The Political Economy of Currency Unions

Kai Arvai

Banque de France

September 30 2022

Introduction

- How can monetary policy sustain a currency union when member states have an exit option?

Introduction

- How can monetary policy sustain a currency union when member states have an exit option?
- Can the central bank with **interest rate** policy alone save the union?

Introduction

- How can monetary policy sustain a currency union when member states have an exit option?
- Can the central bank with **interest rate** policy alone save the union?
- Main contribution:
  - Derive an interest rate rule with state-dependent country weights that can prevent a break-up
  - Spell out conditions under which such a rule works and when not
  - Show which countries are expected to bear the burden

Introduction

- How can monetary policy sustain a currency union when member states have an exit option?
- Can the central bank with **interest rate** policy alone save the union?
- Main contribution:
  - Derive an interest rate rule with state-dependent country weights that can prevent a break-up
  - Spell out conditions under which such a rule works and when not
  - Show which countries are expected to bear the burden
- Preview: Central bank has limits, the rule is not fully credible as it only extends lifetime of the union for a while. Fiscal policy is more potent

Setup

- New Open Economy Model with **2 countries**
- These two countries are in a currency union

Setup

- New Open Economy Model with **2 countries**
- These two countries are in a currency union

- Benefits: Trade of goods is easier with common currency Trade

Setup

- New Open Economy Model with **2 countries**
- These two countries are in a currency union
- Benefits: Trade of goods is easier with common currency Trade
- Costs: The exchange rate as an important shock absorber is missing

Setup

- New Open Economy Model with **2 countries**
- These two countries are in a currency union
- Benefits: Trade of goods is easier with common currency Trade
- Costs: The exchange rate as an important shock absorber is missing
  - Lack of exchange rate is especially costly when **asymmetric shock** hits the union
  - That is the situation in which introducing a national currency is attractive (the outside option)

Exiting the Union

Two-sided limited commitment to the currency union

- Governments decide unilaterally if they leave the currency union
- Utility of the representative household in the member state is decisive.
- Asymmetric shock. Trade benefits of currency union are outweighed by stabilization costs for one country

What can a Central Bank do?

Big Asymmetric (productivity) shock. What can the bank do?

- **Interest rate ↑ (or ↓)**. Intertemp. subst.: **Consumption ↓ (or ↑)**
- But: One-size fits all instrument for currency union. → affects demand everywhere
- One country would like to have higher, the other lower interest rates
- The central bank **trades off costs** of one country **with benefits** of another
- How far can the central bank go?
- How important are trade gains and bus. cycle synchronicity?
- Does one country benefit?
- Spell out conditions under which CB can save the union

Results: Optimal Policies under Exit Options

- An interest rate rule with **state-dependent** country weights sustains the union

Results: Optimal Policies under Exit Options

- An interest rate rule with **state-dependent** country weights sustains the union
- **Credibility** of the rule decisive: If credible, announcement of the CB pushes break-up prob to 0, making the union more attractive
- This renders actual policy interventions unnecessary for many states of the world (announcement effect of "whatever it takes")

Results: Optimal Policies under Exit Options

- An interest rate rule with **state-dependent** country weights sustains the union
- **Credibility** of the rule decisive: If credible, announcement of the CB pushes break-up prob to 0, making the union more attractive
- This renders actual policy interventions unnecessary for many states of the world (announcement effect of "whatever it takes")
- Calibrated simulation: Ability of the central bank is limited

Results: Optimal Policies under Exit Options

- An interest rate rule with **state-dependent** country weights sustains the union
- **Credibility** of the rule decisive: If credible, announcement of the CB pushes break-up prob to 0, making the union more attractive
- This renders actual policy interventions unnecessary for many states of the world (announcement effect of "whatever it takes")
- Calibrated simulation: Ability of the central bank is limited
  1. Interest rates are distortionary for one country

Results: Optimal Policies under Exit Options

- An interest rate rule with **state-dependent** country weights sustains the union
- **Credibility** of the rule decisive: If credible, announcement of the CB pushes break-up prob to 0, making the union more attractive
- This renders actual policy interventions unnecessary for many states of the world (announcement effect of "whatever it takes")
- Calibrated simulation: Ability of the central bank is limited
  1. Interest rates are distortionary for one country
  2. Promises about the future limited to some (asymmetric) states

Results: Optimal Policies under Exit Options

- An interest rate rule with **state-dependent** country weights sustains the union
- **Credibility** of the rule decisive: If credible, announcement of the CB pushes break-up prob to 0, making the union more attractive
- This renders actual policy interventions unnecessary for many states of the world (announcement effect of "whatever it takes")
- Calibrated simulation: Ability of the central bank is limited
  1. Interest rates are distortionary for one country
  2. Promises about the future limited to some (asymmetric) states
- Central Bank can only extend the lifetime of a currency union for a while, but not permanently
- The union eventually collapses if a sequence of sufficiently large shocks hit

Results: Optimal Policies under Exit Options

- An interest rate rule with **state-dependent** country weights sustains the union
- **Credibility** of the rule decisive: If credible, announcement of the CB pushes break-up prob to 0, making the union more attractive
- This renders actual policy interventions unnecessary for many states of the world (announcement effect of "whatever it takes")
- Calibrated simulation: Ability of the central bank is limited
  1. Interest rates are distortionary for one country
  2. Promises about the future limited to some (asymmetric) states
- Central Bank can only extend the lifetime of a currency union for a while, but not permanently
- The union eventually collapses if a sequence of sufficiently large shocks hit
- Fiscal transfers are more potent, Italy-Germany union survives (but not UK-Germany union)
- More open country (Germany) pays net-transfers

Related Literature

- Monetary policy for open economies: Corsetti and Pesenti (2002), Gali and Monacelli (2005)

Related Literature

- Monetary policy for open economies: Corsetti and Pesenti (2002), Gali and Monacelli (2005)
- Gains of a Currency Union:
  - Trade: Baldwin et al. (2008) +5%, Micco et al. (2003) +4% to +16%, Glick and Rose (2002) very high, Baier et al. (2014) very high if other economic integration agreements are considered. Trade
  - Commitment: Chari et al. (2019), Schaumberg and Tambalotti (2007)
  - Financial market integration: Fornaro (2019)

Related Literature

- Monetary policy for open economies: Corsetti and Pesenti (2002), Gali and Monacelli (2005)
- Gains of a Currency Union:
  - Trade: Baldwin et al. (2008) +5%, Micco et al. (2003) +4% to +16%, Glick and Rose (2002) very high, Baier et al. (2014) very high if other economic integration agreements are considered. Trade
  - Commitment: Chari et al. (2019), Schaumberg and Tambalotti (2007)
  - Financial market integration: Fornaro (2019)
- Exit Options in a Union: Fuchs and Lippi (2006), Ferrari et al. (2019), Eijffinger (2018)

Related Literature

- Monetary policy for open economies: Corsetti and Pesenti (2002), Gali and Monacelli (2005)
- Gains of a Currency Union:
  - Trade: Baldwin et al. (2008) +5%, Micco et al. (2003) +4% to +16%, Glick and Rose (2002) very high, Baier et al. (2014) very high if other economic integration agreements are considered. Trade
  - Commitment: Chari et al. (2019), Schaumberg and Tambalotti (2007)
  - Financial market integration: Fornaro (2019)
- Exit Options in a Union: Fuchs and Lippi (2006), Ferrari et al. (2019), Eijffinger (2018)
- Fiscal and Monetary Policy in a Union: Auclert and Rognlie (2014), Farhi and Werning (2017), limited commitment and debt restructuring: Müller et al. (2019), Abraham et al. (2019)

Model Structure

Follow Corsetti and Pesenti (2002): Home (H) and Foreign (F) country

Firms

- Two types of good, H and F, imperfect substitutes
- No capital, each country produces varieties of goods
- **Prices set one period in advance**. Producer Currency Pricing
- Monopolistic markets, **trade costs** when exporting

Model Structure

Follow Corsetti and Pesenti (2002): Home (H) and Foreign (F) country

Firms

- Two types of good, H and F, imperfect substitutes
- No capital, each country produces varieties of goods
- **Prices set one period in advance**. Producer Currency Pricing
- Monopolistic markets, **trade costs** when exporting

Households

- Consume both types, each has a **home bias**
- Supply labor
- Can borrow/lend in international financial markets

Model Structure

Follow Corsetti and Pesenti (2002): Home (H) and Foreign (F) country

Firms

- Two types of good, H and F, imperfect substitutes
- No capital, each country produces varieties of goods
- **Prices set one period in advance**. Producer Currency Pricing
- Monopolistic markets, **trade costs** when exporting

Households

- Consume both types, each has a **home bias**
- Supply labor
- Can borrow/lend in international financial markets

Model

Government

National fiscal authorities

- Subsidies τ to eliminate monopolistic markups
- **Lump-sum taxes** for households, balanced budget

Government

National fiscal authorities

- Subsidies τ to eliminate monopolistic markups
- **Lump-sum taxes** for households, balanced budget

