

ARE JOBS AND GROWTH STILL LINKED?

STRESS-TESTING OKUN'S LAW

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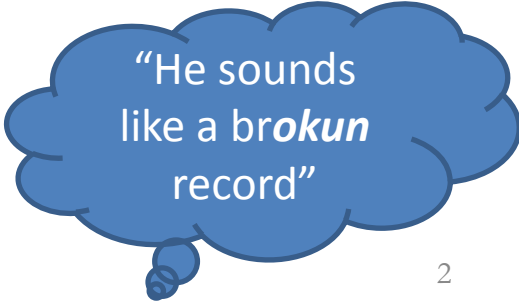
THIS PRESENTATION IS BASED ON SEVERAL PAPERS WRITTEN WITH LARRY BALL (JOHNS HOPKINS UNIVERSITY AND IMF), DAVIDE FURCERI (IMF), JOAO JALLES (OECD), DANIEL LEIGH (IMF) AND SAURABH MISHRA (IMF).

VIEWS EXPRESSED SHOULD NOT BE ATTRIBUTED TO THE IMF OR OECD OR TO MY CO-AUTHORS.

I thank an excellent team of research associates—Hites Ahir, Ezgi Ozturk and Jair Rodriguez—for their hard work on this project.

Outline of talk

- Okun's Law: Fit at 50? (Evidence for OECD countries)
 - Ball, Leigh, Loungani
- A Law for All States? Okun's Law in U.S. States
 - Loungani and Mishra
- A Law for All Ages? Okun's Law for Demographic Groups
 - (work in progress)
- Does One Law Fit All? (Okun Outside OECD)
 - Ball, Furceri, Leigh and Loungani
- Do Forecasters Believe in Okun's Law?
 - Ball, Jalles, Loungani



“He sounds
like a *brokun*
record”

In Advanced Economies, a Debate since the 1970s ...

- *"It takes a heap of Harberger triangles to fill an Okun's gap."* (Tobin, 1977)
- *"There is sometimes **the naïve belief that unemployment must be due to a defect in the labor market**, as if the hole in a flat tire must always be at the bottom, because that is where the tire is flat"* (Solow, 2000).

"We impute the higher [European] unemployment to welfare states' diminished ability to cope with more turbulent economic times, such as the ongoing restructuring from manufacturing to the service industry, adoption of new information technologies, and a rapidly changing international economy. "
(Ljungqvist and Sargent, 1998)

The Debate in the 1960s:

Why was U.S. unemployment higher than in Europe?

- **Robert Solow**
The nature and sources of unemployment in the United States

(Wicksell lectures 1964)

- **R. A. Gordon**
*"Has Structural Unemployment Worsened?"
Industrial Relations
(May, 1964)*
- **Lester Thurow**
*"The Changing Structure of Unemployment: An Econometric Study,"
The Review of Economics and Statistics (May 1965)*

Recent Debate in the Blogosphere: Krugman vs. Kocherlakota

“Why is unemployment remaining high? Because growth is weak — period, full stop, end of story.

Historically, low or negative growth has meant rising unemployment, fast growth falling unemployment (**Okun's Law**) ... what we've been seeing lately is well within the normal range of noise.”

Paul Krugman, July 9, 2011

- *Minneapolis Fed president sees mismatch driving unemployment rate*
Minneapolis Post
Sep. 10, 2010
- *A mismatch of worker skills, the location of available jobs and a less mobile workforce has added 2.5 points to the nation's unemployment rate.*

Narayana changed his mind.
(Shame on me for being too lazy to change this slide.)

Loungani vs. Loungani?

The Conscience of a Liberal

PAUL KRUGMAN



September 14, 2010, 11:08 AM

The International Monetary Fund Is Not Insane

That shouldn't be startling; but these days it is. Given the way [conventional madness](#) has overtaken so many international institutions, the IMF's reasonable, if much too cautious, [new paper on employment](#) (pdf) is actually a welcome surprise. "A recovery in aggregate demand is the single best cure for unemployment" — what a relief to see the Fund actually saying that.



- ***Robert Samuelson: June 20, 2011, The Washington Post, "The great jobs mismatch"***
- ***"One puzzle of this somber economy is the existence of unfilled jobs in the midst of mass unemployment. Somehow, there's a mismatch between idle workers and open jobs."***
- ***"Economist Prakash Loungani of the International Monetary Fund estimates that 25 percent of unemployment is structural; that's more than 3 million jobs."***

Debate in the Blogosphere: Krugman vs. McKinsey

“There’s no hint in these data that we’ve entered new territory in which decent growth fails to create jobs; *the problem is that we haven’t had decent growth.*”

Paul Krugman, July 9, 2011

*“The U.S. jobs challenge today stems from a pattern of jobless recovery that does not conform to the classic cyclical view of recession and recovery. So while healthy GDP growth will be essential [for a return to full employment], it will probably not be sufficient.... it **will require major efforts in education, regulation, and even diplomacy.**”*

McKinsey Global Institute,
2011

In emerging markets, debate over Growth Strategies vs. Jobs Strategies

Quote from World Bank's report on "Jobs"
(World Development Report 2013)

"From a statistical point of view, the relationship between growth and employment (or unemployment) shows substantial variation over time, across countries, and across sectors. In light of this diversity, a given rate of growth does not guarantee a given level of job creation or a given composition of employment."

Growth Strategies vs. Jobs Strategies

Quotes from World Bank's report on "Jobs" (World Development Report 2013)

- "These [Okun] *elasticities* show great variability over time and space, too, making it difficult to forecast net job creation ..."
 - "in Tanzania growth elasticities of employment declined from 1.04 in the period 1992–96 to 0.27 in the period 2004–08. Similar trends have been reported for Ethiopia, Ghana, and Mozambique."
 - "In Latin America, recent estimates show that growth elasticities of employment were much lower during the global financial crisis than in previous crises. In other words, the Great Recession produced comparatively less net employment destruction in that region."

Accusations Against Okun's Law

- It's unstable
 - "An Unstable Okun's Law, Not the Best Rule of Thumb" (Meyer and Tasci, St. Louis Fed, 2012)
- It's dead
 - "The Demise of Okun's Law" (Robert Gordon, 2011)
- Recoveries have become "jobless"
- It broke down during Great Recession
 - April 2010 WEO ("Okun's Law and Beyond")

REVIEW OF OKUN'S LAW

Okun's Law 101

- Okun (1962)
 - “Levels” version:
$$U_t - U_t^* = \beta (Y_t - Y_t^*) + \varepsilon_t, \beta < 0,$$
 - “Changes” version:
$$\Delta U_t = \alpha + \beta \Delta Y_t + \omega_t$$
- Textbooks say U.S. coefficient $\beta = -0.5$.

Deriving Okun's Law

$$(1) \quad E_t - E_t^* = \gamma (Y_t - Y_t^*) + \eta_t \quad \gamma > 0$$

$$(2) \quad U_t - U_t^* = \delta (E_t - E_t^*) + \mu_t \quad \delta < 0$$

- We expect $\gamma < 1.5$ (labor as quasi-fixed factor)
- We expect $|\delta| < 1$ (procyclical labor force participation)

$$(3) \quad U_t - U_t^* = \beta (Y_t - Y_t^*) + \varepsilon_t \quad \beta < 0$$

- $\beta = \gamma\delta$, $|\beta| < 1.5$, and $\varepsilon_t = \mu_t + \delta \eta_t$.

Estimating Okun's Law

$$(3) \quad U_t - U_t^* = \beta (Y_t - Y_t^*) + \varepsilon_t \quad \beta < 0$$

- We usually measure U_t^* and Y_t^* with HP filter.
- Several tests of robustness
 - With HP
 - » Alternate values of HP smoothing parameter
 - » Addressing end-point problem
 - Without HP
 - » Use of forecast errors
 - » Use alternate measures of U_t^* and Y_t^* (e.g. for U.S., CBO measures)
 - » Use of “changes” specification

$$(4) \quad \Delta U_t = \alpha + \beta \Delta Y_t + \omega_t, \text{ holds if } U^* \text{ and } \Delta Y^* \text{ constant.}$$

U.S. EVIDENCE ON OKUN'S LAW

Results: U.S. Annual Data 1948-2011

	Levels		Changes
	$\lambda = 100$	$\lambda = 1,000$	
β	-0.411*** (0.024)	-0.383*** (0.023)	-0.405*** (0.029)
α			1.349*** (0.116)
<i>Obs</i>	64	64	63
Adjusted R^2	0.817	0.813	0.752

Note: OLS standard errors. ***, **, and *: sig. at the 1, 5, and 10 percent level.

Results for U.S., 1948-2011

(SUR, joint estimation of equations 1-3, annual data, $\lambda = 100$)

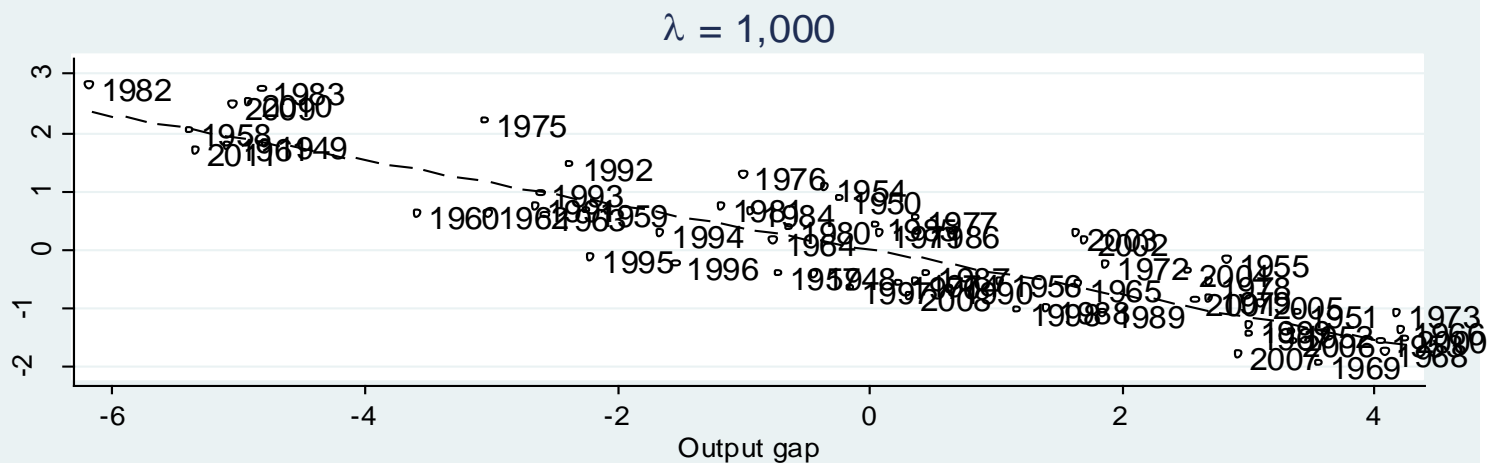
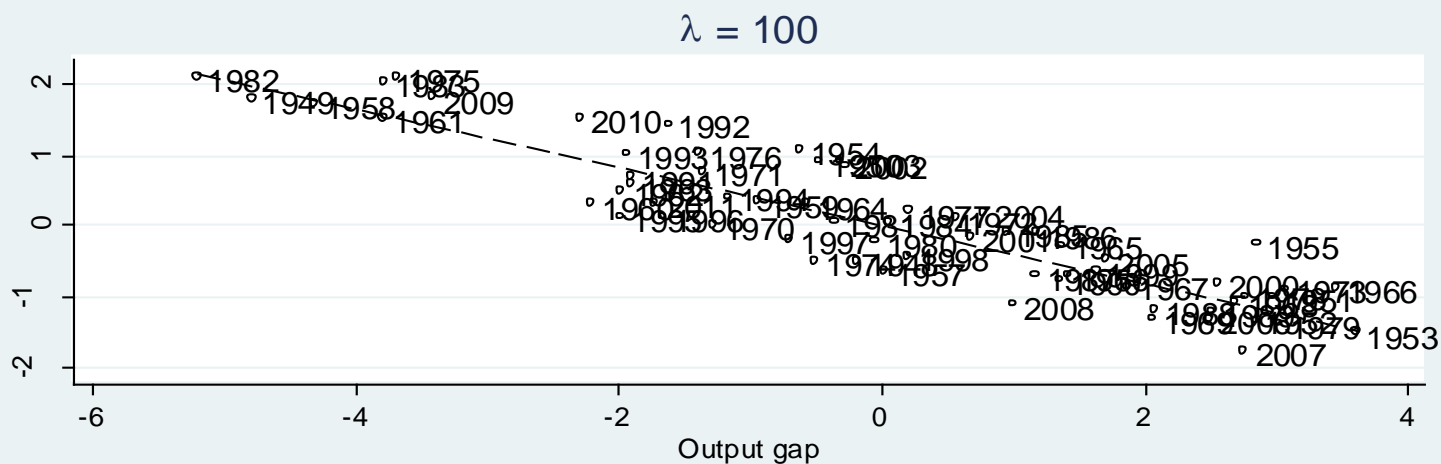
Okun's Law for Employment	Estimate	Adjusted R^2
γ	0.543***	0.610
Unemployment-Employment Relation		
δ	-0.728***	0.798
Okun's Law for Unemployment		
β	-0.405***	0.820

<i>Obs</i>	64
<i>p</i> -value for $H_0: \beta = \gamma\delta$	0.378

Note: Standard errors in parentheses. ***, **, and *: sig. at the 1, 5, and 10 percent level.

