

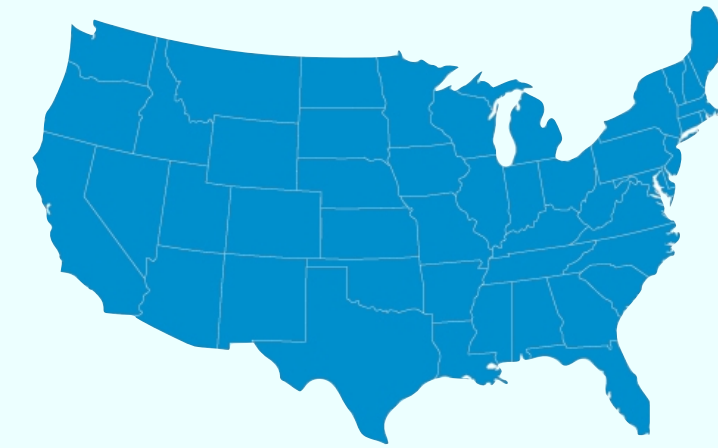
# CREi Lecture 2

Ivan Werning



# Setting the Stage

- Today: focus on the whole, collective union view
- “Case for flexible exchange rates” Friedman (1953)
- Currency unions...
  - single monetary policy
  - stabilize symmetric shocks...
  - ... **not** asymmetric shocks
- How can union lower cost asymmetric shocks?



# Setting the Stage

- Trilemma and OCA literature...
  - Trilemma... Mundell (63), Fleming (62)
  - factor mobility... Mundell (61)
  - openness... McKinnon (63)
  - fiscal integration....Kenen (69)
  - financial integration...Mundell (73)

# Setting the Stage

- Trilemma and OCA literature...
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**Today**



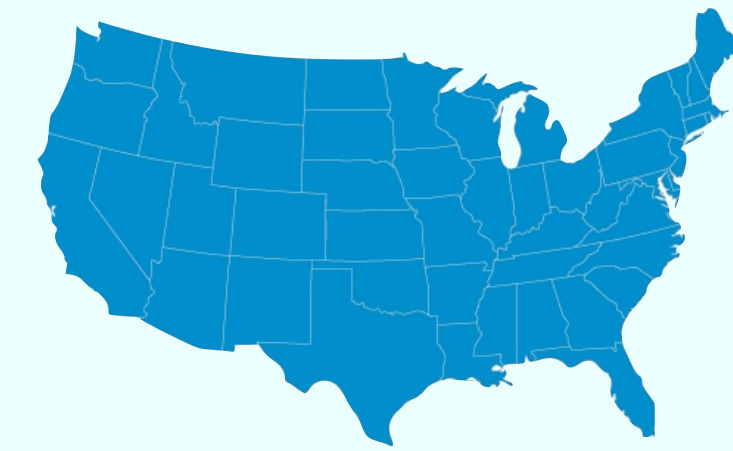
# Kenen 1969

*“It is a chief function of fiscal policy, using both sides of the budget, to offset or compensate for regional differences, whether in earned income or in unemployment rates. The large-scale **transfer payments** built into fiscal systems are **interregional**, not just interpersonal.”*



# United States Union

- Currency union since inception (1775 Continentals, Mint Act 1792 Dollar)
- Fiscal union more gradual...
  - federal taxes: duties, income
  - federal transfers: UI
  - federal banking system
- Feyrer-Sacerdote
  - regional differences in changes in unemployment  $< 2\%$  (much larger in Europe)
  - regional dampening:  $\$1 \Delta GDP \rightarrow \$0.25$  (mostly taxes, not transfers)  
Greece  $\Delta GDP = -16\% \rightarrow +4\%$  (0.06% of EZ GDP)
- Malkin-Wilson:  $\$1 \Delta GDP \rightarrow \$0.40$
- Bigger shocks: special assistance
- Private insurance via wealth portfolio diversification





# Eurozone Fiscal Union?


- EMU “Economic and Monetary Union” more than just EZ (trade, capital, labor mobility)
- Jean Monnet: “Europe will be forged in crisis, and will be the sum of the solutions adopted for those crises”
- Fiscal/Debt Commitments: avoid bailouts + fiscal space for national stabilization policy  
... but on average fiscal policy procyclical
- EMU reform plan 2012, 2015...
  - Sovereign Bailouts (ESM)
  - Banking union (monitoring, resolution, bailouts: SSM, SRM, SRF)
  - Pledges of “policy coordination” (corporate taxes, labor regulations)
  - Deposit Insurance (EDIS)
  - “Economic Shock Absorption Mechanism” transfers before outright sovereign bailouts
- ECB Quantitative Easing (APP)
- Coordinated Pandemic Stimulus: European Commission 2020 Recovery Plan
- Ideas under study...
  - European unemployment insurance (studies and Scholz)
  - Eurobonds

# Insurance Perspective

- Mechanism design meets Keynesian economics
  - fiscal union as **insurance** in a currency union
  - characterize **optimal** arrangement
- **Insight:** Dual role of transfers...
  - risk sharing (usual)
  - macro stabilization (extra)
- **Result 1:** risk sharing **more valuable** in currency union
- **Result 2:** macro externality in insurance decisions  
In currency union: **social insurance  $\neq$  private equilibrium**
- Fiscal and monetary unions go hand in hand
- Fiscal and financial integration **not** perfect substitutes



# Insurance Perspective

- **Key result:** macro externality in insurance decisions
  - Within a currency union: social  $\neq$  private
  - Fiscal and monetary unions go hand in hand
  - Fiscal and financial integration **not** perfect substitutes
- 
- A decorative graphic at the bottom of the slide consisting of several overlapping, wavy, translucent shapes in various colors including light blue, pink, yellow, and orange, creating a soft, abstract landscape effect.

# Implementation

- Complete markets
  - macro-prudential portfolio taxes
- Incomplete markets
  - fiscal transfers



# Implementation

- Complete markets

- macro-prudential portfolio taxes

- Incomplete markets

- fiscal transfers

# Households

$$U^i(C_{NT}^i, C_T^i, N^i; s)$$



# Households

- Country  $i$  households maximizes

subject to 
$$\int U^i(C_{NT}^i(s), C_T^i(s), N^i(s); s) \pi(s) ds$$

$$\int D^i(s) Q(s) \pi(s) ds \leq 0$$

$$P_{NT}^i C_{NT}^i(s) + P_T(s) C_T^i(s) \leq W^i(s) N^i(s) + P_T(s) E_T^i(s) \\ + \Pi^i(s) + T^i(s) + D^i(s)$$

# Households

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$$P_{NT}^i C_{NT}^i(s) + P_T(s) C_T^i(s) \leq W^i(s) N^i(s) + P_T(s) E_T^i(s) \\ + \Pi^i(s) + T^i(s) + (1 + \tau_D^i(s)) D^i(s)$$



# Households

$$C_{NT}^i(s) = \left( \int_0^1 C_{NT}^{i,j}(s)^{1-\frac{1}{\varepsilon}} dj \right)^{\frac{1}{1-\frac{1}{\varepsilon}}}$$

- Country i households maximizes

$$\int U^i(C_{NT}^i(s), C_T^i(s), N^i(s); s) \pi(s) ds$$

subject to

$$\int D^i(s) Q(s) \pi(s) ds \leq 0$$

$$P_{NT}^i C_{NT}^i(s) + P_T(s) C_T^i(s) \leq W^i(s) N^i(s) + P_T(s) E_T^i(s) \\ + \Pi^i(s) + T^i(s) + (1 + \tau_D^i(s)) D^i(s)$$

# Firms

- Each variety  $j$  of NT
  - produced monopolistically
  - technology

$$Y_{NT}^{i,j}(s) = A^i(s)N^{i,j}(s)$$

- price set one period in advance



# Government

- Government budget constraint

$$T^i(s) = \tau_L^i W^i(s) N^i(s) - \tau_D^i(s) D^i(s) + \hat{T}^i(s)$$

- Zero net international fiscal transfers

$$\int \hat{T}^i(s) di = 0$$

# Equilibrium

- Household FOCs
- Firm FOC
- Government budget constraint
- Market clearing

$$C_{NT}^i(s) = A^i(s)N^i(s)$$
$$\int C_T^i(s)di = \int E_T^i(s)di$$

# Alternative: Incomplete Markets

- Household budget constraint

$$\begin{aligned} & P_{NT}^i C_{NT}^i(s) + P_T(s) C_T^i(s) \\ & \leq W^i(s) N^i(s) + P_T(s) E_T^i(s) + \Pi^{i,j}(s) + T^i(s) \end{aligned}$$

- Government budget constraint

$$T^i(s) = \tau_L^i W^i(s) N^i(s) + \hat{T}^i(s)$$

- Same implementability conditions!



