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Being and Consciousness: Fiscal Attitudes According to Hank

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Being and Consciousness: Fiscal Attitudes according to HANK

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Abstract

Attitudes toward fiscal policy differ: *fiscal conservatism* and *fiscal liberalism* vary in their willingness to tolerate budget deficits. We challenge the view that such attitudes reflect national preferences. Instead, we offer an economic explanation based on a two-country Heterogeneous Agent New Keynesian model, bringing its implicit political economy dimension to the forefront. We compute the welfare implications of alternative fiscal policies at the household level to assess the conditions under which a policy commands majority support. Whether the majority supports fiscal conservatism or liberalism depends on a country's debt level, its wealth distribution, and the nature of the economic shock.

Keywords: HANK, Two-country model, Political Economy, Government debt, Fiscal policy, household heterogeneity
JEL-Codes: E32, H63, F45

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"Being determines consciousness"
Karl Marx[1]

1 Introduction

Attitudes towards fiscal policy differ across Europe and have been at the center of many policy debates since the inception of the euro. These attitudes are often seen as reflecting deep-rooted national preferences (Brunnermeier et al. 2016). For instance, many observers have frequently pointed out that the German language uses the same word for both debt and guilt, in an attempt to rationalize what is arguably an excessive aversion to debt in Germany. And while it is true that Germany, along with other "northern" member countries in the euro area (EA), has often advocated tight fiscal policy, it voted in the spring of 2025 for a rather spectacular increase in its national debt. This development may seem puzzling when interpreted against the backdrop of a "national psyche." Yet it can—as this paper shows—be rationalized within a materialist, that is, economic paradigm.

In terms of attitudes toward fiscal policy, we distinguish *fiscal conservatism*, which, all else equal, favors lower levels of government debt, and *fiscal liberalism*, which is more willing to tolerate higher debt levels. We explain why these attitudes ("consciousness") differ across households within and across countries, as well as across states of the world, based on purely economic circumstances ("being"), rather than on innate preferences. Our explanation leverages advances in macroeconomic modeling—it is based on a Heterogeneous Agent New Keynesian (HANK) model that features two countries. Countries differ in how they manage households' income risk and market incompleteness and, ultimately, in their preferred approach to fiscal policy. Consider the EA: in some countries, the state directly guarantees a minimum income, whereas in others, households rely on government debt to self-insure against adverse shocks (Aiyagari and McGrattan 1998).

This shapes attitudes toward fiscal policy both in steady state and over the business cycle. First, in the absence of minimum income benefits, the demand for government debt is higher in steady state, which may directly account for more liberal fiscal attitudes. Second, we formally assess how costs and benefits associated with different fiscal policies change over the business cycle for individual households. We compute how these costs and benefits are distributed and, by zooming in on the median voter, determine "country preferences" for specific fiscal policies at business cycle frequency. In this way, our analysis exploits the household-level heterogeneity embedded in the HANK framework to account for the political economy of the business cycle: Whether there is a majority in favor of fiscal conservatism depends on the level of initial government debt as well as on the nature of the underlying shocks. Moreover, we show that the economic impact of fiscal policy, as predicted by the model, can rationalize voter preferences, as revealed by survey data.

[1]The quote is a commonly used shorthand for: "It is not the consciousness of men that determines their being, but, on the contrary, their social being that determines their consciousness." (Marx 1859).

More in detail, we put forward a heterogeneous agent New Keynesian model of two countries: HANK^2. It duplicates the HANK structure developed in earlier work by Bayer et al. (2024a) in an otherwise standard two-country model as, for instance, in Corsetti et al. (2012). Countries specialize in the production of varieties which are used for consumption and investment in both countries. Prices are adjusted infrequently. There is a common monetary policy but financial markets are segmented. Within each country, households face uninsurable, idiosyncratic income risk and borrowing constraints. Households can save in illiquid capital, which will pay a higher return in equilibrium but has only limited insurance value and is not traded across countries. In addition, households may trade liquid government bonds, both within and across countries. Fiscal policy is set at the national level. In particular, there is a distortionary income tax which is adjusted more or less aggressively to stabilize the level of debt.

Countries differ in terms of household-level heterogeneity, which emerges endogenously in the steady state because of how each country copes with market incompleteness. One country, which we refer to as "South," does not provide government insurance against idiosyncratic income risk in the form of minimum income benefits; the other country, "North," does. As a result, households in *South* hold more liquid assets—government debt—to self-insure against income risk. Both approaches—government insurance and self-insurance—improve consumption insurance and thus bring real interest rates closer to time preferences, but they differ in their implications for the wealth distribution (Hubbard et al. 1995; Pham-Dào 2016; Wellschmied 2021; Bayer et al. 2023).

Our calibration reflects this. Specifically, we use key characteristics of the Italian economy as targets for *South*. Italy is not only the largest southern EA economy but also lacked until recently (permanent) minimum income benefits. We calibrate key model parameters, including those governing household income risk, to match important moments of Italy's income and wealth distributions, as well as its total capital stock and a public-debt-to-GDP ratio of 132%. *North* differs from *South* by featuring a minimum income benefit scheme, which we calibrate in line with evidence for Germany. In all other respects, however, *North* is specified as the parametric twin of *South* in order to isolate the effect of minimum income benefits on the steady-state distribution. Because these benefits provide insurance, they reduce the demand for government bonds and increase wealth inequality in *North*. We set the supply of government bonds in *North* to 95% of GDP, ensuring that the real interest rate in the stationary equilibrium is identical in both countries under a zero net foreign asset position. We find that *North* also exhibits a higher wealth Gini coefficient of 0.68, compared to 0.60 in *South*, bringing *North* closer to actual values for Germany, which has a wealth Gini of 0.73 and a debt-to-GDP ratio of 73%. As a robustness check, we recalibrate *North* to directly match the German data on income and wealth distributions, as well as capital and government debt holdings, and find no substantial differences in the results compared to our baseline scenario.

To study fiscal attitudes over the business cycle, we consider a monetary contraction and—to set the stage—first focus on the limiting case of a closed economy, comparing outcomes in *North* and *South* in isolation, while abstracting from any cross-country spillovers. A monetary contraction leads to a fiscal shortfall: interest rates rise and tax revenues decline. A conservative fiscal policy responds by raising taxes in order to not having to run a budget deficit. In contrast, a liberal fiscal policy buffers the shock by issuing new debt. Our analysis highlights a trade-off: raising taxes to balance the budget causes a sharp and immediate recession, as stressed by Kaplan et al. (2018), while smoothing taxes through debt issuance induces a weaker but more prolonged recession. This trade-off exists in both countries but is more pronounced in *South*, where taxes must increase even further due to the higher initial level of debt.

We assess this trade-off and the resulting attitudes toward fiscal policy using a (one-sided) welfare measure, computed as the consumption equivalent variation that makes households as well off in the presence of a shock as in its absence. We compare the outcomes under liberal and conservative fiscal policies. At the aggregate level—that is, in terms of average welfare—the liberal fiscal policy performs better in both countries. However, this result masks considerable heterogeneity. In *North*, the majority of households turn out to be fiscally conservative: the median voter is better off under a conservative rather than a liberal fiscal policy, with about 60 percent of households "voting" for the conservative policy. Notably, the same holds in the case of a monetary expansion, except that in this scenario, conservative fiscal policy entails running a budget surplus—reducing debt—while liberal fiscal policy maintains a balanced budget.

We assess policy preferences along the income and the wealth distribution and find that while support for the conservative fiscal policy is similar among households in the lower and middle income brackets in *North* and *South*, the support of the income-rich households strongly diverges across countries: while the upper middle class strongly supports conservative fiscal policy in *North*, support for these policies is much weaker by their peers in *South*. There is a similar pattern along the wealth distribution. To see why, we run counterfactual model simulations. We find that there is greater support for conservative fiscal policy among the rich in *North*, because there it requires a milder tax increase and is less recessionary than in *South*. Moreover, it depresses real interest rates relatively less in *North*.

Attitudes toward fiscal policy depend on the nature of the underlying shock. To illustrate this, we consider a government spending shock. In this case, there is an overwhelming majority in favor of liberal fiscal policies in both *South* and *North*. Even in *North*, only around 10% of households opt for fiscal conservatism. Intuitively, balancing the budget would require a substantial tax increase in the face of higher government spending—largely independent of the initial debt level, since it primarily finances the additional spending—which erodes support for fiscal conservatism in both countries.

Still, within countries, the welfare costs of different fiscal policies vary substantially across households. We exploit this insight to confront the model predictions for *North* with survey evidence from German households collected in the spring of 2025. The survey asks respondents whether they support the shift toward a more liberal fiscal policy to fund increased government expenditure—a shift that required the incoming government to alter the constitution. As a proof of concept, we show that the differences in the economic impact of alternative policies, as predicted by our model, can effectively rationalize voter preferences as revealed by the survey data.

Finally, we revisit fiscal policy attitudes in the context of the fully-fledged, two-country model of the monetary union. A first result is that this setting has little impact on how households assess fiscal policies—assuming, counterfactually, that such policies are put to a union-wide vote. As before, the median voter in *North* prefers a conservative fiscal policy, while the median voter in *South* favors a liberal one. For our calibration, we find a slim union-wide majority of 50.7% in favor of conservative fiscal policy, conditional on a monetary contraction.

However, while the EA has common fiscal rules, these are hardly binding in practice; fiscal policy is effectively determined at the national level. To reflect this, we consider voting on fiscal policy within each country, conditional on fiscal policy choices in the other country. Three observations are noteworthy. First, neither country prefers to adopt a conservative fiscal policy unilaterally. Second, there is complementarity in fiscal policy: domestic support for fiscal conservatism increases when the partner country also adopts a conservative fiscal policy. Third, if households were to vote on the other country's fiscal policy, a large majority in each country would prefer the other country to run a conservative policy, regardless of their own country's fiscal policy. Taken together, these patterns suggest a systematic bias toward adopting a more liberal fiscal policy than the partner country.

The remainder of the paper is organized as follows. We conclude this introduction by relating our paper to the existing literature. Section 2 presents our HANK^2 model. Section 3 explains our calibration which specifies *North* and *South*. Sections 4 presents and discusses the results for the limiting case of a closed economy and relates the model predictions to the survey evidence. 5 shows results for the full monetary-union framework. A final section offers some conclusions.

Related literature. Our paper relates to four strands of the literature. First, there is earlier work on monetary-policy tradeoffs in heterogeneous currency unions (Mundell 1961; Alesina and Barro 2002; Benigno 2004; Benigno and López-Salido 2006; Enders et al. 2013; Galí and Monacelli 2016) and, related work which analyzes the how the income distribution impinges on the political economy of fiscal unions (Bolton and Roland 1997; Alesina and Perotti 1998).

Second, a distinct strand of the literature focused on monetary and fiscal interactions in currency unions (Kenen 1969; Beetsma and Jensen 2005; Gali and Monacelli 2008; Farhi and Werning 2017; Hettig and Müller 2018; Camous and Cooper 2019) and, more specifically, the role of national debt levels for monetary policy in a currency union (Beetsma and Uhlig 1999; Sims 1999; Corsetti et al. 2014).

Third, there is work which studies household heterogeneity and incomplete financial markets within countries in an open-economy context accounting for international capital flows (Mendoza et al. 2009; Ferra et al. 2021). A number of studies also extend the HANK framework as originally developed in a closed-economy context by Kaplan et al. (2018) and Bayer et al. (2019) to an open-economy context. Small-open economy versions are used to study the distributional implications of sudden stops, exchange rate shocks, and monetary and fiscal policy (de Ferra et al. 2020; Guo et al. 2020; Auclert et al. 2021; Druedahl et al. 2024; Acharya and Challe 2025) and the impact of foreign shocks (Zhou 2021; Druedahl et al. 2022; Oskolkov 2023). Recent work has also examined fiscal policy in multi-country HANK models, both within and outside monetary unions (Aggarwal et al. 2023; Bellifemine et al. 2022, 2025; Chen et al. 2025). Our study is unique in that it develops the HANK^2 framework to explore the political economy dimension of fiscal policy—within and across countries—placing it at the center of the analysis. In related work, we use this framework to study the distributional impact of asymmetric shocks across countries in the EA (Bayer et al. 2024b), as well as of fiscal responses to an energy shock, both within and across borders (Bayer et al. 2025).

Finally, our work relates to optimal policy in heterogeneous agent economies. Based on more tractable models (Challe and Ragot 2016; Bilbiie 2025), some authors are reassessing what an "optimal" fiscal or monetary policy would look like (Bhandari et al. 2021; Le Grand et al. 2024; Acharya et al. 2023; Gornemann et al. 2021). In a heterogeneous agent framework, however, it seems natural to consider a political economy question: What rationalizes observed policy choices in a democracy? This and related questions have some tradition in public finance and the literature on optimal taxation, see, for instance, Meltzer and Richard (1981), Acemoglu et al. (2008, 2010), Brett and Weymark (2017), Bierbrauer and Boyer (2016), Bierbrauer et al. (2021), and Bierbrauer et al. (2022) and recent examples in a dynamic standard incomplete markets setting (Brendler 2020; Le Grand et al. 2025). Our paper is the first attempt to rationalize observed policy choices based on "voter" preferences within the HANK framework by exploring the distributional impact of fiscal policies over the business cycle; for related earlier work in a real business cycle context, see Bachmann and Bai (2013) and Bachmann et al. (2020).

2 Model

We model a monetary union of two-countries, *South* and *North*. Markets are incomplete and households face idiosyncratic risks, but they can self-insure. As a result households become heterogeneous in income and wealth. Prices and wages are sticky as is standard in the New-Keynesian literature. The set-up in each country is closely related to the HANK model in Bayer et al. (2024a). Each country consists of a firm sector and a household sector, respectively. The firm sector of each country comprises (a) perfectly competitive intermediate goods producers who rent out labor services and capital on a national labor and a national capital market, respectively; (b) final goods producers that face monopolistic competition producing differentiated final goods out of homogeneous domestic intermediate inputs; (c) a representative consumption good bundler bundling domestic and imported foreign final goods to consumption goods; (d) producers of capital goods that turn consumption goods into capital subject to adjustment costs; (e) labor packers that produce labor services combining differentiated labor from (f) unions that differentiate raw labor rented out from households. Price setting for the final goods as well as wage setting by unions is subject to a pricing friction à la Calvo (1983). We assume that only final goods can be traded between both countries.

In each country, there is a continuum of households of size $n_S \in (0,1)$ and $n_N = 1 - n_S$, respectively, such that the overall population of the a monetary union is 1. We index *South* with S and *North* with N. Households in both countries consume a bundle which consists of home and foreign final goods bundles. Households earn income from supplying (raw) labor and capital to the national labor and the national capital markets and from owning their national firm sector, absorbing all its rents that stem from the market power of unions and final good producers, and decreasing returns to scale in capital goods production.

The government sector runs a common monetary authority and national fiscal authorities. The respective fiscal authority levies taxes on labor income and distributed profits, issues government bonds, and adjusts taxes to stabilize its debt in the long run. In addition, they run a targeted transfer system. The monetary authority sets the nominal interest rate on both government bonds according to a Taylor rule. We assume that the set-up of both countries is symmetric, while we allow for different calibrations of the transfer system in each country. In what follows, we describe the households and the firms sector only from the perspective of the *South*. We denote foreign variables from *South*'s perspective with an asterisk *.

