Trade Shocks, Currency Unions and the Role of Fiscal Transfers*

Juan Ignacio Jacoubian†

November 7, 2026

Click here for the latest version

A common trade shock can affect members of a currency union differently, while monetary policy cannot respond separately to country-specific conditions. This paper studies whether cross-country fiscal transfers can substitute for this missing adjustment margin. I develop a dynamic quantitative trade model featuring nominal rigidities and heterogeneous households, which I apply to the 2025 U.S. tariff shock in the euro area. I introduce a cross-country fiscal transfer rule that operates as an automatic stabilizer, directing resources toward countries more adversely affected by the shock. Fiscal transfers of less than 1% of euro-area GDP in present value offset all the additional dispersion in terms of involuntary unemployment and consumption generated by the loss of country-specific monetary policy, while reducing a sizable part of the additional dispersion in employment. Thus, relatively small cross-country transfers can substitute for much of the stabilization role of country-specific monetary policy. Finally, I show that euro-area retaliation combined with fiscal transfers would have further mitigated the labor-market effects of the U.S. tariff shock.

Keywords: Tariff, Trade Fragmentation, Monetary Policy, New Keynesian, Currency Union, Fiscal Policy, Gravity model.

JEL codes: E52; E62; F12; F13; F16; F41; R12.

*I am grateful to my advisor, Natalia Ramondo, for her guidance and support, and to the other members of my dissertation committee, Masao Fukui, Joaquin Blaum, and David Lagakos, for their comments and support throughout this project. I also thank Stefania Garetto, Yuhei Miyauchi, the Trade Advising Group, and participants in the Macro Seminar for helpful comments and discussions. I am also grateful to Cian Ruane and colleagues at the Central Bank of Ireland, and to my colleagues at Boston University, in particular Franco Maldonado, Alvaro Contreras, Plinio Dias Bicalho and Martin Martinez.

†Boston University. Email: jjacoubi@bu.edu.

1 Introduction

In 2025, the euro area was hit by a sharp increase in U.S. tariffs. The average tariff faced by euro-area exports to the United States rose from around 3 percent before the shock to around 15 percent by the second half of 2025, while the euro area did not retaliate.[1] The episode therefore represented a large and rapid deterioration in market access for European exporters, and could have significant economic implications across European countries.

The aggregate increase in tariffs, however, hit member countries of the currency area differently. Euro-area economies specialize in different sectors, export different bundles of goods to the United States, and have different bilateral trade and production linkages. A common change in U.S. trade policy therefore translates into very different effects across member countries. Direct labor-market exposure varies substantially across euro-area members.[2] Ireland, Slovakia, and Germany are among the most exposed economies, but for different sectoral reasons. Ireland's exposure is highly concentrated in chemicals and pharmaceuticals, while Slovakia's is driven primarily by the automobile industry. Germany's exposure is spread across a broader set of manufacturing sectors. Countries such as Croatia, Spain, and France, in contrast, have substantially lower exposure.

This heterogeneity is particularly relevant in a monetary union. The European Central Bank responds to aggregate euro-area conditions, but cannot tailor monetary policy to the stabilization needs of individual members. A country strongly affected by the tariff shock may require a different stabilization response from a country that is only weakly exposed. Cross-country fiscal transfers provide an alternative adjustment margin by reallocating resources toward countries facing larger labor-market distortions. While countries like the United States and Canada smooth a sizable part of the impact of local shocks through fiscal

[1] See Figure 7 in Appendix A.
[2] See Figure 9 in Appendix C.

transfers and financial market integration, the euro area only insures a small part with no centralized fiscal authority.[3]

The potential role of such transfers within currency unions is well understood theoretically.[4] However, their quantitative effectiveness and the scale of transfers required to offset asymmetric shocks remain less well understood. Quantifying how effectively simple fiscal rules can substitute for independent monetary policy requires a model that captures the short-run frictions, cross-country trade linkages, and heterogeneous household consumption responses that shape the transmission of fiscal transfers, particularly in response to trade shocks.

This paper asks how effective cross-country fiscal transfers can be in reducing involuntary unemployment, consumption, and employment dispersion generated by asymmetric exposure to a common trade shock, and how their effectiveness depends on household consumption responses and trade linkages.[5] Answering these questions requires a framework with three key features. First, endogenous monetary policy is needed to quantify the stabilization role of monetary autonomy and the distortions arising from a common monetary policy. Second, because marginal propensities to consume (MPCs) are critical determinants of the effects of fiscal transfers, the model must reproduce empirically relevant, country-specific MPCs while allowing for endogenous consumption-saving decisions. Third, bilateral trade and production linkages determine both countries' exposure to the tariff shock and how transfer-induced expenditure translates into domestic labor demand and spillovers across the currency union.

The main modeling contribution of this paper is to bridge the dynamic quantitative trade

[3] See Allard et al. (2013).

[4] See, for example, Farhi & Werning (2017).

[5] I distinguish between involuntary unemployment and employment. Involuntary unemployment is defined as the difference between desired hours worked and realized hours worked, while employment is only the latter.

literature and the macroeconomic literature on fiscal stabilization in currency unions. To do so, I combine a multi-country, multi-sector trade model with bilateral trade, imperfect labor mobility, and input-output linkages (Caliendo et al., 2019; Rodríguez-Clare et al., 2025; Kim et al., 2026) with endogenous monetary policy and empirically disciplined, country-specific marginal propensities to consume.[6] This framework allows me to quantify the stabilization costs of giving up monetary autonomy and assess how much cross-country fiscal transfers can offset them.

In the model, transfers operate through two main channels. First, transfers affect local labor demand by changing consumption expenditure on domestic and imported goods. The strength of this channel depends on trade linkages, domestic absorption, and the marginal propensities to consume of both recipient and financing countries. When the recipient has high domestic absorption, a relatively large share of the additional expenditure falls on locally produced goods, strengthening the local employment response. As trade integration increases, a larger share leaks toward trading partners, weakening the effect on domestic labor demand. At the same time, financing the transfer reduces disposable income and consumption in the countries making the payment. The aggregate employment response therefore reflects the interaction between expenditure leakages and household consumption responses throughout the union. I call this the *aggregate-demand channel*.

Second, a transfer raises disposable income in the recipient country and, by increasing consumption, reduces desired labor supply at prevailing wages. A transfer can therefore reduce involuntary unemployment even when its effect on observed employment is small. I call this the *labor-supply channel*.

I apply the model to the 2025 U.S. tariff shock in the euro area. The quantitative economy contains 19 euro-area countries, the United States, China, and the rest of the world, with 14 sectors connected through bilateral trade and input-output linkages. I discipline

[6] Appendix E documents cross-country heterogeneity in aggregate marginal propensities to consume.

the initial allocation using pre-shock trade flows, labor allocations, production relationships, and country-level marginal propensities to consume. I construct the tariff shock using the September 2025 schedule from the *Global Tariff Database: U.S. Trade War Extension*, assembled by Rodríguez-Clare et al. (2025) using the methodology developed by Teti (2024). The higher tariff rates remain in place for four years and then gradually return to their pre-shock levels.

To quantify the roles of monetary and fiscal integration, I compare three economies. The first is a currency union without cross-country fiscal transfers, i.e., the baseline case. The second introduces a within-period, zero-sum fiscal rule that reallocates resources across member countries of the currency union. The third is a counterfactual economy without transfers in which each country conducts an independent monetary policy. Together, these scenarios separate the distortions generated directly by the tariff shock from the additional distortions arising from the absence of country-specific monetary policy, and allow me to quantify how much fiscal transfers can substitute for monetary autonomy.

The central quantitative result is that a relatively small fiscal capacity can offset most of the stabilization costs created by the loss of country-specific monetary policy. Gross transfers with a present discounted value of 0.88% of steady-state euro-area GDP eliminate approximately 97% of the additional dispersion in involuntary unemployment generated by the currency union and slightly more than all of the additional consumption dispersion, while reducing the additional employment dispersion by around 70%. These gains require little change in pre-existing cross-country consumption differences.

The stabilization gains are robust to alternative assumptions about preferences, trade adjustment, and monetary policy. Cross-country transfers also provide substantially greater stabilization than national fiscal policy at comparable levels of fiscal support, reflecting their ability to redistribute resources toward countries more adversely affected by the common shock. Finally, I examine the interaction between trade and fiscal policy, showing that

euro-area retaliation and cross-country transfers are complementary: combining them further reduces cross-country dispersion in employment and consumption relative to transfers alone.

Literature. This paper relates most closely to three strands of work. First, it contributes to the dynamic quantitative trade literature studying the adjustment to trade shocks in the presence of labor mobility frictions, nominal rigidities, and endogenous consumption-saving decisions (Caliendo et al., 2019; Rodríguez-Clare et al., 2026; Ulate et al., 2025; Kim et al., 2026). Relative to this literature, I introduce empirically disciplined, heterogeneous marginal propensities to consume and analyze how cross-country fiscal transfers interact with a common monetary policy and international trade linkages.

Second, the paper relates to the literature on fiscal stabilization within currency unions. Farhi & Werning (2017) characterizes optimal fiscal arrangements in currency unions with nominal rigidities, while Evers (2012, 2015) study simple automatic transfer rules. Related work examines fiscal stabilization and policy interactions in multi-country New Keynesian models (Muscatelli et al., 2007; Colciago et al., 2008; Engler & Voigts, 2013; Dmitriev & Hoddenbagh, 2019). I contribute to this literature by evaluating simple cross-country fiscal rules in a multi-country, multi-sector quantitative trade model, where asymmetric stabilization needs arise from a common external shock interacting with observed sectoral specialization, bilateral trade, and input-output linkages.

Finally, the paper contributes to the emerging quantitative literature on the 2025 U.S. tariff episode. Rodríguez-Clare et al. (2025) studies the dynamic employment, income, and welfare consequences of the new tariff regime across U.S. states and countries, while Caliendo et al. (2025); Ignatenko et al. (2025); Evenett & Muendler (2025) examine complementary trade, welfare, and revenue effects. I use the same trade-policy episode to study a different institutional margin: how heterogeneous exposure to a common external shock

interacts with a common monetary policy in the euro area, and whether cross-country fiscal transfers can substitute for the country-specific monetary adjustment that members of a currency union forgo.

2 Model

The framework combines a dynamic multi-country, multi-sector trade model with a two-agent New Keynesian structure. Production takes place using labor and intermediate inputs. Households are either Ricardian or hand-to-mouth, generating heterogeneity in consumption responses to changes in income. Hand-to-mouth households have labor income and fiscal transfers, while Ricardian households have access to the asset market. Countries are linked through sectoral trade in goods and intermediate inputs under an Armington structure. Labor is imperfectly mobile across sectors within countries, with frictional sectoral employment choices, while workers do not migrate across countries. Nominal wage rigidities give monetary policy a role in determining real activity. Countries may either conduct independent monetary policies or belong to a currency union in which a common monetary authority sets the nominal interest rate. Within the currency union, I also allow for cross-country fiscal transfers that redistribute resources across member countries.

Firm. A representative firm in country i, sector s produces under a CRS production function and uses labor and intermediate inputs. Specifically, the technology for producing the (i,s) good takes the following Cobb-Douglas form:

$$Y_{is} = Z_{is} \ell_{is}^{\alpha_{is}} \prod_{k=1}^{S} M_{iks}^{\alpha_{iks}}$$

where Z_{is} is the productivity of sector s in country i, ℓ_{is} is the employment level in the sector, and M_{iks} is the composite of intermediate inputs from sector k, with $\sum_k \alpha_{iks} + \alpha_{is} = 1$. Intermediate inputs are aggregated across country-of-origin varieties using a CES aggregator:

$$M_{iks} = \left(\sum_n m_{niks}^{\frac{\sigma_k - 1}{\sigma_k}} \right)^{\frac{\sigma_k}{\sigma_k - 1}}$$

where m_{niks} denotes intermediate inputs sourced from country n, sector k, and σ_k is the elasticity of substitution across origins. Denoting t_{ijs} as the tariff that country j imposes on imports from country i in sector s and τ_{ijs} as the iceberg trade cost, perfect competition implies that the CIF price that the firm in country i, sector s, selling to country j sets is:

$$p_{ijs} = e_{ij} \frac{(1 + t_{ijs})\tau_{ijs}}{Z_{is}} W_{is}^{\alpha_{is}} \prod_k P_{ik}^{\alpha_{iks}} \tag{1}$$

where e_{ij} is the value of currency i with respect to currency j, P_{ik} is the sectoral price index for sector k in country i, and W_{is} is the wage in sector s. I set all the exchange rates with respect to country 1 (European country) and denote $e_{ijt} = \frac{e_{it}}{e_{jt}}$.

Trade Shares and Sectoral Price Index. Following the multi-sector Armington framework, final consumption within each sector is also a CES aggregate of country-of-origin varieties, with the same elasticity of substitution as intermediate inputs:

$$C_{js} = \left(\sum_i c_{ijs}^{\frac{\sigma_s - 1}{\sigma_s}} \right)^{\frac{\sigma_s}{\sigma_s - 1}}$$

where c_{ijs} denotes final consumption in country j of the sector-s variety produced in country i. Since final consumers and firms use the same sectoral CES aggregator, they face the

same sectoral price index and bilateral trade shares, given by:

$$\lambda_{ijs} = \frac{p_{ijs}^{1-\sigma_s}}{P_{js}^{1-\sigma_s}} \;\; and \;\; P_{js}^{1-\sigma_s} = \sum_i p_{ijs}^{1-\sigma_s} \tag{2}$$

where P_{js} is the sectoral price index in country j and sector s.

Household. In each country j, there is a mass one of households split into two types: a fraction λ_j^{HTM} is hand-to-mouth, and the rest have access to the asset market (Ricardian households). Each household comprises atomistic members m of measure $\overline{N}_j$ and has preferences represented by:[7]

$$\mathcal{U}_j = \sum_{t=0}^{\infty} \beta^t \int_0^{\overline{N}_j} \mathcal{U}_{jt}(m) dm$$

where $\mathcal{U}_{jt}(m)$ is the member-specific utility. Workers are imperfectly mobile across sectors and make forward-looking sectoral reallocation decisions. In particular, a worker who is employed in sector s at time t chooses the sector k in which she will work in period $t+1$. Conditional on being in sector s in period t and choosing sector k for the following period, member-specific period utility is

$$\mathcal{U}_{jt}^p(m; s, k) = \frac{\left(C_{jt}^p(m)\right)^{1-\gamma}}{1-\gamma} - \frac{\chi_{js}}{1+1/\varphi} L_{jst}^{1+1/\varphi} - \xi_{jsk}^p + \epsilon_{jkt}^p(m),$$

where γ is the inverse intertemporal elasticity of substitution, φ is the Frisch elasticity, and χ_{js} captures the disutility of working. ξ_{jsk}^p is the utility cost of moving from sector s to sector k, and $\epsilon_{jkt}^p(m)$ is an idiosyncratic preference shock associated with choosing sector k for the following period. The shocks are independently distributed across workers,

[7] Note that $\overline{N}_j$ is the measure of members of each household and at the same time the number of members of country j by construction.

sectors, and time according to a Type-I Extreme Value distribution with scale parameter ν. Hours worked L_{jst} are determined by labor demand and wage setting and are therefore taken as given by household members. I assume perfect risk sharing across members of each household type, such that $C_{jt}^{p}(m) = C_{jt}^{p}$ for $p \in \{HTM, R\}$. Hence, the marginal value of one additional unit of nominal income for a member of household type p is

$$\Lambda_{jt}^{p} \equiv \frac{u'(C_{jt}^{p})}{P_{jt}} = \frac{1}{P_{jt}(C_{jt}^{p})^{\gamma}}.$$

Preferences over final consumption are Cobb–Douglas across sectors, $C_{jt}^{p} = \prod_{s=1}^{S} \left(\frac{C_{jst}^{p}}{\phi_{js}}\right)^{\phi_{js}}$ for $p \in \{HTM, R\}$. The corresponding aggregate consumer price index is $P_j = \prod_{s=1}^{S} P_{js}^{\phi_{js}}$, where I assume that it is common to both household types, given that they share the same utility function. Therefore, given aggregate consumption expenditure $P_{jt}C_{jt}^{p}$, expenditure on sector s is $\phi_{js}P_{jt}C_{jt}^{p}$. I can therefore solve the household problem directly in terms of aggregate consumption for each household type. Define C_{jt}^{R} and a_{jt} as the consumption and savings of a Ricardian household in country j at period t, respectively. Then, define $A_j = a_j(1 - \lambda_j^{HTM})$ as the aggregate asset position of country j. The budget constraint of a Ricardian household in country j is:

$$\underbrace{P_{jt}C_{jt}^{R}\overline{N}_j}_{\text{Consumption}} + \underbrace{\frac{A_{jt}}{(1+i_{jt})(1-\lambda_j^{HTM})}}_{\text{Asset Purchase}} = \underbrace{\sum_{s} \frac{W_{jst}L_{jst}N_{jst}^{R}}{1-\lambda_j^{HTM}}}_{\text{Labor Income}} + \underbrace{TRC_{jt}}_{\text{Tariff Revenue}} + \underbrace{\frac{A_{j,t-1}}{1-\lambda_j^{HTM}}}_{\text{Asset Income}} + \underbrace{T_{jt}^{fiscal}}_{\text{Fiscal Transfers}}$$

Euler Equations. The optimal consumption-saving decision implies the standard Euler equations for asset choice

$$\left(\frac{C_{j,t+1}^{R}}{C_{jt}^{R}}\right)^{\gamma} = \beta \frac{(1+i_{j,t})}{(1+\pi_{j,t+1})} \tag{3}$$

Non-Ricardian households do not have access to assets. As a consequence, their budget constraint is:

$$\overline{N}_j P_{jt} C_{jt}^{HTM} = \sum_s \frac{W_{jst} L_{jst} N_{jst}^{HTM}}{\lambda_j^{HTM}} + TRC_{jt} + T_{jt}^{fiscal}$$

Mobility Choice. Let V_{jst}^p denote the expected value, measured in utility units, of a worker of type $p \in \{HTM, R\}$ who is currently employed in sector s. Then, as in Artuç et al. (2010) and Caliendo et al. (2019),[8] the worker's dynamic sectoral choice satisfies the following Bellman equation:

$$V_{jst}^p = \underbrace{\Lambda_{jt}^p W_{jst} L_{jst} - \frac{\chi_{js}}{1+1/\varphi} L_{jst}^{1+1/\varphi}}_{\text{Current-period payoff in sector } s} + \nu \log \left[\sum_{k=1}^{S} \exp\left(\frac{\beta V_{jk,t+1}^p - \xi_{jsk}^p}{\nu} \right) \right] \tag{4}$$

where $\Lambda_{jt}^p = u'(C_{jt}^p)/P_{jt}$. The first term in (4) captures the current utility payoff from working in sector s. The second term is the expected value of the optimal sectoral choice for the following period. Because workers are forward-looking, sectoral mobility depends not only on current wages and consumption, but also on the continuation value associated with each potential destination sector. Under the Type-I Extreme Value assumption, the fraction of type-p workers currently in sector s who choose to work in sector k in period $t+1$ is:

$$\mu_{jsk,t}^p = \frac{\exp\left(\frac{\beta V_{jk,t+1}^p - \xi_{jsk}^p}{\nu} \right)}{\sum_{h=1}^{S} \exp\left(\frac{\beta V_{jh,t+1}^p - \xi_{jsh}^p}{\nu} \right)} \tag{5}$$

Denoting by N_{jst}^p the mass of workers of type p employed in sector s at time t, its law

[8] Following Kim et al. (2026) I add endogenous labor supply.

of motion is:

$$N^p_{jk,t+1} = \sum_{s=1}^{S} \mu^p_{jsk,t} N^p_{jst}, \qquad p \in \{HTM, R\} \tag{6}$$

Thus, the number of workers employed in sector k in period $t+1$ is the sum of workers arriving from all origin sectors in period t. Since there is no migration across countries,

$$\sum_{s=1}^{S} N^R_{jst} = (1 - \lambda^{HTM}_j)\overline{N}_j, \qquad \sum_{s=1}^{S} N^{HTM}_{jst} = \lambda^{HTM}_j \overline{N}_j$$

for every t. The parameter ν governs the dispersion of idiosyncratic sectoral preferences and, therefore, the sensitivity of mobility decisions to differences in continuation values. As ν becomes small, workers' choices become increasingly sensitive to differences in sectoral values net of mobility costs. As ν increases, idiosyncratic preference dispersion becomes more important and transition probabilities become less sensitive to differences in expected sectoral values. Persistence in sectoral employment is additionally governed by the bilateral mobility costs ξ^p_{jsk}.

Goods Market Clearing. Total production in country i sector s must be equal to total demand. In the context of tariffs, this implies:

$$R_{ist} = \sum_j \frac{e_{jt}}{e_{it}} \frac{\lambda_{ijst}}{1 + t_{ijst}} \left(\phi_{js} P_{jt} C_{jt} + \sum_k \alpha_{jsk} R_{jkt} \right) \tag{7}$$

where the first term in the parenthesis captures the final goods demand and the second the intermediate consumption of each sector.

