EK-134ix.

Does Openness Amplify Money-Financed Fiscal Stimulus? A Fiscal Theory Perspective*

Eiji Okano†
Nagoya City University

Chikafumi Nakamura‡
Chuo University

Draft: November 2025
(First draft: January 2024).

Abstract

Does economic openness enhance or diminish the effectiveness of money-financed (*MF*) fiscal stimulus? This study re-examines this question in a small open economy framework, emphasizing the fiscal regime governing government debt valuation. While Okano and Eguchi (2024), building on Gali (2020), argue that MF fiscal expansions become more effective as openness increases, we show that this conclusion is not robust when the fiscal theory of the price level (FTPL) is operative. Under the FTPL, the relationship between openness and the effectiveness of *MF* fiscal stimulus becomes fiscal-regime contingent. Under normal conditions, greater openness weakens the stimulative effects of *MF* fiscal policy, reversing the positive openness–multiplier relationship documented in the existing literature. In contrast, under strong deflationary pressure such as at the zero lower bound, although through a distinct transmission mechanism, *MF* fiscal stimulus is more effective in open economies.

However, the broader implications of our analysis are cautionary. Policy conclusions drawn under a Ricardian framework may not generalize to environments in which fiscal–monetary interactions are central to price-level determination.

Keywords: Fiscal Stimulus; Money Financing; Small Open Economy; Zero Lower Bound
JEL Classification: E31, E32, E52, E62, E63, F41

*We thank Olga Bespalova, Masataka Eguchi, Kazuki Hiraga, Daisuke Ida, Jacek Suda, Akira Yakita, seminar participants at Nagoya City University and participants at the 8th FMND, the JAAE Spring Meeting 2024, the 30th CEF and 9th SEM for their helpful comments. All errors are our own. This study was financially supported by the Japan Society for the Promotion of Science KAKENHI, Grant #19K01722.

†Graduate School of Economics, Nagoya City University, 1 Aza, Yamanobata, Mizuhocho, Mizuho-ku, Nagoya-shi Aichi, 467-8501, Japan. Tel.: +81-52-872-5721; Fax: +81-52-872-1531; E-mail: eiji_okano@econ.nagoya-cu.ac.jp

‡Faculty of Policy Studies, Chuo University, Japan. E-mail: nakamura.99r@g.chuo-u.ac.jp

1 Introduction

Does economic openness enhance or diminish the effectiveness of money-financed (*MF*) fiscal stimulus? This question is of first-order policy relevance for small open economies, particularly when conventional monetary policy is constrained by the zero lower bound (ZLB). Research increasingly indicates that *MF* fiscal expansions are especially powerful in open economies, as flexible import prices increase consumer price inflation responsiveness. Notably, Okano and Eguchi[14], extending Gali[8]'s closed-economy analysis to a small open economy setting, show that the output and inflation effects of MF fiscal stimulus increase with trade openness, both under normal conditions and at the ZLB.

This study re-examines this conclusion by highlighting a key implicit assumption in existing literature: the fiscal regime governing the government's intertemporal budget constraint. Standard analyses of the *MF* fiscal policy typically assume a Ricardian fiscal regime, where government debt is ultimately stabilized through future fiscal adjustments. In this environment, money is created primarily through seigniorage, directly boosting inflation and lowering real interest rates. We show that once this assumption is relaxed and the fiscal theory of the price level (FTPL) is operative, the open-economy effects of *MF* fiscal stimulus change fundamentally.

Our central contribution is to demonstrate that the relationship between openness and the effectiveness of *MF* fiscal stimulus is fiscal-regime contingent rather than structural. Under the FTPL, although it is preserved under strong deflationary pressure such as at the ZLB, the positive association between openness and fiscal multipliers documented in literature reverses under normal conditions. This result implies that the conventional view that *MF* fiscal policy is particularly effective in open economies critically depends on how government liabilities are valued and stabilized.

Why does the fiscal framework matter for the open-economy transmission of *MF* stimulus? The key mechanism lies in the interaction between money creation and the government's debt valuation equation under the FTPL. In models that abstract from the FTPL, money injections raise inflation directly, an effect amplified in open economies where consumer price index (CPI) inflation is less sticky owing to flexible import prices. Under the FTPL, however, money creation plays a dual role. An increase in real money balances renews consolidated government liabilities, reducing the need to "inflate away" outstanding debt. This dampening effect on inflation is stronger in open economies, where domestic inflation accounts for a smaller share of CPI inflation. Consequently, under normal conditions, greater openness weakens–rather than strengthens–the stimulative effect

of *MF* fiscal policy.

The dynamic shifts significantly when a large adverse demand shock pushes the economy to the ZLB. At the ZLB, CPI inflation declines substantially, with more significant declines in open economies because of flexible import prices. Under the FTPL, such deflationary pressure necessitates sizable money injections to satisfy the government's debt valuation equation. Consequently, money growth rises more in open economies, accelerating CPI inflation recovery despite the nominal interest rate constraint. Faster inflation recovery lowers the real consumption interest rate, yielding a stronger cumulative output response. Therefore, at the ZLB, although operating through a distinct transmission mechanism, *MF* fiscal stimulus is more effective in open economies, consistent with Okano and Eguchi[14].

Our analysis also yields a sharp limiting result. In a fully open economy, where domestic prices receive zero weight in the CPI, *MF* fiscal stimulus under the FTPL is equivalent to debt-financed (DF) fiscal policy under CPI inflation targeting. In this case, the consolidated government has no incentive to adjust real money balances in response to fiscal shocks, rendering *MF* stimulus ineffective as a distinct policy tool. This equivalence result underscores the central role of the price index relevant for policy in shaping monetary–fiscal interactions under the FTPL.

We do not argue that the FTPL universally characterizes real-world fiscal–monetary arrangements; rather, our analysis is explicitly conditional on the fiscal regime governing government debt valuation. We adopted the FTPL to assess whether policy conclusions from a Ricardian framework remain robust when this assumption is relaxed. In this sense, the FTPL serves as a theoretically coherent benchmark for exploring regime-dependent policy outcomes, rather than a maintained hypothesis about actual institutions.

This study contributes to multiple strands of literature. First, it re-examines the analysis of the *MF* fiscal stimulus initiated by Gali[8] and extended to open economies by Okano and Eguchi[14], showing that the openness–multiplier relationship is not robust to the fiscal regime. Second, it contributes to emerging literature on the FTPL in open economies, following recent research by Benigno[2], by clarifying how openness reshapes the transmission of domestic fiscal policy rather than international monetary arrangements. Third, it adds to literature on state-dependent fiscal policy by demonstrating that identical *MF* interventions can have qualitatively different effects, depending on whether the economy operates under normal conditions or binding monetary constraints.

This paper proceeds as follows. Section 2 reviews related literature. Section 3 presents the

model and derives the FTPL in a small open economy. Section 4 describes steady-state and equilibrium dynamics. Section 5 analyzes the effects of fiscal stimulus under normal conditions and explores how openness shapes fiscal multipliers. Section 6 examines the effectiveness of *MF* fiscal policy at the ZLB. Section 7, the conclusion, discusses policy implications.

2 Related literature

This study connects three strands of literature including the FTPL, *MF* fiscal stimulus, and monetary–fiscal policy in open economies.

The fiscal theory of the price level. The FTPL, developed by Leeper[12], Sims[16], and Woodford[17], posits that the price level adjusts so that the real value of nominal government liabilities equals the expected present value of fiscal surpluses. Unlike the conventional view, where fiscal policy passively adjusts to stabilize debt, the FTPL assigns fiscal variables an active role in price determination. Christiano and Fitzgerald[4] reviewed the theory, highlighting its implications for the feasibility of price stability. Cochrane[5] extended the theory to incorporate long-term debt, and Cochrane[7] offers a comprehensive treatment of its macroeconomic implications. Our analysis builds on Cochrane[6], who showed how money, as a non-interest-bearing government liability, enters the government's debt valuation equation. This formulation is central to our mechanism, where money injections serve as a renewal of consolidated government debt rather than merely as seigniorage.

Money-financed fiscal stimulus. The renewed interest in *MF* fiscal policy reflects concerns about the effectiveness of conventional stabilization tools at the ZLB. Auerbach and Obstfeld[1] examined open market operations in a liquidity trap, and Buiter[3] analyzed helicopter money, highlighting the irredeemability of money as the source of its expansionary effect. Gali[8] systematically compares *MF* and DF fiscal stimulus in a New Keynesian framework, showing that money financing generates larger output by avoiding the contractionary implications of future tax increases. Our analysis departs from this literature by demonstrating that the effectiveness of *MF* stimulus critically depends on the underlying fiscal regime.

Open-economy dimensions. The open-economy transmission of fiscal policy involves additional channels through exchange rates and trade terms. Gali and Monacelli[10, 11] developed the canonical New Keynesian small open economy framework adopted in this study. Okano and Eguchi[14] extended Gali[8]'s analysis to this setting, showing that *MF* stimulus becomes more

effective as openness increases. We demonstrate that although it survives at the ZLB through a distinct mechanism, this result is overturned under the FTPL under normal conditions. Regarding the fiscal theory in open economies, Benigno[2] examined international dimensions of the FTPL, emphasizing global monetary stability. In contrast, we examine how openness shapes the domestic transmission of fiscal policy under the FTPL, rather than international monetary arrangements.

