Quantifying the Benefits of Labor Mobility in a Currency Union

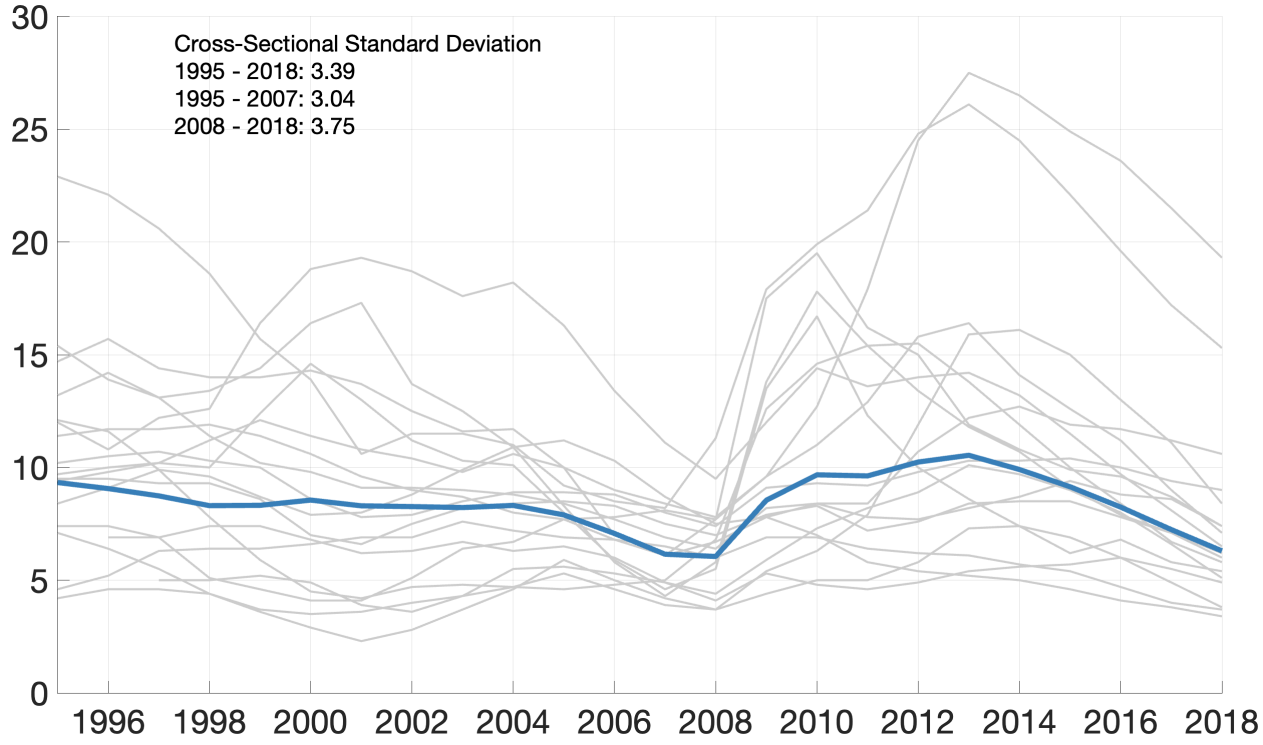
Christopher L. House
University of Michigan and NBER

Christian Proebsting
KU Leuven

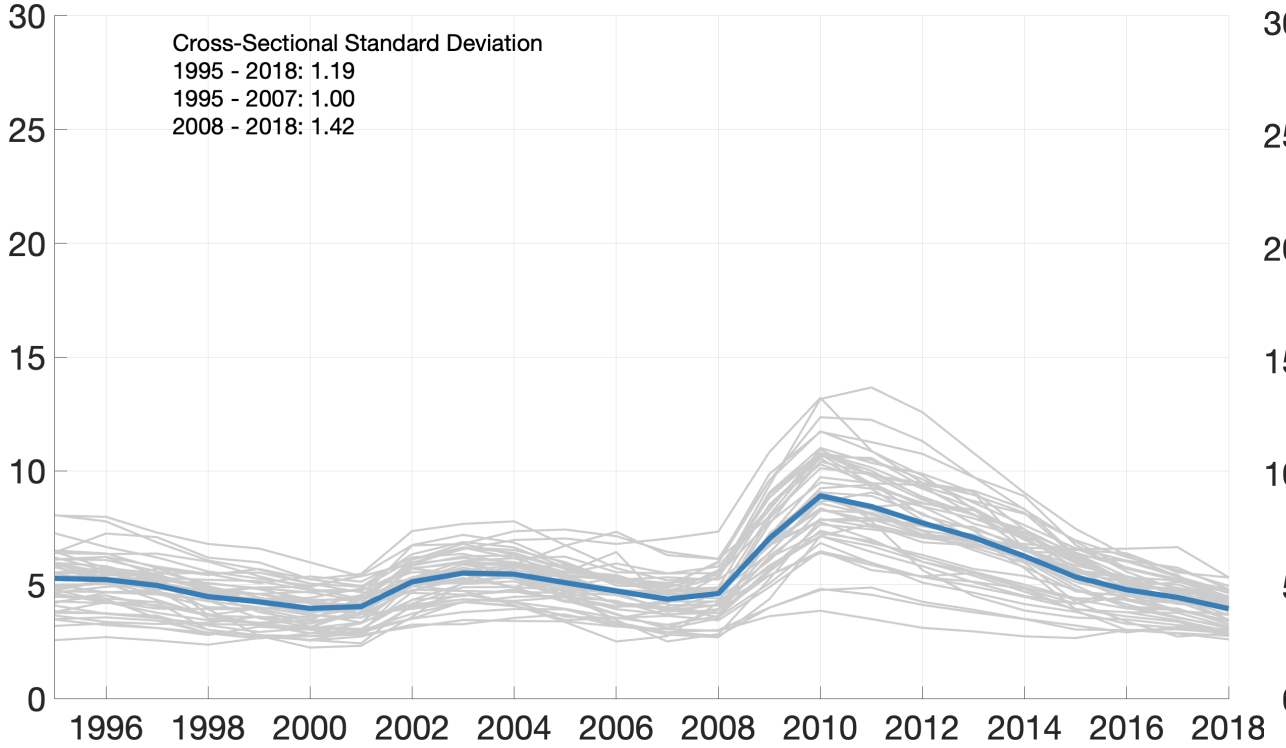
Linda L. Tesar
University of Michigan, NBER and CEPR

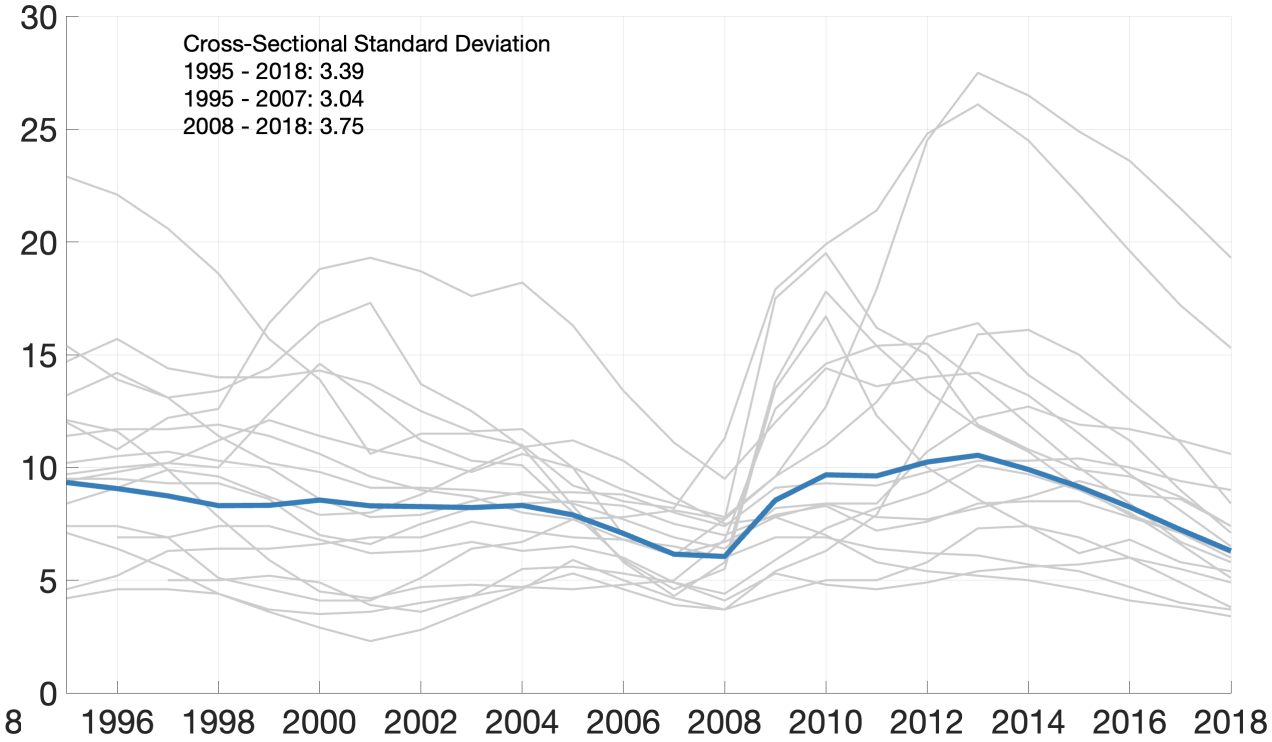
Unemployment rates in the euro area

- Wide dispersion in rates across euro area
- Stronger fluctuations at the country level compared to the union level
- Common currency limits the set of policy responses to country-specific shocks



Unemployment rates in the U.S. vs. the euro area





Mundell (1961): *"If factors are mobile across national boundaries then a flexible exchange rate becomes unnecessary."*

- Factor mobility substitutes for independent monetary policy
- To what extent is this true for the euro area?
- What are the gains if labor was as mobile as it is in the United States?
  - Does migration help reduce the volatility of unemployment?
  - How costly is it for European countries to be in the currency union? Does labor mobility reduce that cost?

Outline

- Present data contrasting migration in the euro area with the United States
- Describe an open-economy model with migration calibrated to the euro area
- Counterfactual experiments: What if…?

U.S. and euro area as integrated economies

- Common currency
- Labor migration
- Integrated market for goods and services
- Integrated (but not fully complete) capital markets
- Central and state/member level fiscal policy
- Political institutions
- Culture/language

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Migration Data

United States

- IRS, based on # tax returns that migrate
- 48 states (Lower 48)
- 1977-2018

Europe

- Eurostat, national sources, flows reconciled using methodology for trade data
- Belgium, Germany, Ireland, Spain, France, Italy, Netherlands, Austria, Portugal, Finland, Greece, Slovenia, Cyprus, Malta, Slovakia, Estonia, Latvia, Lithuania
- 1995-2018

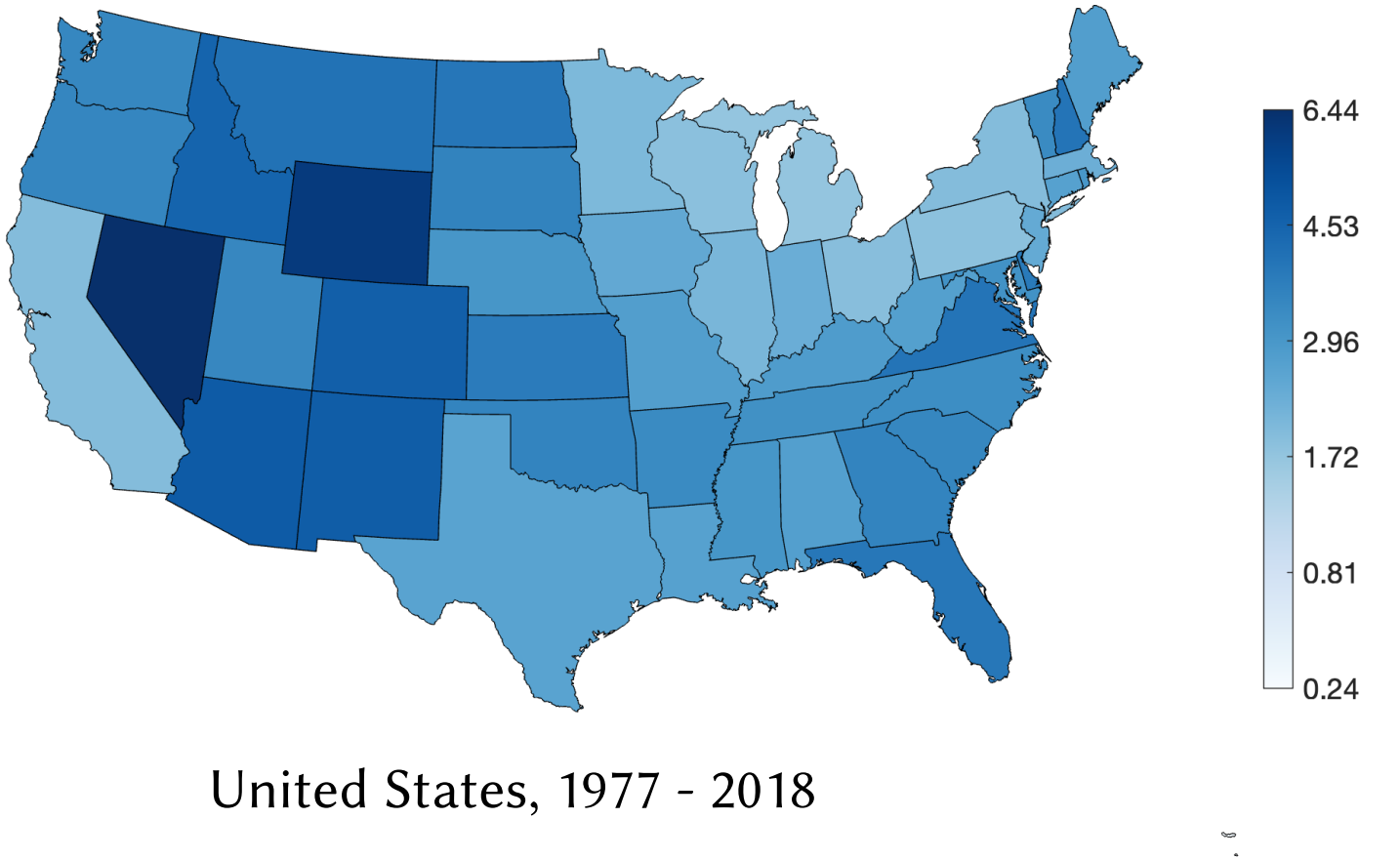
Less migration in Europe than in the U.S.