Tariff Revenue Collected. Given a tariff rate t_{ijs}, for each unit that country i sells to country j, $1/(1 + t_{ijs})$ is the revenue of the seller, while $t_{ijs}/(1 + t_{ijs})$ is the tax collected

by the destination country. It is straightforward that the tariff revenue collected is:

$$TRC_{jt} = \sum_{s} \sum_{i} \frac{t_{ijs,t}}{1 + t_{ijs,t}} \lambda_{ijst} \left(\phi_{js} P_{jt} C_{jt} + \sum_{k} \alpha_{jsk} R_{jkt} \right) \tag{8}$$

Labor Market Clearing. Given that employment is demand driven and production follows a standard Cobb-Douglas form, total labor payments must be equal to:

$$W_{ist} L_{ist} [N_{ist}^{R} + N_{ist}^{HTM}] = \alpha_{is} R_{ist} \tag{9}$$

New Keynesian Phillips Curve (NKPC). I assume that wages are set by labor unions in each sector and are sticky, following Erceg et al. (2000). A continuum of unions in each sector organizes the measure $N_{ist} = N_{ist}^{R} + N_{ist}^{HTM}$ of workers and employs them for an equal number of hours L_{ist}. Each union faces a labor demand curve with elasticity μ_s and a Rotemberg friction and sets nominal wages W_{ist} in each period to maximize the weighted average welfare of all the members, those that come from the Ricardian family and those coming from the HTM family.[9] A union k chooses $W_t(k)$ to maximize:

$$\mathcal{U}_{st}^{un} = \sum_{t' \geq t} \beta^{t'-t} \left[\hat{\zeta}_{ist} L_{is,t'}(k) W_{ist'}(k) - \int v(L_{is,t'}(k)) dk - \underbrace{\Phi \left(W_{is,t'}(k) - W_{is,t'-1}(k) \right)}_{\text{Rotemberg Cost}} \right]$$

Where $\hat{\zeta}_{ist}$ is the weight that the union puts on consumption. This maximization problem generates the standard sectoral Phillips Curve extended to two types of workers:

$$\log\left(\pi_{ist}^{w}+1\right) = \kappa_{is}^{\omega} \left(v'(L_{ist}) - \frac{W_{ist}}{P_{it}} \left[\frac{N_{ist}^{HTM}}{N_{ist}} u'(C_{it}^{HTM}) + \frac{N_{ist}^{R}}{N_{ist}} u'(C_{it}^{R}) \right] \right) + \beta \, \log\left(\pi_{is,t+1}^{w}+1\right) \tag{10}$$

[9] I combine Colciago (2011) and Kim et al. (2026) to take into account hand-to-mouth and Ricardian households. Following the latter, I ignore wage mark-ups.

where $1 + \pi^w_{ist} = \frac{W_{ist}}{W_{is,t-1}}$ denotes wage inflation at time t and the term in parenthesis captures deviations between realized hours worked and average desired labor supply.[10]

Monetary Policy. A monetary authority indexed by m sets the nominal interest rate $i_{m,t}$ for the countries in $\mathcal{M}_m$ according to

$$\log(1+i_{m,t}) = \phi_{sm} \log(1+i_{m,t-1}) + (1-\phi_{sm}) \left[r_m + \phi_\pi \Pi_{m,t} + \phi_L \Theta(L_{m,t}) + \epsilon^{MP}_{m,t} \right] \quad (11)$$

The parameter ϕ_{sm} governs interest-rate inertia, while ϕ_π and ϕ_L determine the response of monetary policy to inflation and labor-market conditions, respectively. The term r_m is the steady-state policy-rate intercept and $\epsilon^{MP}_{m,t}$ is an exogenous monetary policy shock. The labor-market index $\Theta(L_{m,t})$ is increasing in labor-market tightness, so that the policy rate rises when labor markets are relatively strong and falls when they are relatively weak. Under independent monetary policy, each country has its own monetary authority and its policy rate responds to domestic inflation and labor-market conditions. In the currency union, member countries share a common interest rate, which responds instead to weighted averages of inflation and labor-market conditions across the union. Appendix G provides the explicit aggregation formulas and weights.

Financial Markets and Exchange Rate Determination. I assume that international financial markets are segmented, and only financial intermediaries can trade bonds internationally. The no-arbitrage condition implies the standard uncovered interest rate parity (UIP) equation:

$$\left(\frac{1 + i_{1,t}}{(1 + i_{j,t})} \right) = \frac{e_{j,t+1}}{e_{j,t}} \quad (12)$$

[10] Note that in the steady state with zero inflation, we still have a wedge in terms of employment, because we are assuming that both types of agents work the exact same number of hours. However, I will call it the no-wedge steady state to simplify the counterfactual analysis.

Transfers. Finally, there is a fiscal authority at the union level that redistributes resources across member countries. I model these transfers as aggregate nominal transfers, denoted by T_{ht}, and impose that they sum to zero within the union in every period. For each country $h \in EA$, let g_{ht} denote the target defined by the fiscal authority, such that a higher value of g_{ht} indicates a greater need for fiscal transfers. Transfers are then assigned according to each country's shortfall relative to the rest of the union:

$$T_{ht} = \mu_T GDP_{ht} \left(g_{ht} - \bar{g}_t^{EA} \right), \qquad h \in EA, \tag{13}$$

where $\mu_T \geq 0$ governs the strength of the fiscal response, GDP_{ht} denotes nominal GDP, and $\bar{g}_t^{EA}$ is the GDP-weighted average of the fiscal target function in the union. Since $\bar{g}_t^{EA}$ is weighted by GDP_{ht}, the rule satisfies the union budget constraint by construction: $\sum_{h \in EA} T_{ht} = 0$.

The transfer rule operates as an automatic stabilizer at the union level. Given the fiscal target and the response parameter μ_T, transfers respond automatically to differences in economic conditions across member countries, without requiring discretionary adjustments by the fiscal authority in each period. I consider two alternative target rules: (i) a weighted average of sectoral labor-market slackness or *involuntary unemployment*, defined as the gap between desired and realized hours worked, and (ii) deviations of consumption over time.[11]

Equilibrium

Definition 1 (Competitive equilibrium)**.** *Given the exogenous parameters and the initial steady-state wages and assets, an equilibrium consists of sequences, for all $t \geq 0$, of consumption $\{C_{jt}^R, C_{jt}^{HTM}, C_{jt}\}$, bond holdings $\{A_{jt}\}$, labor supply and allocation $\{L_{ist}, N_{ist}^R,$*

[11] See Appendix H for details on each rule.

$N_{ist}^{HTM}\}$, *revenues and expenditures* $\{R_{ist}, E_{jst}, TRC_{jt}\}$, *prices* $\{p_{ijs,t}, P_{js,t}, P_{jt}, W_{is,t}, i_{it}\}$, *and exchange rates* $\{e_{jt}\}$, *with* $e_{ij,t} \equiv e_{it}/e_{jt}$, *such that:*

(a) Firms set optimal prices given input prices (1).

(b) Households optimally choose consumption, saving, and sector allocation (3),(4), (5).

(c) Sectoral labor mobility satisfies its law of motion (6).

(d) Goods and labor markets clear (7), (9).[12]

(e) Tariff revenues are rebated as lump-sum transfers (8).

(f) Labor supply and wages satisfy the wage Phillips curve (10).

(g) Monetary policy follows the rule in (11).

(h) Exchange rates satisfy uncovered interest parity (12).

(i) Fiscal transfers within the currency union satisfy (13).

3 Analytical Results in a Simplified Environment

To isolate the roles of trade linkages and household consumption responses, I study a three-country, one-sector version of the model. This simplified environment clarifies the mechanisms through which fiscal transfers affect involuntary unemployment within a currency union. The analysis considers an unexpected, one-time increase in trade costs at $t = 0$. Following Woodford (2022) and Auclert et al. (2025), I study a first-order approximation in the limiting case $\beta \to 1$.[13]

There are three countries, denoted by F, $H1$, and $H2$, and one sector. Countries $H1$

[12] If all markets clear, then the asset market clears too.

[13] This limit improves tractability; changes in net foreign asset positions have almost no effect on current consumption, which allows the transfer mechanism to be characterized analytically. Asset movements can have sizable effects if real interest rates are too low or too high. However, for simplicity, I do not take it into account in this section.

and $H2$ may form a currency union, while F is a foreign country. I consider an increase in iceberg trade costs on exports from $H1$ to F and study its effects on employment in the two potential currency-union members. From the perspective of exporters, both iceberg trade costs and import tariffs increase the delivered price of goods in foreign markets, reducing foreign demand. I focus on iceberg trade costs to abstract from tariff revenues and isolate the mechanisms through which a reduction in export markets affects employment and the potential role of fiscal transfers. To keep the trade structure transparent, $H1$ trades with both F and $H2$, whereas $H2$ trades only with $H1$. Nominal wages are fixed in local currency, so employment is determined by labor demand. Finally, initial asset positions in steady state are zero everywhere. See Appendix I for more details.

The simplified economy inherits the production structure, trade shares, and household preferences from the quantitative model. The value-added share in production is α, with $1-\alpha$ corresponding to intermediate inputs. With a single sector, there is no sectoral labor mobility. Denoting proportional deviations from steady state by $\hat{x} = dx/x$, the first-order consumption responses are

$$\hat{C}_i^{htm} = \hat{L}_i - \hat{P}_i + \frac{dT_i^{fiscal}}{GDP_i}, \qquad \hat{C}_i^{R} = -\frac{1}{\gamma}\left(\hat{i}_i + \hat{P}_i\right)$$

A transfer changes hand-to-mouth consumption contemporaneously, whereas Ricardian households smooth temporary changes in disposable income through the asset market.[14]

Goods-market clearing follows the same structure as in the quantitative model, with demand for final goods and intermediate inputs. Given fixed nominal wages, labor demand is determined by firm revenues, $W_i L_i N_i = \alpha R_i$. Assuming that country F does not change its monetary policy and that exchange rates return to their steady-state values in the period

[14]The marginal propensity to consume of Ricardian households is $1-\beta$, which converges to zero as $\beta \to 1$.

after the shock, UIP implies $\hat{i}_j = \hat{e}_j$.[15]

I measure involuntary unemployment as the difference between desired labor supply and realized hours worked. Appendix I shows that, to first order,

$$\hat{L}_i^{supply} - \hat{L}_i = -\underbrace{\left(1 + \varphi\gamma\lambda_i^{htm}\right)\hat{L}_i}_{\text{Aggregate Demand Channel}} - \underbrace{\varphi\gamma\lambda_i^{htm}\frac{dT_i^{fiscal}}{GDP_i}}_{\text{Labor-Supply Channel}} + \varphi\left(1 - \lambda_i^{htm}\right)\hat{i}_i - \varphi\lambda_i^{htm}(1-\gamma)\hat{P}_i \tag{14}$$

Fiscal transfers affect this distortion through two channels. First, a transfer raises disposable income and reduces desired labor supply. This is the *labor-supply channel*. Second, the additional consumption generated by the transfer changes expenditure on domestic and imported goods and therefore affects aggregate demand. I refer to this as the *aggregate demand channel*.

With one sector and independent monetary policies, the monetary authority can offset the trade-cost shock by adjusting the exchange rate.[16] Given the focus of the quantitative exercise, I instead consider a price-stabilizing monetary authority within the currency union.[17] Countries $H1$ and $H2$ therefore satisfy $\hat{i}_{H1} = \hat{i}_{H2}$, and fiscal transfers are balanced within the union, $dT_{H1}^{fiscal} = -dT_{H2}^{fiscal} = dT$.

Because nominal wages are fixed in local currency, fiscal transfers do not enter firms' unit costs. As shown in Appendix I, the first-order price system depends on the trade-cost shock and the exchange rate, but not directly on fiscal transfers. Consequently, under price stabilization, the common monetary-policy response is independent of fiscal transfers. Fiscal transfers can therefore be analyzed holding monetary policy fixed.

[15] This assumption is also used by Auclert et al. (2025) and allows me to link the exchange rate with monetary policy.

[16] This result relies on the one-sector structure of the stylized model, and is well known in the international macroeconomics literature.

[17] Inflation stabilization is the primary objective in many quantitative monetary-policy rules, although the quantitative model also allows the authority to respond to labor-market conditions.

To characterize the aggregate-demand channel, define λ^*_{ij} as the share of country i's total sales absorbed by country j, and define $D_i \equiv 1 - \lambda^*_{ii}\left[1 - \alpha\left(1 - \lambda_i^{htm}\right)\right]$. The term D_i^{-1} captures amplification through domestic expenditure and intermediate-input linkages. The labor-demand response in $H1$ can then be written as:

$$\begin{aligned}\hat{L}_{H1} = &\underbrace{\frac{\lambda^*_{H1,H2}\left[1 - \alpha\left(1 - \lambda_{H2}^{htm}\right)\right]}{D_{H1}}}_{\text{Feedback from } H2}\hat{L}_{H2} + \underbrace{\frac{\lambda^*_{H1,F}\left[1 - \alpha\left(1 - \lambda_{F}^{htm}\right)\right]}{D_{H1}}}_{\text{Feedback from } F}\hat{L}_{F} \\ &+ \underbrace{\frac{\alpha\left(\lambda_{H1,H1}\lambda_{H1}^{htm} - \lambda_{H1,H2}\lambda_{H2}^{htm}\right)}{D_{H1}}}_{\text{Direct expenditure effect}}\frac{dT}{GDP_{H1}} + \underbrace{\mathcal{S}_{H1}\left(\hat{\tau}, \hat{e}_{H1}, \hat{e}_{H2}\right)}_{\text{Shock}}\end{aligned} \tag{15}$$

where $\mathcal{S}_{H1}(\cdot)$ collects the direct trade-cost, price-index, and exchange-rate effects. The analogous expression for $H2$ is reported in Appendix I.

The direct expenditure effect in equation (15) illustrates how trade linkages and household consumption responses interact. A transfer increases expenditure in $H1$ while reducing it in $H2$, which finances the transfer. The resulting effect on labor demand depends on the hand-to-mouth shares in both countries and the destination of their expenditure. The following proposition characterizes these mechanisms accounting for general-equilibrium feedback through labor demand in all three countries.

To characterize the comparative statics, I assume equal steady-state GDPs, balanced bilateral trade, home bias, and a common hand-to-mouth share across countries. Changes in bilateral trade shares are offset by changes in domestic absorption, holding the other bilateral trade linkage fixed. The following results account for general-equilibrium feedback through labor demand.

Proposition 1 (Domestic Absorption and Fiscal Transfers)**.** *A higher share of domestic absorption relative to trade with either intra-union or extra-union partners increases the employment multiplier of fiscal transfers in the recipient country.*

The intuition follows from the geography of expenditure. Greater domestic absorption strengthens the employment response to fiscal transfers, as a larger share of additional expenditure falls on domestically produced goods. Conversely, greater trade openness reduces the effectiveness of transfers by directing additional expenditure toward foreign producers.

In addition, holding domestic absorption fixed, greater trade integration within the currency union relative to the foreign economy can either strengthen or weaken the employment multiplier in the recipient country. This ambiguity reflects two competing mechanisms. First, greater integration with the financing country weakens the direct aggregate-demand effect of transfers, as the reduction in the expenditure of the financing country lowers demand for goods produced in the recipient country. This financing effect is absent from trade with the foreign economy. Second, both intra-union and extra-union trade linkages generate feedback effects through employment, income, and consumption. Greater intra-union integration can therefore strengthen the employment multiplier if the additional feedback from the financing country is sufficiently large relative to that from the foreign economy to offset the negative financing effect. Consequently, greater extra-union trade relative to intra-union trade increases the recipient's employment multiplier when the financing effect dominates the difference in feedback effects. A sufficient, but not necessary, condition for this result is $\lambda_{H1,H2} \leq 5\lambda_{H1,F}$. Thus, for greater intra-union integration to increase the multiplier relative to extra-union trade, intra-union trade must exceed extra-union trade by a substantial margin. Consistent with this mechanism, the quantitative analysis in Table 3 reports a negative coefficient on intra-union sales relative to extra-union sales.

Turning to household heterogeneity, I relax the assumption of common hand-to-mouth shares, holding trade shares and the hand-to-mouth shares in $H1$ and F fixed.

Proposition 2 (Household Heterogeneity and Fiscal Transfers)**.** *A higher hand-to-mouth share in the financing country reduces the employment multiplier of fiscal transfers in the recipient country.*

A higher marginal propensity to consume in the financing country amplifies the reduction in expenditure associated with financing the transfer, lowering demand for goods produced in the recipient country. Overall, these results highlight how the effectiveness of fiscal transfers depends on both the geography of trade linkages and the distribution of marginal propensities to consume across countries. Appendix I provides the formal derivations and proofs.

4 Calibration

The quantitative exercise covers the 19 euro-area countries, the United States, China, and a constructed Rest of the World (ROW) region that aggregates all remaining economies.[18] The model contains fourteen sectors: one agricultural sector, twelve manufacturing sectors, and one service sector, following Caliendo et al. (2019). Following the quantitative trade literature, the model operates at an annual frequency, with each period corresponding to one year. I use data from 2019 to characterize the pre-shock economy, thereby avoiding distortions associated with the COVID-19 pandemic. Appendix B provides details on the sectoral mapping, data sources, aggregation procedures, and construction of the initial allocation.

Trade and production data I use the OECD Inter-Country Input-Output (ICIO) tables to construct sector-level bilateral trade flows, input-output linkages, gross output, and final consumption across countries. These data discipline bilateral expenditure shares,

[18] Following Caliendo et al. (2019) and Rodríguez-Clare et al. (2026), Luxembourg is excluded.

consumption, intermediate-input coefficients, and sectoral value-added shares. Sectoral employment comes from the latest available WIOD data.

Household heterogeneity and labor markets Country-level marginal propensities to consume discipline the share of hand-to-mouth households, λ_i^{HTM}. For euro-area countries, I use the hypothetical MPCs elicited in HFCS 4.0, following Jappelli & Pistaferri (2014) and Drescher et al. (2020). For the United States, I use the estimate from Kaplan & Violante (2022), and I impose an MPC of 0.6 for China and ROW.[19] Sectoral employment shares and wage bills are constructed from WIOD and ICIO. Initial hours are normalized to one. The labor-disutility shifters and non-pecuniary sectoral utility terms are chosen to rationalize initial hours and the observed allocation of workers across sectors. For bilateral mobility across sectors in each country, I use IPUMS CPS data pooling 2023-2024 for the United States, and adjust it such that the model satisfies the steady-state equation. For European countries, I take the US bilateral mobility matrix and adjust it such that it matches the steady-state stock of workers in each country.

Initial assets and prices Initial asset positions are pinned down by steady-state trade deficits. I normalize initial prices and exchange rates to one and construct the initial allocation so that it satisfies the model's equilibrium conditions while matching observed trade, production, employment, and expenditure shares.

Tariff shock Tariff data come from the *Global Tariff Database: U.S. Trade War Extension* assembled by Rodríguez-Clare et al. (2025) using the methodology developed by Teti (2024). The data are observed at the HS6 level and mapped into the model sectors using the concordance package from Liao et al. (2020). I aggregate tariffs to the country-sector

[19] Hong (2023) estimates an MPC between 0.55 and 0.6 for Peru, while Sokolova (2023) reports an annual aggregate equivalent of 0.58.

level using pre-shock bilateral trade flows as weights. The initial tariff schedule corresponds to December 2024, while the tariff shock is defined by the schedule observed in September 2025. For ROW, I add 10 percentage points to U.S. tariffs on agricultural and manufacturing imports. Following Rodríguez-Clare et al. (2025), the higher tariffs remain in place for four years and then gradually return to their pre-shock levels.

Externally assigned parameters Table 1 reports the parameters assigned externally. I set the annual discount factor to $\beta = 0.95$, the inverse intertemporal elasticity of substitution to $\gamma = 1$, and the Frisch elasticity to $\varphi = 0.5$. The parameter governing the elasticity of substitution across origins is set to $\sigma_s = 5$, within the range typically used in quantitative trade models. The wage Phillips curve slope, κ^{ω}_{is}, is calibrated from Hazell et al. (2022) at the country level.[20] Monetary policy follows a Taylor rule with $\phi_\pi = 1.5$ and $\phi_L = 1/6$.[21] I set interest-rate smoothing to $\phi_{sm} = 0.57$, corresponding to the annual persistence implied by the quarterly estimate of 0.87 in Christoffel et al. (2008). Finally, I set the sectoral mobility parameter to $\nu = 2.02$, following Caliendo et al. (2019).

Data-disciplined parameters Table 2 summarizes the model objects constructed directly from the data and the parameters chosen to rationalize the initial allocation. Given the elasticity of substitution, bilateral trade flows discipline trade costs and productivity. Consumption shares, input-output coefficients, and value-added shares are constructed from ICIO. The remaining parameters are chosen to match country-level MPCs, initial hours, sectoral employment allocations, and the bilateral sectoral mobility within countries.

[20] The table reports the average value of κ^{ω}_{is}, but for the quantitative exercise I calibrate the parameter at the country level, given the high heterogeneity across countries.

[21] Appendix D maps the response to the output gap into the response to involuntary unemployment. I choose ϕ_L so that the implied output-gap coefficient is 0.5, following Taylor (1993) and consistent with the estimates in Hofmann & Bogdanova (2012).

Table 1: Externally calibrated parameters

Parameter	Value	Description	Source
β	0.95	Discount factor	5% steady-state interest rate
γ	1	CRRA coefficient	Literature
φ	0.5	Frisch elasticity	Chetty et al. (2011)
σ_s	5	Elasticity of substitution	Head & Mayer (2014)
$\overline{\kappa_i^\omega}$	0.02	Wage Phillips curve slope	Hazell et al. (2022)
ϕ_π	1.5	Taylor rule coefficient	Taylor (1993)
ϕ_L	1/6	MP response to labor wedge	Taylor (1993)
ϕ_{sm}	0.57	Interest-rate smoothing	Christoffel et al. (2008)
ν	2.02	Sectoral preferences dispersion	Caliendo et al. (2019)

Table 2: Data-disciplined objects and internally calibrated parameters

Parameter	Description	Target moments
ϕ_{is}	Consumption shares	ICIO consumption shares
α_{iks}	Input-output matrix	ICIO intermediate-input shares
α_{is}	Value-added share	ICIO value added
τ_{ijs}	Trade costs	ICIO bilateral trade flows
Z_{is}	Productivity	ICIO trade flows and initial prices
t_{ijs}	Tariffs	Teti (2024)
λ_i^{HTM}	Share of hand-to-mouth households	MPCs from HFCS and literature
ω_i^m	Country MP Weight	Initial GDP Share
ω_{is}	Sectoral MP Weight	Initial labor dist.
χ_{is}	Labor-disutility shifter	Initial hours normalized to one
ξ_{jsk}^p	Steady State Worker dist.	IPUMS CPS and WIOD

5 The Role of MPCs

This section studies how household MPCs shape the transmission of fiscal transfers in the quantitative model. I compare three specifications: a representative-agent economy with only Ricardian households, as in Kim et al. (2026) and Dix-Carneiro et al. (2023); the baseline model with country-level MPCs and endogenous asset positions; and a specification with all households hand-to-mouth and exogenous trade imbalances, as in Rodríguez-Clare et al. (2026) and Caliendo et al. (2019).[22] The first two specifications isolate the role of the MPC while allowing trade imbalances to adjust endogenously, whereas the third provides a benchmark in which this margin is shut down.

Fiscal Transfers. The stylized model suggests that the effectiveness of fiscal transfers depends not only on the size of the transfer, but also on how strongly recipient households translate additional income into spending and on where that spending falls. To quantify these forces in the full model, I consider a simple transfer experiment that isolates the local fiscal response from the endogenous stabilization rule studied above.