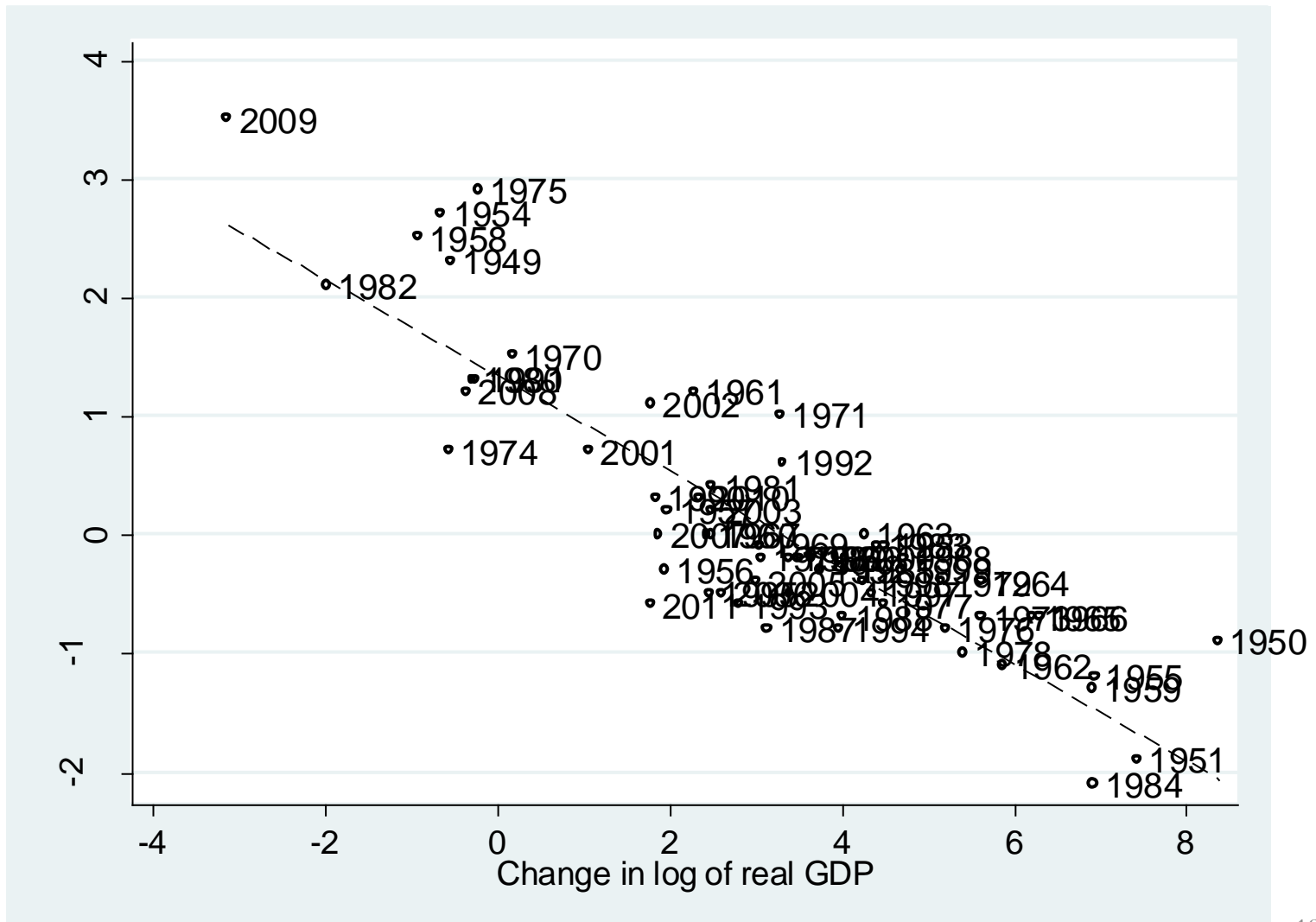
Okun's Law: U.S. Fit

(Levels specification, natural rates based on HP filter, annual data)



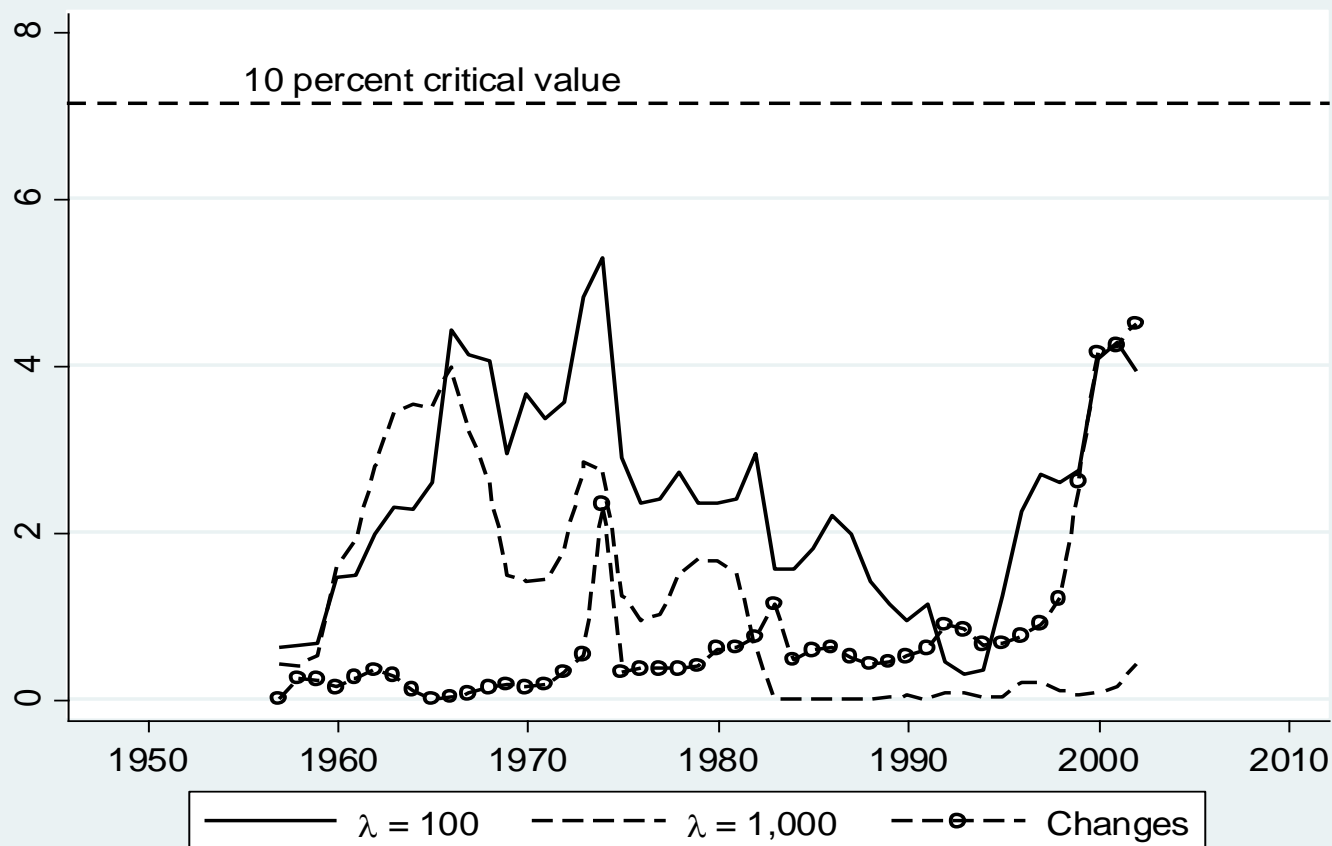
Okun's Law: U.S. Fit

("Changes" specification, annual data)



Okun Stability Test, 1948-2011

(Test for stability of Okun coefficient, β , at unknown date, annual data)



Note: F -statistic, inner 70 percent of sample. Critical value from Andrews (2003).

Results for U.S.: Quarterly Data

(OLS, levels specification: $U_t - U_t^* = \beta(L) (Y_t - Y_t^*) + \varepsilon_t$, 1948Q2-2011Q4)

	Hodrick-Prescott filter λ			
	1,600	1,600	16,000	16,000
β_0	-0.428*** (0.015)	-0.245*** (0.0230)	-0.411*** (0.013)	-0.213*** (0.0286)
β_1		-0.133*** (0.0345)		-0.153*** (0.0447)
β_2		-0.116*** (0.0230)		-0.0794*** (0.0286)
$\beta_0 + \beta_1 + \beta_2$		-0.494*** (0.0126)		-0.445*** (0.0119)
α				
<i>Obs</i>	256	256	256	256
Adjusted R^2	0.767	0.865	0.795	0.852

Note: Standard errors in parentheses. ***, **, and *: sig. at the 1, 5, and 10 percent level.

Replication of Okun (1962) and More

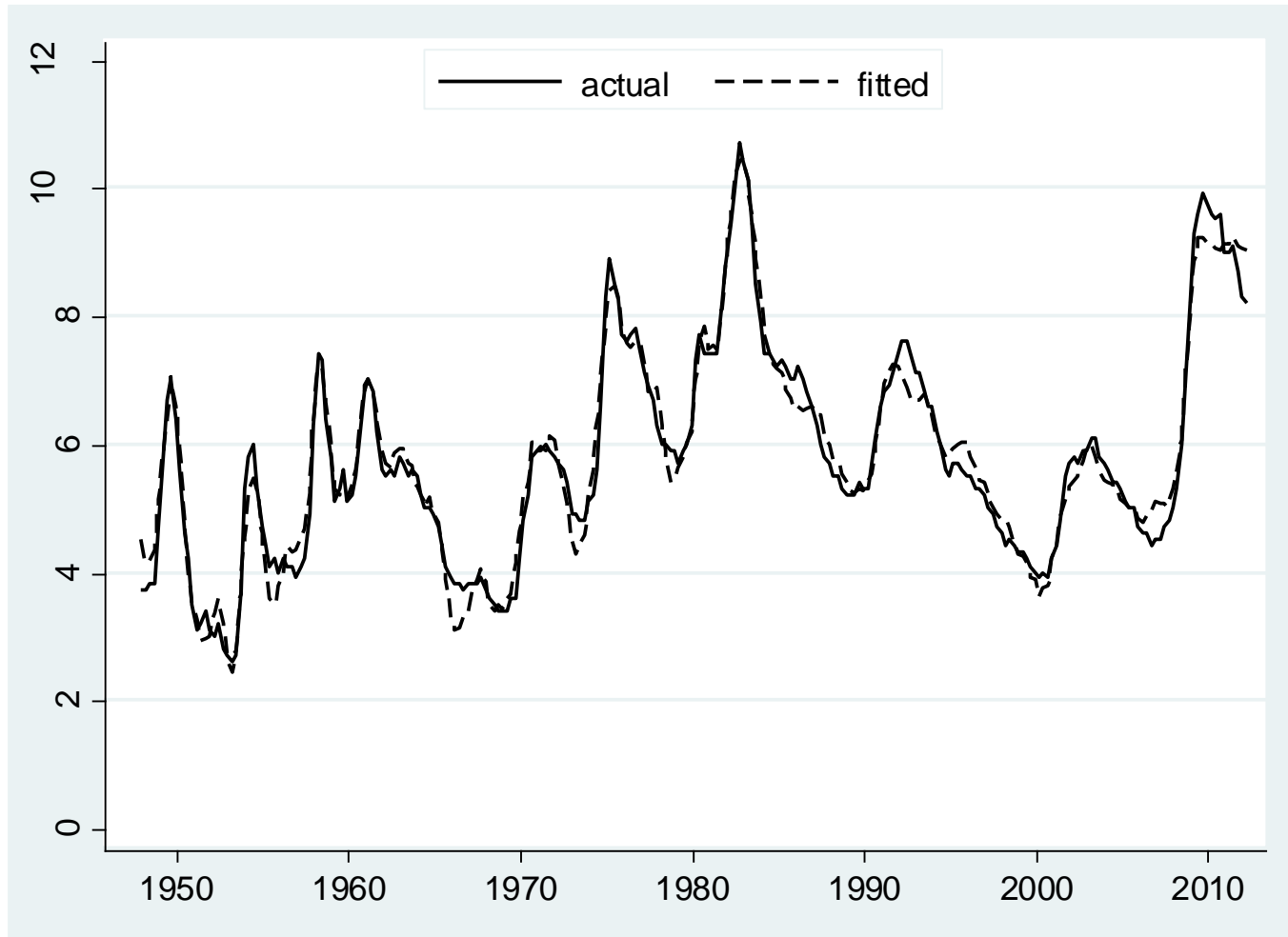
(OLS, changes specification: $\Delta U_t = \alpha + \beta(L) \Delta Y_t + \varepsilon_t$)

Sample Data	1948Q2-1960Q4 Vintage data	1948Q2-2011Q4 Current data
β_0	-0.307*** (0.036)	-0.286*** (0.018)
β_1	-0.168*** (0.0327)	-0.137*** (0.0168)
β_2	-0.0394 (0.0307)	-0.0767*** (0.0160)
$\beta_0 + \beta_1 + \beta_2$	-0.441*** (0.0380)	-0.432*** (0.0200)
α	0.305*** (0.061)	0.244*** (0.023)
<i>Obs</i>	51	255
Adjusted R^2	0.584	0.494

Note: Standard errors in parentheses. ***, **, and *: sig. at the 1, 5, and 10 percent level.