Central bank(s)

- Sets interest rates
- Monetary policy under commitment
- Currency Union
- National Currency as outside option
- **Producer Currency Pricing (PCP)** and flexible exchange rate give most favorable outside option, other pricing in robustness

Policy with National Currencies

National central bank acts under commitment: Discretion

$$\max_{\{i_t(s^t)\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \sum_{s^t \in A} \beta^t p(s^t \mid s^0) \left(\log(C_t(s^t)) - \kappa L_t(s^t) \right)$$

subject to equilibrium conditions

Policy with National Currencies

National central bank acts under commitment: Discretion

$$\max_{\{i_t(s^t)\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \sum_{s^t \in A} \beta^t p(s^t \mid s^0) \left(\log(C_t(s^t)) - \kappa L_t(s^t) \right)$$

subject to equilibrium conditions

Optimal national monetary policy under PCP: **Price stability**

Policy with National Currencies

National central bank acts under commitment: Discretion

$$\max_{\{i_t(s^t)\}_{t=0}^{\infty}} \sum_{t=0}^{\infty} \sum_{s^t \in A} \beta^t p(s^t \mid s^0) \left(\log(C_t(s^t)) - \kappa L_t(s^t) \right)$$

subject to equilibrium conditions

Optimal national monetary policy under PCP: **Price stability**
$\rightarrow$ **Rigid prices are main friction, optimally firm's marginal costs are stabilized**:

$$MC_t = \mathbb{E}_{t-1}[MC_t]$$

$\rightarrow$ Exchange rate is flexible.
$\rightarrow$ Flex price allocation with trade costs can be replicated for all states.

Policy in a Currency Union

Union-wide central bank acts under commitment, weight for H is ξ

$$\max_{\{i_t^{EU}\}_{t=k}^{\infty}} \xi \sum_{t=0}^{\infty} \sum_{s^t \in A} \beta^t p(s^t \mid s^0) \left(\log(C_t(s^t)) - \kappa L_t(s^t) \right)$$
$$+ (1-\xi) \sum_{t=0}^{\infty} \sum_{s^t \in A} \beta^t p(s^t \mid s^0) \left(\log(C_t^*(s^t)) - \kappa L_t^*(s^t) \right)$$

subject to equilibrium conditions and weight ξ for H

Optimal union-wide policy: **Price stability** for the union.

Policy in a Currency Union

$\rightarrow$ Weighted average of marginal costs is stabilized:

$$1 = \left(\underbrace{(\xi\gamma + (1-\xi)(1-\gamma))}_{\text{Effective weight for H}} \frac{MC_t}{\mathbb{E}_{t-1}[MC_t]} + (\xi(1-\gamma) + (1-\xi)\gamma) \frac{MC_t^*}{\mathbb{E}_{t-1}[MC_t^*]} \right)^{-1}$$

Effective weight depends on country weight ξ and **home bias** γ

Policy in a Currency Union

$\rightarrow$ Weighted average of marginal costs is stabilized:

$$1 = \Bigg(\underbrace{\left(\xi\gamma + (1-\xi)(1-\gamma)\right)}_{\text{Effective weight for H}} \frac{MC_t}{\mathbb{E}_{t-1}[MC_t]} + \left(\xi(1-\gamma) + (1-\xi)\gamma\right) \frac{MC_t^*}{\mathbb{E}_{t-1}[MC_t^*]} \Bigg)^{-1}$$

Effective weight depends on country weight ξ and **home bias** γ

$\xi \uparrow$ and $\gamma \uparrow$, more weight on home's marginal costs

$\rightarrow$ Fixed exchange rate, no trade costs
$\rightarrow$ Flex price allocation can only be replicated, if productivity the same

Calibration, SMM

- Symmetric country calibration (asymmetric in robustness)
- Consider a range of trade gains from a currency union, here 4.6% and 6.5%
- Calibrate shocks that match correlation of GDP growth and volatility for Gemany-**Italy** union and Germany-**UK** union

Table: SMM Calibration

	Italy	**UK**	**Description**
Parameters			
ρ	0.66	0.73	weight on local shock
σ	3.48	3.68	variance of shock process
Moments			
GDP correlation data	0.75	0.59	GDP correlation 1970-2020
GDP correlation model	0.75	0.59	GDP correlation in the model
GDP volatility data	2.71	2.70	St. dev. of GDP growth 1970-2020
GDP volatility model	2.71	2.73	St. dev. of GDP growth in the model

Model Experiment

Run several simulation under four scenarios
In each scenario outside option is the same. Only policy within the union differs.

Experiment	Transfers	Interest rates
1. National Planner	-	-
2. Union-wide Ramsey Planner	✓	-
3. **Union-wide Central Bank**	-	✓
4. Transfers & Mon Pol	✓	✓

$\Rightarrow$ Exit options add occasionally binding participation constraints

Optimal Monetary Policy with Exit Option

Old monetary stance if countries cannot exit

$$1 = \left(\left(\xi\gamma + (1-\xi)(1-\gamma)\right) \frac{MC_t}{\mathbb{E}_{t-1}[MC_t]} + \left(\xi(1-\gamma) + (1-\xi)\gamma\right) \frac{MC_t^*}{\mathbb{E}_{t-1}[MC_t^*]} \right)^{-1}$$

New monetary stance with exit option

$$1 = \left(\frac{1-\gamma+\lambda(s^t)\gamma}{1+\lambda(s^t)} \frac{MC_t}{\mathbb{E}_{t-1}[MC_t]} + \frac{\gamma+\lambda(s^t)(1-\gamma)}{1+\lambda(s^t)} \frac{MC_t^*}{\mathbb{E}_{t-1}[MC_t^*]} \right)^{-1}$$

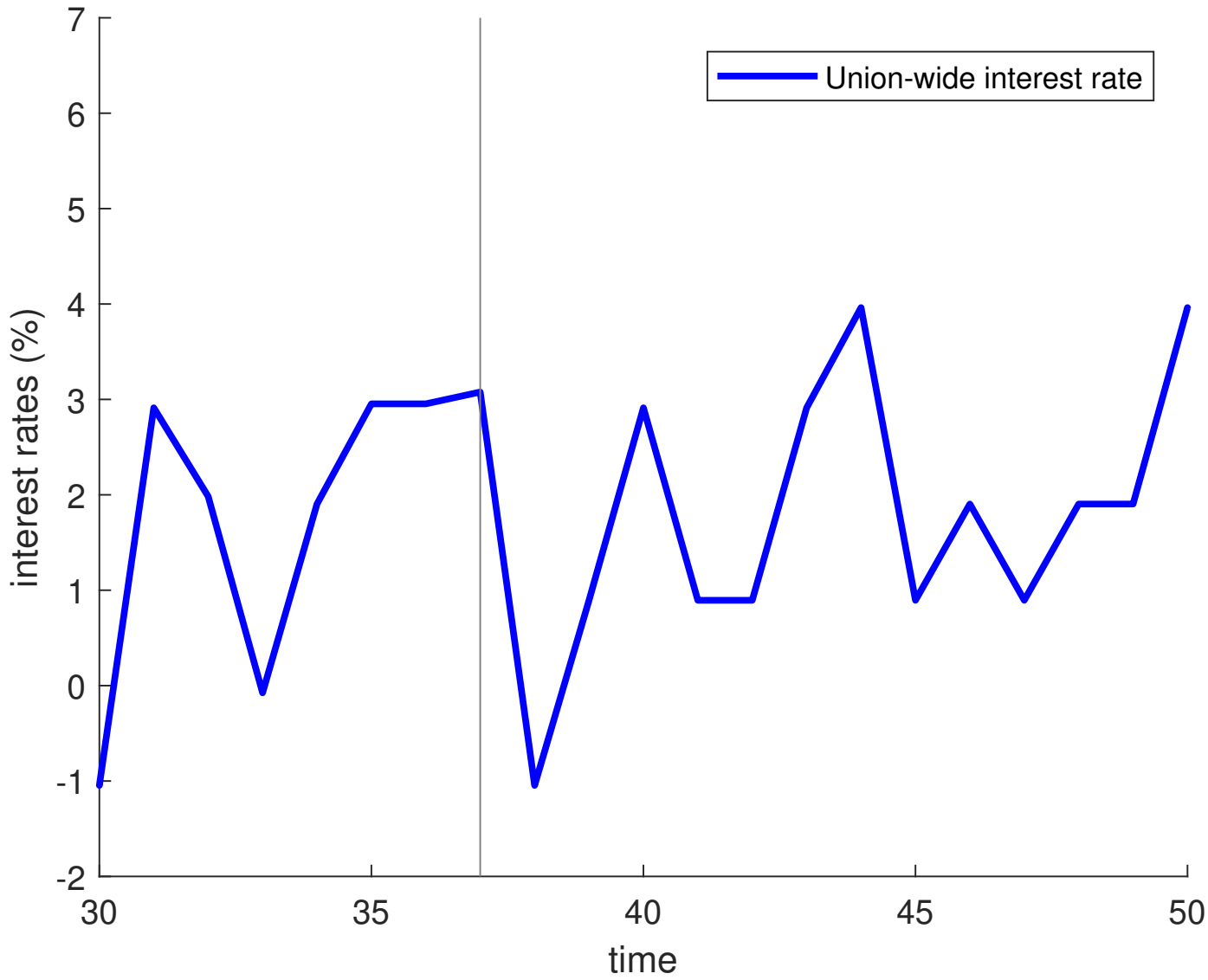
$\Rightarrow \lambda(s^t)$ state-dependent country weight for H