In each experiment, one euro-area country receives a transfer equal on impact to 1% of its initial steady-state GDP, with persistence of 0.5. The transfer is financed proportionally by the remaining euro-area members. I therefore replace the endogenous transfer rule in Section 2 with an exogenous path satisfying $\sum_{i \in EA} T_{it} = 0$, with no transfers involving countries outside the euro area. I repeat the experiment for each of the 19 member countries, treating each country in turn as the recipient.

Figure 1 summarizes the resulting recipient-country responses. Each line reports the

[22] I map the latter specification to Rodríguez-Clare et al. (2026) by fixing all exchange rates and imposing the same nominal anchor. Unlike Rodríguez-Clare et al. (2026), my model features a New Keynesian wage Phillips curve and endogenous labor supply rather than downward nominal wage rigidity and exogenous labor supply. Appendix F.2 shows that MPC heterogeneity has much smaller aggregate effects for a tariff shock, consistent with Kaplan & Violante (2018), who emphasize that household heterogeneity matters much more for fiscal transfers than for aggregate productivity shocks.

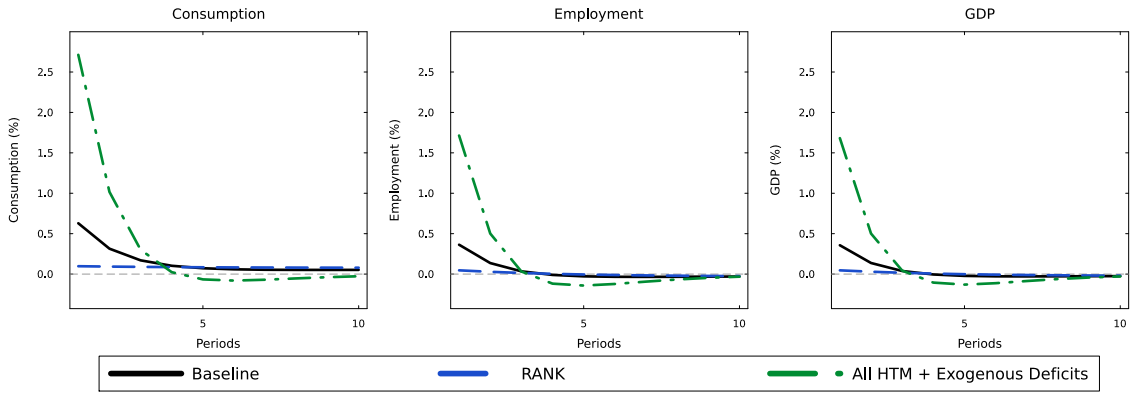


Figure 1: Weighted Mean Responses to a Fiscal Transfer Shock

Notes: In each of 19 experiments, one euro-area country receives a transfer equal on impact to 1% of its own initial steady-state GDP, financed proportionally by the remaining members. The transfer subsequently decays at rate $\rho^{fiscal} = 0.5$. Each line reports the initial-GDP-weighted mean response of the recipient country across experiments. All variables are expressed as percentage deviations from steady state. In the exogenous-deficit specification, I impose the exchange-rate path from the baseline solution.

initial-GDP-weighted mean across the 19 experiments.

The response of the recipient economy depends sharply on households' propensity to spend the transfer. Consumption reacts only modestly in the representative-agent economy, more strongly in the baseline economy, and substantially more when all households are hand-to-mouth. The same ranking carries over to employment and output, as stronger consumption demand raises demand for domestically produced goods and labor. On impact, the GDP multiplier is 0.05 in RANK, 0.36 in the baseline, and 1.68 in the all-hand-to-mouth specification with exogenous trade deficits. The baseline value is close to the fiscal multipliers of 0.3–0.4 estimated by Pennings (2021) and Bracco et al. (2026). The much larger multiplier in the last specification should not be attributed to MPC alone: shutting down endogenous external adjustment and imposing a different nominal anchor also amplifies the response.

The aggregate responses in Figure 1 mask substantial heterogeneity across recipient

countries. This variation is informative about the mechanisms governing the multiplier. In particular, the model suggests two natural sources of cross-country heterogeneity. First, a higher MPC raises the fraction of the transfer that is immediately spent. Second, the destination of that spending determines how much of the resulting demand accrues to domestic producers rather than leaking to trading partners.

To quantify these forces, I regress the baseline impact fiscal multiplier on the recipient country's MPC and the composition of its sales. I distinguish sales to the domestic market, sales to other euro-area members, and sales outside the currency union. Because these three shares sum to one, Foreign Sales is the omitted category. The regression is weighted by population, and all regressors are centered at their population-weighted means, so that the constant corresponds to the population-weighted average impact multiplier. Table 3 reports the results. Country-level characteristics and multipliers are reported in Table 9 in Appendix F.1.

The cross-country results line up closely with the mechanism. Countries with higher MPCs have larger multipliers: a larger share of the transfer is spent immediately, generating a stronger increase in aggregate demand. Conditional on MPC, the multiplier is also substantially larger in countries whose producers sell more to their own domestic market. A shift in sales from foreign markets toward the domestic market therefore raises the share of additional expenditure that returns to domestic producers.

Sales to other currency-union members behave differently. Relative to sales outside the euro area, a larger CU sales share is associated with a lower multiplier. The reason is that the transfer is zero-sum within the union: higher income in the recipient is matched by lower income in the countries financing the transfer. Producers that rely more heavily on sales to those countries therefore face an offsetting decline in external demand. The estimated CU-sales coefficient is imprecise, so I interpret this evidence as suggestive rather than conclusive. Taken together, these results confirm that the quantitative model preserves

Table 3: Cross-Country Determinants of the Impact Fiscal Multiplier

	Fiscal Multiplier
Constant	0.36
	(0.01)
MPC	0.85
	(0.07)
Domestic Sales	0.78
	(0.14)
CU Sales	-0.16
	(0.25)
Observations	19
Weighted R^2	0.96
Adjusted R^2	0.95

Notes: The dependent variable is the baseline impact fiscal multiplier. MPC, Domestic Sales, and CU Sales enter as shares between zero and one. Domestic Sales is the share of producer sales sold domestically, while CU Sales is the share sold to other euro-area members. Foreign Sales is the omitted category. The regression is weighted by country population. Regressors are centered at their population-weighted means, so the constant equals the population-weighted mean impact multiplier. Heteroskedasticity-robust HC1 standard errors are reported in parentheses. The sample contains the 19 euro-area economies in the model.

the key mechanism of the stylized framework: the effectiveness of cross-country transfers depends on both the recipient's MPC and the geography of expenditure. At the same time, the richer structure of the quantitative model allows me to go beyond this qualitative insight and measure how much fiscal capacity is required to offset the stabilization costs created by the loss of country-specific monetary policy.

6 Baseline Results

I now study how the institutional structure of the euro area shapes the adjustment to the 2025 U.S. tariff shock, and to what extent cross-country fiscal transfers can compensate for the loss of country-specific monetary policy. The baseline experiment introduces the September 2025 tariff schedule for four years, followed by a gradual return to the

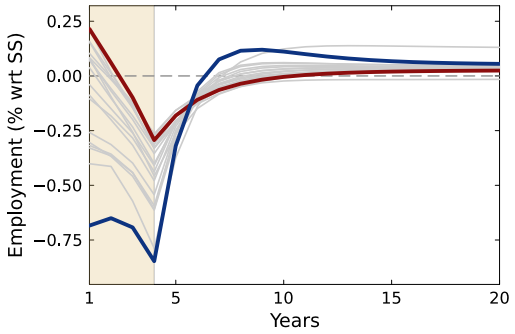
pre-shock tariff schedule. The shock is unexpected when it occurs, but agents learn its subsequent path immediately, as in Caliendo et al. (2019). Throughout the baseline exercise, euro-area countries either share a common monetary policy or, in the counterfactual economy, conduct independent monetary policies according to the same country-level Taylor rule. The analysis proceeds in three steps. I first quantify the additional adjustment costs generated by the common monetary policy, focusing on cross-country dispersion in involuntary unemployment, consumption, employment, and GDP[23]. I then introduce two simple zero-sum fiscal transfer rules and ask how much of these additional costs can be offset through fiscal integration. Finally, I compare how effectively cross-country transfers and national fiscal policy reduce dispersion and examine the interaction between the two instruments.

The Benefits of Independent Monetary Policy

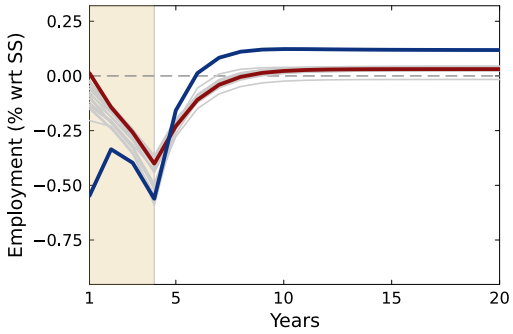
I first isolate the stabilization cost of a common monetary policy by comparing the baseline currency union with a counterfactual in which each euro-area country sets its own interest rate. The tariff shock is otherwise identical across the two economies. Figure 2 reports the country-level responses of employment and inflation.

Independent monetary policy substantially compresses the cross-country differences in employment generated by the tariff shock. Under the currency union, countries with different exposure to the shock face the same policy rate, whereas under independent monetary policy the interest rate responds to country-specific conditions. Inflation responses remain small under both regimes, so the main quantitative difference operates through labor-market adjustment.

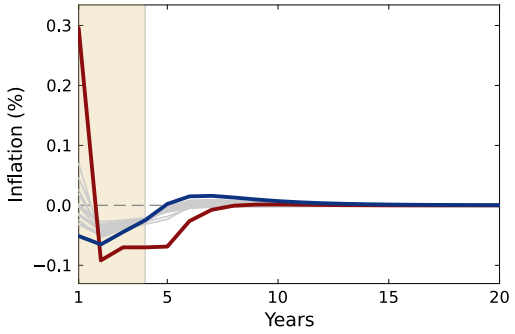
[23]The counterfactual holds steady-state trade flows fixed across monetary regimes, thereby isolating the stabilization role of monetary policy from potential long-run effects of currency-union membership on trade integration. For the euro area, Silva & Tenreyro (2010) finds no evidence that the introduction of the common currency increased trade linkages across member countries.



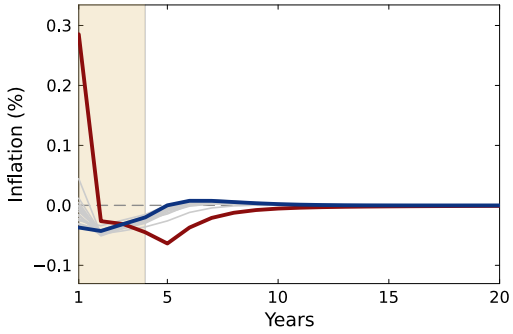
(a) Currency Union – Employment



(b) Independent MP – Employment



(c) Currency Union – Inflation



(d) Independent MP – Inflation

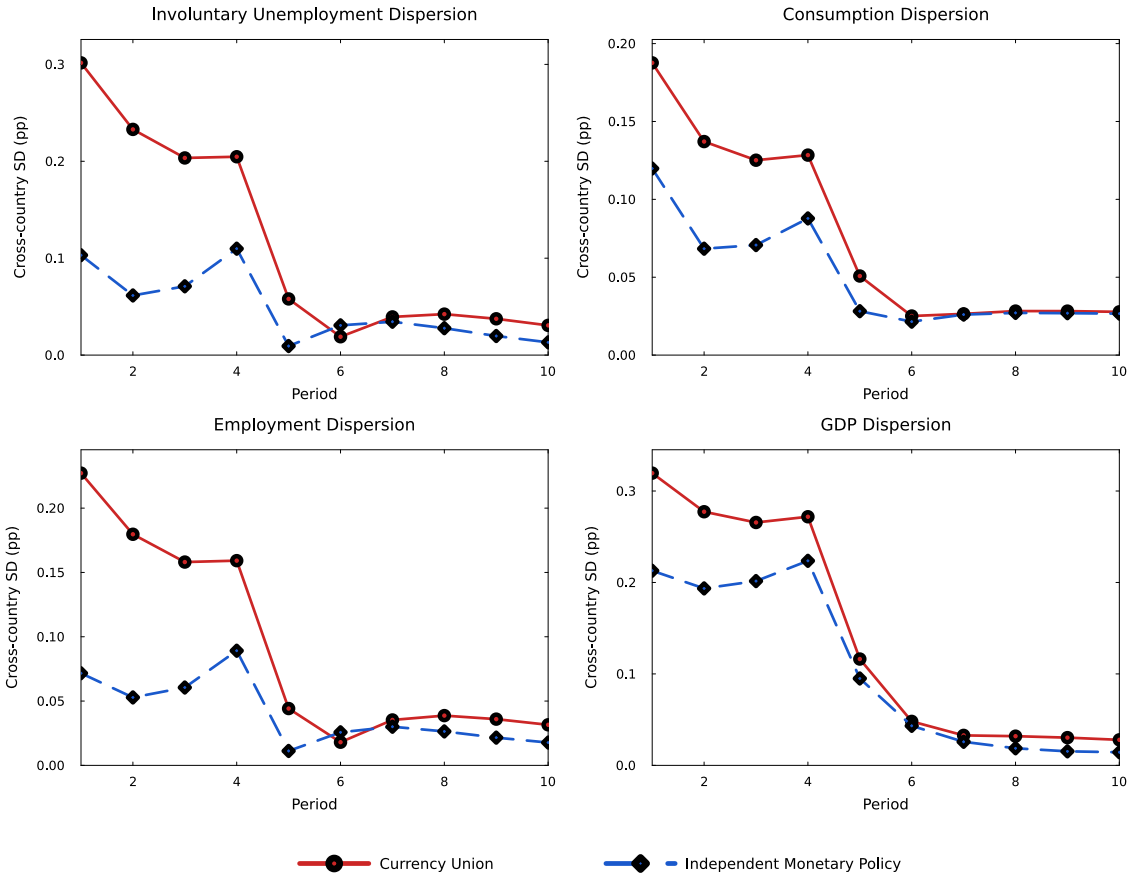
Figure 2: Employment and Inflation under Alternative Monetary Regimes

Notes: The figure reports country-level responses of employment and inflation to the tariff shock under the currency union and independent monetary policy. The top panels report employment responses and the bottom panels report inflation responses. In each panel, the red (blue) line tracks the country with the highest (lowest) response in the first period, illustrating the evolution of cross-country differences over time. The shaded area denotes the first four periods, during which the tariff shock remains fully in place.

Figure 3 summarizes this difference over the full transition. Relative to independent monetary policy, the currency union raises cross-country dispersion in involuntary unemployment by 277%, employment by 164%, consumption by 40%, and GDP by 41%. The largest effects are therefore concentrated in labor-market outcomes, although the common monetary policy also generates economically meaningful additional dispersion in consumption and output.

These results provide the benchmark for the fiscal experiments that follow. The relevant role for a fiscal union is precisely to address the additional cross-country dispersion created when monetary policy can no longer respond to country-specific conditions. I next ask how much of this stabilization gap can be closed through cross-country fiscal transfers.

Figure 3: Currency Union versus Independent Monetary Policy



Notes: The figure reports the weighted cross-country standard deviation under the currency union and under independent monetary policy. Involuntary unemployment is measured in percentage points as the worker-weighted gap between desired labor supply and labor demand. Employment, consumption, and GDP are expressed as percentage deviations from each country's initial steady state. The figure reports the full transition following the tariff shock.

The Benefits of a Fiscal Union

I now introduce the euro-area fiscal authority described in Section 2 and ask how much fiscal capacity is needed to compensate for the loss of country-specific monetary policy. Monetary policy remains common across euro-area members, while the fiscal authority redistributes resources within the union according to the zero-sum transfer rule (13).

The scope for fiscal stabilization is substantial. Relative to independent monetary policy, the currency union without transfers raises cross-country dispersion in involuntary unemployment by 277%, employment by 164%, and consumption by 40%. Figure 4 shows how these gaps evolve as fiscal capacity increases under the two transfer rules. The dispersion measures are normalized by their corresponding values under independent monetary policy, so that a value of one reproduces the independent-monetary-policy benchmark.

Gross transfers in period t are defined as $GT_t \equiv \frac{1}{2}\sum_{h\in EA}|T_{ht}|$. Fiscal capacity is defined as the present discounted value of gross transfers, expressed as a share of steady-state euro-area GDP.

Fiscal transfers substantially reduce the additional dispersion generated by the currency union. The baseline fiscal capacity is selected to approximately eliminate the additional involuntary-unemployment dispersion. This requires gross transfers with a present discounted value of 0.88% of steady-state euro-area GDP, indicated by the vertical dotted line in Figure 4. At this level, transfers eliminate approximately 97% of the additional involuntary-unemployment dispersion and slightly more than all of the additional consumption dispersion, while reducing the additional employment dispersion by around 70%. A fiscal capacity below one percent of euro-area GDP therefore closes almost the entire stabilization gap in involuntary unemployment and consumption created by the loss of country-specific monetary policy.

The effectiveness of fiscal transfers depends on the variable targeted by the fiscal rule.

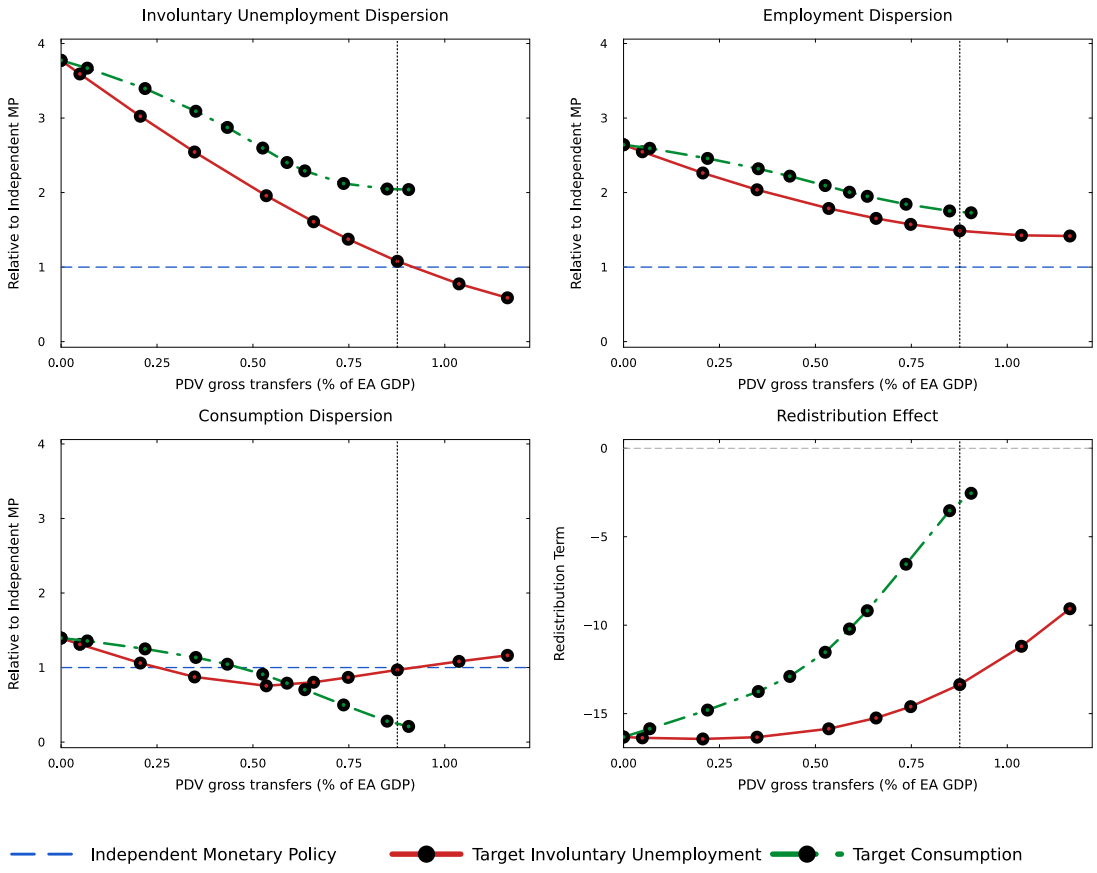
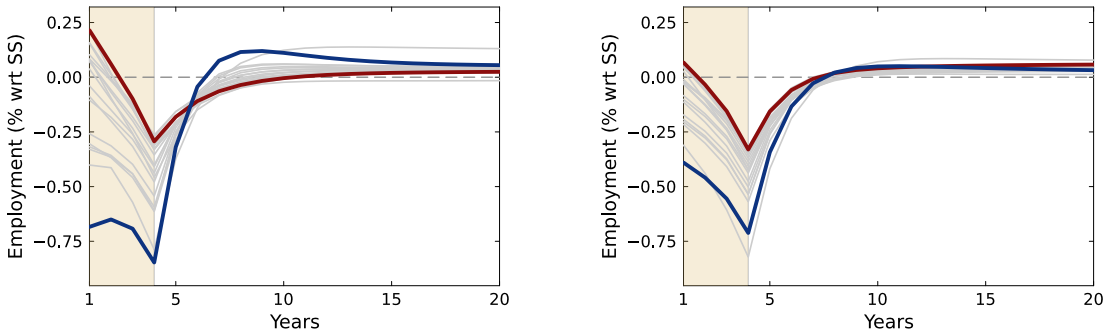


Figure 4: Fiscal Transfers and Macroeconomic Stabilization

Notes: The figure reports the effects of the two fiscal transfer rules as fiscal capacity increases. The horizontal axis reports the present discounted value of gross cross-country transfers as a percentage of steady-state euro-area GDP. Involuntary unemployment, employment, and consumption dispersion are normalized by their corresponding values under independent monetary policy, represented by the horizontal dashed line at one. Dispersion measures are computed as discounted averages of population-weighted cross-country standard deviations over the full transition horizon. The redistribution effect reports the discounted sum of twice the cross-country covariance between initial log consumption and subsequent log consumption changes. The vertical dotted line indicates the fiscal capacity associated with the baseline transfer rule.

