

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

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Abstract

Does economic openness enhance or diminish the effectiveness of money-financed (MF) fiscal stimulus? This study re-examines this question within a small open economy framework, emphasizing the fiscal regime governing government debt valuation. While Okano and Eguchi (2024), building on Galí (2020), show that MF fiscal expansions generate larger output responses as openness increases, we demonstrate 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 output response to MF fiscal stimulus becomes fiscal-regime contingent. Specifically, under normal conditions, greater openness weakens the output response, reversing the positive openness–multiplier relationship documented in the existing literature. In contrast, under strong deflationary pressure such as at the zero lower bound, greater openness amplifies the output response, although through a distinct transmission mechanism. Our analysis is primarily a positive, regime-comparison study. As a supplementary normative benchmark, we also report a welfare comparison based on a second-order approximation of household utility. The broader implication is 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

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1 Introduction

Does economic openness enhance or diminish the effectiveness of money-financed (MF) fiscal stimulus? This question remains policy-relevant for small open economies, particularly when conventional monetary policy is constrained by the zero lower bound (ZLB). A growing body of research suggests that MF fiscal expansions are especially powerful in open economies, as flexible import prices amplify the response of consumer price inflation. Notably, Okano and Eguchi [20], extending Galí [11]’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 revisits this conclusion by highlighting a key implicit assumption in the existing literature: the fiscal regime governing the government’s intertemporal budget constraint. Standard analyses of MF fiscal policy typically assume a Ricardian fiscal regime, in which government debt is ultimately stabilized through future fiscal adjustments. In this environment, money creation boosts inflation directly through seigniorage, an effect amplified in open economies where CPI inflation is less sticky. We show that once this assumption is relaxed and the fiscal theory of the price level (FTPL) is operative, the open-economy transmission of MF fiscal stimulus changes qualitatively: the positive association between openness and fiscal multipliers documented in the existing literature *reverses* under normal conditions, so that greater openness *weakens* the output response to MF fiscal stimulus. At the ZLB, the sign of the openness effect is preserved—greater openness amplifies the output response—but the underlying transmission mechanism differs fundamentally from that operating in the Ricardian regime.

As a conceptual implication, this regime-contingent reversal shows that the fiscal regime assumption is not a secondary modeling choice but a first-order determinant of open-economy policy transmission, alongside structural parameters such as price stickiness or trade openness itself. Policy evaluations that take a Ricardian regime as given may therefore miss qualitatively important features of MF fiscal policy in open economies.

Our analysis is primarily a *positive, regime-comparison* study. In Sections 5 and 6.4, “effectiveness” refers to the magnitude of output and inflation responses across regimes. As a supplementary normative benchmark, Section 6.5 reports a welfare comparison for the liquidity-trap scenario, based on a second-order approximation of household utility. We do not claim that the FTPL universally characterizes real-world fiscal-monetary arrangements but interpret it as a *theoretically coherent benchmark* for studying fiscal-monetary coordination in environments where the

real value of government liabilities is jointly determined through the valuation equation, a use that is standard in the literature (e.g., Cochrane [9]). Our FTPL-based setting, in which money injection renews consolidated government liabilities rather than transferring net wealth to the private sector, is best viewed as a stylized benchmark for *temporary or non-permanent quantitative easing (QE)*, as opposed to *permanent or irreversible QE* (helicopter money). As Buiter [4] and Turner [23] emphasize, the latter is constrained in practice by institutional restrictions such as Article 123.1 of the Treaty on the Functioning of the European Union and Article 5 of the Public Finance Act in Japan.¹ We therefore view the FTPL environment as a useful benchmark for thinking about fiscal-monetary interactions in high-debt economies operating under legal constraints on direct monetization, without claiming that it describes those institutions in full detail.

The key mechanism underlying our results lies in the interaction between money creation and the government’s debt valuation equation. Under the FTPL, an increase in the real money balance renews consolidated government liabilities, reducing the need to “inflate away” outstanding debt. Because domestic inflation accounts for a smaller share of CPI inflation in open economies, this dampening effect on inflation is stronger as openness rises, weakening the stimulative effect of MF fiscal policy under normal conditions. At the ZLB, the dynamic reverses: CPI inflation declines substantially, with larger declines in open economies because of flexible import prices, and the FTPL necessitates sizable money injections to satisfy the valuation equation. Money growth therefore rises more in open economies, accelerating CPI inflation recovery and lowering the real consumption interest rate, yielding a stronger cumulative output response. 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, rendering MF stimulus ineffective as a distinct policy tool.

This study contributes to three strands of literature. First, it re-examines the analysis of MF fiscal stimulus initiated by Galí [11] and extended to open economies by Okano and Eguchi [20], showing that the openness–multiplier relationship is not robust to the fiscal-regime assumption. In doing so, it complements recent closed-economy analyses of MF policy under fiscal stress and regime switching by Jin and Wang [15] and Mao, Shen, and Yang [17] by examining how openness interacts with fiscal-regime assumptions. Second, following Benigno [2], it contributes to the emerging literature on the FTPL in open economies by clarifying how openness reshapes the transmission of domestic fiscal policy. Third, it adds to the literature on state-dependent fiscal policy by

¹By contrast, Galí [11] and Okano and Eguchi [20] effectively study settings closer to permanent money injection, in which money passed to the private sector is not redeemed.

demonstrating that identical MF interventions generate qualitatively different responses depending on whether the economy operates under normal conditions or at the ZLB, and on whether the fiscal regime is Ricardian or FTPL. Finally, as a supplementary normative benchmark, Section 6.5 shows that the regime-contingent weakening of MF transmission under the FTPL also carries over to welfare: MF remains the most welfare-improving regime among those considered in the liquidity-trap scenario, but its welfare gain is smaller under the FTPL than under the non-FTPL.

The 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 transmission of MF fiscal policy at the ZLB. Section 7 concludes.

2 Related Literature

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

The fiscal theory of the price level. The FTPL, developed by Leeper [16], Sims [24], and Woodford [25], posits that the price level adjusts so that the real value of nominal government liabilities equals the expected present value of fiscal surpluses. Christiano and Fitzgerald [5] reviewed the theory, and Cochrane [7] extended it to long-term debt. Cochrane [9] offered a comprehensive treatment of its macroeconomic implications. Our analysis builds on Cochrane [8], whose formulation of how money enters the government’s debt valuation equation is central to our mechanism. More recently, Benigno [2] examined international dimensions of the FTPL, focusing on conditions for global monetary stability when fiscal regimes differ across countries. Our study examines a complementary question: how openness reshapes the *domestic* transmission of fiscal policy under the FTPL.