Intuition

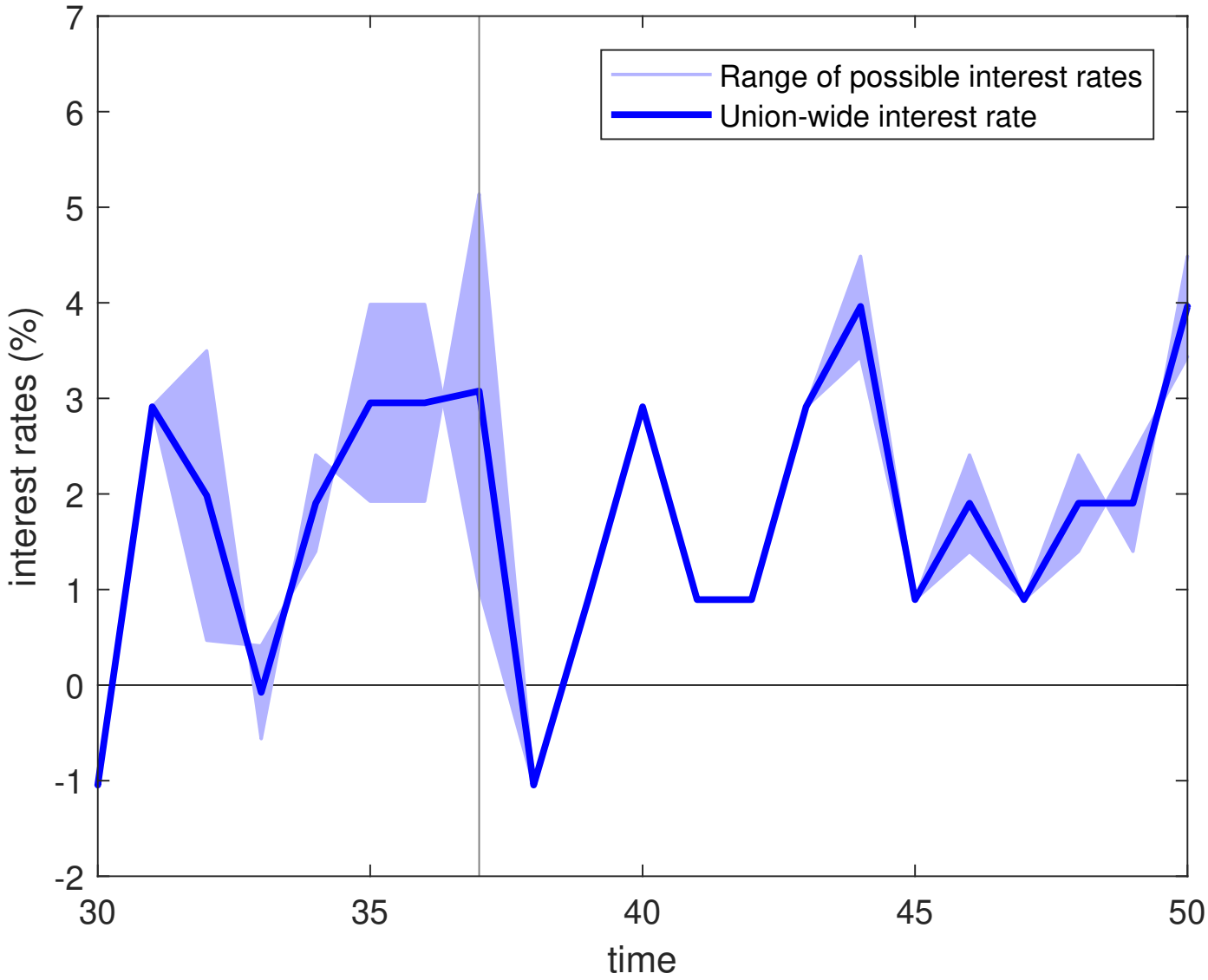
Once a shock comes that makes H willing to leave

- Central bank adjusts interest rates and affects economic activity today
- It announces to do more favorable policy for the crisis country in the future
- Relative weight $\lambda(s^t)$ persistently increases, until another big shock hits the union

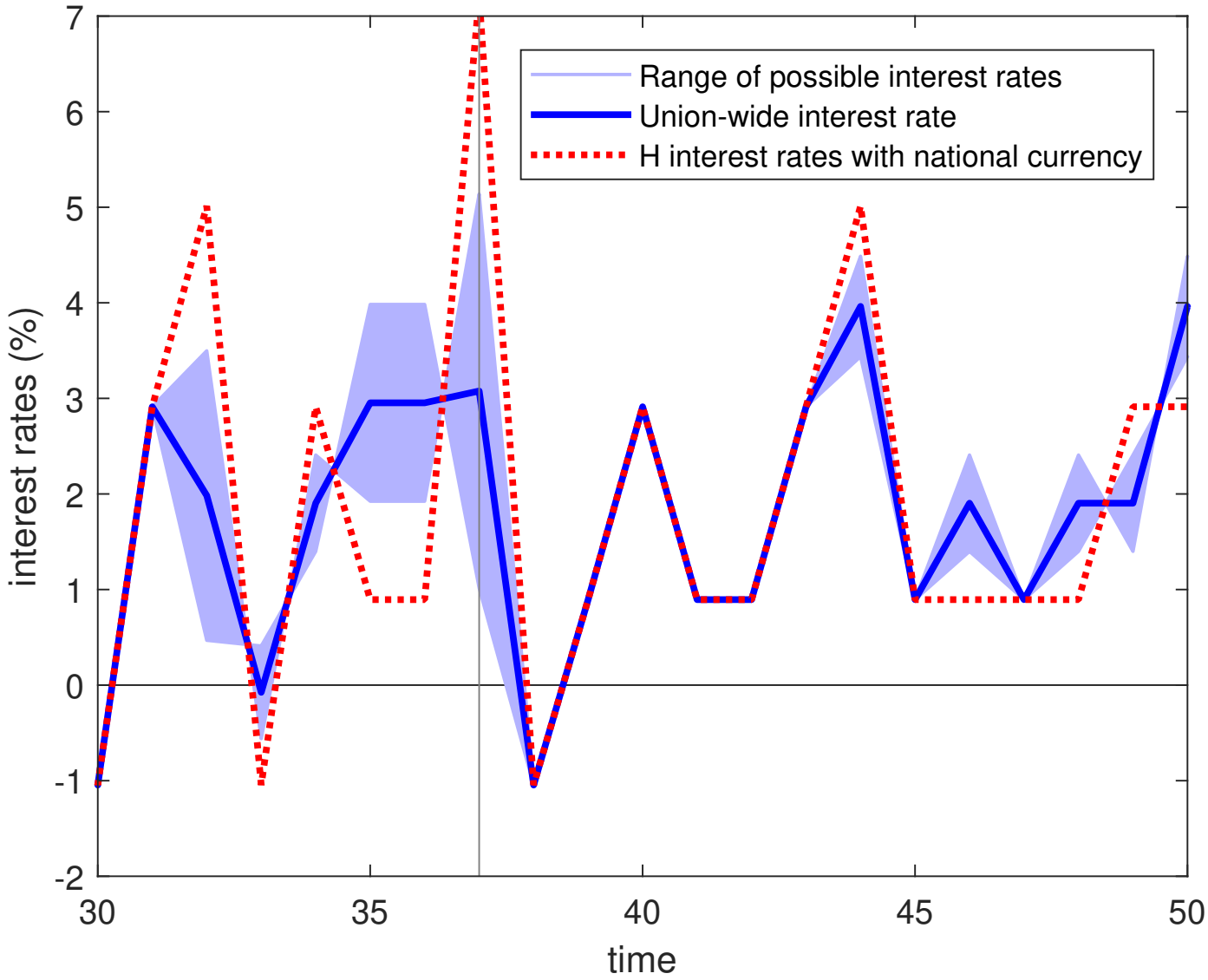
Simulation Interest Rate Path: No Exit Option



