Country Portfolios and Optimal Monetary Policy

Narek Ohanyan*†

American University of Armenia

February 5, 2026

Abstract

In a world of rising financial globalization, exchange rate fluctuations play an increasingly important role in shaping asset returns, thereby strengthening the exchange rate channel of monetary policy. Motivated by this premise, I study the design of optimal monetary policy in a small open economy in relation to its portfolio structure. The analysis shows that the optimal policy deviates from price stability by inducing an optimal co-movement between domestic and foreign inflation, thereby providing insurance against external shocks. Moreover, the optimal policy generates spillovers that lower government borrowing costs, reduce debt accumulation, and improve social welfare. As a result, the optimal policy strategy and the exchange rate regime depend on the fiscal policy conduct and country openness, and thus imply positive or negative co-movements between domestic and foreign variables.

Keywords: monetary policy, fiscal policy, portfolio choice, exchange rates, inflation targeting.

JEL Classification Codes: E52, E63, F31, F41

*Email: narek.ohanyan@aua.am.

Narek Ohanyan is an Assistant Professor at the American University of Armenia and a CERGE-EI Foundation Teaching Fellow.

†This paper is based on the first chapter of my doctoral dissertation at the Pompeu Fabra University, Barcelona, Spain. I am extremely grateful to my advisers Vladimir Asriyan and Edouard Schaal for their invaluable guidance and support. I also thank the Editor, two anonymous Referees, Jordi Galí, Fernando Broner, Luigi Bocola, Alexandre Kohlhas, Vahagn Jerbashian for very helpful comments and discussions, as well as the participants of the CREI Macro Lunch Seminars, 2022 Young Scholars Workshop, and the 2023 Annual Meeting of the Armenian Economic Association for their helpful feedback and suggestions.

The published article is available at https://doi.org/10.1016/j.jimonfin.2026.103537.

Introduction

Financial globalization has led to significant growth in external assets held by both advanced and emerging economies, resulting in unprecedented levels of external wealth. Notably, between the years 1995 and 2015, most countries witnessed a two- to three-fold surge in their external wealth (Lane and Milesi-Ferretti, 2018). Nonetheless, this growth has concurrently increased the countries' vulnerability to external shocks such as exchange rate fluctuations, foreign inflationary pressures, and monetary policy shocks.

The growing integration of global financial markets creates incentives for central banks to leverage exchange rates as a means of influencing asset returns and country portfolios. Motivated by this premise, I study the optimal monetary policy regime in relation to the economy's external wealth position. To this end, I develop a small open economy model with overlapping generations and foreign asset holdings to analyze the policy implications of international portfolio exposures. In the model, monetary non-neutrality arises from the presence of nominal financial contracts, whereby monetary policy affects the real returns on domestic assets, and thus overall portfolio returns. Consequently, the analysis shows that, by inducing an optimal co-movement between domestic and foreign asset returns, the central bank can effectively provide insurance against external shocks, thereby completing the markets.

I then evaluate the welfare implications of alternative monetary policy regimes and find that, contrary to the conventional wisdom, the optimal policy does not imply strict price stability. Moreover, the welfare-maximizing policy depends critically on the fiscal policy conduct and country openness. Specifically, I show that allowing domestic inflation to comove – either positively or negatively – with foreign inflation can enhance household welfare, depending on country characteristics. For a broad range of parameter values, the optimal policy entails a negative correlation between domestic and foreign inflation rates, accompanied by positive inflation volatility. These results contrast with much of the existing literature (e.g., Benigno and Benigno (2003), Céspedes et al. (2004)), which typically identifies price stability, combined with exchange rate flexibility, as the optimal monetary policy strategy.

This paper contributes to the literature by identifying and analyzing two unconventional channels through which monetary policy can generate real effects. It further characterizes the optimal policy framework that operates through these channels to maximize social welfare.

In particular, I show that the central bank can provide insurance against foreign shocks by inducing an optimal co-movement between domestic and foreign inflation. The welfare-improving effects of domestic inflation arise from its effects on the real returns of domestic and foreign assets, while the accompanying exchange rate fluctuations affect asset returns through valuation effects.[1] Through these two mechanisms, the central bank can pursue its policy objectives by managing the correlation between domestic and foreign asset returns. In doing so, domestic assets play a complementary role, allowing households to hedge against foreign shocks. In the baseline model, the optimal policy induces a negative co-movement between domestic and foreign inflation, thereby increasing the expected return on the aggregate portfolio.[2]

The welfare gains from the optimal co-movement between domestic and foreign inflation also extend beyond the insurance channel and improved portfolio returns. I find that the provision of insurance increases the demand for domestic assets, thereby reducing the government's borrowing costs. Over time, these effects translate into lower government debt accumulation and a reduced tax burden on households, thereby improving aggregate welfare. Consequently, although lower interest rates diminish portfolio returns, they also reduce public debt and alleviate the tax burden on households. Therefore, the central bank faces a trade-off between the effects of its policy on portfolio returns and on household taxation. I find that the wealth effect dominates the portfolio effect, and then characterize the optimal policy framework that balances these opposing effects.

The resulting spillovers from monetary policy to government borrowing costs, debt accumulation, and taxation constitute a central feature of the model. Importantly, this interaction between monetary and fiscal policy arises endogenously in the model and does not rely on coordinated policy actions or active fiscal stabilization. Instead, fiscal outcomes respond passively to the monetary policy regime through equilibrium asset prices and debt dynamics. This mechanism highlights a channel through which monetary policy can influence long-run fiscal conditions and aggregate welfare.

Another key distinction between the model developed in this paper and existing frameworks lies in the mechanism through which the central bank provides insurance to households. In the present model, the provision of insurance operates through wealth transfers across generations, in contrast to Fanelli (2024), where redistribution occurs across countries.

Specifically, under the optimal policy regime, periods of high foreign inflation prompt the central bank to induce lower domestic inflation, thereby increasing the real returns on domestic assets held by the older generation. However, this leads to a larger amount of new debt issuance and simultaneously raises the real cost of government borrowing due to the larger supply of government bonds. The latter, in turn, leads to higher taxes and thus lower wealth levels for future young generations. By exploring this intergenerational

[1] See also Tille (2008) and Benigno (2009a) for discussions of the role of exchange rates as determinants of portfolio returns, and Céspedes et al. (2004) for a model of balance-sheet effects of exchange rate fluctuations.

[2] This mechanism is related to the insurance channel analyzed by Fanelli (2024), but in contrast, it operates as a portfolio effect, without interacting with price rigidities or capital controls.

insurance mechanism, the paper studies the optimal policy framework that internalizes these intergenerational trade-offs and achieves maximum social welfare across generations.

Furthermore, I extend the model to incorporate tradable and non-tradable goods with price rigidities and find that the optimal policy regime depends on the degree of country openness, measured by the share of tradable goods in the consumption basket. The underlying mechanism operates through the import share, which determines the optimal co-movement between domestic and foreign inflation. Specifically, the analysis finds that in economies with a low share of tradable goods, the welfare-maximizing policy entails a positive pass-through of foreign inflation to imported goods prices. By contrast, as openness increases, a negative pass-through becomes optimal. In either case, the optimal policy framework yields higher welfare than conventional inflation targeting or a fixed exchange rate regime.

A key advantage of the model developed here is that, unlike many existing frameworks, it admits exact analytical solutions while preserving the model's non-linearities. This feature is particularly important because portfolio decisions inherently involve trade-offs between risk and return, which are often obscured in models solved via perturbation methods. Much of the existing literature relies on approximation techniques that do not permit exact analytical solutions (e.g., Devereux and Sutherland (2009), Devereux and Sutherland (2010), Tille and van Wincoop (2010), Zhang (2019)).[3] In contrast, I solve the model for a finite set of exogenous states, enabling exact analytical solutions while fully retaining the model's non-linear structure.

The paper contributes to several strands of the literature. First, it extends the work on price stability and optimal monetary policy in open economies (e.g., Svensson (2000), Benigno and Benigno (2003), Benigno (2009b), Corsetti et al. (2010), Devereux and Engel (2003), Coulibaly (2023), Egorov and Mukhin (2023)) by highlighting two unconventional channels through which monetary policy can generate real effects: via portfolio returns and through the government's cost of borrowing. I characterize the optimal policy framework operating through these channels, showing how it provides insurance against foreign shocks, improves portfolio diversification, and reduces government debt. Related insurance motives are also explored in the literature (e.g., Obstfeld and Rogoff (2002), Corsetti et al. (2010), Fanelli (2024)).

The paper further contributes to this literature by proposing alternative mechanisms through which a central bank can mitigate the effects of adverse shocks on households. Prior

[3] Adams and Barrett (2021) and Fanelli (2024) are notable exceptions: the former employs a global projection method to solve for optimal portfolios, while the latter develops an approximation technique that allows for analytical analysis of monetary and capital control policies.

studies have also documented welfare gains from inflation volatility: Chari et al. (1991) analyze how government policies can use inflation to alter ex post returns on nominal debt in a closed economy, while Siu (2004) considers state-contingent inflation as a buffer against fiscal shocks. In a similar vein, I show that gains from inflation volatility can serve as a form of insurance against foreign shocks. This finding is consistent with Benigno (2009b), who argues that the welfare benefits of deviating from strict price stability may outweigh the costs associated with incomplete markets.

The results obtained here also speak to the literature on optimal monetary and exchange rate policies (see e.g. Céspedes et al. (2004); Galí and Monacelli (2005); Chang and Velasco (2006); Benigno and Benigno (2006); De Paoli (2009); Benigno (2009a); Schmitt-Grohé and Uribe (2001) and more recently Fornaro (2015); Drenik et al. (2021); Itskhoki and Mukhin (2023)) by highlighting the role of country portfolios in shaping the optimal monetary policy design. Finally, this paper contributes to the growing literature on monetary policy in overlapping generations models initiated by Galí (2014, 2021) by studying the monetary policy transmission channels in these models.

The rest of this paper is structured as follows. In Sections 1 to 3 I present the baseline model and discuss its dynamic properties. Sections 4 and 5 discuss the welfare effects of monetary policy and the optimal policy framework, respectively. Section 6 extends the model into a production economy with sticky prices, while Section 7 examines the robustness of the results. Finally, Section 8 concludes.

1 The model

Consider a small open economy that is populated by households, a government, and a central bank. There is a single internationally traded good consumed by households.

The foreign economy is assumed to be exogenous.

1.1 Households

There are overlapping generations of two-period lived households. Each period, indexed by $t = 1, 2, \ldots$, a new generation of young households is born, of measure one, who are endowed with Q_t units of the consumption good, must pay T_t as taxes to the government and receive B_t as transfers from it. Young households also have access to domestic and foreign government bonds D_t and F_t with gross nominal interest rates R_t and R_t^* respectively.[4]

[4] In the baseline model, I assume that the foreign interest rate R_t^* is constant. Then, in Section 7, I consider an extension with stochastic foreign interest rates.

Households derive utility from consumption when they become old. The preferences of the representative household born in period t are given by

$$U_t = E_t \left[\log\left(C_{t+1}\right)\right]$$

while the budget constraint of the household is given by

$$D_t + F_t = Q_t + B_t - T_t \tag{1}$$

for the young households, and

$$C_{t+1} = \frac{R_t}{\Pi_{t+1}} D_t + \Psi_{t+1} \frac{R_t^*}{\Pi_{t+1}} F_t \tag{2}$$

for the old households, where $\Pi_t \equiv P_t/P_{t-1}$ is gross inflation and $\Psi_t \equiv \mathcal{E}_t/\mathcal{E}_{t-1}$ is the rate of exchange rate depreciation.

Note that the domestic and foreign bonds are assumed to be nominal. That is, the nominal return of domestic (foreign) bonds is fixed in domestic (foreign) currency, and it is thus affected by realized inflation (inflation and exchange rates). This will be the source of monetary non-neutralities, as we will see later.