Money-financed fiscal stimulus. Auerbach and Obstfeld [1] examined open market operations in a liquidity trap, and Buiter [4] analyzed helicopter money, highlighting the irredeemability of money as the source of its expansionary effect. Galí [11] systematically compares MF and DF fiscal stimulus in a New Keynesian framework, showing that money financing generates a larger output response by avoiding contractionary future tax increases. Since Galí [11], the literature has

expanded in several directions. For instance, Tsuruga and Wake [22] show that implementation lags can reduce or reverse the stimulative effects of money-financed spending, while Punzo and Rossi [19] find that household heterogeneity introduces a redistribution channel from savers to borrowers but may generate welfare losses at the efficient steady state. Furthermore, Jin and Wang [15] demonstrate that the zero-debt-increase policy may lead to an unsustainable debt path, and Mao, Shen, and Yang [17] show that even a moderate probability of switching to a debt-financing regime substantially reduces money-financed spending multipliers. Our analysis departs from this literature by showing that the effectiveness of MF stimulus depends critically on the fiscal regime governing debt valuation, rather than on the money supply rule, redistributive channels, or regime-switching probabilities. Moreover, unlike these closed-economy analyses, we examine how openness interacts with the fiscal regime to shape MF fiscal stimulus transmission.

Open-economy dimensions. Fiscal multipliers are systematically conditioned by openness and the exchange rate regime. Using OECD panel data, Corsetti, Meier, and Müller [6] show that government spending effects differ substantially across exchange rate regimes. Building on this, Born, Juessen, and Müller [3] confirm that spending multipliers are larger under fixed rates in a New Keynesian small open economy, and Farhi and Werning [10] provide analytical solutions for multipliers in liquidity traps and currency unions. Our model adopts the canonical small open economy framework developed by Galí and Monacelli [13, 14]. Okano and Eguchi [20] extended Galí [11]’s analysis to this setting, showing that MF stimulus becomes more effective as openness increases. We demonstrate that this result is overturned under the FTPL under normal conditions, although it survives at the ZLB through a distinct mechanism. While these studies condition fiscal multipliers on openness and exchange rate regimes, they do so within Ricardian frameworks. Our contribution is to show that the fiscal regime governing debt valuation introduces an additional dimension that reshapes the openness–multiplier relationship. Finally, as a supplementary normative benchmark, we show in Section 6.5 that this regime-contingent weakening of MF transmission under the FTPL also carries over to welfare, even though MF remains the most welfare-improving regime among those considered in the liquidity-trap scenario.

3 The Model

The model comprises both policy and non-policy blocks. The FTPL equation is adopted for the policy block. The non-policy block closely follows Okano and Eguchi [20], whose model was based

on Galí and Monacelli [14]. 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) applies, and exports are elastic to changes in the terms of trade (TOT), as in Galí and Monacelli [14].

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 [20] and Galí [11], taxation is lump-sum. The key distinction from Okano and Eguchi [20] is that the government budget constraint is iterated forward, and an appropriate transversality condition (TVC) is imposed, similar to Cochrane [8].

3.1 The Fiscal and Monetary Policy Framework

3.1.1 Policy Regimes: Assignment and Boundary Conditions

Before specifying the consolidated government’s budget constraint, we clarify the two alternative fiscal regimes and their policy assignments. Throughout the analysis, we distinguish *policy rules* (behavioral assumptions imposed ex ante) from *equilibrium conditions* (relations that hold as a consequence of rules, constraints, and market clearing).

In the *non-FTPL (Ricardian) regime*, the fiscal authority follows a passive tax rule, as in Galí [11] and Okano and Eguchi [20]:

$$\hat{t}r_t = \psi_b \hat{b}_{t-1}, \quad \psi_b > \rho, \tag{1}$$

which ensures that the debt ratio converges to its long-run target and that the government’s transversality condition (TVC), $\lim_{k \rightarrow \infty} \Lambda_{t,t+k} B_{t+k} = 0$, is satisfied. This passive-fiscal/active-monetary assignment secures local determinacy in standard New Keynesian models (Leeper [16]; Jin and Wang [15]).

In the *FTPL regime*, following Cochrane [8, 9], we do not impose a Ricardian tax-feedback rule. The consolidated government’s nominal liabilities—bonds and money—are treated as a residual claim on the expected present value of future surpluses, so that taxes, money balances, and the price level adjust *jointly* to satisfy the valuation equation (Eqs. (4)–(7) below). Two additional features distinguish this regime. First, the TVC is imposed jointly on bonds and real money

balances, $\lim_{j \rightarrow \infty} \beta^{t+j+1} R_{t+j} (B_{t+j} + L_{t+j}) = 0$, enforcing their joint valuation as consolidated liabilities. Second, a money injection renews consolidated government debt rather than simply generating seigniorage revenue.

Table 1 summarizes how each regime interacts with the MF and DF experiments introduced in Section 3.1.3. With these distinctions in place, we now turn to the specification of the consolidated government's budget constraint and the derivation of the equilibrium conditions that characterize each regime.

3.1.2 Government: Budget Constraints and Financing Regimes

To finance its spending, the government (comprising coordinated fiscal and monetary authorities) relies on a combination of lump-sum taxes, riskless nominal one-period bond with a nominal interest rate, and (non-interest-bearing) money. The consolidated budget constraint is therefore given by:

$$P_{H,t} G_t + B_{t-1} (1 + i_{t-1}) = P_t T R_t + B_t + \Delta M_t, \quad (2)$$

where $P_{H,t}$ denotes the domestic price index, $P_t \equiv P_{H,t}^{1-\nu} P_{F,t}^\nu$ denotes the CPI, $P_{F,t}$ is the import goods price in units of domestic currency, $\nu \in [0, 1]$ denotes the openness of the small open economy, B_t is the nominal riskless one-period domestic government bond in units of domestic currency, i_t denotes the net nominal interest rate, $T R_t$ is 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 Online Appendix A.

Dividing both sides of Eq. (2) by the CPI yields

$$\mathcal{S}_t^{-\nu} G_t + \mathcal{B}_{t-1} \mathcal{R}_{t-1} = T R_t + \mathcal{B}_t + \frac{\Delta M_t}{P_t}, \quad (3)$$

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 subscripts are the steady-state values.

Multiplying both sides of Eq. (3) 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 $j \rightarrow \infty$, and imposing an appropriate TVC

$\lim_{j \rightarrow \infty} \beta^{t+j+1} \mathcal{R}_{t+j} (\mathcal{B}_{t+j} + L_{t+j}) = 0$, one can write:

$$U_{c,t} Z_t \mathcal{R}_{t-1} (\mathcal{B}_{t-1} + L_{t-1}) = \left\{ \sum_{h=0}^{\infty} \beta^h U_{c,t+h} Z_{t+h} S P_{t+h} + \sum_{h=0}^{\infty} \beta^{h-1} U_{c,t+h-1} Z_{t+h-1} \left(\frac{i_{t+h-1}}{1+i_{t+h-1}} \right) L_{t+h-1} \right\} \Pi_t, \quad (4)$$

where $U_{c,t}$ denotes the marginal utility of consumption, Z_t the exogenous preference shifter, $L_t \equiv \frac{M_t}{P_t}$ the real money balance, and $S P_t \equiv T R_t - \mathcal{S}_t^{-\nu} G_t$ the (real) fiscal surplus. The discount factor is $\beta \equiv (1 + \rho)^{-1}$, where ρ is the rate of time preference, identical to the steady-state net nominal interest rate. The term $\left(\frac{i_t}{1+i_t} \right) L_t$ represents the opportunity cost of holding real money balances. Eq. (4) therefore states that consolidated government liabilities, measured in units of marginal utility, equal the present value of fiscal surpluses plus the present value of liquidity-service revenue.