2.1 Households

The household sector is subdivided into two types of agents: workers and entrepreneurs. The transition between both types is stochastic. Both rent out physical capital, but

only workers supply labor. The efficiency of a worker's labor evolves randomly exposing worker-households to labor-income risk. Entrepreneurs do not work but earn all pure rents in our economy except for the rents of unions which are equally distributed across workers. All households self-insure against the income risks they face by saving in a liquid nominal asset (bonds) and a less liquid asset (capital). Trading illiquid assets is subject to random participation in the capital market. To be specific, there is a continuum of ex-ante identical households of measure n_S, indexed by i. Households are infinitely lived, have time-separable preferences with time discount factor β, and derive felicity from consumption c_{it} and leisure. They obtain income from supplying labor, l_{it}, from renting out capital, k_{it}, and from earning interest on bonds, b_{it}, and potentially from profits or union transfers. Households pay taxes on labor and profit income.

2.1.1 Productivity, labor supply, and labor income

A household's gross labor income $w_t l_{it} h_{it}$ is composed of the aggregate wage rate on raw labor, w_t, the household's hours worked, l_{it}, and its idiosyncratic labor productivity, h_{it}. We assume that productivity evolves according to a log-AR(1) process with time-varying volatility and a fixed probability of transition between the worker and the entrepreneur state:

$$\tilde{h}_{it} = \begin{cases} \exp(\rho_h \log \tilde{h}_{it-1} + \epsilon^h_{it}) & \text{with probability } 1-\zeta \text{ if } h_{it-1} \neq 0, \\ 1 & \text{with probability } \iota \text{ if } h_{it-1} = 0, \\ 0 & \text{else.} \end{cases} \tag{1}$$

with individual productivity $h_{it} = \frac{\tilde{h}_{it}}{\int \tilde{h}_{it} di}$ such that $\tilde{h}_{it}$ is scaled by its cross-sectional average, $\tilde{h}_{it} di$, to make sure that average worker productivity is constant. The shocks ϵ^h_{it} to productivity are normally distributed with variance $\sigma^2_{h,t}$. With probability ζ households become entrepreneurs ($h = 0$). With probability ι an entrepreneur returns to the labor force with median productivity. In our baseline specification, an entrepreneur obtains a share of the pure rents (aside from union rents), Π^F_t, in the economy (from monopolistic competition in the goods sector and the creation of capital). We assume that the claim to the pure rent cannot be traded as an asset. Union rents, Π^U_t are distributed lump sum across workers, leading to labor-income compression. For tractability, we assume union profits to be taxed at a fixed rate independent of the recipient's labor income.[2]

With respect to leisure and consumption, households have Greenwood et al. (1988)

[2]This modeling strategy serves two purposes. First and foremost, it generally solves the problem of the allocation of pure rents without distorting factor returns and without introducing another tradable asset. Second, we use the entrepreneur state in particular – a transitory state in which incomes are very high – to match the income and wealth distribution following the idea by Castaneda et al. (1998). The entrepreneur state does not change the asset returns or investment opportunities available to households.

(GHH) preferences and maximize the discounted sum of felicity:

$$E_0 \max_{\{c_{it},l_{it}\}} \sum_{t=0}^{\infty} \beta^t u[c_{it} - G(h_{it}, l_{it})] \tag{2}$$

The maximization is subject to the budget constraints described further below. The felicity function u exhibits a constant relative risk aversion (CRRA) with risk aversion parameter $\xi > 0$,

$$u(x_{it}) = \frac{1}{1-\xi} x_{it}^{1-\xi}, \tag{3}$$

where $x_{it} = c_{it} - G(h_{it}, l_{it})$ is household i's composite demand for goods consumption c_{it} and leisure and G measures the dis-utility from work. The consumption good c is a bundle of domestic and imported foreign final goods as described in Section 2.2.2.

The household's labor income gets taxed at rate τ_t, such that its net labor income is

$$(1 - \tau_t) w_t h_{it} l_{it}, \tag{4}$$

where w_t is the aggregate wage rate. Given net labor income, the first-order condition for labor supply is

$$\frac{\partial G(h_{it}, l_{it})}{\partial l_{it}} = (1 - \tau_t) w_t h_{it} = \frac{y_{it}}{l_{it}}. \tag{5}$$

Assuming that G has a constant elasticity w.r.t. n, $\frac{\partial G(h_{it},l_{it})}{l_{it}} = (1+\gamma)\frac{G(h_{it},l_{it})}{l_{it}}$ with $\gamma > 0$, we can simplify the expression for the composite consumption good, x_{it}, making use of this first-order condition (5), and substitute $G(h_{it}, l_{it})$ out of the individual planning problem:

$$x_{it} = c_{it} - G(h_{it}, l_{it}) = c_{it} - \frac{1}{1+\gamma} y_{it}. \tag{6}$$

When the Frisch elasticity of labor supply is constant and the tax schedule has the form (4), the dis-utility of labor is always a fraction of labor income and constant across households. Therefore, in both the household's budget constraint and felicity function, only after-tax income enters and neither hours worked nor productivity appears separately.

What remains to be determined is individual and aggregate effective labor supply. Without further loss of generality, we assume $G(h_{it}, l_{it}) = h_{it} \frac{l_{it}^{1+\gamma}}{1+\gamma}$. This functional form simplifies the household problem in the stationary equilibrium as h_{it} drops out from the first-order condition and all households supply the same number of hours $l_{it} = L(w_t)$. Total effective labor input, $\int l_{it} h_{it} di$ therefore equals $L(w_t)$ because we normalized $\int h_{it} di = 1$.[3]

[3]This means that we can read off average productivity risk from the estimated income risk series in the literature. Without scaling the labor dis-utility by productivity, we would need to translate productivity risk to income risk through the endogenous hour response.

Households also receive profit income as union profits Π_t^U if they are workers and Π_t^F if they are entrepreneurs. Both also get taxed at rate τ_t. What is more, they may receive *non-distortionary* targeted transfer as minimum income benefits tr_{it}. All together, after-tax non-capital income, plugging in the optimal supply of hours, is then:

$$y_{it} = \left[(1-\tau_t^L)w_t\right]^{\frac{1+\gamma}{\gamma}} h_{it} + \mathbb{I}_{h_{it}\neq 0}\Pi_t^U + \mathbb{I}_{h_{it}=0}\Pi_t^F + tr_{it}. \tag{7}$$

2.1.2 Consumption, savings, and portfolio choice

Given this labor income, households optimize inter-temporally subject to their budget constraint:

$$c_{it} + b_{it+1} + q_t k_{it+1} = y_{it} + b_{it}\frac{R(b_{it}, R_t^b)}{\pi_t^{CPI}} + (q_t + r_t)k_{it}k_{it+1} \geq 0,\ b_{it+1} \geq \underline{B} \tag{8}$$

b_{it} is real bond holdings, k_{it} is the amount of illiquid assets, q_t is the price of these assets, r_t is their dividend, $\pi_t^{CPI} = \frac{P_t}{P_{t-1}}$ is realized domestic CPI inflation, and R is the nominal interest rate on bonds, which depends on the portfolio position of the household and the central bank's interest rate R_t^b, which is set one period before.

All households that do not participate in the capital market ($k_{it+1} = k_{it}$) still obtain dividends and can adjust their bond holdings. Depreciated capital has to be replaced for maintenance, such that the dividend, r_t, is the net return on capital. Holdings of bonds have to be above an exogenous debt limit $\underline{B}$; and holdings of capital have to be non-negative.

Substituting the expression $c_{it} = x_{it} + \frac{1}{1+\gamma}\left[(1-\tau_t^L)w_t\right]^{\frac{1+\gamma}{\gamma}} h_{it}$ for consumption, we obtain the budget constraint for the composite leisure-consumption good:

$$x_{it} + b_{it+1} + q_t k_{it+1} = b_{it}\frac{R(b_{it}, R_t^b)}{\pi_t} + (q_t + r_t)k_{it} + z_{it}, \quad k_{it+1} \geq 0,\ b_{it+1} \geq \underline{B}, \tag{9}$$

where $z_{it} = \frac{\gamma}{1+\gamma}\left[(1-\tau_t^L)w_t\right]^{\frac{1+\gamma}{\gamma}} h_{it} + \mathbb{I}_{h_{it}\neq 0}\Pi_t^U + \mathbb{I}_{h_{it}=0}\Pi_t^F + tr_{it}$ is income corrected for the dis-utility of labor.

Households make their savings choices and their portfolio choice between liquid bonds and illiquid capital in light of a capital market friction that renders capital illiquid because participation in the capital market is random and i.i.d. in the sense that only a fraction, λ, of households are selected to be able to adjust their capital holdings in a given period. This means that we specify:

$$R(b_{it}, R_t^b) = \begin{cases} R_t^b & \text{if } b_{it} \geq 0 \\ R_t^b + \bar{R} & \text{if } b_{it} < 0 \end{cases}. \tag{10}$$

The extra wedge for unsecured borrowing, $\bar{R}$, creates a mass of households with zero unsecured credit but with the possibility to borrow, though at a penalty rate.

Since a household's saving decision——(b'_a, k') for the case of adjustment and (b'_n, k') for non-adjustment—will be some non-linear function of that household's wealth and productivity, inflation and all other prices will be functions of the domestic joint distribution, Θ_t, of (b, k, h) in t and the foreign joint distribution, Θ^*_t. This makes Θ and Θ^* state variables of the household's planning problem and these distributions evolves as a result of the economy's reaction to aggregate shocks. For simplicity, we summarize all effects of aggregate state variables, including the distributions of wealth and income, by writing the dynamic planning problem with time-dependent continuation values.

This leaves us with three functions that characterize the household's problem: value function V^a for the case where the household adjusts its capital holdings, the function V^n for the case in which it does not adjust, and the expected continuation value, $\mathbb{W}$, over both:

$$\begin{aligned} V^a_t(b,k,h) &= \max_{k',b'_a} u[x(b,b'_a,k,k',h] + \beta \mathbb{E}_t \mathbb{W}_{t+1}(b'_a,k',h) \\ V^n_t(b,k,h) &= \max_{b'_n} u[x(b,b'_n,k,k,h] + \beta \mathbb{E}_t \mathbb{W}_{t+1}(b'_n,k,h) \\ \mathbb{W}_{t+1}(b',k',h) &= \lambda V^a_{t+1}(b',k',h) + (1-\lambda) V^n_{t+1}(b',k,h). \end{aligned} \tag{11}$$

Expectations are taken with respect to all stochastic processes conditional on current states. Maximization is subject to the corresponding budget constraint.

2.2 Firm sector

The firm sector of each country consists of five sub-sectors: (a) a labor sector composed of "unions" that differentiate raw labor and labor packers who buy differentiated labor and then sell labor services to intermediate goods producers, (b) intermediate goods producers who hire labor services and rent out capital to produce goods, (c) final goods producers who differentiate intermediate goods and then sell them to (d) goods bundlers who bundles them with foreign final goods and finally sell them as consumption goods to households and to (e) capital goods producers, who turn bundled goods into capital goods. None of these products and goods can be traded between both countries, except for the differentiated final goods.

When profit maximization decisions in the firm sector require inter-temporal decisions (i.e. in price and wage setting and in producing capital goods), we assume for tractability that they are delegated to a mass-zero group of households (managers) that are risk neutral and compensated by a share in profits. They do not participate in any asset market and have the same discount factor as all other households. Since managers are

a mass-zero group in the economy, their consumption does not show up in any resource constraint and all but the unions' profits go to the entrepreneur households (whose $h = 0$). Union profits go lump-sum to worker households.

2.2.1 Labor packers and unions

Worker households sell their labor services to a mass-n_S continuum of unions indexed by j, each of whom offers a different variety of labor to labor packers who then provide labor services to intermediate goods producers. Labor packers produce final labor services according to the production function

$$L_t = \left(\int_0^{n_S} \hat{l}_{jt}^{\frac{\eta_W - 1}{\eta_W}} dj \right)^{\frac{\eta_W}{\eta_W - 1}}. \tag{12}$$

out of labor varieties $\hat{l}_{jt}$. Cost minimization by labor packers implies that each variety of labor, each union j, faces a downward-sloping demand curve

$$\hat{l}_{jt} = \left(\frac{W_{jt}}{W_t^{fi}} \right)^{-\eta_W} L_t \tag{13}$$

where W_{jt} is the nominal wage set by union j and W_t^F is the nominal wage at which labor packers sell labor services to final goods producers. Since unions have market power, they pay the households a wage lower than the price at which they sell labor to labor packers. Given the nominal wage W_t at which they buy labor from households and given the nominal wage index W_t^F, unions seek to maximize their discounted stream of profits. However, they face a Calvo (1983) type adjustment friction with indexation with the probability λ_w to keep wages constant. They therefore maximize

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \lambda_w^t \frac{W_t^{fi}}{P_t} L_t \left\{ \left(\frac{W_{jt}(\bar{\pi}_W)^t}{W_t^{fi}} - \frac{W_t}{W_t^{fi}} \right) \left(\frac{W_{jt}(\bar{\pi}_W)^t}{W_t^{fi}} \right)^{-\eta_W} \right\}. \tag{14}$$

by setting W_{jt} in period t and keeping it constant except for indexation to π_W, the steady state wage inflation rate.

Since all unions are symmetric, we focus on a symmetric equilibrium and obtain the linearized wage Phillips curve from the corresponding first-order condition as follows, leaving out all terms irrelevant at a first-order approximation around the stationary equilibrium:

$$\log \left(\frac{\pi_t^W}{\bar{\pi}^W} \right) = \beta \mathbb{E}_t \log \left(\frac{\pi_{t+1}^W}{\bar{\pi}^W} \right) + \kappa_w \left(mc_t^w - \frac{1}{\mu^W} \right), \tag{15}$$

with $\pi_t^W := \frac{W_t^F}{W_{t-1}^F} = \frac{w_t^F}{w_{t-1}^F} \pi_t^{CPI}$ being domestic wage inflation, w_t and w_t^F being the respective

real wages for households and firms, $mc_t^w = \frac{w_t}{w_t^F}$ is the mark-down of wages the unions pay to households, W_t, relative to the wages charged to firms, W_t^F and $\kappa_w = \frac{(1-\lambda_w)(1-\lambda_w\beta)}{\lambda_w}$. Union profits paid to workers therefore are $\Pi_t^U = (w_t^F - w_t)L_t$.