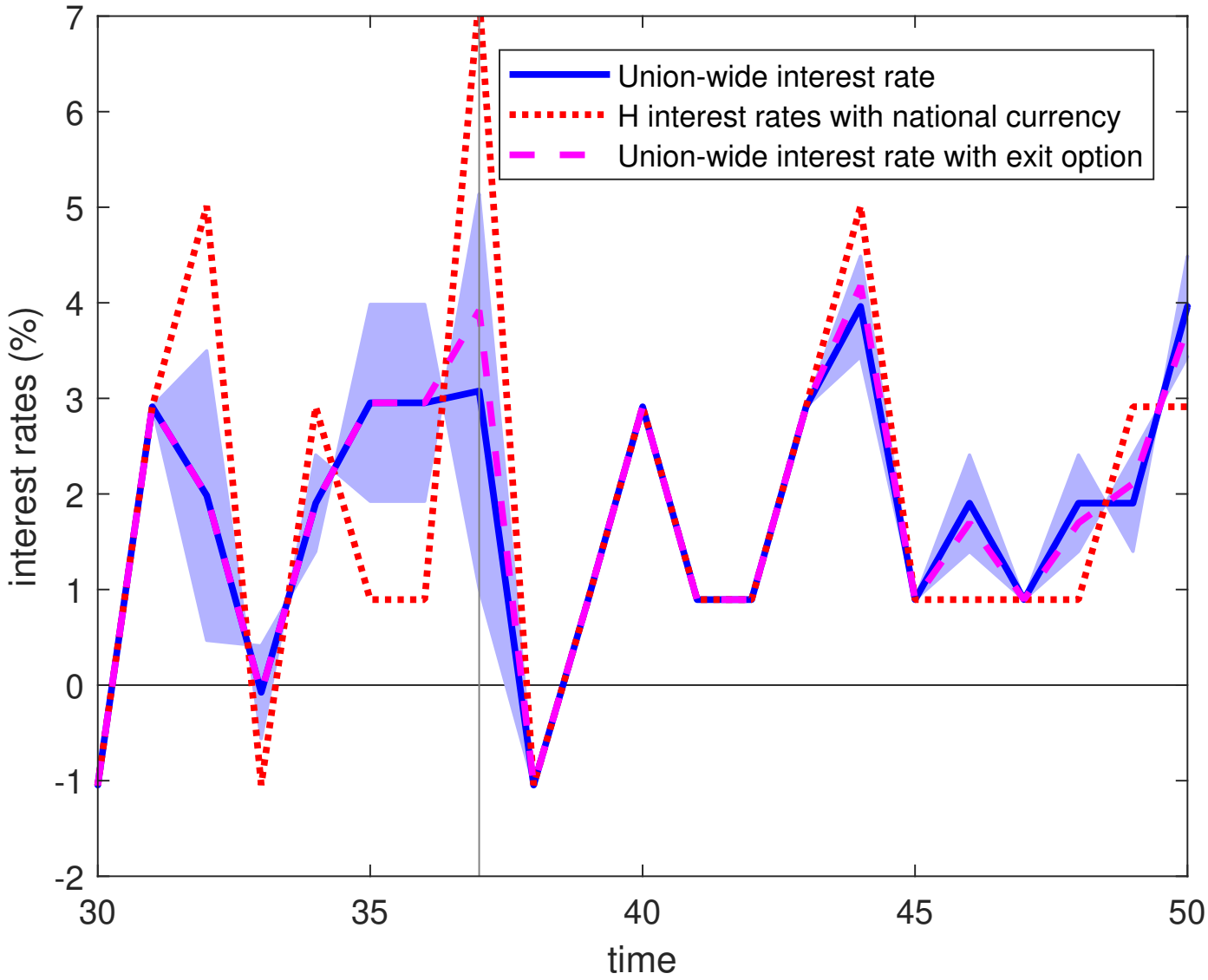
Simulation Interest Rate Path: Set of Possible Rates



Simulation Interest Rate Path: With National Currency



Simulation Interest Rate Path: With Exit Option



Break-up with High Trade Gains

Table: Break-up under different planners, trade gains 6.5%

Planner Allocation	Prob. of a break-up next period		Median duration of the union		Average Gain	
	UK	**Ita**	**UK**	**Ita**	**UK**	**Ita**
National	2.15%	0%	67	100001	0.016654	0.018692
Fiscal	0%	0%	100001	100001	0.016661	0.018692
Monetary	0%	0%	100001	100001	0.016939	0.018692
Fiscal & Monetary	0%	0%	100001	100001	0.01686	0.018692
First best	0%	0%	100001	100001	0.020814	0.020814

Lower Trade Gains

Consider a large simulation with lower trade gains of 4.6%:

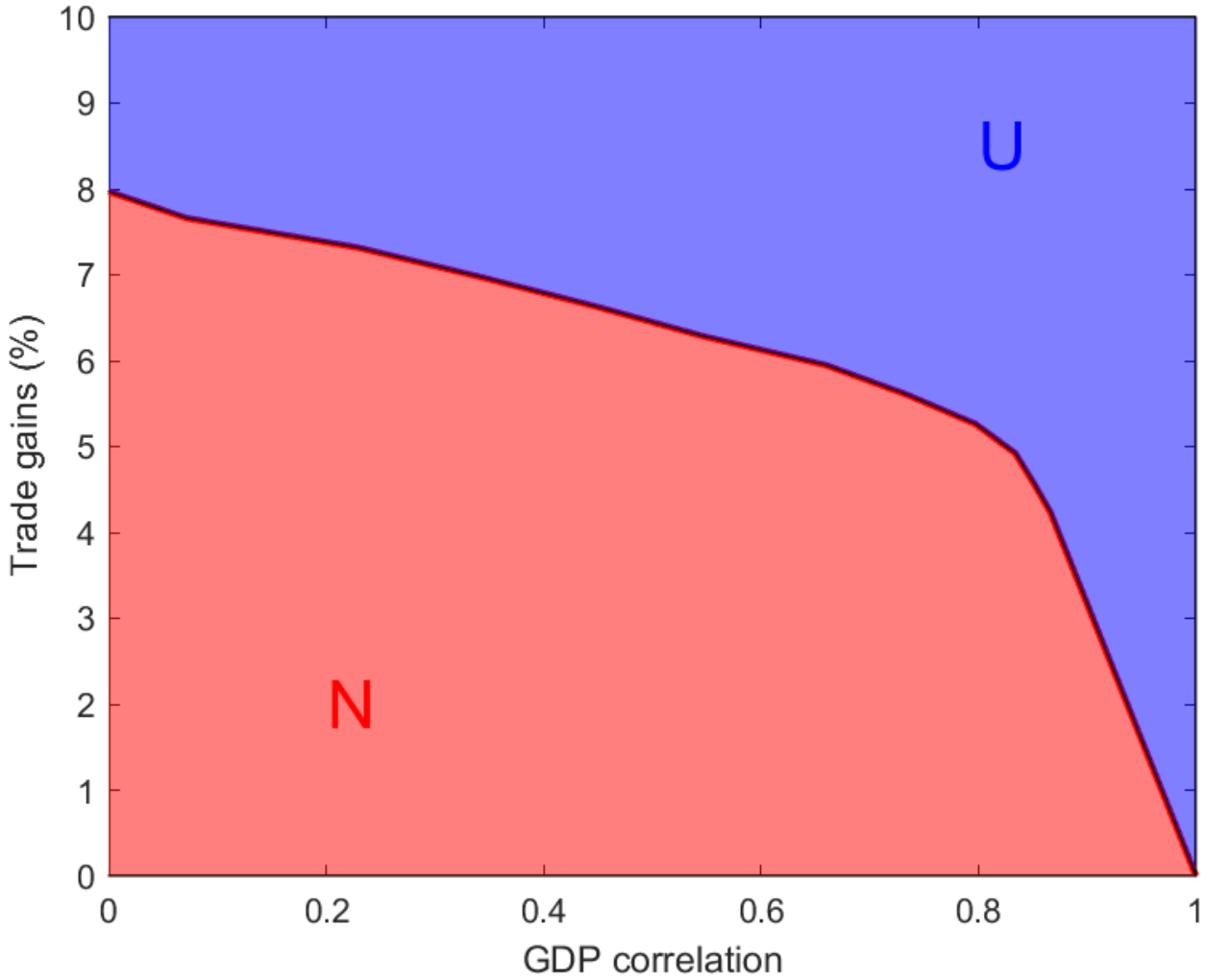
- Gains of union turn negative more frequently, countries would **exit more frequently** Gains
- Larger amount of transfers needed (0.1% of GDP per period). Union **can still be sustained with transfers** Transfers
- Monetary policy cannot sustain the union, only able to extend the lifetime of an unstable currency union a bit