# FOCs

$$\begin{aligned}\frac{U_{C_T}^i(s)(1 + \tau_D^i(s))}{Q(s)P_T(s)} &= \frac{U_{C_T}^i(s')(1 + \tau_D^i(s'))}{Q(s')P_T(s')} \\ \frac{U_{C_T}^i(s)}{P_T(s)} &= \frac{U_{C_{NT}}^i(s)}{P_{NT}^i} \\ -\frac{U_N^i(s)}{W^i(s)} &= \frac{U_{C_{NT}}^i(s)}{P_{NT}^i}.\end{aligned}$$

$$P_{NT}^i = (1 + \tau_L^i) \frac{\varepsilon}{\varepsilon - 1} \frac{\int \frac{Q(s)}{1 + \tau_D^i(s)} \frac{W^i(s)}{A^i(s)} C_{NT}^i(s) \pi(s) ds}{\int \frac{Q(s)}{1 + \tau_D^i(s)} C_{NT}^i(s) \pi(s) ds}$$

# FOCs

$$\frac{U_{C_T}^i(s)}{P_T(s)} = \frac{U_{C_{NT}}^i(s)}{P_{NT}^i}$$

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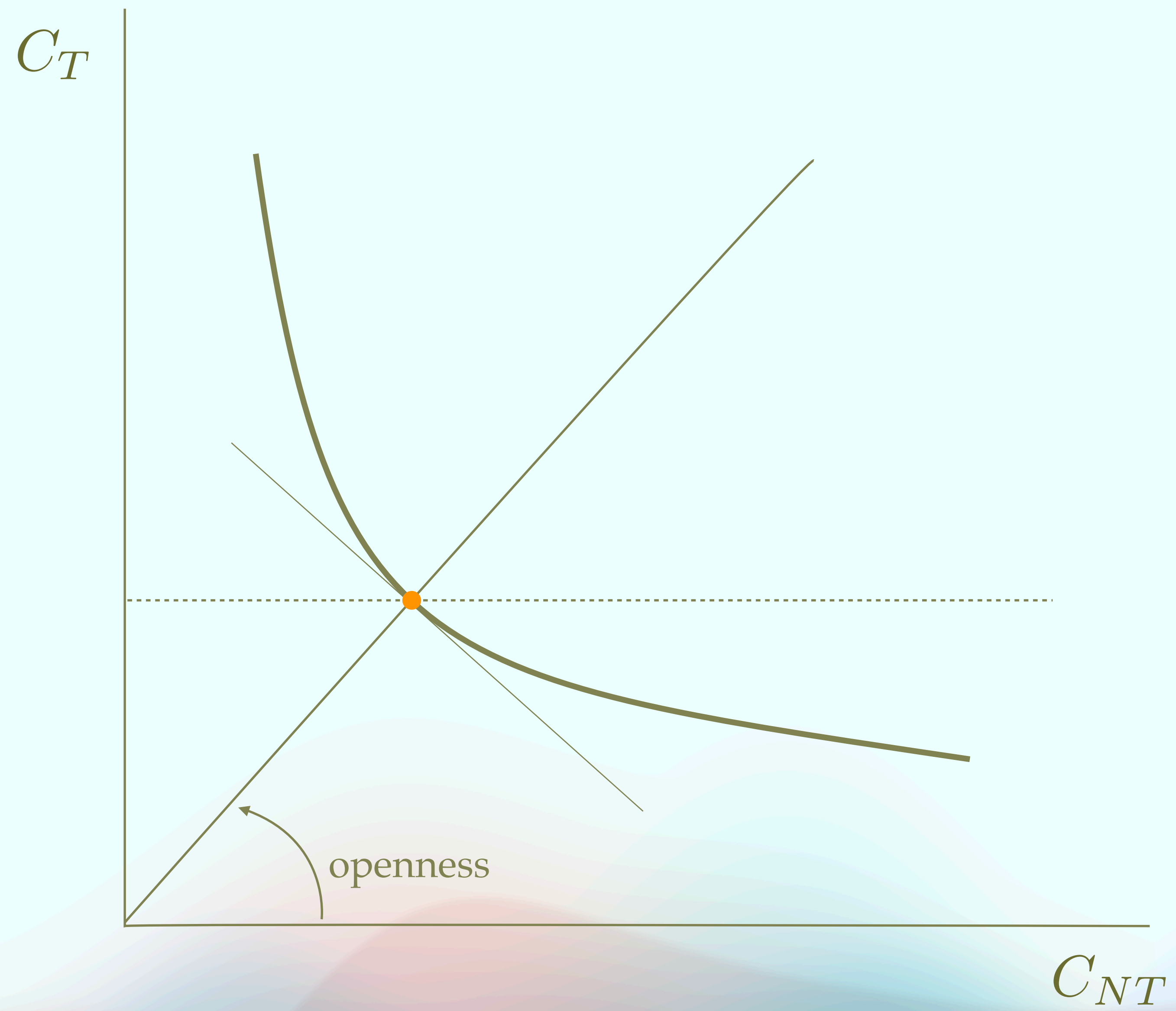
weak separability  
+ homothetic