$$\text{Migration rate}_{i,t} = \frac{1}{2}\frac{\text{Inmigration}_{i,t} + \text{Outmigration}_{i,t}}{\text{Pop}_{i,t}}$$

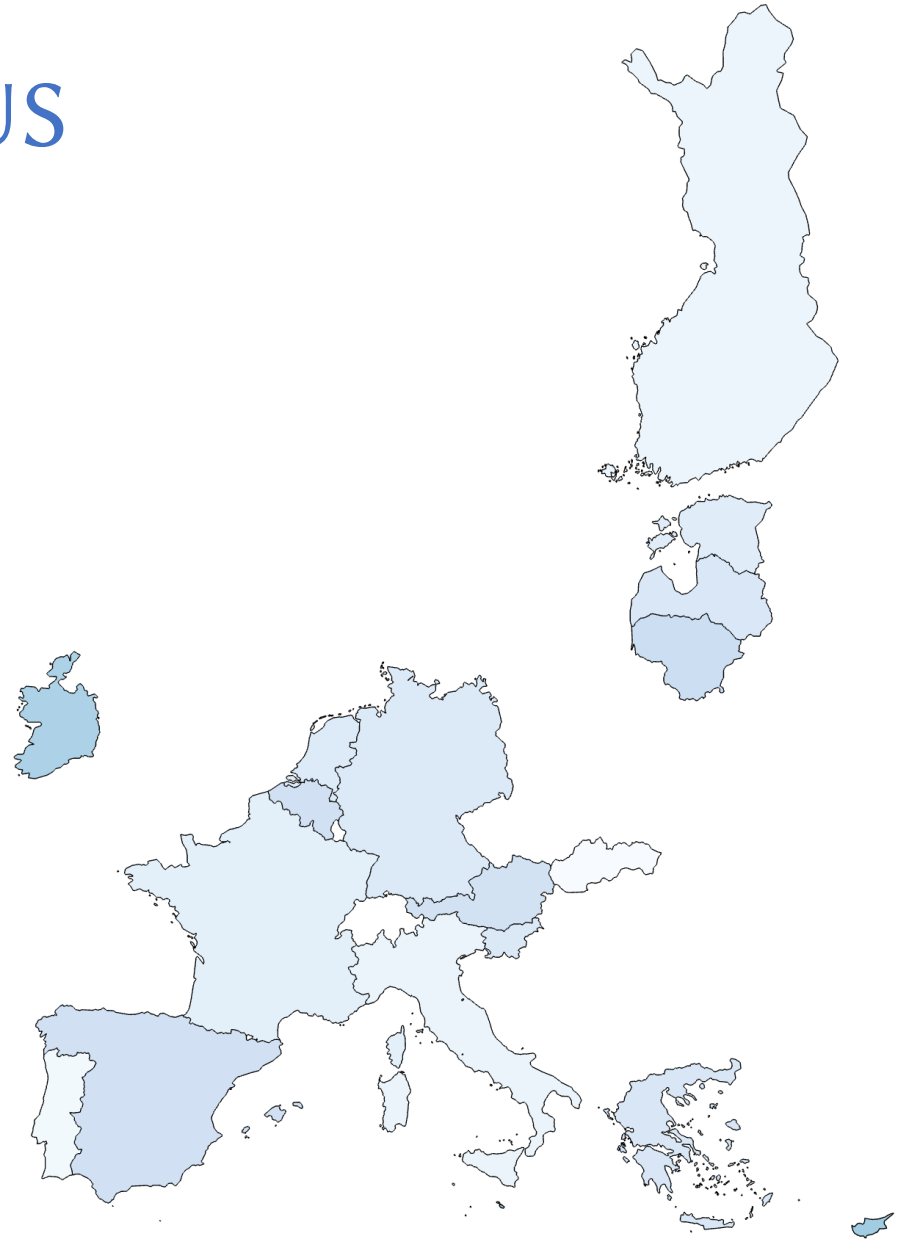
	Unit	U.S.	Euro
Regions	#	48	18
Population	m	5.5	18.2
Migration Rate	%	3.3	0.7

Less migration in Europe than in the US

Gross migration is four times higher in the US

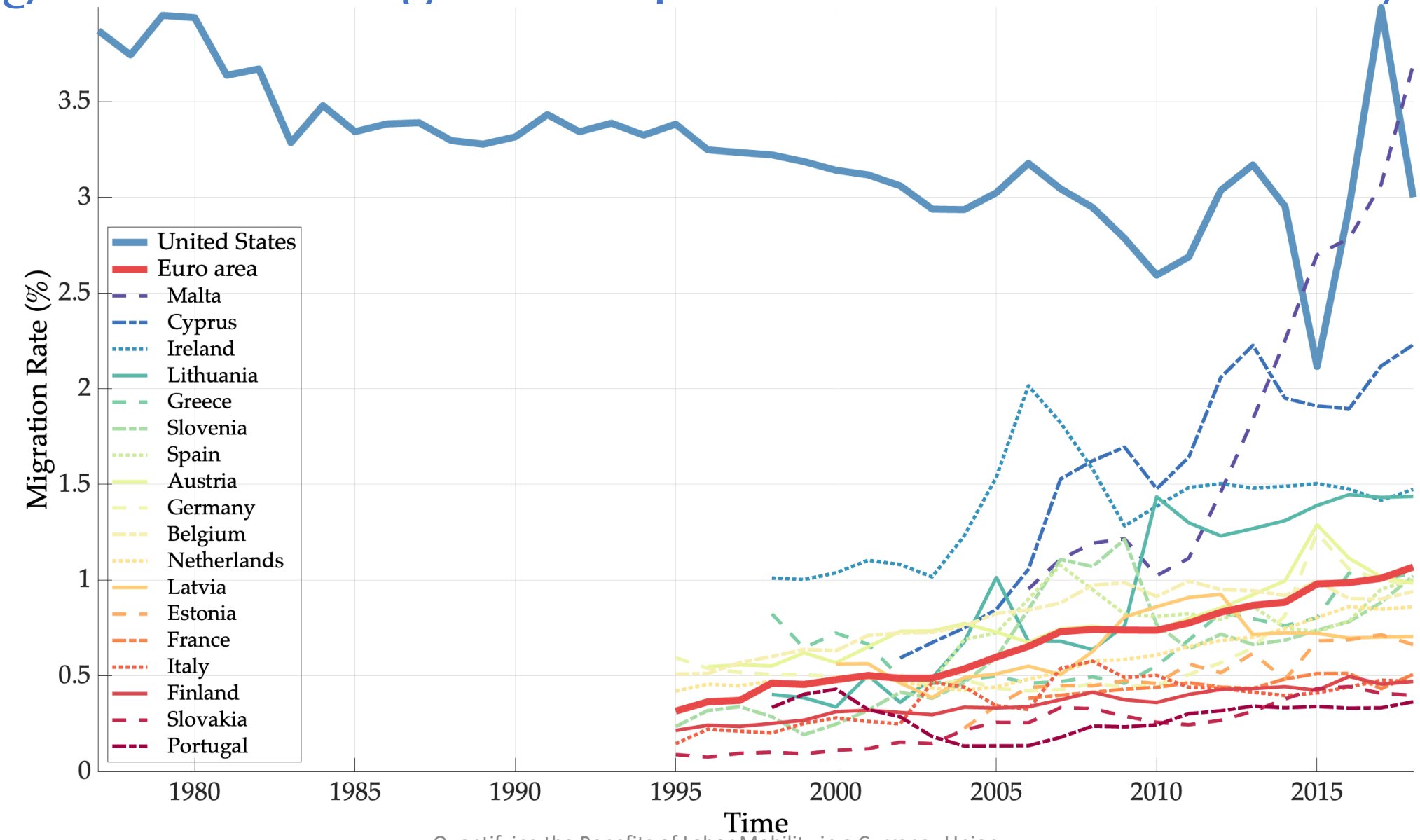


United States, 1977 - 2018



Euro area, 1995-2018

Migration is rising in Europe… but not to U.S. levels yet



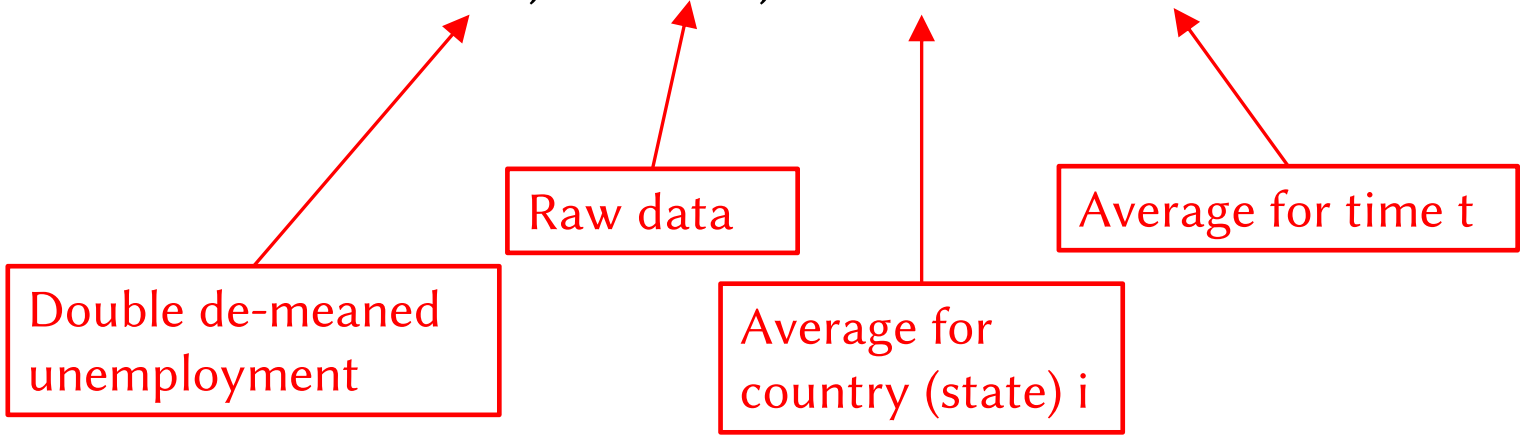
Less migration in Europe than in the US

$$\text{Net migration rate}_{i,t} = \frac{\text{Inmigration}_{i,t} - \text{Outmigration}_{i,t}}{\text{Pop}_{i,t}}$$

	Unit	U.S.	Euro
Regions	#	48	18
Population	m	5.5	18.2
Migration Rate	%	3.3	0.7
Net migration rate (std. dev.)	%	0.5	0.4

Idiosyncratic unemployment

Double de-meaning the data: $\widehat{ur}_{i,t} \equiv ur_{i,t} - ur_i - (ur_t - ur)$



Idiosyncratic unemployment

Double de-meaning the data: $\widehat{ur}_{i,t} \equiv ur_{i,t} - ur_i - (ur_t - ur)$

$$var(ur_{i,t} - ur_i) = var(\widehat{ur}_{i,t}) + var(ur_t) + 2cov(\widehat{ur}_{i,t}, ur_t)$$

Time-series variation for country *i*

Idiosyncratic component

Aggregate component

Zero on average

Most unemployment is idiosyncratic in the euro area

Double de-meaning the data: $\widehat{ur}_{i,t} \equiv ur_{i,t} - ur_i - (ur_t - ur)$

$$var(ur_{i,t} - ur_i) = var(\widehat{ur}_{i,t}) + var(ur_t) + 2cov(\widehat{ur}_{i,t}, ur_t)$$