Eq. (4) can be rewritten as:

$$\frac{U_{c,t} Z_t (1 + i_{t-1}) (B_{t-1} + M_{t-1})}{P_t} = \sum_{h=0}^{\infty} \beta^h U_{c,t+h} Z_{t+h} S P_{t+h} + \sum_{h=0}^{\infty} \beta^{h-1} U_{c,t+h-1} Z_{t+h-1} \left(\frac{i_{t+h-1}}{1+i_{t+h-1}} \right) L_{t+h-1}. \quad (5)$$

According to Cochrane [8], the FTPL recognizes that nominal debt, including the monetary base, is a residual claim on 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:

$$\frac{\text{Nominal Government Debt}}{\text{Price Level}} = \text{Expected Present Value of Primary Surpluses}. \quad (6)$$

Eq. (5) is analogous to Eq. (6), and Eq. (4) successfully characterizes the FTPL of Cochrane [8].

The valuation-based mechanism: an intuitive account. Before proceeding to the log-linearized representation, we highlight the economic intuition behind our central mechanism using

the intertemporal valuation relation Eq. (4). This relation can be written schematically as:

$$\underbrace{\text{Real value of consolidated liabilities}}_{(B_{t-1}+L_{t-1})/P_t} = \underbrace{\text{PV of primary surpluses}}_{\sum \beta^h U_{c,t+h} Z_{t+h} S P_{t+h}} + \underbrace{\text{PV of liquidity service revenue}}_{\sum \beta^{h-1} U_{c,t+h-1} Z_{t+h-1} \left(\frac{i_{t+h-1}}{1+i_{t+h-1}}\right) L_{t+h-1}} \quad (7)$$

An exogenous fiscal stimulus reduces primary surpluses, creating pressure for adjustment through either (i) an increase in CPI inflation Π_t that lowers the real value of liabilities on the left-hand side, or (ii) an increase in the real money balance L_{t+h} that raises liquidity service revenue on the right-hand side. In open economies, domestic inflation accounts for a smaller share of CPI inflation, so channel (i) is attenuated and channel (ii) bears more of the adjustment—but the resulting larger real money balance in turn suppresses the inflation response through money injection, delivering the openness reversal (Section 5). That is, as openness increases, money growth decreases, thereby suppressing inflation responses.

Log-linearizing Eq. (4), substituting the households' Euler equation, and simplifying yields

$$\hat{tr}_t = b\hat{i}_{t-1} + \hat{b}_{t-1} + \frac{b(1-\beta)^2 + \chi\beta^2}{\beta} \hat{l}_{t-1} - \beta\hat{b}_t - \beta\chi\hat{l}_t - (b + \chi\beta)\pi_t + \hat{g}_t, \quad (8)$$

where $\chi \equiv \frac{L}{Y}$ and $b \equiv \frac{B}{Y}$ denote the steady-state inverse velocity and debt-to-output ratio, respectively. Variable definitions and notation conventions follow Online Appendices B and C; the full derivation from Eq. (4) to Eq. (8) is provided in Online Appendix D. We emphasize that Eq. (8) is *not* a behavioral tax rule analogous to Eq. (1), but a *log-linear equilibrium restriction* derived from the valuation equation Eq. (4), characterizing the joint adjustment of taxes, debt, real money balances, inflation, and government spending that must hold in any FTPL equilibrium. Thus, it is distinct from both a behavioral policy rule and the flow budget constraint Eq. (9) below.

Log-linearizing the flow budget constraint Eq. (3), we obtain:

$$\hat{b}_t = \hat{g}_t + (1 + \rho)\hat{b}_{t-1} + (1 + \rho)b\hat{i}_{t-1} - (1 + \rho)b\pi_t - \hat{tr}_t - \chi\Delta m_t, \quad (9)$$

where Δm_t denotes money growth.

3.1.3 Experiments

Below, we analyze two stylized fiscal interventions that take the form of an exogenous increase in government expenditure. The intervention is announced in period zero and implemented from that period onward, following Galí [11] and Okano and Eguchi [20]. For concreteness, we assume that:

$$\hat{g}_t = \delta^t > 0, \quad (10)$$

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

The money-financed (MF) experiment. The MF experiment is defined as one in which seigniorage is adjusted in every period to keep real debt \hat{b}_t constant. This is an *experimental design choice*, not a behavioral policy rule. By construction,

$$\hat{b}_t = 0, \quad \text{for all } t. \quad (11)$$

Substituting Eq. (11) into the log-linearized consolidated budget constraint Eq. (9) yields the required money growth path:

$$\Delta m_t = \frac{1}{\chi} \left[\hat{g}_t - \hat{tr}_t + (1 + \rho)b(\hat{i}_{t-1} - \pi_t) \right]. \quad (12)$$

Under this experimental design, the monetary authority gives up control of the nominal interest rate and adjusts the money supply to meet the government's financing needs. The specific equilibrium paths of taxes \hat{tr}_t and the price level under the MF experiment, however, depend on the underlying fiscal regime. We now discuss each case in turn.

MF experiment in the non-FTPL regime. In the non-FTPL regime, the tax rule is Eq. (1): $\hat{tr}_t = \psi_b \hat{b}_{t-1}$. Combined with the MF experimental design Eq. (11), which implies $\hat{b}_{t-1} = 0$ for all $t \geq 1$ (and $\hat{b}_{-1} = 0$ by the steady-state normalization), the tax rule yields:

$$\hat{tr}_t = 0, \quad \text{for all } t. \quad (13)$$

We emphasize that Eq. (13) is *not* an independent policy rule. It is an *equilibrium implication* that follows from combining the passive tax rule Eq. (1) with the MF experimental design Eq. (11). Under the MF experiment in the non-FTPL regime, taxes need not adjust because real debt is held constant by construction; the government finances the spending increase entirely through money issuance, and the price level is determined by the active monetary (money supply) response and the standard New Keynesian block.

MF experiment in the FTPL regime. In the FTPL regime, no behavioral tax rule is imposed. Instead, taxes, money balances, and the price level adjust jointly so that the FTPL equilibrium restriction Eq. (8) holds. Imposing the MF experimental design Eq. (11) in Eq. (8) yields:

$$\hat{tr}_t = \hat{b}i_{t-1} + \frac{b(1-\beta)^2 + \chi\beta^2}{\beta}\hat{l}_{t-1} - \beta\chi\hat{l}_t - (b + \chi\beta)\pi_t + \hat{g}_t. \quad (14)$$

Like Eq. (8), Eq. (14) is *not* a behavioral policy rule, nor is it the log-linear consolidated budget identity Eq. (9). Rather, it is the FTPL-consistent equilibrium restriction under the MF experimental design, characterizing the joint adjustment of taxes \hat{tr}_t , the real money balance \hat{l}_t , and CPI inflation π_t that must hold in equilibrium. Crucially, unlike in the non-FTPL regime, taxes \hat{tr}_t generally vary along the equilibrium path under the MF experiment in the FTPL regime (see Panel 9, Fig. 1), reflecting the joint adjustment role of fiscal variables in the valuation equation.