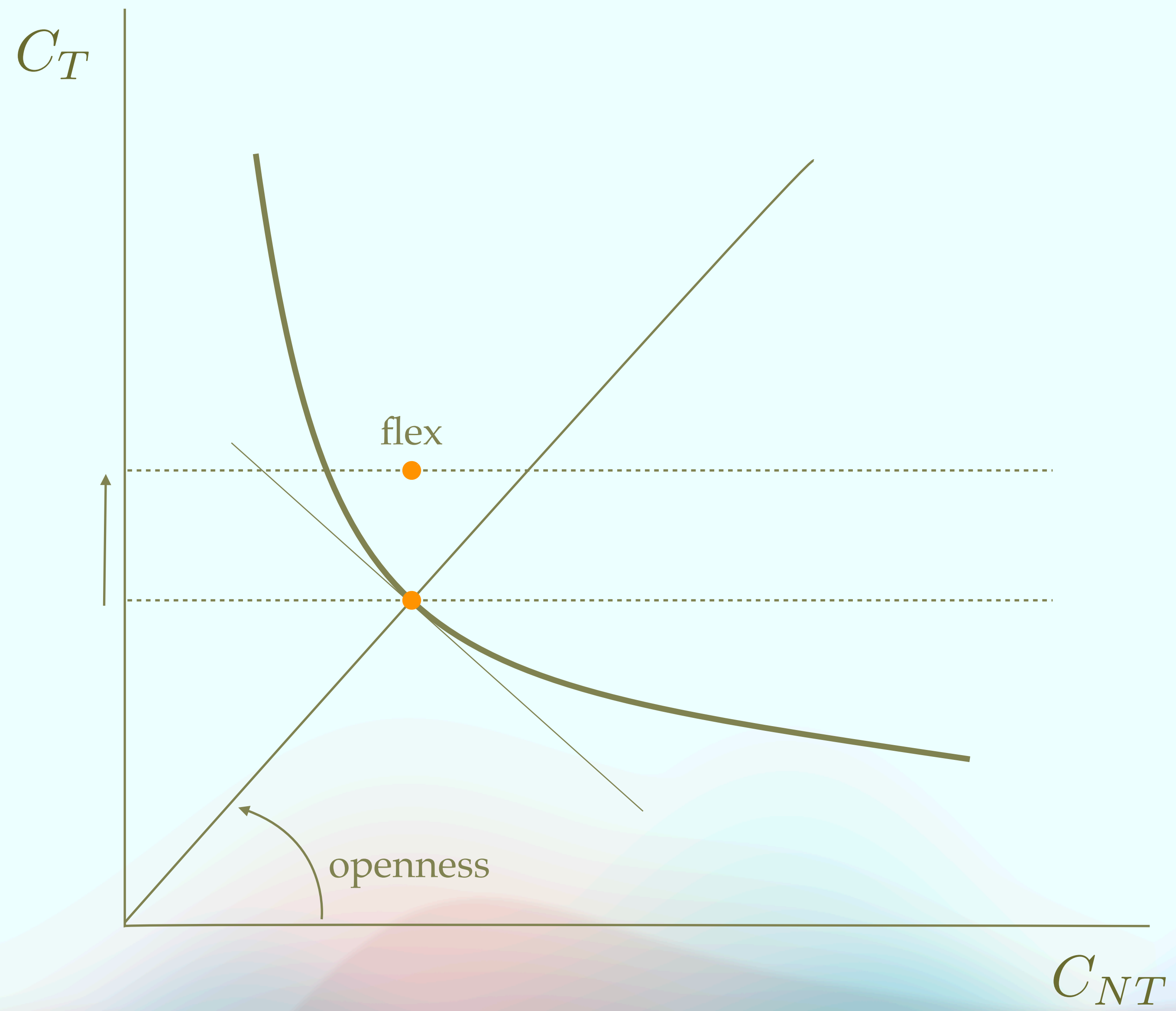


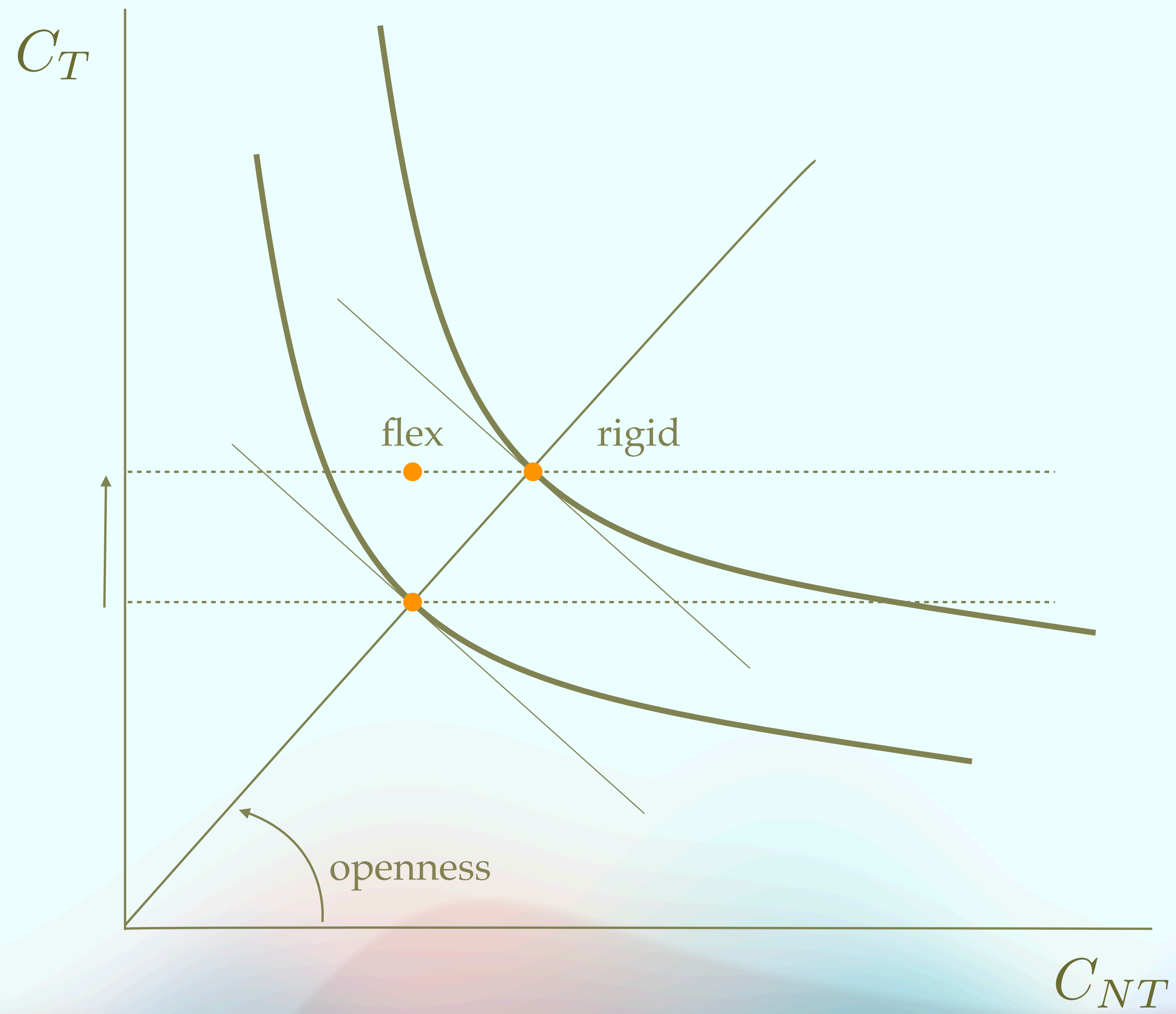
$$C_{NT}^i(s) = \alpha^i(p^i(s); s) C_T^i(s)$$

$$p^i(s) = \frac{P_T(s)}{P_{NT}^i}$$











$$\frac{U_{C_T}^i(s)}{P_T(s)} = \frac{U_{C_{NT}}^i(s)}{P_{NT}^i}$$

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$$V^i(C_T^i(s), p^i(s), s) = U^i \left( \alpha^i(p^i(s); s)C_T^i(s), C_T^i(s), \frac{\alpha^i(p^i(s); s)}{A^i(s)}C_T^i(s); s \right)$$

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$$V_{C_T}^i(s) \neq U_{C_T}(s)$$

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$$V_{C_T}^i(s) = U_{C_T}^i(s) + \alpha^i(p^i(s); s) \left( U_{C_{NT}}^i(s) - \frac{1}{A^i(s)} U_N^i(s) \right)$$

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# Planning Problem

$$\max_{P_{NT}^i, P_T(s), C_T^i(s)} \int \int V^i \left( C_T^i(s), \frac{P_T(s)}{P_{NT}^i}; s \right) \lambda^i \pi(s) di ds$$

$$\int C_T^i(s) di = \int E_T^i(s) di$$

# Planning Problem

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$$\int C_T^i(s) di = \int E_T^i(s) di$$

- Standard risk sharing...
- ... but with social value function, not private

# Optimality Conditions

Proposition (Optimal Price Setting).

Zero average labor wedge across states for each country:

$$\int \alpha_p^i(s) C_T^i(s) U_{C_T}^i(s) \tau^i(s) \pi(s) ds = 0$$

across states for each country

labor wedge



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across states for each country

across countries for each state

labor wedge

**Proposition (Optimal Monetary Policy).**

Zero average labor wedge across countries for each state:

$$\int \alpha_p^i(s) C_T^i(s) U_{C_T}^i(s) \tau^i(s) \lambda^i di = 0$$

# Optimal Risk Sharing

Proposition (Optimal Risk Sharing).

$$\frac{V_{C_T}^i(s)}{V_{C_T}^{i'}(s)} = \frac{V_{C_T}^i(s')}{V_{C_T}^{i'}(s')}$$

# Optimal Risk Sharing

Proposition (Optimal Risk Sharing).

$$\frac{U_{C_T}^i(s)}{U_{C_T}^{i'}(s)} \frac{1 + \frac{\alpha^i(s)}{p^i(s)} \tau^i(s)}{1 + \frac{\alpha^{i'}(s)}{p^{i'}(s)} \tau^{i'}(s)} = \frac{U_{C_T}^i(s')}{U_{C_T}^{i'}(s')} \frac{1 + \frac{\alpha^i(s')}{p^i(s')} \tau^i(s')}{1 + \frac{\alpha^{i'}(s')}{p^{i'}(s')} \tau^{i'}(s')}$$

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- Standard risk sharing condition...



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- ... but with ***social*** instead of *private* marginal values

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Proposition.

Equilibrium without taxes → Pareto inefficient unless first best

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- Standard risk sharing condition...
- ... but with **social** instead of *private* marginal values

Proposition.

Equilibrium without taxes → Pareto inefficient unless first best

- Fiscal and financial integration not perfect substitutes

# Two Implementations

- Complete markets + macro-prudential portfolio taxes

$$\tau_D^i(s) = \frac{\alpha^i(s)}{p^i(s)} \tau^i(s)$$

- Incomplete markets + fiscal transfers

$$\hat{T}^i(s) = P_T(s)(C_T^i(s) - E^i(s))$$

Note: tax rate still shadow tax



# Non-Members

- Outside currency union, same conditions, but...
  - zero labor wedges
  - privately and socially optimal risk sharing coincide
  - no need for macro-prudential portfolio taxes
  - fiscal unions replicate complete markets
- Fiscal unions and currency unions go hand in hand

# Value of Insurance

- **Assume:** special case where first best achieved endowment shocks with separability
- **Result:** Currency union
  - insurance more valuable
  - macroeconomic externality