2.2.2 Consumption Good Bundler

The consumption goods are bundles of domestically produced and imported final goods and are not traded across countries. Letting F_t denote the consumption good and S_t and N_t bundles of domestically and imported final goods, we assume the following aggregation technology

$$F_t = \left\{(1-(1-n_S)\omega_S)^{\frac{1}{\sigma}} S_t^{\frac{\sigma-1}{\sigma}} + ((1-n_S)\omega_S)^{\frac{1}{\sigma}} N_t^{\frac{\sigma-1}{\sigma}}\right\}^{\frac{\sigma}{1-\sigma}}, \tag{16}$$

$$F_t^* = \left\{(n_S\omega_N)^{\frac{1}{\sigma}} S_t^{\frac{\sigma-1}{\sigma}} + (1-n_S\omega_N)^{\frac{1}{\sigma}} N_t^{\frac{\sigma-1}{\sigma}}\right\}^{\frac{\sigma}{1-\sigma}}. \tag{17}$$

Here σ measures the terms of trade elasticity of the relative demand for domestically produced goods. $\omega_S \in [0,1]$ provides a measure for the home bias, in the sense that with $\omega_S = 1$, *South* has no home bias. The bundles of domestically and imported final goods are defined as follows:

$$S_t = \left[\left(\frac{1}{n_S}^{\frac{1}{\sigma}} \int_0^{n_S} S_t(j)^{\frac{\epsilon-1}{\epsilon}} dj\right)\right]^{\frac{\epsilon}{\epsilon-1}}, \; N_t = \left[\left(\frac{1}{1-n_S}^{\frac{1}{\sigma}} \int_{n_S}^{1} N_t(j)^{\frac{\epsilon-1}{\epsilon}} dj\right)\right]^{\frac{\epsilon}{\epsilon-1}}, \tag{18}$$

where $S_t(j)$ and $N_t(j)$ denote final goods produced in Home and Foreign, respectively, and ϵ measures the elasticity of substitution between final goods produced within the same country. Let $P(j)$ denote the price of a final good expressed in domestic currency. Then, letting $\mathcal{E}_t$ denote the nominal exchange rate (price of domestic currency in terms of foreign currency) and assuming that the law of one price holds, we have

$$P_t^*(j) = \mathcal{E}_t P_t(j), \tag{19}$$

with $\mathcal{E}_t = 1 \; \forall t$ since both countries form a monetary union.

The problem of the good bundler is to minimize expenditures subject to $F_t = C_t + I_t$, and the aggregation technologies (16) and (18). Assuming that government consumption, G_t, is a bundle which is isomorphic to consumption goods, but consists of domestically produced goods only, global demand for a generic final good produced in *South* and *North* is given, respectively, by

$$Y_t^d(j) = \left(\frac{P_t(j)}{P_{St}}\right)^{-\epsilon} \left\{\left(\frac{P_{St}}{P_t}\right)^{\sigma} (1-(1-n_S)\omega_S)(C_t+I_t) + (1-n_S)\omega_N Q_t^{-\sigma}(I_t^* + C_t^*) + G_t\right\}, \tag{20}$$

$$Y_t^d(j)^* = \left(\frac{P_t(j)^*}{P_{Nt}^*}\right)^{-\epsilon} \left\{\left(\frac{P_{Nt}^*}{P_t^*}\right)^{\sigma} (n_S\omega_S)Q_t^{\sigma}(C_t + I_t) + (1 - n_S\omega_N)(I_t^* + C_t^*) + G_t^*\right\}, \quad (21)$$

where the price indices are given by

$$P_{St} = \left[\frac{1}{n_S}\int_0^{n_S} P_t(j)^{1-\epsilon}dj\right]^{\frac{1}{1-\epsilon}}, \; P_{Nt} = \left[\frac{1}{1-n_S}\int_{n_S}^{1} P_t(j)^{1-\epsilon}dj\right]^{\frac{1}{1-\epsilon}} \quad (22)$$

and

$$P_t = [(1 - (1 - n_S)\omega_S)P_{St}^{1-\sigma} + ((1 - n_S)\omega_S)P_{Nt}^{1-\sigma}]^{\frac{1}{1-\sigma}}, \quad (23)$$

$$P_t^* = [(n_S\omega_N)(P_{St}^*)^{1-\sigma} + (1 - n_S\omega_N)(P_{Nt}^*)^{1-\sigma}]^{\frac{1}{1-\sigma}}. \quad (24)$$

The real exchange rate is given by

$$Q_t = \frac{P_t\mathcal{E}_t}{P_t^*}. \quad (25)$$

2.2.3 Final goods producers

Similar to unions, final goods producers in the home country differentiate the homogeneous home intermediate good and set prices. They face the global demand (20) for each good $j \in [0, n_S]$ and buy the intermediate good at the national nominal price, MC_t. As we do for unions, we assume price adjustment frictions à la Calvo (1983) with indexation.

Under this assumption, the firms' managers maximize the present value of real profits given this price adjustment friction, i.e., they maximize

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \lambda_Y^t (1 - \tau_t^L) \left\{\left(\frac{p_{jt}(\bar{\pi})^t}{P_t} - \frac{MC_t}{P_t}\right) Y_t^d(j)\right\}^{1-\tau_t^P} \quad (26)$$

with a time-constant discount factor.

The corresponding first-order condition for price setting implies a domestic Phillips curve

$$\log\left(\frac{\pi_{St}}{\bar{\pi}}\right) = \beta\mathbb{E}_t \log\left(\frac{\pi_{St+1}}{\bar{\pi}}\right) + \kappa_Y\left(mc_t - \frac{1}{\mu^Y}\right) \quad (27)$$

where we again dropped all terms irrelevant for a first-order approximation and have $\kappa_Y = \frac{(1-\lambda_Y)(1-\lambda_Y\beta)}{\lambda_Y}$. Here, $\pi_{St} := \frac{P_{St}}{P_{St-1}}$, is gross domestic producer price inflation rate, i.e., the gross inflation rate of domestic final goods, $mc_t := \frac{MC_t}{P_t}$ are the domestic real marginal costs, $\bar{\pi}$ is steady-state inflation, and $\frac{1}{\mu^Y} = \frac{\eta-1}{\eta}$ is the target markup. National profits paid to domestic entrepreneurs therefore are $\Pi_t^F = (1 - mc_t)Y_t$.

2.2.4 Intermediate goods producers

Intermediate goods are produced with a constant returns to scale production function:

$$Y_t = Z_t(L_t)^{\alpha}(u_t K_t)^{(1-\alpha)} \tag{28}$$

where Z_t is national total factor productivity and follows an autoregressive process in logs, and $u_t K_t$ is the effective capital stock taking into account utilization, u_t, i.e., the intensity with which the existing capital stock is used. Using capital with an intensity higher than normal increases depreciation of capital according to $\delta(u_t) = \delta_0 + \delta_1(u_t - 1) + \delta_2/2(u_t - 1)^2$, which, assuming $\delta_1, \delta_2 > 0$, is an increasing and convex function of utilization. Without loss of generality, capital utilization in the steady state is normalized to 1, so that δ_0 denotes the steady-state depreciation rate of capital goods.

Let mc_t be the relative price at which the intermediate good is sold to final goods producers. The intermediate goods producer maximizes profits,

$$mc_t Z_t Y_t - w_t^F L_t - [r_t^F + q_t \delta(u_t)]K_t, \tag{29}$$

where r_t^F and q_t are the rental rate of firms and the (producer) price of capital goods, respectively. The intermediate goods producer operates in perfectly competitive national markets, such that the real wage and the user costs of capital are given by the marginal product of labor and effective capital:

$$w_t^F = \alpha mc_t Z_t \left(\frac{u_t K_t}{L_t}\right)^{1-\alpha} \tag{30}$$

$$r_t^F + q_t \delta(u_t) = u_t(1-\alpha) mc_t Z_t \left(\frac{L_t}{u_t K_t}\right)^{\alpha} \tag{31}$$

We assume that utilization is decided by the owners of the capital goods, taking the aggregate national supply of capital services as given. The optimality condition for utilization is given by

$$q_t[\delta_1 + \delta_2(u_t - 1)] = (1-\alpha) mc_t Z_t \left(\frac{L_t}{u_t K_t}\right)^{\alpha}, \tag{32}$$

i.e., capital owners increase utilization until the marginal maintenance costs equal the marginal product of capital services.

2.2.5 Capital goods producers

Capital goods producers take the relative price of capital goods, q_t, as given in deciding about their output, i.e., they maximize

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t I_t \left\{ q_t \left[1 - \frac{\phi}{2} \left(\log \frac{I_t}{I_{t-1}} \right)^2 \right] - 1 \right\}. \tag{33}$$

Optimality of the capital goods production requires (again dropping all terms irrelevant up to first order)

$$q_t \left[1 - \phi \log \frac{I_t}{I_{t-1}} \right] = 1 - \beta \mathbb{E}_t \left[q_{t+1} \psi \log \left(\frac{I_{t+1}}{I_t} \right) \right], \tag{34}$$

and each capital goods producer will adjust its production until (34) is fulfilled.

Since all capital goods producers within a country are symmetric, we obtain as the law for motion for domestic aggregate capital

$$K_t - (1 - \delta(u_t)) K_{t-1} = \left[1 - \frac{\phi}{2} \left(\log \frac{I_t}{I_{t-1}} \right)^2 \right] I_t \tag{35}$$

The functional form assumption implies that investment adjustment costs are minimized and equal to 0 in steady state.

2.3 Government Sector

The two countries form a monetary union such that they run a common monetary authority. In addition, each country runs a national fiscal authority. The monetary authority controls the nominal interest rate on liquid assets in both countries, while the national fiscal authorities issue government bonds in an union-wide bond market to finance deficits, choose both the average tax rate and the tax progressivity in their country, and make expenditures for government consumption and their national transfer system.

2.3.1 Monetary Union

We assume that monetary policy sets the nominal interest rate, which is the same in both countries, following a Taylor (1993)-type rule with interest rate smoothing:

$$\frac{R^b_{t+1}}{\bar{R}^b} = \left(\frac{R^b_t}{\bar{R}^b} \right)^{\rho_R} \left(\frac{n_S \pi_{St} + (1 - n_S)(\pi_{Nt})}{\bar{\pi}} \right)^{(1-\rho_R)\theta_\pi} \left(n_S \frac{Y_t}{Y_{t-1}} + (1 - n_S) \frac{Y^*_t}{Y^*_{t-1}} \right)^{(1-\rho_R)\theta_Y} \epsilon^R_t. \tag{36}$$

The coefficient $\bar{R}^b \geq 0$ determines the nominal interest rate in the steady state, Y_t^* determines output in *North*, and π_{Nt} is the producer price inflation in *North*. The coefficients $\theta_\pi, \theta_Y \geq 0$ govern the extent to which the central bank attempts to stabilize producer price inflation and the output growth in the monetary union. $\rho_R \geq 0$ captures interest rate smoothing and ϵ_t^R is an i.i.d. monetary policy shock.

2.3.2 Fiscal Policy

The budget constraint of the national fiscal policy reads

$$G_t + Tr_t = B_{t+1} + T_t - \frac{R_t^b}{\pi_t^{CPI}} B_t. \tag{37}$$

Hence, the government has expenditure for government spending, G_t, aggregate spending on its transfer system specified below, Tr_t, and repaying its debt, B_t. It finances its expenditures by issuing new debt and tax revenue, T_t. Tax revenue is

$$T_t = \tau_t(w_t L_t + \mathbb{I}_{h_{it}=0}\Pi_t^F + \mathbb{I}_{h_{it}\neq 0}\Pi_t^U). \tag{38}$$

We assume that the average tax rate is a feedback function of government debt:

$$\frac{\tau_t}{\bar{\tau}} = \left(\frac{B_{t+1}}{\bar{B}}\right)^{\gamma^\tau}, \tag{39}$$

where γ^τ governs the speed with which debt returns to its target.

2.3.3 Targeted Transfer System

The targeted transfer system provides additional resources if net labor income $w_t l_t h_{it}$ falls short of some target level. For simplicity, we assume that these transfers are non-distortionary for the labor supply decision. In particular, we assume that transfers are paid to households according to the following scheme:

$$tr_{it} = \max\{0, a_1\bar{y} - a_2(1-\tau_t)w_t h_{it} l_{it}\}, \tag{40}$$

where $\bar{y}$ is the median income and $0 \leq a_1, a_2 \leq 1$. Thus, transfer decrease in individual income with a transfer withdrawal rate of a_2 and no transfers are paid to households whose net labor income $(1-\tau_t)w_t h_{it} l_{it} \geq \frac{a_1}{a_2}\bar{y}$. Total transfer payments of the government in *South* is then

$$Tr_t = \mathbb{E}_t tr_{it}, \tag{41}$$

where again, the expectation operator is the cross-sectional average.

2.4 Goods, bonds, capital, and labor market clearing

The national labor market in *South* clears at the competitive wage given in (30). A symmetric labor market clearing condition is in place in *North*. The bond markets clear whenever the following equations hold:

$$\begin{aligned} B_{t+1} &= B^d(R_t^b, r_t, q_t, \Pi_t^{fi}, \Pi_t^U, w_t, \pi_t, \tau_t, \tau_t^P, \Theta_t, \Theta_t^*, \mathbb{W}_{t+1}) - \frac{B_{Nt+1}}{Q_t} \\ &:= \mathbb{E}_t[\lambda \mathbb{B}_{a,t} + (1-\lambda)\mathbb{B}_{n,t}] - \frac{B_{Nt+1}}{Q_t}, \\ B_{t+1}^* = B^{d,*}(R_t^b, r_t^*, q_t^*, \Pi_t^{fi,*}, \Pi_t^{U,*} w_t^*, \pi_t^{CPI,*}, \tau_t^*, \tau_t^{P,*}, \Theta_t, \Theta_t^*, \mathbb{W}_{t+1}^*) &+ \frac{n_S}{1-n_S} B_{Nt+1} \\ &:= \mathbb{E}_t[\lambda \mathbb{B}_{a,t}^* + (1-\lambda)\mathbb{B}_{n,t}^*] + \frac{n_S}{1-n_S} B_{Nt+1}, \\ B_{t+1}^d + B_{t+1}^{d,*} &= B_{t+1} + B_{t+1}^* \end{aligned} \tag{42}$$

where $\mathbb{B}_{a,t}$, $\mathbb{B}_{n,t}$ are functions of the states (b, k, h), and depend on how the households in *South* value asset holdings in the future, $\mathbb{W}_{t+1}$, and the current set of prices (and tax rates) $(R_t^b, r_t, q_t, \Pi_t^{fi}, \Pi_t^U, w_t, \pi_t^{CPI}, \tau_t, \tau_t^P)$.[4] Future prices do not show up because we can express the value functions such that they summarize all relevant information on the expected future price paths. Expectations in the right-hand-side expression are taken w.r.t. the distributions in both countries $\Theta_t(b, k, h)$ and $\Theta_t^*(b, k, h)$. The total net amount of foreign bond holdings in *South*, B_{Nt}, is given by the aggregation over the households' budget constraint:

$$\begin{aligned} (1-\tau_t)(w_t L_t + \Pi_t^U + \Pi_t^F) + (P_{St} Y_t - w_t L_t - (\Pi_t^U + \Pi_t^F)) + Tr_t + B_t R_t^b / \pi_t^{CPI} \\ + B_{Nt} R_t^b / (\pi_t^{CPI,*} Q_t)) = C_t + I_t + \bar{R} BD_t + B_{t+1} + B_{Nt+1}/Q_t, \end{aligned} \tag{43}$$

where BD_t is the total amount of borrowing in *South*. Since both government bonds pay the same interest rate, we do not need to take track of the share of domestic vs. foreign bond holdings in each household's portfolio. Equilibrium requires the total *net* amount of bonds the household sectors in both countries demand to equal the supply of government bonds. In gross terms there are more liquid assets in circulation as some households borrow up to $\underline{B}$.