Okun's Law: U.S. Fit, Quarterly Data

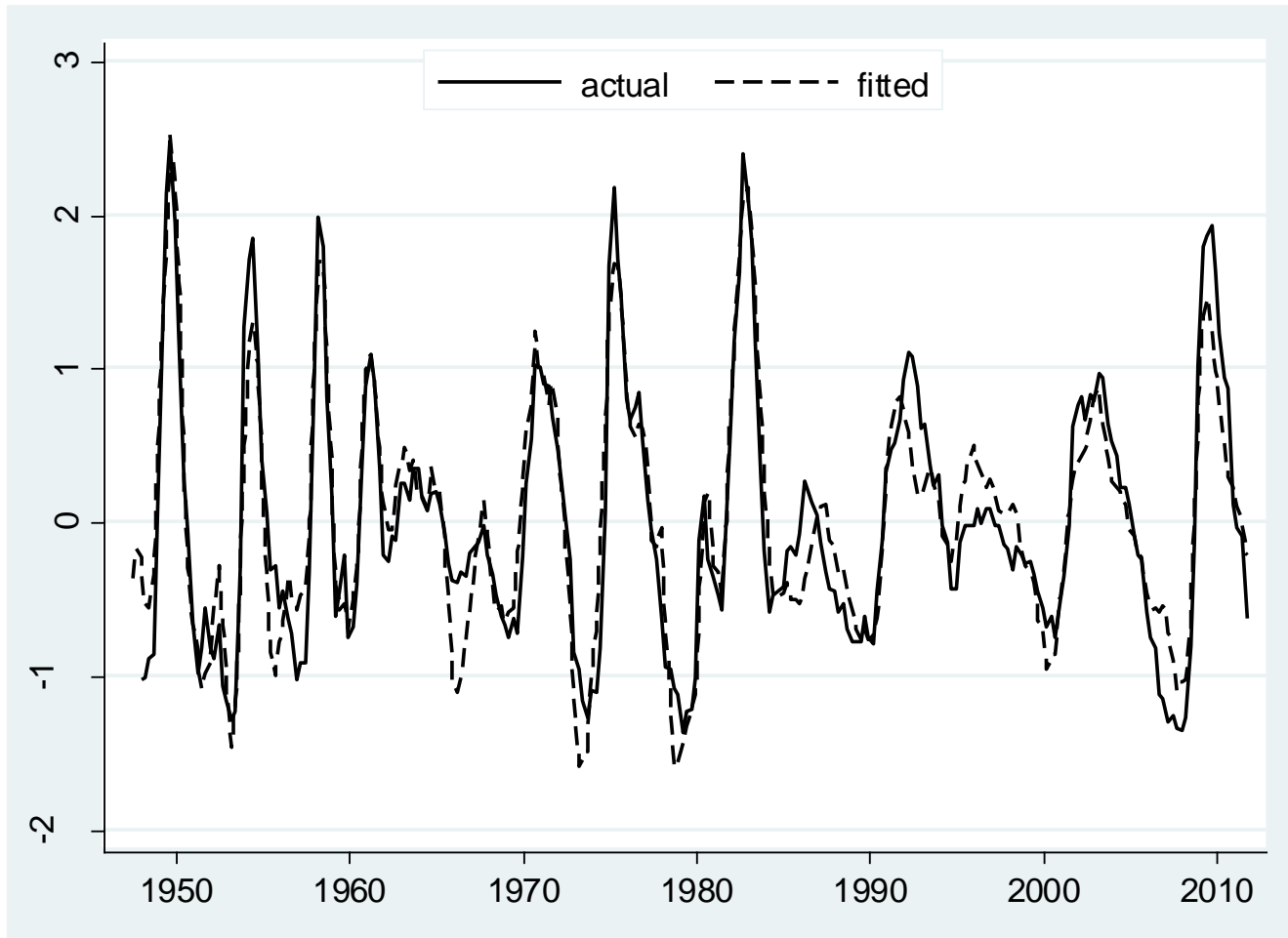
(Actual and fitted values of unemployment rate, 1948Q2-2011Q4)



Note: Fitted value of U_t based estimate of $U_t - U_t^* = \beta (Y_t - Y_t^*) + \varepsilon_t$ with $\lambda = 1,600$.

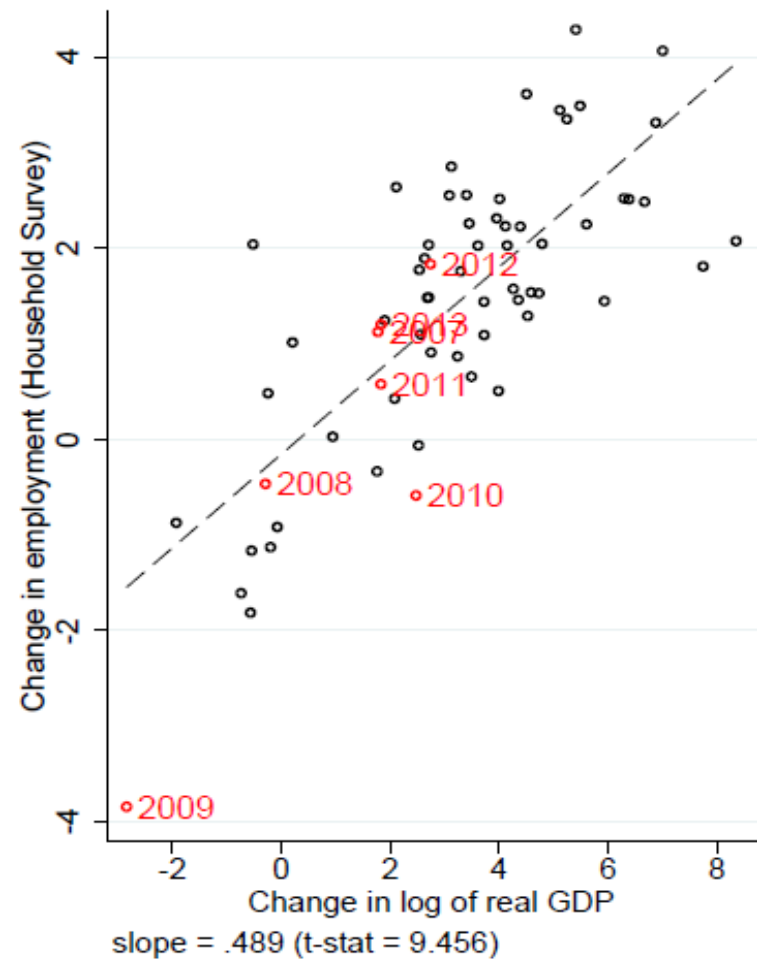
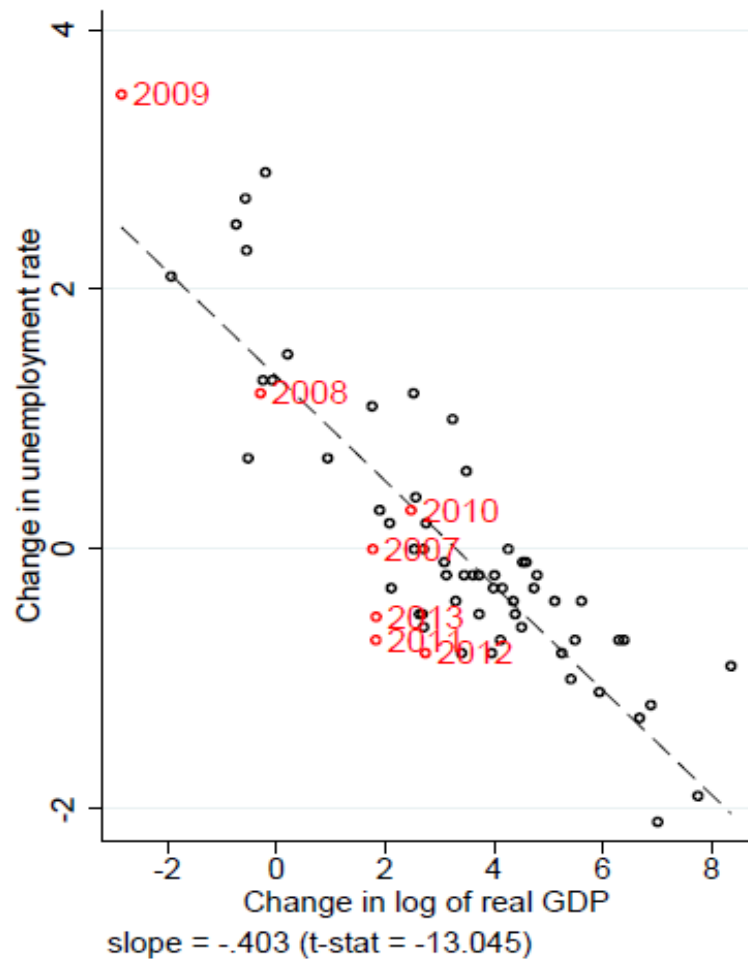
Okun's Law: U.S. Fit, Quarterly Data

(Actual and fitted values of unemployment rate *gap*, 1948Q2-2011Q4)



Note: Fitted value of $\underline{U}_t - U_t^*$ based estimate of $U_t - U_t^* = \beta (Y_t - Y_t^*) + \varepsilon_t$ with $\lambda = 1,600$.

Adding recent years, 2012 and 2013 (forecast)



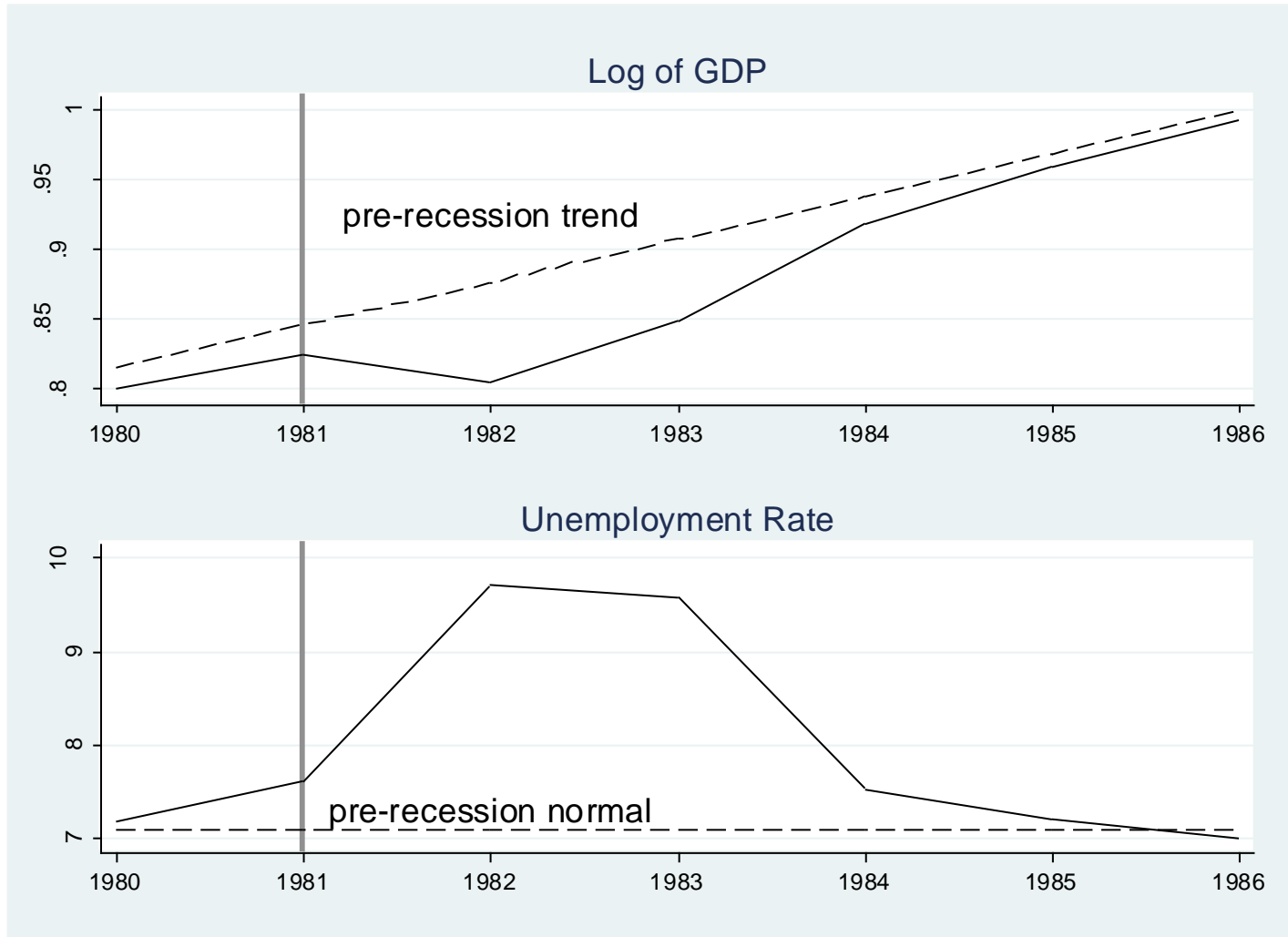
JOBLESS RECOVERIES?