The debt-financed (DF) experiment. Under the debt-financed (DF) experiment, the fiscal authority finances the spending increase by issuing debt. In the non-FTPL regime, the tax path adjusts via Eq. (1) to attain the long-run debt target. The monetary authority pursues an independent price-stability mandate. Specifically, we assume that it follows either domestic inflation targeting (DIT):

$$\pi_{H,t} = 0, \quad (15)$$

or CPI inflation targeting (CIT):

$$\pi_t = 0, \quad (16)$$

for all t . As a result, both the money supply and seigniorage adjust endogenously to achieve the interest rate required for price stability.

In the FTPL regime under the DF experiment, the tax path and price level adjust jointly to satisfy the valuation equation Eq. (8), while the monetary authority follows Eq. (15) or Eq. (16)

when feasible.

3.2 Non-policy Block

The non-policy block follows the standard New Keynesian small open economy framework of Galí and Monacelli [13, 14] and Okano and Eguchi [20]. 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 the 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 their desired levels 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:

$$(1 - \alpha) U_c(N^{1-\alpha}, L) = \frac{\varepsilon}{\varepsilon - 1} V_n N^\alpha, \quad (17)$$

$$h\left(\frac{L}{N^{1-\alpha}}\right) = \frac{\rho}{1 + \rho}, \quad (18)$$

$$\mathcal{S} = 1, \quad (19)$$

which are assumed to have unique solutions.² The last condition above implies that $Q = 1$, which ensures purchasing power parity (PPP) in the steady state. Therefore, an increase in CPI inflation creates 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 Galí and Monacelli [13, 14] and Okano and Eguchi [20]. 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:

$$\hat{b}_t = (1 + \rho) \hat{b}_{t-1} + (1 + \rho) \hat{b}i_{t-1} - (1 + \rho) b\pi_t + \hat{g}_t - \hat{tr}_t - \chi\Delta m_t, \quad (20)$$

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 Galí and Monacelli [13], 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 the TOT. Both consumption and output are affected by changes in the TOT. Therefore, in contrast to Galí [11], 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 [20] and Galí [11].

²Following Galí and Monacelli [12], we find that the TOT is determined uniquely.

4.3 Calibration

Our parameterization is identical to that in Okano and Eguchi [20] (Table 2).³ 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 [20]; that is, $\widehat{nx}_t = 0$ for all t as long as the demand shock $\widehat{\rho}_t$ does not affect the economy.

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 a benchmark openness of $\nu = 0.4$. 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, the FTPL in a closed economy, and the non-FTPL in a small open economy, respectively.

5.1 *MF* Fiscal Stimulus

Under an *MF* fiscal stimulus, output increases in both regimes, with a smaller response under the FTPL than under the non-FTPL in a small open economy (Panel 1, Fig. 1). The key distinction is the valuation-based adjustment under the FTPL: an increase in government expenditure triggers a joint response in taxes, real money balances, and CPI inflation (Panels 3, 6, 9, and 10, Fig. 1), constrained by the FTPL equilibrium restriction Eq. (14). We now trace how this joint adjustment unfolds in each regime, and then analyze how openness reshapes it.

In the non-FTPL regime, as derived in Section 3.1.3, the *MF* experiment combined with the passive tax rule Eq. (1) implies $\widehat{tr}_t = 0$ for all t as an equilibrium outcome (Eq. (13)). Money growth therefore adjusts to finance the entire increase in government expenditure. The real consumption interest rate declines further, consumption increases, the nominal exchange rate depreciates, the TOT worsen, and output increases vigorously.

³For the relative risk aversion and the openness, Okano and Eguchi [20] follow Monacelli [18]. Additionally, they adopt the parameterization of Galí [11].

How does an MF fiscal stimulus differ under the FTPL? First, we consider a closed economy ($\nu = 0$). In contrast to the non-FTPL regime, the FTPL regime does not impose a behavioral tax rule; instead, taxes, money balances, and inflation adjust jointly to satisfy the FTPL-consistent equilibrium restriction under the MF design, Eq. (14). Lump-sum taxes therefore vary endogenously, and part of the increase in government expenditure is absorbed through a tax adjustment (Panel 9, Fig. 1), complementing the valuation-based adjustment through money balances and inflation. Although CPI inflation increases to mitigate the burden of redeeming consolidated government debt, the increase is too small for the real consumption interest rate to decline (Panel 2, Fig. 1). Therefore, the increase in output is not substantial (Panel 1, Fig. 1).

To understand why the sign of the openness effect reverses under the FTPL, we trace the logic through Eqs. (8), (14), and (21). First, the FTPL equilibrium restriction Eq. (8) requires taxes, debt, real money balances, inflation, and government spending to adjust jointly. Under the MF design ($\hat{b}_t = 0$), this reduces to Eq. (14), pinning down how taxes, real money balances, and CPI inflation move together in response to a fiscal stimulus. Second, focusing on the contemporaneous terms in Eq. (14) and abstracting from \hat{tr}_t and predetermined variables yields:

$$\hat{l}_t = -\frac{b + \beta\chi}{\beta\chi(1 - \nu)}\pi_{H,t} - \frac{b + \beta\chi}{\beta\chi}\nu\Delta e_t, \quad (21)$$

where we use the log-linearized CPI definition $p_t = (1 - \nu)p_{H,t} + \nu p_{F,t}$ and the LOOP $p_{F,t} = e_t$. Higher CPI inflation reduces real money balances because it already mitigates the consolidated government's debt burden, making further money issuance unnecessary. Third, as openness ν rises, domestic inflation $\pi_{H,t}$ accounts for a smaller share of CPI inflation. Its effect on real money balances therefore weakens, as captured by the coefficient $(b + \beta\chi)/[\beta\chi(1 - \nu)]$ in Eq. (21). Consequently, the CPI inflation response to a fiscal expansion becomes weaker in more open economies under the FTPL, implying a smaller decline in the real consumption interest rate and hence a smaller output response—the openness reversal.

Under the non-FTPL regime, by contrast, the valuation equation does not bind as an active constraint: the passive tax rule absorbs fiscal adjustment, and the CPI inflation response rises with openness because import prices are flexible (Okano and Eguchi [20]). The reversal thus stems entirely from the valuation equation's role as an active equilibrium restriction.

Our findings are twofold. First, the FTPL weakens the effectiveness of *MF* fiscal stimulus in terms of output and inflation responses 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. (15) or (16), namely, DIT or CIT. The NKPC connects the price markup gap (comprising the marginal utility of consumption, output, and the TOT) with domestic inflation. Therefore, differences in the fiscal-regime specification—the FTPL equilibrium restriction (Eq. (8)) versus the passive tax rule (Eq. (1))—do not change dynamics, except for the fiscal variables.⁴ Irrespective of the fiscal regime, an increase in output is similar across economies under DIT because domestic prices are constant and the 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 to 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 sharp interest rate hike is unnecessary. Given the smaller increase in the nominal interest rate, consumption is higher, resulting in a larger output increase in a small open economy.

5.3 Openness and Fiscal Multipliers

We examine the parameter that measures openness ν rather than price stickiness θ or shock persistence δ , as in Galí [11]. Following Galí [11] and Okano and Eguchi [20], 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. According to Okano and Eguchi [20], 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. Consequently, the higher the openness, the higher the sensitivity of CPI inflation to money growth, leading to larger output increases.

⁴See Okano and Eguchi [20] for details.