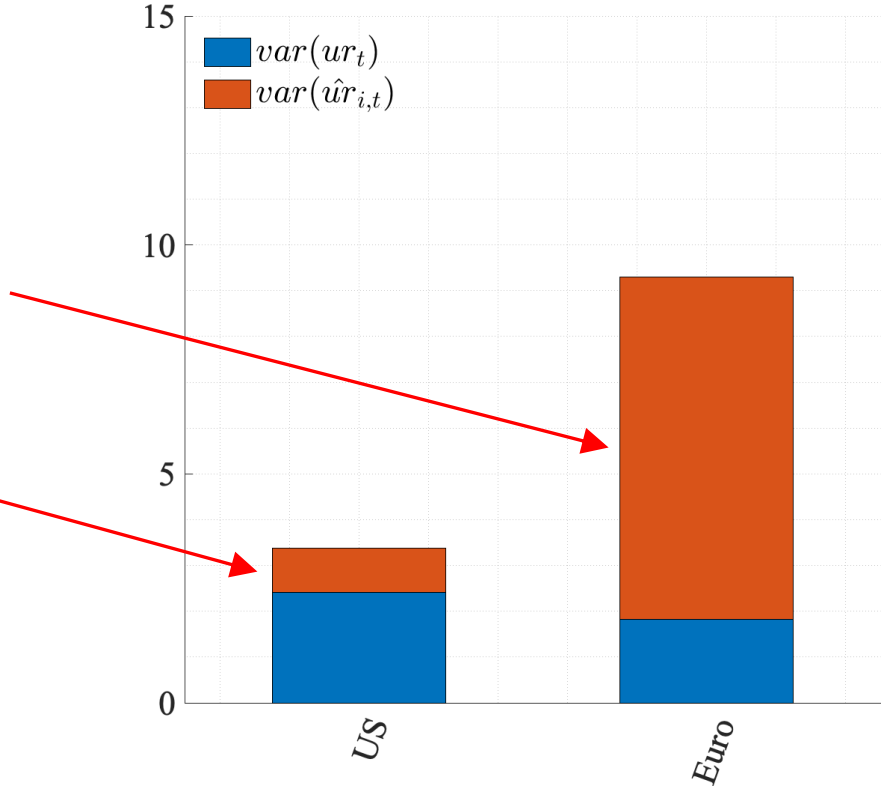
Idiosyncratic component accounts for

80% of total fluctuations in the euro area

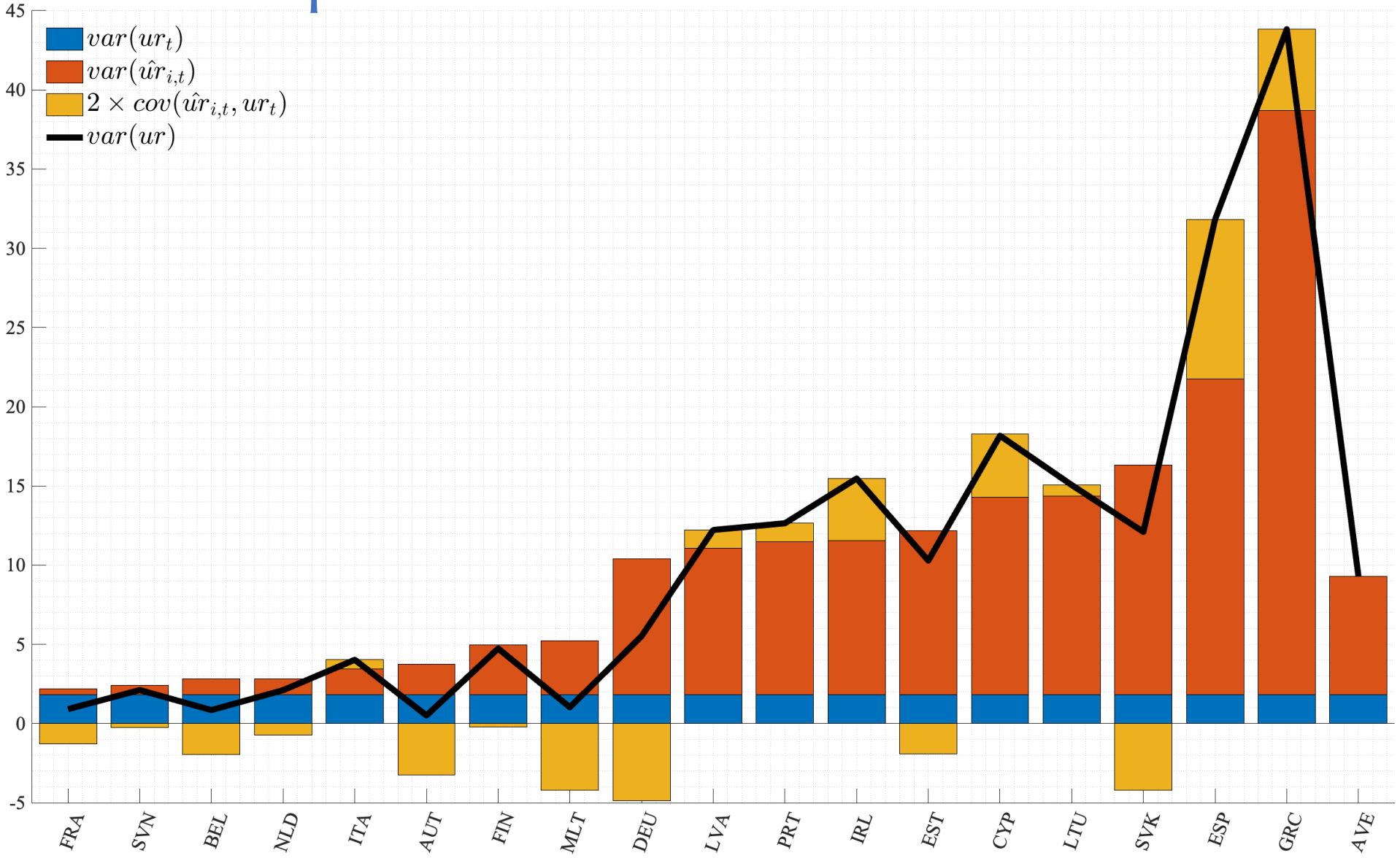
but only 30% in the U.S.

Std. deviation of idiosyncratic component:

2.3 in euro area vs. 1.0 in the U.S.

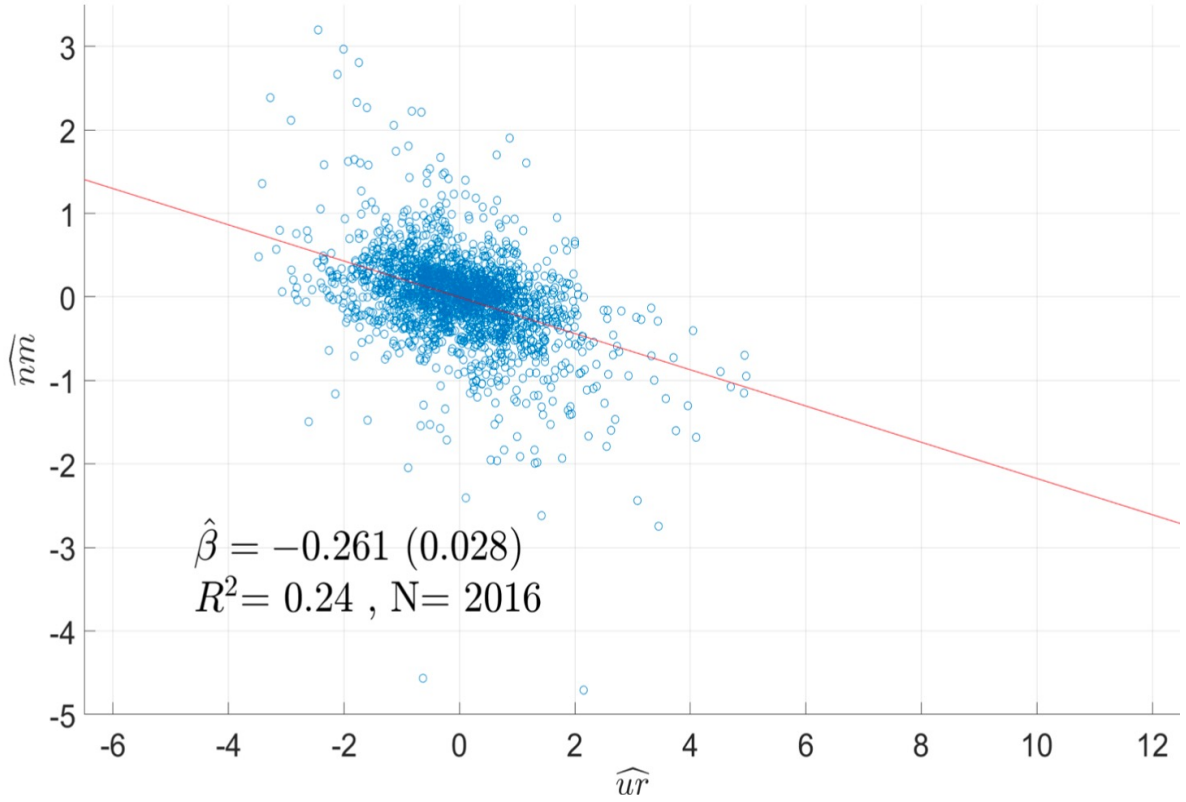


Variance decomposition



Does migration respond to economic conditions?

$$\widehat{nm}_{i,t} = \beta \widehat{ur}_{i,t} + \varepsilon_{i,t}$$



United States, 1977 - 2018

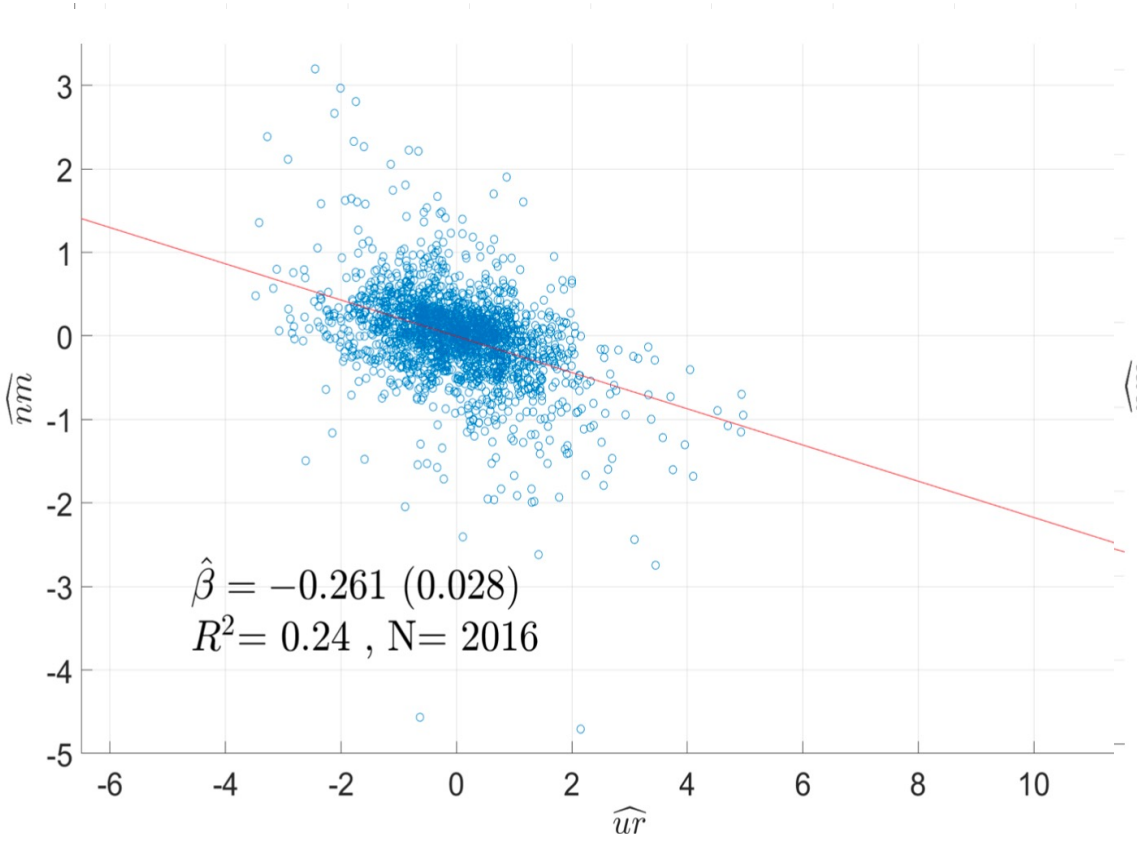
Suppose a labor force participation rate of 0.65.

Then, for every increase of 100 unemployed people,
40 (=26/0.65) people move out.

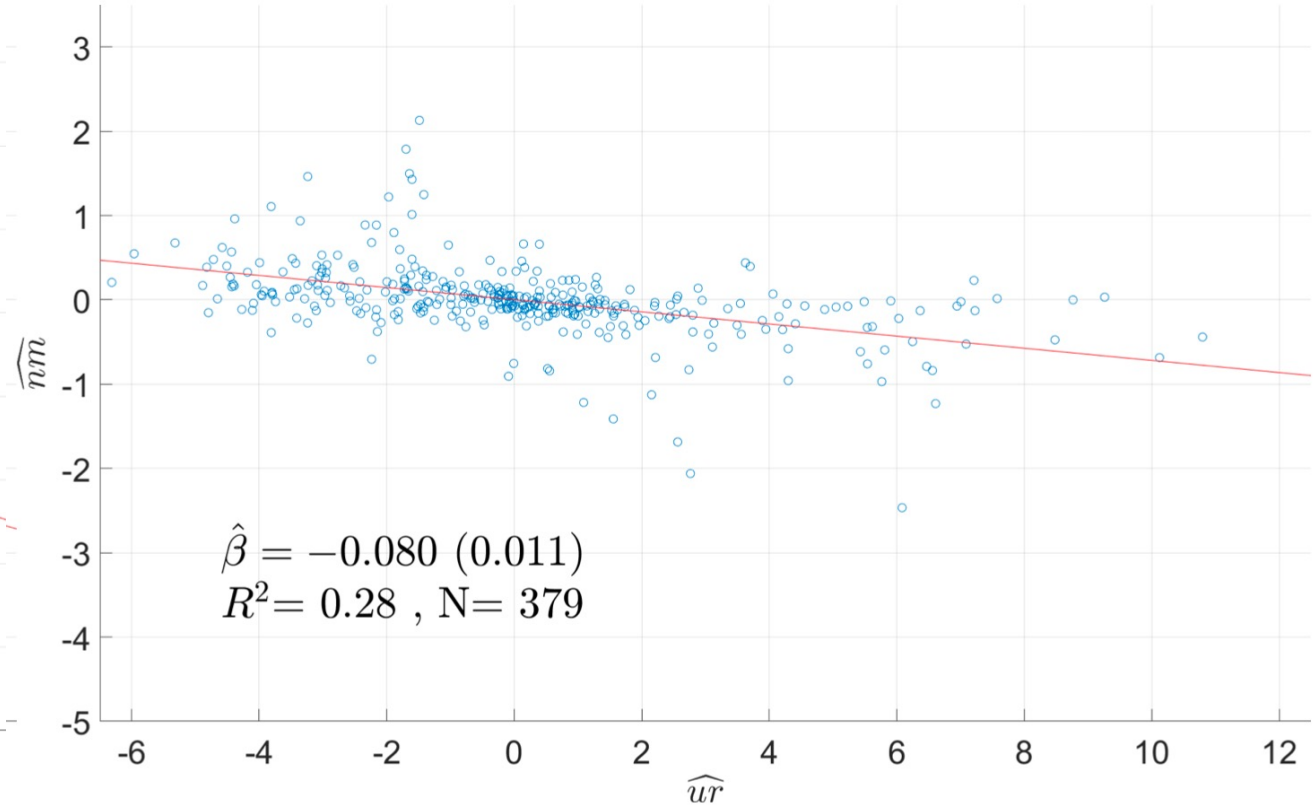
Does migration respond to economic conditions?

$$\widehat{nm}_{i,t} = \beta \widehat{ur}_{i,t} + \varepsilon_{i,t}$$

Response in euro area less than a third.