Okun's Law vs. "Jobless Recoveries"

- Popular view:
 - "Output Came Back, Employment Didn't" (NPR, 2011)
- Our view:
 - Okun's Law holds (as shown in previous slides)
 - Confusion because recent output recoveries have been slow.
 - Point is recognized by some observers
 - » Krugman (2011)
 - » Gali et al. (2012)

A Recovery that Looks Job-full

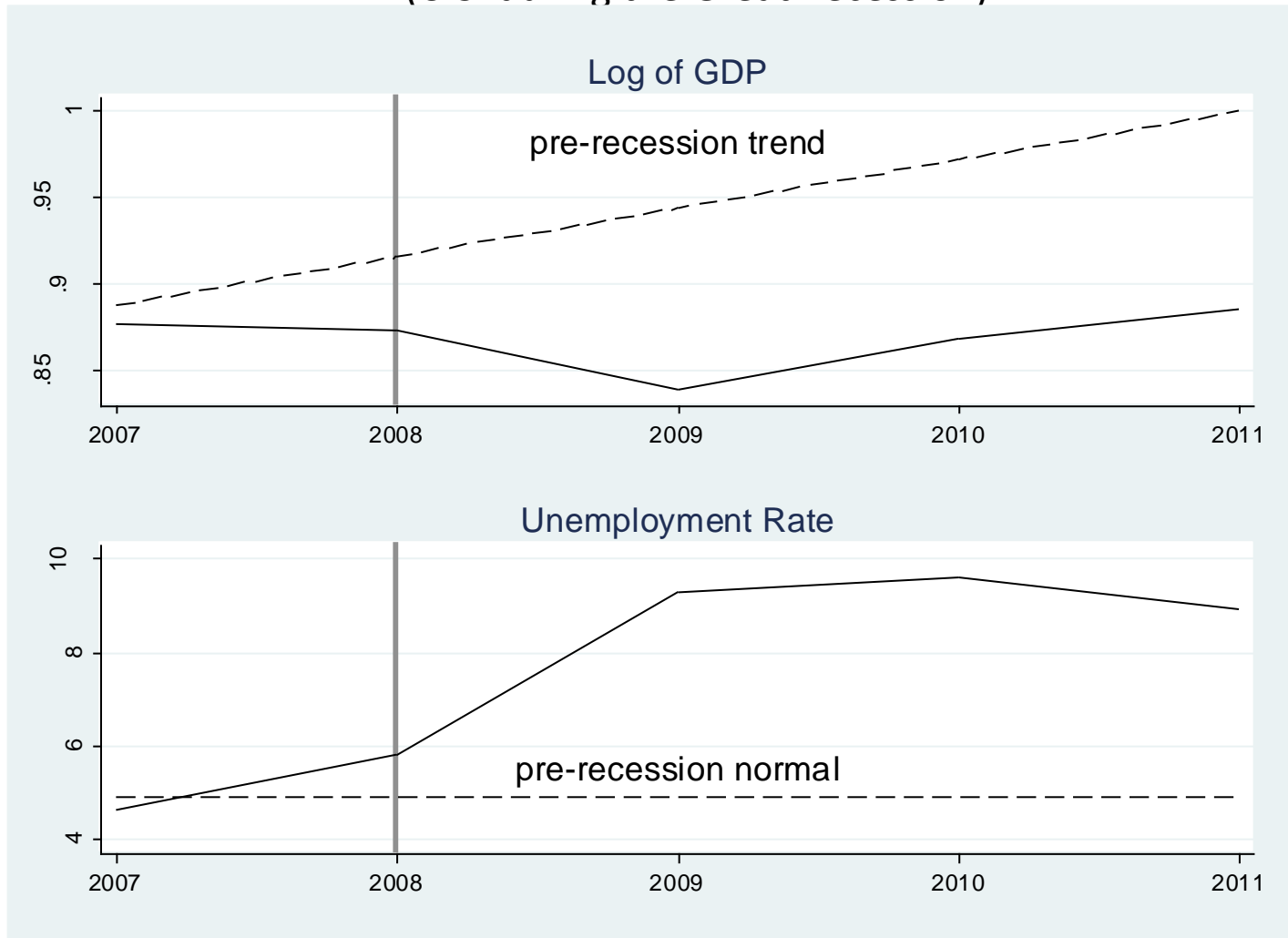
(U.S. During the 1981 Recession)



Note: HP filter trends through 1980. Assumption: U_t^* and ΔY_t^* constant thereafter.

A Recovery that Looks Jobless

(U.S. during the Great Recession)



Note: HP filter trends through 2007. Assumption: U_t^* and ΔY_t^* constant thereafter.

EVIDENCE FOR OECD ECONOMIES

Estimates for 20 OECD Countries, 1980-2011

	β	<i>Obs</i>	<i>Adj. R</i> ²		β	<i>Obs</i>	<i>Adj. R</i> ²
Australia	-0.536***	32	0.80	Japan	-0.152***	32	0.65
Austria	-0.136***	32	0.21	Netherlands	-0.511***	32	0.62
Belgium	-0.511***	32	0.54	New Zealand	-0.341***	32	0.59
Canada	-0.432***	32	0.81	Norway	-0.294***	32	0.62
Denmark	-0.434***	32	0.72	Portugal	-0.268***	32	0.62
Finland	-0.504***	32	0.77	Spain	-0.852***	32	0.90
France	-0.367***	32	0.68	Sweden	-0.524***	32	0.62
Germany	-0.367***	32	0.51	Switzerland	-0.234***	32	0.44
Ireland	-0.406***	32	0.77	UK	-0.343***	32	0.60
Italy	-0.254***	32	0.29	USA	-0.454***	32	0.82

Note: Standard errors in parentheses. ***, **, and *: sig. at the 1, 5, and 10 percent level.

Stability for 20 OECD Countries

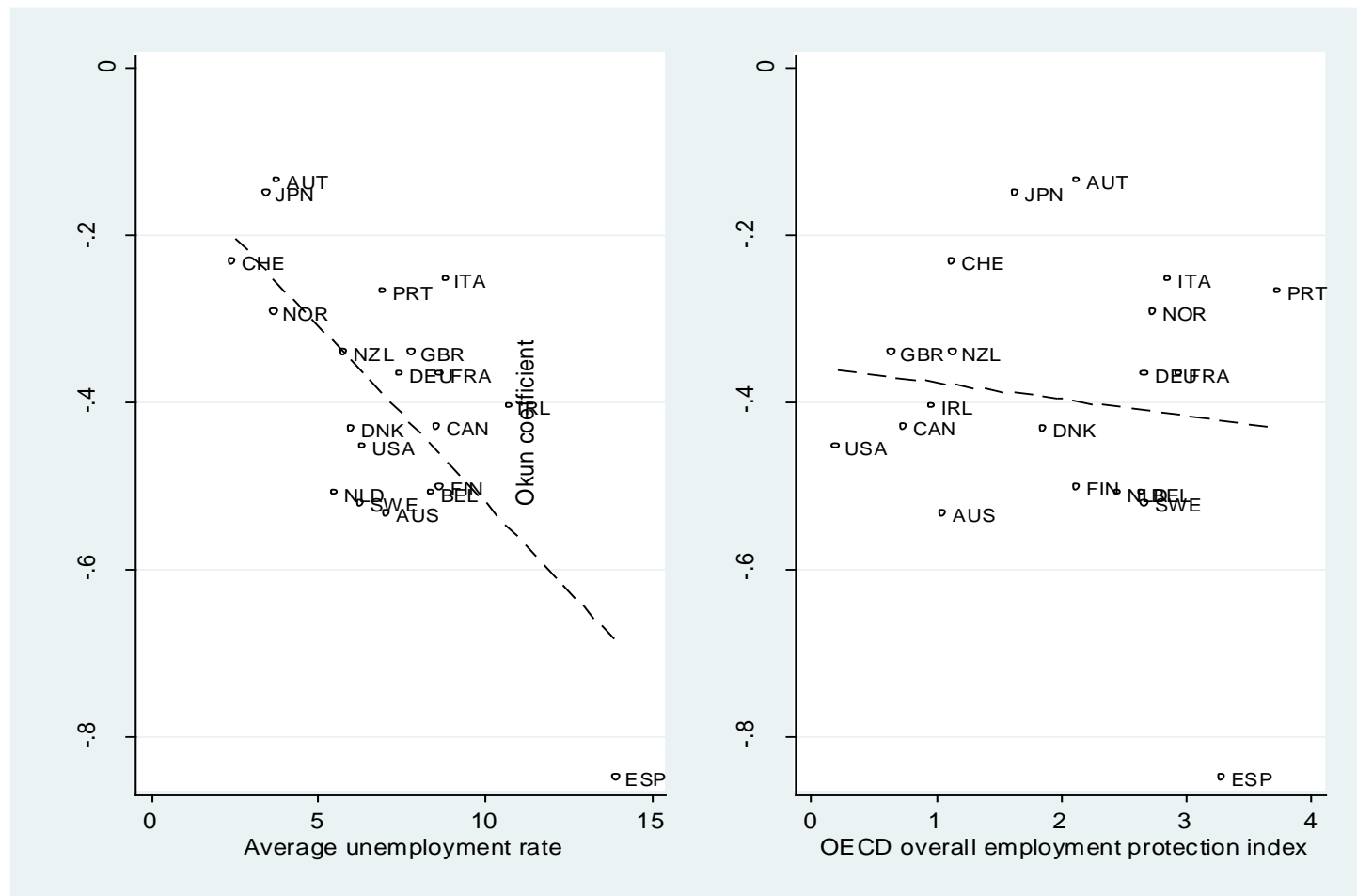
(OLS, levels specification, $\lambda = 100$, annual data, 1980-2011)

	$\beta_{\text{pre-95}}$	$\beta_{\text{post-95}}$	p -value		$\beta_{\text{pre-95}}$	$\beta_{\text{post-95}}$	p -value
Australia	-0.552***	-0.433***	0.405	Japan	-0.109***	-0.209***	0.008
Austria	-0.134*	-0.137**	0.974	Netherlands	-0.713***	-0.336***	0.006
Belgium	-0.634***	-0.310**	0.053	New Zealand	-0.317***	-0.426***	0.363
Canada	-0.500***	-0.287***	0.006	Norway	-0.319***	-0.247***	0.410
Denmark	-0.490***	-0.369***	0.205	Portugal	-0.221***	-0.463***	0.007
Finland	-0.610***	-0.297***	0.001	Spain	-0.793***	-0.923***	0.205
France	-0.400***	-0.335***	0.470	Sweden	-0.648***	-0.362***	0.046
Germany	-0.427***	-0.270**	0.232	Switzerland	-0.211***	-0.274***	0.516
Ireland	-0.462***	-0.382***	0.359	UK	-0.419***	-0.215***	0.045
Italy	-0.142	-0.358***	0.110	USA	-0.447***	-0.464***	0.829

Note: Standard errors in parentheses. ***, **, and *: sig. at the 1, 5, and 10 percent level.

Cross-Country Variables

(Okun coefficient vs. candidate variable)



Note: Average unemployment rate denotes 1980-2011 mean.

OECD overall employment protection index: 1985-2011 mean based on available data.