Transfers targeting involuntary unemployment are particularly effective at reducing labor-market distortions, substantially lowering both involuntary unemployment and employment dispersion, and closing the gap in terms of consumption dispersion. By contrast, targeting consumption generates larger reductions in consumption dispersion as fiscal capacity increases, but is less effective at stabilizing labor-market outcomes. The bottom-right panel shows that the trade shock itself tends to reduce pre-existing consumption differences across euro-area countries, as initially richer economies are more adversely affected. This is reflected in the negative redistribution effect even in the absence of fiscal transfers. Transfers targeting involuntary unemployment leave this effect largely unchanged: despite closing the additional dispersion in consumption responses, they have little impact on cross-country consumption inequality. By contrast, consumption-targeting transfers substantially weaken the initial redistributive effect as fiscal capacity increases.

To illustrate the effects of fiscal transfers on employment dynamics, Figure 5 compares country-level employment responses in the currency union with and without the baseline transfer rule. Fiscal transfers substantially reduce differences in employment responses across member countries, consistent with the reduction in employment dispersion documented above.



(a) No Transfers

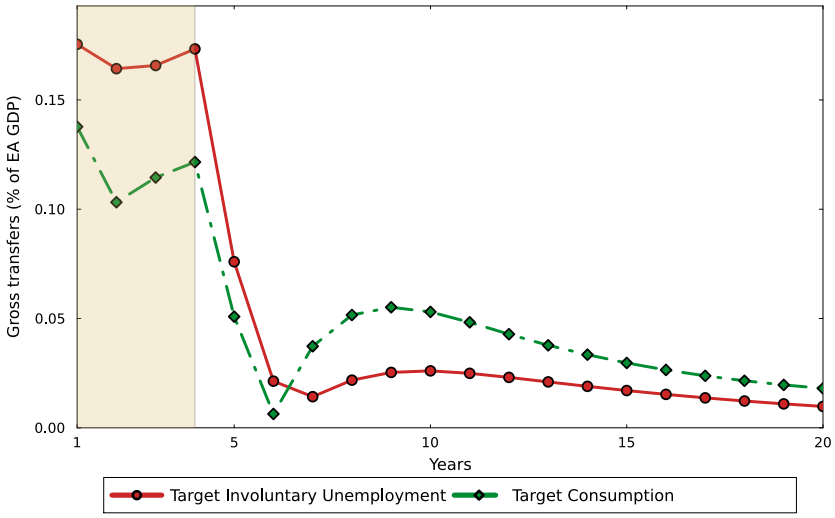
(b) Baseline Transfers

Figure 5: Employment Responses with and without Fiscal Transfers

Notes: The figure reports country-level employment responses relative to steady state. Baseline transfers follow the involuntary-unemployment-targeting rule, with fiscal capacity calibrated to approximately eliminate the additional dispersion in involuntary unemployment generated by the currency union.

Finally, Figure 6 compares the time profile of the two rules at approximately the same fiscal capacity. Under both rules, transfers are concentrated in the periods in which the tariff shock is strongest and decline as the shock dissipates. Similar present values therefore mask differences in the timing and cross-country allocation of transfers implied by the two stabilization objectives. While the present discounted value of the associated transfers is approximately 0.9%, at each point in time transfers are not higher than 0.2% of euro-area GDP, showing the low level of fiscal capacity needed to offset the absence of independent monetary policy.

Figure 6: Gross Fiscal Transfers over Time



Notes: The figure reports gross fiscal transfers period by period for the rule targeting involuntary unemployment and the rule targeting consumption, using cases with approximately the same present discounted value of gross transfers. Gross transfers in each period are expressed as a percentage of contemporaneous euro-area GDP. The shaded area denotes the first four periods, during which the tariff shock remains fully in place.

National and Cross-Country Fiscal Policy

The baseline analysis abstracts from countercyclical fiscal policy at the national level. National governments, however, may also respond to asymmetric shocks by borrowing during downturns and repaying debt subsequently. To compare this intertemporal stabilization margin with cross-country insurance, national fiscal policy follows

$$T_{it}^{N} = \mu_N GDP_{it} g_{it} - \delta_B B_{i,t-1} \tag{16}$$

where g_{it} is the same measure of involuntary unemployment used by the centralized fiscal rule, μ_N governs the fiscal response, and δ_B governs debt repayment. Public debt evolves

Table 4: National versus Cross-Country Fiscal Policy

	PDV Fiscal Support (% EA GDP)	IU Component Offset	Employment Component Offset	Consumption Component Offset
National Fiscal Policy				
Low	0.69	24.89%	14.18%	48.49%
Middle	0.83	32.25%	18.85%	60.72%
High	1.13	41.25%	23.84%	72.72%
Cross-Country Fiscal Transfers				
Low	0.53	65.46%	52.07%	161.97%
Middle	0.88	97.17%	70.36%	108.01%
High	1.04	108.12%	74.04%	79.16%
Both Fiscal Policies				
Low	0.74	55.88%	42.86%	156.10%
Middle	0.90	72.32%	56.03%	171.79%
High	1.18	94.94%	70.59%	130.18%

Note: PDV fiscal support is expressed as a percentage of steady-state euro-area GDP. The stabilization columns report the percentage of the additional cross-country dispersion generated by the currency union, relative to independent monetary policy without fiscal policy, that is eliminated by each fiscal intervention. Thus, 0% corresponds to the currency union without fiscal policy and 100% to fully eliminating the additional currency-union component. National fiscal-policy cases are selected to match the full-horizon PDV fiscal support of the Low, Middle, and High cross-country transfer cases as closely as possible. For the combined-policy cases, PDV fiscal support is the sum of national fiscal support and gross cross-country transfers.

according to $B_{it} = (1+i_{it})(B_{i,t-1}+T_{it}^{N})$, starting from zero debt and satisfying a terminal solvency condition. The repayment parameter is set to $\delta_B = 0.1$, following Colciago et al. (2008); Engler & Voigts (2013).

The two policies provide different forms of insurance. National fiscal policy shifts resources across time within a country, so fiscal support in the downturn is accompanied by future repayment. Cross-country transfers instead redistribute resources across members of the union within each period and therefore direct resources toward countries facing larger adjustment needs without creating a repayment obligation for the recipient.

Table 4 compares the two margins. The national-policy cases are chosen to match the present discounted value of fiscal support under the Low, Middle, and High cross-country transfer cases as closely as possible. The final panel allows both instruments to operate simultaneously and reports three intensities of the cross-country transfer rule.

Cross-country transfers provide substantially more stabilization than national fiscal policy at comparable levels of fiscal support. Around the baseline fiscal capacity, cross-country transfers eliminate 97% of the additional involuntary-unemployment dispersion and 70% of the additional employment dispersion, compared with 32% and 19%, respectively, under national fiscal policy. The difference is also large for consumption. The ability to redistribute resources across countries is therefore quantitatively more effective at addressing asymmetric adjustment than borrowing and repayment within each country.

The combined-policy experiments reinforce this result. With total fiscal support of approximately 0.9% of euro-area GDP, activating both instruments offsets 72% of the additional involuntary-unemployment dispersion and 56% of the additional employment dispersion, compared with 97% and 70% under cross-country transfers alone at essentially the same fiscal capacity. A larger combined intervention eventually approaches the labor-market stabilization of the baseline cross-country rule, but requires more fiscal support. National fiscal policy therefore complements cross-country transfers primarily through additional consumption stabilization rather than by improving the efficiency of labor-market stabilization. Figures 14 and 15 in Appendix H report the associated evolution of national public debt and employment, respectively. Allowing for cross-country transfers also reduces national debt accumulation during the tariff shock, as part of the required stabilization is provided through within-period redistribution across member countries rather than intertemporal borrowing by national governments.

7 Validation

So far, the analysis has focused on model-generated responses to the tariff shock. I now assess how the cross-country predictions of the model compare with observed changes in economic activity. Following Davis & Weinstein (2001); Costinot & Donaldson (2012);

Adao et al. (2019); Ulate et al. (2025), I evaluate the fit of the model by estimating

$$\widehat{Y}_i^{data} = \alpha_Y + \rho_Y \widehat{Y}_i^{model} + \gamma X_i + \nu_i^Y \tag{17}$$

where $\widehat{Y}_i^{data}$ denotes the observed change in outcome Y in country i, $\widehat{Y}_i^{model}$ denotes the corresponding model-implied change, and X_i contains additional controls. If the model correctly captures the magnitude of the cross-country responses, the pass-through coefficient from model-implied to observed changes, ρ_Y, should equal one.

I implement equation (17) for real GDP per capita and employment per capita. Observed outcomes correspond to percentage changes between 2024 and 2025 from Eurostat, while the model counterparts correspond to the first-period response to the tariff shock relative to the initial steady state. The regressions are weighted by initial steady-state population. The sample contains 16 continental euro-area economies, excluding Cyprus, Ireland, and Malta because their measured outcomes are particularly volatile over this period.

Because observed changes over 2024–25 may also reflect shocks outside the model, I report results both without additional controls and controlling for initial Chinese import penetration. The latter is measured as the share of initial purchases sourced from China and captures cross-country differences in exposure to Chinese import competition that are not part of the model experiment.

Table 5 reports the estimated coefficient ρ_Y, its standard error, the p-value for the null hypothesis $\rho_Y = 1$, and the partial R^2. For GDP per capita, the coefficient is close to one in both specifications. It is statistically different from zero, while the hypothesis that it equals one cannot be rejected. The model explains between 34% and 38% of the residual cross-country variation in GDP growth, and both the coefficient and the fit are little affected by controlling for Chinese import penetration.

The employment estimates are less precise. The coefficient is positive in both specifi-

Table 5: Model vs. Data

	(1) GDP per Capita	(2) Employment per Capita
Panel A: No controls		
Model	1.44**	0.86
	(0.51)	(1.04)
P-val Coeff $= 1$	0.400	0.895
Partial R^2	0.378	0.071
Panel B: Chinese import penetration control		
Model	1.40**	0.62
	(0.59)	(1.13)
P-val Coeff $= 1$	0.515	0.746
Partial R^2	0.343	0.040
# Observations	16	16

Notes: This table presents regression results comparing observed changes in economic activity with their model-implied counterparts across continental euro-area economies. Column (1) uses the percentage change in real GDP per capita between 2024 and 2025, while Column (2) uses the percentage change in employment per capita. Panel A reports the specification without controls. Panel B controls for initial Chinese import penetration, defined as the share of total initial purchases sourced from China. Regression specifications are weighted by initial steady-state population. Standard errors are robust to heteroskedasticity. The row "P-val Coeff $= 1$" reports the p-value for the null hypothesis that the coefficient on the model-implied outcome equals one. The partial R^2 measures the share of residual variation explained by the model prediction after partialling out the controls included in each specification. Cyprus, Ireland, and Malta are excluded from the sample. Asterisks denote statistical significance relative to zero: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

cations and the hypothesis that it equals one cannot be rejected, but the standard errors are large and neither estimate is statistically different from zero. The partial R^2 ranges from 4% to 7%. Overall, the observed cross-country variation in GDP lines up closely with the model-implied variation, while the employment results are consistent with the model but considerably less informative.

8 Alternative Specifications

This section examines the sensitivity of the stabilization results to alternative assumptions about monetary policy, labor supply, trade substitution, shock persistence, and retaliation. The alternatives include a monetary policy rule that responds only to inflation, a rule without interest-rate inertia ($\phi_{sm} = 0$), a higher Frisch elasticity ($\varphi = 0.75$), a lower trade elasticity ($\sigma_s = 2$), a permanent tariff shock, and retaliation by the euro area. The lower trade elasticity is motivated by recent estimates pointing to substantially lower short-run elasticities than those commonly used in quantitative trade models (Boehm et al., 2023). Across specifications, the fiscal rule and its policy intensity are kept at their baseline values. Realized gross transfers therefore vary endogenously with the economic environment.

Table 6 reports the results for involuntary-unemployment dispersion. The main stabilization result is robust across specifications. In the baseline, fiscal transfers eliminate 97% of the additional dispersion generated by the currency union. Removing interest-rate inertia leaves this result essentially unchanged, with transfers eliminating 94% of the currency-union component. The result is similarly strong under a higher Frisch elasticity, a lower trade elasticity, and retaliation, where transfers fully or more than fully offset the additional dispersion associated with the loss of country-specific monetary policy.

The alternative monetary-policy specifications illustrate that the result does not hinge on the degree of interest-rate smoothing or on the direct response of monetary policy to labor-market conditions. Eliminating interest-rate inertia has almost no effect on either the additional dispersion generated by the currency union or the fraction eliminated by fiscal transfers. Under the inflation-only rule, by contrast, involuntary-unemployment dispersion is already much larger under independent monetary policy. Monetary autonomy is less effective at stabilizing cross-country labor-market conditions when policy does not respond

Table 6: Robustness: Involuntary Unemployment Dispersion

Scenario	Ind. MP	Currency Union	Fiscal Transfer Effect	% Reduction	Gross Transfers
Baseline	1.00	3.77	1.08	97.2%	0.88%
Alt MP: only inflation	2.98	3.95	1.16	287.5%	0.91%
Alt MP: no inertia	0.92	3.78	1.09	94.2%	0.88%
Higher Frisch Elasticity	1.13	4.08	1.03	103.4%	0.84%
Lower Trade Elasticity	0.89	2.65	0.69	111.9%	0.55%
Permanent Shock	0.73	3.80	1.35	79.8%	1.05%
Retaliation	1.34	3.46	1.04	114.0%	0.82%

Notes: Ind. MP, Currency Union, and Fiscal Transfer Effect report involuntary-unemployment dispersion normalized by its value under independent monetary policy in the baseline specification. Fiscal Transfer Effect is the dispersion remaining after fiscal transfers. % Reduction reports the share of the additional dispersion generated by the currency union relative to independent monetary policy that is eliminated by fiscal transfers. Values above 100% indicate that transfers more than fully offset this additional dispersion. Gross Transfers are the present discounted value of gross transfers as a percentage of steady-state euro-area GDP. Higher Frisch Elasticity sets $\varphi = 0.75$, Lower Trade Elasticity sets $\sigma_s = 2$, and Alt MP: no inertia sets $\phi_{sm} = 0$.

directly to them, leaving a smaller additional currency-union component to offset.[24] Fiscal transfers nevertheless reduce dispersion well below the independent-monetary-policy allocation, which explains the large percentage reduction in Table 6.

The results are also robust to alternative assumptions about labor supply and trade substitution. A higher Frisch elasticity leaves the required fiscal capacity and the stabilization result close to the baseline. Lowering the trade elasticity reduces the dispersion generated by the tariff shock and substantially lowers the fiscal capacity required for stabilization: gross transfers fall from 0.88% to 0.55% of euro-area GDP, while still more than offsetting the additional involuntary-unemployment dispersion generated by the currency union.

The permanent tariff shock is the most demanding specification for labor-market stabilization. Fiscal transfers eliminate approximately 80% of the additional involuntary-unemployment dispersion, compared with 97% in the baseline, while the present discounted value of gross transfers rises to 1.05% of euro-area GDP. Greater shock per-

[24] If anything, greater monetary-policy inertia should reduce the fiscal capacity needed to substitute for monetary autonomy. More inertial country-specific monetary policy responds less aggressively to local conditions, narrowing the stabilization gap between independent monetary policy and the currency union.

Table 7: Robustness: Consumption Dispersion

Scenario	Ind. MP	Currency Union	Fiscal Transfer Effect	% Reduction	Gross Transfers
Baseline	1.00	1.40	0.97	108.0%	0.88%
Alt MP: only inflation	1.41	1.48	1.00	652.0%	0.91%
Alt MP: no inertia	1.00	1.40	0.98	105.1%	0.88%
Higher Frisch Elasticity	0.99	1.36	0.87	132.5%	0.84%
Lower Trade Elasticity	0.94	1.19	0.78	164.4%	0.55%
Permanent Shock	4.19	4.57	3.71	223.0%	1.05%
Retaliation	0.95	1.28	0.83	136.0%	0.82%

Notes: Ind. MP, Currency Union, and Fiscal Transfer Effect report consumption dispersion normalized by its value under independent monetary policy in the baseline specification. Fiscal Transfer Effect is the dispersion remaining after fiscal transfers. % Reduction reports the share of the additional dispersion generated by the currency union relative to independent monetary policy that is eliminated by fiscal transfers. Values above 100% indicate that transfers more than fully offset this additional dispersion. Gross Transfers are the present discounted value of gross transfers as a percentage of steady-state euro-area GDP.

sistence therefore increases the fiscal capacity required to substitute for country-specific monetary policy, but does not overturn the main stabilization result.

Table 7 reports the corresponding results for consumption. Fiscal transfers fully offset the additional consumption dispersion generated by the currency union in every alternative specification. This remains true for the permanent tariff shock, despite the much larger absolute consumption dispersion generated under both monetary regimes. As with involuntary unemployment, the large percentage reduction under the inflation-only rule reflects the small additional dispersion attributable to the currency union in that specification.

Finally, retaliation by the euro area improves the adjustment to the U.S. tariff shock even before fiscal transfers are introduced. As shown in Table 8, retaliation reduces cross-country dispersion in involuntary unemployment and employment by approximately 8%, and consumption dispersion by approximately 9%. Retaliation therefore dampens the asymmetric effects of the original trade shock across euro-area members.

Retaliation and fiscal transfers are complementary in the quantitative model. Relative to fiscal transfers alone, combining retaliation with transfers further reduces employment dispersion by about 7% and consumption dispersion by about 15%, while also slightly

Table 8: Retaliation and Fiscal Transfers

	CU without Transfers	CU with Transfers	CU with Retaliation	CU with Retaliation + Transfers
Involuntary unemployment dispersion	1.00	0.29	0.92	0.28
Employment dispersion	1.00	0.56	0.92	0.52
Consumption dispersion	1.00	0.69	0.91	0.59
Gross transfers (% EA GDP)	0.00	0.88	0.00	0.82

Note: Involuntary unemployment dispersion, employment dispersion, and consumption dispersion are normalized to one under the currency union without retaliation or fiscal transfers. Country-level involuntary unemployment is the contemporaneous-worker-share-weighted average across sectors of labor supply minus labor demand. Gross transfers are the present discounted value of gross cross-country transfers as a percentage of steady-state euro-area GDP.

reducing involuntary-unemployment dispersion. These additional stabilization gains are achieved with a lower present discounted value of gross transfers, which falls from 0.88% to 0.82% of euro-area GDP. Retaliation improves the underlying adjustment to the trade shock, while cross-country transfers insure member countries against the remaining asymmetric effects. The combination therefore delivers stronger stabilization of both labor markets and consumption than either policy alone.

9 Concluding Remarks

Trade shocks can generate sharply different adjustment needs across members of a currency union, while monetary policy can respond only to conditions at the union level. This paper studies whether cross-country fiscal transfers can provide the stabilization margin that countries lose when they give up independent monetary policy. I address this question using a dynamic quantitative trade model with endogenous monetary policy, heterogeneous marginal propensities to consume, sectoral labor reallocation, and bilateral production and trade linkages, disciplined by the 2025 U.S. tariff shock to the euro area.

The central quantitative result is that a relatively small fiscal capacity can offset most of the stabilization costs created by the loss of country-specific monetary policy. Relative to

an economy with independent monetary policy, the currency union substantially amplifies cross-country dispersion in involuntary unemployment, employment, and consumption. Gross cross-country transfers with a present discounted value of 0.88% of steady-state euro-area GDP eliminate approximately 97% of the additional involuntary-unemployment dispersion and slightly more than all of the additional consumption dispersion, while reducing the additional employment dispersion by around 70%. A fiscal capacity below one percent of euro-area GDP can therefore close most of the stabilization gap generated by a common monetary policy without undoing the underlying trade shock itself. Cross-country transfers are also substantially more effective than national fiscal policy at comparable levels of fiscal support, reflecting their ability to redistribute resources across countries facing different adjustment needs rather than only across time within individual countries.

The effectiveness of fiscal transfers depends on both household consumption responses and the geography of expenditure. Countries with higher marginal propensities to consume generate larger responses to transfers, while domestic and cross-country trade linkages determine where the associated increase in expenditure translates into labor demand. These mechanisms allow the quantitative model to generate fiscal multipliers in line with empirical estimates and determine how effectively transfers can target countries facing larger adjustment needs. The cross-country GDP responses generated by the model also line up closely with observed changes between 2024 and 2025, while the corresponding employment relationship is positive but estimated less precisely.

Trade policy provides an additional stabilization margin. Euro-area retaliation reduces cross-country dispersion in involuntary unemployment, employment, and consumption even in the absence of fiscal transfers. Combining retaliation with cross-country transfers further improves employment and consumption stabilization and reduces the fiscal capacity required relative to transfers alone. The two policies therefore operate through

distinct but complementary channels: retaliation changes the incidence of the trade shock, while cross-country transfers insure member countries against the remaining asymmetric adjustment.

The main stabilization result is robust to alternative assumptions about monetary policy, labor supply, trade elasticities, and the persistence of the tariff shock. It also survives when monetary policy does not respond directly to labor-market conditions and when interest-rate inertia is removed. A permanent tariff shock is the most demanding case, but the baseline fiscal rule still eliminates around 80% of the additional involuntary-unemployment dispersion generated by the currency union. The effectiveness of fiscal integration therefore does not depend on a narrow set of parameter values or on the particular monetary-policy specification used in the benchmark.

Although the quantitative exercise focuses on the euro area, the underlying mechanism is more general. Whenever regions share a common monetary policy but differ in their exposure to economic shocks, cross-region fiscal transfers can provide a stabilization margin that monetary policy cannot deliver locally. One natural application is the response of U.S. states or local labor markets to trade shocks, where monetary policy is common across regions but fiscal resources can be redistributed geographically. [25]

The quantitative framework developed in this paper also provides a foundation for studying broader questions about the role of currency unions. One promising direction is to examine how trade-policy uncertainty interacts with monetary arrangements. Uncertainty about the magnitude and persistence of trade shocks, as well as future policy responses, may affect economic activity and inflation (Kalemli-Özcan et al., 2026; Caldara et al., 2020; den Besten et al., 2026). Another direction is to quantify the benefits of monetary integration through reduced exchange-rate volatility and currency risk, greater

[25] O'Connor (2025) studies this question at the commuting-zone level with exogenous deficits and without endogenous consumption-saving decisions.

financial integration (Kalemli-Ozcan et al., 2010), lower borrowing costs, particularly for smaller economies (Hassan, 2013), and more stable and better-anchored long-term interest rates (Ehrmann et al., 2011). Together, these avenues point toward a broader research agenda on how monetary integration shapes economic adjustment to global shocks and the trade-offs associated with currency-union membership.