In addition, the national markets for capital have to clear. In *South*, we have:

$$\begin{aligned} K_{t+1} &= K^d(R_t^b, r_t, q_t, \Pi_t^{fi}, \Pi_t^U, w_t, \pi_t^{CPI}, \tau_t, \tau_t^P, \Theta_t, \Theta_t^*, \mathbb{W}_{t+1}) \\ &:= \mathbb{E}_t[\lambda(\mathbb{K}_t) + (1-\lambda)(k)] \end{aligned} \tag{44}$$

where the first equation stems from competition in the production of capital goods, and the second equation defines the aggregate supply of funds from households in *South* - both

[4] The same logic applies for $\mathbb{B}_{a,t}^*$, $\mathbb{B}_{n,t}^*$ in *North*.

those that trade capital, $\lambda(\mathbb{K}_t)$ and those that do not, $(1-\lambda)(k)$. Again $\mathbb{K}_t$ is a function of the current prices and continuation values. In *North*, the capital market clearing condition is symmetric.

Finally, goods markets clearing require:

$$\begin{aligned} Y_t &= ((1-(1-n_S)\omega_S)\left(\frac{P_{St}}{P_t}\right)^{-\sigma}\left[C_t + I_t + BD_t\bar{R}\right] \\ &\quad + (1-n_S)\omega_N Q_t^{-\sigma}\left[C_t^* + I_t^* + BD_t^*\bar{R})\right] + G_t \\ Y_t^* &= n_S\omega_S Q_t^{\sigma}\left(\frac{P_{Nt}^*}{P_t^*}\right)^{-\sigma}\left[C_t + I_t + BD_t\bar{R}\right] + (1-n_S\omega_N)\left[C_t^* + I_t^* + BD_t^*\bar{R})\right] + G_t^*. \end{aligned} \tag{45}$$

2.5 Equilibrium

A sequential equilibrium with recursive planning in our two-country model is a sequence of policy functions $\{\mathbb{X}_{at}, \mathbb{X}_{nt}, \mathbb{B}_{at}, \mathbb{B}_{nt}, \mathbb{K}_t\}$ in *South* and $\{\mathbb{X}_{at}^*, \mathbb{X}_{nt}^*, \mathbb{B}_{at}^*, \mathbb{B}_{nt}^*, \mathbb{K}_t^*\}$ in *North*, a sequence of value functions $\{V_t^a, V_t^n\}$ in *South* and $\{V_t^{a,*}, V_t^{n,*}\}$ in *North*, a sequence of prices $\{w_t, w_t^F, \Pi_t^U, \Pi_t^F, q_t, r_t, R_t^b, \pi_t^{CPI}, \pi_{St}, \pi_t^W, \frac{P_{St}}{P_t}, \tau_t, \tau_t^P, \tau_t^L, Q_t\}$ in *South* and $\{w_t^*, w_t^{F,*}, \Pi_t^{U,*}, \Pi_t^{F,*}, q_t^*, r_t^*, \pi_t^{CPI,*}, \pi_{Nt}, \pi_t^{W,*}, \frac{P_{Nt}^*}{P_t^*}, \tau_t^*, \tau_t^{P,*}, \tau_t^{L,*}\}$ in *North*, a sequence of of the shock ϵ_t^R, aggregate capital, labor supply, and foreign bond holdings $\{K_t, L_t, B_{Nt}\}$ in *South* and $\{K_t^*, L_t^*\}$ in *North*, distributions Θ_t in *South* and Θ_t^* in *North* over individual asset holdings and productivity, and expectations for the distribution of future prices, Γ, such that

1. Given the functionals $\mathbb{E}_t\mathbb{W}_{t+1}$ and $\mathbb{E}_t\mathbb{W}_{t+1}^*$ for the continuation value and period-t prices, policy functions $\{\mathbb{X}_{at}, \mathbb{X}_{nt}, \mathbb{B}_{at}, \mathbb{B}_{nt}, \mathbb{K}_t\}$ and $\{\mathbb{X}_{at}^*, \mathbb{X}_{nt}^*, \mathbb{B}_{at}^*, \mathbb{B}_{nt}^*, \mathbb{K}_t^*\}$ solve the households' planning problem; and given the policy functions $\{\mathbb{X}_{at}, \mathbb{X}_{nt}, \mathbb{B}_{at}, \mathbb{B}_{nt}, \mathbb{K}_t\}$ and $\{\mathbb{X}_{at}^*, \mathbb{X}_{nt}^*, \mathbb{B}_{at}^*, \mathbb{B}_{nt}^*, \mathbb{K}_t^*\}$ and prices, the value functions $\{V_t^a, V_t^n\}$ and $\{V_t^{a,*}, V_t^{n,*}\}$ are a solution to the Bellman equation.

2. Distributions of wealth and income evolve according to households' policy functions.

3. All markets clear in every period, interest rates on bonds are set according to the central bank's Taylor rule, fiscal policies are set according to the fiscal rules, and stochastic processes evolve according to their law of motion.

4. Expectations are model consistent.

We solve the model by using the method perturbation method in Bayer and Luetticke (2020).

3 Calibration

The goal of this paper is to analyze the role of the different welfare systems in the Euro area—broadly characterized by a southern model emphasizing self-insurance and a northern model with a larger focus on public insurance through minimum income benefits. To isolate the effect of the choice of the welfare state model, we start with a monetary union made of two identical economies that only differ in their welfare system. We select Italy as a starting point for the southern model because it lacked until recently (permanent) minimum income benefits and is the largest economy in the southern part of the euro area. When we introduce such benefits, we select the German level as the alternative policy—the largest country in the northern part of the euro area. Later, we introduce an asymmetric calibration, where we compare Italy to actual Germany instead of Italy with German minimum income benefits. In what follows *South* is always actual Italy.

We calibrate matching long-run averages and using standard parameters from the literature. Since our calibration strategy relies on stationary equilibrium values and a zero net-foreign asset position, the calibration is the same as for a closed economy incomplete markets model, except when trade is explicitly involved. Table 3.1 summarizes our calibration of the model parameters. We calibrate to quarterly frequency.

The labor share in production, α, is 68% corresponding to a labor income share of 62%, given a markup of 10% due to an elasticity of substitution between differentiated goods of 11. The elasticity of substitution between labor varieties is also set to 11, yielding a wage markup of 10%. The parameter δ_1 that governs the cyclicality of utilization, we set to 5.0. The investment adjustment cost is set to 4.0. We set the Calvo parameters for price and wage adjustment probability both to 0.25. All these parameter choices are standard values in the literature.

We calibrate the financial frictions and household preference parameters to match the wealth distribution given risk aversion and labor supply elasticities. We set relative risk aversion, ξ, to 4, following Kaplan and Violante (2014) and the Frisch elasticity, γ to 0.5 following Chetty et al. (2011). The persistence of idiosyncratic income shocks, $\rho_h = 0.9815$, we set to a standard value. The standard deviation of shocks is then chosen to match income inequality in Italy; $\sigma_h = 0.123$. The remaining parameters, i.e., the discount factor, the portfolio adjustment probabilities, the borrowing penalty, the transition of workers to become entrepreneurs and the transition from entrepreneurs to become workers again, are chosen jointly to match the wealth concentration at the top, at the bottom, the share of borrowers, and the wealth Gini, as well as the total holding of government debt and capital. To match the latter, we treat the depreciation rate as a free parameter, such that it generates the needed spread between liquid asset returns and the net marginal product of capital. The annual depreciation rate is 7.2%, reasonable for the physical assets that

Table 3.1: Baseline Calibration—Italy

	Description	Value	Source/Target
Firms			
α	Share of labor	0.68	62% lab. income
η	Elast. of substitution	11	10% Price markup
η_W	Elast. of substitution	11	10% Wage markup
κ	Price adj. prob.	0.25	1 year avg. price duration
κ_W	Wage adj. prob.	0.25	1 year avg. wage duration
ϕ	Inv. adj. cost	4.0	Bayer et al. (2024a)
δ_0	Depreciation rate	0.018	Wealth Gini = 0.61
δ_1	Depr. rate increase	5.0	Bayer et al. (2024a)
Households			
β	Disc. factor	0.9854	B/Y = 132% annual
λ	Portfolio adj. prob.	0.038	K/Y = 330% annual
ξ	Risk aversion	4	Kaplan and Violante (2014)
γ	Inv. Frisch elast.	2	Chetty et al. (2011)
ρ_h	Pers. labor inc.	0.9815	Standard value
σ_h	STD labor inc.	0.123	Gini market incomes
ζ	Trans. prob. W to E	0.0007	T10 wealth share = 0.44
ι	Trans prob. E to W	0.0625	B50 wealth share = 0.09
$\bar{R}$	Borrowing penalty	0.029	Mass of borrowers = 0.08
Open economy			
σ	Trade-price elasticity	0.66	Standard value
ω	Home bias	0.66	Standard value
n_A	Country size	0.5	Same size
Government			
$\bar{\tau}^L$	Tax rate	0.3	Standard value
$\bar{R}^b$	Gross interest rate	1.00	zero interest-growth difference
ρ_R	Pers. in Taylor rule	0.75	standard value
θ_π	Reaction to Infl.	1.25	standard value
θ_Y	Reaction to Output	0	ECB mandate

Notes: Parameter values for baseline calibration. Symmetric countries.

households hold—much of it being housing. The stationary equilibrium real rate(-growth difference) is set to a net rate of zero.

The steady state tax level is set to 0.3. We assume that monetary policy only targets inflation, as is the official mandate of the ECB, and set the Taylor coefficient to 1.25 and the smoothing parameter to 0.75. The steady state inflation is zero. When we consider the full two-country framework, we assume that both countries are equally large and set $n_A = n_B = 0.5$. The home bias parameter, ω, and the terms of trade elasticity, σ are both set to 0.66—again standard values in the literature.

Table 3.2: Baseline Calibration—Italy and its MIB replica

	Description	**South**	**North**
a_1	Transfer level	0	0.5
a_2	Transfer withdrawal rate	0	0.8
G/Y	Government consumption share	0.21	0.20
B/Y	Debt to GDP ratio	1.32	0.95
	Targets (South, Italy) / implied asset holdings (North)		
	Debt to GDP (annual)	1.32	0.95
	Capital to GDP (annual)	3.30	3.20
	Wealth Gini	0.60	0.68
	Top 10 wealth share	0.43	0.49
	Bottom 50 wealth sh.	0.10	0.05
	Mass of borrowers	0.08	0.22

3.1 Baseline Calibration: Italy and its replica with minimum income benefits

In our baseline calibration, we calibrate the other country, *North*, as Italy's "twin" that differs from actual Italy in that it has a targeted transfer system. This system we calibrate to the German minimum income benefits. To keep the overall level of insurance the same for those households on the Euler equation, we adjust the debt level when introducing minimum income benefits such that the interest rate remains constant and both countries have a zero net foreign asset position.

Table 3.2 summarizes these choices. With a minimum income level of $a_1 = 0.5$ and a transfer withdrawal rates, $a_2 = 0.8$, which summarizes the German minimum income benefit system (Peichl et al. 2021), Italy would need a much smaller debt to GDP ratio of 95% to achieve the same level of consumption smoothing as measured by the interest rate (given the time-preferences). However, not only would the desire to save, in particular in liquid form, go down with minimum income benefits, but also the wealth distribution becomes more unequal as a result of diminished savings incentives of the poor (Hubbard et al. 1995). This is in line with the Eurozone evidence Pham-Dào (2016) puts forward. Countries in the Eurozone with higher minimum income benefits have a significantly more unequal wealth distribution.

The level of expenditures on the minimum income benefit system are relatively small such that a one percent of GDP lower government consumption share suffices to finance these expenditures.[5]

[5]Had we calibrated to a higher real interest rate of, say two percent, then the swap of government debt for minimum income benefits would have been completely self financing.

Table 3.3: Alternative Calibration—Asymmetric parameters

	Description	**Country A: Italy**	**Country B: Germany**
a_1	Transfer level	0	0.5
a_2	Transfer withdrawal rate	0	0.8
G/Y	Gov. cons. share	0.21	0.20
σ_h	STD labor inc.	0.123	0.135
β	Discount factor	0.9854	0.9823
λ	Portfolio adj. prob.	0.038	0.071
ζ	Trans. prob. from W to E	0.0007	0.001
$\bar{R}$	Borrowing penalty	0.018	0.029
	Targets		
	Debt to GDP (annual)	1.32	0.71
	Capital to GDP (annual)	3.30	3.20
	Wealth Gini	0.60	0.73
	Top 10 wealth share	0.43	0.53
	Bottom 50 wealth sh.	0.10	0.02
	Mass of borrowers	0.08	0.18

3.2 Alternative calibration: Actual Italy and actual Germany

We also consider a version in which we calibrate *North* to actually meet the key statistics of Germany, see Table 3.3. The German market income inequality before transfers is somewhat higher. The latter implies an idiosyncratic income risk $\sigma_h = 0.135$. Both the German capital to output and the German debt-to-GDP ratio are smaller. German wealth inequality is higher. We then use four parameters—the discount factor, the portfolio adjustment probabilities, the transition of workers to become entrepreneurs, and the borrowing penalty—to meet these targets for Germany. This means that in our alternative calibration not only minimum income benefits but also four parameters are asymmetric across countries as summarized by Table 3.3. All other parameters remain the same as in our baseline calibration.

In order to match the data, the model requires German households to be slightly less patient, asset markets (realistically this means housing markets for most households) to be less liquid, and borrowing penalties to be higher. Yet, the mass of entrepreneurs is larger such that pure profit incomes are smaller. The level of competition (in the sense of monopolistic competition) is higher.

4 The limiting case of a closed economy

To set the stage, we first consider both countries in isolation, setting $n_A = 1$ when analyzing *South*, and $n_B = 1$ when analyzing *North*. In this case, each country operates

de facto as a closed economy, since the other country is small and therefore irrelevant for the outcomes in the country being studied. We will explore the full two-country case in Section 5 below.