Individual Stories

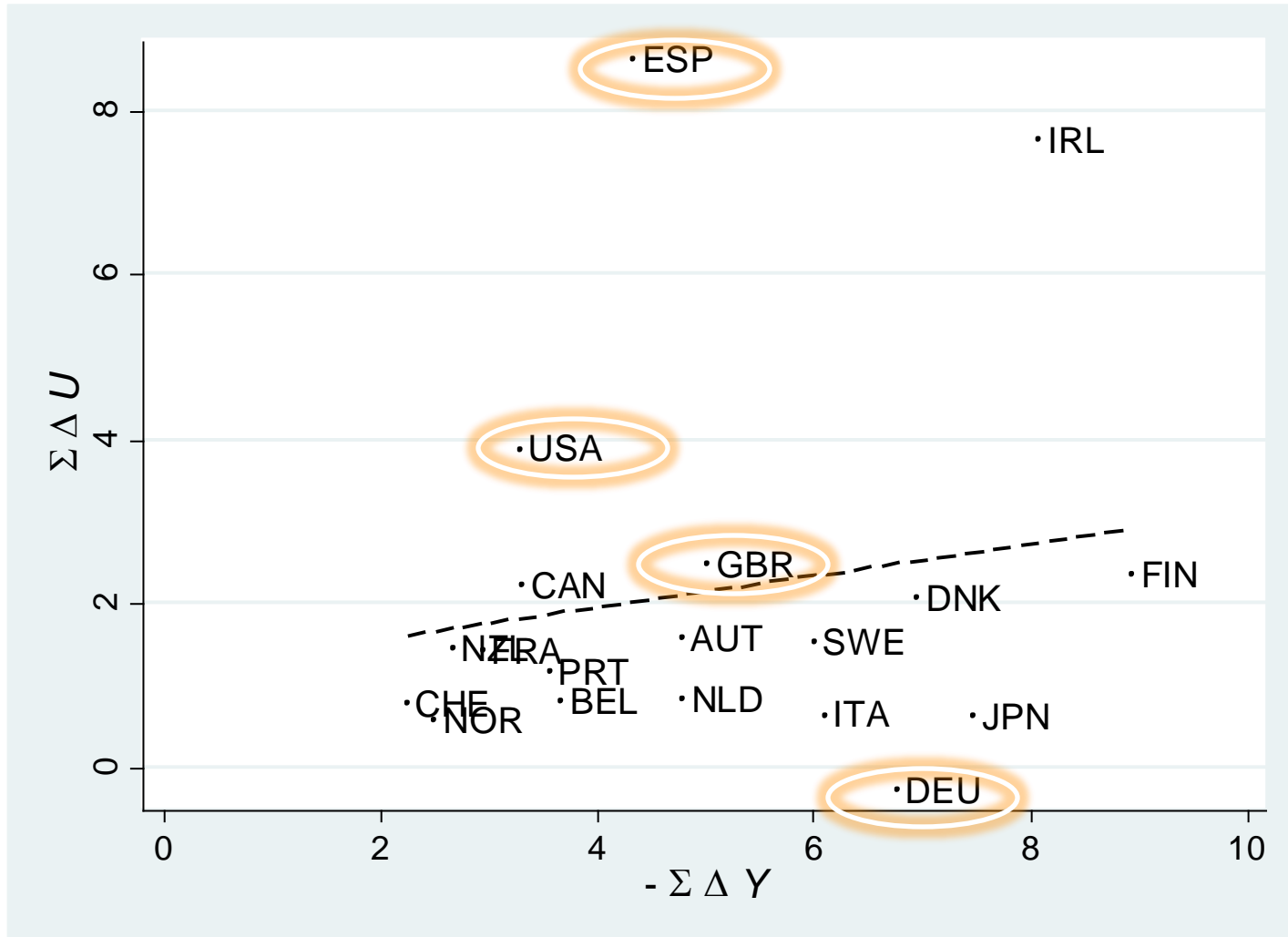
- Large coefficient in Spain: temporary labor contracts
- Three smallest coefficients:
 - Japan: lifetime employment tradition
 - Switzerland: migrant labor
 - Austria: a puzzle

Summary of Estimates for 20 OECD Countries

- Strong relationship in most countries.
- Substantial cross-country variation only partly understood.
- Sub-sample stability:
 - Coefficient β falls significantly at 5 percent level in 5 countries, rises significantly in 2.
 - Average β is -0.43 in first sample, -0.35 in second.
 - Correlation of countries' β s across periods = 0.50.

Okun's Law and the Great Recession

(Peak-to-trough output and unemployment changes)

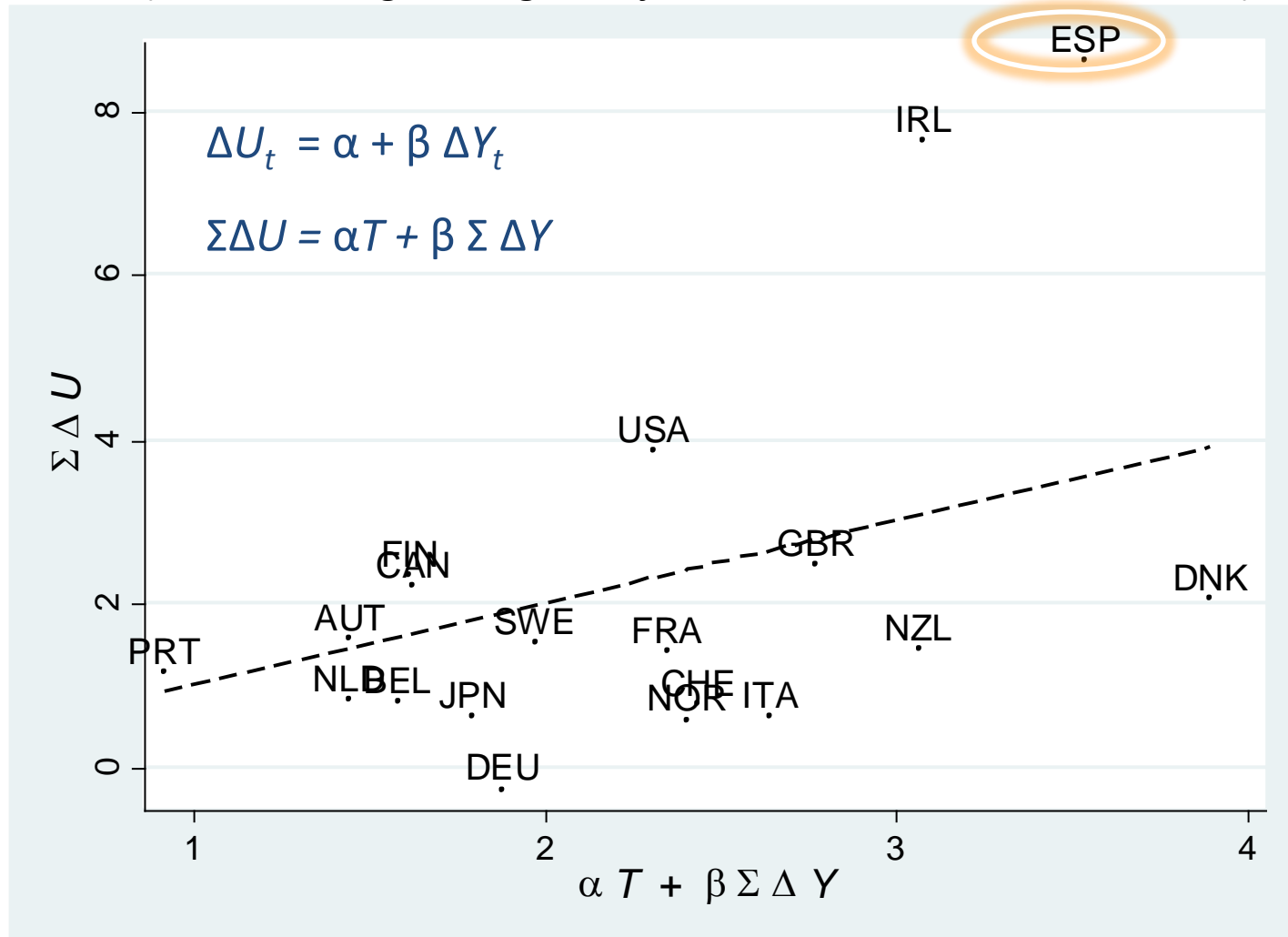


Notes: Similar to Figure 3.1 in April 2010 WEO.

$\Sigma\Delta U$ and $\Sigma\Delta Y$ = cumulative peak-trough changes. Adjusted $R^2 = -0.03$.

Okun's Law and the Great Recession

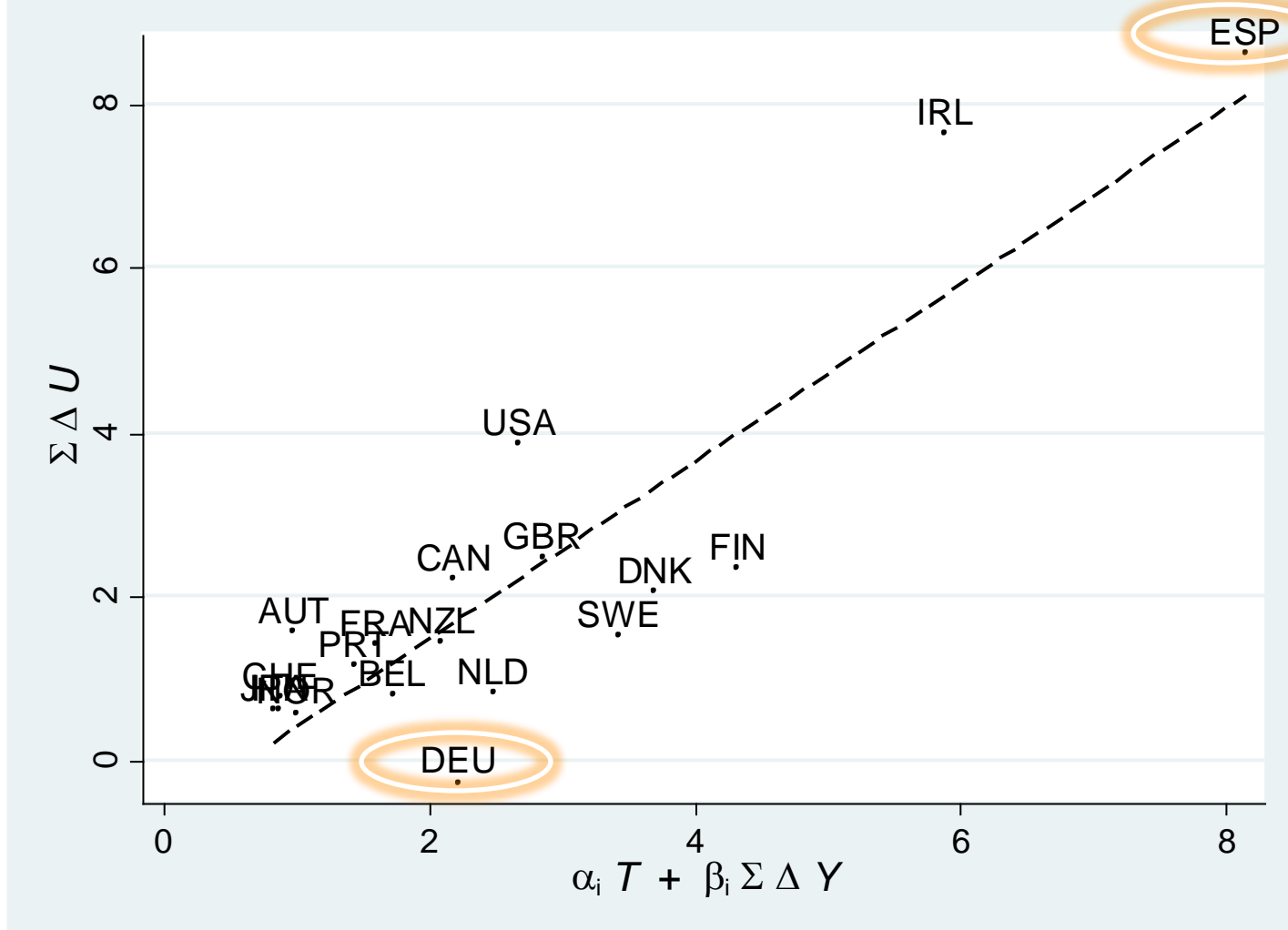
(Peak-to-trough changes, adjustment for recession duration, T)



Note: Adjusted $R^2 = 0.54$.