References

Acharya, S., Challe, E., & Dogra, K. (2023). Optimal monetary policy according to hank. *American Economic Review*, 113(7), 1741–1782.

Adao, R., Arkolakis, C., & Esposito, F. (2019). *General equilibrium effects in space: Theory and measurement*. Technical report, National Bureau of Economic Research.

Aggarwal, R., Auclert, A., Rognlie, M., & Straub, L. (2023). Excess savings and twin deficits: The transmission of fiscal stimulus in open economies. *NBER Macroeconomics Annual*, 37(1), 325–412.

Aguilar, P., Darracq Pariès, M., Dieppe, A., Domínguez-Díaz, R., Eugenelo, A., Gallegos, J.-E., & Quintana, J. (2026). *Tariffs, Production Networks, and Spillovers: The Case of a US–China Trade War*. ECB Working Paper Series 3254, European Central Bank.

Albacete, N., Fessler, P., & Pekanov, A. (2025). The role of mpc heterogeneity for fiscal policy in the euro area. *Journal of Macroeconomics*, (pp. 103719).

Alesina, A. & Barro, R. J. (2002). Currency unions. *The Quarterly Journal of Economics*, 117(2), 409–436.

Alessandria, G. A., Khan, S. Y., Khederlarian, A., Ruhl, K. J., & Steinberg, J. B. (2025). *Recovering credible trade elasticities from incredible trade reforms*. Technical report, National Bureau of Economic Research.

Allard, C., Brooks, M. P. K., Bluedorn, M. J. C., Bornhorst, F., Ohnsorge, M. F. L., & Puh,

M. K. M. C. (2013). *Toward a fiscal union for the euro area*. International Monetary Fund.

Ambrosino, L., Chan, J., & Tenreyro, S. (2026). Trade fragmentation, inflationary pressures and monetary policy. *Journal of International Economics*, (pp. 104219).

Artuç, E., Chaudhuri, S., & McLaren, J. (2010). Trade shocks and labor adjustment: A structural empirical approach. *American economic review*, 100(3), 1008–1045.

Auclert, A., Bardóczy, B., Rognlie, M., & Straub, L. (2021a). Using the sequence-space jacobian to solve and estimate heterogeneous-agent models. *Econometrica*, 89(5), 2375–2408.

Auclert, A., Rognlie, M., Souchier, M., & Straub, L. (2021b). *Exchange rates and monetary policy with heterogeneous agents: Sizing up the real income channel*. Technical report, National Bureau of Economic Research.

Auclert, A., Rognlie, M., & Straub, L. (2023). Determinacy and existence in the sequence space. *Manuscript*.

Auclert, A., Rognlie, M., & Straub, L. (2025). *The macroeconomics of tariff shocks*. Technical report, National Bureau of Economic Research Cambridge, MA.

Bassanini, A. & Marianna, P. (2009). *Looking inside the perpetual-motion machine: Job and worker flows in OECD countries*. Technical report, IZA Discussion Papers.

Becko, J. S., Flynn, J. P., & Patterson, C. (2024). *Fiscal policy in a networked economy*. Technical report, Working Paper 29619, National Bureau of Economic Research.

Beetsma, R., Cimadomo, J., & Van Spronsen, J. (2024). One scheme fits all: a central fiscal capacity for the emu targeting eurozone, national and regional shocks. *European Economic Review*, 165, 104721.

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

Bergin, P. R. & Corsetti, G. (2023). The macroeconomic stabilization of tariff shocks:

What is the optimal monetary response? *Journal of International Economics*, 143, 103758.

Berriel, R., Gonzalez-Aguado, E., Kehoe, P. J., & Pastorino, E. (2024). Is a fiscal union optimal for a monetary union? *Journal of Monetary Economics*, 141, 157–177.

Bianchi, J. & Coulibaly, L. (2025). *The optimal monetary policy response to tariffs*. Technical report, National Bureau of Economic Research.

Bilbiie, F., Monacelli, T., & Perotti, R. (2021). Fiscal policy in europe: controversies over rules, mutual insurance, and centralization. *Journal of Economic Perspectives*, 35(2), 77–100.

Bluedorn, J., Bluedorn, M. J. C., Caselli, F., Hansen, M. N.-J. H., Hansen, N.-J., Shibata, M. I., & Tavares, M. M. (2022). *The distributional impacts of worker reallocation: Evidence from europe*. International Monetary Fund.

Boehm, C. E., Levchenko, A. A., & Pandalai-Nayar, N. (2023). The long and short (run) of trade elasticities. *American Economic Review*, 113(4), 861–905.

Bracco, J., Galeano, L., Juarros, P., Riera-Crichton, D., & Vuletin, G. (2026). Social transfer multipliers in developed and emerging countries: The role of hand-to-mouth consumers. *The World Bank Economic Review*, (pp. lhag024).

Bussiere, M. (2013). Exchange rate pass-through to trade prices: The role of nonlinearities and asymmetries. *Oxford Bulletin of Economics and Statistics*, 75(5), 731–758.

Caldara, D., Iacoviello, M., Molligo, P., Prestipino, A., & Raffo, A. (2020). The economic effects of trade policy uncertainty. *Journal of Monetary Economics*, 109, 38–59.

Caliendo, L., Dvorkin, M., & Parro, F. (2019). Trade and labor market dynamics: General equilibrium analysis of the china trade shock. *Econometrica*, 87(3), 741–835.

Caliendo, L., Kortum, S. S., & Parro, F. (2025). *Tariffs and trade deficits*. Technical report, National Bureau of Economic Research.

Chetty, R., Guren, A., Manoli, D., & Weber, A. (2011). Are micro and macro labor supply

elasticities consistent? a review of evidence on the intensive and extensive margins. *American Economic Review*, 101(3), 471–475.

Christoffel, K. P., Coenen, G., & Warne, A. (2008). The new area-wide model of the euro area: a micro-founded open-economy model for forecasting and policy analysis.

Colciago, A. (2011). Rule-of-thumb consumers meet sticky wages. *Journal of money, credit and banking*, 43(2-3), 325–353.

Colciago, A., Ropele, T., Muscatelli, V. A., & Tirelli, P. (2008). The role of fiscal policy in a monetary union: are national automatic stabilizers effective? *Review of International Economics*, 16(3), 591–610.

Costinot, A. & Donaldson, D. (2012). Ricardo's theory of comparative advantage: old idea, new evidence. *American Economic Review*, 102(3), 453–458.

Costinot, A. & Werning, I. (2025). *How tariffs affect trade deficits*. Technical report, National Bureau of Economic Research.

Davis, D. R. & Weinstein, D. E. (2001). An account of global factor trade. *American Economic Review*, 91(5), 1423–1453.

den Besten, T., Barnichon, R., Känzig, D. R., & Singh, A. (2026). *The macroeconomic effects of tariffs: Insights from 180 years of us trade policy*. Technical report, National Bureau of Economic Research.

Dix-Carneiro, R., Pessoa, J. P., Reyes-Heroles, R., & Traiberman, S. (2023). Globalization, trade imbalances, and labor market adjustment. *The Quarterly Journal of Economics*, 138(2), 1109–1171.

Dmitriev, M. & Hoddenbagh, J. (2019). Optimal fiscal transfers in a monetary union. *Journal of International Economics*, 117, 91–108.

Dolls, M., Fuest, C., & Peichl, A. (2012). Automatic stabilizers and economic crisis: Us vs. europe. *Journal of Public Economics*, 96(3-4), 279–294.

Drescher, K., Fessler, P., & Lindner, P. (2020). Helicopter money in europe: New evidence

on the marginal propensity to consume across european households. *Economics Letters*, 195, 109416.

Ehrmann, M., Fratzscher, M., Gürkaynak, R. S., & Swanson, E. T. (2011). Convergence and anchoring of yield curves in the Euro area. *The Review of Economics and Statistics*, 93(1), 350–364.

Engler, P. & Voigts, S. (2013). *A transfer mechanism for a monetary union*. Technical report, SFB 649 Discussion Paper.

Erceg, C. J., Henderson, D. W., & Levin, A. T. (2000). Optimal monetary policy with staggered wage and price contracts. *Journal of monetary Economics*, 46(2), 281–313.

Erceg, C. J. & Lindé, J. (2011). Asymmetric shocks in a currency union with monetary and fiscal handcuffs. In *NBER International Seminar on Macroeconomics*, volume 7 (pp. 95–136).: University of Chicago Press Chicago, IL.

Erceg, C. J. & Lindé, J. (2012). Fiscal consolidation in an open economy. *American Economic Review*, 102(3), 186–191.

Evenett, S. & Muendler, M. (2025). Tariffs cannot fund the government: Evidence from tariff laffer curves. *Globalization and prosperity lab note, University of California, San Diego*.

Evers, M. P. (2012). Federal fiscal transfer rules in monetary unions. *European Economic Review*, 56(3), 507–525.

Evers, M. P. (2015). Fiscal federalism and monetary unions: A quantitative assessment. *Journal of International Economics*, 97(1), 59–75.

Farhi, E. & Werning, I. (2017). Fiscal unions. *American Economic Review*, 107(12), 3788–3834.

Ferrero, A. (2009). Fiscal and monetary rules for a currency union. *Journal of international Economics*, 77(1), 1–10.

Flood, S., King, M., Rodgers, R., Ruggles, S., Warren, J. R., Backman, D., Breton, E.,

Cooper, G., Rivera Drew, J. A., Richards, S., & Van Riper, D. (2025). Integrated public use microdata series, current population survey: Version 13.0 [dataset].

Fornaro, L. & Steffen, C. G. (2024). *Fragmented monetary unions*. Universitat Pompeu Fabra, Department of Economics and Business.

Forni, L., Gerali, A., & Pisani, M. (2010). The macroeconomics of fiscal consolidations in euro area countries. *Journal of Economic Dynamics and Control*, 34(9), 1791–1812.

Frankel, J. A. & Rose, A. K. (1998). The endogenity of the optimum currency area criteria. *The economic journal*, 108(449), 1009–1025.

Galí, J. (2011). The return of the wage phillips curve. *Journal of the European Economic Association*, 9(3), 436–461.

Gali, J. & Monacelli, T. (2005). Monetary policy and exchange rate volatility in a small open economy. *The Review of Economic Studies*, 72(3), 707–734.

Gancia, G., Ponzetto, G. A., & Ventura, J. (2020). A theory of economic unions. *Journal of Monetary Economics*, 109, 107–127.

Gelman, M. (2021). What drives heterogeneity in the marginal propensity to consume? temporary shocks vs persistent characteristics. *Journal of Monetary Economics*, 117, 521–542.

Gerdesmeier, D. & Roffia, B. (2003). *Empirical estimates of reaction functions for the euro area*. Technical report, ECB Working Paper.

Gomes, S., Jacquinot, P., & Lozej, M. (2025). A single monetary policy for heterogeneous labour markets: the case of the euro area. *Macroeconomic Dynamics*, 29, e111.

Gomes, S., Jacquinot, P., & Pisani, M. (2012). The eagle. a model for policy analysis of macroeconomic interdependence in the euro area. *Economic Modelling*, 29(5), 1686–1714.

Goswami, S. (2020). Employment consequences of us trade wars. *University of California Irvine Working Paper*.

Guerrieri, V., Lorenzoni, G., & Werning, I. (2025). Global price shocks and international monetary coordination. *NBER Working Paper*, (w33840).

Gurkova, E., Helpman, E., & Itskhoki, O. (2023). Trade liberalization, wage rigidity, and labor market dynamics with heterogeneous firms. *Unpublished Manuscript*.

Hassan, T. A. (2013). Country size, currency unions, and international asset returns. *The Journal of Finance*, 68(6), 2269–2308.

Hassan, T. A., Mertens, T. M., Wang, J., & Zhang, T. (2025). *Trade war and the dollar anchor*. Technical report, National Bureau of Economic Research.

Hazell, J., Herreno, J., Nakamura, E., & Steinsson, J. (2022). The slope of the phillips curve: evidence from us states. *The Quarterly Journal of Economics*, 137(3), 1299–1344.

He, C., Mau, K., & Xu, M. (2021). Trade shocks and firms hiring decisions: Evidence from vacancy postings of chinese firms in the trade war. *Labour Economics*, 71, 102021.

Head, K. & Mayer, T. (2014). Gravity equations: Workhorse, toolkit, and cookbook. In *Handbook of international economics*, volume 4 (pp. 131–195). Elsevier.

Hofmann, B. & Bogdanova, B. (2012). Taylor rules and monetary policy: a global 'great deviation'? *BIS quarterly review September*.

Hong, S. (2023). Mpcs in an emerging economy: Evidence from peru. *Journal of International Economics*, 140, 103712.

Ignatenko, A., Lashkaripour, A., Macedoni, L., & Simonovska, I. (2025). *Making America Great Again? The Economic Impacts of Liberation Day Tariffs*. Technical report, National Bureau of Economic Research.

Jacoubian, J. I. (2026). The welfare implications of the china shock across us states and skill groups. *Available at SSRN 6148986*.

Jappelli, T. & Pistaferri, L. (2010). The consumption response to income changes. *Annu. Rev. Econ.*, 2(1), 479–506.

Jappelli, T. & Pistaferri, L. (2014). Fiscal policy and mpc heterogeneity. *American Economic Journal: Macroeconomics*, 6(4), 107–136.

Kalemli-Ozcan, S., Papaioannou, E., & Peydró, J.-L. (2010). What lies beneath the Euro's effect on financial integration? currency risk, legal harmonization, or trade? *Journal of International Economics*, 81(1), 75–88.

Kalemli-Özcan, Ş., Soylu, C., & Yıldırım, M. A. (2026). Global trade, tariff uncertainty, and the us dollar. *AEA Papers and Proceedings*, 116, 47–52.

Kalemli-Ozcan, S., Soylu, C., & Yıldırım, M. A. (2026). *Global Trade, Tariff Uncertainty and the US Dollar*. Technical report, National Bureau of Economic Research, Inc.

Kaplan, G. & Violante, G. L. (2014). A model of the consumption response to fiscal stimulus payments. *Econometrica*, 82(4), 1199–1239.

Kaplan, G. & Violante, G. L. (2018). Microeconomic heterogeneity and macroeconomic shocks. *Journal of Economic Perspectives*, 32(3), 167–194.

Kaplan, G. & Violante, G. L. (2022). The marginal propensity to consume in heterogeneous agent models. *Annual Review of Economics*, 14(1), 747–775.

Kaufmann, C. (2019). Optimal fiscal substitutes for the exchange rate in monetary unions. *Journal of Economic Dynamics and Control*, 103, 43–62.

Kenen, P. B. (1969). The theory of optimum currency areas: an eclectic view. In *Essays in international economics* (pp. 163–182). Princeton University Press.

Kim, B., De la Barrera, M., & Fukui, M. (2026). Currency pegs, trade imbalances and unemployment: A reevaluation of the china shock.

Kleinman, B., Liu, E., & Redding, S. J. (2023). Dynamic spatial general equilibrium. *Econometrica*, 91(2), 385–424.

Lashkaripour, A. (2021). The cost of a global tariff war: A sufficient statistics approach. *Journal of International Economics*, 131, 103419.

Liao, S., Kim, I. S., Miyano, S., & Zhang, H. (2020). concordance: Product concordance.

R package version, 2(0).

Liu, Z. & Pappa, E. (2008). Gains from international monetary policy coordination: Does it pay to be different? *Journal of Economic Dynamics and Control*, 32(7), 2085–2117.

McKinnon, R. I. (1963). Optimum currency areas. *The American economic review*, 53(4), 717–725.

Mundell, R. A. (1961). A theory of optimum currency areas. *The American economic review*, 51(4), 657–665.

Mundell, R. A. (2013). Uncommon arguments for common currencies. In *The economics of common currencies* (pp. 114–132). Routledge.

Muscatelli, A., Ropele, T., & Tirelli, P. (2007). Macroeconomic adjustment in the euro area: the role of fiscal policy. In *Macroeconomic Policy in the European Monetary Union* (pp. 59–84). Routledge.

Obstfeld, M. (2022). Uncoordinated monetary policies risk a historic global slowdown. *PIIE Realtime Economic Issues Watch, September*, 12.

Obstfeld, M. & Rogoff, K. (1995). The intertemporal approach to the current account. *Handbook of international economics*, 3, 1731–1799.

Obstfeld, M. & Rogoff, K. (2002). Global implications of self-oriented national monetary rules. *The Quarterly journal of economics*, 117(2), 503–535.

O'Connor, D. G. (2025). *Revitalize or Relocate: Optimal Place-Based Transfers for Local Recessions*. Technical report, Working Paper. January 14.

Parker, J. A. & Souleles, N. S. (2017). Reported preference vs. revealed preference: Evidence from the propensity to spend tax rebates. *Revealed Preference: Evidence from the Propensity to Spend Tax Rebates (June 30, 2017)*.

Pennings, S. (2021). Cross-region transfer multipliers in a monetary union: Evidence from social security and stimulus payments. *American Economic Review*, 111(5), 1689–1719.

Peterman, W. B. (2016). Reconciling micro and macro estimates of the frisch labor supply

elasticity. *Economic inquiry*, 54(1), 100–120.

Qiu, Z., Wang, Y., Xu, L., & Zanetti, F. (2025). *Monetary policy in open economies with production networks*. Technical report, CESifo Working Paper.

Quintana, J. (2024). The dynamics of trade fragmentation: a network approach. *Unpublished manuscript*.

Redding, S., Amiti, M., & Weinstein, D. (2019). The impact of the 2018 trade war on us prices and welfare.

Rodríguez-Clare, A., Teti, F., Ulate, M., Vasquez, J. P., & Zarate, R. D. (2025). The 2025 trade war: Dynamic impacts across us states and the global economy.

Rodríguez-Clare, A., Ulate, M., & Vasquez, J. P. (2026). Trade with nominal rigidities: Understanding the unemployment and welfare effects of the china shock. *Journal of Political Economy*, 134(2), 626–664.

Schmitt-Grohé, S. & Uribe, M. (2003). Closing small open economy models. *Journal of international Economics*, 61(1), 163–185.

Schmitt-Grohé, S. & Uribe, M. (2016). Downward nominal wage rigidity, currency pegs, and involuntary unemployment. *Journal of Political Economy*, 124(5), 1466–1514.

Silva, J. S. & Tenreyro, S. (2010). Currency unions in prospect and retrospect. *Annu. Rev. Econ.*, 2(1), 51–74.

Smets, F. & Wouters, R. (2002). *An estimated stochastic dynamic general equilibrium model of the euro area: International Seminar on Macroeconomics*. Europ. Central Bank.

Smets, F. & Wouters, R. (2003). An estimated dynamic stochastic general equilibrium model of the euro area. *Journal of the European economic association*, 1(5), 1123–1175.

Sokolova, A. (2023). Marginal propensity to consume and unemployment: A meta-analysis. *Review of Economic Dynamics*, 51, 813–846.

Tamberi, N. (2025). *The dynamics of the trade elasticity: Evidence from the 2018 US trade war*. Technical report, CITP Working Paper.

Taylor, J. B. (1993). Discretion versus policy rules in practice. In *Carnegie-Rochester conference series on public policy*, volume 39 (pp. 195–214).: Elsevier.

Teti, F. A. (2024). *Missing Tariffs*. Technical Report 11590, CESifo Working Papers. Feodora Teti's Global Tariff Database (v_beta1-2024-12).

Timmer, M. P., Dietzenbacher, E., Los, B., Stehrer, R., & De Vries, G. J. (2015). An illustrated user guide to the world input–output database: the case of global automotive production. *Review of International Economics*, 23(3), 575–605.

Ulate, M., Vasquez, J. P., & Zarate, R. D. (2025). Labor market effects of global supply chain disruptions. *Journal of monetary economics*, 149, 103724.

Woodford, M. (2022). Effective demand failures and the limits of monetary stabilization policy. *American Economic Review*, 112(5), 1475–1521.

Yilmazkuday, H. (2019). Estimating the trade elasticity over time. *Economics Letters*, 183, 108579.

A Motivating Facts

Using data from Teti (2024) and Rodríguez-Clare et al. (2025), I calculate the average tariff rate faced and imposed by the European Union with respect to the United States. The graph shows a flat rate of around 3% over the whole period, with a peak in 2025.

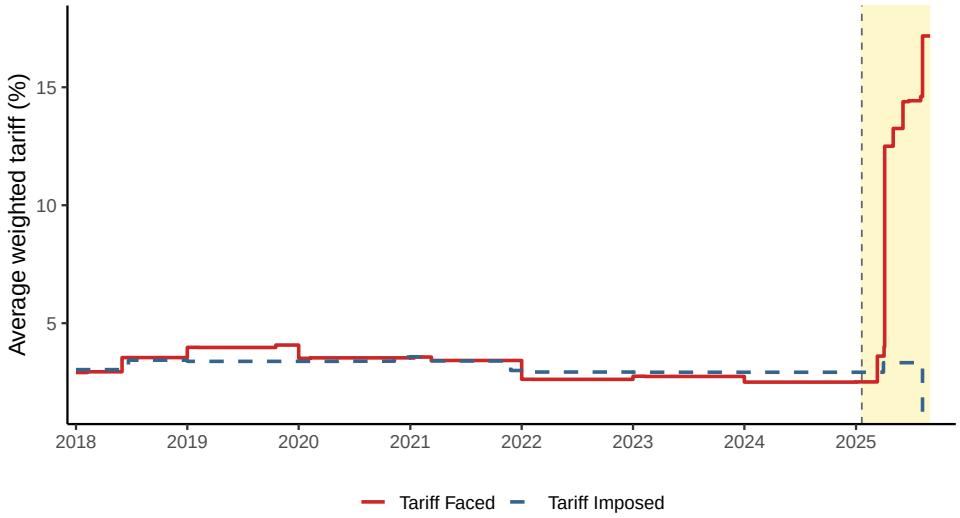


Figure 7: Tariffs Faced and Imposed by the Euro Area

Notes: This figure shows the trade-weighted average tariff evolution that the European Union has imposed and faced with respect to the United States. Tariff rates are from Teti (2024) and Rodríguez-Clare et al. (2025). I map HS6 tariff rates to NAIC codes following Liao et al. (2020). Both series are aggregated by taking fixed pre-shock trade linkages. See Appendix B for more details.