3 The Model

The model comprised policy and non-policy blocks. The FTPL equation was adopted for the policy block. The non-policy block is almost similar to that in Okano and Eguchi[14], whose model was developed following Gali and Monacelli[11]. We assume a representative household, sticky prices for domestic goods (i.e., Calvo pricing is applied for domestic goods), and flexible wages. A representative household lives in an infinitesimally small open economy with a complete international financial market. Here, the law of one price (LOOP) is applicable, and exports are elastic to changes in terms of trade (TOT), as in Gali and Monacelli[11].

In the policy block, the consolidated government (comprising coordinated fiscal and monetary authorities) finances expenditures by issuing a riskless nominal one-period bond with a nominal interest rate and (non-interest-bearing) money. As in Okano and Eguchi[14] and Gali[8], taxation is lump-sum. The key distinction from Okano and Eguchi[14] is that the government budget constraint is iterated and an appropriate transversality condition (TVC) is imposed, similar to Cochrane[6].

3.1 The Fiscal and Monetary Policy Framework

3.1.1 Government: Budget Constraints and Financing Regimes

We assume that the government (comprising coordinated fiscal and monetary authorities) finances its expenditures through lump-sum taxes and issues a riskless nominal one-period bond with a nominal interest rate and (non-interest-bearing) money. Therefore, the consolidated budget constraint is

$$P_{H,t}G_t + B_{t-1}\left(1 + i_{t-1}\right) = P_t TR_t + B_t + \Delta M_t, \tag{1}$$

where $P_{H,t}$ denotes the domestic price index, $P_t \equiv P_{H,t}^{1-\nu} P_{F,t}^{\nu}$ denotes the CPI, $P_{F,t}$ denotes the import goods price in units of domestic currency, $\nu \in [0,1]$ denotes the openness of the small open economy, B_t denotes the nominal riskless one-period domestic government bond in units of domestic currency, i_t denotes the net nominal interest rate, TR_t denotes the lump-sum tax revenue, M_t denotes the (non-interest bearing) money, Δ is the difference operator, and G_t denotes the (real) government expenditure index. $P_{H,t}$ and $P_{F,t}$ are defined in Section 3.2.1.

Dividing both sides of Eq. (1) using the CPI yields

$$\mathcal{S}_t^{-\nu} G_t + \mathcal{B}_{t-1}\mathcal{R}_{t-1} = TR_t + \mathcal{B}_t + \frac{\Delta M_t}{P_t}, \tag{2}$$

where $\mathcal{S}_t \equiv \frac{P_{F,t}}{P_{H,t}}$ denotes the TOT, $\mathcal{B}_t \equiv \frac{B_t}{P_t}$ denotes real domestic government debt outstanding, and $\mathcal{R}_t \equiv (1+i_t)\,\Pi_{t+1}^{-1}$ denotes the (ex-post) gross real interest rate. The following analysis focuses on the equilibrium near a steady state with zero inflation, no growth trend, and no government expenditure, taxes, or debt. The constancy of real balances requires $\Delta M = 0$, and hence, zero seigniorage in the steady state. Note that the variables without time scripts are the steady-state values.

Multiplying both sides of Eq.(2) by $1+i_t$, iterating forward j times, plugging Euler equation $U_{c,t}Z_t = \beta\mathcal{R}_t U_{c,t+1}Z_{t+1}$, taking the limit for $j \to \infty$, and imposing an appropriate TVC $\lim_{j\to\infty}\beta^{t+j+1}\mathcal{R}_{t+j}\left(\mathcal{B}_{t+j} + L_{t+j}\right) = 0$, one can write

$$\begin{aligned} U_{c,t}Z_t\mathcal{R}_{t-1}\left(\mathcal{B}_{t-1}+L_{t-1}\right) &= \left\{\sum_{h=0}^{\infty}\beta^h U_{c,t+h}Z_{t+h}SP_{t+h}\right. \\ &\quad \left. + \sum_{h=0}^{\infty}\beta^{h-1}U_{c,t+h-1}Z_{t+h-1}\left(\frac{i_{t+h-1}}{1+i_{t+h-1}}\right)L_{t+h-1}\right\}\Pi_t, \end{aligned} \tag{3}$$

where $U_{c,t}$ denotes the marginal utility of consumption, Z_t denotes the exogenous preference shifter, $L_t \equiv \frac{M_t}{P_t}$ denotes the real money balance, $\beta \equiv (1+\rho)^{-1}$ denotes the subjective discount factor, ρ denotes the time preference which is identical with the steady state value of the net nominal interest rate, and $SP_t \equiv TR_t - \mathcal{S}_t^{-\nu}G_t$ denotes the (real) fiscal surplus. $\left(\frac{i_t}{1+i_t}\right)L_t$ is the opportunity cost of holding the real money balance deprived from households so that Eq.(3) shows that the consolidated government liability in terms of the marginal utility of consumption equals the sum of the net present value of the sum of the fiscal surplus in terms of the marginal utility of consumption, and the net present value of the sum of the opportunity cost of holding the real money balance.

Eq.(3) can be rewritten as

$$\begin{aligned}\frac{U_{c,t}Z_t\left(1+i_{t-1}\right)\left(B_{t-1}+M_{t-1}\right)}{P_t} &= \sum_{h=0}^{\infty}\beta^h U_{c,t+h}Z_{t+h}SP_{t+h} \\ &\quad+\sum_{h=0}^{\infty}\beta^{h-1}U_{c,t+h-1}Z_{t+h-1}\left(\frac{i_{t+h-1}}{1+i_{t+h-1}}\right)L_{t+h-1}. \quad (4)\end{aligned}$$

According to Cochrane[6], the FTPL recognizes that nominal debt, including the monetary base, is a residual claim to government primary surpluses. If the surplus is insufficient, the government must default or inflate its debt. Therefore, we can determine the price level using the valuation equation for government debt as follows:

$$\frac{\text{Nominal Government Debt}}{\text{Price Level}} = \text{Expected Present Value of Primary Surpluses.} \quad (5)$$

Eq.(4) is analogous to Eq.(5) and Eq.(3) successfully characterizes Cochrane[6] FTPL.

Eq.(3) can be rewritten as

$$1=\frac{\sum_{h=0}^{\infty}\beta^h U_{c,t+h}Z_{t+h}SP_{t+h}+\sum_{h=0}^{\infty}\beta^{h-1}U_{c,t+h-1}Z_{t+h-1}\left(\frac{i_{t+h-1}}{1+i_{t+h-1}}\right)L_{t+h-1}}{U_{c,t}Z_t\left(1+i_{t-1}\right)\left(L_{t-1}+\mathcal{B}_{t-1}\right)}\Pi_t,$$

which implies that fiscal stimulus, such as an increase in government expenditure, which applies pressure to decrease fiscal surplus SP_t can increase (gross) CPI inflation Π_t, premising that changes in the marginal utility of consumption $U_{c,t}$ and exogenous preference shock Z_t are negligible. More importantly, the previous expression implies that the effects of the MF scheme on increasing inflation are limited. Whereas an increase in money growth applies pressure to increase inflation, it increases the expected present value of primary surplus by increasing the opportunity cost of holding real money balance deprived from households $\left(\frac{i_t}{1+i_t}\right)L_t$ and applies pressure to decrease inflation. The pressure to increase inflation is canceled by the pressure to decrease it. Therefore, the effects of *MF* fiscal stimulus weaken.

Eq.(3) can be rewritten as the following second-order difference equation:

$$\begin{aligned}U_{c,t}Z_tSP_t+\beta^{-1}U_{c,t-1}Z_{t-1}\frac{i_{t-1}}{1+i_{t-1}}L_{t-1} &= U_{c,t}Z_t\left(1+i_{t-1}\right)\left(\mathcal{B}_{t-1}+L_{t-1}\right)\Pi_t^{-1} \\ &\quad-\beta U_{c,t+1}Z_{t+1}\left(1+i_t\right)\left(\mathcal{B}_t+L_t\right)\Pi_{t+1}^{-1}.\end{aligned}$$

In the previous expression, the LHS is the consolidated government's revenue in terms of the

marginal utility of consumption. The first term in the RHS is consolidated government's burden of redeeming its debt with real interest payment, and the second term is the renewal of consolidated government debt with real interest payments (or the issuance of new debt with real interest payments). The previous expression can be log-linearized as

$$\hat{i}_{t-1}+\frac{b\left(1-\beta\right)}{\chi\beta}\widehat{sp}_t=\frac{b+\chi}{\chi}\hat{i}_{t-1}+\frac{1}{\chi}\hat{b}_{t-1}+\frac{b\left(1-\beta\right)^2+\chi\beta^2}{\chi\beta}\hat{l}_{t-1}-\frac{\beta}{\chi}\hat{b}_t-\beta\hat{l}_t-\frac{b+\chi\beta}{\chi}\pi_t,$$

where we use households' intertemporal optimality condition, namely, the Euler equation (see Online Appendix A), to eliminate marginal rate for consumption before log-linearizing. Lower-case letters with " ˆ " denote percentage deviations of the corresponding upper-case letters from their steady state values, as shown in the Online Appendix C, unless otherwise noted. Exceptionally, $\hat{i}_t$ denotes the percentage deviation of the "gross" nominal interest rate $1+i_t$ from its steady state value. Variables without a time script are the steady state values of the corresponding variables with a time script. In the previous expression, the LHS is (logarithmic) revenue, comprising interest payment deprived from households and fiscal surplus (the principal to produce interest payment $\hat{l}_t$ is canceled on both sides). The first to third terms in the RHS are expenditures, comprising the burden to redeem government debt with interest payment and the real money balance. The fourth and fifth terms represent the renewal of government debt (or newly issued government debt) and real money balance (or newly issued real money balance). The sixth term represents the so-called inflation tax, which increases to reduce the burden of repaying the consolidated government's debt when the government's revenue or debt renewal is insufficient, and vice versa.