Okun's Law and the Great Recession

(Adjustment for recession duration and country-specific Okun coefficients)

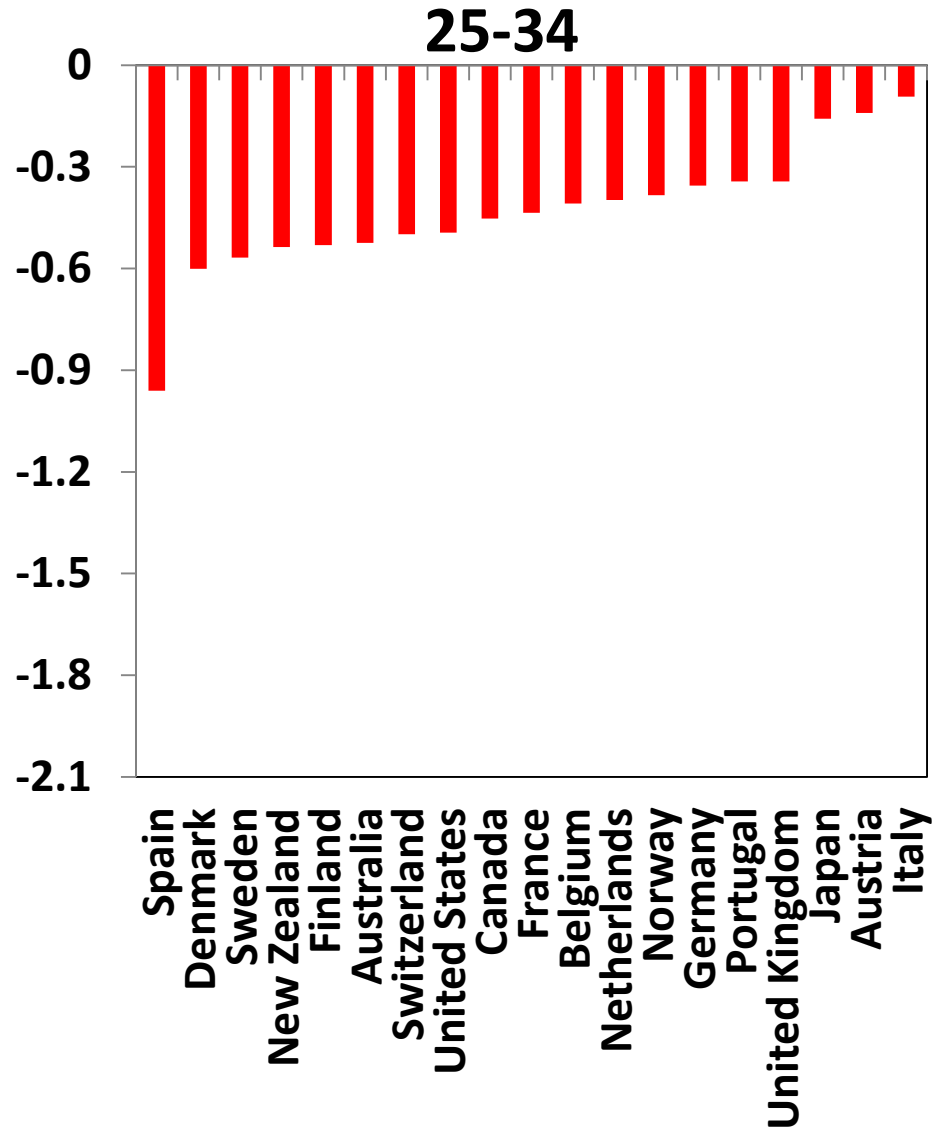
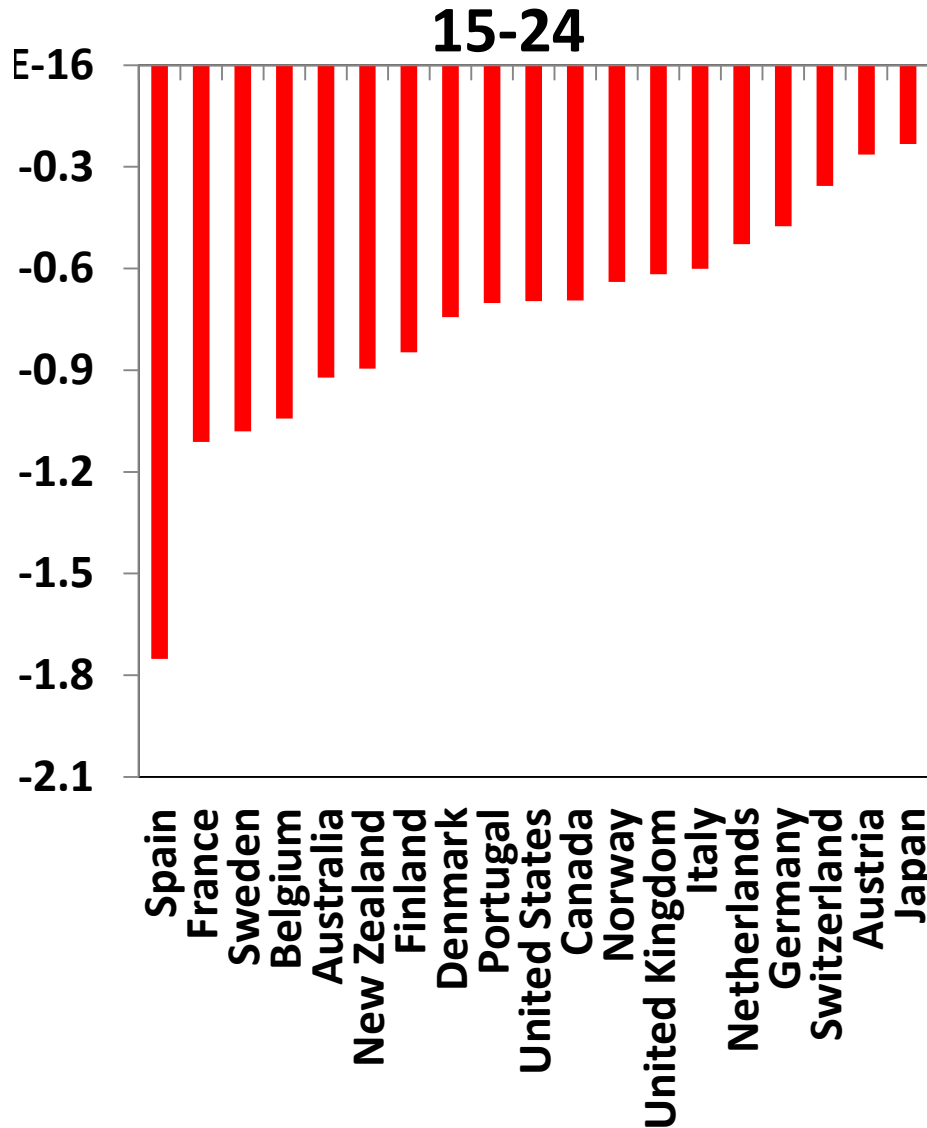


Note: α_i and β_i = country-specific Okun coefficients, T = duration. Adjusted $R^2 = 0.76$.

A LAW FOR THE AGES?

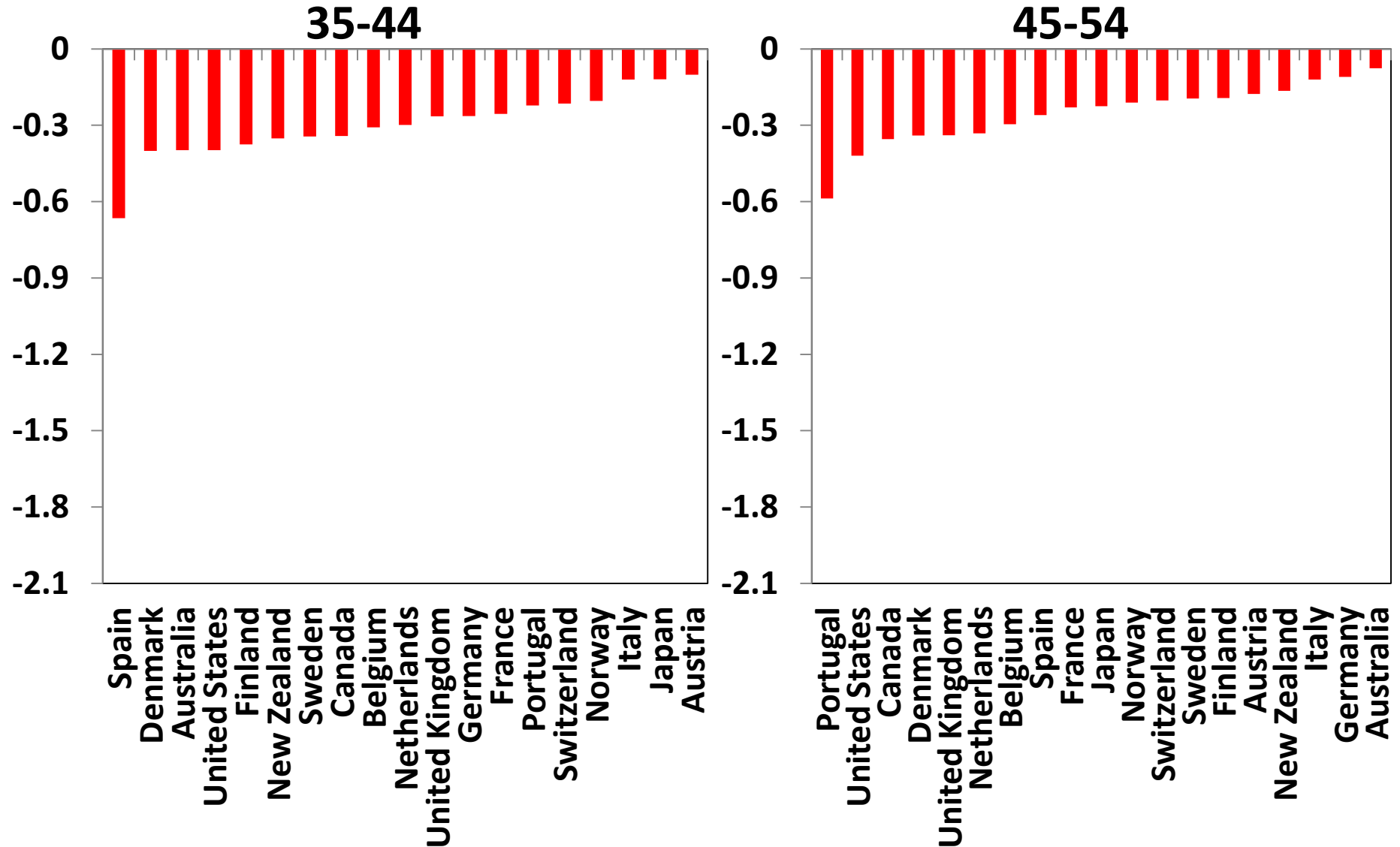
Okun's Law Coefficient: Age Groups

(based on "levels" specification)



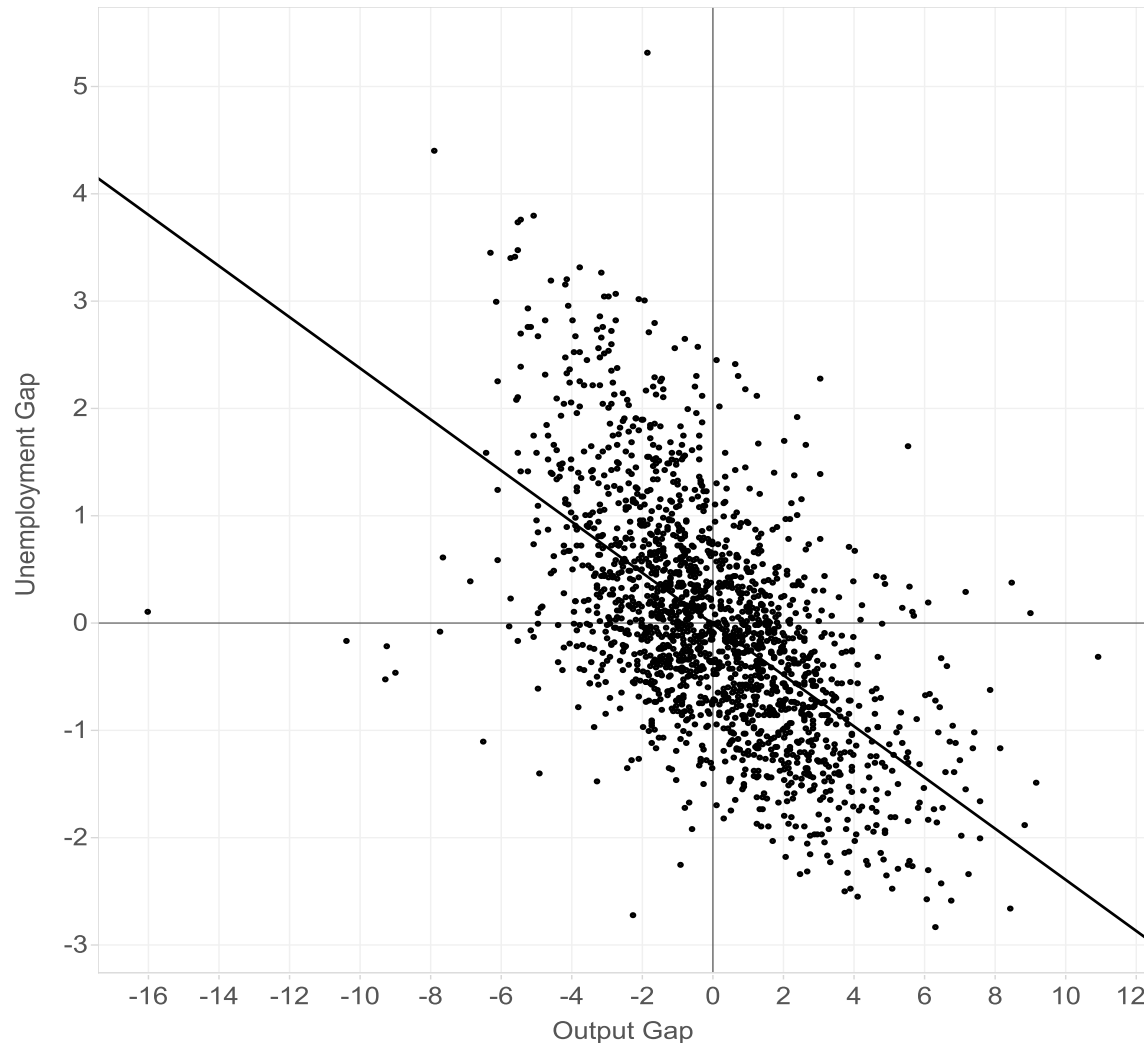
Okun's Law Coefficient: Age Groups

(based on "levels" specification)