Results with low trade gains

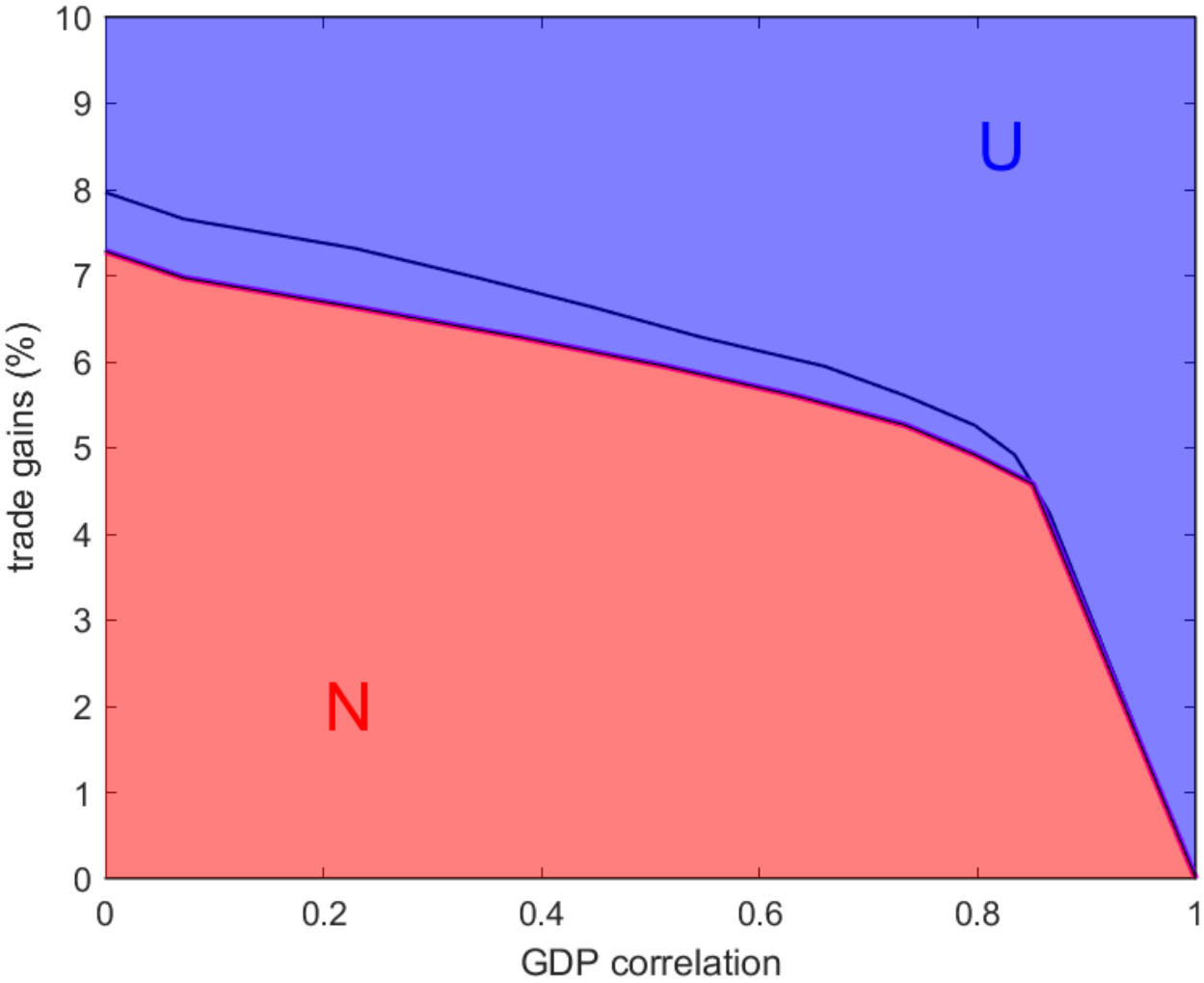
Table: Break-up under different planners, trade gains 4.6%

Planner Allocation	Prob. of a break-up next period		Median duration of the union		Average Gain	
	UK	**Ita**	**UK**	**Ita**	**UK**	**Ita**
National	46.30%	2.29%	3	62	0.0047635	0.010301
Fiscal	0%	0%	100001	100001	0.0090647	0.010555
Monetary	2.15%	2.29%	67	62	0.0086743	0.0098041
Fiscal & Monetary	0%	0%	100001	100001	0.0092006	0.010467
First best	0%	0%	100001	100001	0.012665	0.012665

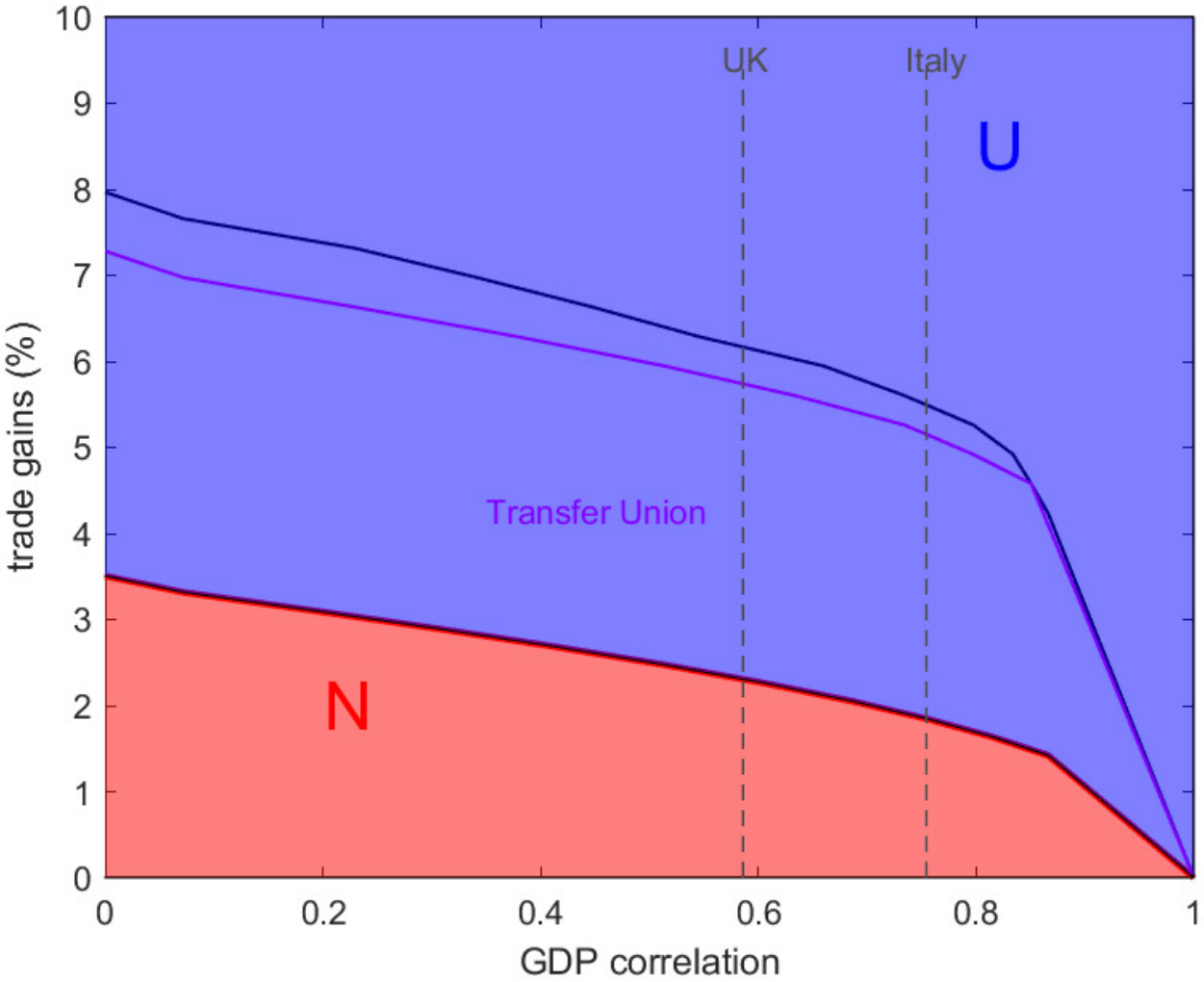
Sustainability Frontier: National Planner