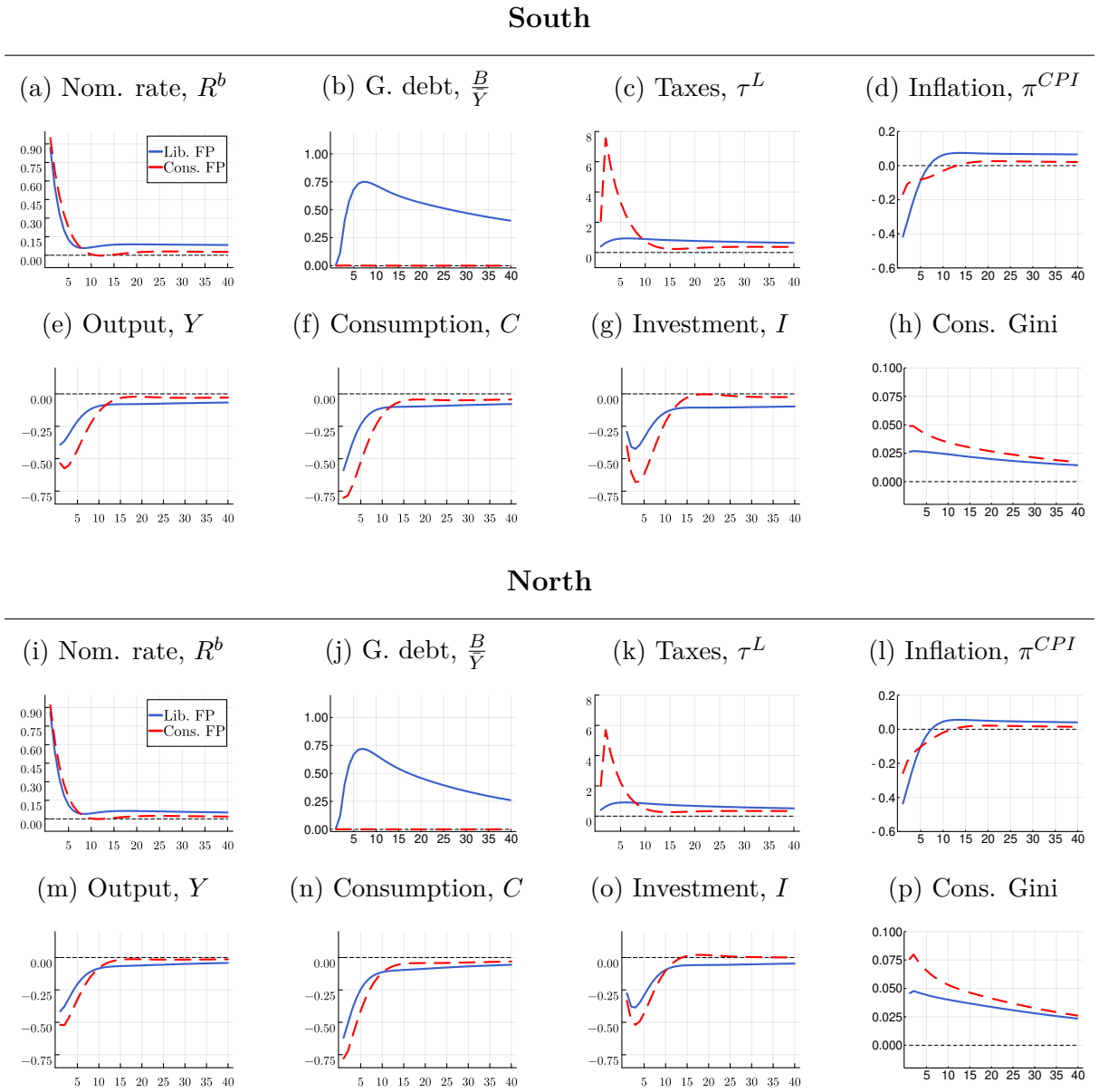
4.1 Monetary policy transmission under different fiscal policies

We begin by analyzing the effects of a monetary policy shock. It causes output and interest rates to move in opposite directions along the entire adjustment path. As a result, a contractionary monetary policy shock has unambiguously adverse fiscal consequences. We study the outcomes under two alternative fiscal policies. First, we consider a *liberal fiscal policy*, which issues additional government debt to buffer the fiscal implications of the shock. Formally, we implement this in the context of the monetary contraction by setting the feedback parameter γ^τ in the tax rule (39) to 0.8. As a result, the additional tax burden due to the monetary contraction is smoothed and debt is stabilized only in the long run. Second, we consider a *conservative fiscal policy* which avoids issuing additional debt in the face of a monetary contraction but relies on taxes to keep the budget balanced; formally we set $\gamma^\tau \to \infty$.

Figure 4.1 shows the impulse responses to a monetary contraction for both fiscal policies, for *South* in the upper part of the figure, and for *North* in the lower part. The solid (blue) lines represent the adjustment dynamics under the liberal fiscal policy. Interest rates are shown in panel (a). The budgetary impact of the shock is absorbed through increased debt issuance (panel b), while taxes rise only gradually (panel c). In contrast, the dashed (red) lines depict the dynamics under the conservative fiscal policy, where no additional debt is issued and taxes increase much more sharply in the short run.

The remaining panels of the figure illustrate how differences in tax policy shape the transmission of the monetary policy shock in the broader economy. Under the liberal fiscal policy, inflation falls more sharply in the short run than under conservative fiscal policy, which induces some cost-push inflation that partly offsets the deflationary impact of the shock (panel d). Output (panel e) instead declines less in the short run under the liberal fiscal policy, as both consumption (panel f) and especially investment (panel g) contract less severely—consistent with the findings of Kaplan et al. (2018). However, a liberal fiscal policy results in a more persistent slump because taxes remain elevated for a longer period. In fact, in this case output does not return to its steady state in the medium run but remains subdued for an extended time. In contrast, under a conservative fiscal policy, economic activity contracts more sharply in the short run but recovers to its steady-state level after about three years. This implies a trade-off between a harsher immediate contraction and a more prolonged downturn. Finally, note that the conservative fiscal policy implies a greater increase in consumption inequality due to the monetary contraction, as the sharper short-run downturn disproportionately affects poorer and less

Figure 4.1: Impulse responses to a monetary policy shock

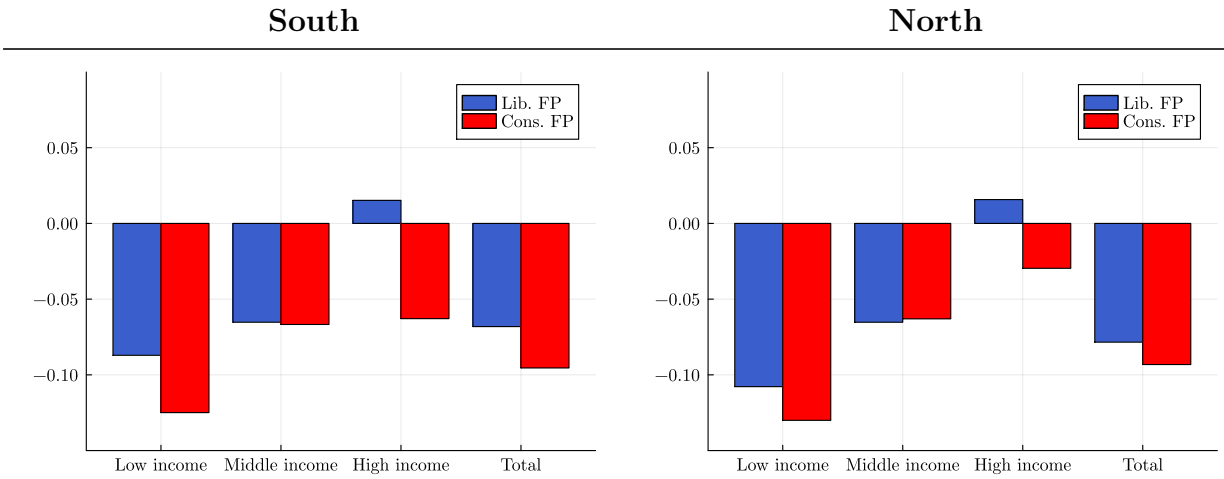


Notes: Model simulation assumes $n_A = 1$ when analyzing *South*, and $n_B = 1$ when analyzing *North*. Liberal fiscal policy ("Lib. FP") refers to $\gamma^\tau = 0.8$ and conservative fiscal policy ("Cons. FP") to $\gamma^\tau \to \infty$. *South*/*North* see Section 3. Y-axis: Percentage deviation from steady state, percentage points in the case of inflation and interest rate. X-axis: Quarters.

well-insured households (panel h).

Turning to the dynamics in *North*, shown in the lower part of Figure 4.1, we observe a very similar overall pattern: the choice between liberal or conservative fiscal policy involves a trade-off between a sharper, immediate contraction and a more prolonged slump. However, there are subtle differences in the trade-offs faced by the two countries. Specifically, the required tax increase in *North* is smaller than in *South* due to its lower initial level of government debt as a result of which a given monetary contraction has a smaller adverse impact on the government budget in *North*. Consequently, the difference

Figure 4.2: Welfare impact of monetary contraction



Notes: Average willingness to pay, expressed in terms of consumption equivalence, by income group after a contractionary monetary policy shock. "Low" refers to the bottom 50%, "Middle" to the 50–90% percentile group, and "High" to the top 10%. Income is measured net of taxes. Liberal fiscal policy ("Lib. FP") corresponds to $\gamma^\tau = 0.8$, and conservative fiscal policy ("Cons. FP") to $\gamma^\tau \to \infty$. *South*/*North* see Section 3.

in output responses between the two fiscal policies is also smaller in *North*. In terms of inequality, however, the impact of the monetary contraction is larger under both fiscal policies compared to what is observed in *South*.

4.2 Who is fiscally conservative?

Fiscal policy shapes the transmission of monetary policy and gives rise to macroeconomic trade-offs that, in turn, matter for households. However, because households differ in their exposure to the business cycle, their evaluation of these trade-offs typically varies depending on their position in the income and wealth distribution. To establish this formally—and to rationalize what appear to be conservative and liberal attitudes toward fiscal policy and, in particular, toward government debt—we calculate the (one-sided) welfare gains and losses across the income distribution resulting from a monetary contraction.[6]

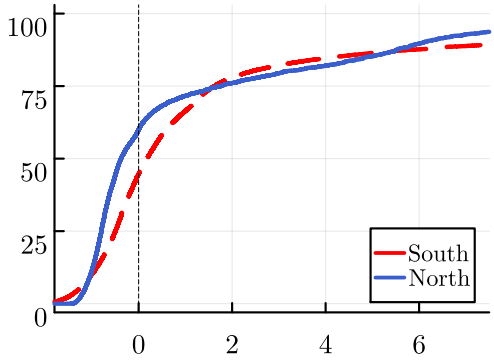
Figure 4.2 shows the average consumption-equivalent welfare changes for different income groups following a monetary contraction, under the assumption of either liberal fiscal policy (blue bars) or conservative fiscal policy (red bars).[7] In the figure, we show the *average* consumption-equivalent welfare changes for different income groups: The low-income group represents the bottom 50% of the distribution, the middle-income group comprises households between the 50th and 90th percentiles, and the high-income group includes the top 10%. We contrast results for *South* (left panel) and *North* (right panel) and make four observations. First, regardless of fiscal policy or country, there is a

[6]We abstract from questions of optimal policy design or from how systematic policy responses might shape welfare outcomes, as in Gornemann et al. (2021).

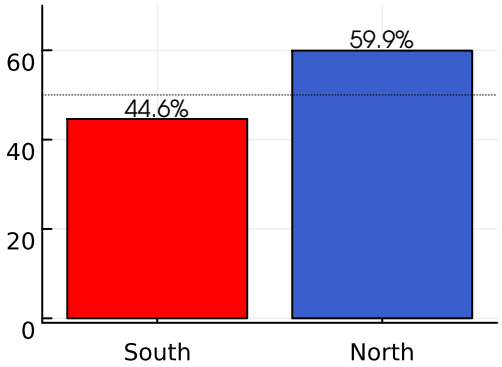
[7]Figure A.8 in the Appendix shows the average welfare impact along the wealth distribution.

Figure 4.3: Voting for conservative fiscal policy

(a) Preference distribution: lib. vs. cons.



(b) Support for cons. fiscal policy



Notes: The left panel shows the cumulative distribution function of the welfare differences between liberal ("lib.") and conservative fiscal policy ("cons. FP"): positive (negative) values on the horizontal mean that welfare is higher under the liberal (conservative) policy. *South*/*North* see Section 3. The right panel displays the share of votes in favor of conservative fiscal policy in each country. Y-axes are in percent.

clear gradient—apparent from the first three sets of bars in each panel: the poorer the households, the more adverse the welfare impact of the monetary contraction. Second, on average, welfare losses are larger under conservative fiscal policy in both countries (rightmost bars in each panel). Third, this difference in the average welfare impact across fiscal policies is smaller in *North* than in *South*. Finally, while in both countries welfare is higher for the lowest and highest income groups under liberal fiscal policy, how fiscal policy influences the welfare impact of the monetary contraction for the middle class differs across countries: in *South*, the middle class is (slightly) worse off under conservative fiscal policy, whereas the opposite is true in *North*. While these differences are small, the average welfare effect can mask considerable heterogeneity for an income group. In addition, while liberal fiscal policy may yield higher *average* welfare in both countries, this does not necessarily imply that a majority of households prefers it over a more conservative fiscal policy.

For this reason, we now focus on the (consumption-equivalent) welfare impact at the level of individual households—each defined by its position in the full distribution of liquid and illiquid asset holdings, as well as income. For each household, the welfare impact should, in turn, determine its preferences over alternative policies. To be clear, we do not model an explicit voting process; rather, we assume that each household supports the policies that make it better off in relative terms.

Figure 4.3 presents the results. The left panel displays the cumulative distribution of households' preferences in both countries. Given that we express fiscal preferences as the welfare difference under liberal and conservative fiscal policy, negative values indicate a preference for conservative fiscal policy, while positive values indicate a preference for

liberal fiscal policy. The bars in the right panel map the preference distribution into voting shares in favor of conservative fiscal policy in both countries. We find that—although average welfare losses are larger under conservative fiscal policy—the "median voter" in *North* prefers conservative fiscal policy. In contrast, the median voter in *South* prefers liberal fiscal policy.

Mutatis mutandis, this also implies that following a monetary *expansion*, households in *South* would prefer a balanced-budget policy (that is, $\gamma^\tau \to \infty$), which—in the case of a monetary expansion—amounts to a liberal fiscal policy: it prevents any fiscal surplus that would otherwise contribute to reducing the level of debt.[8] Instead, the median voter in *North* would indeed opt for running a fiscal surplus (i.e., $\gamma^\tau = 0.8$). Hence, in this sense, *North* prefers a more conservative fiscal policy relative to *South* also after a monetary expansion. In sum, if fiscal policy were subject to majority voting, *North* would prefer a more conservative fiscal policy regardless of whether there is a monetary contraction or a monetary expansion, whereas *South* would vote in favor of a more liberal fiscal policy.

To understand the drivers of this result, the top panels of Figure 4.4 provide a decomposition of voting patterns along the income and wealth distributions for both countries. Panel (a) shows that while the support for conservative fiscal policy is similar among households in the lower and middle income brackets, the support of the income-rich households strongly diverges across countries: while the upper middle class strongly supports conservative fiscal policy in *North*, support for these policies is much weaker by their peers in *South*. Panel (b) shows a similar pattern along the wealth distribution.

To investigate the difference in the support for conservative fiscal policy between *North* and *South* across the income distribution, we run three counterfactual model simulations. First, we recalculate support for conservative fiscal policy in the *South*, assuming that, all else equal, households receive income benefits as those provided under the MIB scheme operating in the *North*.[9] The blue bars in panel (c) of Figure 4.4 illustrate how such "government insurance" shifts voting behavior: across the entire income distribution, support for conservative fiscal policy increases, as better-insured households are more willing to tolerate the stronger recession associated with conservative fiscal policy.

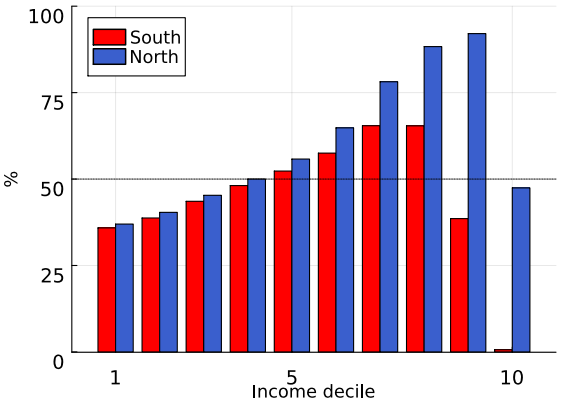
Second, we replace—all else equal—the steady-state wealth distribution of *South* with that of *North*, that is, with the distribution that would have emerged if the *South* had implemented the same MIB transfer scheme as *North*. The orange bars in panel (c) show how voting behavior changes as a result: given the lower level of private insurance in *North*'s steady state, support for conservative fiscal policy declines across the entire income distribution. Quantitatively, the effects of government insurance and private insurance on voting behavior almost exactly offset each other.