By substituting the logarithmic definition of the fiscal surplus $\widehat{sp}_t=\frac{\beta}{b(1-\beta)}\widehat{tr}_t-\frac{\beta}{1-\beta}\hat{g}_t$ into the LHS in the previous expression, we obtain

$$\widehat{tr}_t=b\hat{i}_{t-1}+\hat{b}_{t-1}+\frac{b\left(1-\beta\right)^2+\chi\beta^2}{\beta}\hat{l}_{t-1}-\beta\hat{b}_t-\beta\chi\hat{l}_t-\left(b+\chi\beta\right)\pi_t+\hat{g}_t, \tag{6}$$

where $\chi\equiv\frac{L}{Y}$ and $b\equiv\frac{\mathcal{B}}{Y}$ represent the steady state inverse velocity and target debt ratio, respectively. Here, the interest payment deprived from households is canceled on both sides and disappears from the LHS in Eq.(6). In other words, seigniorage is less than the burden of paying interest on government debt. Eq.(6) is a fiscal policy rule that complies with the FTPL regime and shows that the burden to redeem consolidated government's debt including interest payment and the real money balance and the government expenditure is not covered by lump-sum tax and newly issued debt including newly issued real money, the government "inflate away" as referred

by Cochrane[7]. Additionally, the fifth and sixth terms in the RHS imply that injecting money to boost CPI inflation is less effective under the FTPL. Increased money growth increases the real money balance, which helps alleviate the burden of redeeming the consolidated government debt. In such a case, "inflate away" is not necessary. Therefore, the pressure to increase CPI inflation from money injections weakens under the FTPL. Furthermore, *MF* fiscal stimulus under the FTPL is less effective.

As in Gali[8] and Okano and Eguchi[14], in the non-FTPL regime, we assume the following simple tax rule throughout the analysis:

$$\widehat{tr}_t = \psi_b \hat{b}_{t-1}. \tag{7}$$

Eq.(7) shows that tax variations depend on $\psi_b \hat{b}_{t-1}$, which is endogenous and varies in response to deviations in the debt ratio from its long-run target, where ψ_b is a tax adjustment parameter. Note that $\psi_b > \rho$ guarantees that $\lim_{k\to\infty} \mathrm{E}_t\left(b_{t+k}\right) = 0$; in other words, the debt ratio converges to its long-run target. Accordingly, the government's TVC $\lim_{k\to\infty} \Lambda_{t,t+k}\mathcal{B}_{t+k} = 0$ is satisfied for any price level path as long as the discount factor $\Lambda_{t,t+k}$ converges to zero as $k \to \infty$, which is the case in all the experiments considered below, where $\Lambda_{t,t+k} \equiv \prod_{j=0}^{k-1} \mathcal{R}_{t+j}^{-1}$ is the domestic discount factor. We assume that the previous property, referred to as the Ricardian (or passive) fiscal policy (e.g., Leeper[12]), as in the standard specifications of the New Keynesian model, must be integrated with an active monetary policy (implicitly assumed below) to guarantee a unique local equilibrium.

Log-linearizing Eq.(2), we obtain

$$\hat{b}_t = \hat{g}_t + (1+\rho)\,\hat{b}_{t-1} + (1+\rho)\,b\hat{i}_{t-1} - (1+\rho)\,b\pi_t - \widehat{tr}_t - \chi\Delta m_t, \tag{8}$$

where Δm_t denotes money growth.

3.1.2 Experiments

Below, we analyze two stylized fiscal interventions that take the form of an exogenous increase in government expenditure, using the basic New Keynesian model with a small open economy setting as a reference framework. The intervention is announced in period zero and implemented from that period onward, similar to Gali[8] and Okano and Eguchi[14]. For concreteness, we assume

that

$$\hat{g}_t = \delta^t > 0,$$

for $t = 0, 1, 2, ...,$ where $\delta \in [0, 1)$ measures the persistence of an exogenous fiscal stimulus. We normalized the size of the stimulus to correspond to 1% of the steady-state output during period zero.

We analyze the effects of fiscal intervention under the *MF*. We define this regime as one in which seigniorage is adjusted in every period to keep real debt $\mathcal{B}_t$ constant. By substituting $\hat{b}_t = 0$ into Eq.(8), we obtain

$$\Delta m_t = \frac{1}{\chi}\left[\hat{g}_t - \widehat{tr}_t + (1+\rho)\, b\left(\hat{i}_{t-1} - \pi_t\right)\right], \tag{9}$$

for $t = 0, 1, 2, ...$ The previous assumptions, combined with Eq. (8) imply that under the *MF* regime, the government does not need to adjust taxes because of an increase in government expenditure, either in the short or long run, relative to their initial level. A monetary policy must give up control of the nominal interest rate and adjust the money supply to meet the government's financing needs.

Under the (*DF*) scheme, the fiscal authority issues debt to finance the fiscal stimulus and eventually adjusts the tax path to attain the long-run debt target $\mathcal{B}$. We assume that the monetary authority pursues an independent price stability mandate. For concreteness, we assume that if feasible, it conducts a policy such that

$$\pi_{H,t} = 0, \tag{10}$$

$$\pi_t = 0, \tag{11}$$

for all t. Domestic inflation targeting (DIT) Eq. (10) or CPI inflation targeting (CIT) Eq. (11) is applicable to the *DF* scheme. The money supply, and therefore, seigniorage, then adjusts endogenously to bring about the interest rate required to stabilize prices, as well as the regime generally assumed in the New Keynesian literature on the effects of fiscal policy.

3.2 Non-policy Block

The non-policy block follows the standard New Keynesian small open economy framework of Gali and Monacelli[10, 11] and Okano and Eguchi[14]. The model features a representative household with CES preferences for domestic and foreign goods, where $\nu \in [0,1]$ measures the degree of openness. Households maximize lifetime utility subject to a budget constraint, yielding standard optimality conditions: the consumption Euler equation, labor supply condition, and money demand schedule.

Regarding production, domestic firms produce differentiated goods using labor with decreasing returns and set prices according to Calvo pricing. The LOOP holds for both imports and exports. Complete international financial markets imply an international risk-sharing condition linking domestic and foreign consumption through TOT. The market-clearing condition aggregates domestic consumption, exports, and government expenditure.

Online Appendix A presents the full specification of the non-policy block, including all structural equations and their derivations.

4 Steady State and Equilibrium Dynamics

4.1 Steady State

The following analysis considers equilibrium in the neighborhood of a steady state with zero inflation and zero government expenditure. Note that steady-state price markups must be at the desired level with zero inflation. By combining this result with the labor supply condition, money demand schedule, and market-clearing condition (see Online Appendix A for details), all evaluated at the steady state, one can derive the conditions, jointly determining the steady state output and real balances given by the system.

$$\begin{aligned}(1-\alpha)\,U_c\left(N^{1-\alpha}, L\right) &= \frac{\varepsilon}{\varepsilon-1} V_n N^{\alpha},\\ h\left(\frac{L}{N^{1-\alpha}}\right) &= \frac{\rho}{1+\rho},\\ \mathcal{S} &= 1,\end{aligned}$$

which are assumed to have unique solutions.[1] The last condition above implies that $\mathcal{Q} = 1$ which assures purchasing power parity (PPP) in the steady state. Therefore, an increase in CPI inflation

[1] Following Gali and Monacelli[9], we found that TOT is determined uniquely.

applies pressure to depreciate the nominal exchange rate through an increase in the CPI (level), and vice versa.

4.2 Equilibrium Dynamics

We approximate the equilibrium around the steady state at which inflation is zero (ignoring the ZLB constraint at this point). The log-linearized equilibrium conditions—including the international risk-sharing condition, market-clearing condition, consumption Euler equation, marginal utility of consumption, New Keynesian Phillips curve (NKPC), price markup gap, money demand schedule, and price/exchange rate definitions—follow the standard New Keynesian small open economy framework of Gali and Monacelli[10, 11] and Okano and Eguchi[14]. Online Appendix B presents the full set of equations, parameter definitions, and variable notations.

Here, we highlight the consolidated government budget constraint, which is central to our analysis of fiscal–monetary interactions

$$\hat{b}_t = (1+\rho)\,\hat{b}_{t-1} + (1+\rho)\,b\hat{i}_{t-1} - (1+\rho)\,b\pi_t + \hat{g}_t - \widehat{tr}_t - \chi\Delta m_t, \tag{12}$$

where $\chi \equiv \frac{L}{Y}$ is the inverse income velocity of money, $b \equiv \frac{B}{Y}$ denotes the steady-state share of government debt to output, and Δ is the difference operator.

Our log-linearized model inherits the features of the small open economy of Gali and Monacelli[10], whose model comprises not only the New Keynesian IS curve and NKPC, but also the international risk-sharing condition. Additionally, the market-clearing conditions and average markup include TOT. Both consumption and output are affected by changes in TOT. Therefore, in contrast to Gali[8], the real consumption interest rate and TOT are involved in the monetary–fiscal policy interactions. The presentation of the model and notation closely parallels those of Okano and Eguchi[14] and Gali[8].

4.3 Calibration

Our parameterization is identical to that in Okano and Eguchi[14] (Table 1).[2] Our implied assumptions of perfect substitution between domestic and imported goods and our benchmark parameterization of relative risk aversion to attain balanced trade are similar to Okano and Eguchi[14]; that is, $\widehat{nx}_t = 0$ for all t as long as the demand shock $\hat{\rho}_t$ does not affect the economy.