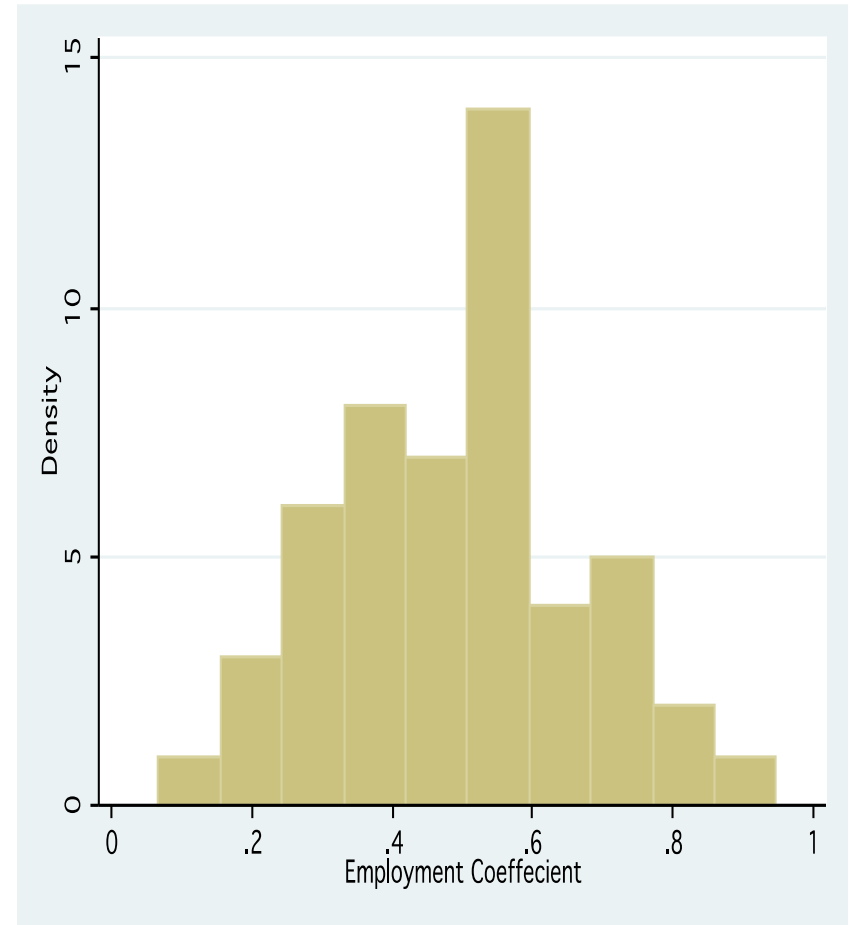
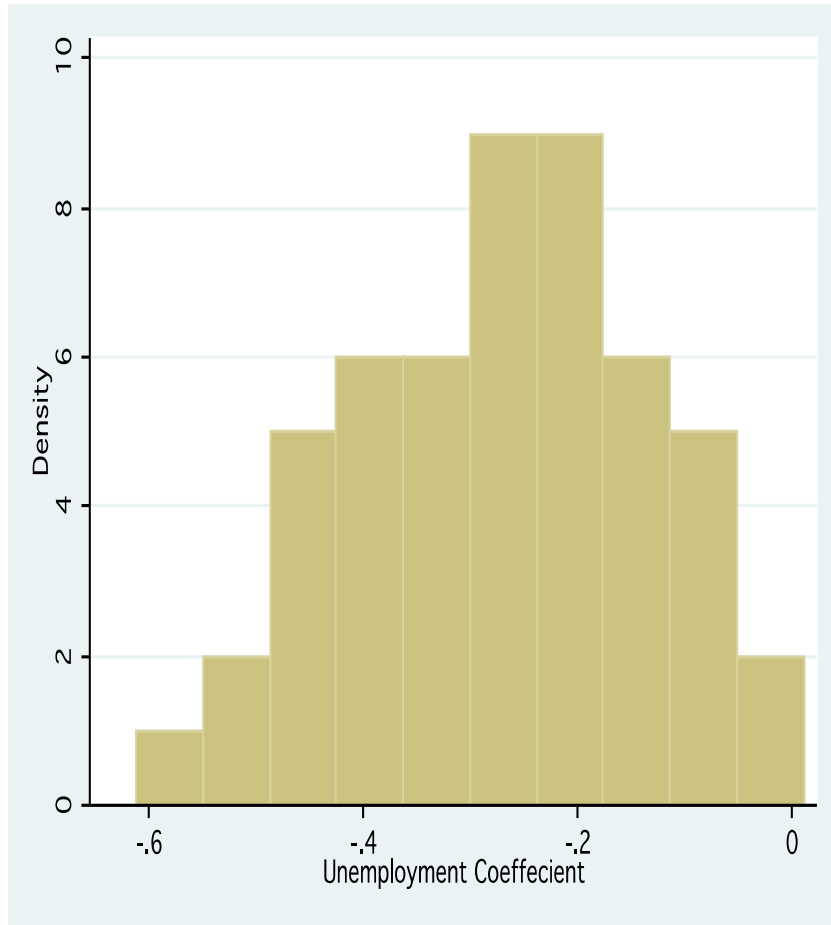


EVIDENCE FOR U.S. STATES

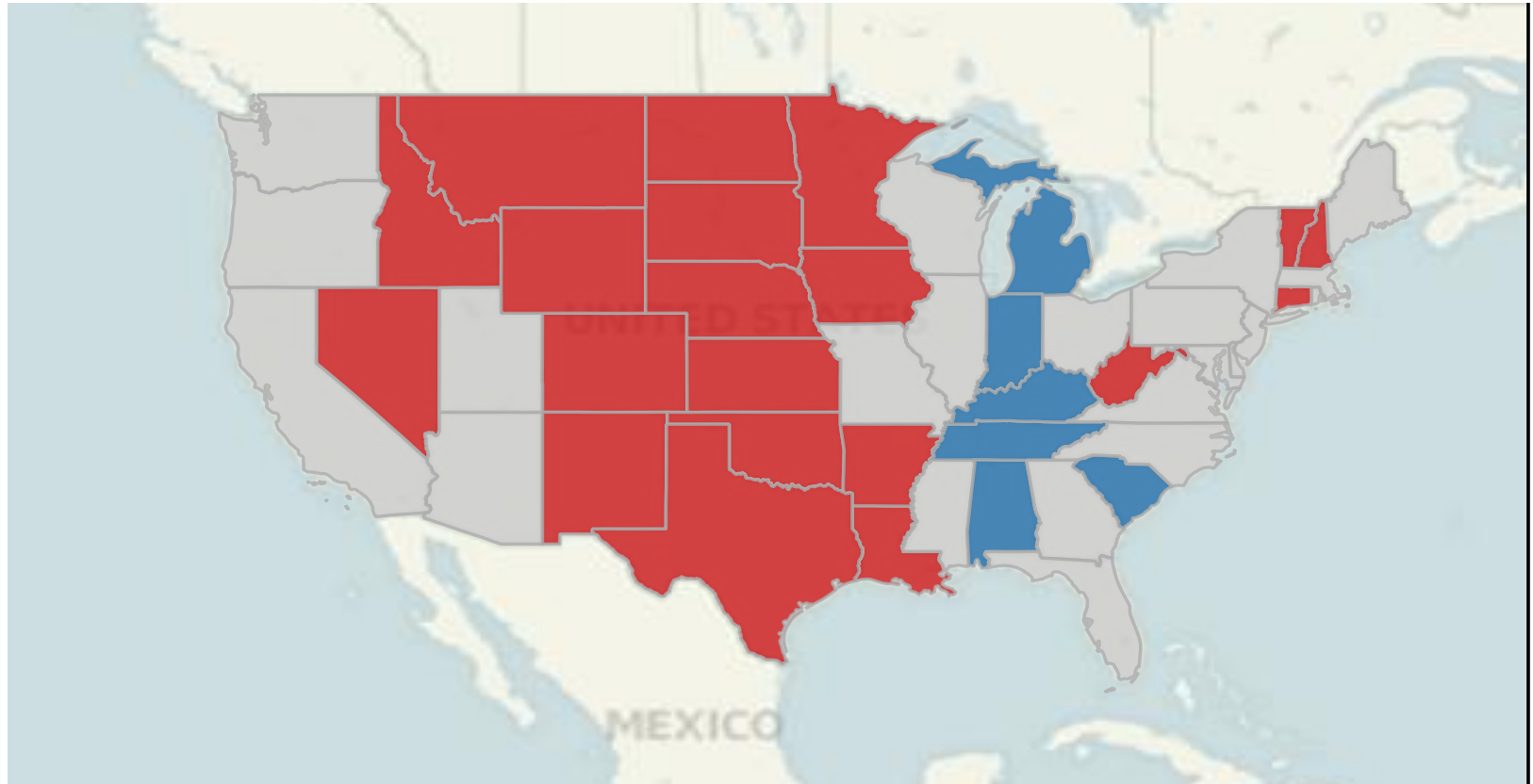
Relationship between unemployment gap and output gap across US States, 1976-2012



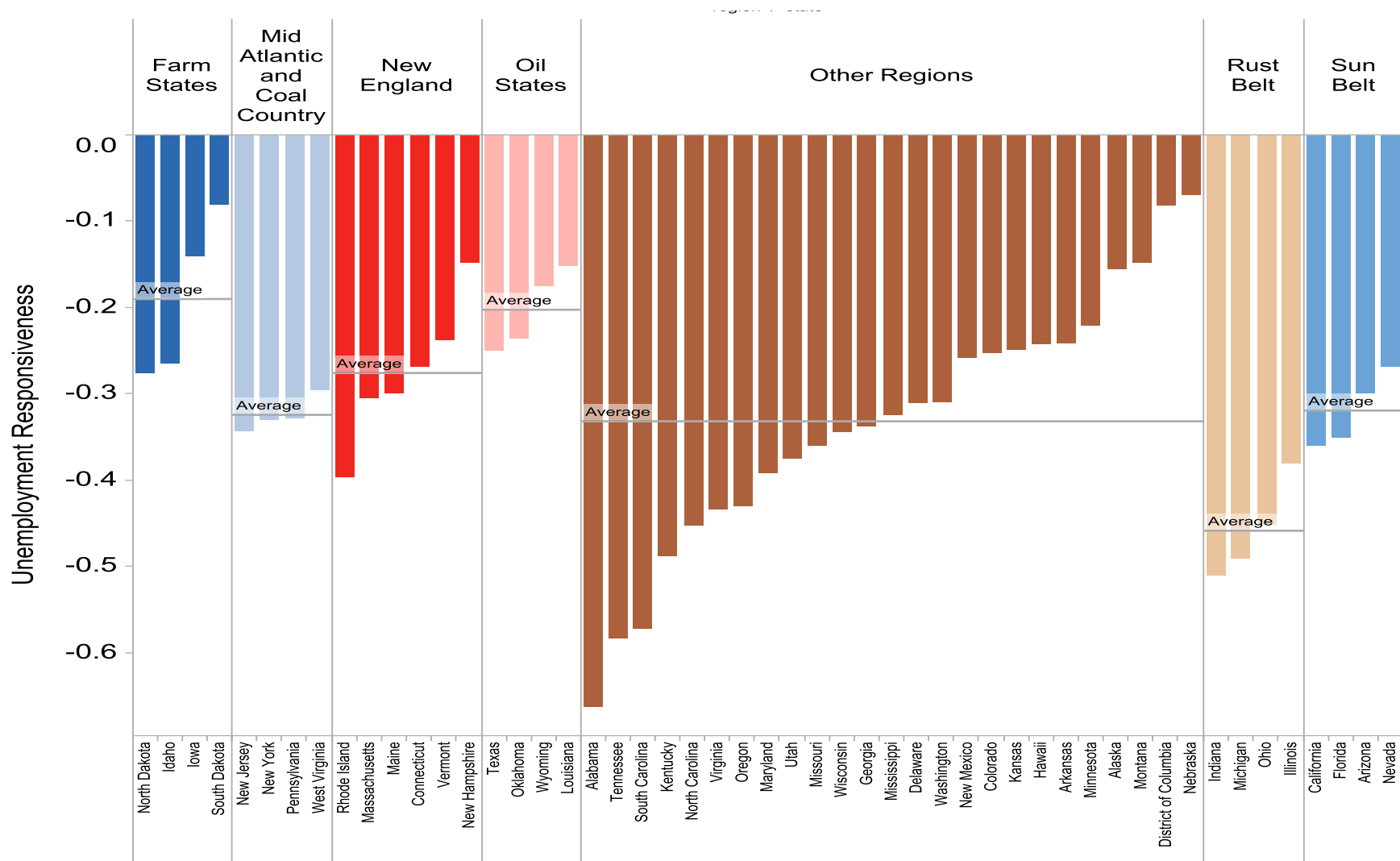
Frequency Distribution of Okun Coefficients across US States, 1976-2012