[8] Given that the model solution is linear in aggregate variables, in response to a monetary expansion, 55.4% (44.6%) of households in *South* would be better (worse) off under a balanced-budget fiscal policy.

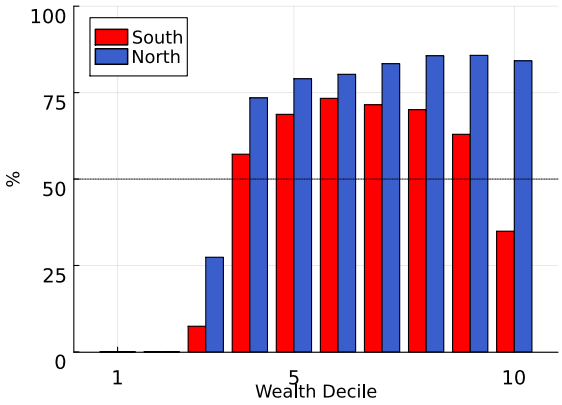
[9] Importantly, to implement the "all else equal" scenario in the counterfactual, we maintain the price response of the baseline.

Figure 4.4: Support for conservative fiscal policy

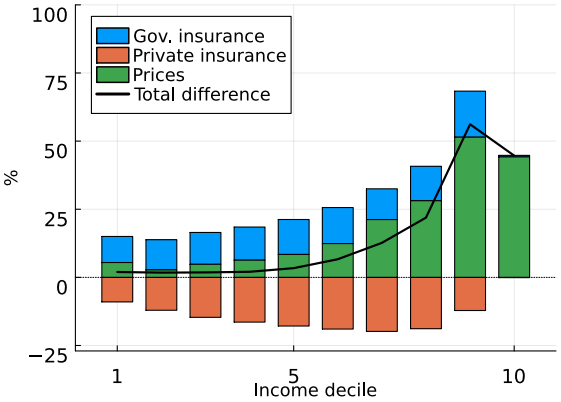
(a) Votes along income distribution



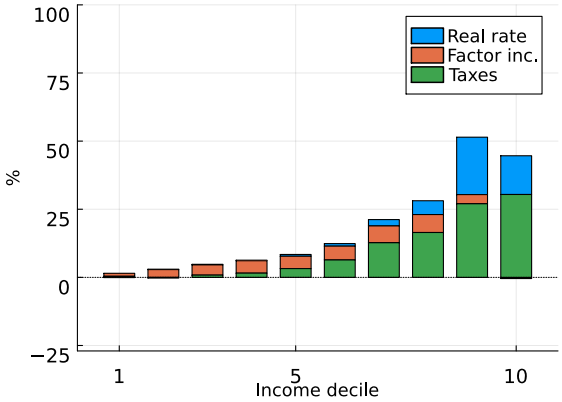
(b) Votes along the wealth distribution



(c) Overall decomposition



(d) Zooming in on the GE prices



Notes: The top panels show the share of households in favor for the conservative fiscal policy within each income (left) and wealth (right) decile. Panel (c) decomposes the differences in support for conservative fiscal policy within each income decile between *South* and *North*. See main text for a description how we compute these decompositions. Panel (d) further decomposes the price channel ("prices"). *South*/*North* see Section 3. Y-axis denoting percentages.

Lastly, we return to the original steady-state wealth distribution of *South*, but counterfactually impose the equilibrium prices that prevail during the adjustment process in *North*. This experiment proves to be quite impactful, as illustrated by the green bars in panel (c). Support for conservative fiscal policy increases across the entire income distribution in the *South* once households are confronted with the counterfactual equilibrium prices of the *North*. To see why, we further decompose the price response in panel (d) into changes in factor income (consisting of capital, labor, and profit incomes), tax adjustments, and the real return on liquid assets. All three components positively contribute to the increased support for conservative fiscal policy, albeit with varying strengths across the income distribution. First, differences in factor income dynamics increase support as conservative fiscal policy aggravates the recession relatively less in *North* than in *South* and, thus, results in relatively less depressed factor incomes. This effect is particularly relevant for lower- and middle-income households. Second, differences in tax adjustments increase

support particularly among middle- and upper-income households. Given their high current incomes, these households will benefit if taxes increase less under conservative fiscal policy, as they do in *North* compared to *South*. Finally, the real rate differential implied by the two fiscal policies is less pronounced in *North* in the medium run, which increases supports among high-income households—who are also likely to be wealthy and, thus, benefit from higher real rates.

4.3 Funding higher government spending: A proof of concept

We now study an exogenous increase in government spending and evaluate welfare differences under alternative funding schemes: conservative vs. liberal. Analyzing this scenario serves a twofold purpose. First, it illustrates that the welfare impact of fiscal policy on individual households—and hence their attitudes toward it—depends on the nature of the underlying shock. Second, we relate our results to a survey of German households regarding the country's shift toward liberal fiscal policy to fund increased government expenditure in 2025, and show that the heterogeneity in welfare impacts across households helps explain the variation in survey responses. This serves as a proof of concept: differences in the economic impact of alternative policies, as predicted by our model, can effectively rationalize voter preferences, as revealed by the survey data.

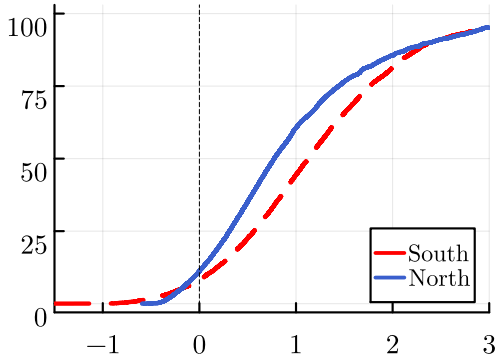
Specifically, we consider an exogenous shock to government spending, G_t, which follows an AR(1) process with a persistence parameter of 0.85. Liberal and conservative fiscal policies are given, as before, by $\gamma^\tau = 0.8$, such that government spending is temporarily debt-financed (liberal policy), and by $\gamma^\tau \to \infty$, such that the budget remains balanced (conservative policy). Figure 4.5 plots the cumulative preference distributions in *North* and *South* in panel a), and maps these into voting shares for conservative fiscal policy, shown in panel b). Qualitatively, we observe the same pattern as in the case of the monetary contraction analyzed above: support for conservative fiscal policy is higher in *North*. In absolute terms, however, support remains low in both countries—only 8.4% in *South* and 11.3% in *North*. Most strikingly, even in *North*—where a majority supported conservative fiscal policy in response to monetary contractions—there is now an overwhelming majority in favor of liberal fiscal policy.

Two forces drive this result. First, higher government spending is inflationary, prompting the central bank to raise interest rates. In response to this monetary contraction, voters in *North* are more willing to accept conservative fiscal measures, as shown above—explaining the relative difference in support across countries. Second, however, under a conservative fiscal policy, taxes also rise to finance the government spending itself, and this increase is independent of a country's initial debt level. This necessary tax hike reduces the appeal of conservative fiscal policy symmetrically in both countries.

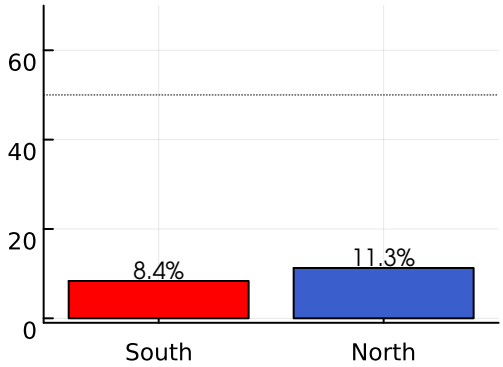
Still, within countries, the welfare costs of different fiscal policies vary substantially

Figure 4.5: Voting for conservative fiscal policy: Government spending

(a) Preference distribution: lib. vs. cons.



(b) Support for cons. fiscal policy



Notes: The left panel shows the cumulative distribution function of the welfare differences between liberal ("lib.") and conservative fiscal policy ("cons. FP"): positive (negative) values on the horizontal mean that welfare is higher under the liberal (conservative) policy. *South*/*North* see Section 3. The right panel displays the share of votes in favor of conservative fiscal policy in each country. Y-axes are in percent.

across households. We illustrate this for *North* in Figure A.9 in the Appendix. These within-country differences provide an opportunity to confront our theory with survey evidence for Germany. In the spring of 2025, the funding of additional government spending on public infrastructure became a particularly salient issue, as the incoming coalition government managed to relax the constitutional deficit limit, the so-called "debt brake," to permit higher borrowing. This effectively shifted Germany's fiscal policy response from conservative to liberal in the face of increased government spending.

Against this background, we run a survey in May 2025, asking political attitudes towards an easing of the constitutional limit of debt financing.[10] Concretely, survey participants were asked whether they approve the German constitutional reform which allows the government to fund a significant share of infrastructure spending by issuing new debt. The survey participants were also asked about their income and total wealth such that we can locate them them in the income and wealth distribution.

For each combination of income and wealth deciles, we calculate the average difference between liberal and conservative fiscal policies expressed in consumption-equivalent variation (CEV) in response to the government spending shock, see again Figure A.9. We then estimate the response x_j of participant j as a function of the CEV of that respondent's income decile, $i(j)$, and wealth decile, $w(j)$:

$$x_j = \alpha + \beta \log CEV(i(j), w(j)) + \gamma \text{ control}_j, \tag{46}$$

where responses, x_j, can be one of the following: "strongly disagree," "tend to disagree," "neither agree nor disagree," "tend to agree," or "completely agree" with the proposal to exempt the spending increase from the deficit limit.

[10]For details on the survey as well as the complete set of questions, see Appendix D.

Table 4.4: Political support of liberal debt policy to finance government spending, survey

	linear	ordered probit	ordered logit
log CEV	0.18	0.16	0.28
	(0.09)	(0.08)	(0.15)
N	452	452	452

Notes: The table shows the regression coefficients of a regression that has survey answers to the question of whether households view the exemption of planned infrastructure investments from the German debt brake positively on the left hand side (five-point Likert scale, from strong disagreement to strong agreement). The answers are regressed on the imputed consumption-equivalent variation. Survey respondents are categorized based on the income and wealth deciles they belong to. the regression only uses those respondents that view the German debt brake positive in general (Answers 4 or 5 on the Likert scale). Regressions control for household size (OECD equivalence scale), age, and general political leaning. Standard errors in brackets are clustered at the income-wealth decile combination.

Survey participants were also asked about their attitudes towards the debt brake in general. Since it is no surprise if a respondent who rejects the debt brake in general also approves a specific spending exemption, we focus on those respondents who have a positive view of the introduction of the German debt brake in 2008. We control household size using the OECD equivalence scale because we only have the raw income and wealth deciles. We also control for background political leaning and linearly for age.

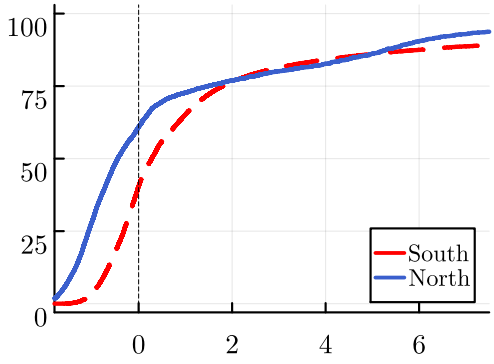
Table 4.4 shows the results of this regression. We estimate a linear regression, an ordered probit, and an ordered logit. All show the same result: households for which our model predicts a higher material benefit from financing the planned fiscal expansion by debt issuance (liberal fiscal policy) are more likely to support the constitutional reform that allows for exactly this debt issuance. Although the observation numbers are small and the actual German reform might be linked to further policy connotations, we consider this regression result to be a clear proof of concept that goes beyond our motivating anecdotal evidence.

5 A Heterogeneous Monetary Union

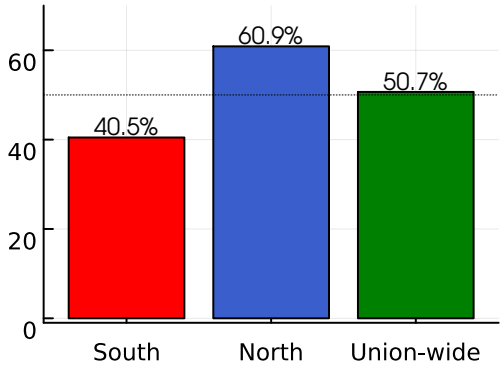
We now extend our analysis to the full two-country framework, setting $n_A = n_B = 0.5$. We first show that our main results remain largely unchanged when the two countries interact within a monetary union and vote on union-wide fiscal policies. We then use the $HANK^2$ setup to explore the cross-border implications of the union's political economy. In particular, we show that in each member state, a large majority prefers the other country to adopt conservative fiscal policies.

Figure 5.6: Voting for conservative fiscal policy in the monetary union

(a) Preference distribution: lib. vs. cons.



(b) Support for cons. FP



Notes: The left panel shows the cumulative distribution function of the welfare differences between liberal ("lib.") and conservative fiscal policy ("cons. FP"): positive (negative) values on the horizontal mean that welfare is higher under the liberal (conservative) policy. *South*/*North* see Section 3. The right panel displays the share of votes in favor of conservative fiscal policy in each country. Y-axes are in percent.