Sustainability Frontier: Monetary Policy



Sustainability Frontier: Transfers

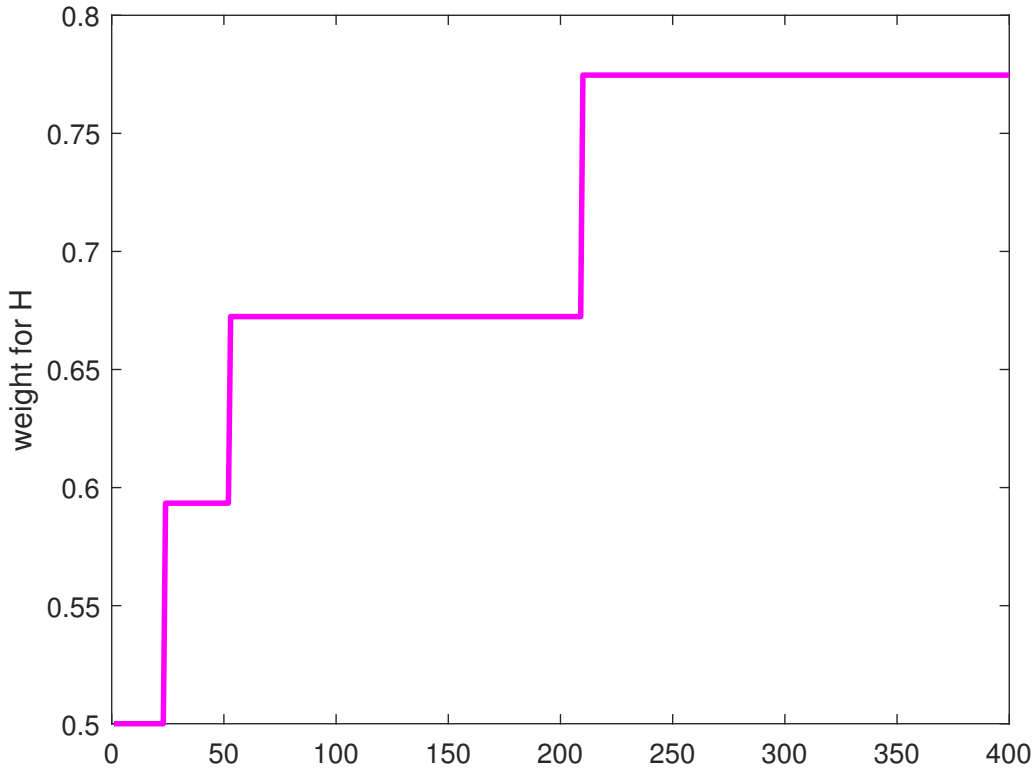


Robustness, asymmetric countries

- Change PCP assumption to LCP or intermediate values
- Consider asymmetric countries

If F is more open, it benefits more from trade in union

F never hits participation constraint, H's weight for CB with exit option converges to fix values



Conclusion

- Monetary policy alone cannot sustain currency union
- Central bank can only extend the lifetime of an unstable currency union for some time
- It requires other interventions than monetary policy to prevent exit by a member state
- Larger gains and higher GDP growth correlation increase stability. A union with the UK seems less stable.

Trade Benefits

- The paper models the costs of a currency union in detail, not the gains
- The gains in form of more trade of goods in the steady state is by assumption
- Think about the elimination of currency conversion costs and more complicated contracts with different currencies
- Trade gains can also be thought as break-up costs: If currency union breaks up, you have to make a new trade deal
- Baier et al. (2014). Customs Unions & common market increase bilateral trade by a lot! Country that exits the union might have to exit these agreements as well.

Intro firms literature calibration

Households

- Countries **H** and **F** with representative households.

$$\mathbb{E}\left[\sum_{\tau=t}^{\infty}\beta^{\tau-t}\left(\ln(C_\tau)-\kappa L_\tau\right)\right]$$

- C_t is basket of **home and foreign** goods with **home bias** γ

$$C_t = C_{H,t}^{\gamma}C_{F,t}^{1-\gamma}, \quad C_t^* = C_{H,t}^{*1-\gamma}C_{F,t}^{*\gamma}$$

- Varieties h: $C_{H,t} = \left[\int_0^1 C(h)^{\frac{\theta-1}{\theta}}dh\right]^{\frac{\theta}{\theta-1}}$

Households

- Countries **H** and **F** with representative households.

$$\mathbb{E}\left[\sum_{\tau=t}^{\infty}\beta^{\tau-t}\left(\ln(C_\tau)-\kappa L_\tau\right)\right]$$

- C_t is basket of **home and foreign** goods with **home bias** γ

$$C_t = C_{H,t}^{\gamma}C_{F,t}^{1-\gamma}, \quad C_t^* = C_{H,t}^{*1-\gamma}C_{F,t}^{*\gamma}$$

- Varieties h: $C_{H,t} = \left[\int_0^1 C(h)^{\frac{\theta-1}{\theta}}dh\right]^{\frac{\theta}{\theta-1}}$
- The budget constraint is given by

$$B_{H,t}+\mathcal{E}_t B_{F,t}+P_{H,t}C_{H,t}+P_{F,t}C_{F,t}+T_t =$$
$$(1+i_t)B_{H,t-1}+(1+i_t^*)\mathcal{E}_t B_{F,t-1}+W_t L_t+\Pi_{H,t}$$

- Exchange rate $\mathcal{E}_t$ defined as one unit of home currency per unit of foreign currency, i_t set by central bank and known in $t-1$.

Firms

- Input labor $L_t(h)$ to produce variety h:

$$Y_t(h) = a_t L_t(h)$$

- Stochastic productivity a_t and a_t^*

Firms

- Input labor $L_t(h)$ to produce variety h:

$$Y_t(h) = a_t L_t(h)$$

- Stochastic productivity a_t and a_t^*
- Demand for good h:

$$\left(\frac{p_t(h)}{P_{H,t}}\right)^{-\theta} C_{H,t} + (1+\varpi)\left(\frac{p_t^*(h)}{P_{H,t}^*}\right)^{-\theta} C_{H,t}^*$$

- Iceberg trade costs. If 1 unit is shipped only $\frac{1}{1+\varpi}$ arrives. Trade

- Marginal costs MC_t and wages W_t:

$$MC_t(h) = MC_t = a_t^{-1} W_t$$

Firms: Profits and Pricing

- **Pricing one period before**
- Monopolistic pricing for H's goods in H and F
- Firms maximize their profits

$$\Pi_t(h) = \overbrace{\left((1-\tau)p_t(h) - MC_t\right)\left(\frac{p_t(h)}{P_{H,t}}\right)^{-\theta} C_{H,t}}^{\text{Profits in H}} + \underbrace{\left((1-\tau)\mathcal{E}_t p_t^*(h) - (1+\varpi)MC_t\right)\left(\frac{p_t(h)^*}{P_{H,t}^*}\right)^{-\theta} C_{H,t}^*}_{\text{Profits in F}}$$

Optimal Prices

$$p_t(h) = P_{H,t} = \frac{1}{1-\tau}\frac{\theta}{\theta-1}\mathbb{E}_{t-1}[MC_t]$$

$$p_t^*(h) = P_{H,t}^* = (1+\varpi)\frac{1}{1-\tau}\frac{\theta}{\theta-1}\frac{\mathbb{E}_{t-1}\left[MC_t\right]}{\mathcal{E}_t}$$

main

Discretion

$$\max_{\{i_t(s^t)\}_{t=k}^{\infty}} \sum_{t=0}^{\infty} \sum_{s^t \in A} \beta^t p(s^t \mid s^t) \left(\log(C_t(s^t)) - \kappa L_t(s^t) \right)$$

Monetary policy implies that marginal costs follow:

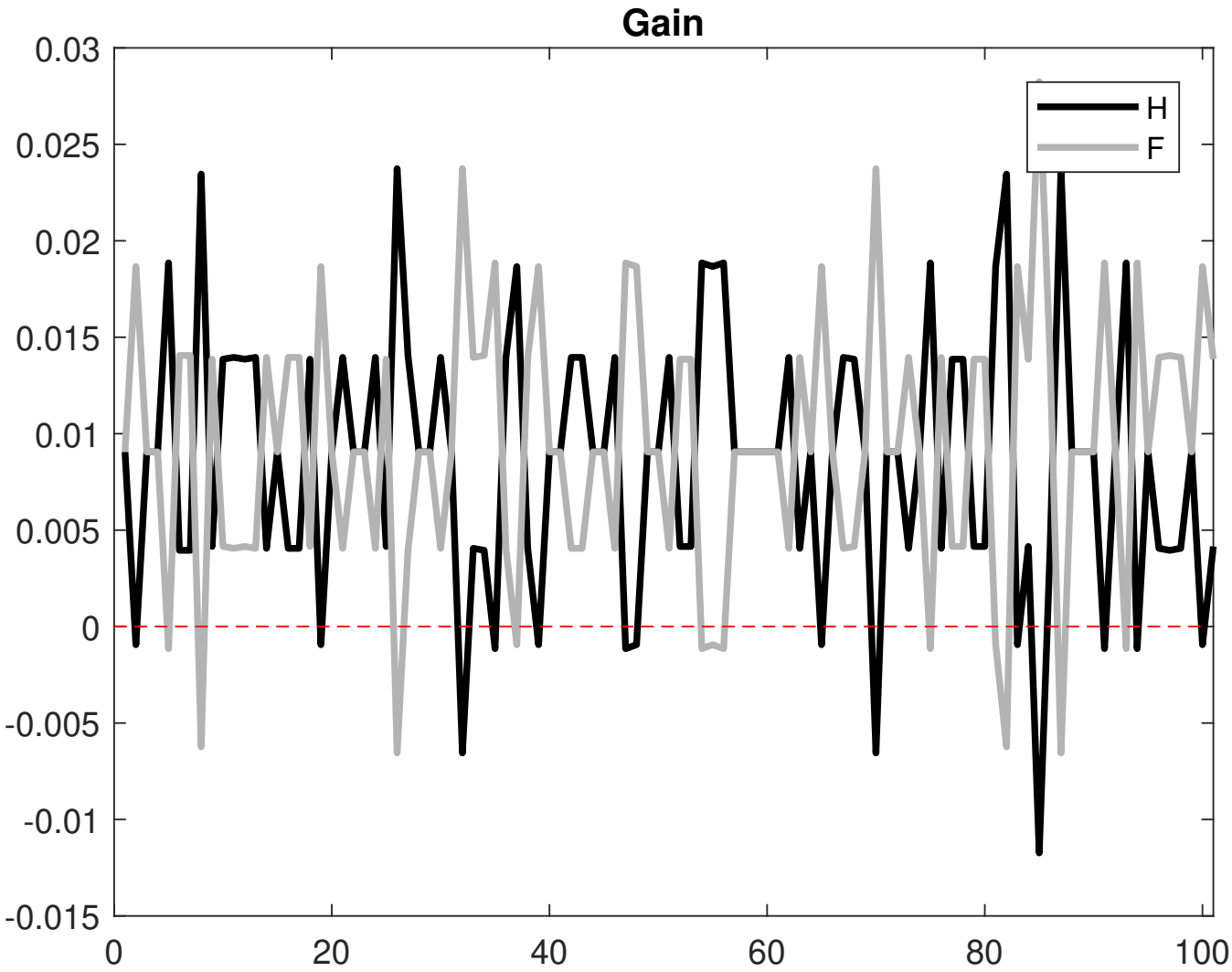
$$P_{Ht} = \Theta \mathbb{E}_{t-1}[MC_t]$$