# Value of Insurance

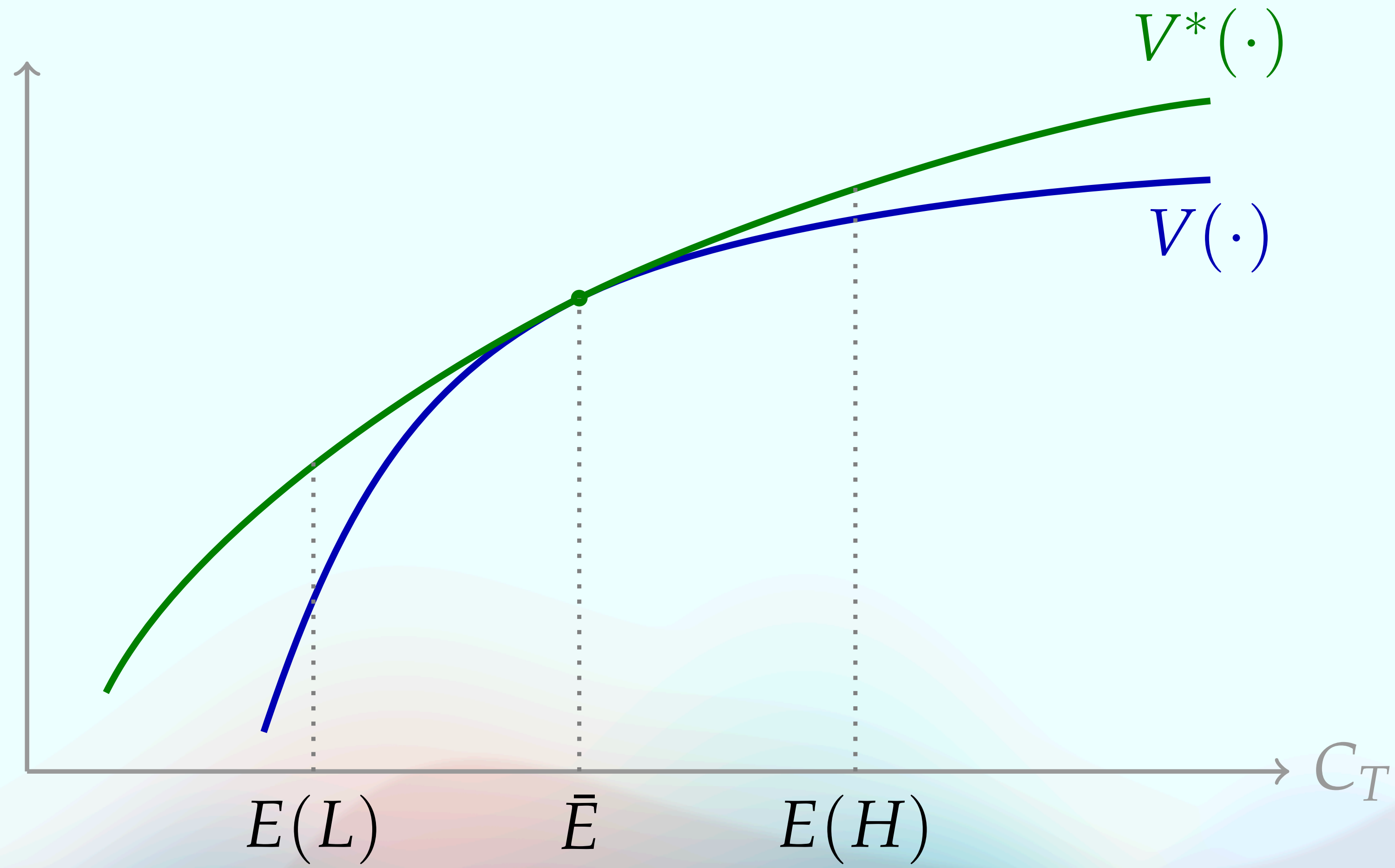
- **Assume:** special case where first best achieved endowment shocks with separability
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## Proposition (Value of Risk Sharing).

- Exclude *entire country* from insurance
  - loss greater if in currency union
- Exclude *individual within country* from insurance
  - loss same if in a currency union or not

# Value of Insurance

$$V(C_T, \bar{p}) \leq \max_p V(C_T, p) \equiv V(C_T)$$