[2]For the relative risk aversion and the openness, Okano and Eguchi[14] follow Monacelli[13]. Additionally, they adopted Gali[8].

5 Effects of the Fiscal Stimulus under Normal Conditions

This section analyzes the effects of *MF* fiscal stimulus under normal conditions, when the nominal interest rate is unconstrained. The focus is on how trade openness reshapes fiscal transmission under the FTPL, highlighting the regime-dependent reversal emphasized in the Introduction. The key result is that, unlike in Ricardian environments, greater openness weakens the stimulative effects of *MF* fiscal policy under the FTPL. This reversal arises from the interaction between CPI composition and the government debt valuation equation. We compare the FTPL and non-FTPL regimes with benchmark openness $\nu = 0.4$. In Figs. 1, 4, and 6, the red line with circles, blue line with diamonds, and magenta line with pluses denote responses under the FTPL in a small open economy (SOE), the FTPL in a closed economy (CE), and the non-FTPL in a SOE, respectively.

5.1 *MF* Fiscal Stimulus

Fig. 1 shows the dynamic effects of an increase in government expenditure under *MF* fiscal stimulus under normal conditions. Under *MF* fiscal stimulus, output increases, and the increase in the non-FTPL is larger than that under the FTPL in a small open economy (Panel 1, Fig. 1). An increase in government expenditure applies pressure to increase domestic inflation, which functions as the so-called inflation tax. Given the inflation tax revenue, which mitigates the burden of redeeming consolidated government debt, the fiscal surplus with inflation tax increases (Panel 10, Fig. 1). Although government expenditure increases, the fiscal surplus with inflation tax is sufficient for monetary growth to decrease (Panel 6, Fig. 1).

In the non-FTPL, as shown by Okano and Eguchi[14], an increase in domestic inflation applies pressure to depreciate the nominal exchange rate because of PPP in the steady state (Panel 12, Fig. 1). This depreciation increases CPI inflation through import inflation (Panel 3, Fig. 1). In the non-FTPL, the fiscal policy rule under the *MF* scheme is

$$\widehat{tr}_t = 0, \tag{13}$$

which implies no additional tax revenue because $\hat{b}_t = 0$ for all t, and money growth increases to finance government expenditure. Therefore, the real consumption interest rate declines further, consumption increases, the nominal exchange rate depreciates, the TOT worsen, and output increases vigorously.

How does *MF* fiscal stimulus differ under the FTPL? First, we consider a closed economy

($\nu = 0$). In contrast to non-FTPL, the fiscal policy rule under *MF* is

$$\widehat{tr}_t = b\hat{i}_{t-1} + \frac{b\left(1-\beta\right)^2 + \chi\beta^2}{\beta}\hat{l}_{t-1} - \beta\chi\hat{l}_t - \left(b+\chi\beta\right)\pi_t + \hat{g}_t, \tag{14}$$

This implies that the lump-sum tax varies and that an increase in government expenditure can be financed by an increase in tax (Panel 9, Fig. 1). The relationship between the real money balance and CPI inflation is highlighted as follows: the lower the real money balance, the higher the CPI inflation. A decrease in the current real money balance implies that the consolidated government fails to issue new real money, and the burden of redeeming consolidated government debt increases. Then, "inflate away" is necessary—this is the FTPL. Although CPI inflation increases to mitigate this burden, the increase is insignificant for the real consumption interest rate to decline (Panel 2, Fig. 1). Therefore, the increase in output is not substantial (Panel 1, Fig. 1).

Under the FTPL, an increase in CPI inflation in a small open economy is less than that in a closed economy (Panel 3, Fig. 1). This contrasts with Okano and Eguchi[14], who show that CPI inflation is higher in a small open economy under *MF* fiscal stimulus. This is because of the fiscal policy rule Eq.(14). Ignoring the lump-sum tax and predetermined variables, Eq.(14) can be rewritten as

$$\begin{aligned}\hat{l}_t &= -\frac{b+\beta\chi}{\beta\chi}\left(1-\nu\right)\pi_{H,t} - \frac{b+\beta\chi}{\beta\chi}\nu\pi_{F,t}, \\ &= -\frac{b+\beta\chi}{\beta\chi}\left(1-\nu\right)\pi_{H,t} - \frac{b+\beta\chi}{\beta\chi}\nu\Delta e_t,\end{aligned} \tag{15}$$

where we use the log-linearized CPI definition $p_t = \left(1-\nu\right)p_{H,t} + \nu p_{F,t}$ and LOOP $p_{F,t} = e_t$. Eq.(15) implies that, as openness increases, changes in domestic inflation affect the real money balance less. The higher the CPI inflation, the lower the real money balance because higher CPI inflation mitigates the burden of redeeming consolidated government debt, and renewal of consolidated government debt is unnecessary. In a small open economy, the ratio of domestic inflation to CPI inflation is lower than that in a closed economy. Therefore, the pressure to decrease the real money balance is lower, and the decrease in the real money balance is mitigated (Panel 11, Fig. 1). Consequently, an increase in CPI inflation in a small open economy is less than that in a closed economy, which suppresses depreciation in the nominal exchange rate (Panel 12, Fig. 1). The TOT improve, but worsen in the non-FTPL (Panel 7, Fig. 1). Lastly, cumulative output in a small open economy is lower than that in a closed economy (Panel 1, Fig. 1).

Our findings are twofold. First, the FTPL weakens the overall effectiveness of *MF* fiscal stimulus by canceling the inflationary effects of money injection. Second, the FTPL amplifies the adverse effect that weakens *MF* fiscal stimulus in a small open economy.

5.2 *DF* Fiscal Stimulus

The *DF* fiscal stimulus is given by either Eq.(10) or (11), namely, DIT or CIT. The NKPC connects the price markup gap (comprising the marginal utility of consumption, output, and TOT) with domestic inflation. Therefore, differences in fiscal policy rules between the FTPL (Eq.(6)), and non-FTPL (Eq.(7)) do not change dynamics, except for the fiscal variables.[3] Irrespective of the fiscal regime, an increase in output is similar across economies under DIT because domestic prices are constant and TOT do not change.

Under CIT, an increase in output in a small open economy is greater than that in a closed economy. In a closed economy, CPI inflation is identical with domestic inflation; therefore, the nominal interest rate must be significantly raised to stabilize CPI inflation. In a small open economy, zero domestic inflation is unnecessary because CPI inflation is a weighted average of domestic and import inflation. A decrease in import inflation resulting from an increase in the nominal interest rate cancels the increase in domestic inflation; therefore, a harsh interest rate hike is unnecessary. Given the smaller increase in the nominal interest rate, consumption is higher, and therefore, output increase is larger in a small open economy.

5.3 Sensitivity Analysis

We examine the parameter that measures openness ν rather than price stickiness θ or shock persistence δ, as in Gali[8]. Following Gali[8] and Okano and Eguchi[14], we define the cumulative output multiplier as $(1-\delta)\sum_{t=0}^{\infty}\hat{y}_t$.

5.3.1 Fiscal Multipliers: FTPL vs. Non-FTPL

Figs. 2 and 3 depict the cumulative output multipliers as a function of openness ν. Fig. 2 compares multipliers under the FTPL and non-FTPL. As Okano and Eguchi[14] show, multipliers increase with openness under *MF* fiscal stimulus in the non-FTPL (Panel 2, Fig. 2). As openness increases, the share of import inflation (which has no stickiness) increases in CPI inflation. Therefore, the

[3] See Okano and Eguchi[14] for details.

higher the openness, the higher the sensitivity of CPI inflation to money growth, leading to larger output increases.

In contrast, under the FTPL, multipliers decrease as openness increases (Panel 1, Fig. 2). As shown in Eq.(15), as openness increases, changes in domestic inflation insignificantly affect the real money balance. As the decrease in real money balance is mitigated, the increase in CPI inflation is suppressed. Therefore, the higher the openness, the more the TOT improve and the output decreases.

Under *DF* fiscal stimulus, multipliers under the FTPL are identical to those in the non-FTPL, as the NKPC tightly links the price markup gap with domestic inflation, regardless of fiscal policy rules.

5.3.2 Fiscal Multipliers: *MF* vs. *DF*

Fig. 3 compares multipliers under *MF* and *DF* fiscal stimulus under the FTPL. Two limiting results emerge. First, at $\nu = 0$, DIT and CIT multipliers coincide because domestic inflation equals CPI inflation. Second, at $\nu = 1$, *MF* and *DF*CIT multipliers coincide. As openness increases, the ratio of domestic inflation to CPI inflation decreases; therefore, pressure to decrease the real money balance is mitigated. Accordingly, higher openness implies lower CPI inflation, which suppresses nominal exchange rate depreciation. Eq.(15) implies $\hat{l}_t = 0$ when openness equals one. Therefore, changing CPI inflation is unnecessary. In other words, *MF* fiscal stimulus becomes equivalent to *DF* fiscal stimulus with CIT when a small open economy is fully open.

5.4 *MF* Fiscal Stimulus with an Adverse Demand Shock

To understand the effectiveness of fiscal stimulus in a liquidity trap (Section 6), we examine *MF* fiscal stimulus combined with an adverse demand shock that pushes the nominal interest rate into negative territory. We ignore the ZLB constraint at this point. Fig. 4 shows responses to an increase in government expenditure under *MF* fiscal stimulus with an adverse demand shock $\hat{\rho}_t = -\gamma^t$ (persistence $\gamma = 0.5$, size 1%), combined with a government expenditure increase (persistence 0.5, size 1%).