where Θ is the inflationary bias, a function of trade openness, markups and subsidies. The higher the markups and the higher the home bias, the larger the inflationary bias will be, as a central bank tries to inflate away the monopolistic markups.

$$\Theta^{*N} = \frac{\gamma}{\frac{1+\gamma\varpi}{\frac{\theta^*}{(\theta^*-1)(1-\tau)(1+\varpi)}}}$$

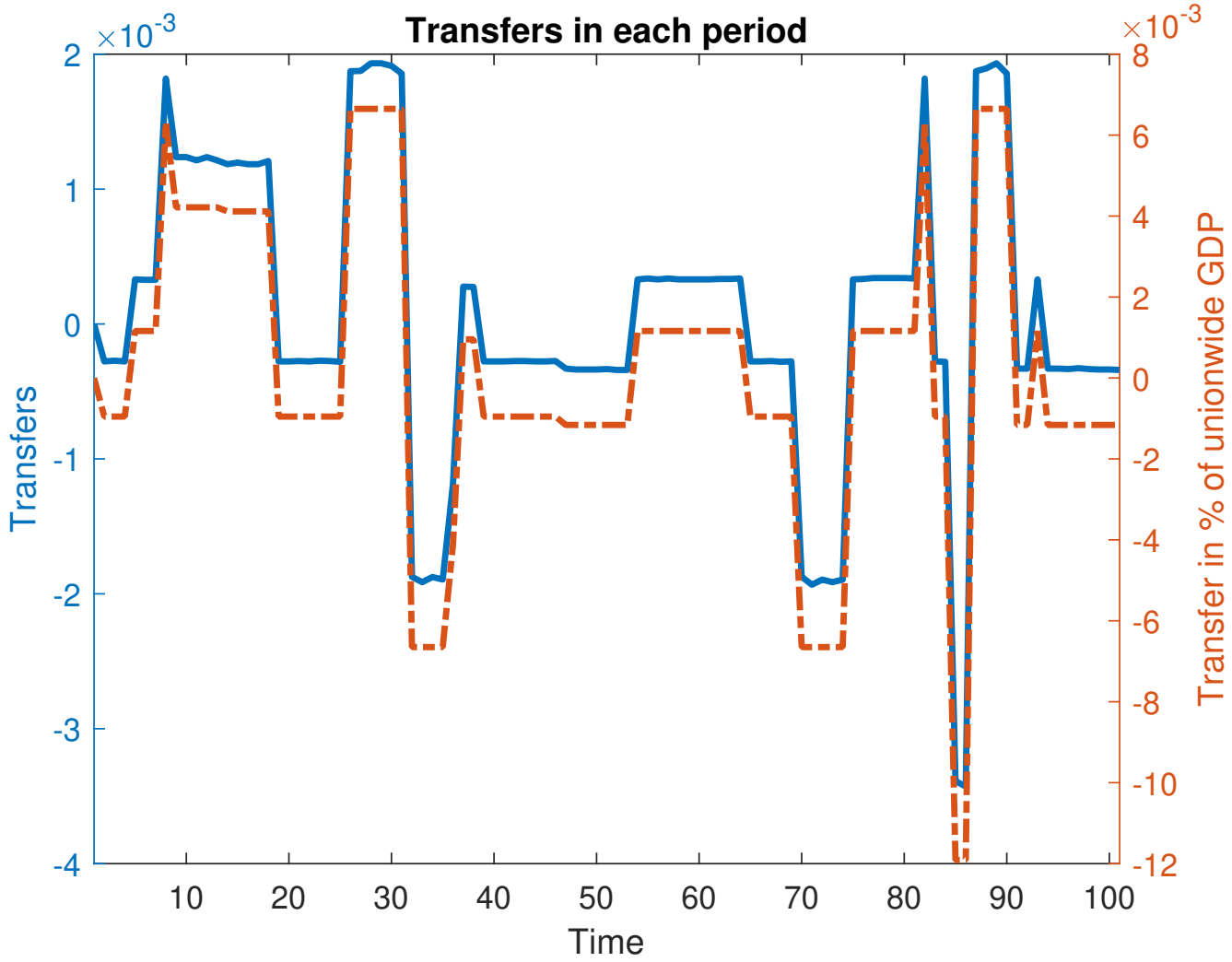
back

Gains over time with low trade gains



back

Transfers over time with low trade gains



back

Households

Countries **H** and **F** with representative households.

$$\mathbb{E}\left[\sum_{\tau=t}^{\infty}\beta^{\tau-t}\left(\ln(C_\tau)-\kappa L_\tau\right)\right]$$

C_t is a basket of **home and foreign goods**:

$$C_t = C_{H,t}^{\gamma}C_{F,t}^{1-\gamma}, \quad C_t^* = C_{H,t}^{*1-\gamma}C_{F,t}^{*\gamma}$$

varieties h: $C_{H,t} = \left[\int_0^1 C(h)^{\frac{\theta-1}{\theta}}dh\right]^{\frac{\theta}{\theta-1}}$

Households

Countries **H** and **F** with representative households.

$$\mathbb{E}\left[\sum_{\tau=t}^{\infty}\beta^{\tau-t}\left(\ln(C_\tau)-\kappa L_\tau\right)\right]$$

C_t is a basket of **home and foreign goods**:

$$C_t = C_{H,t}^{\gamma}C_{F,t}^{1-\gamma}, \quad C_t^* = C_{H,t}^{*1-\gamma}C_{F,t}^{*\gamma}$$

varieties h: $C_{H,t} = \left[\int_0^1 C(h)^{\frac{\theta-1}{\theta}}dh\right]^{\frac{\theta}{\theta-1}}$

The budget constraint is given by

$$B_{H,t}+\mathcal{E}_t B_{F,t}+P_{H,t}C_{H,t}+P_{F,t}C_{F,t}+T_t =$$
$$(1+i_t)B_{H,t-1}+(1+i_t^*)\mathcal{E}_t B_{F,t-1}+W_t L_t+\Pi_{H,t}$$

Exchange rate $\mathcal{E}_t$ defined as one unit of home currency per unit of foreign currency.

Firms

Input labor $L_t(h)$ to produce variety h:

$$Y_t(h) = L_t(h)a_t$$

Stochastic productivity a_t and a_t^*.

Firms

Input labor $L_t(h)$ to produce variety h:

$$Y_t(h) = L_t(h)a_t$$

Stochastic productivity a_t and a_t^*.
Demand for good h is:

$$\left(\frac{p_t(h)}{P_{H,t}}\right)^{-\theta} C_{H,t} + (1+\varpi)\left(\frac{p_t^*(h)}{P_{H,t}^*}\right)^{-\theta} C_{H,t}^*.$$

Iceberg trade costs. If 1 unit is shipped only $\frac{1}{1+\varpi}$ arrives.