In contrast, under the FTPL, multipliers decrease as openness increases (Panel 1, Fig. 2). Eq. (21) demonstrates that in a more open economy, changes in domestic inflation have a negligible effect on the real money balance. With the decrease in the real money balance mitigated, the increase in CPI inflation is suppressed. As a result, 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 share of domestic inflation in CPI inflation decreases; therefore, the pressure to decrease the real money balance is mitigated. Accordingly, higher openness implies lower CPI inflation, which suppresses nominal exchange rate depreciation. Eq. (21) implies $\hat{l}_t = 0$ when openness equals one. Consequently, a change in 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 an increase in government expenditure (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). This 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 a smaller decrease in the real consumption interest rate and remarkably less cumulative output than in the 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 FTPL equilibrium restriction, 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 the 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 Openness and Multipliers under an Adverse Demand Shock

Fig. 5 shows the relationship between fiscal multipliers and openness under *MF* fiscal stimulus with an adverse demand shock. Without this shock, multipliers decrease as openness increases (red line with circles). However, when it is present, 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).

This contractionary shock applies pressure to decrease CPI inflation, which appreciates the nominal exchange rate. Because of the FTPL equilibrium restriction 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, these factors explain why multipliers increase with openness when a fiscal stimulus coincides with such a shock.

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. Instead, greater openness amplifies the effects of MF stimulus, albeit through a mechanism distinct from Ricardian channels. Following Galí [11] and Okano and Eguchi [20], we compare MF and DF fiscal stimuli under an adverse demand shock sufficiently large to prevent the central bank from fully stabilizing output and inflation.

Following Galí [11] and Okano and Eguchi [20], the ZLB constraint assumes the form $\hat{i}_t \geq \log\beta$, and the experiment postulates that $\hat{\rho}_t = -\gamma < \log\beta$ for $t = 0, 1, 2, \dots, T$ and $\hat{\rho}_t = 0$ for $t = T + 1, T + 2, \dots$. This describes a temporary adverse demand shock that takes the natural interest rate to negative territory up to period T , before disappearing thereafter. We assume $\gamma = 0.01$ and $T = 5$. The shock is fully unanticipated; however, once realized, the trajectory of $\{\hat{\rho}_t\}$ and the 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:

$$\hat{l}_t \geq \hat{c}_t - \eta\hat{i}_t, \tag{22}$$

represents the demand for real money balances.

In addition to the previous changes, under the DF fiscal stimulus and the *no response* benchmark, Eqs. (15) and (16) must be replaced by:

$$\left(\hat{i}_t - \log\beta\right) \pi_{H,t} = 0, \tag{23}$$

$$\left(\hat{i}_t - \log\beta\right) \pi_t = 0, \tag{24}$$

for all t , together with Eqs. (15) and (16), 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. (12) determines the money supply for all t . If the nominal interest rate is positive, Eq. (22) holds with equality (but with inequality once the nominal interest rate reaches the ZLB and the real money balance overshoots its satiation level). 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).

Regarding the fiscal intervention, we simulate a 1% increase in the steady-state ratio of government expenditure to output for the duration of the adverse demand shock ($\hat{g}_t = 0.01$, for $t = 0, 1, \dots, 5$) in both the *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. (15) and (23) under DIT and Eqs. (16) and (24) under 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 [20], even when the FTPL is introduced in the model. As mentioned in Section 5.2, the difference in fiscal-regime specifications—the FTPL equilibrium restriction Eq. (8) versus the passive tax rule Eq. (1)—does not change dynamics between the FTPL and the non-FTPL (except for fiscal variables).

First, we describe the response under the *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 drops remarkably, causing a severe revenue shortfall that must be financed by issuing bonds. Moreover, money growth decreases significantly. Given the ZLB constraint, the nominal interest rate cannot turn 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 falls to -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 in a small open economy, making its recovery 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 *no response* scenario 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 further. Therefore, the decrease in CPI inflation is more significant and the improvement in the 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 results, we first describe the dynamics of the non-FTPL in a small open economy, as shown in Okano and Eguchi [20]. 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. Consequently, the real consumption interest rate decreases because of less sticky CPI inflation, although the nominal interest rate sticks to the ZLB (Panels 2 and 6, Fig. 6). Subsequently, output recovers (Panel 1, Fig. 6), bringing the cumulative output to -1.78 .

Turning to 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 FTPL equilibrium restriction 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 decline in the real consumption interest rate is smaller, and the improvement in the 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.

Finally, we 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 the FTPL equilibrium restriction, 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 [20].

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 [20]. Additionally, these dynamics are not substantially different from those under the *no response* described in Section 6.1. However, the fiscal stimulus does improve cumulative output. Under the *DF* fiscal stimulus with DIT, the cumulative output in a small open economy is -9.80 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, the cumulative output in a small open economy 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 identical to the DIT case.

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. As in Okano and Eguchi [20], even under the FTPL, *MF* fiscal stimulus generates the largest responses of output, domestic inflation, and CPI inflation, making it the most effective regime in terms of macroeconomic stabilization in a liquidity

trap. 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 [20]. A large money injection occurs, which causes a 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. The next subsection asks whether this stabilization ranking also holds in welfare terms.

6.5 Welfare Comparison

To supplement the positive analysis with a normative perspective, we compare welfare costs across fiscal regimes and financing modes in a liquidity trap, following Punzo and Rossi [19]. A second-order approximation of household utility (derived in Online Appendix E) yields the welfare cost function:

$$\mathcal{L} = \frac{\Omega_y}{2} \text{var}(\tilde{x}_t) + \frac{\Omega_\pi}{2} \text{var}(\pi_{H,t}), \quad (25)$$

where $\tilde{x}_t \equiv \hat{y}_t - \hat{y}_t^e$ is the welfare-relevant output gap, \hat{y}_t^e is the efficient level of output, $\pi_{H,t}$ is domestic inflation, and Ω_y and Ω_π are calibrated coefficients reported in Online Appendix E. Under our calibration, $\Omega_y = 13.10$ and $\Omega_\pi = 169.73$, reflecting the large weight on domestic inflation stabilization implied by a low slope of the New Keynesian Phillips curve ($\kappa = 0.021$).

Table 3 reports the welfare improvement (in percentage terms) delivered by each policy, measured against the welfare cost under *no response* with CIT as the baseline. We focus the welfare comparison on the liquidity-trap scenario, where the adverse demand shock creates a clear stabilization problem and where the ranking of *MF* and *DF* interventions is central to the analysis.

Three results emerge. First, even under the FTPL, the *MF* regime delivers the largest welfare improvement among all regimes considered, reducing the welfare cost by 94.0% relative to the *no response* CIT baseline. Second, the welfare gain under *MF* is about five percentage points smaller under the FTPL than under the non-FTPL (94.0% vs. 99.0%), confirming that the FTPL weakens *MF* fiscal stimulus not only in terms of output and inflation stabilization but also in terms of welfare improvement. Third, the welfare costs under *no response* and *DF* fiscal stimulus are

identical across the two regimes, consistent with the finding in Sections 5.2 and 6.1–6.3 that fiscal-regime specifications do not affect non-fiscal dynamics under *no response* and *DF* fiscal stimulus.

