



## Distortionary taxation and interest rate policy

Takushi Kurozumi\*

Bank of Japan, 2-1-1 Nihonbashi, Hongoku-cho, Tokyo 103-8660, Japan

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### ABSTRACT

In a cashless economy with strictly inflation-forecast-targeting interest rate policy, recent research shows that in the presence of distorting taxes, a balanced-budget taxation policy is likely to induce indeterminacy of equilibrium but a debt-targeting one is not, suggesting that short-run budget deficits play a role in stabilizing the economy. The present paper finds that this result is overturned in a monetary economy with flexibly inflation-forecast-targeting interest rate policy. The balanced-budget policy is likely to ensure determinacy together with the flexibly inflation-forecast-targeting policy, but the debt-targeting one may lead to indeterminacy in the monetary economy.

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### 1. Introduction

In recent literature on monetary policy, the role of fiscal policy has been disregarded. This would be acceptable if a government uses lump-sum taxes and ‘passive’ fiscal policy in the sense of [Leeper \(1991\)](#).<sup>1</sup> Actual governments, however, adopt distortionary taxation, whereby fiscal policy affects private agents’ decisions. An equilibrium of the economy is therefore an outcome of interaction between a government’s fiscal policy and a central bank’s monetary policy. Thus, the question of whether and how the presence of distorting taxes alters stabilization properties of fiscal and monetary policies is of great interest and of great importance.

In the present paper we address this issue along the lines of recent studies such as [Benhabib and Eusepi \(2005\)](#) and [Linnemann \(2006\)](#). In these studies, a government levies distorting taxes on households’ non-interest income and adopts a balanced-budget or debt-targeting taxation policy.<sup>2</sup> The balanced-budget policy sets the tax rate so as to keep real government debt permanently fixed at some initial level. The debt-targeting policy sets it so that tax revenues are adjusted in response to outstanding government debt similarly to [Leeper’s \(1991\)](#) lump-sum taxation policy. In a cashless economy model, [Benhabib and Eusepi \(2005\)](#) find that if interest rate policy is strictly inflation-targeting (i.e. it responds only to current inflation), both the balanced-budget and debt-targeting taxation policies may induce indeterminacy of equilibrium. Yet they also show that the

\* Tel.: +81 3 3279 1111.

E-mail address: [takushi.kurozumi@boj.or.jp](mailto:takushi.kurozumi@boj.or.jp).

<sup>1</sup> [Leeper \(1991\)](#) examines the role of a debt-targeting lump-sum taxation policy in stabilizing a monetary economy with inflation-targeting interest rate policy. See also [Benhabib et al. \(2001\)](#).

<sup>2</sup> [Røisland \(2003\)](#) and [Edge and Rudd \(2007\)](#) examine how distorting taxes on interest income affect conditions for equilibrium determinacy.

flexibly inflation-targeting policy (i.e. interest rate policy responds to current output as well as current inflation) may be effective in preventing indeterminacy. Linnemann (2006) considers an actually cashless economy model with strictly inflation-forecast-targeting interest rate policy, which responds only to expected future inflation.<sup>3</sup> He shows that the balanced-budget taxation policy is likely to induce indeterminacy but the debt-targeting one is not, suggesting that short-run budget deficits play a role in stabilizing the economy.

This paper re-examines the result of Linnemann (2006) using a monetary economy model with flexibly inflation-forecast-targeting interest rate policy, which also responds to current output. This is because actual central banks are concerned not only about expected future inflation but also about real economic activities, as indicated by Clarida et al. (1998, 2000) and Orphanides (2004), and because interest-rate-elastic money demand affects equilibrium determinacy via the presence of seignorage revenues in the government budget constraint. We find that Linnemann's result is overturned in the monetary economy. That is, the balanced-budget policy is likely to ensure determinacy together with the flexibly inflation-forecast-targeting policy, but the debt-targeting one may lead to indeterminacy in the monetary economy.