There is also an initial old generation consuming at time $t = 1$ which holds an initial stock of domestic and foreign bonds D_0 and F_0 with interest rates R_0 and R_0^* respectively.

1.2 Government

The domestic government collects taxes T_t from households and issues bonds D_t to them to satisfy its spending needs G_t, as well as to roll over the previous period's debt.[5] The government budget constraint is given by

$$G_t + \frac{R_{t-1}}{\Pi_t} D_{t-1} = T_t + D_t \tag{3}$$

The government spending G_t is exogenous and constant in the baseline model.[6] A fraction $\kappa \in [0, 1]$ of government spending is assumed to be returned to the domestic economy in the

[5]I will assume that the domestic debt is held domestically, which would be true, for instance, if payments to foreigners were difficult to enforce. While this is an extreme assumption made for simplicity, the results of the paper require that a part of the domestic debt is held by domestic households. In fact, in many emerging market economies, local-currency-denominated government debt is primarily held by domestic investors (International Monetary Fund, 2025).

[6]In Section 7, I consider an extension with stochastic government spending shocks and find that the results are robust to the presence of such shocks.

form of transfers $B_t = \kappa G_t$ to the young households, while the remaining fraction is used for other government expenditures.[7]

I assume that the government sets taxes according to the following rule

$$T_t = \tau D_{t-1} \tag{4}$$

where $\tau > 0$ is a parameter characterizing the tax policy.[8]

As we will see throughout the paper, the fiscal policy, as represented by G_t and τ, is an important determinant of the optimal monetary policy framework. In particular, higher government spending and lower taxes lead to increased borrowing and debt accumulation. Higher debt levels, in turn, result in a larger supply of government bonds and a higher share of domestic assets in the households' portfolios. This, consequently, affects the optimal monetary policy design.

1.3 Central bank

Goods prices are assumed to be flexible, and there are no trade costs. Moreover, since there is a single internationally tradable good, inflation is determined by the law-of-one-price identity

$$\Pi_t = \Psi_t \Pi_t^*$$

where Π_t^* is the foreign inflation.

Thus, given the foreign inflation (which I will assume is given exogenously), there is a one-to-one mapping between the rate of exchange rate depreciation and domestic inflation.[9]

[7] In the baseline model, I assume $\kappa = 1$, such that the social transfers aim to purely neutralize the effects of taxes in the economy. Then, in the online appendix, I study the optimal policy framework under alternative values of κ and find that the results are unaffected by it.

[8] Note, that substituting Eq. (4) into Eq. (3) yields the following law of motion for government debt

$$D_t = \left(\frac{R_{t-1}}{\Pi_t} - \tau \right) D_{t-1} + G_t$$

Therefore, stationarity of the model requires $\frac{R_{t-1}}{\Pi_t} - \tau < 1$, implying a sufficiently large value of τ.
If instead we assume constant taxes, government spending, and no inflation for simplicity (i.e., $\Pi_t = 1$ under inflation targeting), then Eq. (3) would reduce to

$$D_t = R_{t-1} D_{t-1} + G - T$$

Then, given a gross interest rate $R_{t-1} > 1$, the government debt would diverge.

[9] In Section 6, I also consider an extension with non-tradable goods where the pass-through from foreign inflation and exchange rates to domestic inflation is less than one-to-one.

With this relationship in place, the central bank can choose different monetary policy regimes by choosing between targeting domestic inflation or the exchange rate.[10] Therefore, similar to Benigno and Benigno (2006) and De Paoli (2009), I assume that monetary policy is implemented through a targeting rule, such that

$$\Pi_t = \Pi_t^{*\phi} \qquad \text{and} \qquad \Psi_t = \Pi_t^{*\phi-1} \tag{5}$$

Parameter ϕ above defines the monetary policy strategy as well as the exchange rate regime. The policy rule above nests inflation targeting and exchange rate pegging strategies, as well as intermediate policy regimes. In particular, $\phi = 0$ corresponds to *inflation targeting* with fixed domestic prices and a volatile exchange rate. In this case, the central bank can fully stabilize domestic prices by setting $\Psi_t = 1/\Pi_t^*$ in every period.

On the contrary, $\phi = 1$ implies an *exchange rate peg* with a fixed exchange rate and volatile domestic inflation. It is easy to see that the central bank can set $\Psi_t = 1$, such that domestic inflation would be identical to that of the foreign economy. On the other hand, $0 < \phi < 1$ corresponds to *hybrid targeting* with a relatively stable exchange rate and inflation, and partial propagation of foreign inflation shocks into the domestic economy.[11]

The rules considered above allow us to study the optimal policy in the form of simple targeting rules, rather than state-contingent policies, in line with Woodford's "timeless perspective".[12] Time-consistency of the policy plans is especially important in this environment, since it offers a coherent framework for a central bank to address the intergenerational welfare trade-offs inherent in the OLG models.

[10] The central bank's ability to control inflation can be micro-founded and derived as the cashless limit of an economy where households get utility from holding domestic money balances. Then, the central bank can control domestic inflation and exchange rate change, for example, through a money growth rate rule that targets domestic inflation or the exchange rate.

[11] See Ilzetzki et al. (2019) for a recent discussion on the history of exchange rate regimes (including hybrid arrangements) during the post-World War II period.

[12] See Woodford (1999) and Woodford (2003) for a discussion on the timeless perspective and its implications for optimal monetary policy.

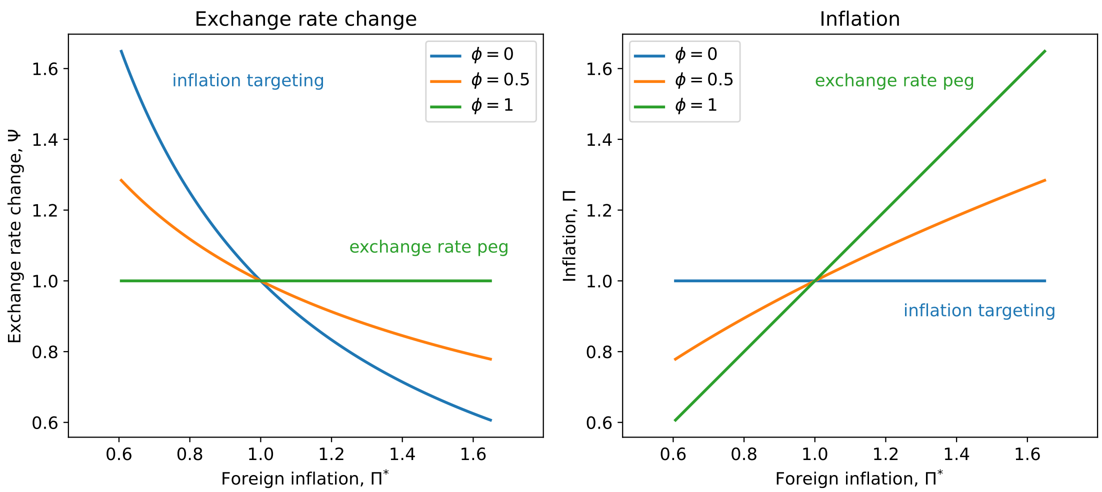


Figure 1: Effects of monetary policy strategy on exchange rate and inflation

Fig. 1 shows the relationship between domestic and foreign inflation rates as well as the exchange rate change for different values of ϕ. As the figure shows, apart from defining the policy regime, the parameter ϕ also indicates the degree of pass-through of foreign inflation to domestic inflation. For example, $\phi = 0$ implies that foreign inflation does not affect domestic inflation at all, whereas $\phi = 1$ implies that foreign inflation is replicated in the domestic economy. Generally, $\phi > 0$ implies a positive co-movement between foreign and domestic inflation, whereas $\phi < 0$ would imply a negative co-movement.

1.4 Foreign economy

The foreign economy is assumed to be arbitrarily large relative to the domestic economy. Foreign inflation shocks follow an IID process with high/low inflation states

$$\Pi_t^* = \begin{cases} \Pi^{*h} & \text{with probability} \quad p \\ \Pi^{*l} & \text{with probability} \quad 1-p \end{cases}$$

where $0 < p < 1$ and $\Pi^{*h} > \Pi^{*l} > 0$.[13]

The distribution of foreign inflation implies the following states for domestic inflation and

[13] The assumption of only two states is made for analytical tractability. In Section 7, I consider an extension with multiple states of foreign inflation and find that the results are robust to the number of states.

the exchange rate

$$\Pi_t,\ \Psi_t = \begin{cases} \Pi^h,\ \Psi^h & \text{if} \quad \Pi_t^* = \Pi^{*h} \\ \Pi^l,\ \Psi^l & \text{if} \quad \Pi_t^* = \Pi^{*l} \end{cases}$$

with $\Pi^l > 0$, $\Pi^h > 0$, $\Psi^l > 0$, $\Psi^h > 0$.

This mapping between the states of foreign inflation, domestic inflation, and the exchange rate is important for the analysis since it preserves the number of states of the model and allows us to obtain an exact solution to the model.

2 Equilibrium

Maximization of the household utility function subject to the budget constraint yields the following Euler equation for the portfolio choice

$$E_t\left[\frac{1}{C_{t+1}}\frac{R_t}{\Pi_{t+1}}\right] = E_t\left[\frac{1}{C_{t+1}}\Psi_{t+1}\frac{R_t^*}{\Pi_{t+1}}\right] \tag{6}$$

which, together with the budget constraints in Eqs. (1) and (2), determines the household demand for domestic and foreign bonds given the interest rates R_t and R_t^*.

Combining Eq. (6) with the budget constraints in Eqs. (1) and (2) yields the following demand functions for domestic and foreign bonds

$$D_t = \frac{R_t^*\Psi_{t+1}^l\Psi_{t+1}^h - R_t\left(p\Psi_{t+1}^l + (1-p)\,\Psi_{t+1}^h\right)}{\left(R_t - R_t^*\Psi_{t+1}^l\right)\left(R_t - R_t^*\Psi_{t+1}^h\right)} R_t^* Z_t \tag{7}$$

for domestic bonds, and

$$F_t = \frac{R_t - R_t^*\left(p\Psi_{t+1}^h + (1-p)\,\Psi_{t+1}^l\right)}{\left(R_t - R_t^*\Psi_{t+1}^l\right)\left(R_t - R_t^*\Psi_{t+1}^h\right)} R_t Z_t \tag{8}$$

for foreign bonds, with

$$Z_t \equiv D_t + F_t = Q_t + B_t - T_t$$

where I keep the subscripts on the high/low values of Ψ_{t+1} to emphasize the fact that they are realized in the period *t+1*.

Definition 1 (Equilibrium)

For sequences of Q_t, G_t, R_t^* and Π_t^*, competitive equilibrium is defined as the sequence of

D_t, F_t, B_t, T_t, C_t, R_t, Π_t and Ψ_t satisfying Eqs. (1), (2), (3), (4), (5) and (6).

From Eq. (3) and Eq. (4), it follows that D_t is predetermined by the state variables D_{t-1}, R_{t-1}, G_t, and Π_t^*. Consequently, the supply of domestic government bonds is inelastic in each period. The equilibrium interest rate R_t is then determined by Eq. (7), adjusting to absorb fluctuations in supply and to clear the government bond market. The amount of foreign bonds is then determined from Eq. (8), representing the residual wealth after meeting the inelastic supply of domestic bonds.

Lemma 1 (Existence and uniqueness of equilibrium)
Given a domestic debt level D_t, such that $0 < D_t < Z_t$, there exists a unique equilibrium interest rate R_t that satisfies the portfolio optimality conditions in Eqs. (7) and (8).