7 Conclusion

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

When the FTPL is operative, greater openness weakens the output response to MF fiscal policy under normal conditions, reversing the positive openness–multiplier relationship emphasized in the existing literature. By contrast, under strong deflationary pressure—such as at the ZLB—greater openness amplifies the output response to 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.

Interpretation and scope. Our analysis remains primarily a positive, regime-comparison study. In Sections 5 and 6.4, “effectiveness” refers to the magnitude of output and inflation responses across regimes, not to welfare dominance. Larger output responses under one regime may come at the cost of larger money injections, different inflation paths, or larger tax adjustments. At the same time, Section 6.5 adds a supplementary welfare comparison for the liquidity-trap scenario, based on a second-order approximation of household utility. That comparison does not constitute a fully general normative ranking, but within the model and calibration considered it shows that *MF* fiscal stimulus delivers the largest welfare improvement even under the FTPL, albeit with a smaller gain than under the non-FTPL.

Implications. The broader implication of our analysis is 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 transmission of MF fiscal policy cannot be evaluated independently of the fiscal regime governing the stabilization of government liabilities. This suggests that open-economy policy analyses should treat the fiscal-regime assumption as an explicit modeling choice whose implications for positive

predictions—and, ultimately, for welfare evaluation—deserve systematic examination. The welfare comparison reinforces this message: although MF remains the most welfare-improving regime in the liquidity trap, its gain is smaller under the FTPL than under the non-FTPL. We view our FTPL-based analysis as a first step toward this broader research agenda, particularly relevant for high-debt economies operating under legal constraints on direct monetization.

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Tables and Figures

Table 1: Policy assignment across regimes and experiments

| | non-FTPL (Ricardian) | FTPL |
|--|--|--|
| <i>General regime closure</i> | Passive fiscal rule $\hat{tr}_t = \psi_b \hat{b}_{t-1}$ stabilises debt; monetary policy pins down the price level. | No Ricardian tax-feedback rule. Price level adjusts jointly with taxes and money to satisfy the valuation equation; TVC on bonds <i>and</i> money. |
| <i>MF experiment</i> ($\hat{b}_t = 0$ by design) | Tax rule (1) + $\hat{b}_t = 0 \Rightarrow \hat{tr}_t = 0$ (equilibrium implication). Δm_t adjusts to finance spending. | Eq. (14): FTPL equilibrium restriction. Taxes, money balances, and inflation adjust jointly; \hat{tr}_t generally $\neq 0$. |
| <i>DF experiment</i> | Tax rule (1) adjusts the tax path toward the debt target. Monetary policy: DIT (15) or CIT (16). | Taxes and the price level adjust jointly via the valuation equation; monetary authority follows DIT or CIT. |

Table 2: 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 |
| v | Separability of Real Balances | 0 |
| ψ_b | Tax Adjustment | 0.02 |
| b | Target Debt Ratio | 2.4 |
| δ | Persistence | 0.5 |

Table 3: Welfare improvement (%) in a liquidity trap

| | <i>No response</i> | | <i>DF</i> | | <i>MF</i> |
|----------|--------------------|-----|-----------|------|-----------|
| | DIT | CIT | DIT | CIT | |
| FTPL | 83.5 | 0.0 | 88.6 | 25.5 | 94.0 |
| Non-FTPL | 83.5 | 0.0 | 88.6 | 25.5 | 99.0 |