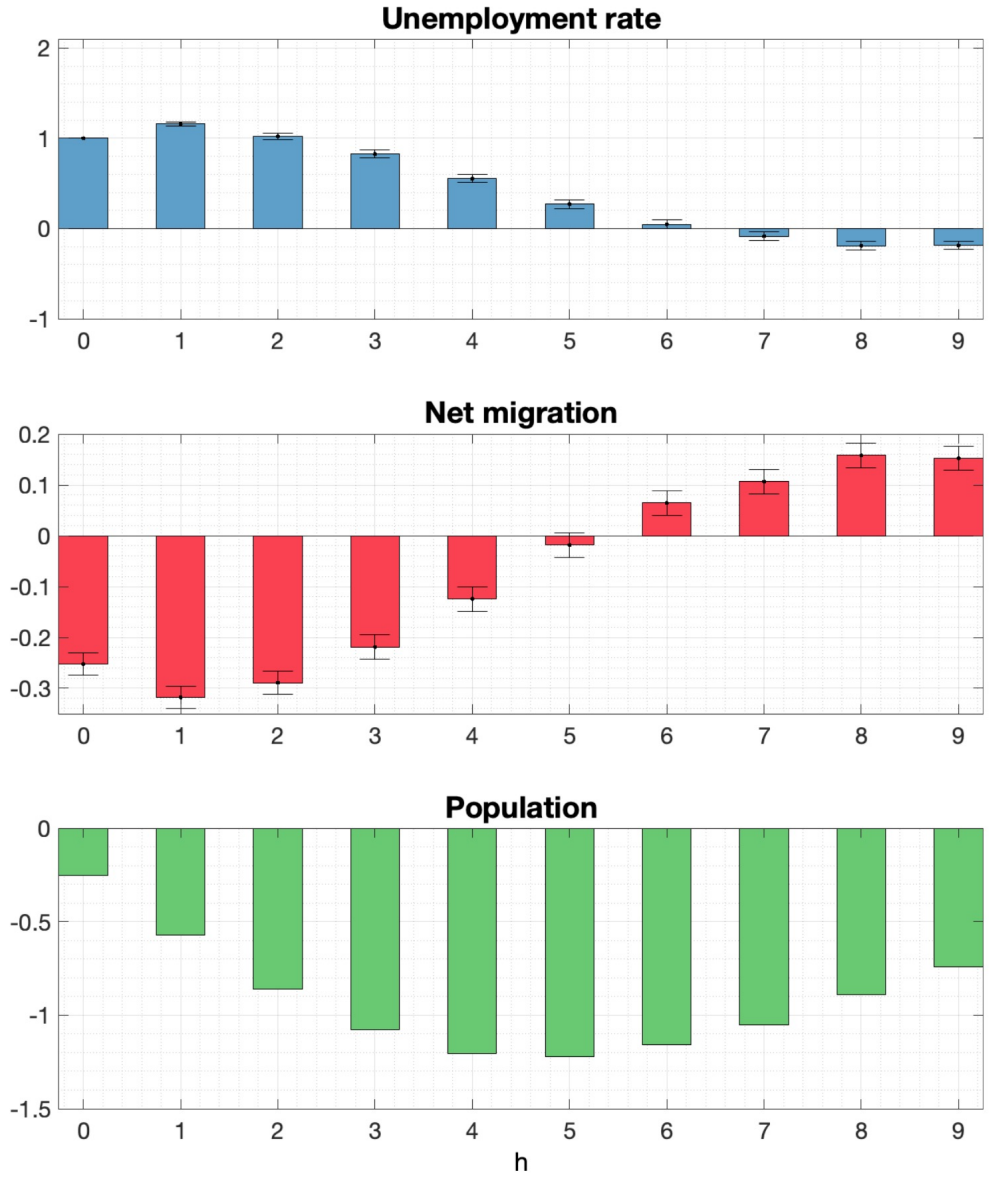


United States, 1977 - 2018

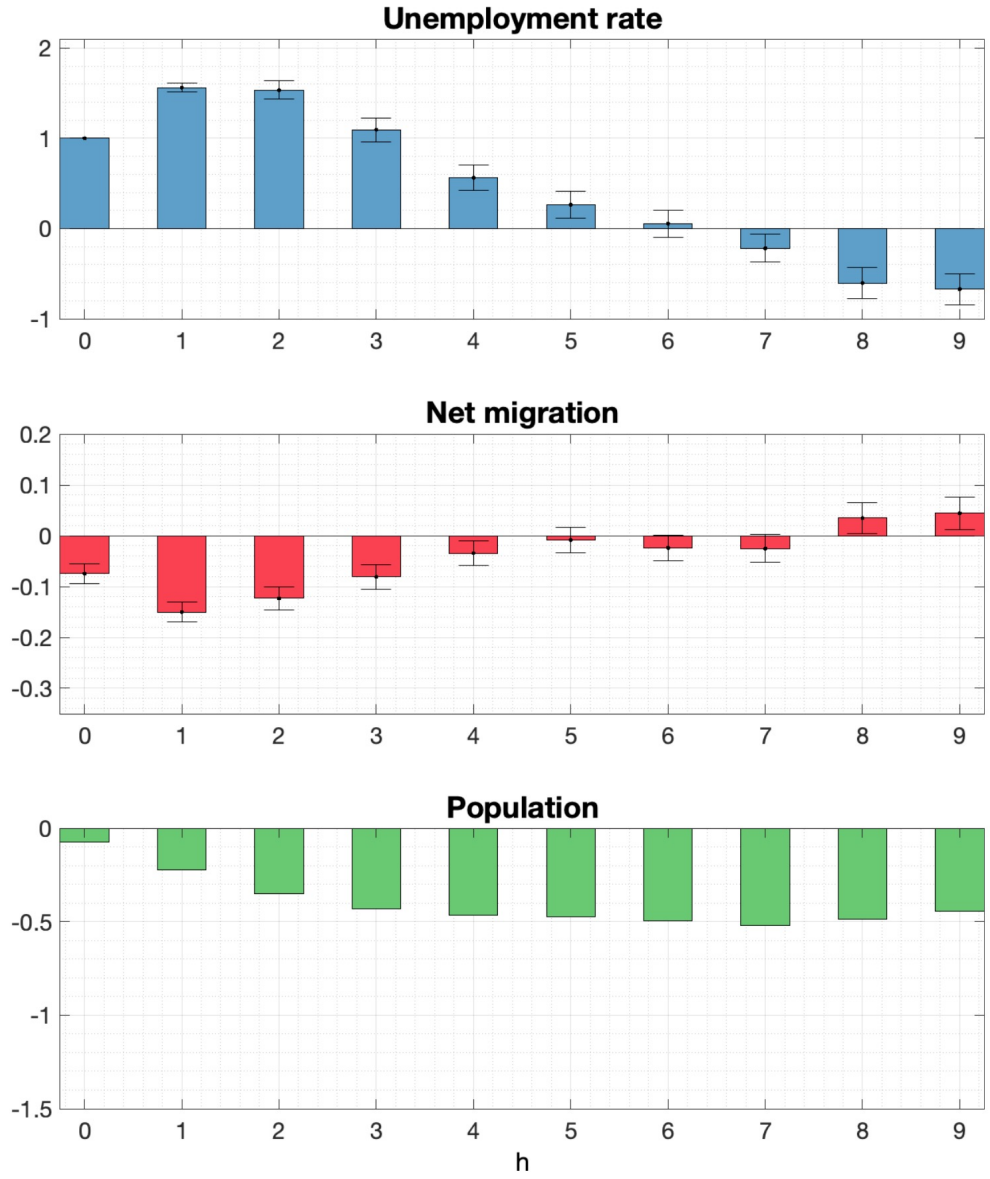


Euro area, 1995 - 2018

Cumulative effect



(a) United States



(b) Euro area

Summing up

- Less migration in euro area relative to US
- Unemployment differentials are greater and more persistent in euro area
- Migration less responsive to unemployment differentials in euro area
- Migration response is persistent, significant changes in population in both US and euro area

To evaluate Mundell's trade-off we need ...

- Multi-country model of a currency union (18 countries +RoW)
- Labor migration (Artuc et al. 2010, Caliendo et al. 2015)
- Unemployment (Erceg et al. 2000, Gali 2011)
- Trade (Eaton and Kortum 2002)
- Country-specific shocks

Model: Population

$$\mathbb{N}_{i,t} = \mathbb{N}_i^k + \mathbb{N}_{i,t}^w$$

Capital owners $\mathbb{N}_i^k$

- Immobile
- Labor and capital income
- Inelastic labor supply
- Trade in international (non-contingent) bonds

Workers $\mathbb{N}_{i,t}^w$

- Mobile
- Labor income only
- Inelastic labor supply, but can change location of work
- Hand-to-mouth

Model: Migration

A worker who is currently living in country *i* chooses location according to:

$$v_{i,t} = \max_j \left\{ U\left(c_{j,t}^w\right) + \frac{1}{\gamma}\epsilon_{j,t} - \tau_j^i + \beta\,\mathbb{E}_t\left(V_{j,t+1}\right) \right\}$$

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Utility from consuming in country *j*

Model: Migration

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Utility from consuming in country *j*

Random idiosyncratic benefit from being in country *j*

Model: Migration

A worker who is currently living in country i chooses location according to:

$$v_{i,t} = \max_j \left\{ U\left(c_{j,t}^w\right) + \frac{1}{\gamma}\epsilon_{j,t} - \tau_j^i + \beta \mathbb{E}_t\left(V_{j,t+1}\right) \right\}$$

Utility from consuming in country j

Random idiosyncratic benefit from being in country j

$\epsilon_{j,t} \sim$ Type-I extreme value distribution

Higher γ makes relocation less random

Model: Migration

A worker who is currently living in country *i* chooses location according to:

$$v_{i,t} = \max_j \left\{ U\left(c_{j,t}^w\right) + \frac{1}{\gamma}\epsilon_{j,t} - \tau_j^i + \beta\,\mathbb{E}_t\left(V_{j,t+1}\right) \right\}$$

Utility from consuming in country *j*

Random idiosyncratic benefit from being in country *j*

Cost of moving from *i* to *j*

$\epsilon_{j,t} \sim$ Type-I extreme value distribution

Higher γ makes relocation less random

Model: Migration

A worker who is currently living in country *i* chooses location according to:

$$v_{i,t} = \max_j \left\{ U\left(c^w_{j,t}\right) + \frac{1}{\gamma}\epsilon_{j,t} - \tau^i_j + \beta\, \mathbb{E}_t\left(V_{j,t+1}\right) \right\}$$

Utility from consuming in country *j*

Random idiosyncratic benefit from being in country *j*

Cost of moving from *i* to *j*

Expected value from living in country *j* in *t+1*

$\epsilon_{j,t} \sim$ Type-I extreme value distribution

Higher γ makes relocation less random

Model: Migration

Specification pins down share of workers that relocate from *i* to *j*:

$$n_{j,t}^{i} = \frac{\exp\left\{\gamma\left(U\left(c_{j,t}^{w}\right) - \tau_{j}^{i} + \beta\,\mathbb{E}_{t}\left(V_{j,t+1}\right)\right)\right\}}{\sum_{k}\exp\left\{\gamma\left(U\left(c_{k,t}^{w}\right) - \tau_{j}^{i} + \beta\,\mathbb{E}_{t}\left(V_{k,t+1}\right)\right)\right\}}$$

Model: Migration

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$$\tilde{n}_{j,t}^{i} - \tilde{n}_{i,t}^{i} = \gamma\left[\tilde{c}_{j,t}^{w} - \tilde{c}_{i,t}^{w} + \beta\,\mathbb{E}_t\left(\Delta V_{j,t+1} - \Delta V_{i,t+1}\right)\right]$$

Model: Migration

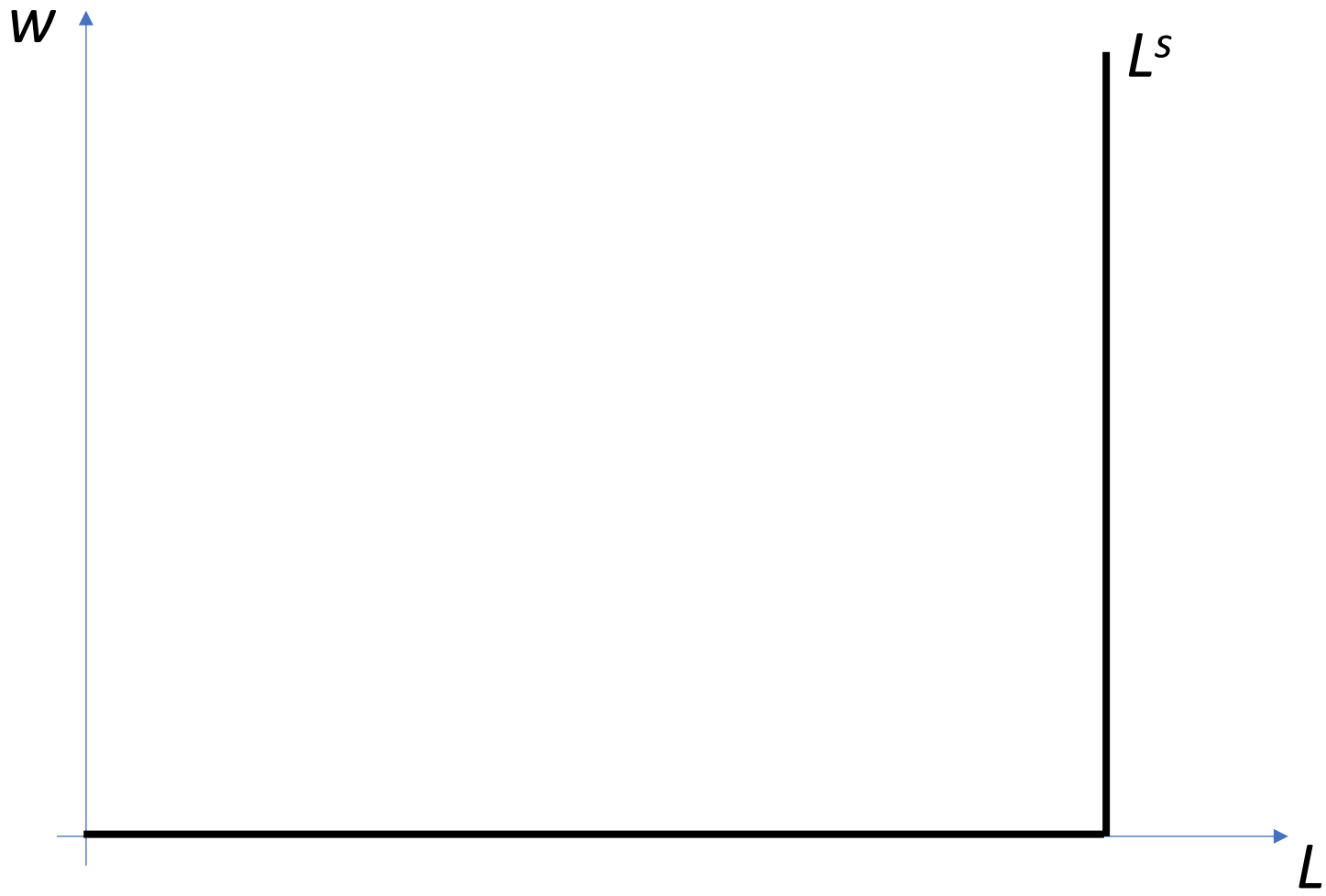
Specification pins down share of workers that relocate from i to j

$$n_{j,t}^{i} = \frac{\exp\left\{\gamma\left(U\left(c_{j,t}^{w}\right) - \tau_{j}^{i} + \beta\,\mathbb{E}_t\left(V_{j,t+1}\right)\right)\right\}}{\sum_k \exp\left\{\gamma\left(U\left(c_{k,t}^{w}\right) - \tau_{j}^{i} + \beta\,\mathbb{E}_t\left(V_{k,t+1}\right)\right)\right\}}$$