The equilibrium interest rate R_t is given by

$$R_t = \frac{1}{2} R_t^* \left[\left(\Psi_{t+1}^l + \Psi_{t+1}^h \right) - \frac{Z_t}{D_t} \left(p\Psi_{t+1}^l + (1-p)\,\Psi_{t+1}^h \right) + \Delta_t^{1/2} \right] \tag{9}$$

where

$$\Delta_t = \left(\Psi_{t+1}^l - \Psi_{t+1}^h \right)^2 - 2\frac{Z_t}{D_t} \left(\Psi_{t+1}^l - \Psi_{t+1}^h \right) \left(p\Psi_{t+1}^l - (1-p)\,\Psi_{t+1}^h \right) + \frac{Z_t^2}{D_t^2} \left(p\Psi_{t+1}^l + (1-p)\,\Psi_{t+1}^h \right)^2$$

Lemma 1 establishes the existence of a unique equilibrium interest rate R_t, which is the only variable that is not predetermined by the rest of the equilibrium conditions. Therefore, the lemma confirms the uniqueness of the equilibrium.

To further characterize the equilibrium analytically, for the rest of this paper, I assume that low and high foreign inflation states are equally likely, i.e., $p = 1/2$. This assumption is not essential for the results of this paper, but it simplifies the analysis and the exposition.

Moreover, the low and high states of foreign inflation are set to

$$\log \Pi^{*h} = \sigma_{\pi^*}$$
$$\log \Pi^{*l} = -\sigma_{\pi^*}$$

where $\sigma_{\pi^*} \geq 0$ denotes the volatility of foreign inflation.[14][15]

[14]Noting that $E\left[\log \Pi_t^*\right] = 0$, we can see that σ_{π^*} equals to the standard deviation of foreign inflation

$$\operatorname{Var}\left(\log \Pi_t^*\right) = \frac{1}{2}\log^2 \Pi^{*h} + \frac{1}{2}\log^2 \Pi^{*l} = \sigma_{\pi^*}^2$$

[15]We may also note that the assumptions about foreign inflation states imply a positive expected foreign inflation rate, i.e., $E\left[\Pi_t^*\right] > 1$. However, the results of this paper are due to the volatility of foreign inflation, rather than its expected value.

On the other hand, using the definition of the exchange rate, we obtain the following implied states for the exchange rate change

$$\log \Psi^l = (\phi - 1)(-\sigma_{\pi^*}) = \psi$$
$$\log \Psi^h = (\phi - 1)\sigma_{\pi^*} = -\psi$$

where, given that $\phi \leq 1$ for the monetary policy strategies considered in this paper, $\psi \geq 0$ denotes the volatility of exchange rate changes.

2.1 Determinants of the equilibrium interest rate

Under the assumed distribution of foreign inflation and exchange rate changes, the relative interest rate from Eq. (9) can be rewritten as

$$\frac{R_t}{R_t^*} = \frac{1}{2}\left[\left(e^{\psi} + e^{-\psi}\right)\left(1 - \frac{1}{2\omega_t}\right) + \Delta_t^{1/2}\right] \tag{10}$$

where

$$\Delta_t = \left(e^{\psi} - e^{-\psi}\right)^2\left(1 - \frac{1}{2\omega_t}\right)^2 + \frac{1}{\omega_t^2} \tag{11}$$

and $\omega_t \equiv D_t/Z_t$ is the share of domestic bonds in households' portfolios.

In the remainder of this section, I study the determinants of the relative interest rate R_t/R_t^*. For that purpose, Lemma 2 establishes the relationship between the share of domestic bonds ω_t, the volatility of the exchange rate change ψ and the relative interest rate R_t/R_t^*.

Lemma 2 (First derivatives of R_t/R_t^*)

Given the equilibrium relative interest rate R_t/R_t^* as a function of the share of domestic bonds ω_t and exchange rate volatility ψ, as in Eq. (10), the following statements hold.

- *R_t/R_t^* is weakly increasing in ω_t for all $0 < \omega_t < 1$ and $\psi \geq 0$:*

  $$\frac{\partial R_t/R_t^*}{\partial \omega_t} \geq 0 \qquad \textit{for} \quad 0 < \omega_t < 1$$

  with equality if and only if $\psi = 0$.

- *R_t/R_t^* is weakly decreasing in ψ for $0 < \omega_t \leq 1/2$, and weakly increasing for $1/2 \leq \omega_t < 1$ and all $\psi \geq 0$:*

  $$\frac{\partial R_t/R_t^*}{\partial \psi} \leq 0 \qquad \textit{for} \quad 0 < \omega_t \leq 1/2 \qquad \textit{and} \qquad \frac{\partial R_t/R_t^*}{\partial \psi} \geq 0 \qquad \textit{for} \quad 1/2 \leq \omega_t < 1$$

with equality if and only if $\omega_t = 1/2$.

To better understand these results, first note from Eq. (10) that in the case of an exchange rate peg with $\psi = 0$, domestic and foreign assets become perfect substitutes, hence the relative interest rate is independent of the share of domestic bonds and is equal to 1. On the other hand, under a volatile exchange rate with $\psi > 0$, households allocate their wealth between (nominally) riskless domestic bonds and risky foreign bonds. Thus, the first part of Lemma 2 implies that households demand higher domestic interest rates to hold a larger share of domestic bonds in their portfolios.

The second part of Lemma 2 characterizes the relationship between the relative interest rate and the volatility of the exchange rate change. It is easy to see from Eq. (10) that for any level of exchange rate volatility, the relative interest rate is equal to 1 when households hold equal shares of domestic and foreign bonds, i.e., $\omega_t = 1/2$. This is because with log utility, households hold a growth-optimal portfolio that balances the risk and return characteristics of the two assets. Specifically, any loss in utility due to exchange rate volatility (volatility effect) is offset by the higher returns on foreign bonds (return effect), such that households do not require any additional compensation in the form of higher domestic interest rates.

However, although exchange rate volatility does not affect the relative interest rate at $\omega_t = 1/2$, it affects the latter at other values of ω_t. In particular, for $0 < \omega_t \leq 1/2$, an increase in exchange rate volatility leads to larger consumption volatility and higher demand for domestic bonds in the form of a hedge against these fluctuations (i.e., the volatility effect dominates the return effect). As a result, households require lower relative interest rates to hold domestic bonds. On the other hand, for $1/2 \leq \omega_t < 1$, exchange rate volatility leads to relatively lower consumption volatility and households require higher relative interest rates to hold domestic bonds (i.e., the return effect dominates the volatility effect).

3 Transition dynamics

The dynamics of the economy are governed by the government debt accumulation equation, which may take different forms depending on the monetary policy regime. In particular, the domestic real interest rate, which determines the rate of government debt accumulation, depends on the monetary policy regime chosen by the central bank.

If the central bank implements an inflation-targeting strategy, then the domestic inflation rate is fixed at $\Pi_t = 1$, and foreign inflation shocks are completely absorbed by the exchange rate. As a result, the dynamics of the economy are not affected by foreign inflation shocks, and the government debt evolves according to the following equation

$$D_t = (R_{t-1} - \tau)\, D_{t-1} + G_t$$

Hence, for a given initial level of government debt D_0, the government debt converges to a long-run equilibrium level $\overline{D}$, as shown in Fig. 2.[16] Note, also, that the domestic real interest rate R_t is increasing in the share of domestic bonds ω_t, as a result of Lemma 2, thus the convexity of the transition function in the left panel of Fig. 2.

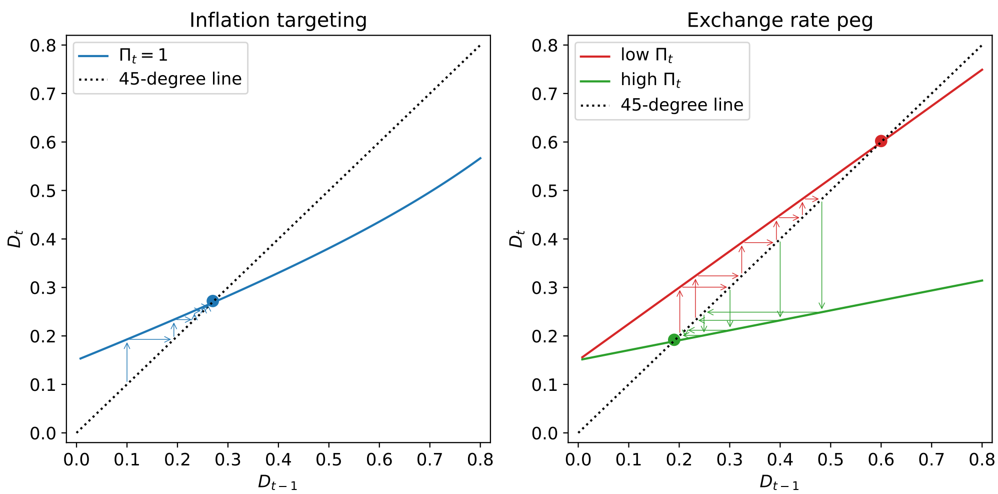


Figure 2: Transition dynamics under different monetary policy strategies

Inflation-targeting strategy with $\phi = 0$ leads to a constant long-run equilibrium level for all domestic variables, except for consumption, which fluctuates as a result of volatile returns on foreign assets. In the long-run equilibrium, since domestic prices are fixed, there are no further disturbances that may drive government debt away from its equilibrium level. Hence, under inflation targeting, the government debt, taxes, and the domestic interest rate are constant in the long-run equilibrium.

However, if the central bank implements an exchange rate peg with $\Psi_t = 1$, then foreign inflation shocks propagate into the economy with a complete pass-through, and domestic inflation is equal to the foreign inflation $\Pi_t = \Pi_t^*$. Then, the real interest rate may take two

[16]Note that the long-run equilibrium in the economy under inflation targeting differs from the deterministic steady-state level without shocks. In particular, in the presence of foreign shocks, the domestic interest rate R_t differs from the foreign interest rate R_t^* due to exchange rate volatility and the resulting demand for domestic bonds as a safe asset. Consequently, the long-run equilibrium levels of domestic variables are different from their steady-state levels in the absence of shocks. To maintain consistency throughout the paper, I refer to this state as the "long-run equilibrium", denoting it with an overline, and reserve the term "steady state" for the case without shocks, denoting it with SS.

different values depending on the state of the economy, and the government debt will evolve according to the following equations

- low inflation state: $\Pi_t = \Pi^l$

$$D_t = \left(\frac{R_{t-1}}{\Pi^l} - \tau \right) D_{t-1} + G_t$$

- high inflation state: $\Pi_t = \Pi^h$

$$D_t = \left(\frac{R_{t-1}}{\Pi^h} - \tau \right) D_{t-1} + G_t$$

As a result, the government debt accumulates faster in the low-inflation state and slower in the high-inflation state. On the other hand, under an exchange rate peg, the domestic interest rate is equal to the foreign interest rate $R_t = R_t^*$. Hence, unlike the case of inflation targeting, the government debt does not converge to a long-run equilibrium level but instead oscillates within a limited range, as shown in Fig. 2.

4 Welfare

To analyze the welfare effects of the monetary policy regime, we need to define an aggregate welfare measure that will encompass the welfare of all generations. Given such an objective, the optimal monetary policy strategy will aim to maximize an aggregate household welfare measure $\mathcal{U}$, that is

$$\max_{\phi} \quad \mathcal{U}$$

subject to the equilibrium conditions of the model.

Recall that the welfare of the generation born at time t is

$$U_t = E_t \left[\log \left(C_{t+1} \right) \right]$$

which shows the expected utility from old-age consumption at time *t-1*.