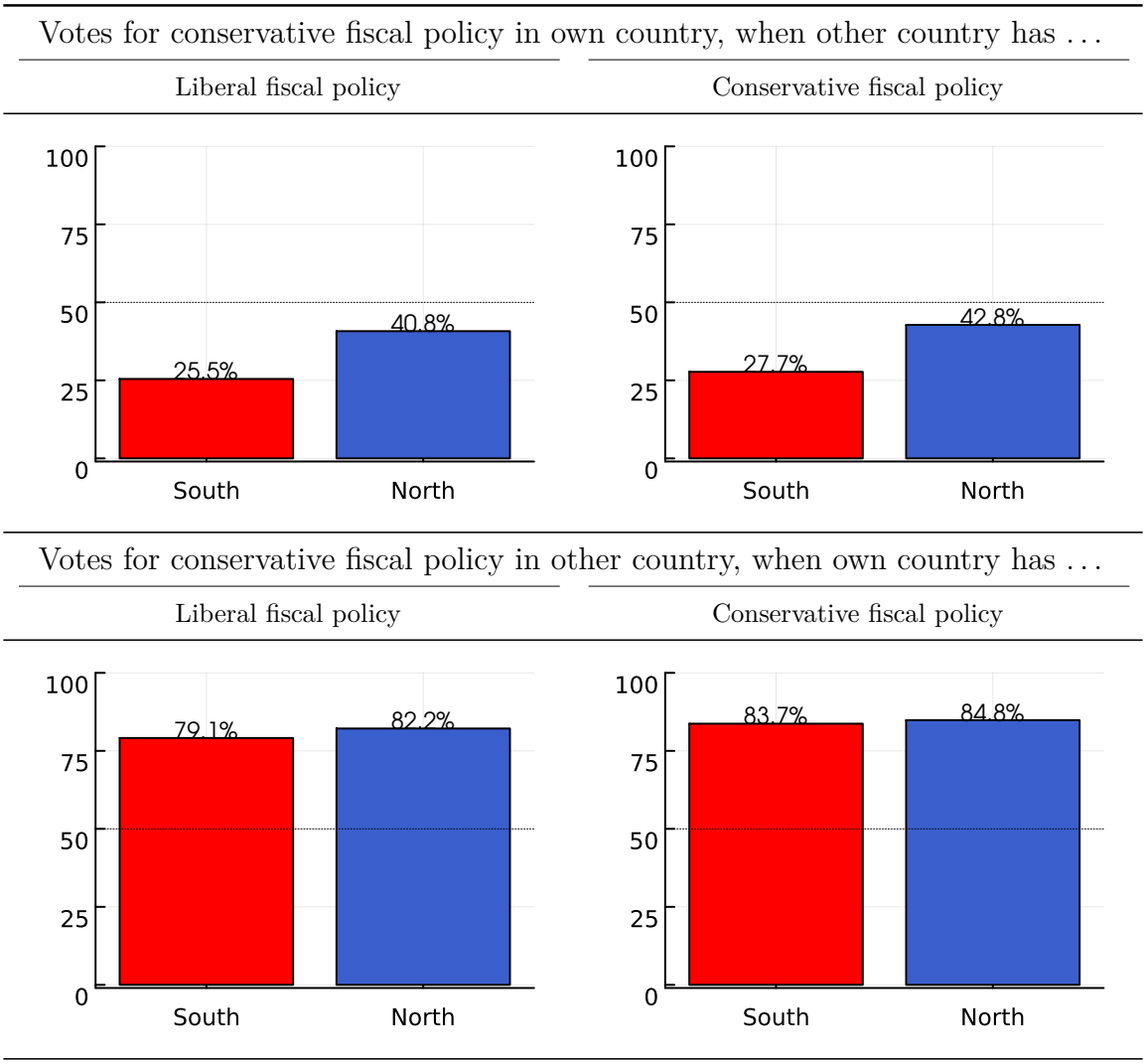
5.1 Union-wide fiscal rules

We start by exploring the case, in which both countries adopt the same fiscal policy in the face of a monetary contraction—either liberal ($\gamma^\tau = 0.8$) or conservative ($\gamma^\tau \to \infty$). The aggregate impulse responses to a common contractionary monetary policy shock—reported in the Appendix to economize on space (Figure B.10 for the case with liberal fiscal policies and Figure B.11 for the case with conservative fiscal policies)—closely mirror our closed-economy results in Section 4. This is because, despite sizable differences in the degree of household heterogeneity, these country differences have only a minor impact on the dynamics triggered by a common shock (Bayer et al. 2024b).

Indeed, because price dynamics differ little from the closed-economy setup, within-country voting patterns closely mirror our earlier findings. Figure 5.6 shows the cumulative preference distributions in *South* and *North* in panel (a) and how they map into voting shares for conservative fiscal policy in panel (b). As before, the median voter in *North* prefers conservative fiscal policy, while the median voter in *South* prefers liberal fiscal policy. Recall the underlying trade-off: a sharper but short-lived recession under conservative fiscal policy versus a milder but longer recession under a liberal policy. Households in both *North* and *South* are similarly well-insured—either through government minimum income benefits or private savings. However, since initial debt is higher in *South*, the short but severe recession under fiscal conservatism becomes even more severe. In addition, we find a union-wide, if slim, majority in favor of conservative fiscal policy.

As a robustness exercise, we recalibrate the *North* Country to reflect "actual Germany" instead of "Italy with MIB" (see Section 3). Our results remain qualitatively unchanged. Quantitatively, there are some differences: Under conservative fiscal policy, the aggregate

Figure 5.7: Support for conservative fiscal policy with country-specific rules



Notes: Displayed is the share of households in favor for conservative fiscal policy. The top panels show voting outcomes when residents decide on their own country's fiscal response; the bottom panels show voting outcomes when they decide on the foreign country's fiscal response. *South*/*North* see Section 3. Y-axis denoting percentages.

dynamics diverge more noticeably across the two countries as the required tax adjustments in the *North* are reduced due to its lower original debt level (see Figure B.12 in the Appendix). Second, although a majority in the *North* still favors conservative fiscal policy, the overall level of support is slightly lower (see Figure B.13 in the Appendix). The reason is that our actual Germany calibration requires households in the *North* to have a lower discount factor, which—*ceteris paribus*—tilts the intertemporal trade-off towards avoiding a deeper recession today.

5.2 Country-specific fiscal rules

Given that fiscal policy decisions are made at the national level in the euro area, analyzing a common euro area-wide fiscal response comes with important caveats. For this reason,

we also calculate the shares of households in favor of a given policy rule in each country conditional on a given fiscal policy adopted by the respective partner country. Figure 5.7 displays the results, conditional on a monetary contraction.

Three observations are noteworthy: First, neither country prefers to unilaterally adopt conservative fiscal policy. Even *North*, which prefers union-wide fiscal conservatism, would not chose to deviate unilaterally. Second, both countries strongly prefer the other country to adopt a conservative fiscal policy. Third, there is a complementarity in fiscal policy: domestic support for fiscal conservatism increases when the partner country also adopt a conservative fiscal policy.

The reason is that, under monopolistic competition between countries, part of the burden of higher national taxes can be shifted abroad through higher prices. However, asymmetric fiscal rules create asymmetries in the timing of tax adjustments. With nominal rigidities, this timing matters: in the short run, nominal rigidities mitigate the impact of higher taxes on higher prices but less so over time. As a result, front-loaded tax increases primarily extract rents from domestic residents, concentrating the immediate burden at home. In contrast, deferring taxes allows a greater share of the future tax burden to be shifted onto foreigners. This creates an incentive to adopt a more liberal fiscal stance than one's union partner.

6 Conclusion

Who is fiscally conservative? Who is fiscally liberal? Rather than attributing fiscal attitudes to nationality or personal character, we try to answer these questions based on a person's economic circumstances—both idiosyncratic and aggregate. We formalize this argument within HANK^2, calibrated to reflect key features of the EA, specifically its *South* and *North*. A central aspect of the calibration is that government debt is higher and wealth inequality lower in *South*, because, in the absence of minimum income benefits, even poorer households have a strong incentive to accumulate government debt as insurance against income risk. We then establish that, conditional on a monetary contraction, there is indeed majority support for conservative fiscal policy in *North* and for liberal fiscal policy in *South*, conforming with widely held views on fiscal attitudes in Europe. Yet in our model this difference reflects economic conditions rather than national identities. Moreover, majorities change with the nature of the underlying shock. For instance, in response to a government spending shock, the median voter in *North* also prefers a liberal fiscal policy—by a wide margin.

Our analysis is relevant to policy, as it highlights a dimension of heterogeneity within currency unions that has been overlooked in earlier work: differences in economic conditions across countries can critically shape the popular support for specific economic policies. Harmonizing these conditions may be essential to ensure the political viability of currency

unions. We leave a formal assessment of this conjecture to future research.

At a conceptual level, we note that our analysis brings to the forefront the political-economy dimension inherent in modern macroeconomic models with rich household heterogeneity. As such, our approach naturally extends beyond the analysis of the political economy of monetary unions and can be applied to a wide range of questions in monetary and fiscal policy.

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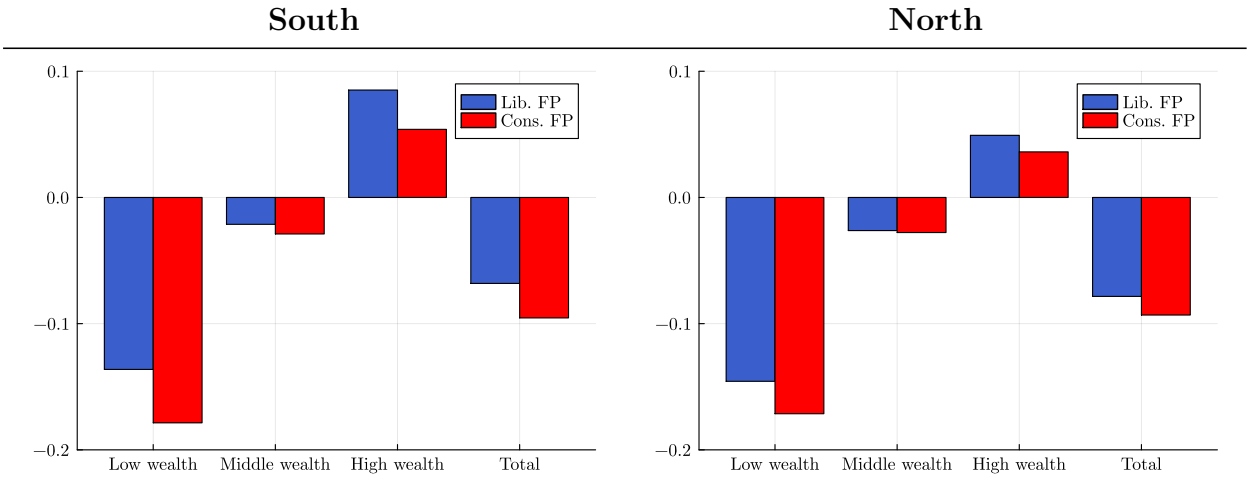
A Further Results Closed-economy

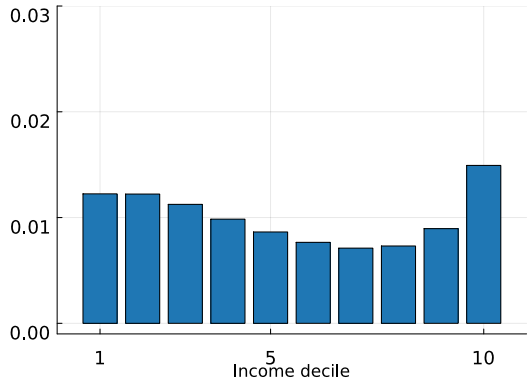
Figure A.8: Welfare impact of monetary contraction



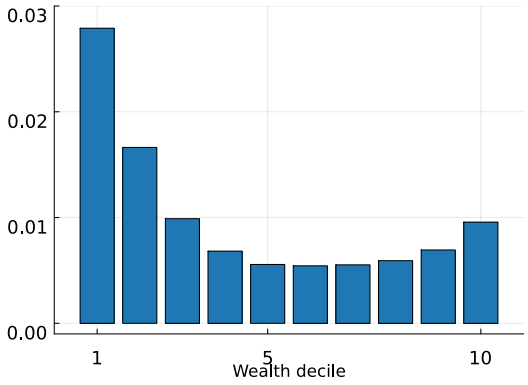
Notes: Average willingness to pay, expressed in terms of consumption equivalence, by wealth group after a contractionary monetary policy shock. "Low" refers to the bottom 50%, "Middle" to the 50–90% percentile group, and "High" to the top 10%. Wealth denotes total wealth, including liquid and illiquid assets. Liberal fiscal policy ("Lib. FP") corresponds to $\gamma^\tau = 0.8$, and conservative fiscal policy ("Cons. FP") to $\gamma^\tau \to \infty$. *South*/*North* see Section 3.

Figure A.9: Welfare differences across income and wealth deciles between liberal and conservative fiscal policy in *North* after a government spending shock

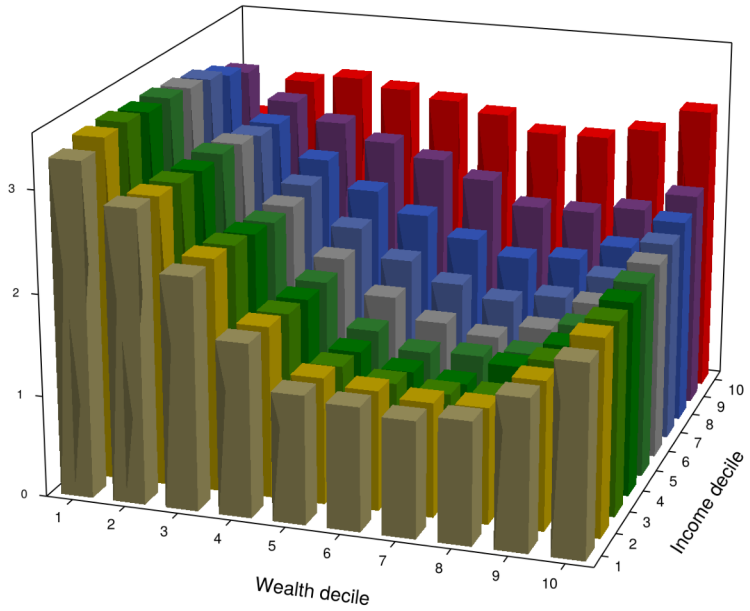
(a) Income



(b) Wealth



(c) Joint income-wealth, $log(CEV * 1000)$

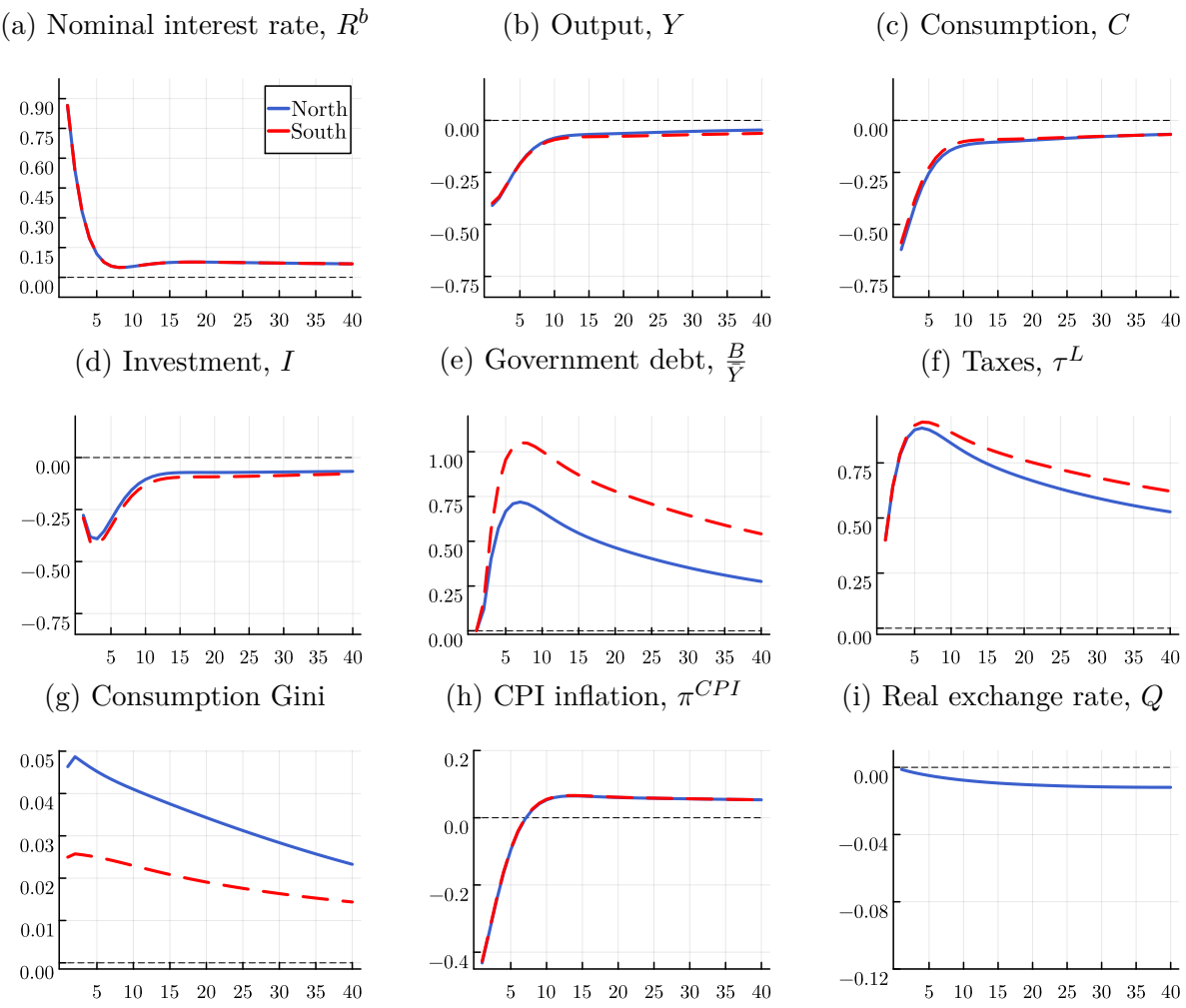


Notes: Average welfare differences between liberal ("lib.") and conservative fiscal policy ("cons. FP") after a government spending shock: positive (negative) values mean that welfare is higher under the liberal (conservative) policy. Panel (a) groups households by income deciles (b) by wealth deciles and (c) by joint income-wealth deciles. Welfare expressed in average willingness to pay in terms of consumption equivalence (CEVs).