Although there is an adverse demand shock, output increases in the non-FTPL (Panel 1, Fig. 4). However, output under the FTPL decreases regardless of openness (Panel 1, Fig. 4). An adverse demand shock applies pressure to decrease CPI inflation, causing a revenue shortfall (Panel 10, Fig.4). To finance this, money is injected and the real money balance increases (Panel

6, Fig. 4). Under the FTPL, an increase in the current real money balance reduces the burden of redeeming consolidated government debt and applies pressure to decrease CPI inflation. Therefore, the decrease in CPI inflation is larger under the FTPL (Panel 3, Fig. 4), resulting in smaller decrease in real consumption interest rate and remarkably less cumulative output than in non-FTPL (Panels 1 and 2, Fig. 4).

The most important feature in Fig. 4 is that the output decline in a small open economy is less than in a closed economy under the FTPL, opposite to the result in Fig. 1. There are two reasons. First, the real consumption interest rate is lower in a small, open economy (Panel 2, Fig. 4). An adverse demand shock decreases CPI inflation, and, because of the fiscal policy rule, Eq.(14), a decrease in CPI inflation requires an increase in the real money balance. In a small open economy, a more significant decrease in CPI inflation (due to flexible import prices) necessitates more vigorous money injection (Panel 6, Fig. 4), lowering the nominal interest rate more (Panel 5, Fig. 4).

Second, adverse demand shocks increase net exports. Combining equilibrium conditions (see Online Appendix B) yields $\widehat{nx}_t = -\nu\zeta_t$, implying that adverse demand shocks make the trade balance positive, with higher net exports in more open economies.

5.4.1 Sensitivity Analysis

Fig. 5 shows the relationship between fiscal multipliers and openness under *MF* fiscal stimulus with an adverse demand shock. Without an adverse demand shock, multipliers decrease as openness increases (red line with circles). However, with an adverse demand shock, multipliers increase slightly with openness (blue line with diamonds). At the benchmark openness ($\nu = 0.4$), the multiplier is –0.76, which is higher than that in a closed economy (–0.81).

An adverse demand shock applies pressure to decrease CPI inflation, which appreciates the nominal exchange rate. Because of the fiscal policy rule Eq.(14), an increase in the real money balance is necessary as CPI inflation decreases. In a small open economy, a more significant decrease in CPI inflation requires greater money injection, leading to larger decreases in nominal and real consumption interest rates. Combined with higher net exports, multipliers increase with openness when an adverse demand shock coincides with fiscal stimulus.

6 Effects of Fiscal Stimulus in a Liquidity Trap

This section examines the effects of *MF* fiscal stimulus at the ZLB, where nominal interest rates cannot be adjusted downward. While the fiscal regime remains unchanged, strong deflationary pressure fundamentally alters the role of money creation under the FTPL. Consequently, the regime-dependent reversal documented in normal times disappears; greater openness amplifies the effects of *MF* stimulus, although through a mechanism distinct from Ricardian channels. We compare *MF* and *DF* fiscal stimuli, similar to Gali[8] and Okano and Eguchi[14], assuming an adverse demand shock sufficiently large to prevent the central bank from fully stabilizing output and inflation.

Similar to Gali[8] and Okano and Eguchi[14], the ZLB constraint assumes the form $\hat{i}_t \geq \log\beta$,and the experiment assumes that $\hat{\rho}_t = -\gamma < \log\beta$ for $t = 0, 1, 2, \ldots, T$ and $\hat{\rho}_t = 0$ for $t = T+1, T+2, \ldots$. This describes a temporary adverse demand shock that takes the natural interest rate to negative territory up to period T. The shock disappears after period T. We assume $\gamma = -0.01$ and $T = 5$. The shock is assumed to be fully unanticipated; however, once realized, the trajectory of $\{\hat{\rho}_t\}$ and corresponding policy responses are known with certainty.

The ZLB constraint can be formally incorporated into the set of equilibrium conditions by substituting the money demand schedule under the following complementary slackness conditions:

$$\left(\hat{i}_t - \log\beta\right)\left(\hat{l}_t - \hat{c}_t + \eta\hat{i}_t\right) = 0,$$

for all t, where

$$\hat{l}_t \geq \hat{c}_t - \eta\hat{i}_t, \tag{16}$$

represents the demand for real money balance.

In addition to the previous changes, under *DF* fiscal stimulus and *no response* benchmark, Eqs. (10) and (11) must be replaced by

$$\left(\hat{i}_t - \log\beta\right)\pi_{H,t} = 0, \tag{17}$$

$$\left(\hat{i}_t - \log\beta\right)\pi_t = 0, \tag{18}$$

for all t, together with Eqs. (10) and (11), which represent DIT and CIT, respectively. This applies

to the period when the ZLB constraint on the nominal interest rate is not binding. By contrast, in the *MF* fiscal stimulus case, Eq. (9) determines the money supply for all t. If the nominal interest rate is positive, Eq. (16) holds with equality (but with inequality once the nominal interest rate reaches the ZLB and the real money balances overshoot their satiation levels). Therefore, given $\beta = 0.995$, the experiment corresponds to an unanticipated fall in the natural interest rate to –2% (in annual terms) for six quarters and a subsequent revision back to the initial value of 2% (in annual terms).

The scenario of an increase in government expenditure is a 1% increase in the steady state ratio to output in response to the adverse demand shock that lasts for the duration of the adverse shock ($\hat{g}_t = 0.01$, for $t = 0, 1, \dots, 5$) in *MF* and *DF* fiscal stimulus cases.

6.1 *No Response*

In the case of *no response* to the shock (i.e., $\hat{g}_t = 0$, for $t = 0, 1, 2, \dots$), Eqs. (10) and (17) in the DIT and Eqs. (11) and (18) in the CIT describe monetary policy. Responses under the FTPL are similar to those in the non-FTPL, except for the fiscal variables. In other words, responses are identical to those in Okano and Eguchi[14], even when the FTPL is introduced in the model. As mentioned in section 5.2, the difference in fiscal policy rules between Eqs.(6) and (7) does not change dynamics between the FTPL and the non-FTPL (except for fiscal variables).

First, we describe the response under *no response* with DIT. In a small open economy, an adverse demand shock decreases domestic inflation, which applies pressure to appreciate the nominal exchange rate, so that import inflation decreases. Because import inflation has no stickiness, CPI inflation decreases remarkably, causing severe revenue shortfall, financed by issuing bonds. Moreover, money growth decreases remarkably. Given the ZLB constraint, the nominal interest rate cannot be negative. However, CPI inflation recovers rapidly because of less stickiness in a small open economy. Moreover, the real consumption interest rate decreases. The nominal exchange rate appreciates, and the TOT improve. Eventually, cumulative output decreases (–12.58). Dynamics under the FTPL are similar to those in the non-FTPL, except for fiscal variables. It is noteworthy that net exports increase after an adverse shock, and output is bolstered.

In a closed economy under the FTPL, CPI inflation is identical to domestic inflation and the decrease in CPI inflation is mitigated. However, CPI inflation is stickier than that in a small open economy, and its recovery is slower. Coupled with the nominal interest rate that adheres to the ZLB, this slower recovery in CPI inflation makes the real consumption interest rate higher than in

a small open economy. Therefore, the decrease in cumulative output is larger (–17.66).

We further describe the responses under *no response* with CIT. In a small open economy, dynamics under the non-FTPL and the FTPL are identical, except for fiscal variables. Under *no response* with CIT, domestic inflation is not targeted and decreases more. Therefore, the decrease in CPI inflation is more significant and the improvement in TOT is more pronounced than under *no response* with DIT. Cumulative output reaches –31.18, irrespective of the non-FTPL or the FTPL. In a closed economy under the FTPL, the responses are similar to those under *no response* with DIT because CPI inflation is identical to domestic inflation. The cumulative output is –17.66 as mentioned.

6.2 *MF* Fiscal Stimulus

Fig. 6 shows the dynamic effects of an increase in government expenditure under *MF* fiscal stimulus in a liquidity trap. To clarify how introducing the FTPL changes the result, we first describe the dynamics of the non-FTPL in a small open economy, as shown in Okano and Eguchi[14]. An adverse demand shock decreases CPI inflation, causing a revenue shortfall (Panels 3 and 10, Fig. 6). In contrast to the *DF* scheme, this shortfall is financed by money injection, and the real consumption interest rate decreases because of CPI inflation, which has less stickiness, although the nominal interest rate sticks to the ZLB (Panels 2 and 6, Fig. 6). Subsequently, output recovers (Panel 1, Fig. 6). The cumulative output is –1.78.

We further describe the responses to *MF* fiscal stimulus under the FTPL. The cumulative output is –6.83 in a small open economy and –7.58 in a closed economy (Panel 1, Fig. 6). In the non-FTPL in a closed economy, the cumulative output is –2.69. Therefore, irrespective of openness, *MF* fiscal stimulus under the FTPL is less effective than in the non-FTPL in a liquidity trap. The reason for this is discussed in Section 5.1. An increase in the current real money balance applies pressure to decrease CPI inflation because it alleviates the burden of redeeming consolidated government debt, as shown in the fiscal policy rule Eq.(14). In fact, in a small open economy, although monetary growth and the real money balance under the FTPL are higher than those in the non-FTPL, the decrease in CPI inflation is more significant under the FTPL (Panels 3, 6, and 11, Fig. 6). As a result of this more significant decrease in CPI inflation, the decrease in the real consumption interest rate is smaller, and the improvement in TOT is larger under the FTPL (Panels 2 and 7, Fig. 6). Therefore, the effectiveness of *MF* fiscal stimulus under the FTPL is less than that in the non-FTPL.