Then, an aggregate welfare measure comprising all generations can be defined as

$$\mathcal{U} \equiv E\left[U_t\right] = \lim_{T \to \infty} \frac{1}{T} \sum_{t=0}^{T} U_t$$

The welfare measure above is defined as the unconditional expectation of the utility of a representative generation, or equivalently, the average utility of all generations.[17]

Unlike in models with infinitely lived agents and time discounting, the welfare measure defined above assigns equal weights to all generations. This choice is motivated by the following considerations. The main objective of the paper is to identify the optimal monetary policy regime characterized by a time-invariant parameter ϕ, rather than a state-contingent optimal policy. Consequently, the welfare measure is defined as the unconditional expectation of the utility of all generations, which is consistent with the time-invariant nature of the policy parameter.[18]

The effects of the monetary policy regime on aggregate welfare can be observed by studying its effects on household consumption. For this purpose, substituting $\Psi_t = \Pi_t/\Pi_t^*$ from the law-of-one-price relation into the household budget constraint Eq. (2), we obtain

$$C_{t+1} = \frac{R_t}{\Pi_{t+1}} D_t + \frac{R_t^*}{\Pi_{t+1}^*} F_t$$

Hence, monetary policy may affect consumption through its effects on portfolio allocation between domestic and foreign bonds, as well as through its effects on the real returns of those assets. The latter expression, however, shows that monetary policy may only affect the real returns of domestic assets, whereas the real returns of foreign assets are determined by the foreign nominal interest rate R_t^* and the foreign inflation rate Π_{t+1}^*.

Therefore, monetary policy can affect consumption through the following channels: 1) real interest rate: through its effects on R_t and Π_{t+1}, 2) portfolio allocation: through its effects on D_t vs F_t, 3) interaction with fiscal policy: through its effects on $D_t \to T_t \to Z_t$.

To evaluate the effects of each transmission channel on household welfare across generations, it is useful to apply a decomposition of the welfare measure into its components. For this purpose, household consumption can be expressed as

$$C_{t+1} = \frac{R_t}{\Pi_{t+1}} D_t + \frac{R_t^*}{\Pi_{t+1}^*} F_t = X_{t+1} Z_t \tag{12}$$

where

$$X_{t+1} = \omega_t \frac{R_t}{\Pi_{t+1}} + (1 - \omega_t) \frac{R_t^*}{\Pi_{t+1}^*} \tag{13}$$

[17]Note that the existence of the aggregate welfare measure depends on the stationarity of the model, which is satisfied given the model assumptions.

[18]In Section 7, I also consider the sum of discounted utilities of all generations as an alternative welfare measure and study the optimal policy under this specification.

is the real return on the household's portfolio.

Then, the welfare of generation t can be expressed as a sum of two components: 1) the log wealth of households, and 2) the expected log return on their portfolios. That is

$$U_t \equiv E_t \left[\log\left(C_{t+1}\right)\right] = \log Z_t + E_t \left[\log\left(X_{t+1}\right)\right]$$

Similarly, the aggregate welfare measure can be written as

$$\mathcal{U} \equiv E\left[U_t\right] = E\left[\log Z_t\right] + E\left[E_t\left[\log\left(X_{t+1}\right)\right]\right]$$

To study the effects of monetary policy on household welfare, I first analyze the effects of the policy parameter ϕ on the utility of each generation. Taking the total derivative of the utility of generation t with respect to ϕ, we obtain

$$\frac{dU_t}{d\phi} = \underbrace{\frac{d}{d\phi}\log Z_t}_{\text{Wealth effect}} + \underbrace{\frac{\partial}{\partial \omega_t} E_t\left[\log\left(X_{t+1}\right)\right]\frac{d\omega_t}{d\phi}}_{\text{Portfolio allocation effect}} + \underbrace{\frac{\partial}{\partial \phi} E_t\left[\log\left(X_{t+1}\right)\right]}_{\text{Portfolio return effect}} \tag{14}$$

The decomposition above breaks down the effects of monetary policy into three components: 1) the *indirect* effects through the wealth of the households, 2) *indirect* effects through the portfolio allocation, and 3) the *direct* effects through the real returns on portfolios. Note that the portfolio return X_{t+1} is a function of the monetary policy strategy parameter ϕ, as well as the share of domestic bonds ω_t, which itself also depends on ϕ. Therefore, the effects of monetary policy on the real returns of portfolios are separated into the portfolio allocation effect and the portfolio return effect.

Finally, it should be noted that as we preserve the non-linearities in the model to obtain accurate analytical solutions for portfolio decisions, this creates some challenges in the welfare analysis. As a result, the interaction of the model's non-linearities with the stochastic nature of the economy prevents us from studying the aggregate welfare effects analytically. Specifically, while the portfolio return effect is straightforward to analyze, the two remaining channels above – the portfolio allocation and wealth effects – do not exhibit closed-form expressions for all values of ϕ.

Therefore, in the remainder of this section, I study these two channels under inflation targeting and exchange rate peg regimes, which allow us to determine the sign of the optimal ϕ. Then, in Section 5, I analyze overall welfare effects and find the optimal policy parameter ϕ numerically.

4.1 Portfolio return effect

To analyze the effects of monetary policy on household utility, I study each of the three channels separately. I begin by considering the impact of monetary policy on the real returns of household portfolios. We can see from Eq. (13) that portfolio returns are determined by the structure of portfolios ω_t, the domestic interest rate R_t, and inflation Π_{t+1} (and the resulting fluctuations in the exchange rate Ψ_{t+1}). Then, monetary policy can affect portfolio returns through two channels – its effects on the portfolio structure and consequently the domestic interest rate R_t, as well as its effects on domestic inflation Π_{t+1}.[19] Thus, to study these effects, Lemma 3 below formulates the partial effects of portfolio structure and the monetary policy regime on expected log returns.

Lemma 3 (Determinants of expected log returns)
The following statements hold for the expected log portfolio return.

- *The expected log portfolio return is weakly increasing in the share of domestic bonds:*

$$\frac{\partial}{\partial \omega_t} E_t \left[\log\left(X_{t+1}\right)\right] \geq 0 \qquad \textit{for} \quad 0 < \omega_t < 1 \quad \textit{and} \quad \phi \leq 1$$

with equality if and only if $\phi = 1$.

- *The expected log portfolio return is weakly decreasing in the monetary policy strategy parameter:*

$$\frac{\partial}{\partial \phi} E_t \left[\log\left(X_{t+1}\right)\right] \leq 0 \qquad \textit{for} \quad 0 < \omega_t < 1 \quad \textit{and} \quad \phi \leq 1$$

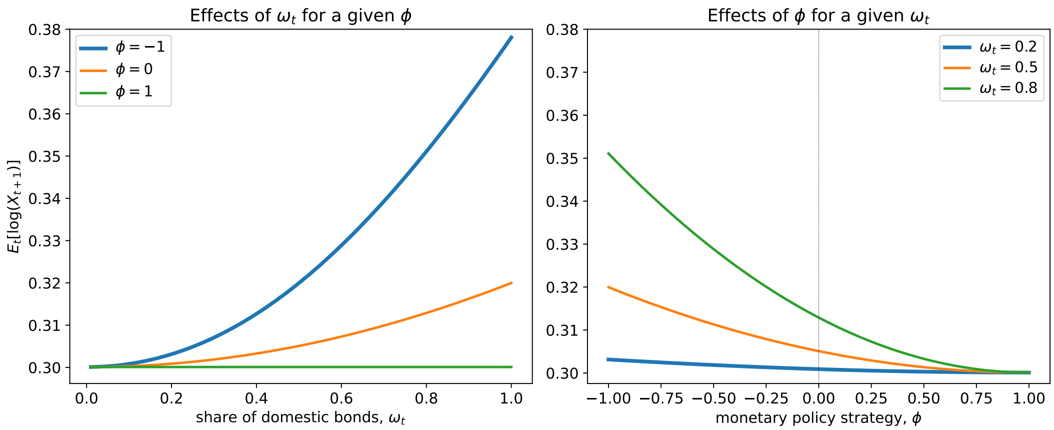
with equality if and only if $\phi = 1$.

The first part of Lemma 3 shows that expected log returns are increasing in the share of domestic bonds ω_t. This result is due to two different effects. First, the household optimality condition Eq. (6) implies that expected log returns are at their optimum; hence, in general equilibrium, ω_t has no first-order effect on expected log returns. However, while households optimize their portfolio structure given the domestic interest rate R_t, the aggregate portfolio structure ω_t has general equilibrium effects on R_t, as a result of Lemma 2. Therefore, a higher share of domestic bonds increases the expected log portfolio returns.

Then, the second part of Lemma 3 shows that expected log returns are decreasing in the monetary policy strategy parameter ϕ. The welfare benefits of a lower ϕ arise because

[19] Recall from Section 2.1 that the domestic interest rate R_t increases with the share of domestic bonds ω_t, as a higher supply of domestic bonds leads to higher interest rates.

differences in domestic and foreign inflation reduce the correlation between the real returns on domestic and foreign assets. Under inflation targeting with $\phi = 0$, where domestic prices are fixed, domestic government bonds effectively become risk-free assets, providing households with some insurance against foreign inflation shocks. Policies with $\phi < 0$ induce domestic inflation to move opposite to foreign inflation, generating a negative correlation between the real returns of domestic and foreign assets and improving portfolio diversification further.



Note: The figure illustrates the results of Lemma 3 by showing the partial effects of portfolio structure ω_t and monetary policy strategy ϕ on expected log returns $E_t[\log(X_{t+1})]$.

Figure 3: Partial effects of portfolio structure and monetary policy strategy on expected log returns

The results of Lemma 3 are illustrated in Fig. 3, which depicts the partial effects of portfolio structure and monetary policy regime on expected log returns, and, by extension, on household utility. The left panel shows the impact of the portfolio structure parameter ω_t for different values of the monetary policy parameter ϕ, while the right panel illustrates the effects of ϕ for varying levels of ω_t.

Based on the results of Lemma 3, Proposition 1 below establishes the sign of the aggregate portfolio return effect, i.e., the average portfolio return effect across all generations.

Proposition 1 (Monetary policy and portfolio returns)

The following statements hold for the mean portfolio allocation effect, i.e., the average portfolio return effect across all generations.

- *The mean portfolio return effect is non-negative:*

$$E\left[\frac{\partial}{\partial\phi}E_t\left[\log\left(X_{t+1}\right)\right]\right] \leq 0$$

with equality if and only if $\phi = 1$.

As indicated by Proposition 1, the portfolio return effect is always non-positive, since expected log returns decrease in ϕ across all generations as a result of Lemma 3. Thus, in terms of portfolio returns, monetary policy can improve household welfare by choosing policies corresponding to lower values of ϕ.

4.2 Portfolio allocation effect

Apart from affecting the portfolio returns through the policy-induced co-movement between domestic and foreign inflation, the central bank can also alter the portfolio allocation of households. This channel works through the effects of the policy parameter ϕ on the share of domestic bonds in the portfolios of different generations. As the share of domestic bonds ω_t increases for a given generation, the increased supply of domestic bonds leads to higher domestic interest rates, and vice versa, as a result of Lemma 2. Consequently, the expected log returns on household portfolios increase, as shown in the first part of Lemma 3.

The share of domestic bonds ω_t depends on the government debt level D_t and the wealth level Z_t, which in turn depend on the state of the economy. Therefore, the portfolio allocation of each generation is affected differently by the monetary policy regime, depending on the realization of foreign inflation during their lifetime. In particular, from Eq. (3), high domestic inflation leads to lower government debt levels and consequently lower shares of domestic bonds in households' portfolios. The latter, along with the resulting lower domestic interest rates, reduces expected log returns on household portfolios. Conversely, low domestic inflation leads to higher government debt levels, higher shares of domestic bonds in households' portfolios, and consequently higher expected log returns.

The above mechanism implies that monetary policy can affect the portfolio allocation of different generations in opposite directions. Thus, to assess the aggregate effect of portfolio allocation across generations, we can take the expectation of it across all generations, yielding the aggregate counterpart of the portfolio allocation effect in Eq. (14). The following proposition establishes the sign of this aggregate portfolio allocation effect under both inflation targeting and fixed exchange rate regimes.

Proposition 2 (Monetary policy and portfolio allocation)
The following statements hold for the mean portfolio allocation effect, i.e., the average portfolio allocation effect across all generations.