B Further Results Two-country

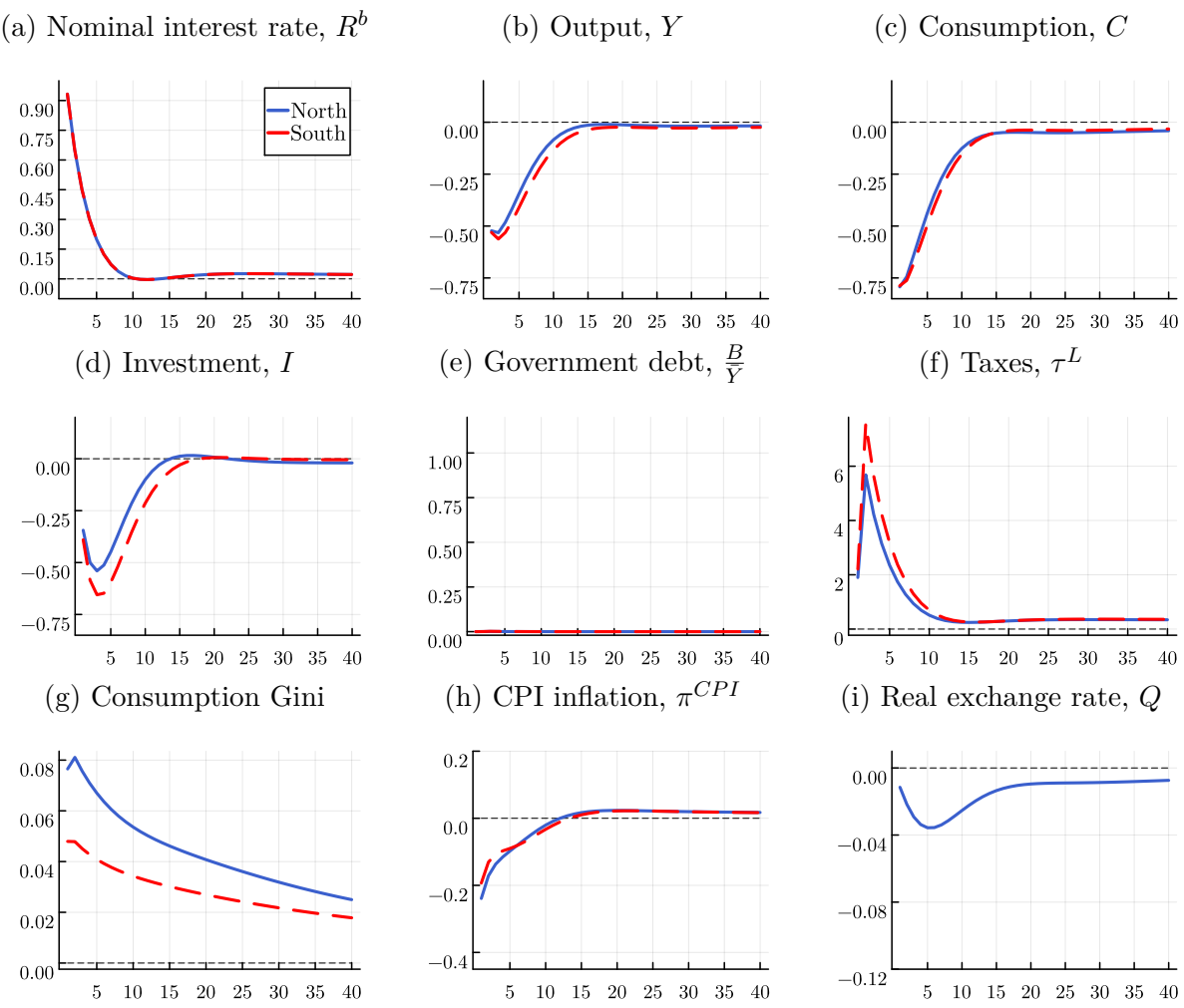
B.1 IRFs after monetary policy shock in monetary union

Figure B.10: Impulse responses in $HANK^2$ to a monetary policy shock under liberal fiscal policy



Notes: Liberal fiscal policy refers to the case $\gamma^\tau = 0.8$. *South*/*North* see Section 3. Y-axis: Percentage deviation from steady state, percentage points in case of inflation and interest rate. X-axis: Quarters.

Figure B.11: Impulse responses in $HANK^2$ to a monetary policy shock under conservative fiscal policy

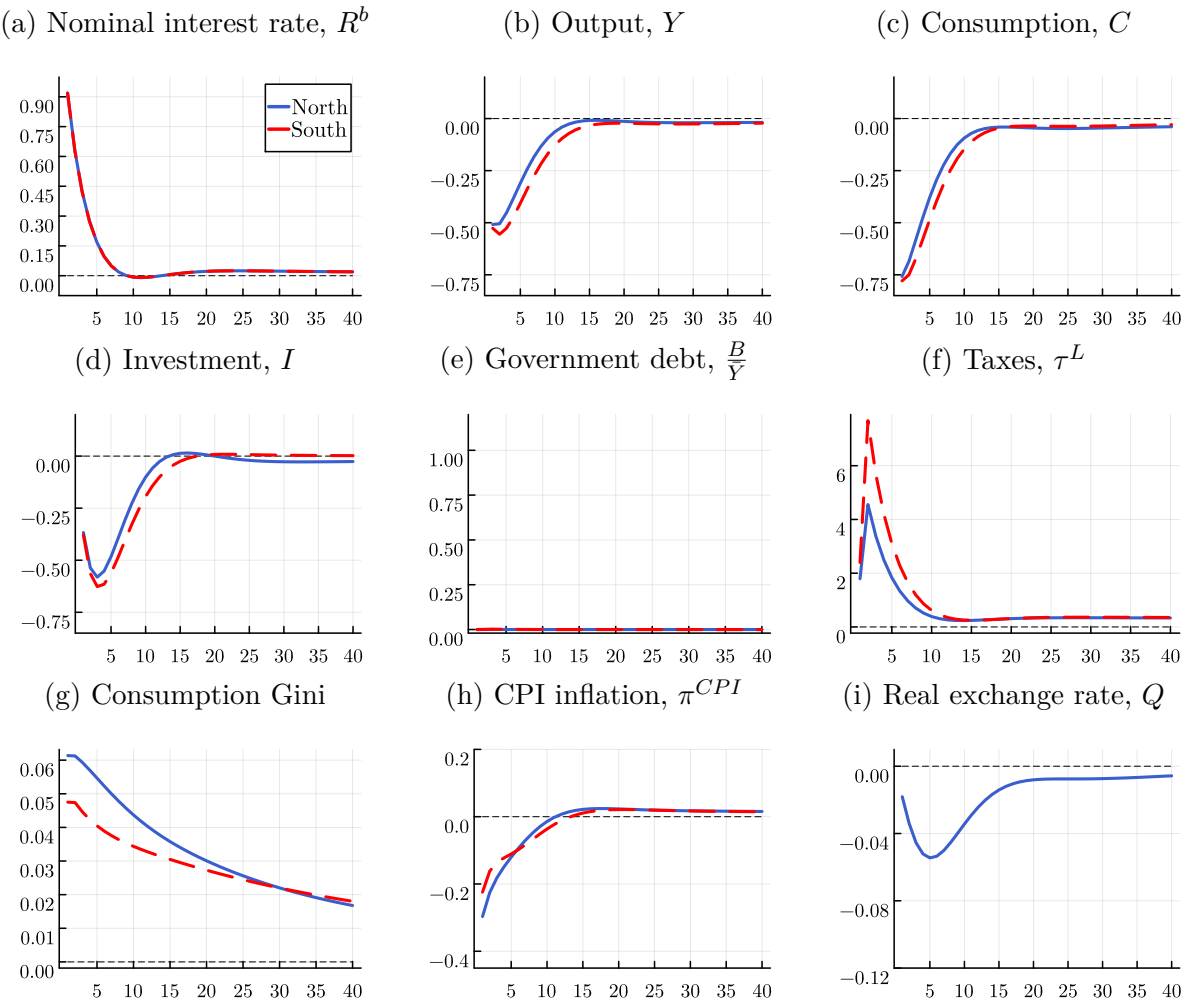


Notes: Conservative fiscal policy refers to the case $\gamma^\tau \to \infty$. *South*/*North* see Section 3. Y-axis: Percentage deviation from steady state, percentage points in case of inflation and interest rate. X-axis: Quarters.

B.2 Alternative Calibration: Italy and actual Germany

Figure B.12 shows that with the larger differences in our alternative calibration, where debt levels are more different, also the asymmetries increase. Here the monetary union is composed not of Italy and its hypothetical twin, but of actual Italy and actual Germany. However, overall the findings are very similar to our baseline.

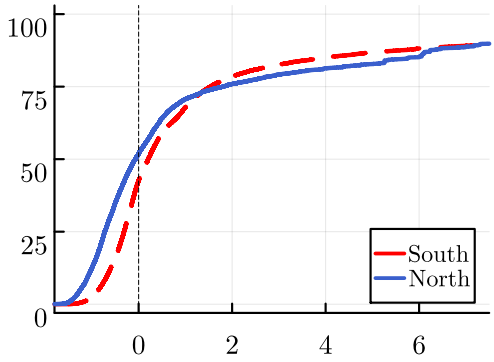
Figure B.12: Impulse responses in $HANK^2$ to a monetary policy shock under conservative fiscal policy: Alternative calibration



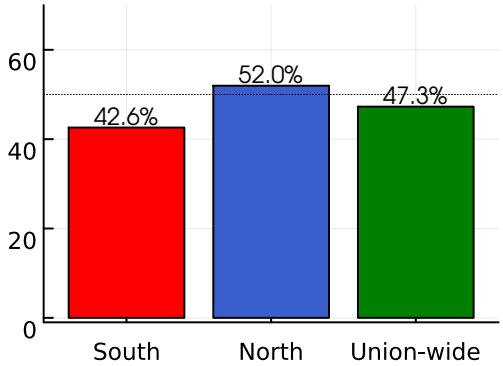
Notes: Conservative fiscal policy refers to the case $\gamma^\tau \to \infty$. *South*/*North* see Section 3 (alternative calibration for *North*). Y-axis: Percentage deviation from steady state, percentage points in case of inflation and interest rate. X-axis: Quarters.

Figure B.13: Voting for conservative fiscal policy in the monetary union: Alternative calibration

(a) Preference distribution: lib. vs. cons.



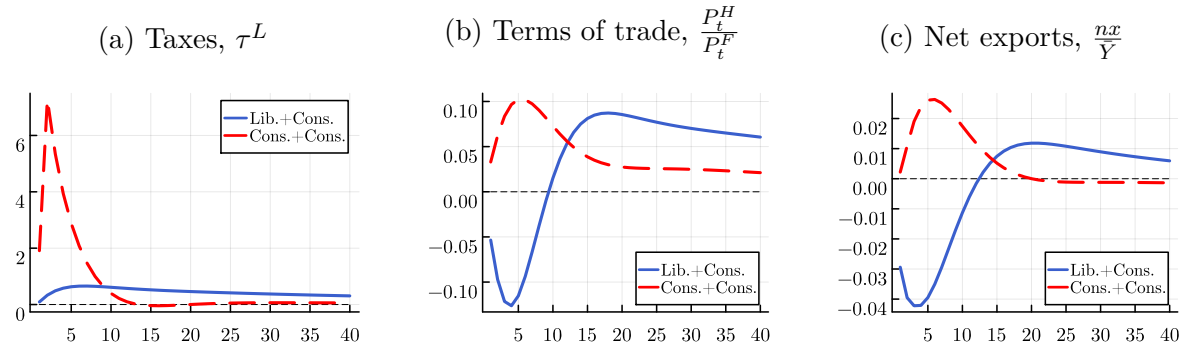
(b) Support for cons. FP



Notes: The left panel shows the cumulative distribution function of the welfare differences between liberal ("lib.") and conservative fiscal policy ("cons. FP"): positive (negative) values on the horizontal mean that welfare is higher under the liberal (conservative) policy. *South*/*North* see Section 3 (alternative calibration for *North*). The right panel displays the share of votes in favor of conservative fiscal policy in both countries. Y-axes are in percent.

C Further Results Country-Specific Fiscal Rules

Figure C.14: Impulse responses in *South* to a monetary policy shock with country-specific fiscal policy



Notes: Results conditional on *North* adopting a conservative fiscal policy ($\gamma^\tau \to \infty$). "Lib. + Cons." refers to the case when *South* adopts a liberal fiscal policy ($\gamma^\tau = 0.8$). "Cons. + Cons." refers to the case when *South* also adopts a conservative fiscal policy. *South*/*North* see Section 3. Y-axis: Percentage deviation from steady state, percentage points in case of inflation and interest rate. X-axis: Quarters.

D Details on the survey

The survey was conducted in May 2025 using Qualtrics, a professional service provider. The survey was originally designed by other researchers to track attitudes regarding wealth taxes and estate taxes, but we were allowed to include questions regarding the German debt brake. The group of respondents was selected to represent quotas of key demographic variables, including gender, age, and income. In total, data were collected from 1,088 respondents in Germany.

	Age	Household Income	Household Wealth
Mean	48.10	3815.83	97299.14
SD	18.05	3910.81	296343.7
Min	18	0	0
Max	92	39000	5000000

Table D.5: Descriptive Statistics. Outliers removed. Maximal age allowed = 100. All variables are self-reported.

First, the survey collected **demographic data** of the respondents. We use information from the following questions:

1. Please indicate your year of birth.
2. Please state your marital status.
3. How many people live in your household?

Second, the survey asked about **general political attitudes and the socio-economic status**. Here, we use the following questions

1. Are you affiliated with a political party? If yes, which party?
2. Please state your average monthly household income after taxes.
3. Please state your total household net worth in euros. Please include assets such as real estate, company shares, transportation, etc.

Finally, the the following questions regarding the **German debt brake** and the exemption to finance € 500 Billion additional infrastructure spending by issuing new debt

1. The debt brake was introduced in Germany to prevent the rise in government debt. Do you agree that the introduction of the debt brake was fundamentally a good idea?
2. Should there be exceptions to the debt brake for the financing of temporary infrastructure projects?