B Data Details

The quantitative exercise covers the 19 euro-area countries, the United States, China, and a constructed Rest of the World (ROW) region that aggregates all remaining economies. I construct sector-level bilateral expenditure shares using the OECD Inter-Country Input-Output (ICIO) tables for 2019, thereby avoiding distortions associated with the COVID-19

pandemic. Following Caliendo et al. (2019), I aggregate economic activity into fourteen sectors: agriculture, twelve manufacturing sectors, and services, excluding public administration, postal services, and utilities.[26] The initial tariff schedule corresponds to December 2024, and the tariff shock is defined by the schedule observed in September 2025.

The fourteen sectors are obtained by mapping OECD ISIC divisions into NAICS codes: **Agriculture**, A01–02 and B05–09, NAICS 11 and 211–213; **Food, Beverage, and Tobacco**, C10–12, NAICS 311–312; **Textiles, Apparel, Leather, and Allied Products**, C13–15, NAICS 313–316; **Wood, Paper, and Printing**, C16–18, NAICS 321–323; **Petroleum and Coal Products**, C19, NAICS 324; **Chemicals**, C20–21, NAICS 325; **Plastics and Rubber Products**, C22, NAICS 326; **Nonmetallic Mineral Products**, C23, NAICS 327; **Primary and Fabricated Metals**, C24–25, NAICS 331–332; **Machinery**, C28, NAICS 333; **Electronics and Electrical Equipment**, C26–27, NAICS 334–335; **Transportation Equipment**, C29–30, NAICS 336; **Furniture and Miscellaneous Manufacturing**, C31–33, NAICS 339; and **Services**, all remaining included divisions.

Tariff data come from the *Global Tariff Database: U.S. Trade War Extension* assembled by Rodríguez-Clare et al. (2025) using the methodology developed by Teti (2024). Tariffs are observed at the HS6 level and matched to NAICS industries using the concordance package from Liao et al. (2020). I aggregate product-level tariffs to the model's country-sector level using pre-shock bilateral trade flows as weights. The pre-shock values correspond to the final tariff schedule of 2024, while the post-shock values correspond to September 2025. For ROW, I add 10 percentage points to U.S. tariffs on agricultural and manufacturing imports.

The ICIO tables also discipline input-output linkages, gross output, and final expenditure. For each country i and sector s, the input-output coefficient α_{iks} is computed as expenditure on inputs from sector k relative to gross output in sector s. In the few obser-

[26] See also Rodríguez-Clare et al. (2026).

vations for which input shares slightly exceed gross output, I rescale them to sum to one and assign zero value added. Sectoral value added, α_{is}, is the residual of gross output net of intermediate-input expenditure.

The consumption share ϕ_{is} is the fraction of country i's final consumption allocated to sector s. Final consumption includes household final consumption expenditure, consumption by non-profit institutions serving households, and government final consumption, gross fixed capital formation, changes in inventories, and direct purchases abroad by residents.

Country-level marginal propensities to consume discipline household heterogeneity. For euro-area countries, I use the hypothetical MPCs elicited in HFCS 4.0 and interpret them as behavioral MPCs, following Jappelli & Pistaferri (2014) and Drescher et al. (2020). I use the estimate from Kaplan & Violante (2022) for the United States, and impose an MPC of 0.6 for the remaining economies.[27] I then choose the share of hand-to-mouth households, λ_i^{HTM}, so that the model reproduces these country-level MPC moments.

I normalize initial hours worked to one. Sectoral employment shares N_{is} come from the latest available WIOD data. I recover sectoral wage bills by combining ICIO revenues with labor-income shares and compute wages by dividing the wage bill by $L_{is}N_{is}$. The labor-disutility shifter χ_{is} is chosen so that the normalization $L_{is} = 1$ is consistent with the household's intratemporal condition.

Initial asset positions are pinned down by steady-state trade deficits. I normalize all initial prices and exchange rates to one. Given observed trade shares, tariffs, and initial asset positions, I adjust country-sector revenues so that the pre-shock allocation satisfies goods-market clearing. The resulting revenues have a correlation of one with their data

[27] Hong (2023) estimates an MPC between 0.55 and 0.6 for Peru, while Sokolova (2023) reports an annual aggregate equivalent of 0.58.

counterparts.

Finally, I need bilateral sectoral mobility for each country. For RoW and China, I assume no mobility at all. For the United States, I use CPS monthly data for the years 2023 and 2024 together. Following Rodríguez-Clare et al. (2026), I keep only those workers with MISH equal 1 and 5, taking advantage of the 4-8-4 structure of the survey. Then, I adjust the mobility matrix such that the model mobility matrix matches the stock of workers in steady state, i.e $N_k = \sum_s \mu_{sk} N_s$. Given that comparable bilateral mobility data are unavailable for European countries, I use the U.S. bilateral mobility matrix as a benchmark and adjust such that each country satisfies the steady-state equation of labor flows. The correlation between data and model steady-state flows is 0.9994. Figure 8 shows the average European mobility across sectors [28].

[28]This use of the U.S. transition matrix as a benchmark is consistent with evidence that the determinants and broad patterns of worker reallocation are similar across advanced economies. Using harmonized data for OECD countries, Bassanini & Marianna (2009) show that industry and worker characteristics systematically shape gross worker flows across countries, although the overall intensity of mobility can differ. Moreover, using EU-LFS data for 30 European countries, Bluedorn et al. (2022) document substantial regularities in sectoral mobility across European labor markets, with an average annual sector-to-sector transition probability of 3.3 percent and relatively limited variation over the business cycle. Therefore, I do not impose either the U.S. sectoral employment distribution or an identical transition matrix across countries. Instead, the U.S. matrix serves as a benchmark for the bilateral structure of sectoral flows, while each country's observed employment distribution determines the country-specific transition matrix through the steady-state restriction.

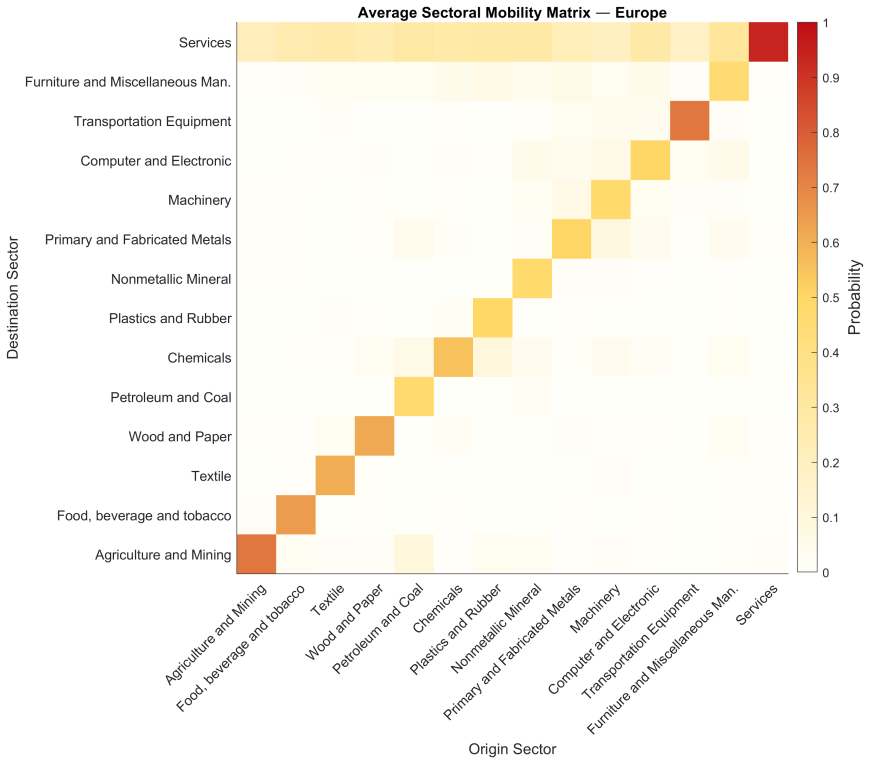


Figure 8: Bilateral mobility

C Tariff Exposure in EU countries

This appendix describes the construction of the country-level measure of direct labor-market exposure reported in Figure 9. Although European Union members face a common trade policy, their exposure to the 2025 U.S. tariff shock differs because countries specialize in different sectors, export different bundles of goods, and differ in the importance of the U.S. market for sectoral revenue.

Following Rodríguez-Clare et al. (2026), but measuring exposure from the exporting side, I define country i's employment-weighted tariff exposure as

$$\text{Exposure}_i = \sum_s \underbrace{\frac{N_{is}}{N_i}}_{\text{Employment share}} \underbrace{\frac{X_{i,\text{US},s}}{R_{i,s}} \frac{t'_{i,\text{US},s} - t_{i,\text{US},s}}{1 + t_{i,\text{US},s}}}_{\text{Sectoral revenue exposure}} \tag{18}$$

Here, N_{is}/N_i is the share of country i's workers employed in sector s, $X_{i,\text{US},s}/R_{i,s}$ is the share of sectoral revenue associated with exports to the United States, and $t_{i,\text{US},s}$ and $t'_{i,\text{US},s}$ denote the pre-shock and post-shock tariff rates, respectively. The measure is larger when employment is concentrated in sectors that export heavily to the United States and face larger tariff increases. It therefore captures the direct labor-market exposure of each country to the tariff shock.

I construct sector-level tariffs using the *Global Tariff Database: U.S. Trade War Extension* from Rodríguez-Clare et al. (2025), which is based on the methodology developed by Teti (2024). I compare the tariff schedule in place at the end of 2024 with the schedule observed in September 2025. Product-level tariffs are aggregated to the model's sectoral classification using pre-shock, country-specific trade weights. Consequently, sector-level tariff changes can differ across countries even when the underlying product-level tariff changes are common, because countries export different products within each broad sec-

tor.[29]

The exposure measure in equation (18) captures the direct incidence of the tariff shock. It does not incorporate indirect effects operating through input-output linkages, expenditure switching, changes in wages and prices, or the response of monetary policy. These general-equilibrium channels are incorporated in the quantitative model.

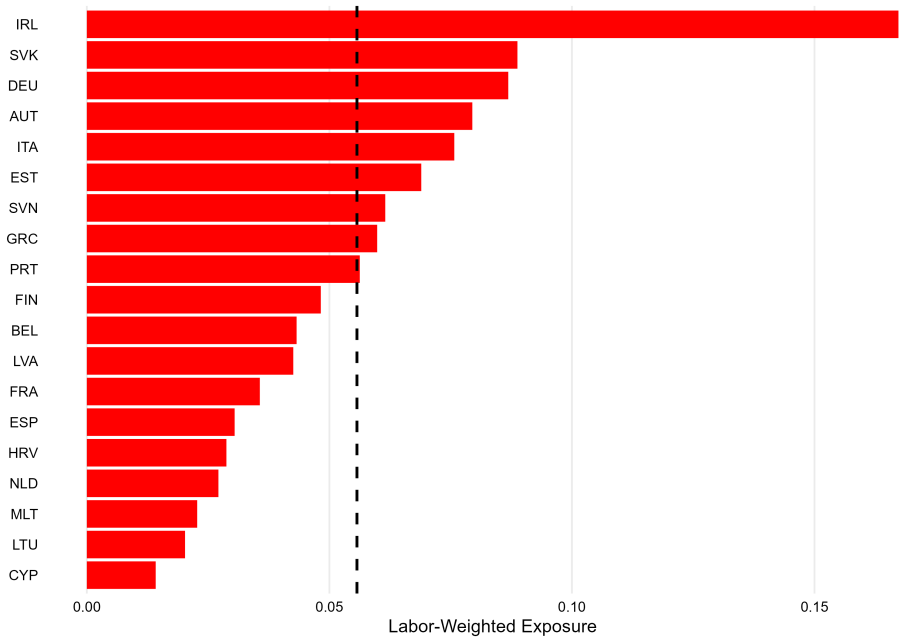


Figure 9: Labor-Market Exposure to the 2025 U.S. Tariff Shock

Notes: Labor Market Exposure is calculated as the pre-shock labor-weighted distribution of exports to the United States over total sales multiplied by the change in tariff at the sectoral level. See Appendix C for details.

[29]While the main exercise focuses on tariffs imposed by the United States, the baseline also allows for changes in European Union import tariffs on goods from the United States.

D Labor Wedge and Output Gap

Define all the variables in this section in logs for simplicity. Note that in the model, we have input-output linkages. This makes the relation between the output gap and the labor wedge more complicated. In this section, we assume an economy where production only needs labor. We define the labor wedge as:

$$\chi_j e^{\frac{L_{jt}}{\varphi}} - e^{w_{jt}} \left(\frac{\lambda_j^{HTM}}{e^{p_{jt}+\gamma c_{jt}^{htm}}} + \frac{1-\lambda_j^{HTM}}{e^{p_{jt}+\gamma c_{jt}^{R}}} \right)$$

Then, define τ_{jt}^{lw} as:

$$\tau_{jt}^{lw} = log\left(\chi_j e^{L_{jt}/\varphi}\right) - log\left(e^{w_{jt}} \left(\frac{\lambda_j^{HTM}}{e^{p_{jt}+\gamma c_{jt}^{htm}}} + \frac{1-\lambda_j^{HTM}}{e^{p_{jt}+\gamma c_{jt}^{R}}} \right) \right)$$

In steady state, $\tau_{jt}^{lw} = 0$. Then we can split the wedge in two. The difference between the labor in natural levels and in the economy $\frac{1}{\varphi}(L_{jt} - L_{jt}^{n})$ and the consumption term. Remember that $Y_{jt} = C_{jt} + NX_{jt} = C_{jt} + A_{jt}^{real} - \frac{A_{j,t-1}^{real}}{1+i_{jt}}$. If the comovement between consumption and output is close to 1, then:

$$c_{jt}^{gap} \approx y_{jt}^{gap} - nx_{jt}^{gap} \approx y_{jt}^{gap}$$

And then we can find a relation between the output gap and my labor wedge as:

$$\tau_{jt}^{lw} \approx \left(\gamma + \frac{1}{\varphi}\right) y_t^{gap}$$

In a different set-up, Acharya et al. (2023) explained that, up to first-order, the log-deviation of the labor wedge from its steady state value is proportional to the output gap.

E Marginal Propensity to Consume

An important source of heterogeneity for monetary transmission is the aggregate marginal propensity to consume. Following Drescher et al. (2020), Albacete et al. (2025), and Jappelli & Pistaferri (2014), I estimate country-level MPCs using data from the Eurosystem Household Finance and Consumption Survey (HFCS) for the years 2020 and 2021. The estimates reveal substantial cross-country dispersion within the euro area[30].

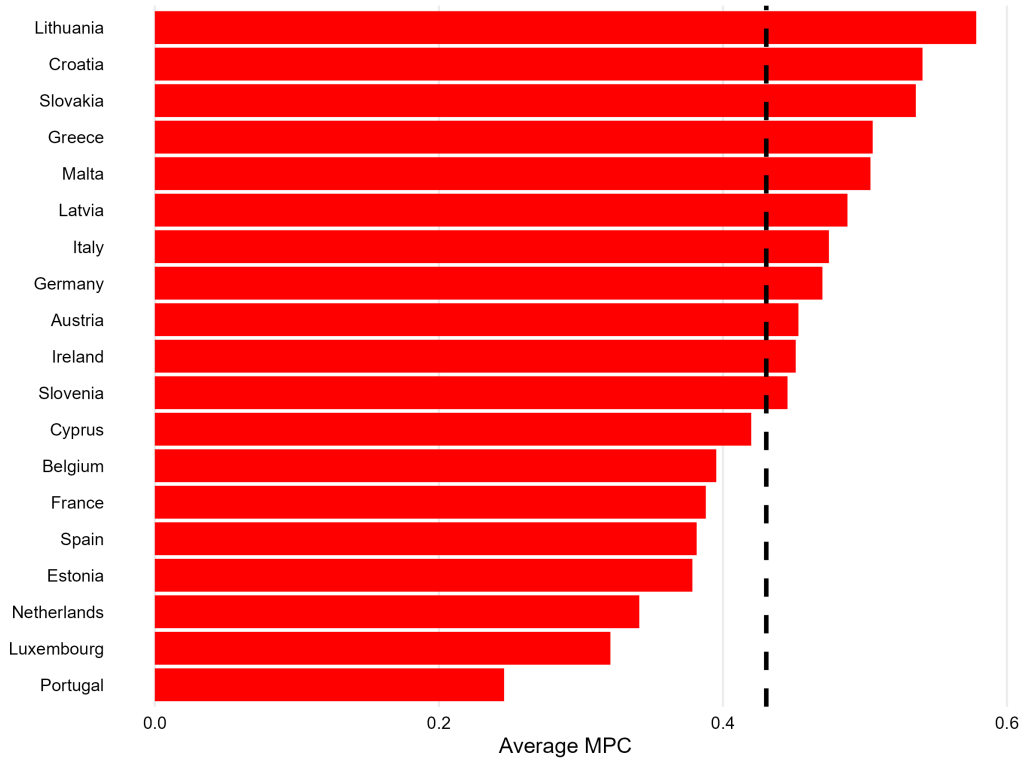


Figure 10: MPC Heterogeneity

[30]Muscatelli et al. (2007) calibrates the share of HTM households for the Euro-area equal to 0.50. Note that the European average is very close to that number

F MIT Shock

In this section, I first show more results related to the transfer shock. Then, I analyze how the tariff shock itself affects different countries according to the model assumptions in terms of trade deficits and marginal propensity to consume.

F.1 Transfer shock: details

Table 9 reports the country characteristics and first-period GDP response for each of the 19 transfer experiments. In each experiment, the recipient receives 1% of its own initial steady-state GDP, financed by the other euro-area countries.

Table 9: Country Characteristics and Fiscal Multipliers

Country	MPC	Domestic Sales (%)	CU Sales (%)	Foreign Sales (%)	Fiscal Multiplier
AUT	0.45	72.57	13.16	14.27	0.32
BEL	0.41	70.78	14.36	14.86	0.24
CYP	0.42	61.11	7.72	31.17	0.18
DEU	0.48	78.30	6.91	14.79	0.39
ESP	0.39	81.59	8.36	10.05	0.36
EST	0.36	67.99	14.11	17.90	0.21
FIN	0.43	80.11	6.59	13.30	0.37
FRA	0.41	83.55	6.51	9.94	0.37
GRC	0.52	76.29	6.89	16.82	0.41
HRV	0.55	75.46	12.74	11.80	0.45
IRL	0.44	36.63	19.80	43.57	0.07
ITA	0.45	83.49	5.94	10.57	0.44
LTU	0.56	65.85	14.39	19.76	0.35
LVA	0.46	75.50	10.07	14.43	0.34
MLT	0.51	48.96	11.57	39.48	0.13
NLD	0.34	71.53	14.17	14.30	0.23
PRT	0.26	76.83	11.62	11.54	0.19
SVK	0.55	63.69	14.98	21.33	0.32
SVN	0.46	63.56	20.21	16.23	0.27

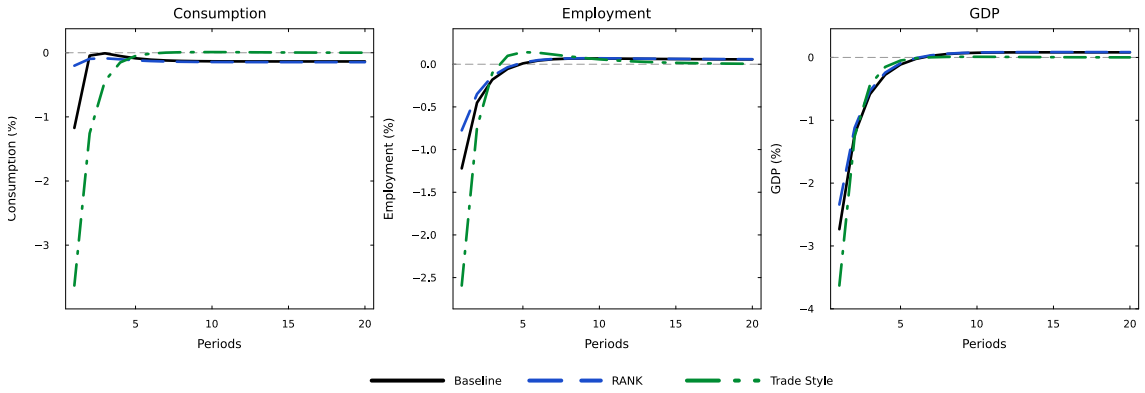
Notes: MPC is the model-implied marginal propensity to consume, $MPC_i = \lambda_i + (1 - \lambda_i)(1 - \beta)$. Domestic Sales is the share of total producer sales sold in the producer's own country. CU Sales is the share of total producer sales sold to other euro-area countries, excluding domestic sales. Foreign Sales is the share of total producer sales sold outside the euro area. The three sales shares sum to one by construction. The Fiscal Multiplier is the period-1 GDP response to the transfer shock, which is one percent of the recipient country's initial steady-state GDP.

F.2 Tariff shock

Section 5 shows why MPCs and endogenous trade deficits matter for the quantitative effects of fiscal transfers. Here, I examine whether MPCs play a similar role in the transmission of a tariff shock. I impose a 10 percentage point increase in U.S. tariffs on agricultural and manufacturing imports. The shock follows an AR(1) process with autocorrelation 0.5 and is almost fully reversed after four years. Given that responses are small

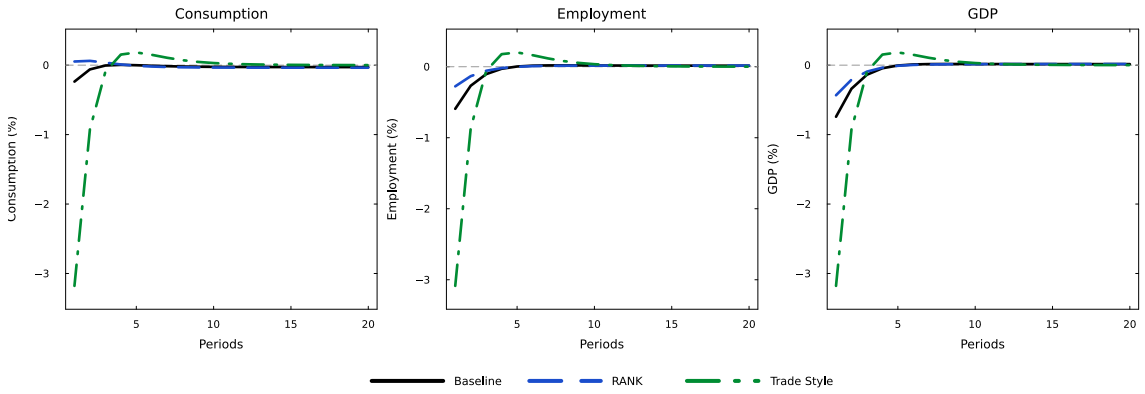
at the aggregate level, I focus on the two countries more exposed to the shock. Figures 11 and 12 report the corresponding responses for Ireland and Germany, two of the euro-area countries most exposed to the tariff shock.