- *Under an exchange rate peg, i.e., at $\phi = 1$, the mean portfolio allocation effect is zero:*

$$E\left[\frac{\partial}{\partial \omega_t} E_t\left[\log\left(X_{t+1}\right)\right] \frac{d\omega_t}{d\phi}\right]\Bigg|_{\phi=1} = 0$$

- *Under inflation targeting, i.e., at $\phi = 0$, such that the economy is at its long-run equilibrium,*
  - *the mean portfolio allocation effect is non-negative if $0 < \overline{\omega} \leq 1/2$:*

$$E\left[\frac{\partial}{\partial \omega_t} E_t\left[\log\left(X_{t+1}\right)\right] \frac{d\omega_t}{d\phi}\right]\Bigg|_{\phi=0} \geq 0 \qquad \text{if} \quad 0 < \overline{\omega} \leq 1/2$$

  - *the mean portfolio allocation effect is non-positive if $1/2 \leq \overline{\omega} < 1$:*

$$E\left[\frac{\partial}{\partial \omega_t} E_t\left[\log\left(X_{t+1}\right)\right] \frac{d\omega_t}{d\phi}\right]\Bigg|_{\phi=0} \leq 0 \qquad \text{if} \quad 1/2 \leq \overline{\omega} < 1$$

  with equality if and only if $\overline{\omega} = 1/2$.

Proposition 2 provides insights into how monetary policy influences household welfare through its impact on portfolio allocation under an exchange rate peg and inflation targeting. Namely, it indicates that the sign of the portfolio allocation effect under inflation targeting depends on the share of domestic bonds in households' portfolios. Specifically, the effect is positive if $0 < \overline{\omega} < 1/2$ and negative if $1/2 < \overline{\omega} < 1$. By contrast, the portfolio allocation effect is always zero under a fixed exchange rate. These results imply that, under inflation targeting, the central bank can enhance household welfare by implementing a policy with $\phi > 0$ if $0 < \overline{\omega} < 1/2$, whereas such a policy may reduce welfare when $1/2 < \overline{\omega} < 1$.

4.3 Wealth effect

Finally, monetary policy can also alter the wealth of households through its effects on domestic debt levels and taxes. Thus, the interaction of monetary policy with fiscal policy affects the wealth transfer across household generations. To see the mechanism behind this effect, we can evaluate the wealth effect channel in Eq. (14) as

$$\frac{d}{d\phi} \log\left(Z_t\right) = \frac{1}{Z_t}\frac{dZ_t}{d\phi} = -\tau \frac{1}{Z_t}\frac{dD_{t-1}}{d\phi}$$

Note that as taxes T_t levied on every generation t are a function of the government debt levels D_{t-1} prevailing in the preceding period, the effects of monetary policy on household wealth depend on its ability to alter the state of the economy D_{t-1}. Hence, the optimal policy framework should internalize its effects on the aggregate welfare through taxes and government debt.

We have to note that, similar to the portfolio allocation channel, this mechanism implies a trade-off for the central bank across different generations. Thus, to evaluate the aggregate wealth effect across generations, I take the expectation of it across all generations, which is the aggregate counterpart of the wealth effect in Eq. (14). The proposition below establishes the sign of the aggregate wealth effect evaluated in inflation targeting and exchange rate pegging regimes.

Proposition 3 (Monetary policy and household wealth)
The following statements hold for the mean wealth effect, i.e., the average wealth effect across all generations.

- *Under an exchange rate peg, i.e., at $\phi = 1$, the mean wealth effect is non-positive:*

$$E\left[\frac{d}{d\phi}\log\left(Z_t\right)\right]\Bigg|_{\phi=1} \leq 0$$

  with equality if and only if $\sigma_{\pi^*} = 0$.

- *Under inflation targeting, i.e., at $\phi = 0$, such that the economy is at its long-run equilibrium,*

  - *the mean wealth effect is non-positive if $0 < \overline{\omega} \leq 1/2$:*

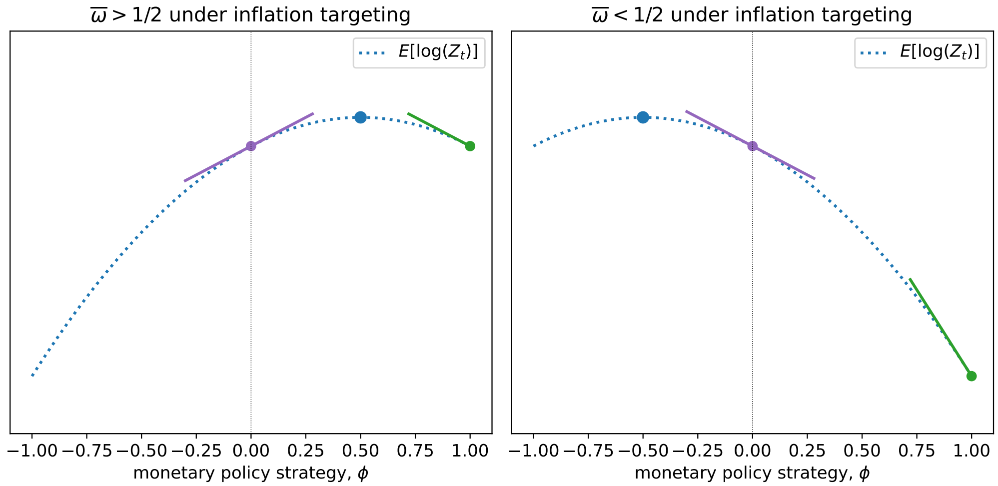
$$E\left[\frac{d}{d\phi}\log\left(Z_t\right)\right]\Bigg|_{\phi=0} \leq 0 \qquad \text{if} \quad 0 < \overline{\omega} \leq 1/2$$

  - *the mean wealth effect is non-negative if $1/2 \leq \overline{\omega} < 1$:*

$$E\left[\frac{d}{d\phi}\log\left(Z_t\right)\right]\Bigg|_{\phi=0} \geq 0 \qquad \text{if} \quad 1/2 \leq \overline{\omega} < 1$$

  with equality if and only if $\overline{\omega} = 1/2$.

Proposition 3 evaluates the aggregate wealth effect of monetary policy under inflation targeting and exchange rate peg. It shows that under an exchange rate peg, the central bank may improve household welfare by implementing a policy corresponding to $\phi < 1$. On the other hand, similar to the portfolio allocation effect, under inflation targeting, the central bank may improve household welfare by implementing a policy corresponding to $\phi < 0$ if $0 < \overline{\omega} < 1/2$, while it may worsen household welfare if $1/2 < \overline{\omega} < 1$.



Note: The figure illustrates the results of Proposition 3 regarding the effects of monetary policy strategy on expected log wealth. That is, if under inflation targeting the share of domestic assets $\overline{\omega}$ satisfies $0 < \overline{\omega} < 1/2$, the optimal policy implies $\phi < 0$, whereas for $1/2 < \overline{\omega} < 1$, the optimal policy is $\phi > 0$.

Figure 4: An illustration of the effects of monetary policy strategy on expected log wealth

The results of Proposition 3 are demonstrated in Fig. 4, which depicts the impact of the monetary policy regime on expected log wealth under both strategies. The proposition indicates that, under inflation targeting, the optimal monetary policy depends on household portfolio allocations. Specifically, when $0 < \overline{\omega} < 1/2$, the optimal policy corresponds to $\phi < 0$, whereas for $1/2 < \overline{\omega} < 1$, the optimal policy is $\phi > 0$.

5 Optimal policy

The preceding section analyzed the welfare effects of monetary policy through different channels. The results indicate that household welfare decreases with the monetary policy parameter ϕ due to the portfolio return effect. In contrast, the portfolio allocation and wealth effects imply that the optimal monetary policy regime depends on the model parameters.

Therefore, to evaluate the overall impact of monetary policy on household welfare, this section identifies the policy that optimally weighs the above-mentioned effects to maximize the aggregate welfare measure, $\mathcal{U}$. Throughout the analysis, I will assume that the economy starts at its long-run equilibrium under inflation targeting, such that $D_0 = \overline{D}$, $F_0 = \overline{F}$, $R_0 = \overline{R}$ and $R_0^* = R^*$ for the initial old generation. Then, the central bank chooses an optimal time-invariant policy parameter ϕ for all $t \geq 1$.

5.1 Calibration

In the model, each period is assumed to correspond to 10 years. Additionally, the foreign economy is calibrated to match the US economy.

I normalize the endowment size to $Q_t = 1$. Foreign inflation volatility is set to $\sigma_{\pi^*} = 0.2$ in order to match the standard deviation of US 10-year inflation, which is around 20% over the period 1960-2020.[20] Also, the foreign interest rate is set to $R^* = 1.35$ in order to match the average US 10-year bond yield, approximately 6% (yearly) over the period 1960-2020.[21] The government spending is constant at $G_t = 0.15$, while the tax rate is set to $\tau = 0.9$, resulting in a long-run equilibrium share of domestic bonds $\overline{\varpi} = 0.3$.[22] Social transfers make up the whole of government spending, i.e., $\kappa = 1$.

Using the above calibration, the model is simulated for 10,000 periods. The simulation results are available in the online appendix.

5.2 Optimal monetary policy

I begin the analysis of optimal monetary policy by comparing the welfare implications of inflation targeting, exchange rate targeting, and alternative policy regimes. Fig. 5 shows the aggregate welfare measure $\mathcal{U}$, along with its two components, $\log Z_t$ and $E_t\left[\log\left(X_{t+1}\right)\right]$, evaluated under different monetary policy strategies ϕ. The figure also plots the range of attainable welfare values bounded by the two regimes corresponding to persistently low and high levels of inflation.

[20] Foreign inflation volatility σ_{π^*} is calculated as the standard deviation of the log-difference of a price index

$$\sigma_{\pi^*} = \widehat{\sigma}\left(\Delta \log\left(P_t^*\right)\right)$$

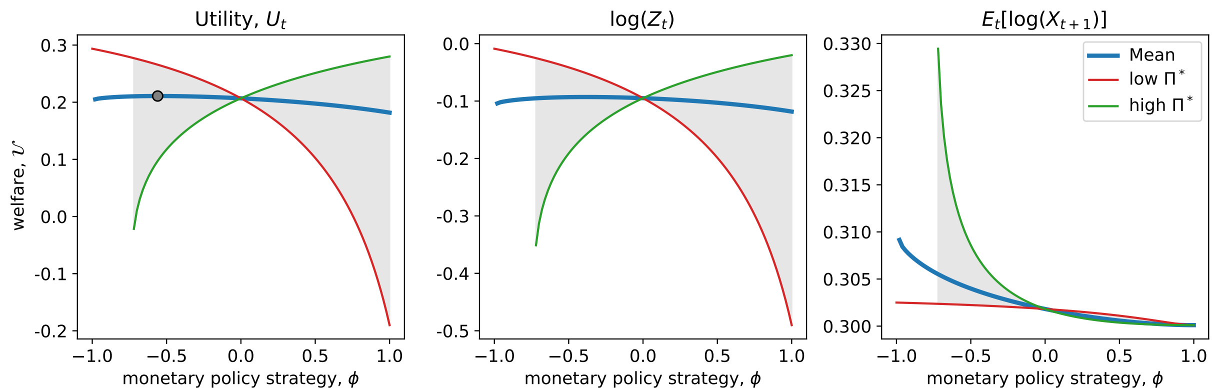
where P_t^* is the 10-year average of a price index in the US. Using the GDP deflator and the CPI as price indices, we obtain $\widehat{\sigma}_{\pi^*} = 0.18$ and $\widehat{\sigma}_{\pi^*} = 0.21$, respectively.

[21] Foreign net interest rate $r^* = \log R^*$ is calculated as

$$r^* = 10 \cdot \overline{r_t^*} - \overline{\Delta \log\left(P_t^*\right)}$$

where $\overline{r_t^*}$ is the average log yield on 10-year treasury bonds in the US and $\overline{\Delta \log\left(P_t^*\right)}$ is the average log-difference of the price index in the US. Using the GDP deflator and the CPI as price indices, we obtain $r^* = 0.3$ and $r^* = 0.26$, respectively.