# Moral Hazard

- Up to now, no incentive issues
- Extension: introduce moral hazard; insurance vs. incentives
- Again: more insurance in currency union (social vs. private)

$$\max_{C_T^i(\cdot), P_T, P_{NT}^i, e^i} \left( \int V^i \left( C_T^i(s), \frac{P_T}{P_{NT}^i} \right) F(ds|e) - h(e^i) \right)$$

$$\int (C_T^i(s) + G_T^i(s) - E_T^i(s)) F(ds|e) = 0$$

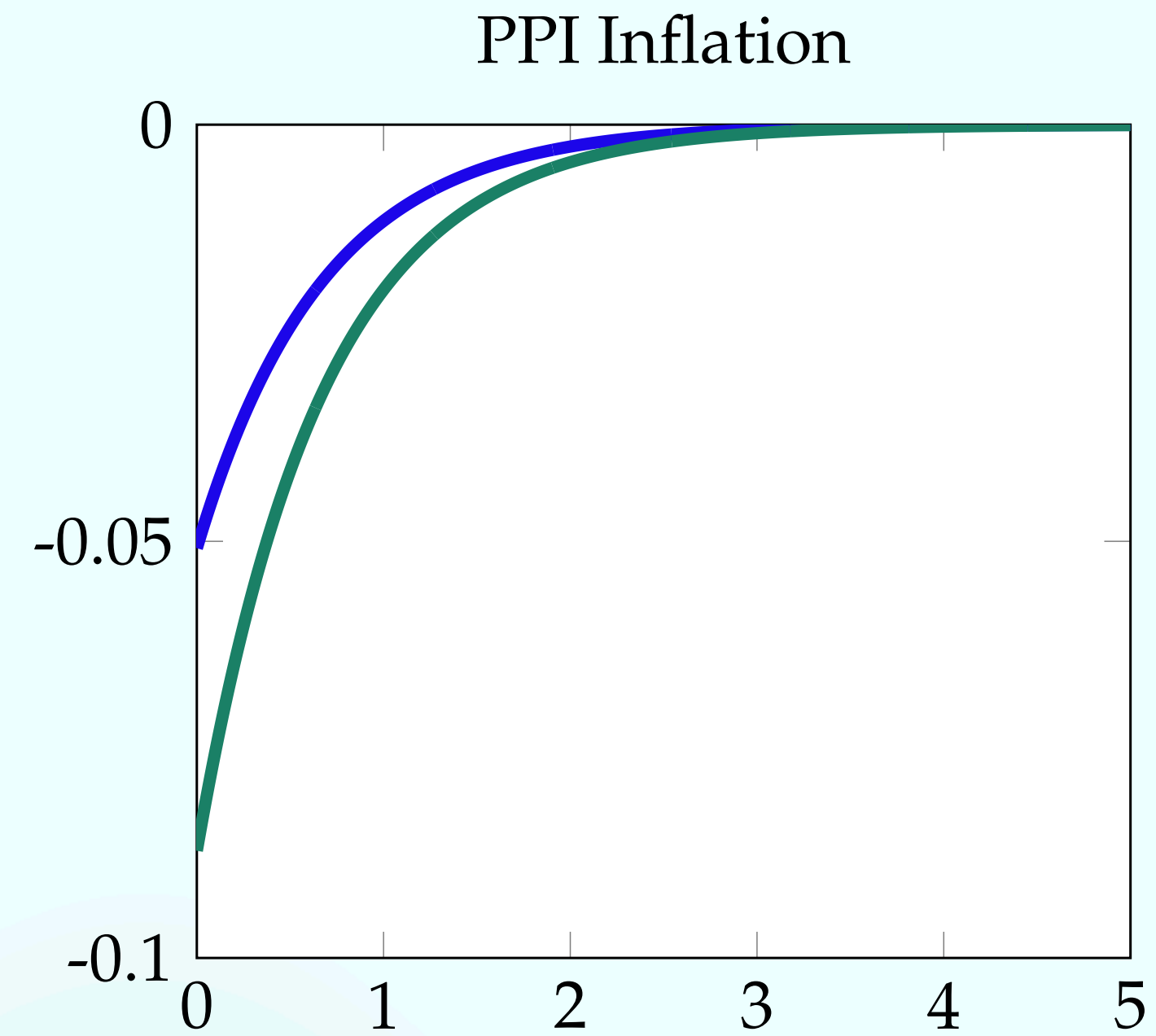
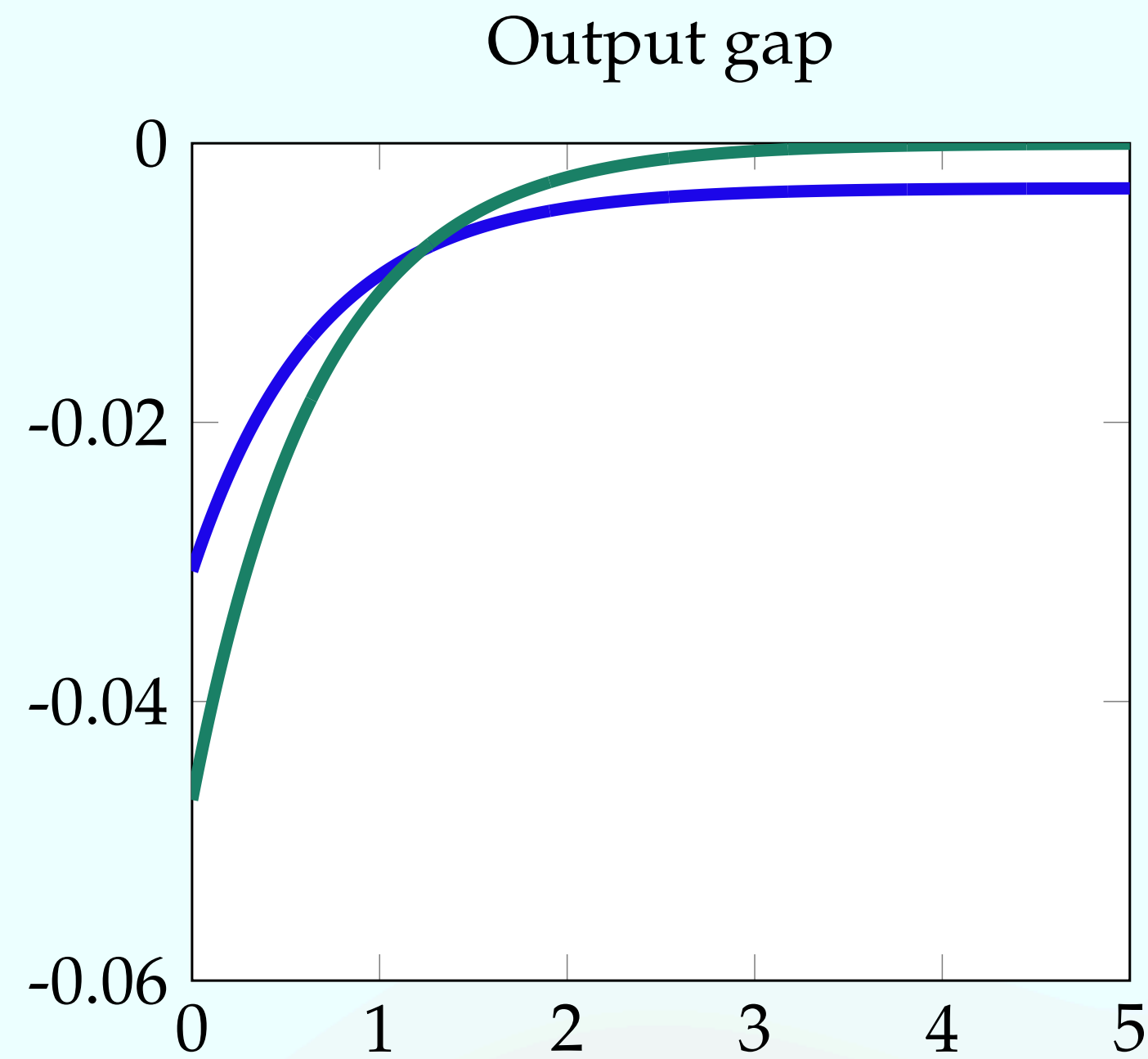
$$e \in \arg \max_{e'} \int V^i \left( C_T^i(s), \frac{P_T}{P_{NT}^i} \right) F(ds|e') - h(e')$$