Figure 11: Tariff Shock: Ireland



Notes: The figure reports impulse responses for Ireland to a 10 percentage point increase in U.S. tariffs on agricultural and manufacturing imports. All variables are expressed as percentage deviations from steady state.

Figure 12: Tariff Shock: Germany



Notes: The figure reports impulse responses for Germany for the same tariff shock.

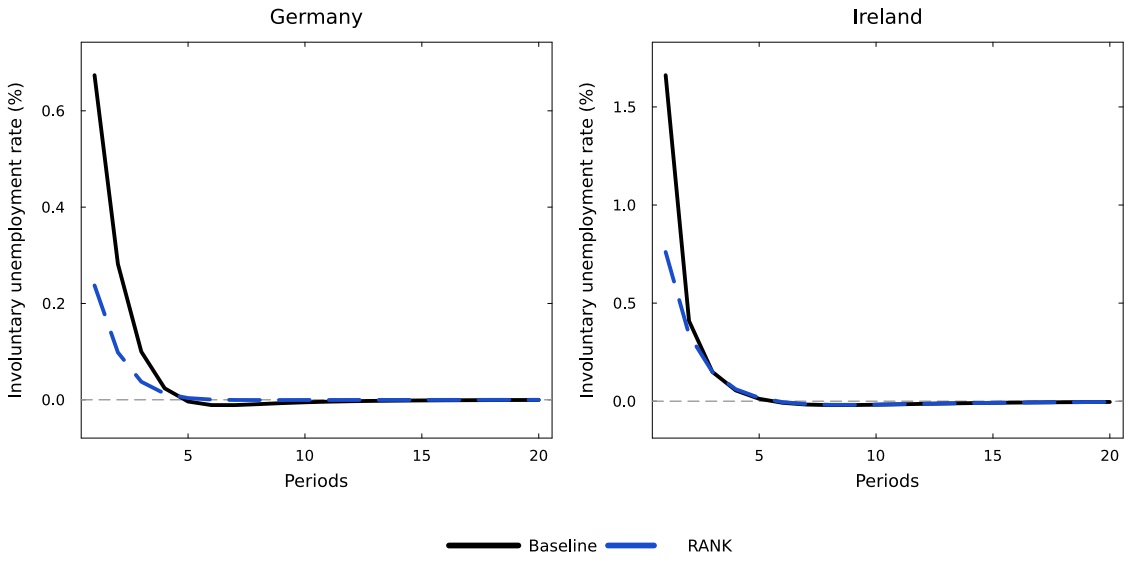
The country-level results are similar. In Germany, the consumption response is close

to zero, so the MPC has almost no effect on employment or GDP. Consumption responds more in Ireland, but its effect on GDP remains limited because Ireland is highly open. Except for the exogenous-deficit specification, incorporating heterogeneous and positive MPCs therefore has little effect on the response of observed employment and output to the tariff shock. The MPC nevertheless affects the labor wedge. Define involuntary unemployment as

$$u_{jt} = 1 - \frac{\sum_s N_{jst} L_{jst}}{\sum_s N_{jst} L_{jst}^{supply}},$$

where L_{jst}^{supply} denotes the hours households would choose at prevailing wages and consumption in the absence of a labor wedge. Figure 13 reports this measure for Germany and Ireland.

Figure 13: Tariff Shock and Involuntary Unemployment



A higher MPC implies a higher weight on hand-to-mouth agents, and therefore changes desired aggregate labor supply and the gap between observed employment and the flexible allocation, even though the response of employment itself changes little. MPCs are there-

fore relevant for measuring labor-market distortions generated by the tariff shock, but not for its aggregate employment and GDP effects.

G Explicit Monetary Policy

Monetary policy follows a Taylor-style interest-rate rule with responses to inflation and labor-market conditions. In the quantitative model, I do not construct a country-level output gap relative to a flexible allocation. I instead use a sectoral labor-market wedge, which captures the distortion between actual hours and the hours workers would choose at prevailing wages and consumption. The rule retains the systematic response to inflation and real activity in Taylor (1993), while using a measure of real activity that is directly linked to the model's wage-setting block:

$$\log(1+i_{m,t}) = \phi_{sm}\log(1+i_{m,t-1}) + (1-\phi_{sm})\Bigg[r_m + \phi_\pi \sum_{i\in\mathcal{M}_m} \omega_i^m \log(1+\pi_{i,t}) + \phi_L \sum_{i\in\mathcal{M}_m} \omega_i^m \sum_s \omega_{is}\Big(\log(\chi_{is}L_{ist}^{1/\varphi}) - \log\Big[\frac{W_{ist}}{P_{it}}\Big(\frac{N_{ist}^{HTM}}{N_{ist}}\frac{1}{(C_{it}^{HTM})^\gamma} + \frac{N_{ist}^{R}}{N_{ist}}\frac{1}{(C_{it}^{R})^\gamma}\Big)\Big]\Big) + \epsilon_{m,t}^{MP}\Bigg].$$

The term in parentheses is the sectoral labor-market wedge. Its first component, $\log(\chi_{is}L_{ist}^{1/\varphi})$, is the log marginal disutility of actual hours. Its second component is the log real wage, $\log(W_{ist}/P_{it})$, plus the log of marginal utility of consumption averaged across the two household types using their sectoral employment shares. The same underlying marginal utilities enter the wage Phillips curve, equation (10); see Erceg et al. (2000), Colciago (2011), and Kim et al. (2026) for the wage-rigidity and heterogeneous-household ingredients. When actual hours are below the hours desired at the prevailing real wage, the wedge

is negative. With $\phi_L > 0$, this lowers the target policy rate.

A negative labor wedge can therefore be interpreted as the counterpart of a negative output gap. Appendix D makes this connection explicit in a simplified labor-only economy, where the wedge is approximately $(\gamma + 1/\varphi)$ times the output gap. This proportionality is used to discipline the policy coefficient; it is not imposed as an exact relationship in the multi-sector model with input-output linkages.

In the rule, ω_{is} aggregates sectoral wedges within country i, and ω_i^m aggregates conditions across the countries in monetary-policy area $\mathcal{M}_m$. Thus, the currency union has one policy rate responding to union-wide conditions, whereas under independent monetary policy $\mathcal{M}_i = \{i\}$. The lagged rate captures interest-rate smoothing, r_m is the constant term, and $\epsilon_{m,t}^{MP}$ is a monetary-policy shock. I set $\phi_\pi = 1.5$ following Taylor (1993) and $\phi_{sm} = 0.57$ following Christoffel et al. (2008). The simplified output-gap mapping implies $\phi_L = \psi_y/(\gamma + 1/\varphi) = 1/6$ for $\psi_y = 0.5$, $\gamma = 1$, and $\varphi = 0.5$.

H Fiscal Targets

In the paper, I propose two main simple targets to analyze the role of fiscal transfers. In this subsection, I show the exact definition of each of them.

H.1 Labor Market Slackness

The baseline transfer rule targets labor market slackness. For country h, we define

$$g_{ht}^L = \sum_s \omega_{hst}^{fiscal} \left[\log \left(L_{hst}^{supply}(\mathbf{w}_{hst}, \mathbf{C}_{ht}) \right) - \log \left(L_{hst} \right) \right] \tag{19}$$

The measure is positive when desired labor supply exceeds observed employment, and therefore captures labor market distortions associated with insufficient employment.

H.2 Consumption Deviations

As an alternative, we consider a rule that targets deviations of consumption from its previous period. We define

$$g_{ht}^{C} = \log\left(C_{h,t-1}\right) - \log\left(C_{ht}\right) \tag{20}$$

Thus, the target is positive when consumption falls relative to the previous period.

H.3 Interaction of National and Coordinated Fiscal Policy

This appendix provides additional results on the interaction between national fiscal policy and coordinated cross-country fiscal transfers. The main text shows that the two instruments provide different forms of stabilization: national fiscal policy shifts resources across time within countries, while cross-country transfers redistribute resources across members of the currency union. I first examine how this interaction affects national debt accumulation and then report the corresponding country-level employment dynamics.

Figure 14 compares aggregate national public debt when national fiscal policy operates alone and when it is combined with cross-country fiscal transfers. Cross-country transfers reduce national debt accumulation during the tariff shock and substantially lower its initial peak. Part of the stabilization required during the downturn is therefore provided through contemporaneous redistribution across member countries rather than through additional national borrowing. As the shock dissipates, the two debt paths cross, and debt under the combined policy declines more gradually during the repayment phase. Both paths

eventually converge back toward zero, consistent with the terminal solvency condition imposed on national fiscal policy.

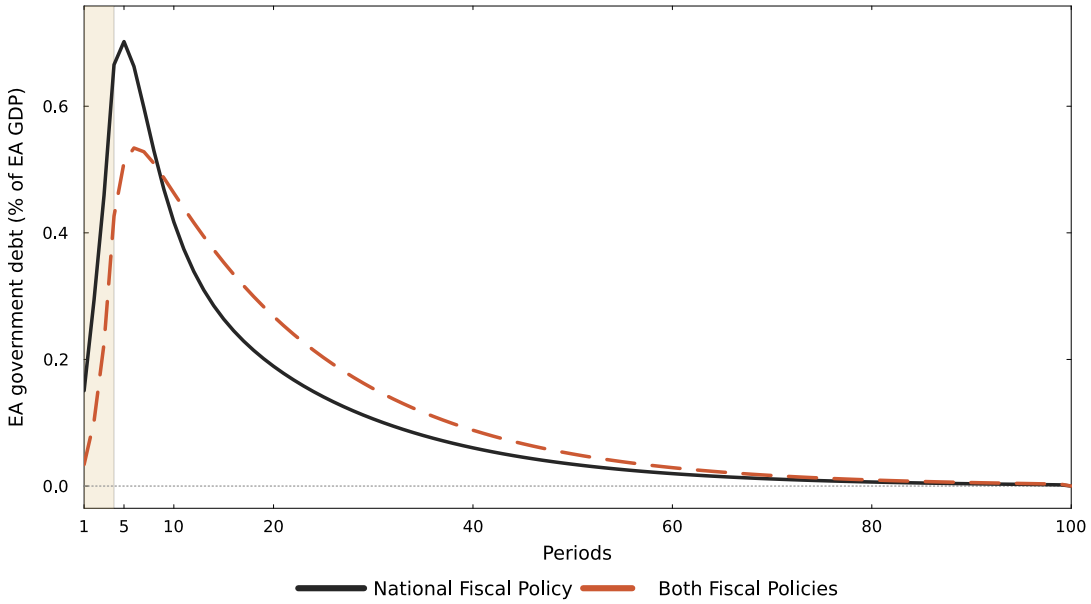
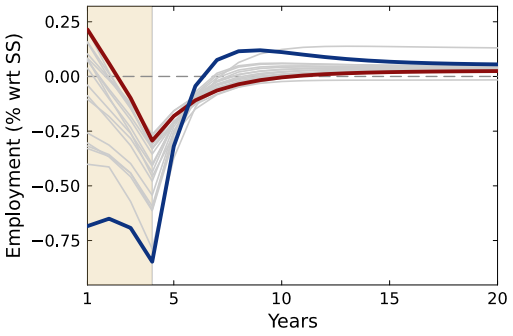
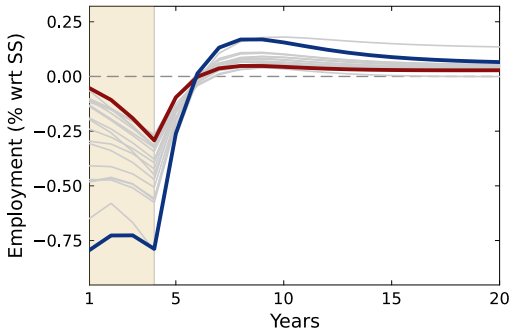


Figure 14: Aggregate National Debt

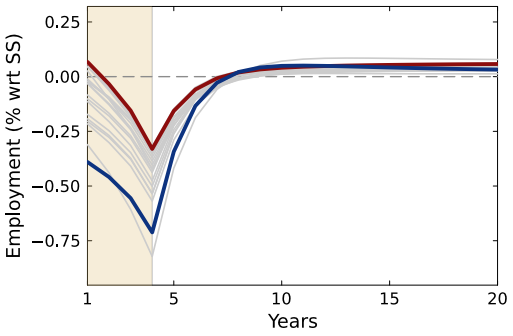
Figure 15 reports country-level employment responses under the four policy configurations considered in the main text. Panel (a) shows the currency union without fiscal stabilization. Panels (b) and (c) introduce national fiscal policy and cross-country fiscal transfers separately, while Panel (d) allows both instruments to operate jointly. Cross-country transfers compress the differences in employment responses across member countries more strongly than national fiscal policy alone. Allowing both instruments to operate changes the allocation of stabilization across the two fiscal margins, consistent with the comparison in Table 4. All panels use the same vertical scale to facilitate comparison of both the magnitude and the cross-country dispersion of employment responses.



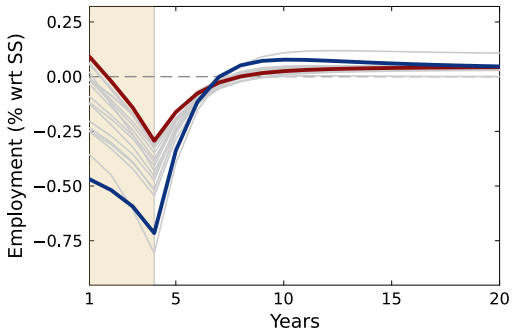
(a) Currency Union



(b) National Fiscal Policy



(c) Cross-Country Fiscal Transfers



(d) Both Fiscal Instruments

Figure 15: Employment Responses under National and Cross-Country Fiscal Policy

I Derivations for the Stylized Model

This appendix provides the derivations underlying the analytical results in Section 3. I maintain throughout the assumptions introduced in the main text. In particular, nominal wages are fixed in local currency, the initial steady-state net foreign asset position is zero in every country, and the analysis considers the limiting case $\beta \to 1$. I use

$$h_i \equiv \lambda_i^{htm}, \qquad r_i \equiv 1 - h_i$$

to denote the shares of hand-to-mouth and Ricardian households, respectively, and let $\hat{x} = dx/x$ denote a proportional deviation from steady state.

Fiscal transfers are available only between the two currency-union members and satisfy

$$dT_{H1}^{fiscal} = dT, \qquad dT_{H2}^{fiscal} = -dT, \qquad dT_{F}^{fiscal} = 0.$$

I.1 Household Consumption and Labor Supply

The hand-to-mouth budget constraint is

$$N_i P_i C_i^{htm} = W_i L_i N_i + T_i^{fiscal}.$$

Since nominal wages are fixed and steady-state transfers are zero, its first-order approximation is

$$\hat{C}_i^{htm} = \hat{L}_i - \hat{P}_i + \frac{dT_i^{fiscal}}{GDP_i}.$$

Ricardian households satisfy

$$(C_i^R)^{-\gamma} = \beta(1+i_i)\frac{P_i}{P_{i,+1}}(C_{i,+1}^R)^{-\gamma}.$$

The shock is unexpected and temporary, and the economy returns to its steady state in the following period. Hence,

$$\hat{C}_i^R = -\frac{1}{\gamma}\left(\hat{i}_i + \hat{P}_i\right).$$

Aggregate consumption therefore satisfies

$$\hat{C}_i = h_i\hat{C}_i^{htm} + r_i\hat{C}_i^R.$$

To derive desired labor supply, define L_i^{supply} as the amount of labor households would choose at the prevailing wage and consumption levels. The intratemporal optimality condition is

$$\chi\left(L_i^{supply}\right)^{1/\varphi} = \frac{W_i}{P_i}\left[h_i(C_i^{htm})^{-\gamma} + r_i(C_i^R)^{-\gamma}\right].$$

Log-linearizing around the steady state, where the two household types have the same initial consumption level, and using $\hat{W}_i = 0$, gives

$$\frac{1}{\varphi}\hat{L}_i^{supply} = -\hat{P}_i - \gamma\left[h_i\hat{C}_i^{htm} + r_i\hat{C}_i^R\right].$$

Substituting the consumption responses yields

$$\hat{L}_i^{supply} = -\varphi\gamma h_i\hat{L}_i - \varphi h_i(1-\gamma)\hat{P}_i + \varphi r_i\hat{i}_i - \varphi\gamma h_i\frac{dT_i^{fiscal}}{GDP_i}.$$

Hence the labor-market distortion used in the main text is

$$\hat{L}_i^{supply} - \hat{L}_i = -\left(1 + \varphi\gamma h_i\right)\hat{L}_i - \varphi h_i(1-\gamma)\hat{P}_i + \varphi r_i \hat{i}_i - \varphi\gamma h_i \frac{dT_i^{fiscal}}{GDP_i}.$$

This expression separates the two effects of fiscal transfers that matter below. Transfers directly alter desired labor supply through hand-to-mouth consumption, while their effect on actual employment operates through aggregate expenditure.

I.2 The Price Block and Monetary Policy

With fixed nominal wages, producer prices satisfy

$$\hat{p}_{ij} = \hat{e}_{ij} + \hat{\tau}_{ij} + (1-\alpha)\hat{P}_i.$$

The CES price index implies

$$\hat{P}_j = \sum_i \lambda_{ij}\left[\hat{e}_{ij} + \hat{\tau}_{ij} + (1-\alpha)\hat{P}_i\right].$$

The only trade-cost shock is on exports from $H1$ to F. Under a common currency,

$$\hat{e}_{H1} = \hat{e}_{H2} \equiv \hat{e},$$

so the bilateral exchange rate between $H1$ and $H2$ does not move. The price system becomes

$$\hat{P}_{H1} = -\frac{\lambda_{F,H1}}{1-(1-\alpha)\lambda_{H1,H1}}\hat{e} + \frac{(1-\alpha)\lambda_{H2,H1}}{1-(1-\alpha)\lambda_{H1,H1}}\hat{P}_{H2} + \frac{(1-\alpha)\lambda_{F,H1}}{1-(1-\alpha)\lambda_{H1,H1}}\hat{P}_F,$$

$$\hat{P}_{H2} = \frac{(1-\alpha)\lambda_{H1,H2}}{1-(1-\alpha)\lambda_{H2,H2}}\hat{P}_{H1},$$

$$\hat{P}_F = \frac{\lambda_{H1,F}}{1-(1-\alpha)\lambda_{F,F}}(\hat{\tau}+\hat{e}) + \frac{(1-\alpha)\lambda_{H1,F}}{1-(1-\alpha)\lambda_{F,F}}\hat{P}_{H1}.$$

For compactness, define

$$\psi_{ij} \equiv \frac{\lambda_{ij}}{1-(1-\alpha)\lambda_{jj}}$$

and

$$\Delta_P \equiv 1-(1-\alpha)^2\left(\psi_{F,H1}\psi_{H1,F}+\psi_{H2,H1}\psi_{H1,H2}\right).$$

Solving the system gives

$$\hat{P}_{H1} = \frac{(1-\alpha)\psi_{F,H1}\psi_{H1,F}}{\Delta_P}\hat{\tau} - \frac{\psi_{F,H1}\left[1-(1-\alpha)\psi_{H1,F}\right]}{\Delta_P}\hat{e},$$

$$\hat{P}_{H2} = \frac{(1-\alpha)^2\psi_{H1,H2}\psi_{F,H1}\psi_{H1,F}}{\Delta_P}\hat{\tau} - \frac{(1-\alpha)\psi_{H1,H2}\psi_{F,H1}\left[1-(1-\alpha)\psi_{H1,F}\right]}{\Delta_P}\hat{e},$$

$$\hat{P}_F = \frac{\psi_{H1,F}\left[1-(1-\alpha)^2\psi_{H2,H1}\psi_{H1,H2}\right]}{\Delta_P}\hat{\tau} + \frac{\psi_{H1,F}\left[1-(1-\alpha)\psi_{F,H1}-(1-\alpha)^2\psi_{H2,H1}\psi_{H1,H2}\right]}{\Delta_P}\hat{e}.$$

The important property of this system is that fiscal transfers do not appear anywhere in

the price block. In particular, each price can be written as

$$\hat{P}_i = p_i^{\tau}\hat{\tau} + p_i^{e}\hat{e},$$

where p_i^{τ} and p_i^{e} depend only on structural parameters and steady-state trade shares.

Suppose, more generally, that the common monetary authority stabilizes a weighted price index,

$$\sum_{i\in\{H1,H2\}} \omega_i^{P}\hat{P}_i = 0.$$

Substituting the price solution gives

$$\hat{e} = -\frac{\sum_i \omega_i^{P} p_i^{\tau}}{\sum_i \omega_i^{P} p_i^{e}}\hat{\tau}.$$

Thus, whenever the price-stability problem has a regular solution, the common exchange-rate response depends on the trade shock but not on fiscal transfers. UIP then pins down the common interest-rate response independently of dT. This establishes the proposition in Section 3.