[22] The literature on country portfolios often finds that the home bias is higher than 30% for most countries. Thus, although relatively low values of G and, consequently, $\overline{\varpi}$ allow us to see the main mechanisms of the model more clearly, I also study the optimal policy for a variety of values of G and τ in the next subsection.



Note: The figure plots the household utility, along with its components, i.e., log wealth and expected log returns on portfolios, for different values of ϕ. The optimal policy implies $\phi^* = -0.56$.

Figure 5: Household welfare and its components under different monetary policy strategies

As shown in Fig. 5, an exchange rate targeting policy with $\phi = 1$ yields the lowest welfare levels, whereas inflation targeting with $\phi = 0$ delivers higher welfare. The optimal policy, however, corresponds to $\phi < 0$, inducing counter-cyclical domestic inflation relative to foreign inflation. This counter-cyclical behavior generates a negative co-movement between the returns on domestic and foreign bonds, thereby improving expected portfolio returns and, in turn, household welfare.

While the policy characterized by $\phi < 0$ maximizes overall welfare, it involves a trade-off between different welfare components, as illustrated in Fig. 5. On one hand, the central bank seeks to maximize expected log returns on portfolios; on the other, it influences households' log disposable endowments through its impact on government debt accumulation and taxes. These effects, analyzed in more detail in the next subsection, arise from the portfolio return, portfolio allocation, and wealth effects, respectively, as described in Section 4.

Next, I study how the fiscal policy – namely, government spending G and the tax rate τ – affects the optimal monetary policy. Fig. 6 depicts the optimal policy parameter ϕ for different values of government spending G and the tax rate τ. As the figure shows, the optimal ϕ increases with government spending G, and decreases with the tax rate τ. These relationships arise from the implied government debt level (higher with higher G and lower τ) and its effects on household wealth, portfolio allocations, and returns.

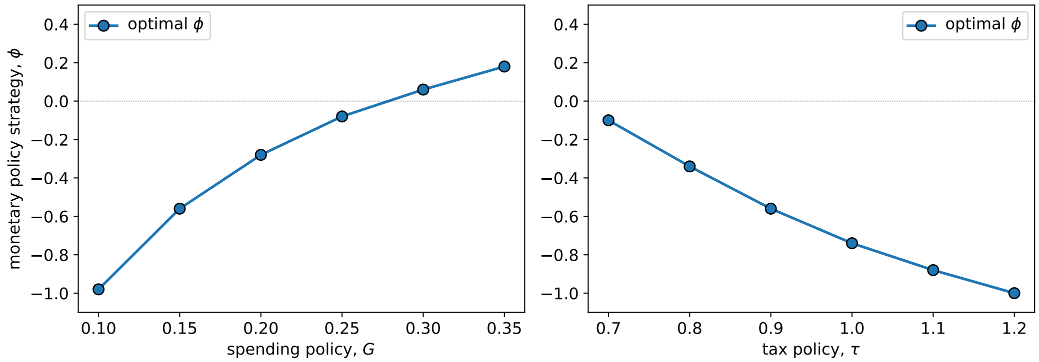


Figure 6: Optimal policy parameter ϕ for different values of G and τ

Specifically, a higher government debt raises taxes and consequently lowers household wealth, causing the portfolio return and allocation effects to be dominated by the wealth effect. In this environment, large negative values of ϕ therefore generate high inflation volatility, which translates into increased debt and tax volatility. Thus, higher government debt levels and the resulting higher taxes amplify these fluctuations. To mitigate these fluctuations, the optimal policy adopts a relatively higher value of ϕ, thereby reducing tax volatility.

The findings presented above stand in contrast to the earlier open-economy literature of the 2000s, which typically concludes that the optimal monetary policy is characterized by either inflation targeting or exchange rate pegging.[23] In contrast, the optimal policy emerging from the current framework is an alternative regime that induces an optimal degree of co-movement between domestic and foreign inflation rates. This policy framework aligns more closely with recent contributions by Senay and Sutherland (2019), Corsetti et al. (2023), and Fanelli (2024).

5.3 Optimal policy and intergenerational effects

The optimal monetary policy identified above has heterogeneous effects on household welfare across generations. In particular, the optimal policy entails welfare transfers between generations, aimed at providing insurance against foreign shocks. This mechanism is studied in detail below, by examining the policy effects on a representative set of three consecutive generations – generations *t-1*, *t*, and *t+1* – and highlighting the welfare effects of the optimal policy relative to inflation targeting.

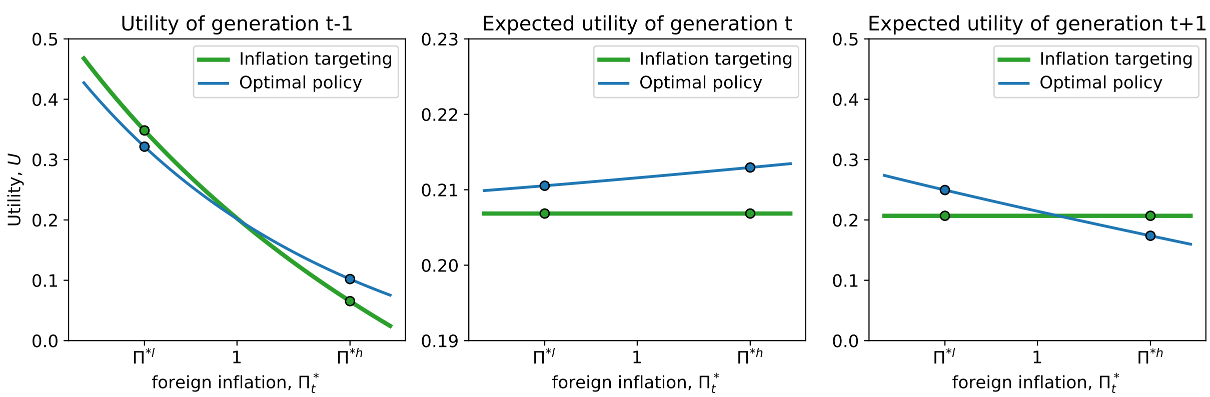
[23] For instance, Benigno and Benigno (2003) and Céspedes et al. (2004) find that the optimal policy entails price stability combined with exchange rate flexibility, whereas De Paoli (2009) shows that the optimal regime may correspond to either price stability or an exchange rate peg, depending on model parameters.

To study the welfare effects of monetary policy across generations, I plot in Fig. 7 the utility of generation *t-1*, i.e., $\log(C_t)$, along with the expected utilities of generations t and *t+1*, i.e., $E_t\left[\log\left(C_{t+1}\right)\right]$ and $E_t\left[\log\left(C_{t+2}\right)\right]$, as a function of the exogenous foreign inflation Π_t^*.[24]

To understand the trade-offs involved in the optimal policy, first, recall from Eq. (12) and Eq. (13) that the consumption of generation *t-1* is given by

$$C_t = \left(\omega_{t-1}\frac{R_{t-1}}{\Pi_t} + (1-\omega_{t-1})\frac{R_{t-1}^*}{\Pi_t^*}\right) Z_{t-1} \tag{15}$$

Thus, for a given portfolio allocation ω_{t-1} and nominal returns R_{t-1}, R_{t-1}^*, generation *t-1* experiences lower real returns on foreign assets when foreign inflation is high, i.e., at $\Pi_t^* = \Pi^{*h}$ and vice versa if $\Pi_t^* = \Pi^{*l}$. However, under the optimal policy with $\phi < 0$, they enjoy diversification benefits from the negative correlation between domestic and foreign inflation rates. Consequently, as shown in the left panel of Fig. 7, under the optimal policy generation *t-1* attains higher (lower) utility levels from higher (lower) log returns in the high (low) Π_t^* state and reduced consumption volatility relative to inflation targeting. This effect is the portfolio return effect characterized in Section 4.1 and is positive for all generations in aggregate, as shown in Proposition 1.



Note: The figure illustrates the intergenerational insurance mechanism implemented by the central bank, whereby under the optimal policy, generation *t-1* benefits from improved portfolio returns, while generation *t+1* bears the cost through higher taxes in the high Π_t^* state and vice versa.

Figure 7: Effects of optimal monetary policy on household welfare across generations

Despite the diversification benefits for generation *t-1*, the improved portfolio returns also

[24] Note that under inflation targeting, such that the economy is in its long-run equilibrium, household wealth, portfolio allocations, and nominal returns are constant across generations. Therefore, the expected utilities of generations t and *t+1* are constant. Nevertheless, all generations are exposed to the foreign inflation shocks, such that the realized utility of generation *t-1* varies with Π_t^*.

affect the amount of government debt issued at time t, and, consequently, the portfolio allocation of generation t. In particular, recall from Eq. (1) and Eq. (3) that government debt, i.e., domestic bonds held by generation t, along with foreign assets, evolves according to

$$D_t = \frac{R_{t-1}}{\Pi_t} D_{t-1} + G_t - T_t$$
$$F_t = Q_t - \frac{R_{t-1}}{\Pi_t} D_{t-1} + B_t - G_t$$

We thus see that for a given level of disposable income $Z_t \equiv Q_t + B_t - T_t$, under the high Π_t^* state lower real returns on domestic bonds for generation *t-1* lead to higher government debt levels in period t. This, in turn, leads to a higher share of domestic bonds and consequently a lower share of foreign bonds in the portfolios of generation t. Consequently, generation t experiences higher expected utility levels under the optimal policy compared to inflation targeting, as shown on the middle panel of Fig. 7.

This improvement in utility arises due to two effects. First, a larger supply of government debt leads to higher domestic interest rates R_t and an increased share of domestic bonds ω_t (portfolio allocation effect), as shown in Lemma 2. Second, similar to the previous generation, generation t benefits from higher expected portfolio returns from diversification (portfolio return effect).

While the portfolio return effect is positive for all generations (which explains higher expected utility levels in Fig. 7), the portfolio allocation effect may be either positive or negative depending on the portfolio structure (given by the positive slope of the optimal policy line in Fig. 7). Specifically, as shown in Fig. 7, generation t experiences higher expected utility from a larger share of domestic bonds under the high Π_t^* state and vice versa. Nevertheless, the aggregate portfolio allocation effect is negative in the baseline calibration, implying $\overline{\omega} = 0.3$, consistent with Proposition 2.

Finally, the increased government debt levels affect household wealth through their effects on taxes. In particular, recall from Eq. (4) that we have

$$T_{t+1} = \tau D_t$$

such that taxes faced by generation *t+1* depend on the government debt level D_t.

On the other hand, the consumption of generation *t+1* is given by

$$C_{t+2} = \left(\omega_{t+1} \frac{R_{t+1}}{\Pi_{t+2}} + (1 - \omega_{t+1}) \frac{R_{t+1}^*}{\Pi_{t+2}^*} \right) Z_{t+1} \tag{16}$$

where $Z_{t+1} \equiv Q_{t+1} + B_{t+1} - T_{t+1}$ is the disposable endowment of generation *t+1*.

Thus, under the high Π_t^* state, higher government debt levels lead to higher future taxes, thereby reducing the disposable endowment of generation *t+1*. Therefore, we can see from Eq. (16) that across possible future portfolio allocations ω_{t+1} and nominal returns R_{t+1}, R_{t+1}^* (similarly contingent on the realization of Π_{t+1}^*), generation *t+1* experiences lower expected utility levels under the high Π_t^* state and vice versa, as shown in the right panel of Fig. 7. This outcome, positive or negative depending on the realization of Π_t^*, is the wealth effect described in Section 4.3. In the baseline calibration with $\overline{\omega} = 0.3$, the aggregate wealth effect is positive, consistent with Proposition 3.

Fig. 7 also illustrates the wealth transfers across generations induced by the optimal monetary policy. Specifically, relative to inflation targeting, the improved utility levels of generation *t-1* under the high Π_t^* state come at the expense of generation *t+1*. That is, higher portfolio returns and resulting higher utility levels for generation *t-1* are financed through higher future taxes for generation *t+1* resulting from increased government debt levels in period *t*. Conversely, in the low Π_t^* state, generation *t-1* has to bear the cost of lower portfolio returns, while generation *t+1* benefits from lower future taxes.