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

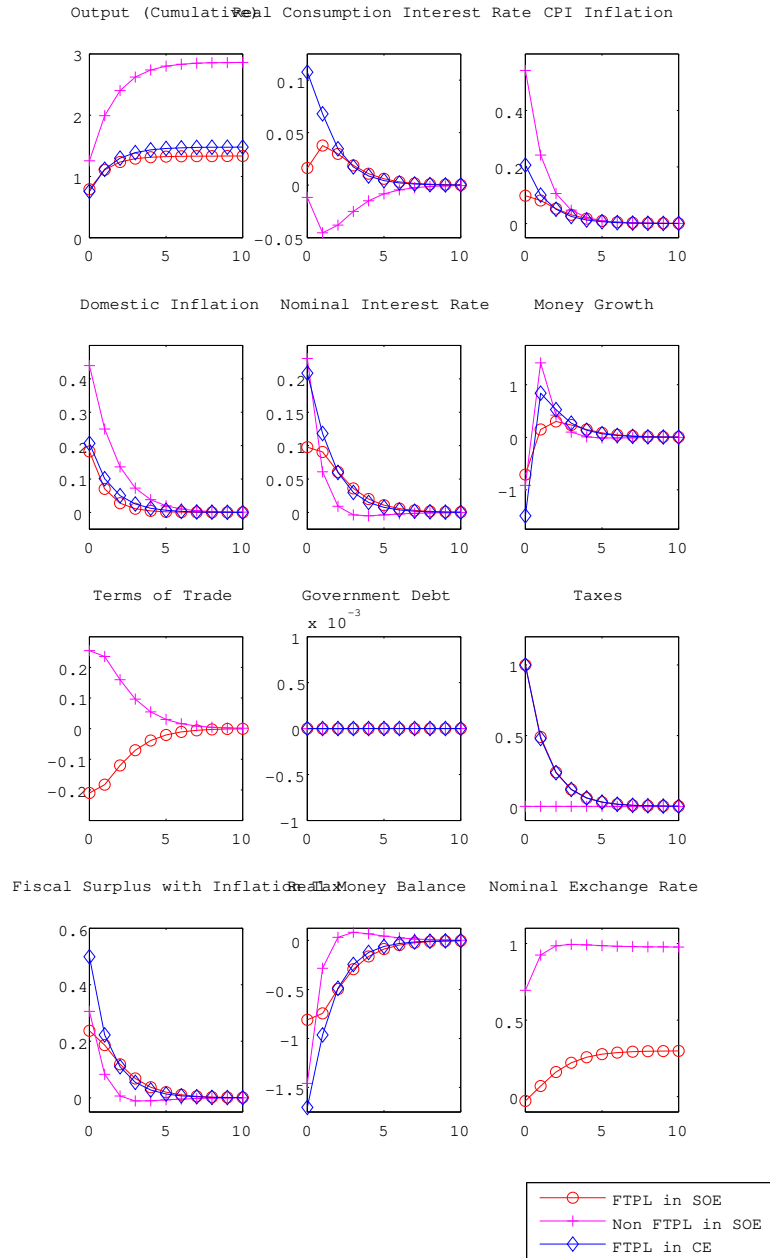


Figure 2: Fiscal Multipliers: FTPL vs. Non-FTPL

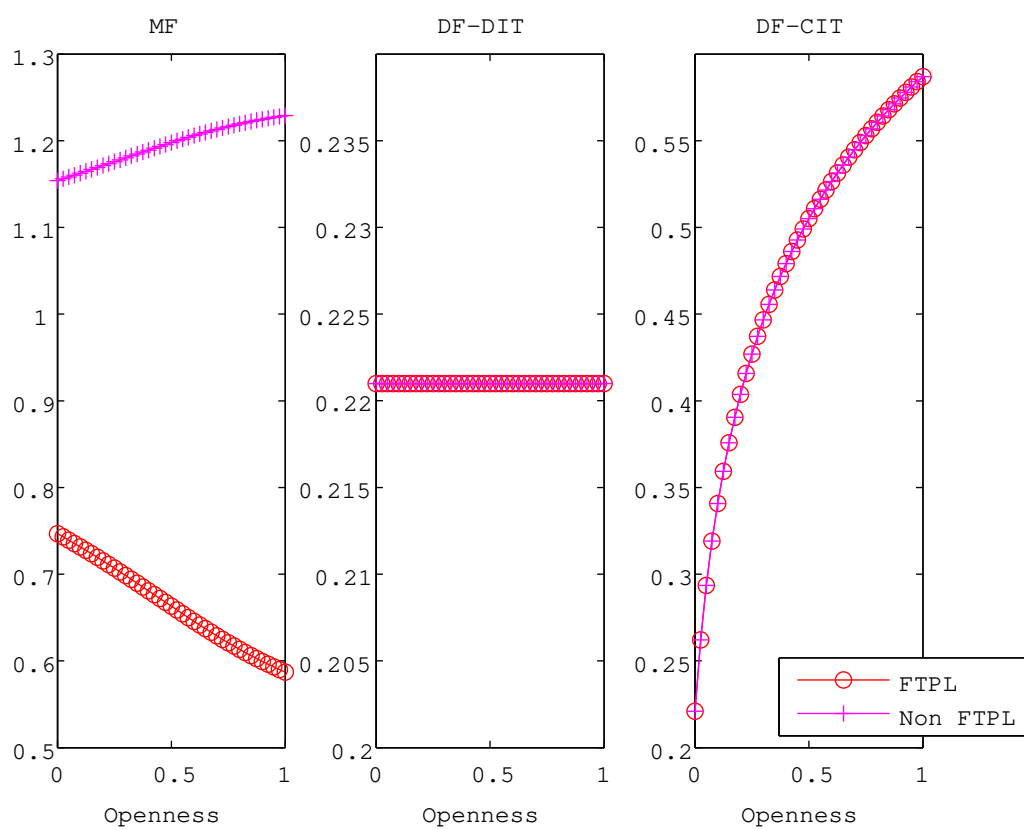


Figure 3: Fiscal Multipliers: MF vs. DF

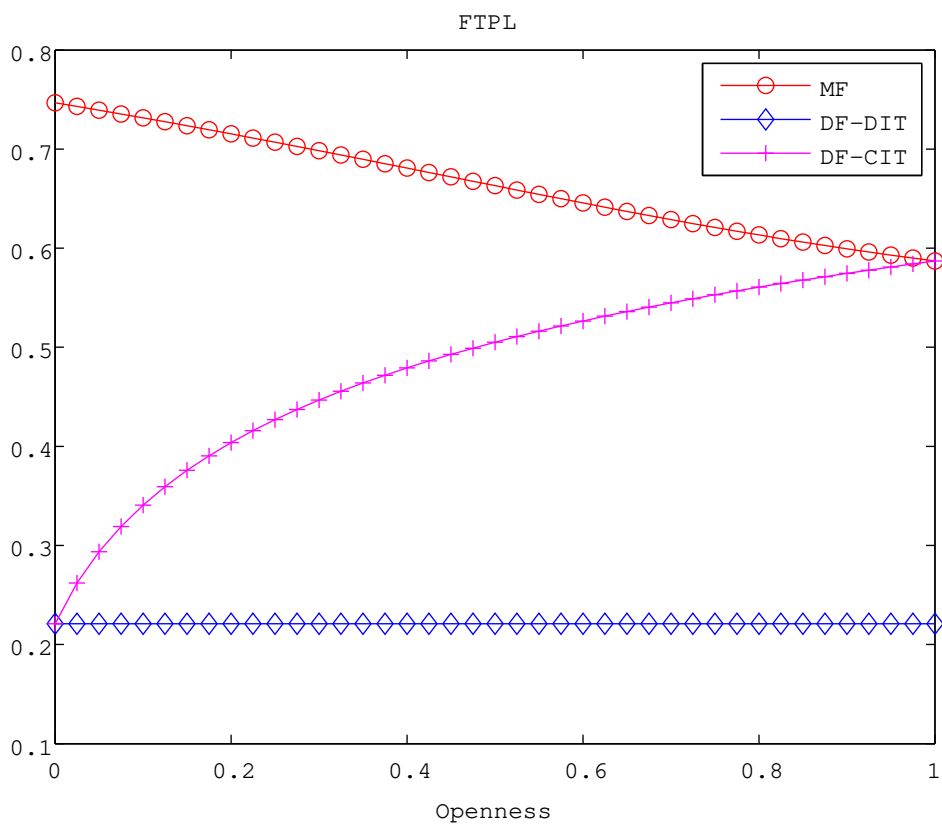


Figure 4: Dynamic Effects of an Increase in the Government Expenditure under the *MF* Fiscal Stimulus in Normal Times with an Adverse Demand Shock

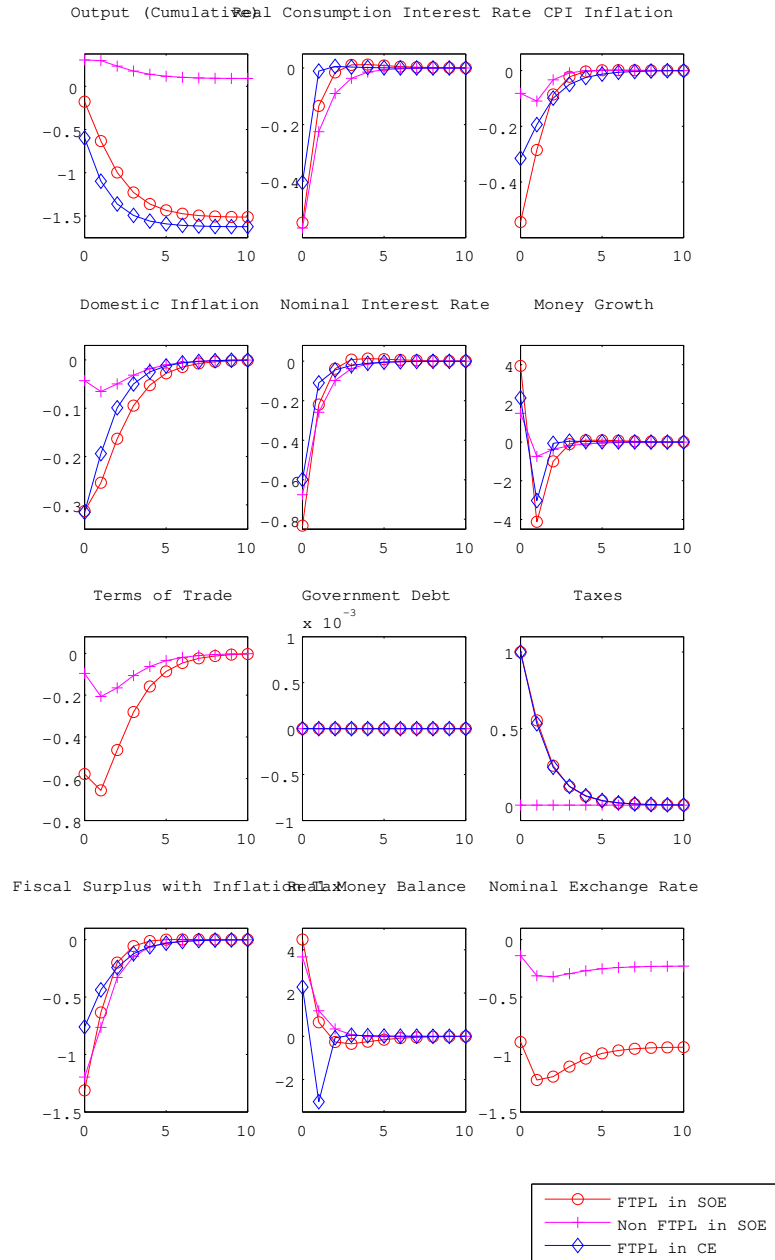


Figure 5: Fiscal Multipliers: with Adverse Demand Shock vs. without Adverse Demand Shock