I.3 Labor Demand

To derive the expenditure channel, define the share of country i's steady-state sales absorbed by country j as

$$\lambda_{ij}^{*} \equiv \frac{\lambda_{ij} W_j N_j L_j}{W_i N_i L_i}.$$

Steady-state goods-market clearing implies

$$\sum_j \lambda_{ij}^* = 1.$$

Log-linearizing goods-market clearing gives

$$\hat{e}_i + \hat{L}_i = \sum_j \lambda_{ij}^* \left[\hat{\lambda}_{ij} + \alpha(\hat{P}_j + \hat{C}_j) + (1-\alpha)\hat{L}_j \right].$$

CES demand implies

$$\hat{\lambda}_{ij} = (1-\sigma)\left(\hat{p}_{ij} - \hat{P}_j\right).$$

Moreover,

$$\hat{P}_j + \hat{C}_j = h_j \hat{L}_j + h_j \frac{dT_j^{fiscal}}{GDP_j} + r_j \frac{\gamma - 1}{\gamma} \hat{P}_j - \frac{r_j}{\gamma} \hat{i}_j.$$

Substituting these expressions into goods-market clearing and collecting employment terms gives

$$D_i \hat{L}_i = \sum_{j \neq i} \lambda_{ij}^* \left[1 - \alpha r_j\right] \hat{L}_j + \Xi_i + \alpha \sum_j \lambda_{ij}^* h_j \frac{dT_j^{fiscal}}{GDP_j},$$

where

$$D_i \equiv 1 - \lambda_{ii}^* \left[1 - \alpha r_i\right]$$

and

$$\Xi_i \equiv -\hat{e}_i + \sum_j \lambda^*_{ij} \Bigg\{ (1-\sigma)\left[\hat{e}_{ij} + \hat{\tau}_{ij} + (1-\alpha)\hat{P}_i - \hat{P}_j\right] + \alpha r_j \left[\frac{\gamma-1}{\gamma}\hat{P}_j - \frac{1}{\gamma}\hat{i}_j\right] \Bigg\}.$$

Because the price and interest-rate responses derived above do not depend on transfers, Ξ_i is a function only of the trade shock and monetary policy. In particular,

$$\frac{\Xi_i}{D_i} \equiv \mathcal{S}_i(\hat{\tau}, \hat{e}).$$

For $H1$, the labor-demand equation therefore becomes

$$\hat{L}_{H1} = \frac{\lambda^*_{H1,H2}\left[1-\alpha r_{H2}\right]}{D_{H1}}\hat{L}_{H2} + \frac{\lambda^*_{H1,F}\left[1-\alpha r_F\right]}{D_{H1}}\hat{L}_F + \frac{\alpha}{D_{H1}}\left(\frac{\lambda^*_{H1,H1}h_{H1}}{GDP_{H1}} - \frac{\lambda^*_{H1,H2}h_{H2}}{GDP_{H2}}\right)dT + \mathcal{S}_{H1}(\hat{\tau}, \hat{e}).$$

Similarly,

$$\hat{L}_{H2} = \frac{\lambda^*_{H2,H1}\left[1-\alpha r_{H1}\right]}{D_{H2}}\hat{L}_{H1} - \frac{\alpha}{D_{H2}}\left(\frac{\lambda^*_{H2,H2}h_{H2}}{GDP_{H2}} - \frac{\lambda^*_{H2,H1}h_{H1}}{GDP_{H1}}\right)dT + \mathcal{S}_{H2}(\hat{\tau}, \hat{e}),$$

while employment in F satisfies

$$\hat{L}_F = \frac{\lambda^*_{F,H1}\left[1-\alpha r_{H1}\right]}{D_F}\hat{L}_{H1} + \frac{\alpha\lambda^*_{F,H1}h_{H1}}{D_F GDP_{H1}}dT + \mathcal{S}_F(\hat{\tau}, \hat{e}).$$

These equations make clear that the transfer component of labor demand is distinct from the trade-shock component. Since monetary policy and prices are independent of dT, the marginal employment effect of transfers can be obtained by differentiating this three-equation system while holding $\hat{\tau}$ and $\hat{e}$ fixed.

I.4 Comparative Statics

To obtain transparent comparative statics, impose the assumptions used in Section 3: GDPs are equal, bilateral trade is balanced, and hand-to-mouth shares are initially common across countries. Equal GDPs and balanced trade imply

$$\lambda_{ij}^{*} = \lambda_{ij}.$$

Define

$$x \equiv \lambda_{H1,H2} = \lambda_{H2,H1}, \qquad f \equiv \lambda_{H1,F} = \lambda_{F,H1}, \qquad h \equiv \lambda^{htm},$$

and

$$\Psi \equiv 1 - \alpha + \alpha h.$$

The domestic expenditure shares are

$$\lambda_{H1,H1} = 1 - x - f, \qquad \lambda_{H2,H2} = 1 - x, \qquad \lambda_{F,F} = 1 - f.$$

Home bias requires

$$x + f < \frac{1}{2}.$$

Let

$$t \equiv \frac{dT}{GDP}$$

and isolate the component of employment generated by the transfer. Because prices

and monetary policy do not respond to t, the three labor-demand equations reduce to

$$\begin{aligned}
[1-(1-x-f)\Psi]\,\hat{L}_{H1}^{T} &= x\Psi\hat{L}_{H2}^{T} + f\Psi\hat{L}_{F}^{T} + \alpha h(1-2x-f)t,\\
[1-(1-x)\Psi]\,\hat{L}_{H2}^{T} &= x\Psi\hat{L}_{H1}^{T} - \alpha h(1-2x)t,\\
[1-(1-f)\Psi]\,\hat{L}_{F}^{T} &= f\Psi\hat{L}_{H1}^{T} + \alpha f h\,t.
\end{aligned}$$

Solving the system gives

$$\hat{L}_{H1}^{T} = G_{H1}(x,f,h)t, \qquad \hat{L}_{H2}^{T} = G_{H2}(x,f,h)t,$$

where

$$G_{H1}(x,f,h) = -\alpha h\frac{3f\Psi x - 2f\Psi + f - 2\Psi x + \Psi + 2x - 1}{\mathcal{D}(x,f,h)}$$

and

$$G_{H2}(x,f,h) = \alpha h\frac{3f\Psi x - 2f\Psi - 2\Psi x + \Psi + 2x - 1}{\mathcal{D}(x,f,h)}.$$

The common denominator is

$$\begin{aligned}
\mathcal{D}(x,f,h) &= 3f\Psi^{2}x - 2f\Psi^{2} + 2f\Psi - 2\Psi^{2}x + \Psi^{2} + 2\Psi x - 2\Psi + 1\\
&= (1-\Psi)\left[1-\Psi+2f\Psi\right] + x\Psi\left[2(1-\Psi)+3f\Psi\right].
\end{aligned}$$

Since $0 < \Psi < 1$,

$$\mathcal{D}(x,f,h) > 0$$

throughout the admissible parameter region.

I.4.1 Bilateral Trade Integration

Proposition 3 (Bilateral trade integration)**.** *Holding trade linkages with F fixed, greater bilateral integration between $H1$ and $H2$ reduces the transfer multiplier in $H1$ and increases it in $H2$. Consequently, whenever a transfer raises employment in $H1$ and lowers employment in $H2$, bilateral integration reduces both responses in absolute value.*

Proof. Differentiating the reduced-form employment multipliers with respect to x gives

$$\frac{\partial G_{H1}}{\partial x} = -\alpha h \frac{[1-\Psi(1-f)]\,[2(1-\Psi)+3f\Psi]}{\mathcal{D}^2}$$

and

$$\frac{\partial G_{H2}}{\partial x} = \alpha h \frac{[1-\Psi(1-2f)]\,[2(1-\Psi)+3f\Psi]}{\mathcal{D}^2}.$$

Because $0 < \Psi < 1$, $f < 1/2$, and $\mathcal{D} > 0$,

$$1-\Psi(1-f) > 0, \qquad 1-\Psi(1-2f) > 0,$$

and

$$2(1-\Psi)+3f\Psi > 0.$$

Therefore,

$$\frac{\partial G_{H1}}{\partial x} < 0, \qquad \frac{\partial G_{H2}}{\partial x} > 0.$$

Hence stronger bilateral integration reduces the employment gain in the recipient and attenuates the employment loss in the financing country whenever $G_{H1} > 0$ and $G_{H2} < 0$. □

The economic mechanism can also be seen directly from the transfer term in the $H1$ equation,

$$\alpha h(1 - 2x - f)t.$$

Greater bilateral integration raises the fraction of the financing country's expenditure that is directed toward $H1$, partially offsetting the increase in demand generated by the recipient country.

I.4.2 Hand-to-Mouth Households and Bilateral Trade

The role of the hand-to-mouth share is easiest to see from the same expression. The direct expenditure effect on $H1$ is proportional to

$$\alpha h(1 - 2x - f).$$

Its sensitivity to the hand-to-mouth share is

$$\frac{\partial}{\partial h}\left[\alpha h(1 - 2x - f)\right] = \alpha(1 - 2x - f) > 0,$$

where the inequality follows from home bias. Moreover,

$$\frac{\partial^2}{\partial x \partial h}\left[\alpha h(1 - 2x - f)\right] = -2\alpha < 0.$$

Thus, even before accounting for general-equilibrium feedback, bilateral integration weakens the MPC channel through which a higher hand-to-mouth share translates a transfer into greater demand for $H1$ goods.

The same mechanism is present in the full general-equilibrium multiplier. At zero bilateral integration,

$$\left.\frac{\partial G_{H1}}{\partial h}\right|_{x=0} = \alpha \frac{\mathcal{R}_0(f,h)}{\mathcal{D}^2},$$

where, letting

$$q \equiv 1 - \Psi = \alpha(1-h) > 0,$$

we have

$$\begin{aligned}\mathcal{R}_0(f,h) = \alpha &\left[(1-2f)^2 q^2 + 2f(1-2f)q + 2f^2\right] \\ &+ f(1-2f)q^2.\end{aligned}$$

Under home bias $f < 1/2$, every term in $\mathcal{R}_0(f,h)$ is non-negative and at least one is strictly positive. Hence,

$$\left.\frac{\partial G_{H1}}{\partial h}\right|_{x=0} > 0.$$

A larger hand-to-mouth share therefore unambiguously amplifies the transfer effect when bilateral integration is weak. As bilateral integration increases, a larger fraction of the expenditure gain in $H1$ is offset by the expenditure loss in $H2$, weakening this mechanism.

I.4.3 Foreign Trade Linkages

Proposition 4 (Foreign trade linkages)**.** *Holding bilateral integration between $H1$ and $H2$ fixed, stronger trade linkages between $H1$ and F reduce the $H1$ employment response to the transfer and make the $H2$ employment response more negative.*

Proof. Differentiating the two employment multipliers with respect to f gives

$$\frac{\partial G_{H1}}{\partial f} = \alpha h \frac{(\Psi - 1)\left[\Psi x - \Psi + 1\right]}{\mathcal{D}^2}$$

and

$$\frac{\partial G_{H2}}{\partial f} = \alpha h \frac{\Psi x(\Psi - 1)}{\mathcal{D}^2}.$$

Since

$$\Psi - 1 < 0$$

and

$$\Psi x - \Psi + 1 = 1 - \Psi(1 - x) > 0,$$

it follows that

$$\frac{\partial G_{H1}}{\partial f} < 0, \qquad \frac{\partial G_{H2}}{\partial f} < 0.$$

Hence stronger exposure to F reduces the employment gain in $H1$ and makes the employment response in $H2$ more negative. □

I.4.4 Heterogeneity in Marginal Propensities to Consume

Finally, allow hand-to-mouth shares to differ across countries. Define

$$h_i \equiv \lambda_i^{htm}, \qquad \Psi_i \equiv 1 - \alpha + \alpha h_i.$$

Proposition 5 (Hand-to-mouth households in the financing country)**.** *Holding trade shares and the hand-to-mouth shares in $H1$ and F fixed, a higher hand-to-mouth share in $H2$*

reduces the effect of a transfer on $H1$ labor demand.

Proof. Let

$$M_{H1} \equiv \frac{\partial \hat{L}_{H1}^{T}}{\partial t} = \frac{\mathcal{N}_H}{\mathcal{D}_H},$$

where

$$\begin{aligned}\mathcal{N}_H = \alpha\left[(1-x-f)h_{H1} - xh_{H2}\right] \\ - \frac{x\Psi_{H2}}{1-(1-x)\Psi_{H2}}\alpha\left[(1-x)h_{H2} - xh_{H1}\right] \\ + \frac{f\Psi_F}{1-(1-f)\Psi_F}\alpha f h_{H1},\end{aligned}$$

and

$$\begin{aligned}\mathcal{D}_H = 1-(1-x-f)\Psi_{H1} - \frac{x^2\Psi_{H1}\Psi_{H2}}{1-(1-x)\Psi_{H2}} \\ - \frac{f^2\Psi_{H1}\Psi_F}{1-(1-f)\Psi_F}.\end{aligned}$$

Since

$$\frac{\partial \Psi_{H2}}{\partial h_{H2}} = \alpha,$$

direct differentiation gives

$$\frac{\partial M_{H1}}{\partial h_{H2}} = -\frac{\alpha x \mathcal{R}_H}{\mathcal{D}_H^2\left[1-(1-x)\Psi_{H2}\right]^2\left[1-(1-f)\Psi_F\right]},$$

where

$$\mathcal{R}_H = \alpha\Big[f(1-\Psi_F)\Psi_{H1} + (1-\Psi_{H1})\,(f\Psi_F + 1 - \Psi_F)\Big] \\ + x(1-\alpha)\Big[f(1-\Psi_F)\Psi_{H1} + 2(1-\Psi_{H1})\,(f\Psi_F + 1 - \Psi_F)\Big].$$

Every term in $\mathcal{R}_H$ is non-negative, and at least one is strictly positive whenever $x > 0$. Moreover,

$$1 - (1-x)\Psi_{H2} > 0, \qquad 1 - (1-f)\Psi_F > 0.$$

It follows that

$$\frac{\partial M_{H1}}{\partial h_{H2}} < 0.$$

A higher hand-to-mouth share in the financing country therefore magnifies the fall in its current expenditure and, through bilateral trade, reduces the employment effect of the transfer in $H1$. □

I.5 Illustration of the Comparative Statics

Figure 16 illustrates the preceding results. The left panel varies bilateral integration between $H1$ and $H2$ for different degrees of exposure to F, while the right panel varies the common hand-to-mouth share.

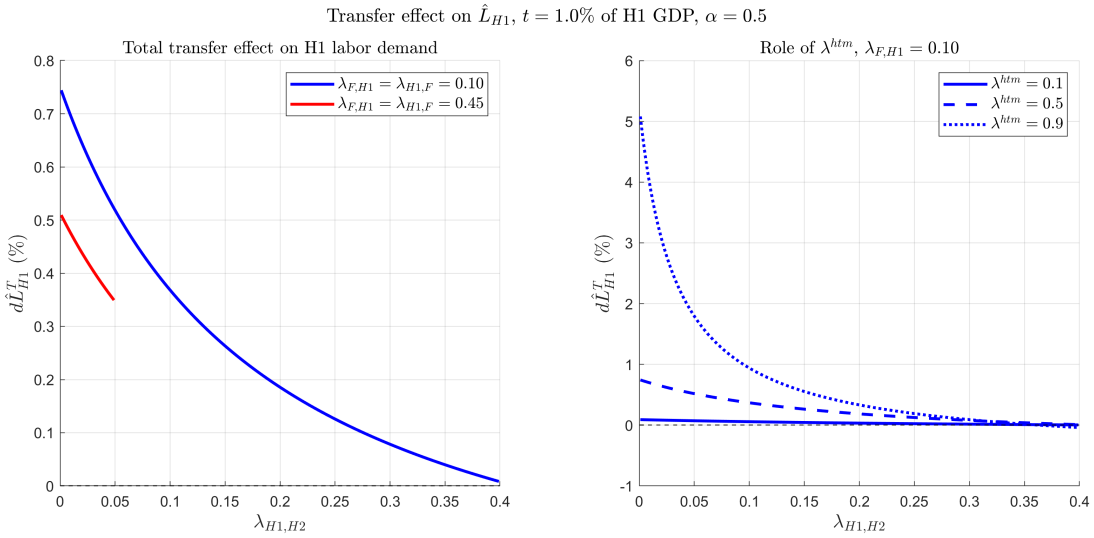


Figure 16: Fiscal Transfers and Labor Demand in the Stylized Model

Notes: The figure reports the effect of a transfer equal to 1% of $H1$ GDP on labor demand in $H1$. The left panel varies bilateral integration between $H1$ and $H2$ for different levels of trade exposure to F. The right panel varies the hand-to-mouth share for a fixed foreign trade linkage. All parameterizations satisfy the home-bias assumption.

I.6 Distortion-Minimizing Fiscal Transfers

For completeness, I characterize the balanced fiscal transfer that minimizes labor-market distortions in the stylized economy. This exercise is not required for the comparative statics in Section 3, but provides a useful benchmark for understanding how the effectiveness of transfers depends on household consumption responses and trade linkages.

Let

$$h_i \equiv \lambda_i^{htm}, \qquad r_i \equiv 1 - h_i,$$

and define the labor-market distortion as

$$\mathcal{W}_i \equiv \hat{L}_i^{supply} - \hat{L}_i.$$

The fiscal authority chooses a balanced transfer,

$$dT_{H1}^{fiscal} = dT, \qquad dT_{H2}^{fiscal} = -dT,$$

to solve

$$\min_{dT} \frac{1}{2} \sum_{i \in \{H1, H2\}} \omega_i \mathcal{W}_i^2,$$

where ω_i determines the weight placed on labor-market distortions in country i.

The first-order condition is

$$0 = \sum_{i \in \{H1, H2\}} \omega_i \mathcal{W}_i \frac{\partial \mathcal{W}_i}{\partial dT}.$$

As shown in Section 3, prices and the monetary-policy response are independent of fiscal transfers up to a first order. Transfers therefore affect the labor-market distortion only through desired labor supply and actual employment.

Define Θ_i as the general-equilibrium employment response to a transfer received by country i:

$$\hat{L}_i = \Theta_i \frac{dT_i^{fiscal}}{GDP_i} + \mathcal{T}_i,$$

where $\mathcal{T}_i$ collects the effects of the trade shock and monetary policy. It follows that

$$\frac{\partial \hat{L}_{H1}}{\partial dT} = \frac{\Theta_{H1}}{GDP_{H1}}, \qquad \frac{\partial \hat{L}_{H2}}{\partial dT} = -\frac{\Theta_{H2}}{GDP_{H2}}.$$

Using the labor-wedge expression derived above,

$$\mathcal{W}_i = -(1 + \varphi\gamma h_i)\hat{L}_i - \varphi h_i (1 - \gamma)\hat{P}_i + \varphi r_i \hat{i}_i - \varphi\gamma h_i \frac{dT_i^{fiscal}}{GDP_i},$$

we obtain

$$\frac{\partial \mathcal{W}_{H1}}{\partial dT} = -\frac{\varphi\gamma h_{H1} + (1+\varphi\gamma h_{H1})\Theta_{H1}}{GDP_{H1}},$$

and

$$\frac{\partial \mathcal{W}_{H2}}{\partial dT} = \frac{\varphi\gamma h_{H2} + (1+\varphi\gamma h_{H2})\Theta_{H2}}{GDP_{H2}}.$$

Substituting into the first-order condition gives

$$\begin{aligned} 0 = \omega_{H1}\mathcal{W}_{H1}\frac{\varphi\gamma h_{H1} + (1+\varphi\gamma h_{H1})\Theta_{H1}}{GDP_{H1}} \\ - \omega_{H2}\mathcal{W}_{H2}\frac{\varphi\gamma h_{H2} + (1+\varphi\gamma h_{H2})\Theta_{H2}}{GDP_{H2}}. \end{aligned}$$

Equivalently,

$$\frac{\mathcal{W}_{H1}}{\mathcal{W}_{H2}} = \frac{\omega_{H2}}{\omega_{H1}}\frac{GDP_{H1}}{GDP_{H2}}\left[\frac{\varphi\gamma h_{H2} + (1+\varphi\gamma h_{H2})\Theta_{H2}}{\varphi\gamma h_{H1} + (1+\varphi\gamma h_{H1})\Theta_{H1}}\right].$$

Thus, a distortion-minimizing fiscal authority does not generally equalize labor-market distortions across countries. The relevant object is instead the effectiveness of transfers in reducing those distortions.

The term

$$\varphi\gamma h_i$$

captures the direct effect of a transfer on desired labor supply, while

$$(1+\varphi\gamma h_i)\Theta_i$$

captures its effect on actual employment and, through employment, on the labor-market distortion.

The comparative statics derived above characterize the determinants of Θ_i. In partic-

ular, the employment response depends on the recipient country's hand-to-mouth share, its domestic absorption, trade linkages within and outside the currency union, and the consumption response of the country financing the transfer.

I.7 Comparison with Welfare Maximization

The previous exercise characterizes the optimal transfer for the specific objective of minimizing labor-market distortions. It does not, in general, coincide with the transfer chosen by a welfare-maximizing fiscal authority.

To see this, consider a fiscal authority that chooses the same balanced transfer but instead maximizes household welfare:

$$\max_{dT} \sum_{i\in\{H1,H2\}} \omega_i^W N_i \sum_{k=t}^{\infty} \beta^{k-t} \left[h_i \frac{(C_{ik}^{htm})^{1-\gamma}}{1-\gamma} + r_i \frac{(C_{ik}^{R})^{1-\gamma}}{1-\gamma} - \frac{\chi}{1+1/\varphi} L_{ik}^{1+1/\varphi} \right].$$

Define the average marginal utility of consumption in country i as

$$\mathcal{M}_i \equiv h_i (C_i^{htm})^{-\gamma} + r_i (C_i^{R})^{-\gamma}.$$

The marginal welfare value of one additional unit of nominal resources in country i is therefore

$$\frac{\mathcal{M}_i}{P_i}.$$

Importantly, although Ricardian households have a vanishing contemporaneous marginal propensity to consume as $\beta \to 1$, their marginal welfare value of wealth does not vanish. Additional resources can instead be saved and consumed in future periods.

Using the household envelope conditions and the fact that fiscal transfers do not directly

affect prices or monetary policy, the welfare first-order condition can be written as

$$0 = \underbrace{\omega_{H1}^{W} \frac{\mathcal{M}_{H1}}{P_{H1}} - \omega_{H2}^{W} \frac{\mathcal{M}_{H2}}{P_{H2}}}_{\text{Cross-country insurance motive}} + \underbrace{\sum_{i \in \{H1, H2\}} \omega_{i}^{W} N_{i} \chi \left[\left(L_{i}^{supply} \right)^{1/\varphi} - L_{i}^{1/\varphi} \right] \frac{\partial L_{i}}{\partial dT}}_{\text{Labor-market stabilization motive}}.$$

The second term is closely related to the stabilization motive in the distortion-minimization problem: transfers are valuable when they move employment toward desired labor supply. The first term, however, is absent from the distortion-minimization objective. It captures the cross-country insurance motive associated with differences in the marginal utility of wealth.

Consequently, the welfare-maximizing transfer generally differs from the transfer that minimizes labor-market distortions. Welfare maximization combines cross-country insurance with labor-market stabilization, whereas the distortion-minimization problem isolates the stabilization role of fiscal transfers.