Law of motion for workers in country i

$$\mathbb{N}_{i,t}^{w} = \sum_j n_{i,t}^{j}\mathbb{N}_{j,t-1}^{w}$$

Model: Labor market

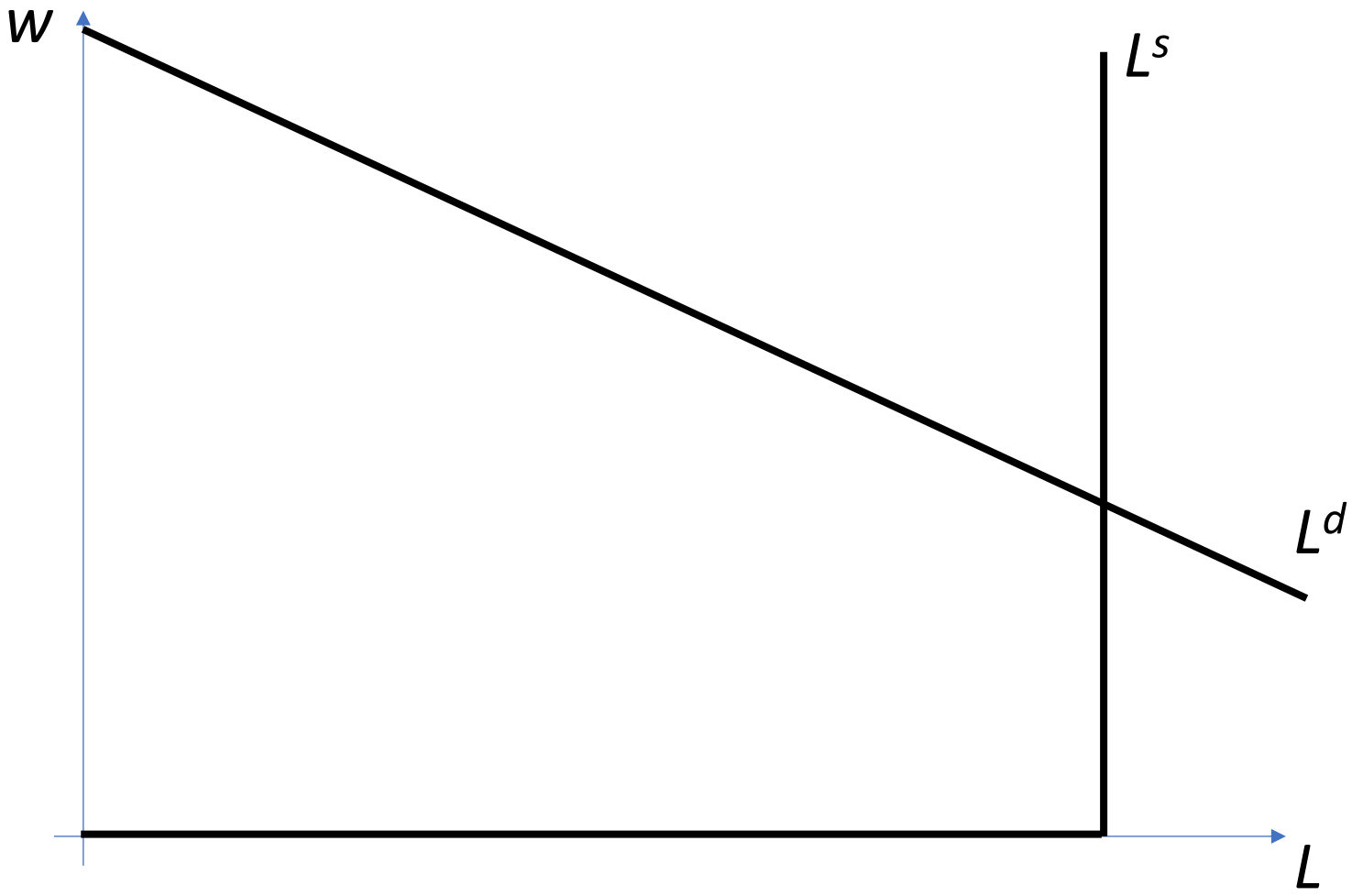


Households:
Supply labor inelastically

Randomly assigned to a type and to a labor union

Risk-sharing guarantees same wage across households

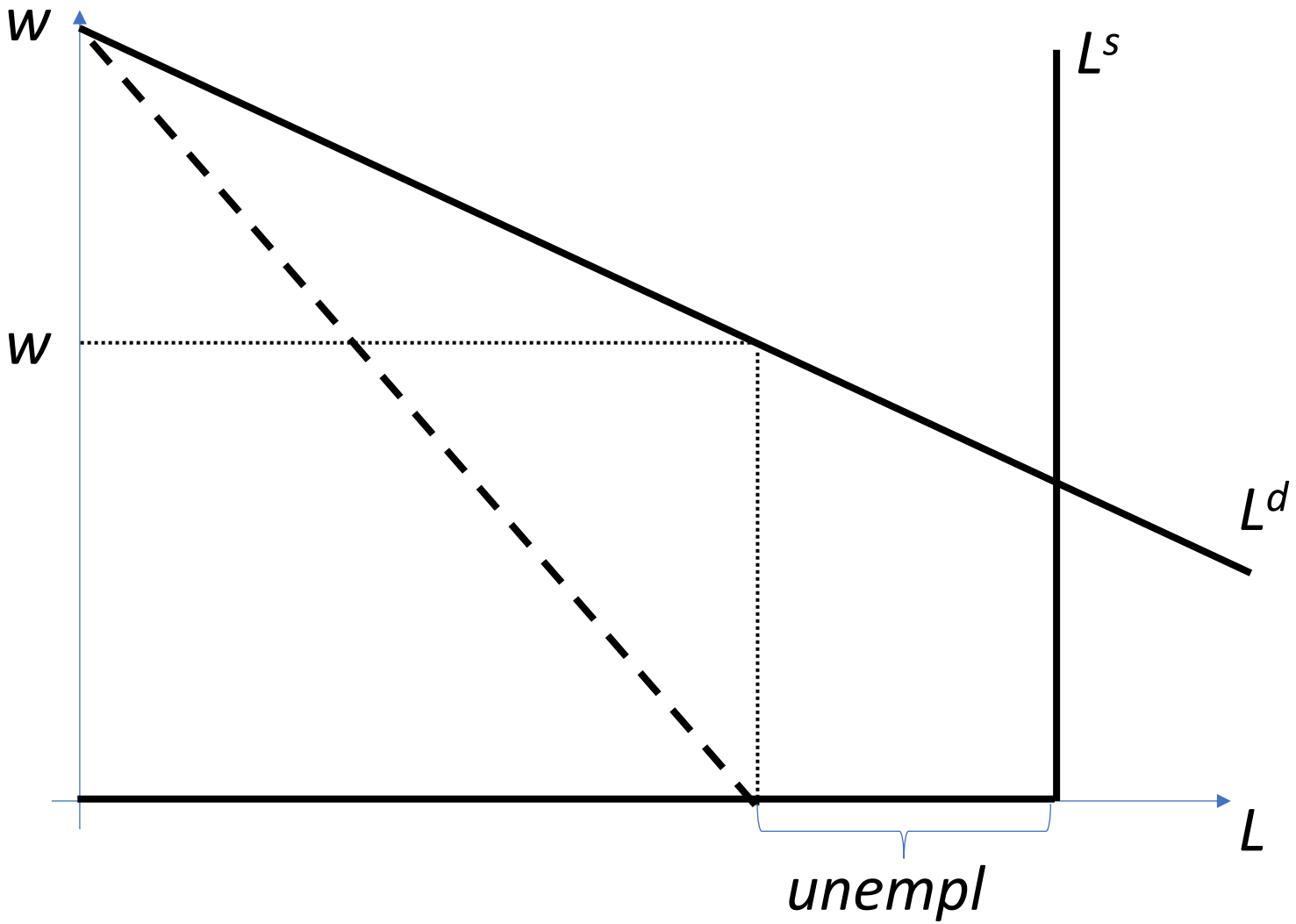
Model: Labor market



Labor aggregating firms:
Labor types aggregated in "effective" labor *L*

Profit maximization delivers a type-specific (linear) labor demand curve

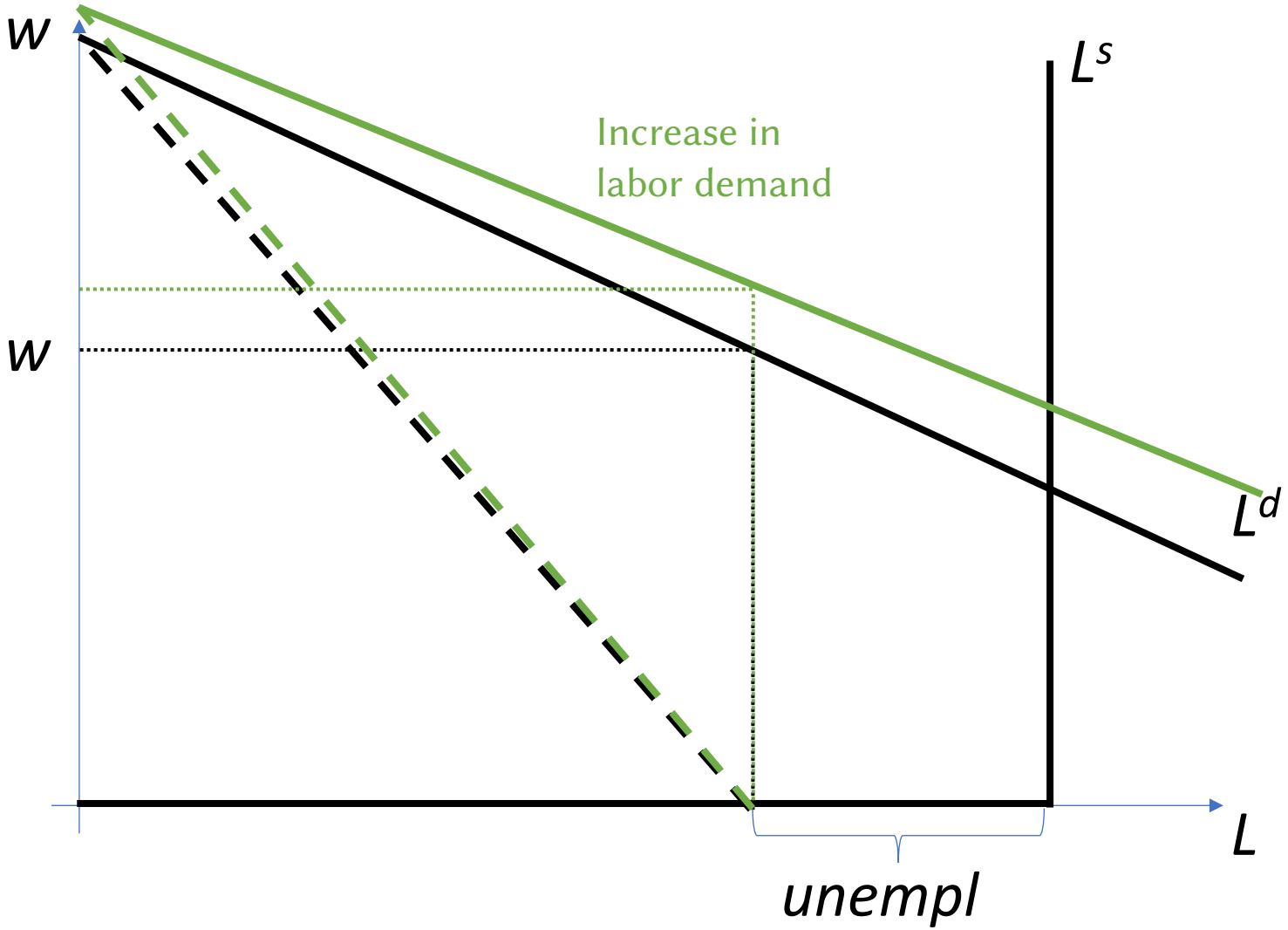
Model: Labor market



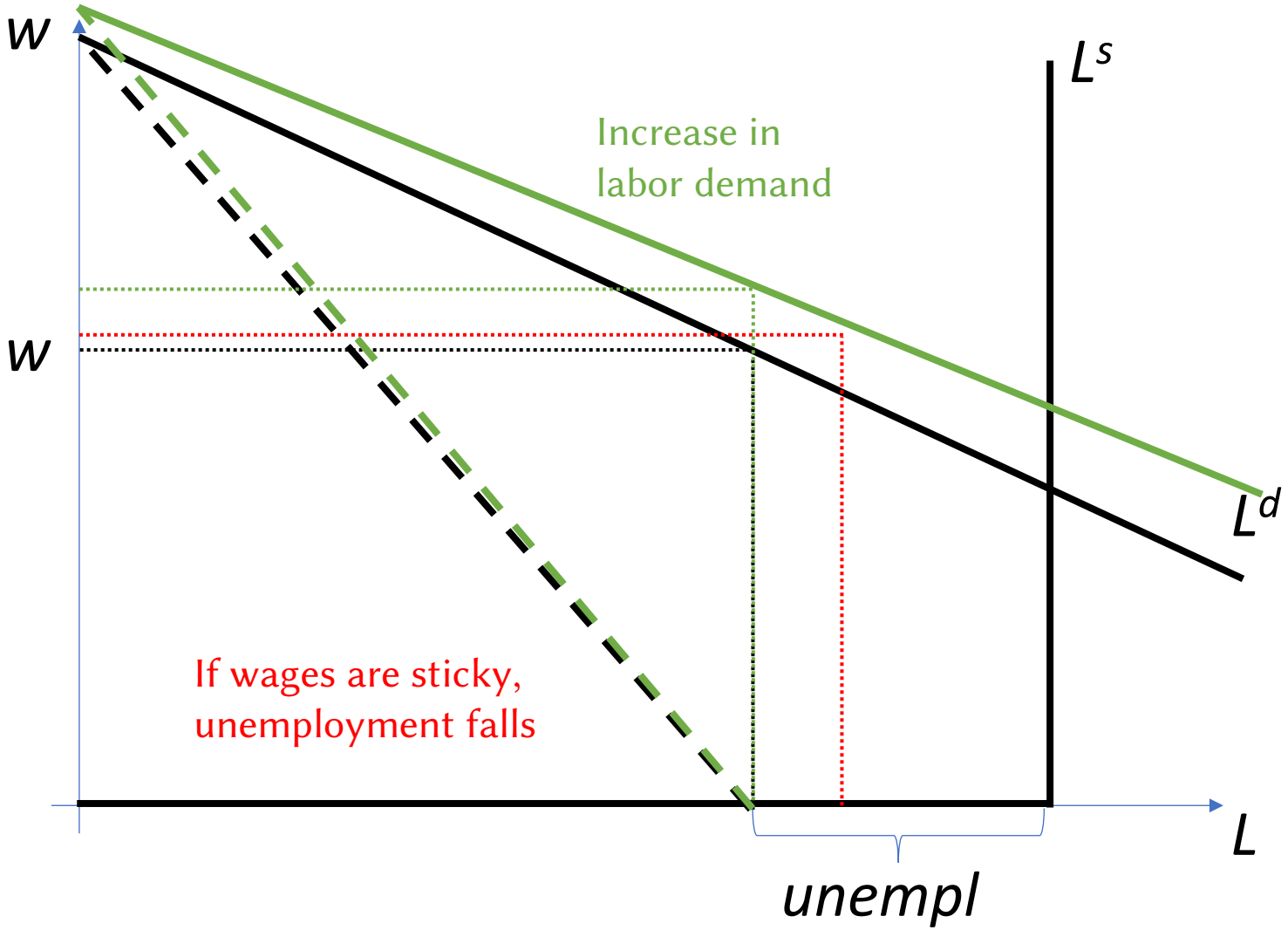
Labor unions:
Given labor demand, maximize wage income for each type.