In summary, the optimal monetary policy balances positive portfolio return effects against potentially negative portfolio allocation and wealth effects. Specifically, counter-cyclical domestic inflation leads to higher expected portfolio returns at the cost of increasing the volatility of government debt levels and taxes. The volatility of government debt, in turn, translates into higher volatility of domestic interest rates, despite reducing their average levels and the cost of borrowing for the government.

Through these mechanisms, the effects of monetary policy extend beyond the traditional insurance channel by altering the long-run dynamics, i.e., the mean and volatility, of government debt and, consequently, household taxes. Therefore, the optimal monetary policy weighs the three opposing channels above to maximize aggregate welfare.

6 Extensions

In this section, I extend the model to a production economy with tradable and non-tradable goods with sticky prices. The extension allows us to study the optimality of monetary policy in a more general setting and to examine the role of price rigidities in policy design.

6.1 Households

Assume that households supply labor to domestic firms at the young age and consume at the old age. The household utility function is

$$U_t = E_t \left[\log\left(C_{t+1}\right)\right] - \chi \frac{N_t^{1+\varphi}}{1+\varphi}$$

where φ is the inverse Frisch elasticity of labor supply and χ captures the disutility of labor.

The consumption aggregate is composed of two consumption goods – tradable and non-tradable – given by

$$C_t = \left((1-\gamma)^{\frac{1}{\eta}} \left(C_{N,t}\right)^{\frac{\eta-1}{\eta}} + \gamma^{\frac{1}{\eta}} \left(C_{T,t}\right)^{\frac{\eta-1}{\eta}} \right)^{\frac{\eta}{\eta-1}}$$

with price index

$$P_t = \left((1-\gamma)\left(P_{N,t}\right)^{1-\eta} + \gamma \left(P_{T,t}\right)^{1-\eta} \right)^{\frac{1}{1-\eta}}$$

where $P_{N,t}$ and $P_{T,t}$ are the prices of non-tradable and tradable goods, respectively, and $\eta > 1$ is the elasticity of substitution between the two goods.

The budget constraint of the household is

$$D_t + F_t = \frac{P_{T,t}}{P_t} Q_t + W_t N_t + \Omega_t + B_t - T_t$$

where W_t denotes the real wage, Q_t is an endowment of the tradable good and Ω_t represents the profits from domestic firms.

Maximization of household utility results in the following labor supply function

$$N_t^{\varphi} = \frac{1}{\chi} \frac{W_t}{Z_t}$$

where $Z_t \equiv D_t + F_t = \frac{P_{T,t}}{P_t} Q_t + W_t N_t + \Omega_t + B_t - T_t$.

6.2 Firms

Monopolistically competitive firms use labor as the only input to produce non-tradable goods according to a linear production function of the form

$$Y_t(j) = N_t(j)$$

Following Galí (2014), I introduce price stickiness for non-tradable goods, assuming that the price $P_{N,t}(j)$ of each good is set in period *t-1* to solve

$$\max_{P_{N,t}(j)} \quad E_{t-1}\left[\Lambda_{t-1,t}\left(\frac{P_{N,t}(j)}{P_t}Y_t(j) - W_t N_t(j)\right)\right]$$

subject to the demand schedule

$$Y_t(j) = \left(\frac{P_{N,t}(j)}{P_{N,t}}\right)^{-\epsilon} C_{N,t}$$

using $\Lambda_{t-1,t} \equiv (\lambda_{o,t}/\lambda_{y,t})$ as the discount factor, where $\lambda_{y,t}$ and $\lambda_{o,t}$ denote the Lagrange multipliers on the young- and old-age budget constraints of households, respectively.

In a symmetric equilibrium with $Y_t(j) = Y_t$, $P_{N,t}(j) = P_{N,t}$ and $S_{N,t}(j) = S_{N,t}$ for all j, the optimal price-setting rule becomes

$$E_{t-1}\left[\Lambda_{t-1,t}Y_t\left(\frac{S_{N,t}}{\Pi_t} - \mathcal{M}W_t\right)\right] = 0$$

where $S_{N,t} = \frac{P_{N,t}}{P_{t-1}}$ and $\mathcal{M} = \frac{\epsilon}{\epsilon-1}$.

The price-setting rule above implies an inefficiently low level of employment and output due to monopolistic competition.[25] Thus, to restore the steady-state efficient level of output, I assume that the government implements a subsidy ν on labor income, which is financed by lump-sum taxes. The subsidy is set at $\nu = 1/\epsilon$, such that $1 - \nu = 1/\mathcal{M}$ and the efficient level of output is restored in the steady state. As a result, the price-setting rule becomes

$$E_{t-1}\left[\Lambda_{t-1,t}Y_t\left(\frac{S_{N,t}}{\Pi_t} - W_t\right)\right] = 0$$

If firms are allowed to reset prices in each period and prices are flexible, then the optimal price-setting rule becomes

$$S_{N,t} = W_t \Pi_t$$

It is important to note that, unlike many New-Keynesian models with staggered price setting, the optimal price above is the same for all firms. Hence, due to the symmetry of firms, price dispersion is absent in the model, and thus, welfare losses due to price dispersion are absent.

[25] See Galí (2015) for a discussion of the distortion of the efficient steady state due to monopolistic competition.

Lastly, market clearing in the non-tradable goods market implies $Y_t = C_{N,t}$, thus domestic output is determined as

$$Y_t = (1-\gamma)\left(\frac{P_{N,t}}{P_t}\right)^{-\eta} C_t$$

6.3 Central bank

Due to the free flow of tradable goods, tradable goods inflation in the domestic economy is governed by the law of one price

$$\Pi_{T,t} = \Psi_t \Pi_t^*$$

The central bank chooses the monetary policy strategy parameter ϕ such that

$$\Pi_{T,t} = {\Pi_t^*}^{\phi} \qquad \text{and} \qquad \Psi_t = {\Pi_t^*}^{\phi-1}$$

Note that the policy parameter ϕ captures the pass-through of foreign inflation on tradable goods inflation. Thus, $\phi = 0$ implies imported goods inflation targeting, while $\phi = 1$ corresponds to an exchange rate peg.

The rest of the setup is the same as in the baseline model.

6.4 Optimal policy

The open-economy literature – most notably Galí and Monacelli (2005) and a series of subsequent studies – has established that the optimal monetary policy in a small open economy is characterized by domestic inflation targeting, due to the open-economy divine coincidence.[26] However, in this model, the divine coincidence does not hold due to several key differences in the underlying structure.

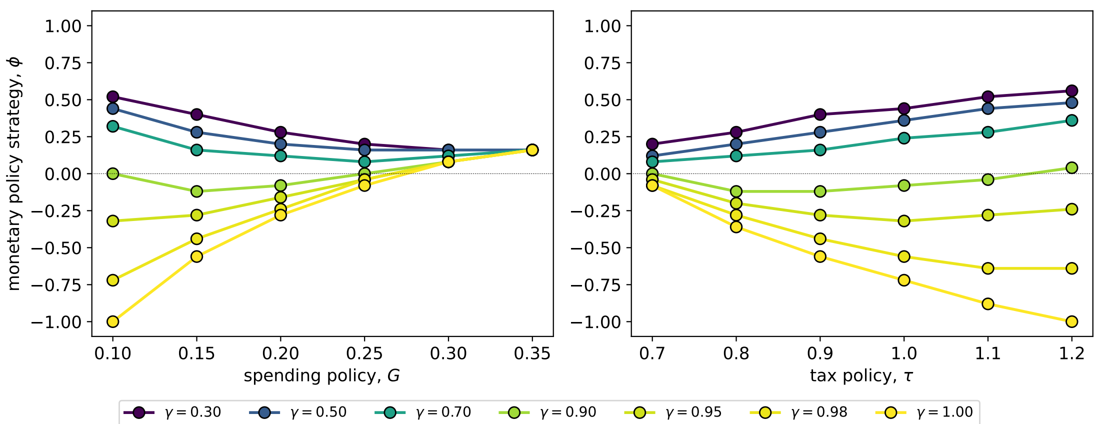
First, markets are incomplete, and international risk sharing is absent, implying that household welfare depends critically on fluctuations in asset returns. Second, even with complete stabilization of domestic prices and output, household welfare remains sensitive to fiscal policy through its impact on debt accumulation and taxation.

As a result, the optimal policy regime in this framework may deviate from price stability. Accordingly, in this subsection, I examine the optimal monetary policy regime in the model with production and sticky prices.

[26] The open-economy divine coincidence refers to the result that, in standard New Keynesian open-economy frameworks, the optimal monetary policy simultaneously stabilizes domestic prices and output. See Galí and Monacelli (2005) for a detailed discussion of alternative policy regimes in open economies.

To evaluate household welfare in the model with production, I study the welfare implications of different monetary policy strategies. In this analysis, the inverse Frisch elasticity of labor supply is set to $\varphi = 1$, and the elasticity of substitution among varieties of non-tradable goods is set to $\epsilon = 6$, consistent with standard calibrations in the literature. I then set the elasticity of substitution between tradable and non-tradable goods to $\eta = 2$ and study how varying values of γ influence the optimal monetary policy regime.

Next, I examine the effects of the country's fiscal policy conduct on the optimal policy regime. Specifically, Fig. 8 depicts the optimal monetary policy parameter ϕ as a function of the government spending G and tax rate τ for different degrees of openness γ. The figure presents results for the sticky-price economy, while the results for the flexible-price economy, which are similar in nature, are provided in the online appendix.



Note: The figure plots the optimal monetary policy parameter ϕ^* as a function of government spending G and the tax rate τ for different degrees of openness γ in the sticky-price economy.

Figure 8: Optimal monetary policy strategy and country openness

The analysis indicates that the optimal policy regime depends critically on the share of tradable goods γ in the consumption basket and the fiscal policy parameters. In particular, Fig. 8 shows that in economies with a high share of tradable goods, i.e., a high degree of openness, the optimal policy implies a negative pass-through of foreign inflation to imported goods inflation, i.e., $\phi < 0$, across a wide range of fiscal policy parameters. Notably, the optimal policy generates a negative correlation between foreign inflation and imported goods inflation in these economies. This result aligns with the baseline model, where the optimal policy strategy implies a negative correlation between foreign inflation and domestic inflation.

In contrast, in economies with a low degree of openness, i.e., lower γ, the optimal policy implies a positive pass-through of foreign inflation to imported goods inflation, i.e., $\phi > 0$. Here, unlike the baseline model, the policy induces a positive correlation between foreign inflation and imported goods inflation. Nevertheless, the optimal policy still generates moderate inflation volatility, deviating from strict price stability. Therefore, except under specific calibrations, the optimal policy regime entails non-zero inflation volatility.

The persistence of counter-cyclical policies even under sticky prices is a key feature of the model. This arises because, unlike New-Keynesian setups, the model does not feature welfare losses arising from labor misallocation due to price dispersion. Unlike models with costly inflation, such as Galí and Monacelli (2005), Benigno and Benigno (2006), and De Paoli (2009), the central bank in this framework can achieve maximum welfare by deviating from price stability and inducing optimal co-movements between domestic and foreign inflation.

7 Robustness analysis

In this section, I study the robustness of the main results to several extensions of the baseline model. In particular, I examine the effects of time-varying exogenous variables, alternative welfare measures, and a multi-state economy.

7.1 Time-varying exogenous variables

The preceding analysis was conducted assuming constant government spending and foreign interest rates to focus on the effects of foreign inflation shocks. Thus, in this subsection, I study the robustness of the results by allowing for time-varying government spending and foreign interest rates.