We further examine the difference in the effectiveness between a closed economy and a small open economy under the FTPL. As previously mentioned, *MF* fiscal stimulus is more effective in a small open economy than in a closed economy. The causes are lower real consumption interest rates and higher net exports in a small open economy. The mechanisms are similar to those discussed in Section 5.4 for normal conditions with an adverse demand shock. However, the reason the real consumption interest rate is lower in a small open economy differs in a liquidity trap, where even with a large money injection to comply with fiscal policy rules, Eq.(14), the nominal interest rate cannot fall below zero because of the ZLB constraint (Panels 5 and 6, Fig. 6). Although this large money growth does not contribute to a further reduction in the nominal interest rate owing to the ZLB constraint, it boosts the CPI level. Coupled with less stickiness in CPI inflation in a small open economy, CPI inflation recovers faster than in a closed economy (Panel 3, Fig. 6). Therefore, the decrease in the real consumption interest rate is greater than in a closed economy (Panel 2, Fig. 6). Along with higher net exports, the cumulative output in a small open economy is larger than in a closed economy (Panel 1, Fig. 6). Even under the FTPL, *MF* fiscal stimulus is more effective in a small open economy than in a closed economy. This finding is consistent with Okano and Eguchi[14].

6.3 *DF* Fiscal Stimulus

Except for fiscal variables, the responses under the *DF* fiscal stimulus under the FTPL are identical to those in the non-FTPL, as shown by Okano and Eguchi[14]. Additionally, responses under the *DF* fiscal stimulus under the FTPL not substantially different from those under *no response* described in Section 6.1. However, owing to fiscal stimulus, cumulative output is improved under *DF* fiscal stimulus. The cumulative output under *DF* fiscal stimulus with DIT in a small open economy is –9.80, which is similar for both the FTPL and the non-FTPL (improvement is 2.78). In a closed economy, it is –10.10 (an improvement of 7.56). Under the *DF* fiscal stimulus with CIT in a small open economy, the cumulative output is –26.29, which is similar in both the FTPL and the non-FTPL (improvement is 4.89). In a closed economy, it is –10.10, which is similar to that under *DF* fiscal stimulus with DIT.

6.4 Comparing *MF* and *DF* Fiscal Stimulus in a Liquidity Trap

Fig. 7 compares the effectiveness of *MF* fiscal stimulus with *DF* fiscal stimulus in a liquidity trap in a small open economy. In Fig. 7, the red line with circles, the blue line with diamonds, and

the magenta line with pluses are the responses under *MF* fiscal stimulus, *DF* fiscal stimulus with DIT, and *DF* fiscal stimulus with CIT, respectively. Similar to Okano and Eguchi[14], even under the FTPL, *MF* fiscal stimulus is most effective in terms of recovering output, domestic inflation, and CPI inflation. Under normal conditions, without an adverse demand shock, an increase in government expenditure under *MF* fiscal stimulus in a small open economy is less effective than in a closed economy. However, it is more effective in a liquidity trap, as shown in Okano and Eguchi[14]. A large money injection occurs, which causes faster recovery in CPI inflation and bolsters output in a small open economy.

Therefore, the difference between normal times and the ZLB does not reflect a change in the fiscal regime, but a change in the dominant force governing inflation dynamics. Under normal conditions, CPI composition dampens the inflationary effects of money creation in open economies, whereas at the ZLB, deflationary pressure dominates and amplifies the role of *MF* fiscal stimulus.

7 Conclusion

Does economic openness enhance or diminish the effectiveness of *MF* fiscal stimulus? This study shows that the answer critically depends on the fiscal regime governing government debt valuation. While existing studies argue that *MF* fiscal expansions become more effective as openness increases, we demonstrate that this conclusion is not structural, but fiscal-regime contingent.

When the FTPL is operative, greater openness weakens the effectiveness of *MF* fiscal policy under normal conditions, reversing the positive openness–multiplier relationship emphasized in literature. By contrast, under strong deflationary pressure–such as at the ZLB–openness amplifies the effects of *MF* stimulus, although through a mechanism distinct from standard seigniorage-based channels. These contrasting outcomes arise from the interaction between real money balances, government debt valuation, and the composition of consumer prices in open economies.

However, the broader implications of our analysis are cautionary. Policy conclusions derived under a Ricardian fiscal framework do not necessarily generalize to environments in which fiscal–monetary interactions are central to price-level determination. In open economies, the effectiveness of *MF* fiscal policy cannot be assessed independently of the fiscal regime that governs the stabilization of government liabilities.

References

[1] Auerbach, Alan J. and Maurice Obstfeld (2005), "The Case for Open-market Purchases in a Liquidity Trap," *American Economic Review*, 95, 110–137.

[2] Benigno, Pierpaolo (2024), "The International Supply of Rescue Currency," *IMF Economic Review*, Forthcoming (Available On-line).

[3] Buiter, Willem H. (2014), "The Simple Analytics of Helicopter Money: Why It Works–Always," *Economics, The Open-access, Open-assessment E-Journal*, 8, 1–51.

[4] Christiano, Lawrence and Terry Fitzgerald (2000), "Understanding the Fiscal Theory of the Price Level," *Economic Review*, Q II, 2–38.

[5] Cochrane, John H. (2001), "Long Term Debt and Optimal Policy in the Fiscal Theory of the Price Level," *Econometrica*, 69, 69–116.

[6] Cochrane, John H. (2005), "Money as stock," *Journal of Monetary Economics*, 52, 501–528.

[7] Cochrane, John H. (2023), "The Fiscal Theory of the Price Level," *Princeton University Press.*

[8] Gali, Jordi (2020), "The Effects of a Money-financed Fiscal Stimulus," *Journal of Monetary Economics*, 115, 1–19.

[9] Gali, Jordi and Tommaso Monacelli (2002), "Monetary Policy and Exchange Rate Volatility in a Small Open Economy," *NBER Working Paper*, No. 8905.

[10] Gali, Jordi and Tommaso Monacelli (2005), "Monetary Policy and Exchange Rate Volatility in a Small Open Economy," *Review of Economic Studies*, 72, 707–734.

[11] Gali, Jordi and Tommaso Monacelli (2016), "Understanding the Gains from Wage Flexibility: The Exchange Rate Connection," *American Economic Review*, 106, 3829–3868.

[12] Leeper, Eric M. (1991), "Equilibria under 'Active' and 'Passive' Monetary and Fiscal Policies," *Journal of Monetary Economics*, 27, 129–147.

[13] Monacelli, Tommaso (2005), "Monetary Policy in a Low Pass-Through Environment," *Journal of Money, Credit and Banking*, 37, 1047–1066.

[14] Okano, Eiji and Masataka Eguchi (2024), "The Effects of a Money-Financed Fiscal Stimulus in a Small Open Economy," *IMF Economic Review*, 72, 1212–1237.

[15] Okano, Eiji and Masataka Eguchi (2021), "The Effects of a Money-Financed Fiscal Stimulus in a Small Open Economy," *Dynare Working Paper Series*, No. 70.

[16] Sims, Christopher A. (1994), "A Simple Model for Study of the Determination of the Price Level and the Interaction of Monetary and Fiscal Policy," *Economic theory*, 4, 381–399.

[17] Woodford, Michael (1995), "Price-level Determinacy without Control of a Monetary Aggregate," In Carnegie-Rochester Conference Series on Public Policy, 43, 1–46, North-Holland.

Tables and Figures.

Table 1: Parameterization

Parameter	Description	Value
σ	Relative Risk Aversion	1
ν	Openness	0.4
β	Discount Factor	0.995
φ	Curvature of Labor Disutility	5
α	Index of Decreasing Returns to Labor	0.25
ϵ	Elasticity of Substitution among Goods	9
θ	Calvo Index of Price Rigidities	0.75
χ	Steady state Inverse Velocity	$\frac{1}{3}$
η	Semi-elasticity of Money Demand	7
υ	Separability of Real Balances	0
ψ_b	Tax Adjustment	0.02
b	Target Debt Ratio	2.4
δ	Persistence	0.5

Figure 1: Dynamic Effects of an Increase in the Government Expenditure under the *MF* Fiscal Stimulus in Normal Times