Market power results in wage markup and unemployment.

Model: Labor market



Model: Labor market



Wage Phillips curve:

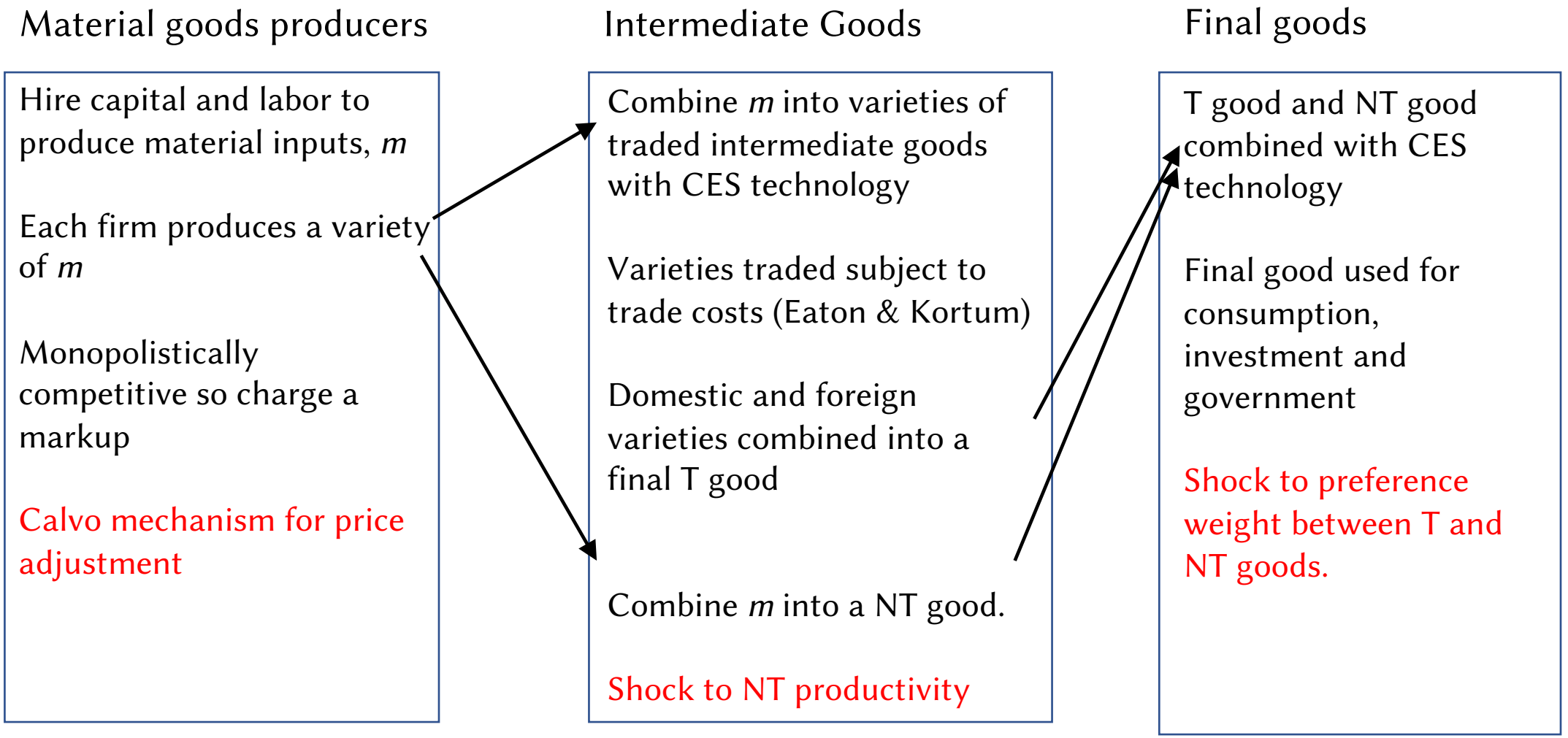
$$\pi_{i,t}^{w} = -\frac{(1-\theta_w\beta)(1-\theta_w)}{2\theta_w}\frac{ur_{i,t}-ur_i}{1-ur_i} + \beta\mathbb{E}_t\left(\pi_{i,t+1}^{w}\right)$$

Workers' consumption

$$c_{i,t}^{w} = w_{i,t}(1-ur_{i,t})$$

Migration decision linked to unemployment rate and wage

Model: Goods markets



Was Mundell right? Does labor mobility substitute for flexible exchange rates?

Step 1: Fit the model to European data.

Calibrate most parameters, estimate a few.

Was Mundell right? Does labor mobility substitute for flexible exchange rates?

Step 1: Fit the model to European data.

Calibrate most parameters, estimate a few.

Step 2: Use the model to answer 2 questions

1. Does labor mobility stabilize economies?
2. Does labor mobility reduce the cost of joining a currency union?

Calibration and estimation of model

	(1) Data	(2) Baseline model
Estimated Parameters		
Migration propensity (γ)		0.14
Investment adjustment cost (f'')		1.20
Utilization adjustment cost (a'')		0.02
Persistence preference weights (ρ_ω)		0.96
Persistence TFP shocks (ρ_Z)		0.88
Targeted Moments		
Slope coefficient $\widehat{nm}_{i,t}$ on $\widehat{ur}_{i,t}$	−0.08	−0.08
Volatility investment to GDP	3.63	3.55
Volatility utilization to GDP	0.98	1.02
GDP (GDP)	0.95	0.94
Unemployment (ur)	−0.63	−0.58
Persistence $\varepsilon^{\omega}_{i,t}$	0.00	0.33
Persistence $\varepsilon^{Z}_{i,t}$	0.00	0.07

Elasticity of net migration
to changes in relative unemployment
(slope for European data)

1. Stabilizing fluctuations

Counterfactual: Adjust γ to match U.S. slope coefficient (-0.26)

Baseline

	No mobility		Baseline mobility			High mobility	
	(1) Fixed	(2) Float	(3) Fixed	(4) Float	(5) Flex	(6) Fixed	(7) Float
Panel A: Volatility, Per-Capita Variables (percent)							
Unemployment rate	2.36	0.24	2.28	0.24	0.00	1.73	0.27
GDP per capita	4.46	3.44	4.43	3.50	3.55	3.37	3.41
Consumption per capita	2.89	2.03	2.80	2.01	2.06	2.02	1.88
Net migration	0.00	0.00	0.19	0.17	0.16	1.77	1.60
Panel B: Volatility, Aggregate Variables (percent)							
GDP	4.46	3.44	4.09	3.37	3.53	6.44	6.19
Consumption	2.89	2.03	3.34	2.81	2.81	6.96	6.56

Counterfactual: Assume independent monetary policy

Counterfactual: Flexible prices and wages

1. Stabilizing fluctuations

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GDP	4.46	3.44	4.09	3.37	3.53	6.44	6.19
Consumption	2.89	2.03	3.34	2.81	2.81	6.96	6.56

Migration reduces volatility of per-capita variables, but amplifies volatility of aggregate variables.

1. Stabilizing fluctuations

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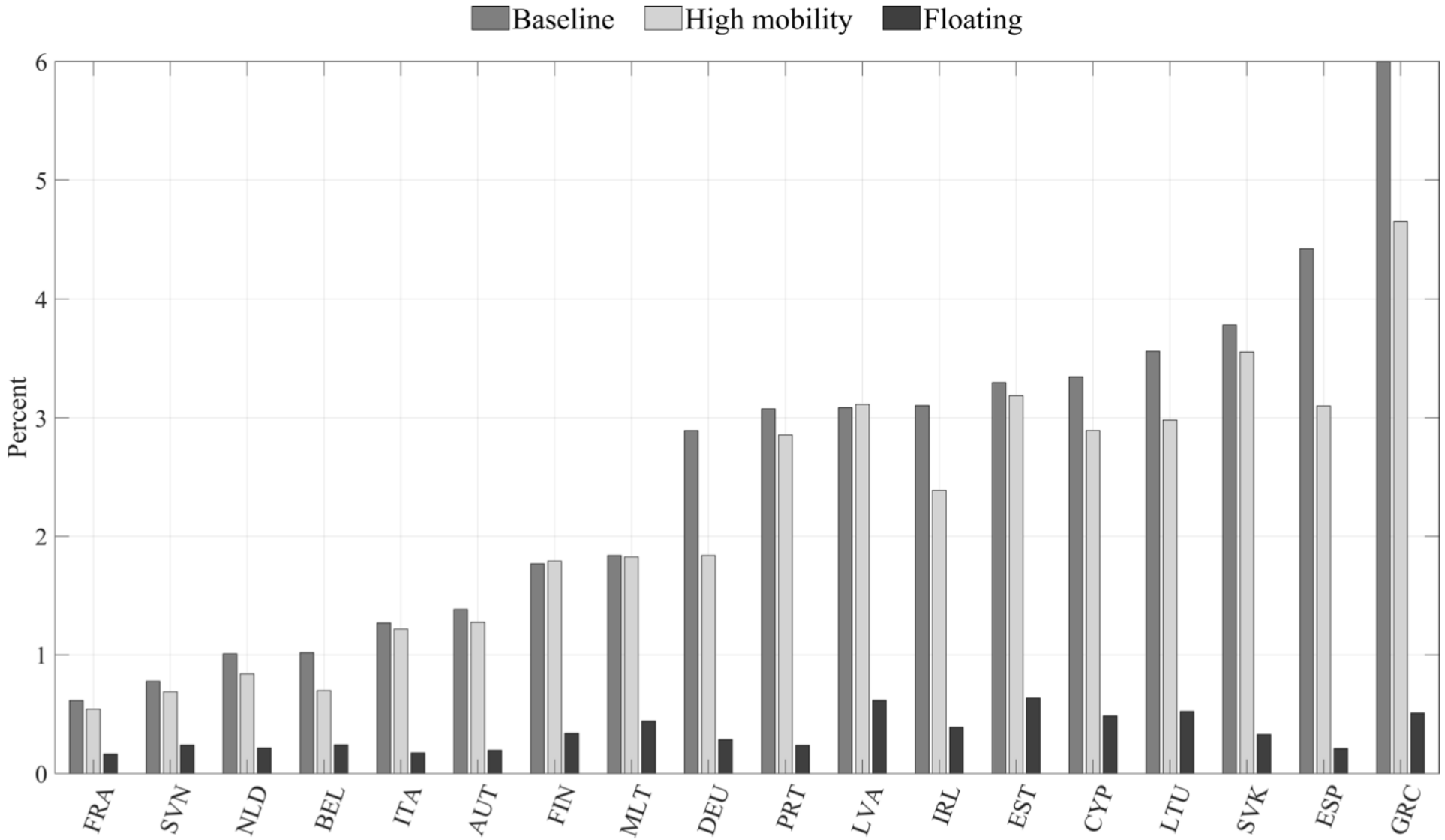
Independent monetary policy can be very effective in reducing unemployment volatility and bring it close to flex-price solution.

1. Stabilizing fluctuations



Basic patterns for unemployment volatility hold for most countries.

2. Welfare cost of a currency union

Standard techniques from New Keynesian literature (see Woodford, 2003; Gali, 2008)

Welfare loss = additional consumption required to compensate for…

- inefficient consumption fluctuations (relative to flex-price)
- reduced average consumption due to wage inflation
- reduced average consumption due to price inflation

Separate calculation for workers and capital owners

Cost of union = welfare cost under fixed less welfare cost under floating

Mundell's question: Does labor mobility reduce the cost of sharing a currency?

2. Welfare cost of a currency union

	No mobility		Baseline mobility			High mobility	
	(1) Fixed	(2) Float	(3) Fixed	(4) Float	(5) Flex	(6) Fixed	(7) Float
Panel D: Welfare Costs (euros per capita)							
Consumption gap workers	3	0	2	0	0	1	0
Consumption gap capital owners	0	0	0	0	0	0	0
Migration gap workers	0	0	0	0	0	0	0
Wage inflation	51	8	47	9	0	24	11
Material price inflation	227	77	224	84	0	188	108
Workers (Total)	197	57	191	62	0	143	79
Capital owners (Total)	362	114	354	124	0	281	159
Total	280	85	273	93	0	212	119
Cost of Currency Union (euros per capita)							
Total	**195**	–	**180**	–	–	**93**	–

2. Welfare cost of a currency union

Welfare cost mostly reflect inflation

	No mobility		Baseline mobility			High mobility	
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Migration gap workers	0	0	0	0	0	0	0
Wage inflation	51	8	47	9	0	24	11
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Cost of Currency Union (euros per capita)							
Total	**195**	–	**180**	–	–	**93**	–

2. Welfare cost of a currency union

Cost of union: 180 euros p. a. p. cap.

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	(1) Fixed	(2) Float	(3) Fixed	(4) Float	(5) Flex	(6) Fixed	(7) Float
Panel D: Welfare Costs (euros per capita)							
Consumption gap workers	3	0	2	0	0	1	0
Consumption gap capital owners	0	0	0	0	0	0	0
Migration gap workers	0	0	0	0	0	0	0
Wage inflation	51	8	47	9	0	24	11
Material price inflation	227	77	224	84	0	188	108
Workers (Total)	197	57	191	62	0	143	79
Capital owners (Total)	362	114	354	124	0	281	159
Total	280	85	273	93	0	212	119
Cost of Currency Union (euros per capita)							
Total	**195**	–	**180**	–	–	**93**	–

2. Welfare cost of a currency union

U.S.-level mobility would reduce cost of currency union by one half,...