I assume that government spending and the foreign interest rate follow AR(1) processes

$$
\begin{aligned}
\log G_t &= (1-\rho_g)\log G_{ss} + \rho_g \log G_{t-1} + \varepsilon_t^g \qquad && \varepsilon_t^g \sim IID\left(0, \sigma_g^2\right) \\
\log R_t^* &= (1-\rho_r)\log R_{ss}^* + \rho_r \log R_{t-1}^* + \varepsilon_t^r \qquad && \varepsilon_t^r \sim IID\left(0, \sigma_r^2\right)
\end{aligned}
$$

where G_{ss} and R_{ss}^* are the steady-state values of government spending and the foreign interest rate, respectively.

We can note from Eq. (3) that shocks to government spending shift the government debt transition function up or down in Fig. 2, thereby affecting the dynamics of government debt accumulation. However, in the long run, the steady-state level of government debt is determined by the average level of government spending. Therefore, time-varying government spending does not affect the government debt levels and households' portfolio structure in the long run. Consequently, the optimal monetary policy regime remains unchanged when government spending is time-varying.

On the other hand, because the portfolio structure in each period is predetermined by outstanding government debt, Eq. (9) implies that the domestic interest rate R_t must adjust one-to-one with the foreign interest rate R_t^* to clear the bond market. Consequently, interest rate shocks influence both the domestic interest rate and the government's borrowing costs, as described in Eq. (3), and propagate through the domestic economy via the debt accumulation process. Nevertheless, this feature does not alter the main trade-offs involved in the optimal monetary policy design.

To verify the robustness of the results, I study the model economy under time-varying government spending and foreign interest rates. The results, reported in the online appendix, indicate that the optimal policy regime is robust to such shocks. Specifically, the optimal policy continues to feature $\phi < 0$ ($\phi > 0$) for low (high) values of government spending G and high (low) values of the tax rate τ.

7.2 Discounted utilities

I also study the robustness of the results to an alternative welfare measure. In particular, I consider the discounted sum of the expected utility of all generations, that is

$$\mathcal{U} \equiv E_0 \sum_{t=0}^{\infty} \beta^t U_t$$

where $\beta = 1/R_{ss}$ is the discount factor.

The results, available in the online appendix, show that optimal monetary policy strategy similarly implies $\phi < 0$, however, with far larger values of ϕ compared to the baseline case. This result arises because of discounting the utilities of future generations, which places more weight on the current and upcoming generations, who benefit more from portfolio diversification, relative to future generations that get benefits from lower government debt levels and taxes. Therefore, the central bank leans towards lower values of ϕ to enhance the portfolio returns of current generations, at the (discounted) cost of higher debt and tax volatility for future generations.

7.3 Multi-state economy

The previous sections studied the model with only two states of the world – low and high foreign inflation. This formulation allowed us to obtain an analytical solution for the model and provided valuable insights into the effects of monetary policy. In this subsection, I extend the number of states in the model economy to study the model economy in a more general setting.

Assume that foreign inflation shocks follow an IID process with five possible states and corresponding probabilities

Π_t^*	Π^{*1}	Π^{*2}	Π^{*3}	Π^{*4}	Π^{*5}
Probability	$(1-p)^4$	$4p\,(1-p)^3$	$6p^2\,(1-p)^2$	$4p^3\,(1-p)$	p^4

where $0 < p < 1$ and $0 < \Pi^{*1} < \Pi^{*2} < \Pi^{*3} < \Pi^{*4} < \Pi^{*5}$.[27]

As in the baseline model, I assume $p = 1/2$ and set $\log \Pi^{*1} = -2\sigma_{\pi^*}$, $\log \Pi^{*2} = -\sigma_{\pi^*}$, $\log \Pi^{*3} = 0$, $\log \Pi^{*4} = \sigma_{\pi^*}$, and $\log \Pi^{*5} = 2\sigma_{\pi^*}$, such that σ_{π^*} denotes the volatility of foreign inflation.[28] As a result, domestic inflation and the exchange rate may take five possible values, which are determined by the policy parameter ϕ.

The results of the analysis, available in the online appendix, show that the optimal policy regime implies a negative pass-through of foreign inflation to domestic inflation as in the baseline model. Nevertheless, the optimal policy strategy still implies a non-zero inflation volatility and similarly depends on the fiscal policy parameters.

8 Conclusions

This paper develops an overlapping generations model with portfolio choice to analyze the role of monetary policy in an economy with external asset holdings. I study the effects of different monetary policy strategies on the domestic economy and household welfare, and show that the optimal policy depends on the fiscal policy conduct and country openness. As a result, this paper puts forward a new policy framework that, instead of inflation targeting, implies inducing a negative correlation between domestic and foreign inflation to complete asset markets.

The model features nominal debt contracts; hence, monetary policy can affect real interest rates and, therefore, the real return on household portfolios, as well as the domestic debt accumulation rate. In this setting, the optimal policy regime implies a negative correlation between the returns of domestic and foreign assets, as a means of insurance against foreign

[27] The probabilities are set according to the binomial distribution

$$P\,(X = k) = \binom{n}{k} p^k\,(1-p)^{n-k}$$

where $n = 4$ and $k = 0, 1, 2, 3, 4$.

[28] Noting that $E\,[\log \Pi_t^*] = 0$, we can see that σ_{π^*} equals to the standard deviation of foreign inflation

$$\mathrm{Var}\,(\log \Pi_t^*) = \frac{1}{16}\log^2 \Pi^{*1} + \frac{1}{4}\log^2 \Pi^{*2} + \frac{3}{8}\log^2 \Pi^{*3} + \frac{1}{4}\log^2 \Pi^{*4} + \frac{1}{16}\log^2 \Pi^{*5} = \sigma_{\pi^*}^2$$

inflation shocks. This result is achieved by inducing optimal co-movements between domestic inflation relative to foreign inflation. In the long run, monetary policy may also affect the domestic debt levels and the tax burden on households via its effects on the debt accumulation rate.

These channels of policy transmission generate a policy trade-off for the central bank. On the one hand, higher real interest rates increase the real return on household portfolios and therefore improve welfare. At the same time, higher real interest rates increase the domestic debt accumulation rate and lead to an equilibrium with higher government debt. This effect, however, reduces welfare, since higher government debt implies higher taxes and lower disposable income for households. Therefore, the optimal policy implies a trade-off between the effects on the real return on the household portfolio and the domestic debt accumulation rate.

The optimal monetary policy seeks a balance between the effects of these two channels of policy transmission. For a wide range of parameter values, the optimal policy implies a negative correlation between the domestic and foreign inflation rates, with positive inflation volatility. This policy promotes higher welfare compared with exchange rate targeting as well as inflation targeting, contrary to the conventional wisdom.

References

Adams, J. J. and Barrett, P. (2021). Why are countries' asset portfolios exposed to nominal exchange rates? *Journal of International Money and Finance*, 110:102277.

Benigno, G. and Benigno, P. (2003). Price Stability in Open Economies. *The Review of Economic Studies*, 70(4):743–764.

Benigno, G. and Benigno, P. (2006). Designing targeting rules for international monetary policy cooperation. *Journal of Monetary Economics*, 53(3):473–506.

Benigno, P. (2009a). Are valuation effects desirable from a global perspective? *Journal of Development Economics*, 89(2):170–180.

Benigno, P. (2009b). Price Stability with Imperfect Financial Integration. *Journal of Money, Credit and Banking*, 41(s1):121–149.

Céspedes, L. F., Chang, R., and Velasco, A. (2004). Balance sheets and exchange rate policy. *American Economic Review*, 94(4):1183–1193.

Chang, R. and Velasco, A. (2006). Currency mismatches and monetary policy: A tale of two equilibria. *Journal of International Economics*, 69(1):150–175.

Chari, V. V., Christiano, L. J., and Kehoe, P. J. (1991). Optimal Fiscal and Monetary Policy: Some Recent Results. *Journal of Money, Credit and Banking*, 23(3):519–539.

Corsetti, G., Dedola, L., and Leduc, S. (2010). Optimal Monetary Policy in Open Economies. *Handbook of Monetary Economics*, 3:861–933.

Corsetti, G., Dedola, L., and Leduc, S. (2023). Exchange rate misalignment and external imbalances: What is the optimal monetary policy response? *Journal of International Economics*, 144:103771.

Coulibaly, L. (2023). Monetary Policy in Sudden Stop-Prone Economies. *American Economic Journal: Macroeconomics*, 15(4):141–76.

De Paoli, B. (2009). Monetary policy and welfare in a small open economy. *Journal of International Economics*, 77(1):11–22.

Devereux, M. B. and Engel, C. (2003). Monetary Policy in the Open Economy Revisited: Price Setting and Exchange-Rate Flexibility. *The Review of Economic Studies*, 70(4):765–783.

Devereux, M. B. and Sutherland, A. (2009). A portfolio model of capital flows to emerging markets. *Journal of Development Economics*, 89(2):181–193.

Devereux, M. B. and Sutherland, A. (2010). Country portfolio dynamics. *Journal of Economic Dynamics and Control*, 34(7):1325–1342.

Drenik, A., Kirpalani, R., and Perez, D. J. (2021). Currency Choice in Contracts. *The Review of Economic Studies*, 89(5):2529–2558.

Egorov, K. and Mukhin, D. (2023). Optimal Policy under Dollar Pricing. *American Economic Review*, 113(7):1783–1824.

Fanelli, S. (2024). Monetary policy, capital controls, and international portfolios. *Working paper*.

Fornaro, L. (2015). Financial crises and exchange rate policy. *Journal of International Economics*, 95(2):202–215.

Galí, J. (2014). Monetary Policy and Rational Asset Price Bubbles. *American Economic Review*, 104(3):721–52.

Galí, J. (2015). *Monetary Policy, Inflation, and the Business Cycle*. Princeton University Press, 2nd edition.

Galí, J. (2021). Monetary Policy and Bubbles in a New Keynesian Model with Overlapping Generations. *American Economic Journal: Macroeconomics*, 13(2):121–67.

Galí, J. and Monacelli, T. (2005). Monetary Policy and Exchange Rate Volatility in a Small Open Economy. *The Review of Economic Studies*, 72(3):707–734.

Ilzetzki, E., Reinhart, C. M., and Rogoff, K. S. (2019). Exchange Arrangements Entering the Twenty-First Century: Which Anchor will Hold? *The Quarterly Journal of Economics*, 134(2):599–646.

International Monetary Fund (2025). EM Local Currency Bond Holdings Monitor. Available at www.imfconnect.org.

Itskhoki, O. and Mukhin, D. (2023). Optimal Exchange Rate Policy. *Working paper*.

Lane, P. R. and Milesi-Ferretti, G. M. (2018). The External Wealth of Nations Revisited: International Financial Integration in the Aftermath of the Global Financial Crisis. *IMF Economic Review*, 66:189–222.

Obstfeld, M. and Rogoff, K. (2002). Global Implications of Self-Oriented National Monetary Rules. *The Quarterly Journal of Economics*, 117(2):503–535.

Schmitt-Grohé, S. and Uribe, M. (2001). Stabilization Policy and the Costs of Dollarization. *Journal of Money, Credit and Banking*, 33(2):482–509.

Senay, O. and Sutherland, A. (2019). Optimal monetary policy, exchange rate misalignments and incomplete financial markets. *Journal of International Economics*, 117:196–208.

Siu, H. E. (2004). Optimal fiscal and monetary policy with sticky prices. *Journal of Monetary Economics*, 51(3):575–607.

Svensson, L. E. (2000). Open-economy inflation targeting. *Journal of International Economics*, 50(1):155–183.

Tille, C. (2008). Financial integration and the wealth effect of exchange rate fluctuations. *Journal of International Economics*, 75(2):283–294.

Tille, C. and van Wincoop, E. (2010). International capital flows. *Journal of International Economics*, 80(2):157–175.

Woodford, M. (1999). Commentary : how should monetary policy be conducted in an era of price stability? *Proceedings - Economic Policy Symposium - Jackson Hole*, pages 277–316.

Woodford, M. (2003). *Interest and prices: foundations of a theory of monetary policy*. Princeton University Press.

Zhang, N. (2019). Country portfolios under global imbalances. *European Economic Review*, 119:302–317.