# Dynamic Model

- Dynamic model
  - Calvo price setting
  - all goods traded
  - openness: home bias in preferences
  - fraction of HtM consumers with high MPCs (financially constrained)

# Optimum without HtM

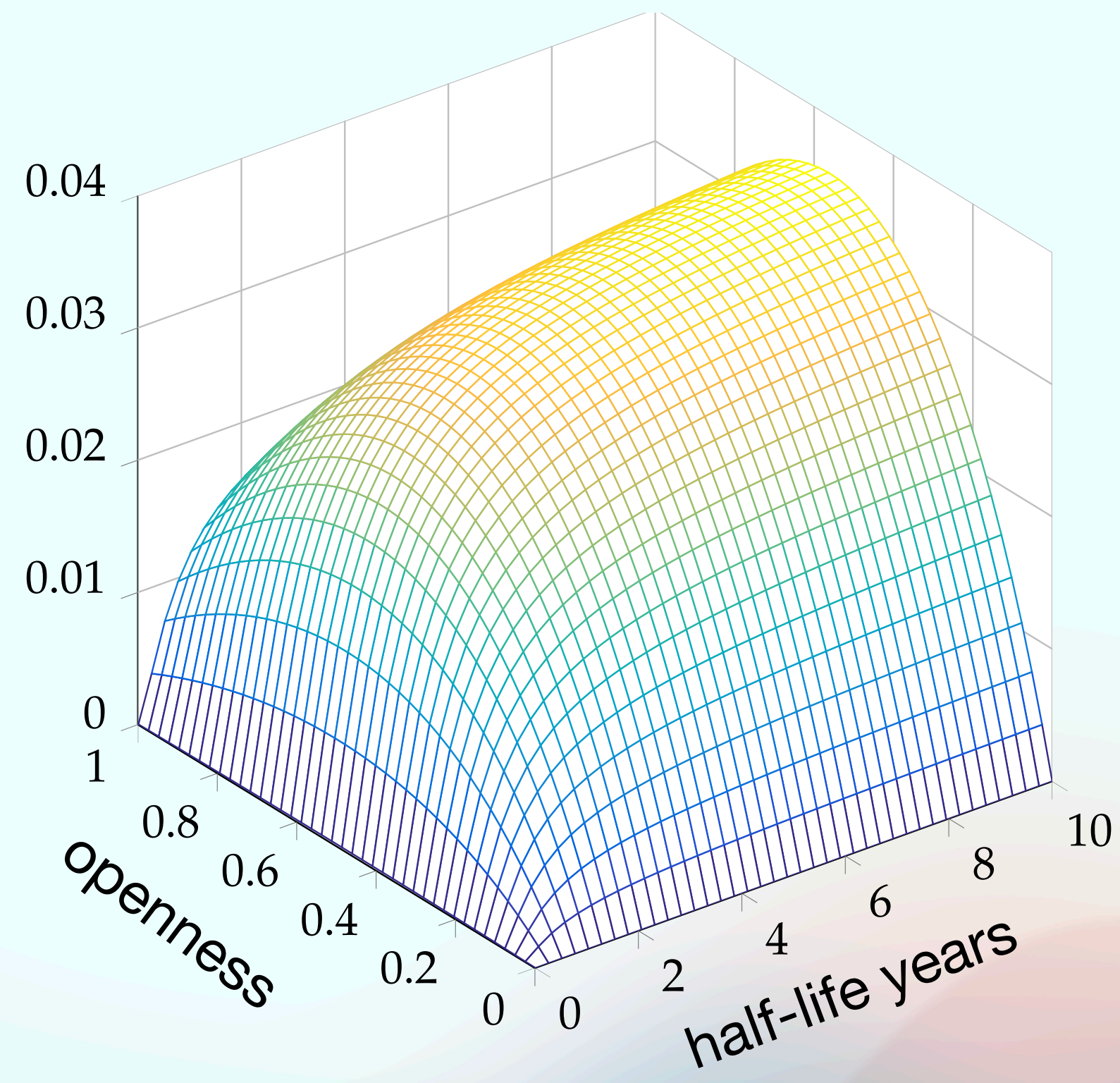
■ 5% productivity shock



# Optimum without HtM

■ 5% productivity shock

Transfer/GDP

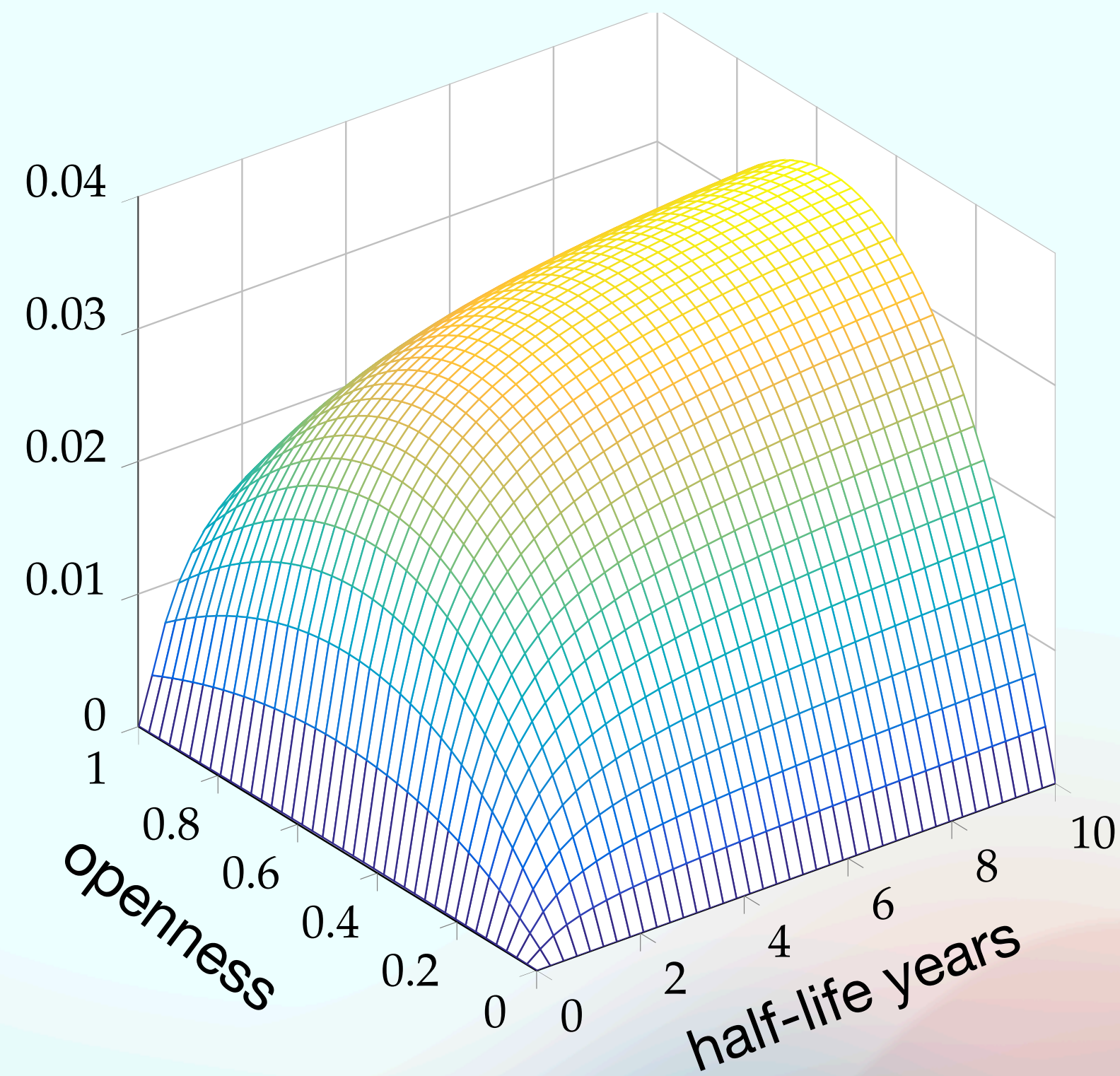




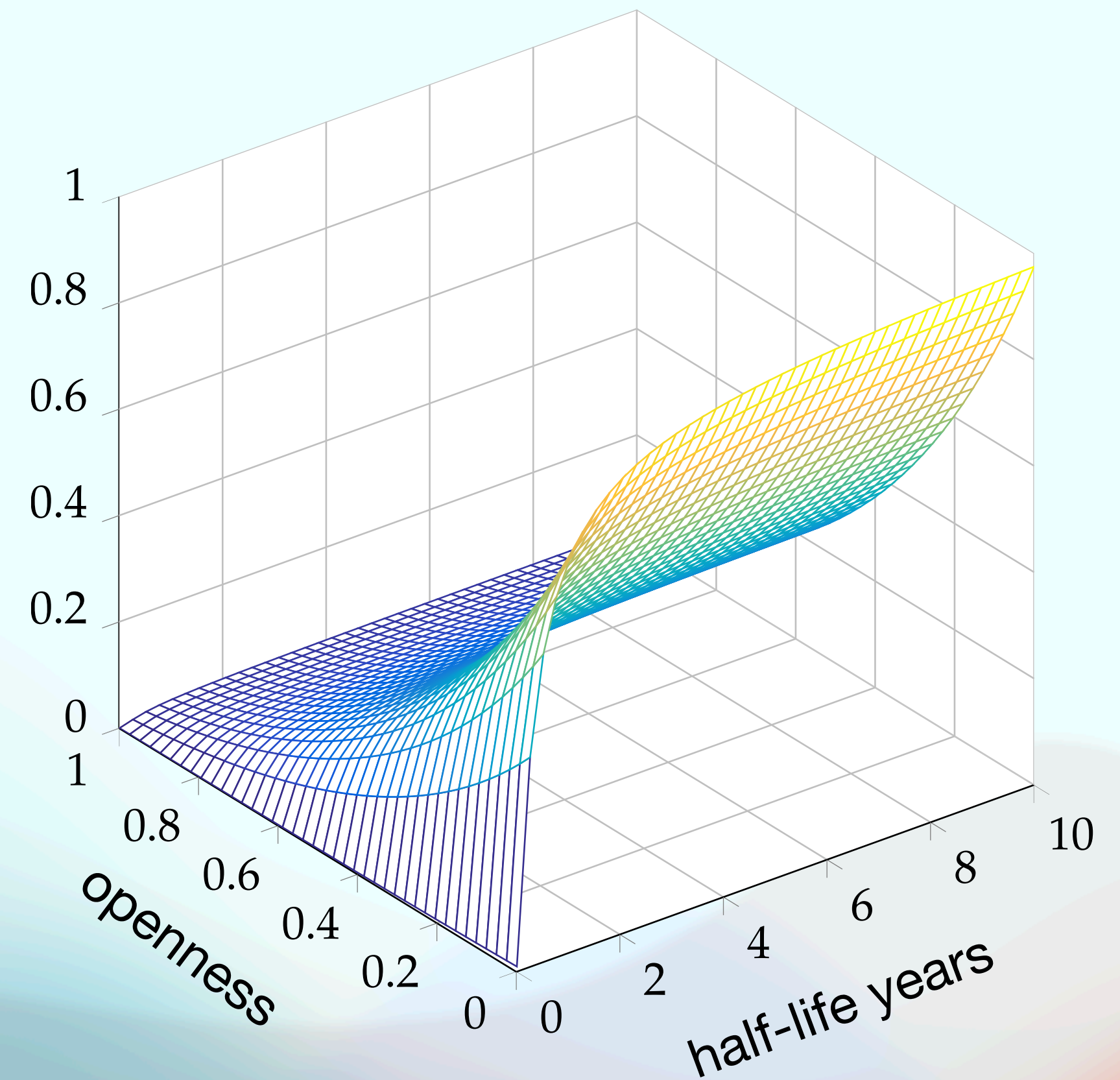
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## Transfer/GDP