	No mobility		Baseline mobility			High mobility	
	(1) Fixed	(2) Float	(3) Fixed	(4) Float	(5) Flex	(6) Fixed	(7) Float
Panel D: Welfare Costs (euros per capita)							
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Consumption gap capital owners	0	0	0	0	0	0	0
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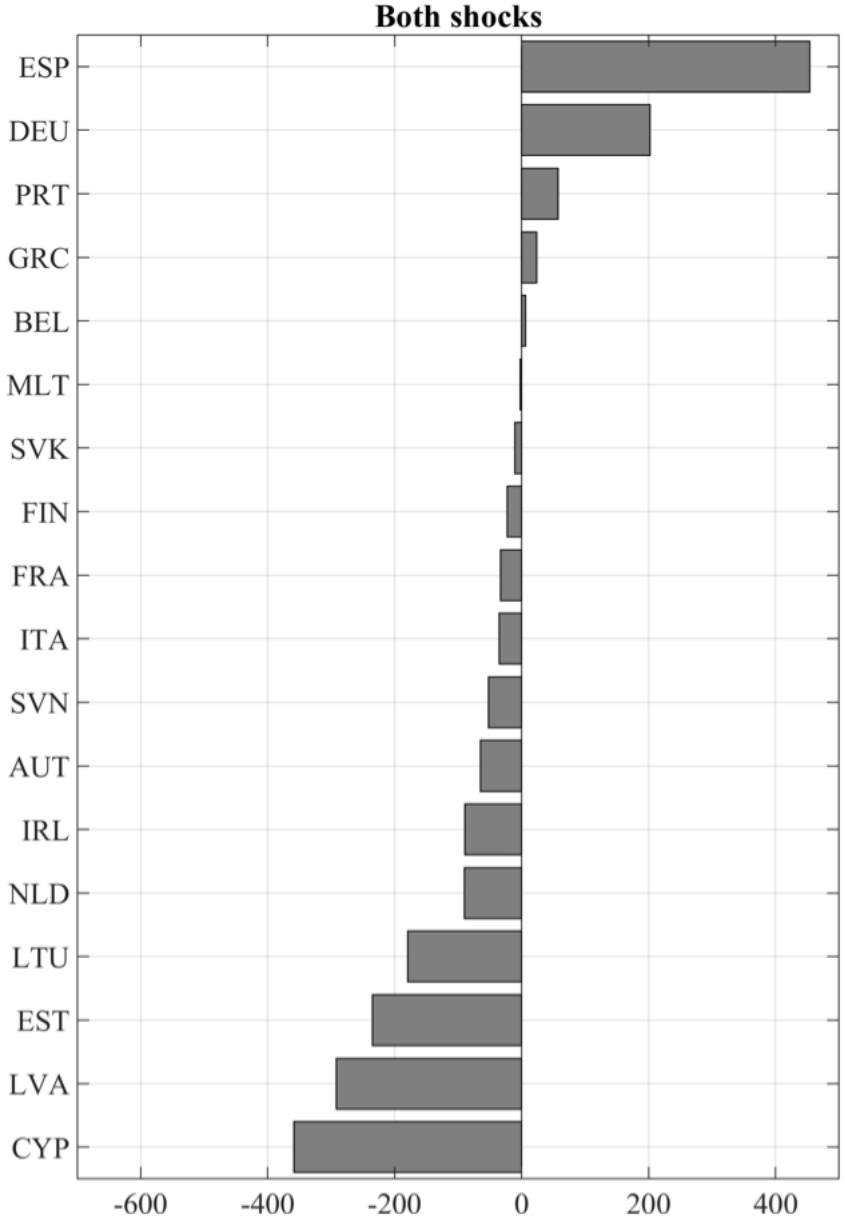
2. Welfare cost of a currency union



For the average euro area citizen, mobility would reduce the cost of the union by 87 euros...

... but there is substantial heterogeneity across countries!

Average gains driven by Spain and Germany.

For most countries, mobility makes union more costly (Mundell upside down!)

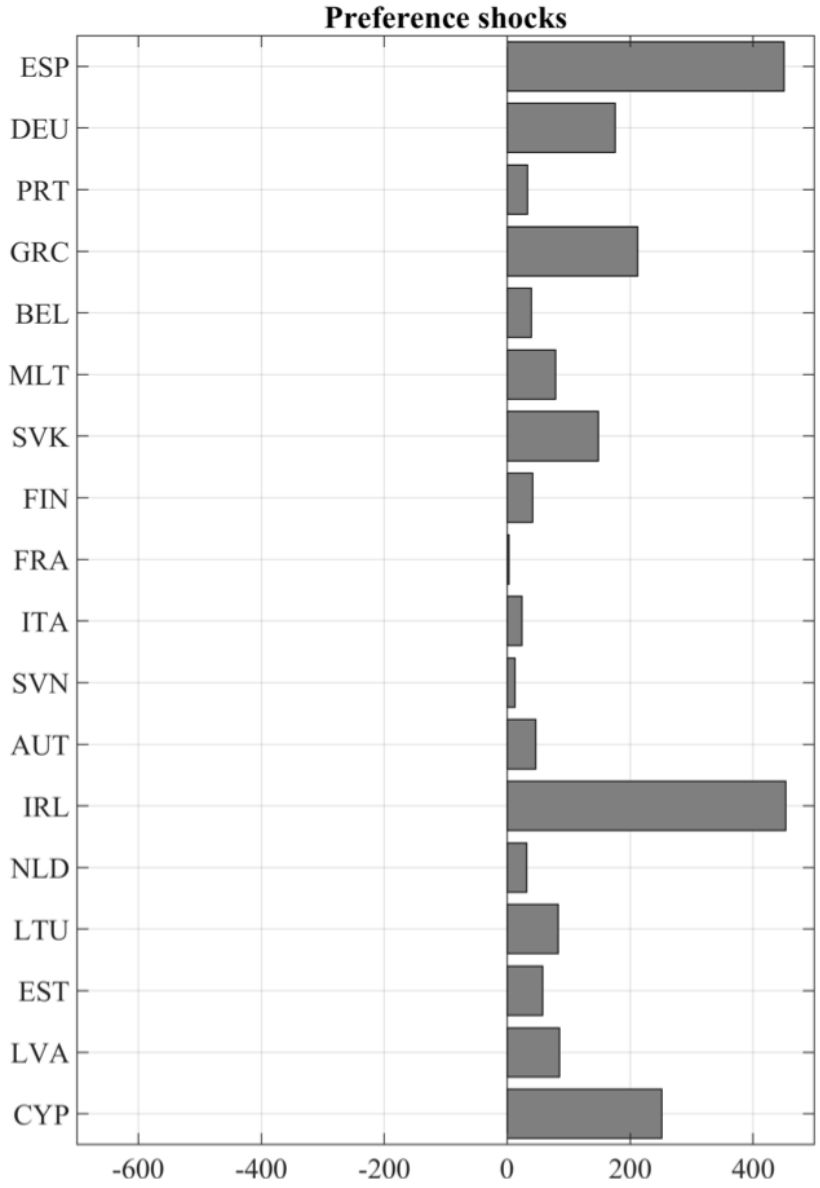
Why?

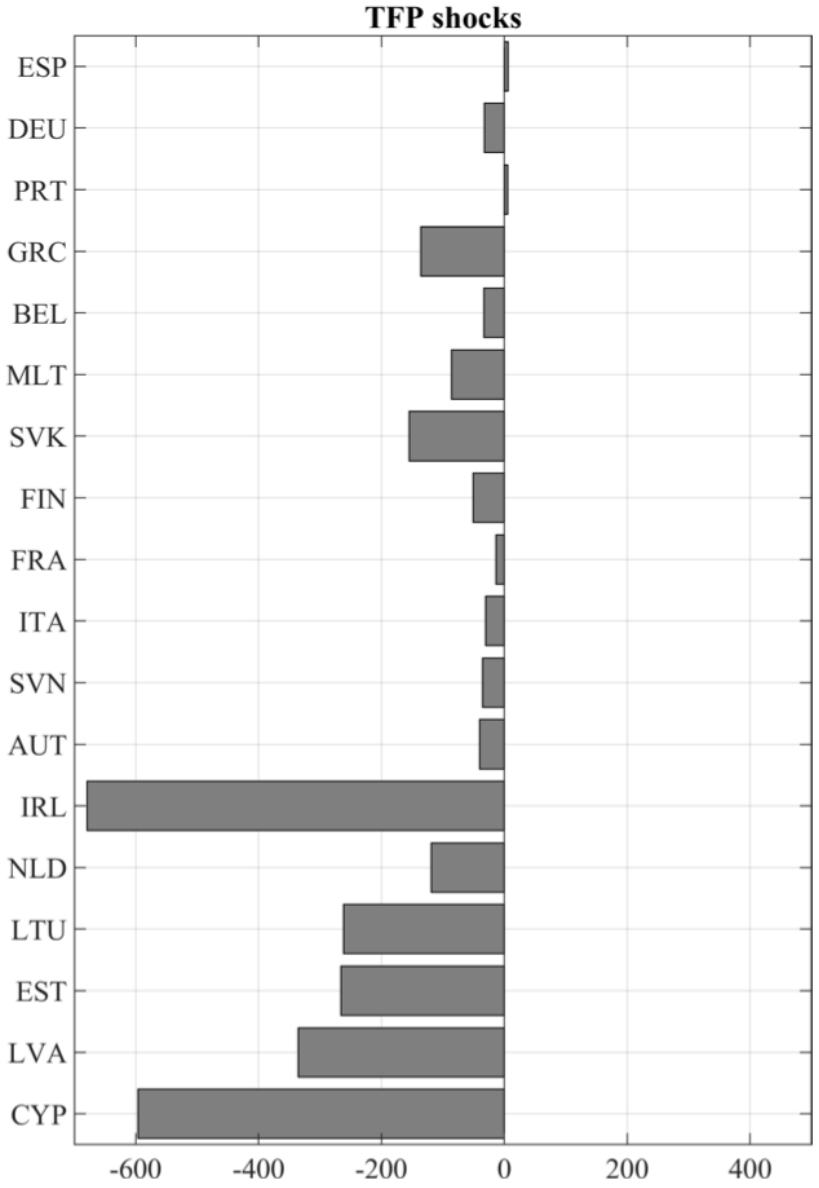
2. Welfare cost of a currency union

Simulate model feeding in only 1 type of shock at a time.

In a world with preference shocks, mobility reduces cost of union.

In a world with TFP shocks, mobility raises cost of union





2. Welfare cost of a currency union

Supply and demand shocks in a currency union

Recall: welfare costs driven by inflation.

Positive demand shock:
Output ↑, inflation ↑
Inflow of additional workers eases inflationary pressure

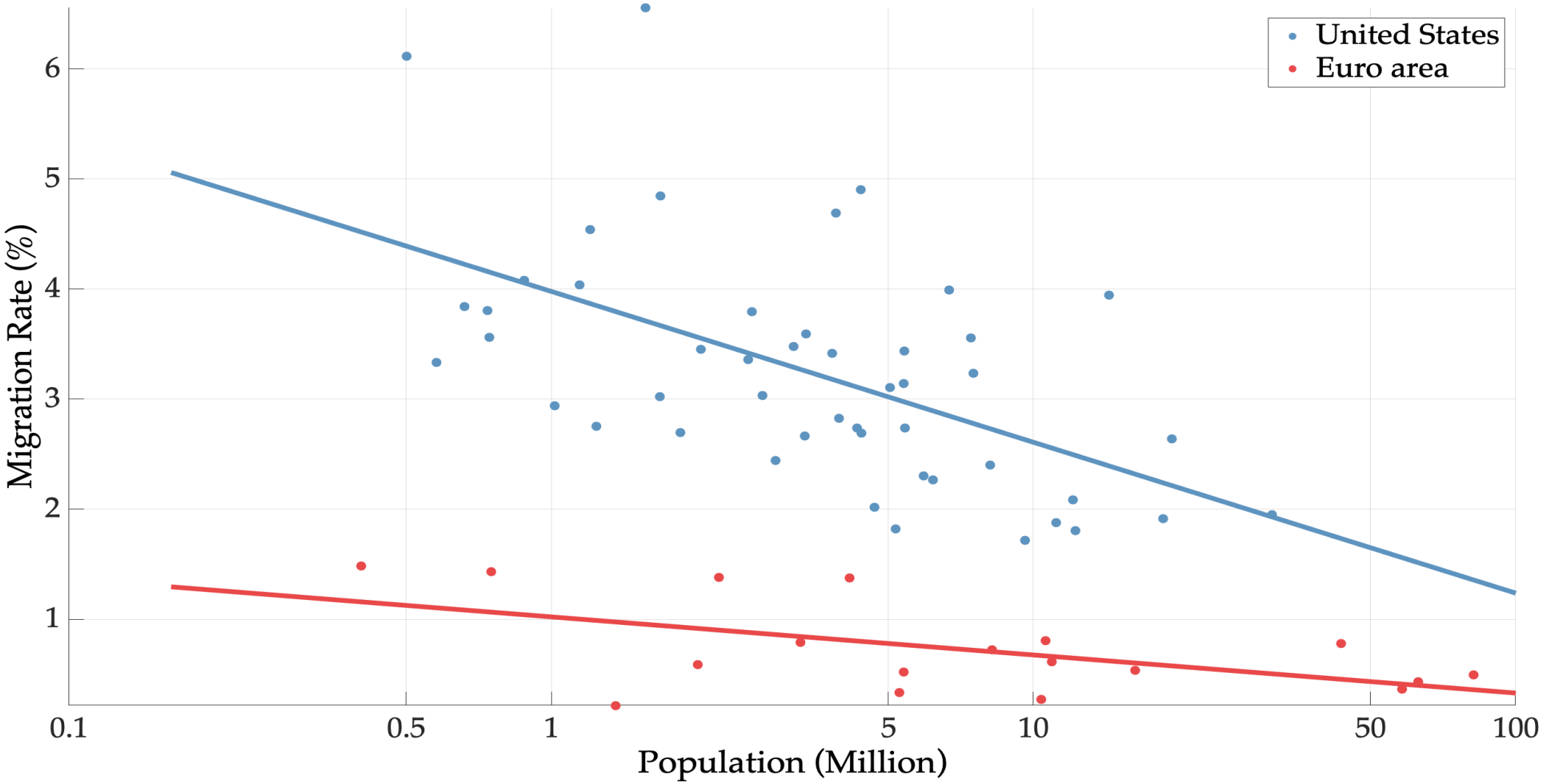
Positive supply shock:
Output ↑, inflation ↓
Inflow of additional workers puts more downward pressure on prices

Migration destabilizes inflation in the face of supply shocks! Mundell upside down.