Marginal costs MC_t and wages W_t.

$$MC_t(h) = MC_t = a_t^{-1} W_t$$

Firms: Profits and Pricing

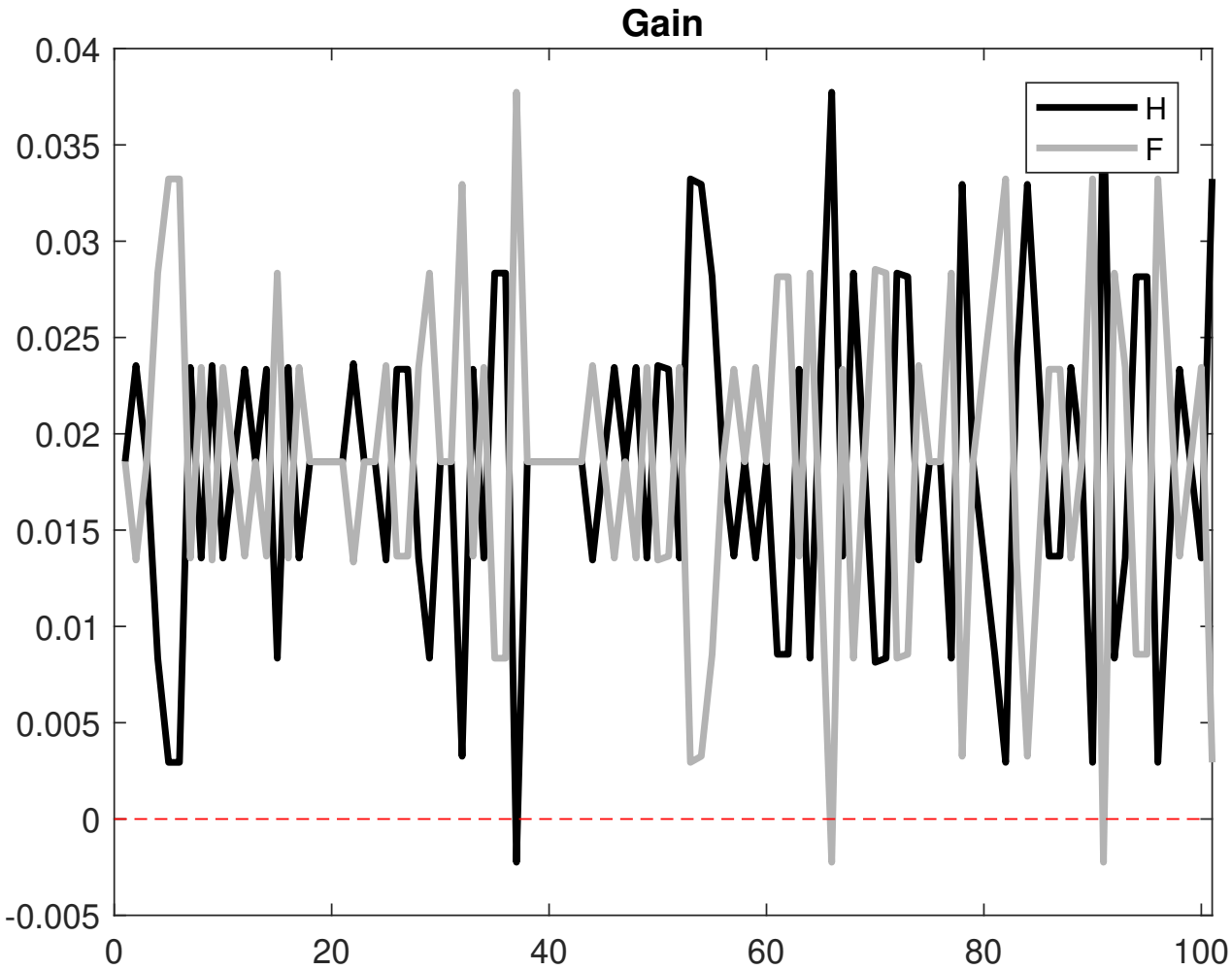
Profits are :

$$\Pi_t(h) = \overbrace{\left((1-\tau)p_t(h) - MC_t\right)\left(\frac{p_t(h)}{P_{H,t}}\right)^{-\theta} C_{H,t}}^{\text{Profits in H}} + \underbrace{\left((1-\tau)\mathcal{E}_t p_t^*(h) - (1+\varpi)MC_t\right)\left(\frac{p_t(h)^*}{P_{H,t}^*}\right)^{-\theta} C_{H,t}^*}_{\text{Profits in F}}$$

Pricing one period before: Monopolistic pricing for H's goods in H and F

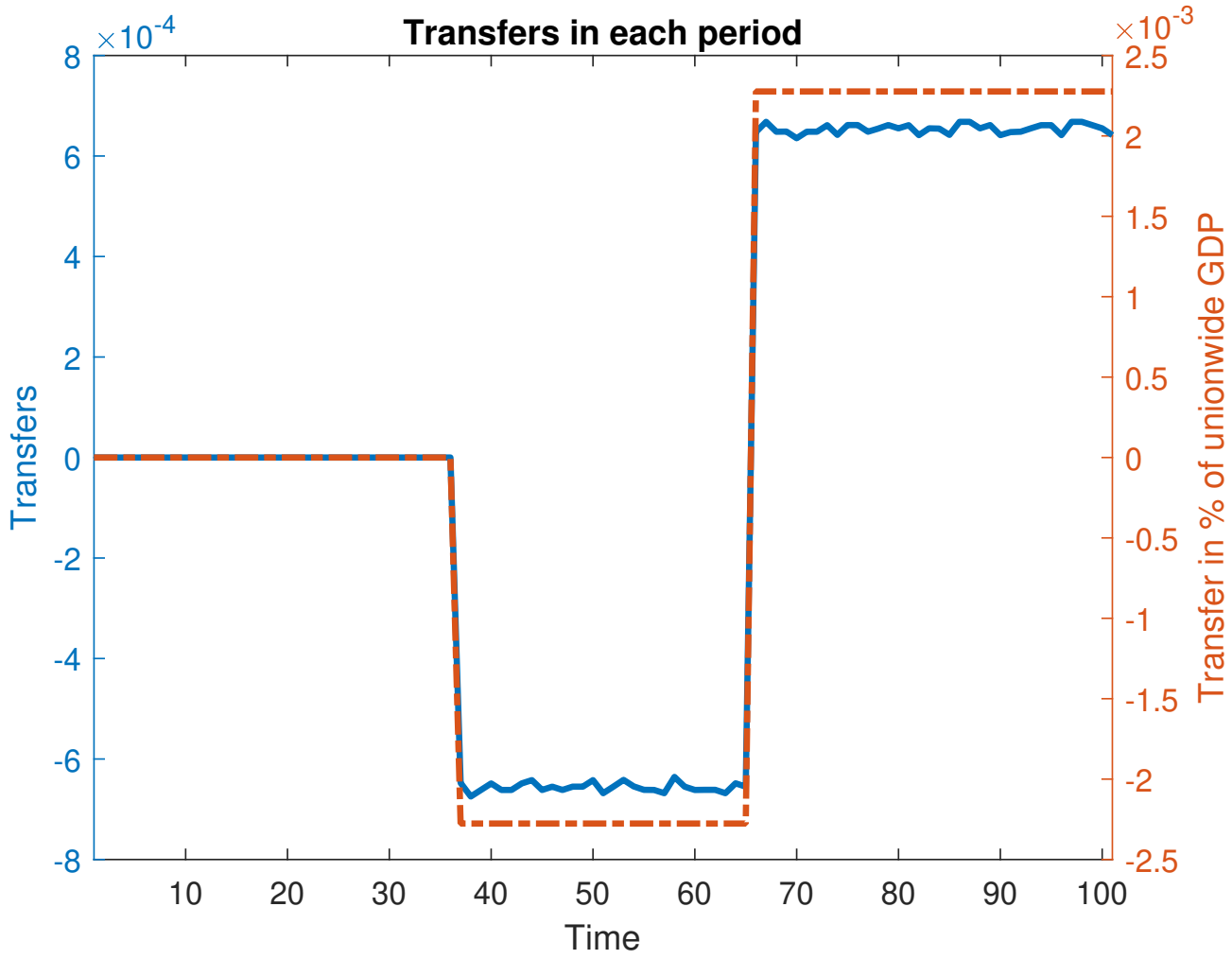
back

Break-up: Simulating Gain over time



Transfers

2.Ramsey Planner: Optimal Transfer in each Period



Gains

Mechanism and Intuition for Monetary Policy

Why are currency unions costly? Example of an asymmetric shock.

- **Productivity** $\downarrow$ in Home country. $\rightarrow$ **Marginal costs** $\uparrow$

Mechanism and Intuition for Monetary Policy

Why are currency unions costly? Example of an asymmetric shock.

- **Productivity** $\downarrow$ in Home country. $\rightarrow$ **Marginal costs** $\uparrow$

- Sticky prices: Prices do not rise enough, Home **prices are too low**
- **Too much demand** of home goods by foreigners
- Households in Home need to work too much, utility goes down

Mechanism and Intuition for Monetary Policy

Why are currency unions costly? Example of an asymmetric shock.

- **Productivity** $\downarrow$ in Home country. $\rightarrow$ **Marginal costs** $\uparrow$

- Sticky prices: Prices do not rise enough, Home **prices are too low**
- **Too much demand** of home goods by foreigners
- Households in Home need to work too much, utility goes down

- With a national currency & focus on price stability: **Interest rates** $\uparrow$, **exchange rate appreciates** and **prices** $\uparrow$ of home goods for foreigners
- In a currency union this adjustment does not happen