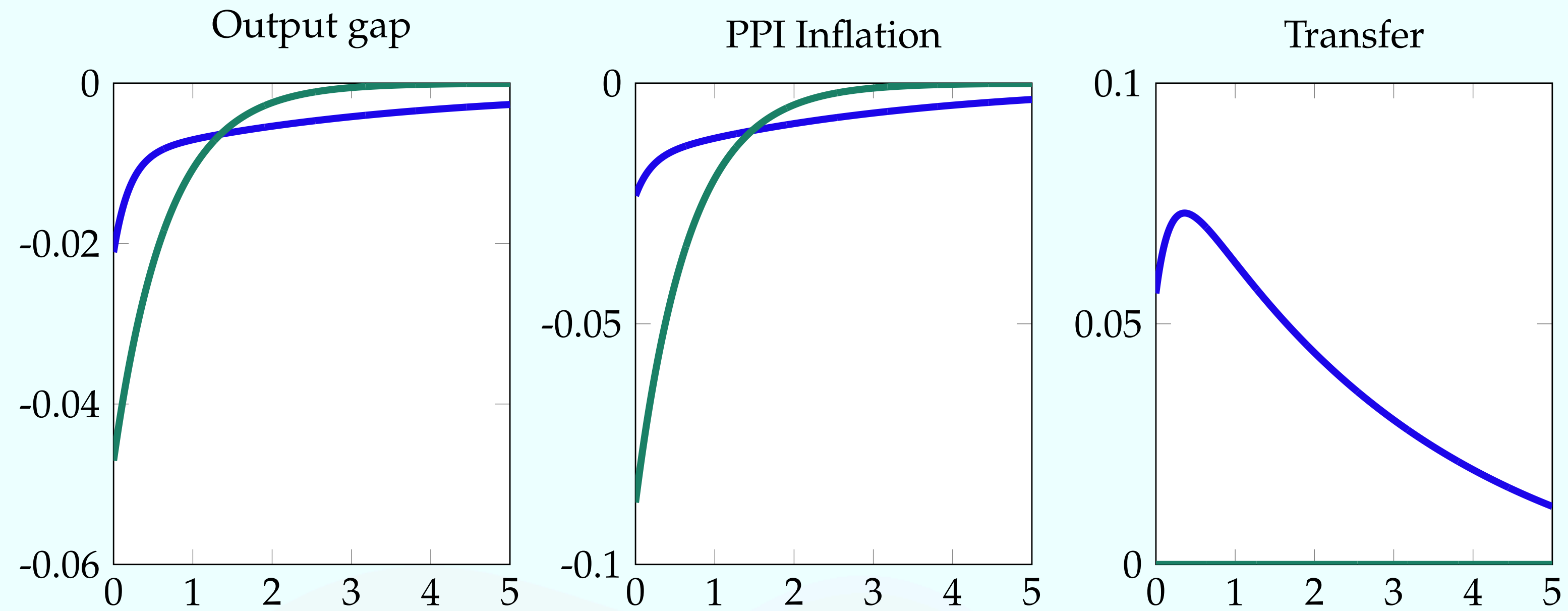


## Stabilization



# Optimum with HtM

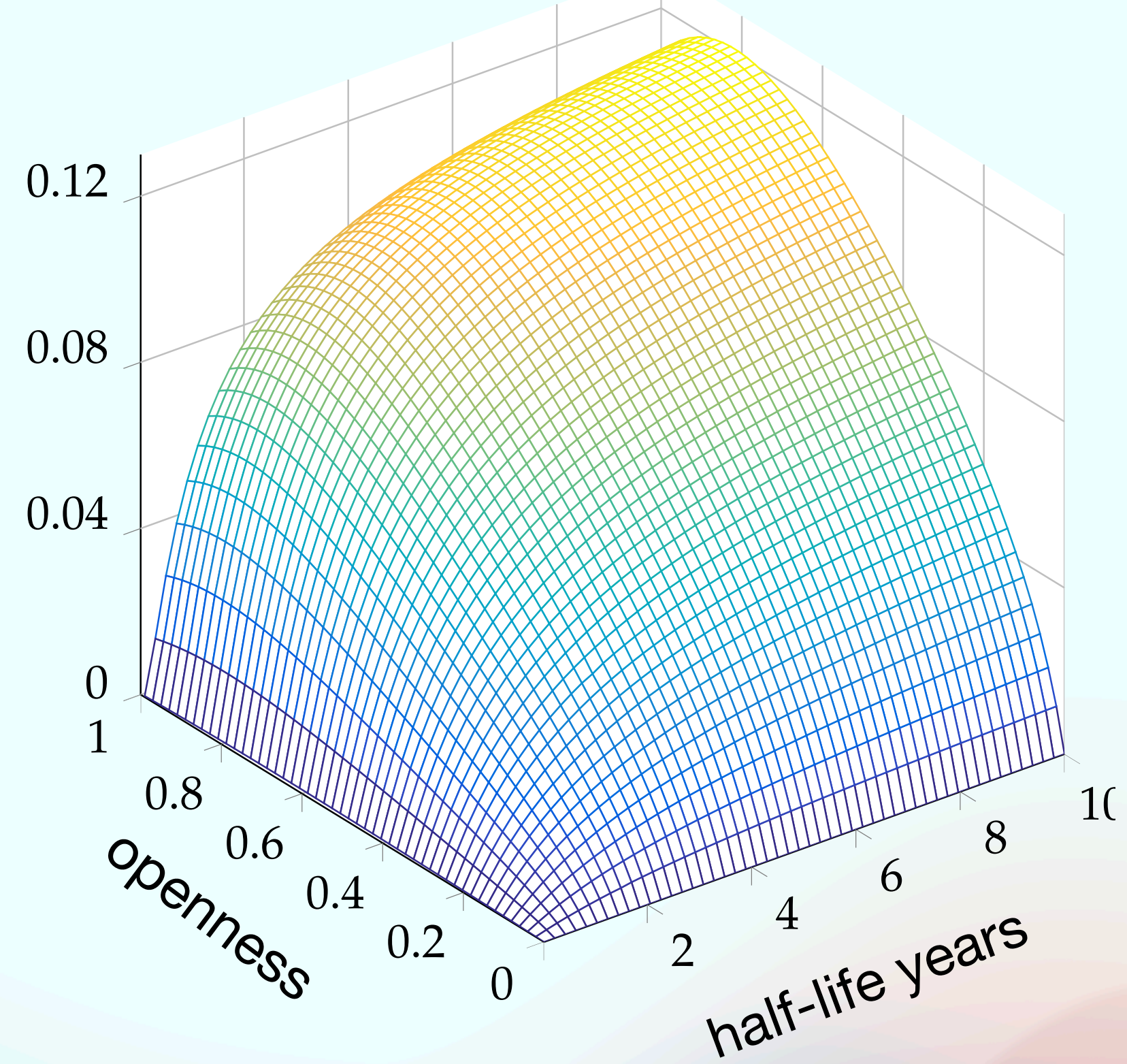
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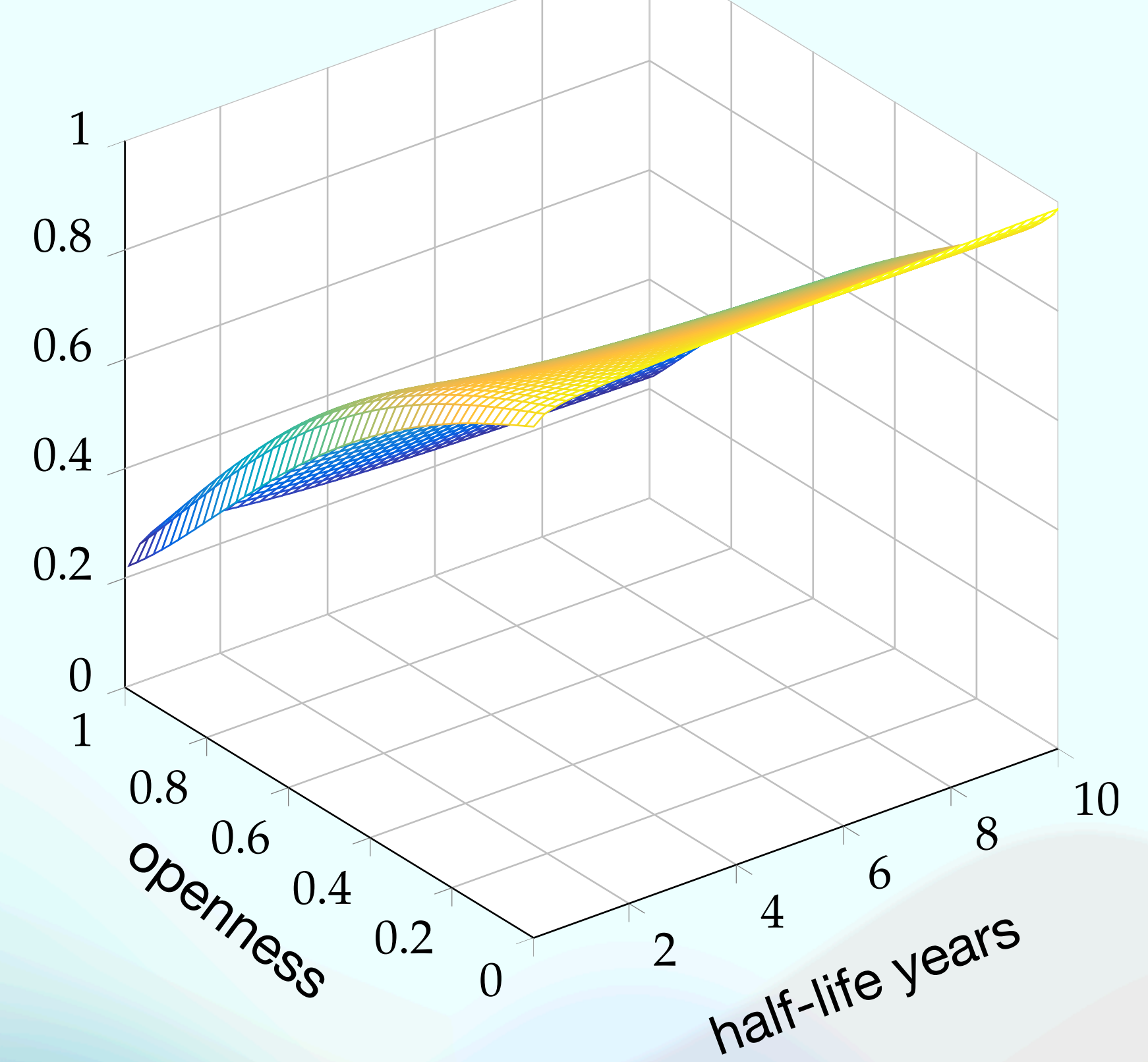