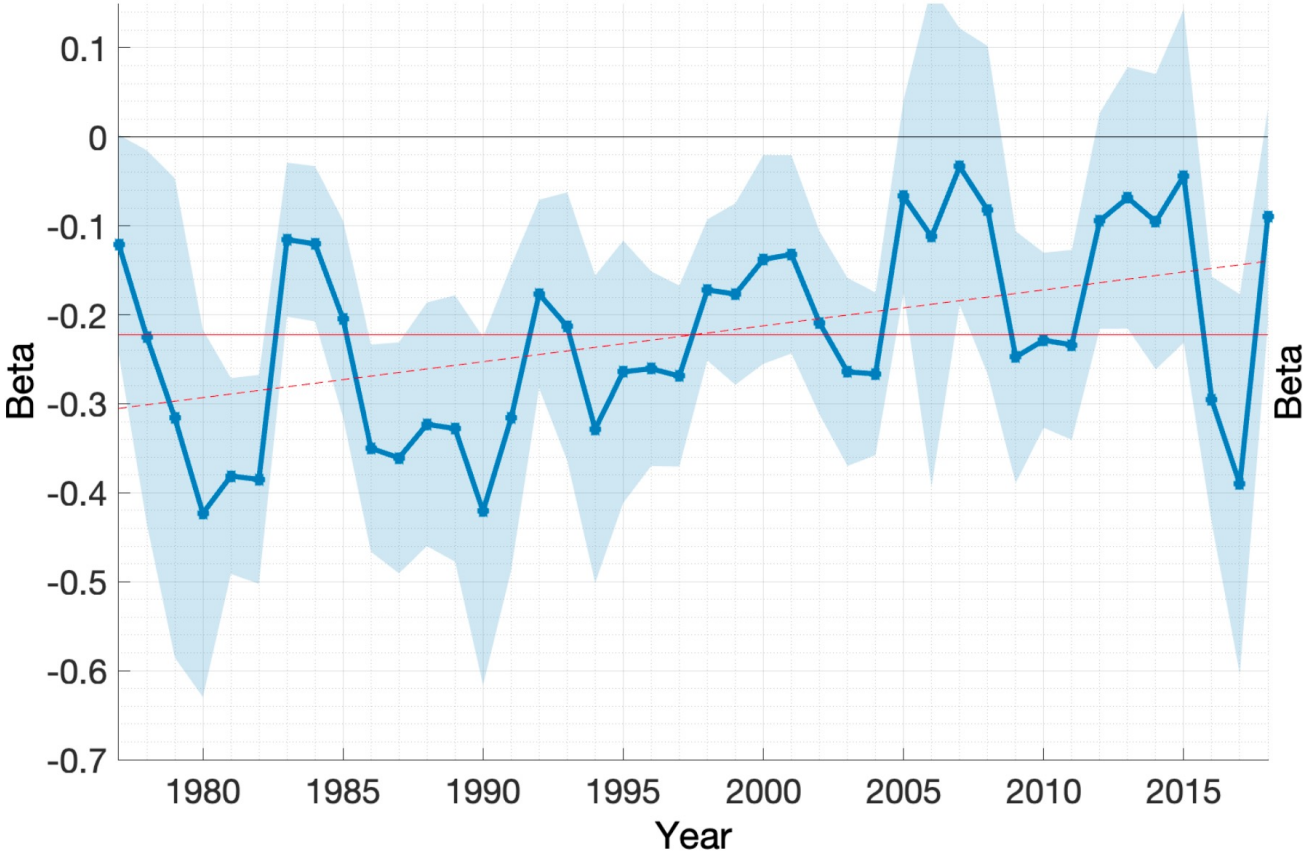
Was Mundell right? Yes and no.

- Euro area country unemployment rates are about 2.5 more volatile than U.S. state unemployment rates
- Higher (U.S.-level) labor mobility in Europe would reduce this gap by about 25%.
- Welfare cost of currency union would fall by one half,...
- ... but not all countries gain!

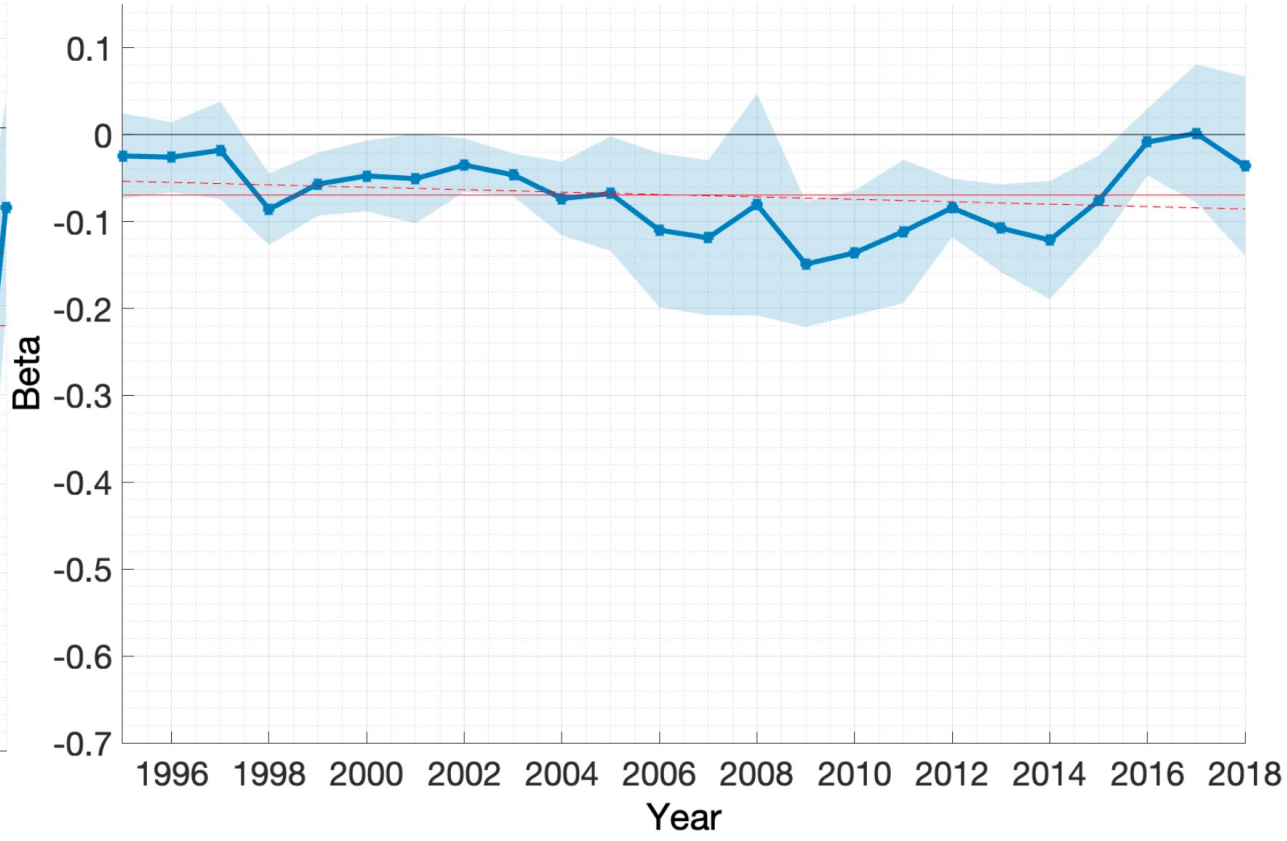
Migration is lower in Europe...
... even after controlling for country size



Does migration respond to economic conditions?

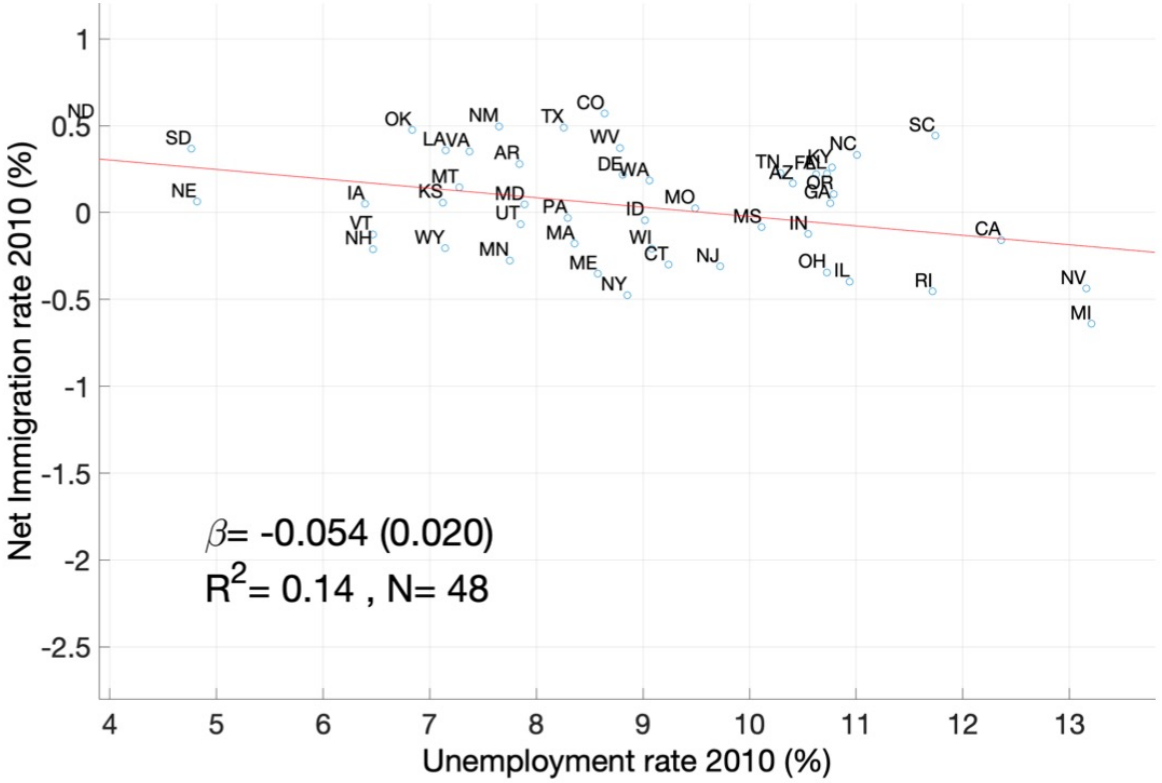


(a) United States: 1977 - 2018

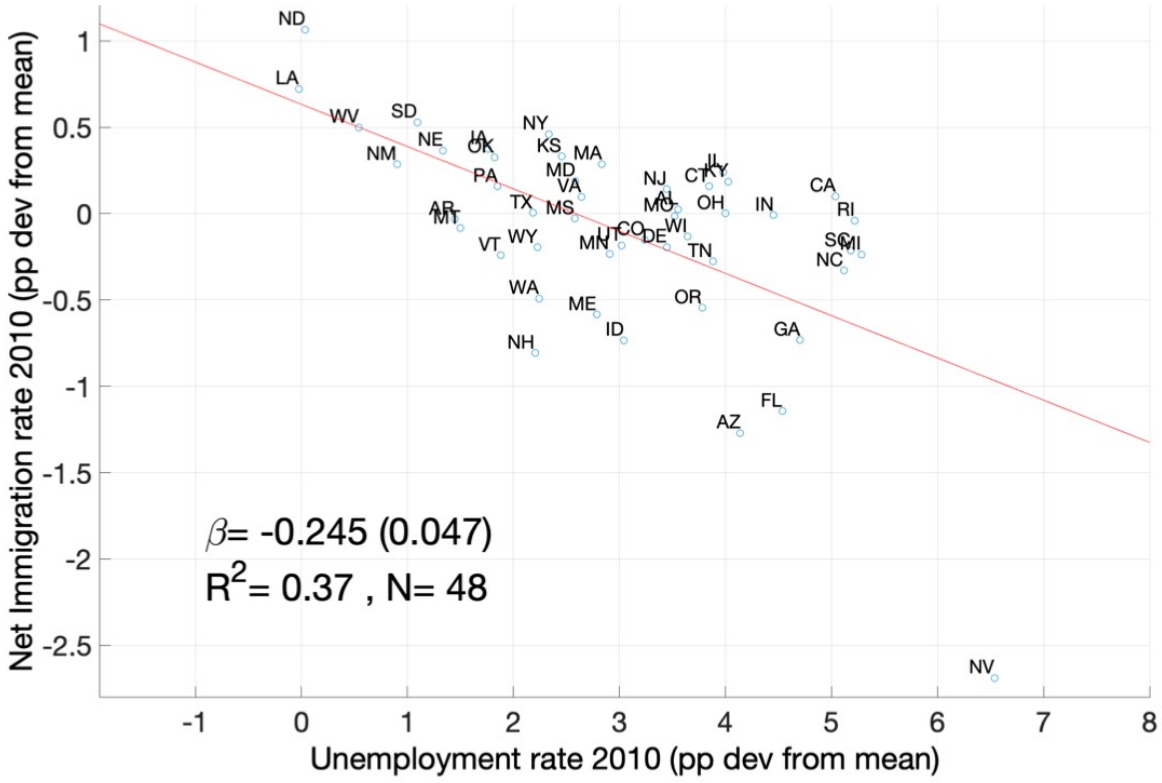


(b) Euro area: 1995 - 2018

Migration in the U.S. durig the Great Recession



(a) Raw Data



(b) Demeaned Data

	(1) Data	(2) Baseline model	(3) Only ω shocks	(4) Only Z^N shocks
Other Moments				
Time-Series Standard Deviation				
Unemployment rate (ur)	2.28	2.28	2.43	0.73
Consumption per capita (C)	2.80	2.80	2.05	2.00
Investment per capita (I)	8.07	12.93	2.71	12.11
GDP per capita	2.45	3.64	2.23	2.85
GDP	2.60	3.73	2.25	2.94
Inflation	2.20	2.72	0.65	2.71
Net exports over GDP $\left(\frac{nx}{GDP}\right)$	1.24	0.96	0.41	1.18
Net migraton rate (nm)	0.26	0.18	0.16	0.09
Persistence				
Net exports over GDP $\left(\frac{nx}{GDP}\right)$	0.89	0.96	0.96	0.96
Investment per capita (I)	0.88	0.96	0.97	0.96
Net migration rate (nm)	0.65	0.83	0.86	0.74
Correlation with GDP				
Consumption per capita (C)	0.80	0.96	0.93	1.00
Investment per capita (I)	0.84	0.79	0.73	0.99
Net exports over GDP $\left(\frac{nx}{GDP}\right)$	−0.43	−0.51	0.36	−0.79
Inflation (π)	0.07	0.05	0.85	−0.03