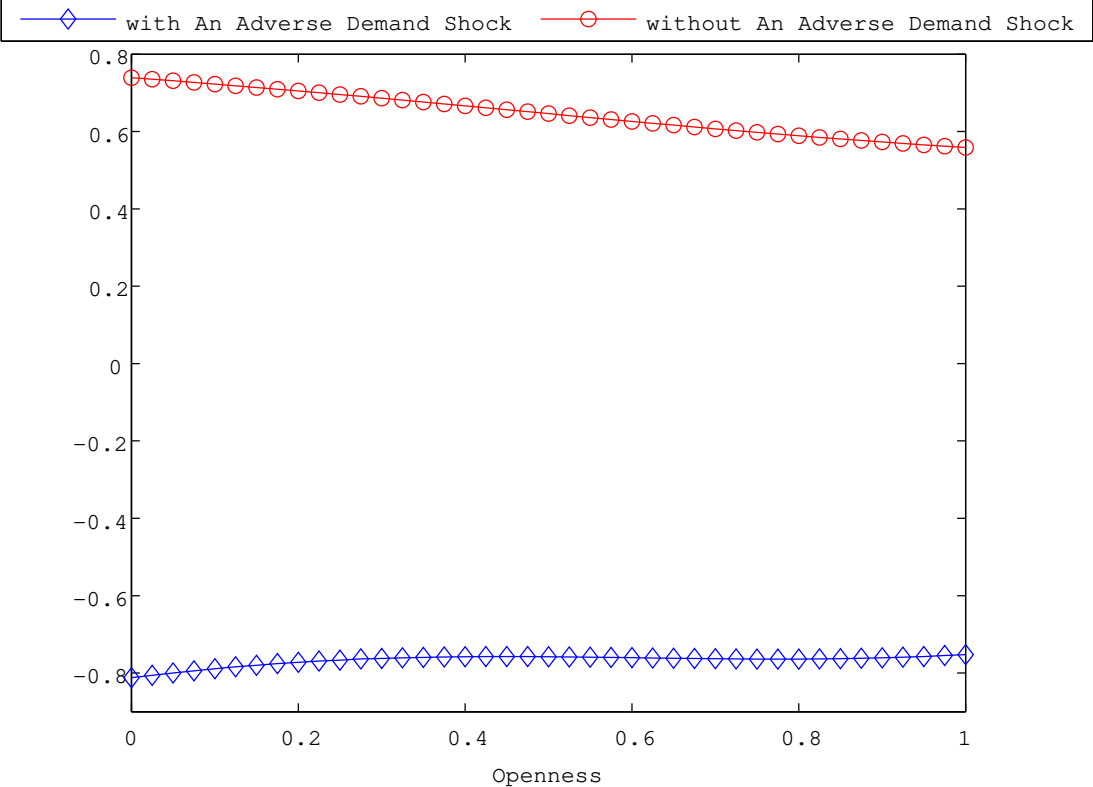


Figure 6: Dynamic Effects of an Increase in the Government Expenditure under the *MF* Fiscal Stimulus in a Liquidity Trap

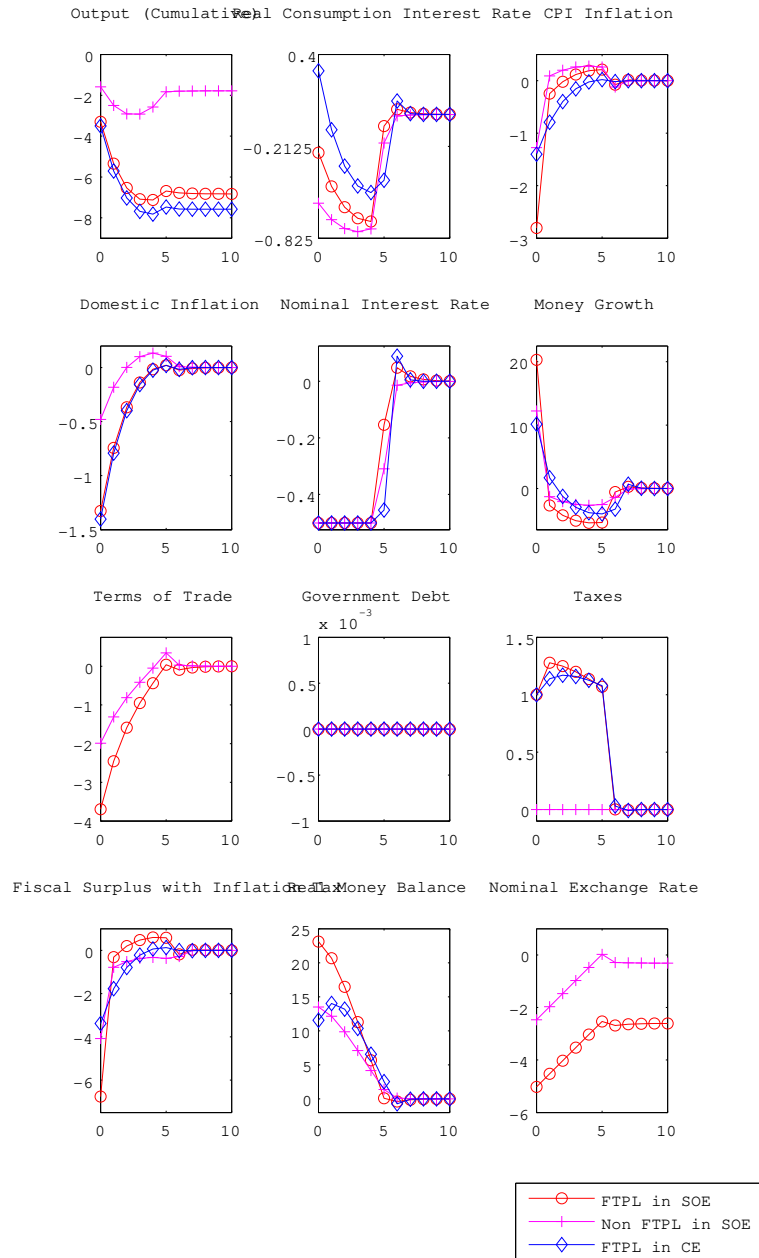


Figure 7: Dynamic Effects of an Increase in the Government Expenditure in a Liquidity Trap – Comparison of the *MF*, the *DF* (DIT), and the *DF* (CIT) Fiscal Stimulus

