardian individuals, as widely documented by the empirical evidence.

The paper proceeds as follows. Section 2 develops the model. Section 3 investigates the interaction between inflation and public deficits dynamics from a global perspective. Section 4 summarizes the conclusions.

2. The model

There is a continuum of infinitely lived households $[0, 1]$. A $1-\lambda$ share consists of 'Ricardian' households, who are forward looking and smooth consumption by having access to financial markets. The remaining λ share consists of 'non-Ricardian' households *à la* Mankiw (2000), who cannot accumulate any assets nor have any liabilities, hence fully consuming their current labor income net of taxes.

Subscript R denotes the Ricardian representative agent, whose lifetime utility function is given by

$$\int_0^\infty e^{-\rho t} \log \Omega(c_R(t), m_R(t))dt, \tag{1}$$

where $\rho > 0$ indicates the rate of time preference, $c_R(t)$ consumption, and $m_R(t)$ real money balances at instant of time t. Function $\Omega(\cdot, \cdot)$ is strictly increasing, strictly concave and linearly homogeneous. Consumption and real money balances are Edgeworth complements (Reis, 2007), $\Omega_{cm} > 0$, and the elasticity of substitution between the two is lower than unity (Cushing, 1999). The flow budget constraint is

$$\begin{aligned}\dot{a}_R(t) = {} & (i(t) - \pi(t))\, a_R(t) + y_R(t) \\ & - \tau_R(t) - c_R(t) - i(t)\, m_R(t),\end{aligned} \tag{2}$$

where $a_R(t)$ denotes real financial wealth, consisting of interest-bearing government bonds and money balances, $y_R(t)$ an endowment of perishable goods, $\tau_R(t)$ real lump-sum taxes net of public transfers, $i(t)$ the nominal interest rate on bonds, and $\pi(t) = \dot{P}(t)/P(t)$ the inflation rate. Ponzi's games are precluded, implying

$$\lim_{t\to\infty} e^{-\int_0^t [i(j)-\pi(j)]dj} a_R(t) \geq 0. \tag{3}$$

Letting $z_R(t)$ denote total consumption, defined as physical consumption plus the interest forgone on real money holdings,

$$z_R(t) = c_R(t) + i(t)\, m_R(t), \tag{4}$$

the optimizing problem can be solved using a two-stage procedure (Marini and van der Ploeg, 1988). In the first stage, consumers solve an intratemporal problem of choosing the efficient allocation between consumption and real money balances to maximize function $\Omega(\cdot, \cdot)$, for a given level of total consumption, $z_R(t)$. Optimality implies that the marginal rate of substitution between consumption and real balances equals the nominal interest rate, $\Omega_m(c_R(t), m_R(t))/\Omega_c(c_R(t), m_R(t)) = i(t)$. Because preferences are linearly homogeneous, this optimality condition is of form

$$c_R(t) = \Gamma(i(t)) m_R(t), \tag{5}$$

where $\Gamma'(\cdot) > 0$. In the second stage, Ricardian households solve an intertemporal problem of choosing the optimal time path of total consumption, $z_R(t)$, to maximize the lifetime utility function (1), given (5) and the constraints (2) and (3). Using (4) and (5) yields $\log \Omega(c_R(t), m_R(t)) = \log q(t) + \log z_R(t)$, where $q(t) = \Omega\left(\frac{\Gamma(i(t))}{\Gamma(i(t))+i(t)}, \frac{1}{\Gamma(i(t))+i(t)}\right)$. Consequently, at the optimum

$$\dot{z}_R(t) = (i(t) - \pi(t) - \rho) z_R(t), \tag{6}$$

$$\lim_{t\to\infty} e^{-\int_0^t [i(j)-\pi(j)]dj} a_R(t) = 0. \tag{7}$$

From (5),

$$z_R(t) = \Theta(i(t)) c_R(t), \tag{8}$$

where $\Theta(i(t)) = 1 + i(t)/\Gamma(i(t))$. Combining (6) and (8) yields the optimal time path of Ricardian households' consumption:

$$\dot{c}_R(t) = (i(t) - \pi(t) - \rho)\, c_R(t) - \frac{\Theta'(i(t))\dot{i}(t)}{\Theta(i(t))} c_R(t). \tag{9}$$

where $\Theta'(\cdot) > 0$.

Households in the $[0, \lambda]$ interval, denoted by subscript NR, neither save nor borrow, thereby behaving in a "hand-to-mouth" fashion, along the lines of Mankiw (2000)[3]:

$$c_{NR}(t) = y_{NR}(t) - \tau_{NR}(t). \tag{10}$$

As in Galí et al. (2007), taxes paid by non-Ricardian households may differ from those of Ricardian households.

The government finances deficits by printing money, M, and issuing bonds, B. Assuming that public consumption is zero, for simplicity, the government's budget constraint in real terms is thus

$$\begin{aligned}\dot{a}(t) = {} & (i(t) - \pi(t))\, a(t) - \lambda \tau_{NR}(t) \\ & - (1-\lambda)\, \tau_R(t) - i(t)\, m(t),\end{aligned} \tag{11}$$

where $a(t) = (B(t) + M(t))/P(t)$ and $m(t) = M(t)/P(t)$. For the argument developed in this paper, we shall assume that the fiscal policy regime is globally 'Ricardian', *i.e.*, guarantees that the present discounted value of government liabilities converges to zero for any path of the endogenous variables:

$$\lim_{t\to\infty} e^{-\int_0^t [i(j)-\pi(j)]dj} a(t) = 0. \tag{12}$$

[1] An alternative strand of literature departing from Ricardian equivalence studies monetary–fiscal policy interactions in the presence of distortionary taxation. See, for example, Correia et al. (2013), who examine the issue of optimal unconventional fiscal policy at the zero lower bound, following a temporary discount factor shock.

[2] See Cochrane (2011, 2016) for a critique to the standard local determinacy results emphasized in the New Keynesian literature under the conventional Taylor-rule-framework.

[3] Reasons behind such a behavior notably include lack of access to financial markets, binding borrowing constraints, myopia, extreme hyperbolic discounting, or limited information.