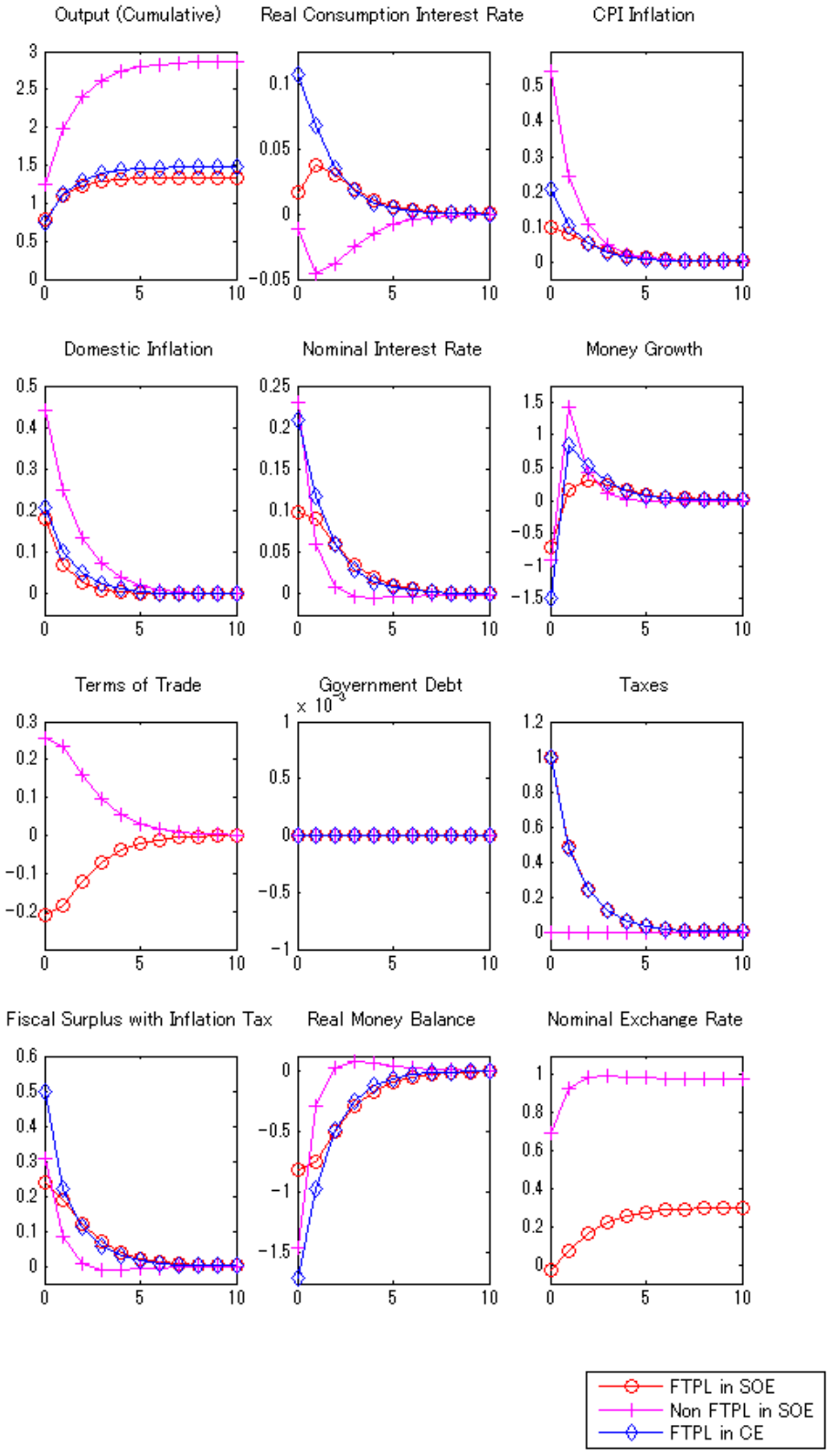

Figure 2: Fiscal Multipliers: FTPL vs. Non-FTPL

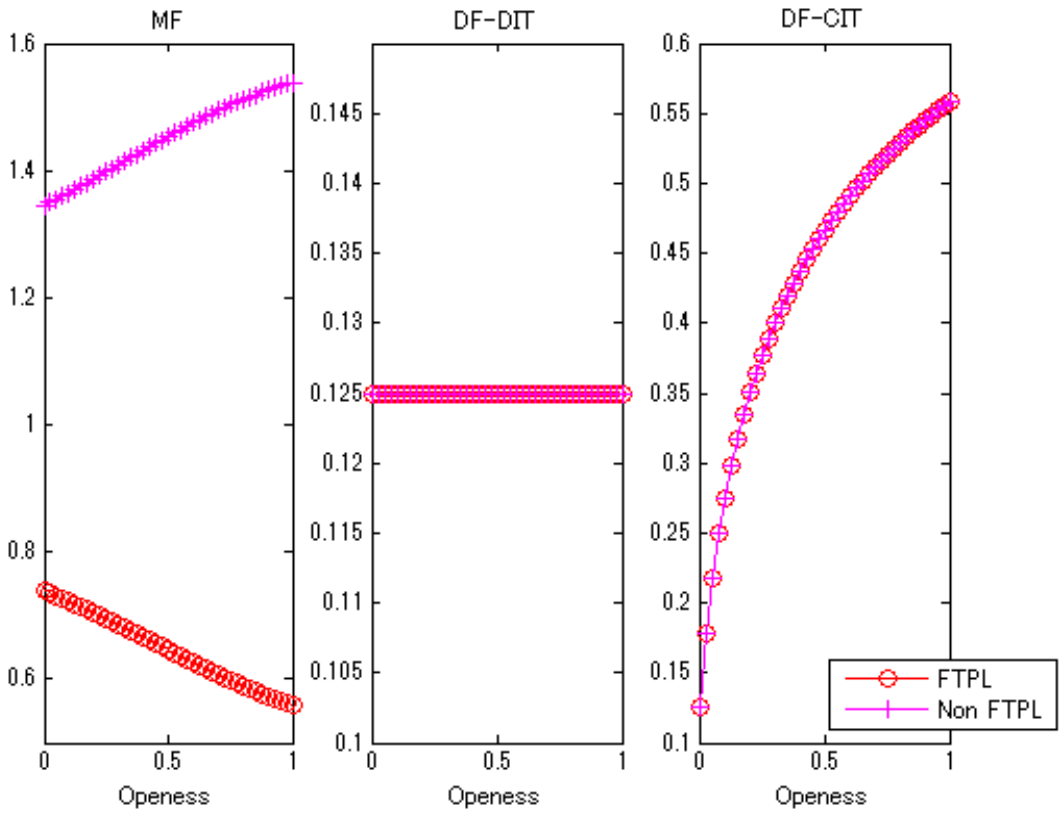

Figure 3: Fiscal Multipliers: *MF* vs. *DF*

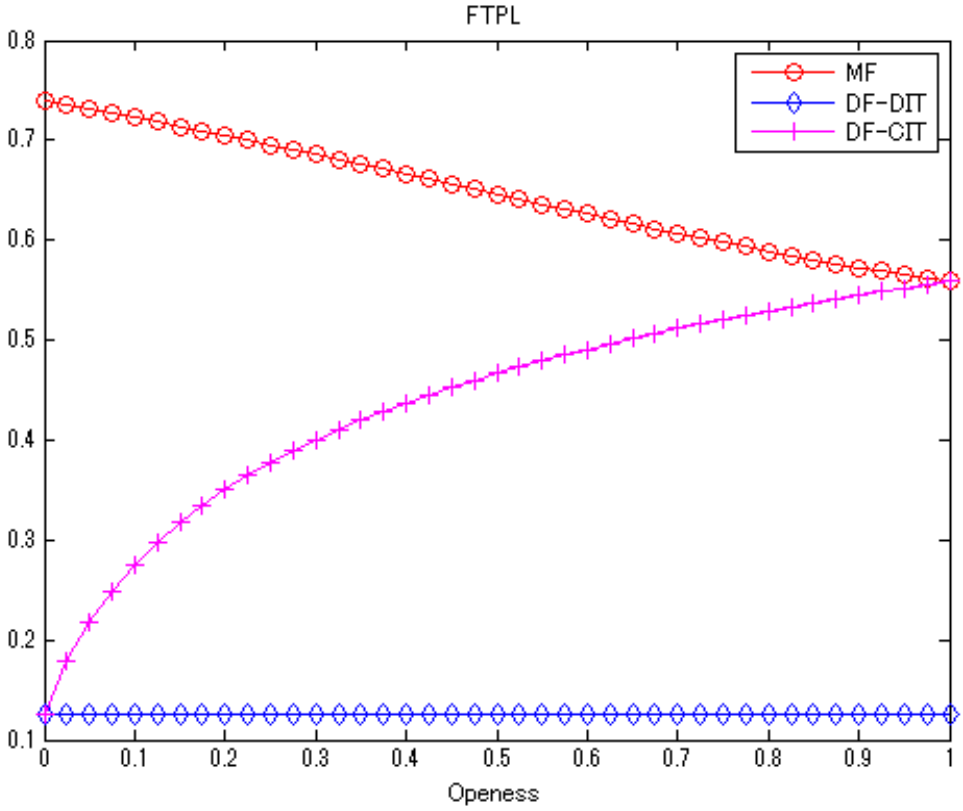

Figure 4: Dynamic Effects of an Increase in the Government Expenditure under the *MF* Fiscal Stimulus in Normal Times with an Adverse Demand Shock