# Optimum with HtM

Transfer/GDP



Stabilization



# Transfers vs. Other Instruments

		TRANSITORY													
		No HtM agents							HtM agents						
NOMINAL RIGIDITIES	OPEN-NESS	<i>No policy</i>	<i>Transfers</i>	<i>Capital controls</i>	<i>Gov. spending</i>	<i>Redistri-bution</i>	<i>Deficits</i>	<i>Joint fiscal policy</i>	<i>No policy</i>	<i>Transfers</i>	<i>Capital controls</i>	<i>Gov. spending</i>	<i>Redistri-bution</i>	<i>Deficits</i>	<i>Joint fiscal policy</i>
More flexible	Open	0%	21%	83%	47%	0%	0%	47%	0%	76%	82%	47%	73%	73%	78%
	Closed	0%	57%	96%	47%	0%	0%	47%	0%	91%	96%	47%	88%	88%	89%
Sticky	Open	0%	29%	84%	49%	0%	0%	49%	0%	78%	83%	49%	75%	75%	80%
	Closed	0%	58%	97%	49%	0%	0%	49%	0%	92%	97%	49%	89%	89%	90%
Rigid	Open	0%	10%	56%	26%	0%	0%	26%	0%	53%	54%	26%	43%	43%	53%
	Closed	0%	14%	79%	26%	0%	0%	26%	0%	81%	79%	26%	67%	67%	72%

		PERMANENT														
		No HtM agents							HtM agents							
NOMINAL RIGIDITIES	OPEN-NESS	<i>No policy</i>	<i>Transfers</i>	<i>Capital controls</i>	<i>Gov. spending</i>	<i>Redistri-bution</i>	<i>Deficits</i>	<i>Joint fiscal policy</i>	<i>No policy</i>	<i>Transfers</i>	<i>Capital controls</i>	<i>Gov. spending</i>	<i>Redistri-bution</i>	<i>Deficits</i>	<i>Joint fiscal policy</i>	
More flexible	Open	0%	25%	67%	36%	0%	0%	36%	0%	63%	66%	36%	58%	58%	62%	
	Closed	0%	68%	85%	36%	0%	0%	36%	0%	83%	85%	36%	73%	73%	74%	
Sticky	Open	0%	41%	65%	36%	0%	0%	36%	0%	66%	64%	36%	55%	55%	61%	
	Closed	0%	81%	82%	36%	0%	0%	36%	0%	87%	82%	36%	71%	71%	72%	
Rigid	Open	0%	66%	0%	26%	0%	0%	26%	0%	66%	0%	26%	0%	0%	26%	
	Closed	0%	94%	0%	26%	0%	0%	26%	0%	94%	0%	26%	0%	0%	26%	



# Transfers vs. Other Instruments

		TRANSITORY													
		No HtM agents							HtM agents						
NOMINAL RIGIDITIES	OPEN-NESS	<i>No policy</i>	<i>Transfers</i>	<i>Capital controls</i>	<i>Gov. spending</i>	<i>Redistri-bution</i>	<i>Deficits</i>	<i>Joint fiscal policy</i>	<i>No policy</i>	<i>Transfers</i>	<i>Capital controls</i>	<i>Gov. spending</i>	<i>Redistri-bution</i>	<i>Deficits</i>	<i>Joint fiscal policy</i>
More flexible	Open	0%	21%	83%	47%	0%	0%	47%	0%	76%	82%	47%	73%	73%	78%
	Closed	0%	57%	96%	47%	0%	0%	47%	0%	91%	96%	47%	88%	88%	89%
Sticky	Open	0%	29%	84%	49%	0%	0%	49%	0%	78%	83%	49%	75%	75%	80%
	Closed	0%	58%	97%	49%	0%	0%	49%	0%	92%	97%	49%	89%	89%	90%
Rigid	Open	0%	10%	56%	26%	0%	0%	26%	0%	53%	54%	26%	43%	43%	53%
	Closed	0%	14%	79%	26%	0%	0%	26%	0%	81%	79%	26%	67%	67%	72%

		PERMANENT													
		No HtM agents							HtM agents						
NOMINAL RIGIDITIES	OPEN-NESS	<i>No policy</i>	<i>Transfers</i>	<i>Capital controls</i>	<i>Gov. spending</i>	<i>Redistri-bution</i>	<i>Deficits</i>	<i>Joint fiscal policy</i>	<i>No policy</i>	<i>Transfers</i>	<i>Capital controls</i>	<i>Gov. spending</i>	<i>Redistri-bution</i>	<i>Deficits</i>	<i>Joint fiscal policy</i>
More flexible	Open	0%	25%	67%	36%	0%	0%	36%	0%	63%	66%	36%	58%	58%	62%
	Closed	0%	68%	85%	36%	0%	0%	36%	0%	83%	85%	36%	73%	73%	74%
Sticky	Open	0%	41%	65%	36%	0%	0%	36%	0%	66%	64%	36%	55%	55%	61%
	Closed	0%	81%	82%	36%	0%	0%	36%	0%	87%	82%	36%	71%	71%	72%
Rigid	Open	0%	66%	0%	26%	0%	0%	26%	0%	66%	0%	26%	0%	0%	26%
	Closed	0%	94%	0%	26%	0%	0%	26%	0%	94%	0%	26%	0%	0%	26%

# Transfers vs. Other Instruments

		TRANSITORY													
		No HtM agents							HtM agents						
NOMINAL RIGIDITIES	OPEN-NESS	<i>No policy</i>	<i>Transfers</i>	<i>Capital controls</i>	<i>Gov. spending</i>	<i>Redistri- bution</i>	<i>Deficits</i>	<i>Joint fiscal policy</i>	<i>No policy</i>	<i>Transfers</i>	<i>Capital controls</i>	<i>Gov. spending</i>	<i>Redistri- bution</i>	<i>Deficits</i>	<i>Joint fiscal policy</i>
More flexible	Open	0%	21%	83%	47%	0%	0%	47%	0%	76%	82%	47%	73%	73%	78%
	Closed	0%	57%	96%	47%	0%	0%	47%	0%	91%	96%	47%	88%	88%	89%
Sticky	Open	0%	29%	84%	49%	0%	0%	49%	0%	78%	83%	49%	75%	75%	80%
	Closed	0%	58%	97%	49%	0%	0%	49%	0%	92%	97%	49%	89%	89%	90%
Rigid	Open	0%	10%	56%	26%	0%	0%	26%	0%	53%	54%	26%	43%	43%	53%
	Closed	0%	14%	79%	26%	0%	0%	26%	0%	81%	79%	26%	67%	67%	72%

		PERMANENT													
		No HtM agents							HtM agents						
NOMINAL RIGIDITIES	OPEN-NESS	<i>No policy</i>	<i>Transfers</i>	<i>Capital controls</i>	<i>Gov. spending</i>	<i>Redistri- bution</i>	<i>Deficits</i>	<i>Joint fiscal policy</i>	<i>No policy</i>	<i>Transfers</i>	<i>Capital controls</i>	<i>Gov. spending</i>	<i>Redistri- bution</i>	<i>Deficits</i>	<i>Joint fiscal policy</i>
More flexible	Open	0%	25%	67%	36%	0%	0%	36%	0%	63%	66%	36%	58%	58%	62%
	Closed	0%	68%	85%	36%	0%	0%	36%	0%	83%	85%	36%	73%	73%	74%
Sticky	Open	0%	41%	65%	36%	0%	0%	36%	0%	66%	64%	36%	55%	55%	61%
	Closed	0%	81%	82%	36%	0%	0%	36%	0%	87%	82%	36%	71%	71%	72%
Rigid	Open	0%	66%	0%	26%	0%	0%	26%	0%	66%	0%	26%	0%	0%	26%
	Closed	0%	94%	0%	26%	0%	0%	26%	0%	94%	0%	26%	0%	0%	26%



# Transfers vs. Other Instruments

- Transfers: better for more persistent shocks, more closed economies, more sticky prices, fraction of HtM improves for more transitory shocks and more flexible prices
- Capital controls: better for more transitory shock, more closed economies, more flexible prices
- Government spending: less sensitive to persistence, openness, stickiness, HtM
- Redistribution and deficits: only with fraction of HtM, better for more transitory shocks, more closed economies, more flexible prices
- Baseline calibration: transfers dominate all other instruments

# Conclusion

- Formal argument for fiscal unions in currency unions
- **Result 1:** risk sharing **more valuable** in currency union
- **Result 2:** macro externality in insurance decisions  
In currency union: **social insurance  $\neq$  private equilibrium**
- Determinants....
  - persistence
  - openness
  - financial constraints (HtM)
- Baseline calibration: transfers dominate domestic fiscal policy and capital controls