In the case of the balanced-budget taxation policy, the strictly inflation-forecast-targeting interest rate policy is likely to induce indeterminacy of equilibrium, as in line with Linnemann (2006). In this taxation case the interest rate policy is labeled as active or passive using the condition called the long-run version of the Taylor principle: in the long run the nominal interest rate should be raised by more than the increase in inflation.<sup>4</sup> When the interest rate policy fails to meet that version of the Taylor principle, it is passive and generates indeterminacy. This is because in response to a sunspot rise in inflation expectations such a policy lowers the real interest rate and thus those expectations become self-fulfilling. Also, the active interest rate policy, which satisfies the long-run version of the Taylor principle, causes indeterminacy due to the following public finance channel of monetary policy. For a sunspot increase in inflation expectations, the active policy raises the real interest rate, which increases the government's future real interest payments on its debt and hence the expected future tax rate. This in turn raises expected future real marginal cost and hence expected future inflation. Therefore, the sunspot inflationary expectations become self-fulfilling and thereby yield indeterminate equilibrium. However, indeterminacy can be prevented when the interest rate policy is active and flexibly inflation-forecast-targeting. This is because a rise in the real interest rate stemming from a sunspot increase in inflation expectations dampens output, and at the same time, such a rise is subdued by the policy adjustment for the dampened output. This prevents the sunspot inflationary expectations from becoming self-fulfilling and from generating indeterminacy.

When taxation policy is debt-targeting, it is a distortory tax version of Leeper's (1991) lump-sum taxation policy. We thus label fiscal and monetary policies as active or passive similarly to Leeper. Monetary policy is classified in the way consistent with the one above. That is, the interest rate policy is active if the long-run version of the Taylor principle under the balanced-budget taxation policy is satisfied; otherwise it is passive.<sup>5</sup> Fiscal policy is then classified as follows. When the interest rate policy is active, the debt-targeting taxation policy is labeled as passive if its associated long-run version of the Taylor principle is met; otherwise, it is labeled as active. This classification is reversed when the interest rate policy is passive. As a consequence, similarly to Leeper (1991) and Linnemann (2006), the active fiscal policy ensures determinacy together with the passive monetary policy and yields no non-explosive equilibrium together with the active monetary policy. Also, both the passive fiscal and monetary policies induce indeterminacy.<sup>6</sup> The remaining combination of the passive fiscal policy and the active monetary policy, in contrast to Leeper and Linnemann, is likely to generate indeterminacy if the interest rate policy is strictly inflation-forecast-targeting. This indeterminacy is caused by the following public finance channel of monetary policy, which is absent in the cashless economy model of Linnemann. For a sunspot increase in inflation expectations, the active monetary policy raises the nominal interest rate and causes private agents to substitute base money for government bonds. On the government side, this increases its debt and hence the expected future tax rate under the debt-targeting taxation policy. Such a tax rate increase raises expected future real marginal cost and hence expected future inflation, so that the sunspot inflationary expectations become self-fulfilling and thereby induce indeterminacy. The active flexibly inflation-forecast-targeting interest rate policy mitigates the possibility of indeterminacy, but cannot prevent it unless the policy response to output is unrealistically high (e.g. more than six times as high as the estimate of Taylor (1993)), which is in stark contrast to the case of the balanced-budget taxation policy. This is because it is hard to subdue a nominal interest rate rise stemming from sunspot inflationary expectations substantially unless the monetary policy response to output is unrealistically high.

The remainder of the paper proceeds as follows. The next section describes a monetary economy model with distorting taxes. Section 3 examines stabilization properties of fiscal and monetary policies in the monetary economy. Section 4 considers an associated cashless economy model and argues that the stabilization properties differ between the monetary and cashless economies. Finally, Section 5 concludes.

<sup>3</sup> Linnemann (2006) uses a separable utility function between real money balances and other arguments and eliminates base money from the government budget constraint by assuming that seignorage revenues are rebated to households as a lump-sum transfer. His model is thus equivalent to an associated cashless economy model.

<sup>4</sup> Note that this long-run version is consistent with the original Taylor principle when the interest rate policy is strictly inflation-forecast-targeting.

<sup>5</sup> When the degree of the debt-targeting taxation policy response to outstanding government debt is infinite, which implies that real government debt is permanently fixed at an initial level, the long-run version of the Taylor principle coincides under the balanced-budget and debt-targeting taxation policies. For any degree of the debt-targeting taxation policy response, that version of the Taylor principle still works to classify the interest rate policy.

<sup>6</sup> The classification of fiscal policy implies that the non-explosive equilibrium is indeterminate or does not exist unless the long-run version of the Taylor principle under the debt-targeting taxation policy is satisfied.

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