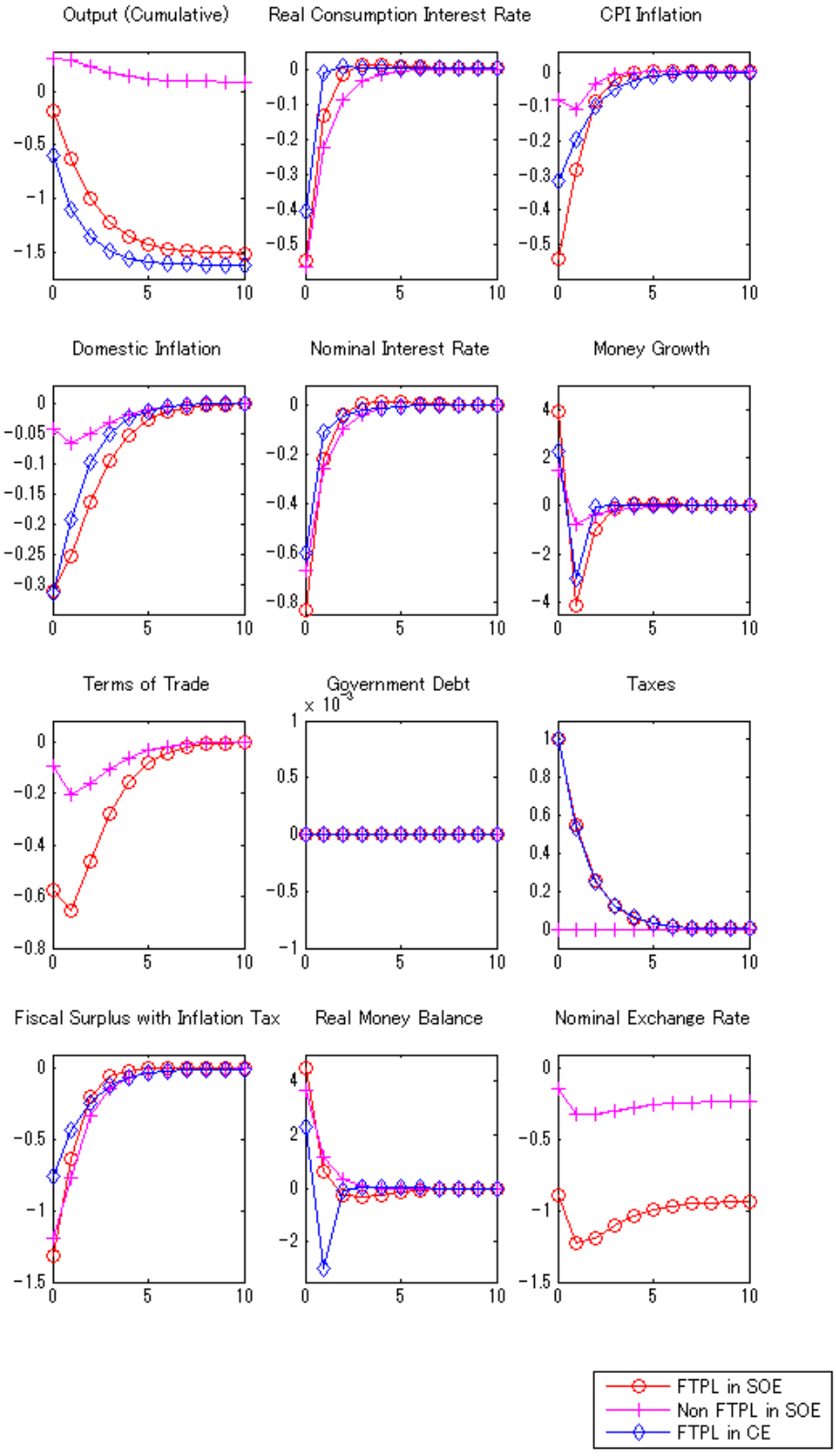

Figure 5: Fiscal Multipliers: with Adverse Demand Shock vs. without Adverse Demand Shock

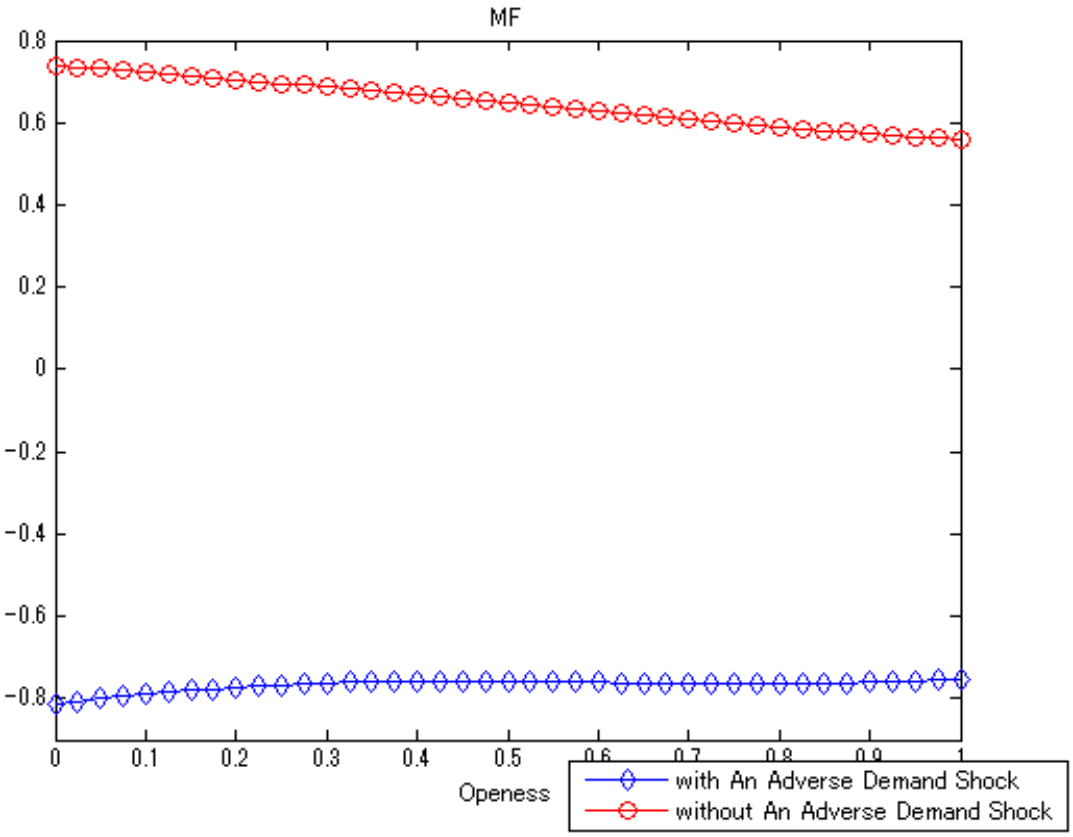

Figure 6: Dynamic Effects of an Increase in the Government Expenditure under the *MF* Fiscal Stimulus in a Liquidity Trap

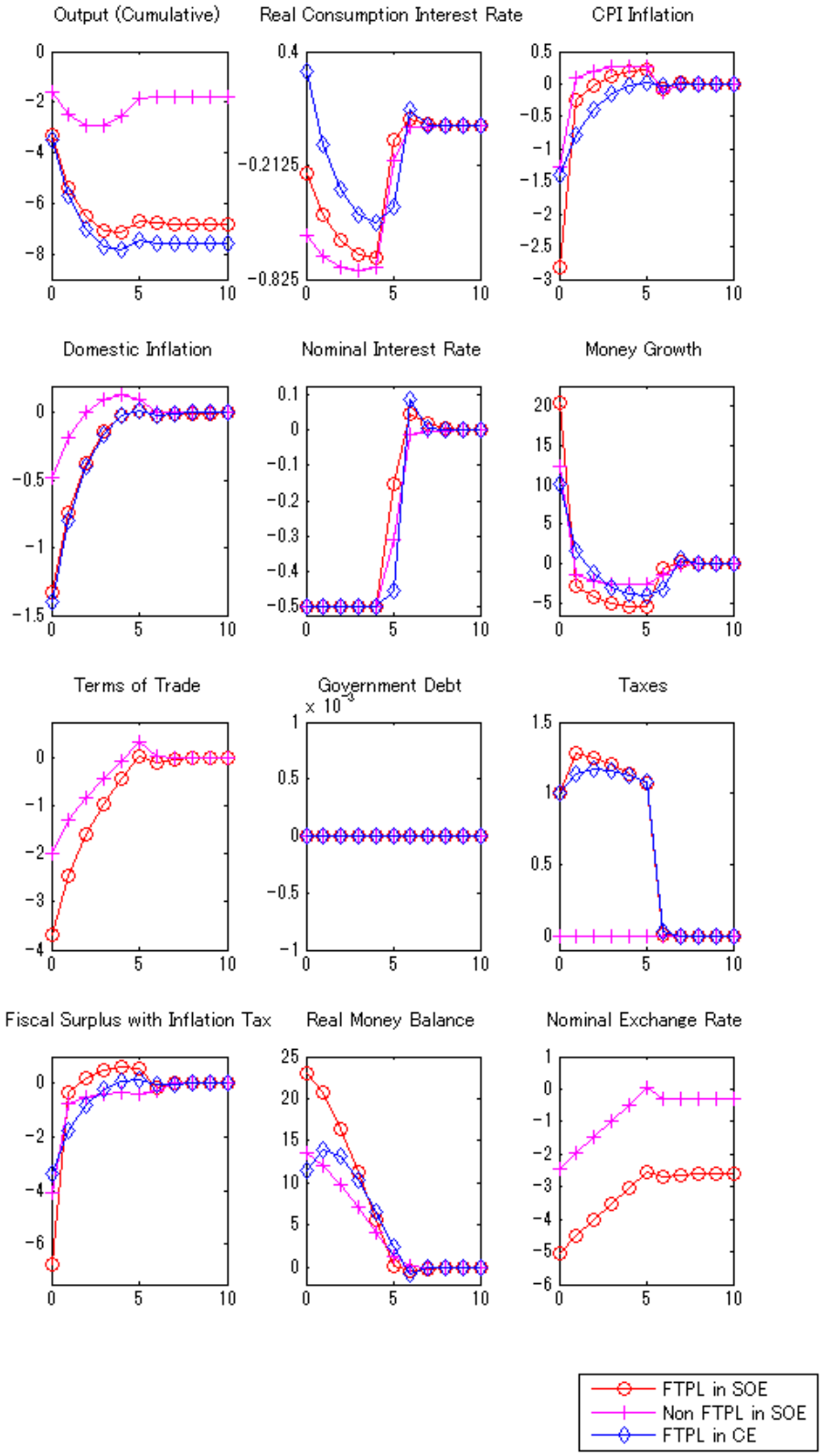

Figure 7: Dynamic Effects of an Increase in the Government Expenditure in a Liquidity Trap – Comparison of the *MF*, the *DF* (DIT), and the *DF* (CIT) Fiscal Stimulus