A map of Okun coefficients, 1995-2012



Okun's coefficients by region, 1995-2012



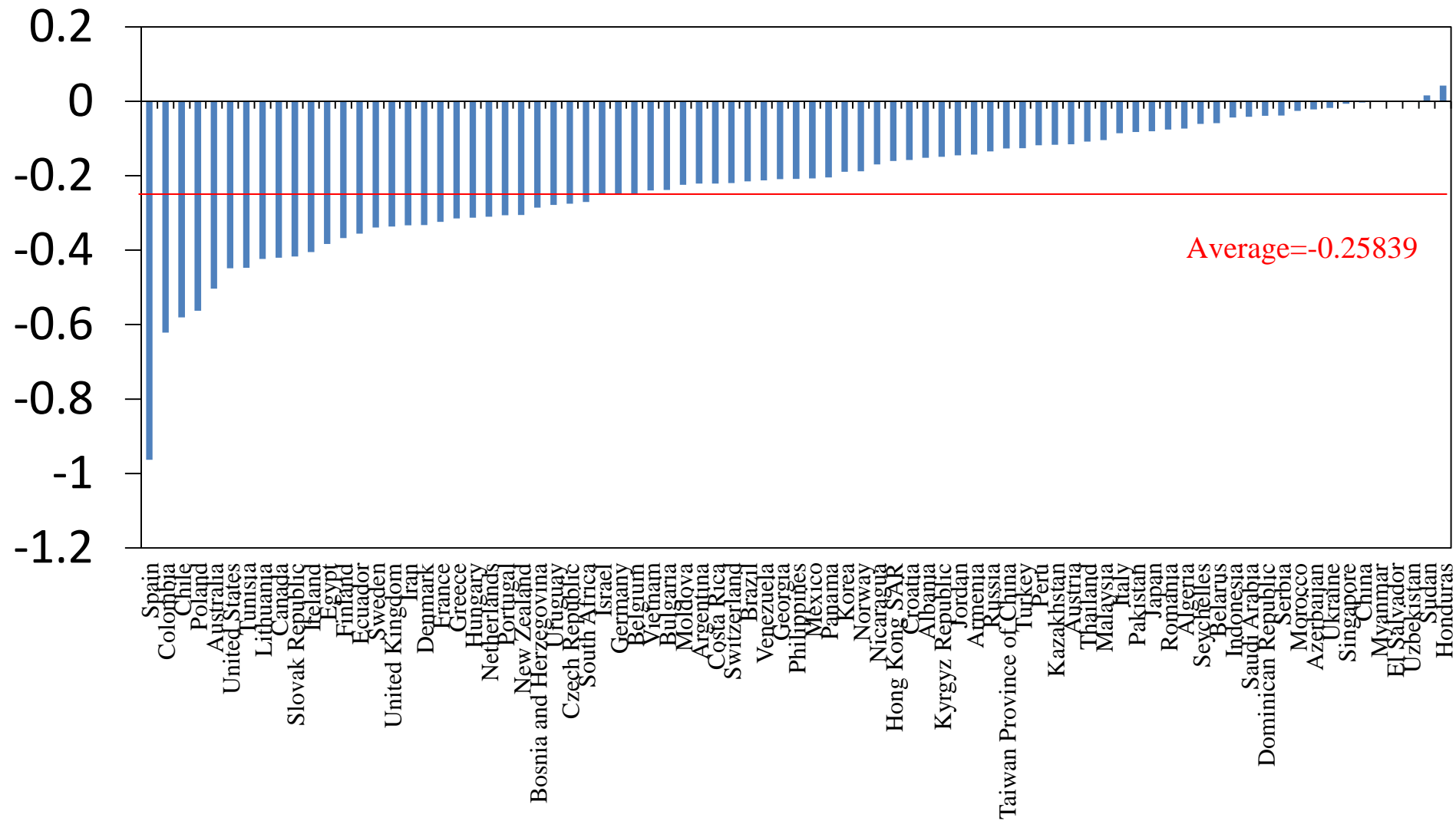
Explaining variations in the Okun coefficient across states

	(1)	(2)
	1995-2012	
	Unemployment Gap Specification	Unemployment Change Specification
log labor force	-0.0367*** (0.0132)	-0.0383*** (0.0132)
industrial structure	-1.002** (0.418)	-1.027** (0.416)
Constant	1.066*** (0.345)	1.130*** (0.334)
Observations	51	51
R-squared	0.257	0.267

OKUN OUTSIDE OECD

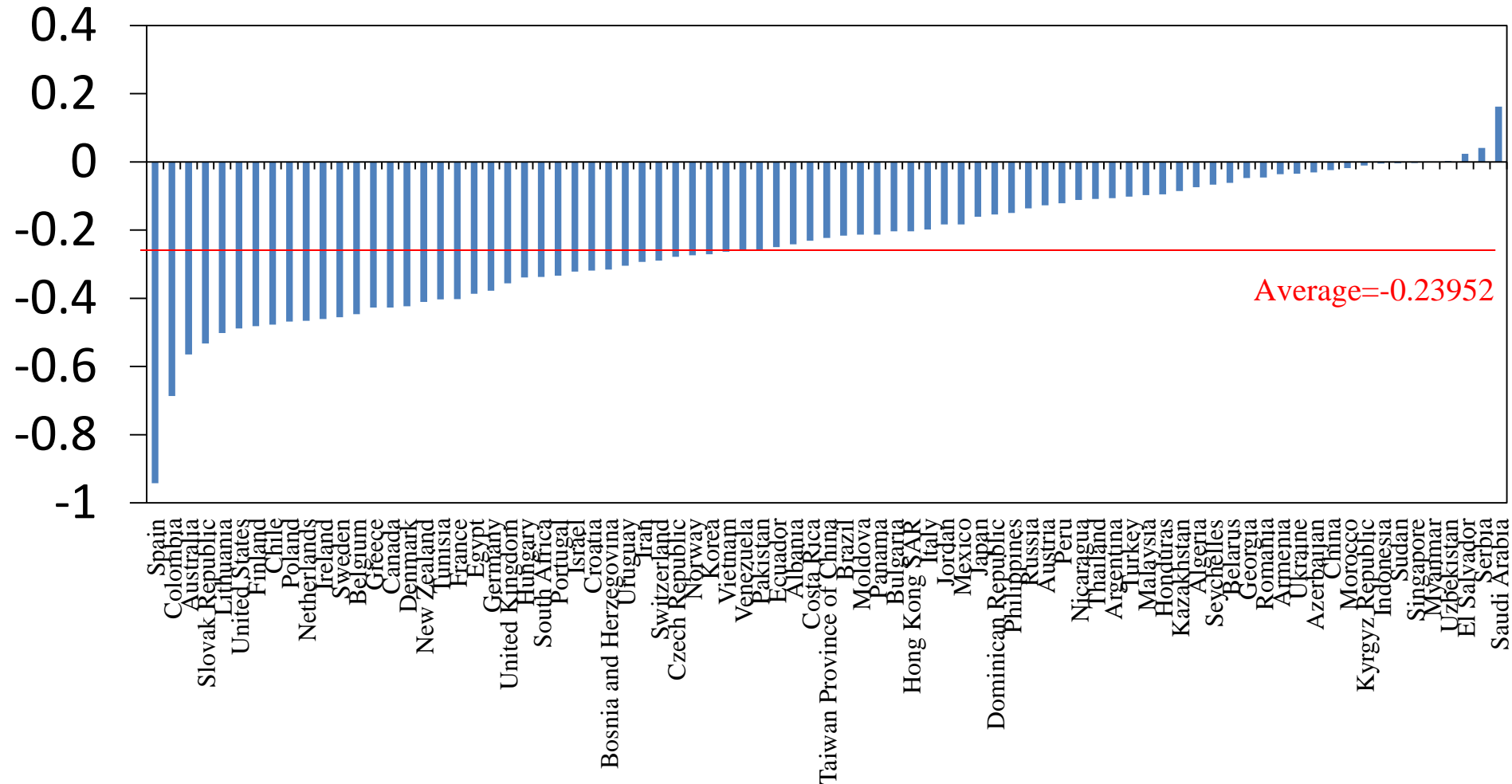
Okun's Law Coefficients: All Countries

(based on "change" specification)



Okun's Law Coefficients: All Countries

(based on "level (HP100)" specification)



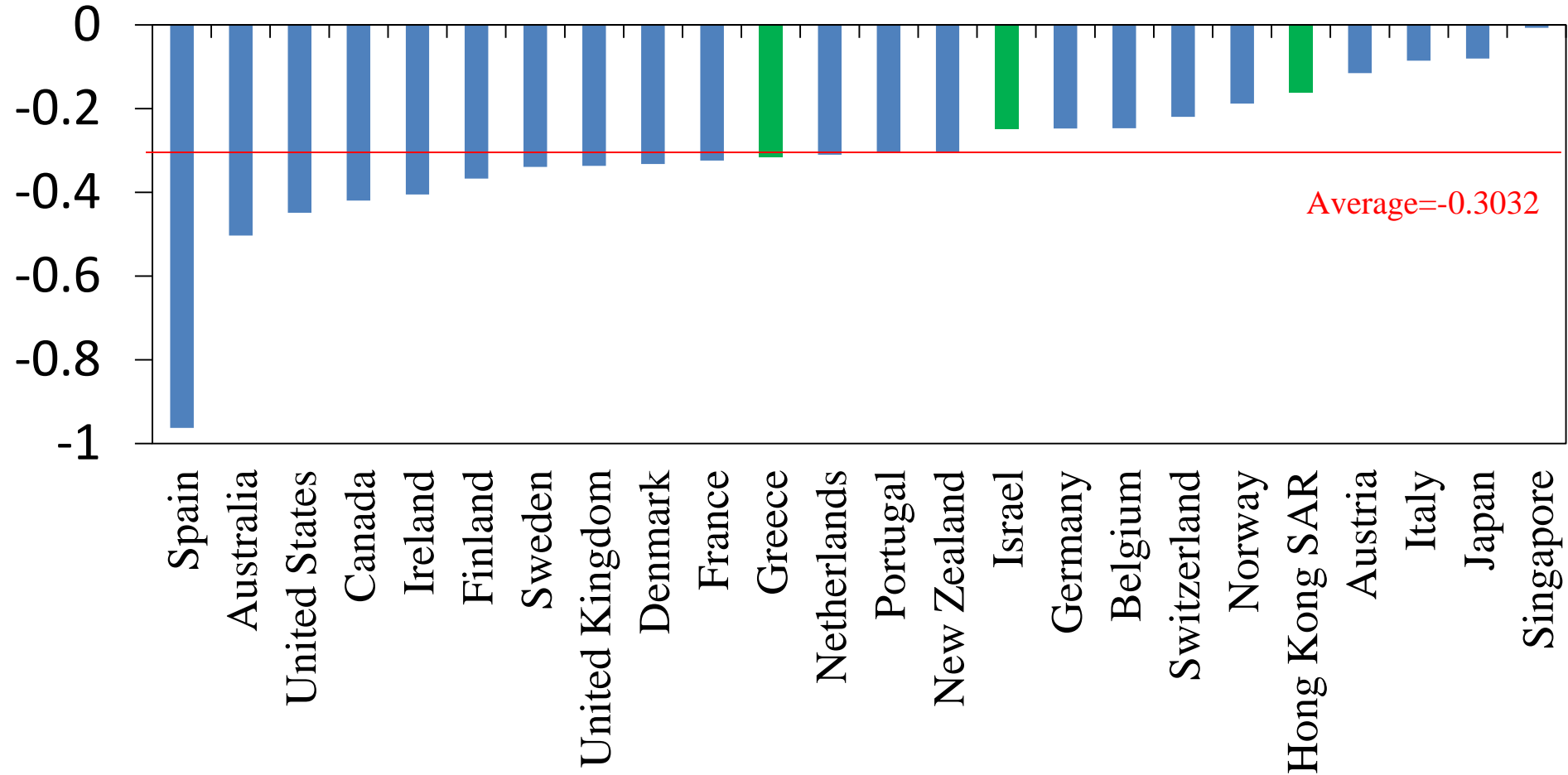
Country Groups

Total: 81 Countries

- 24 Advanced Economies
- 20 Emerging Market Economies
- 11 Frontier Market Economies
- 26 Other Developing Economies

Okun's Law Coefficients: Advanced Economies

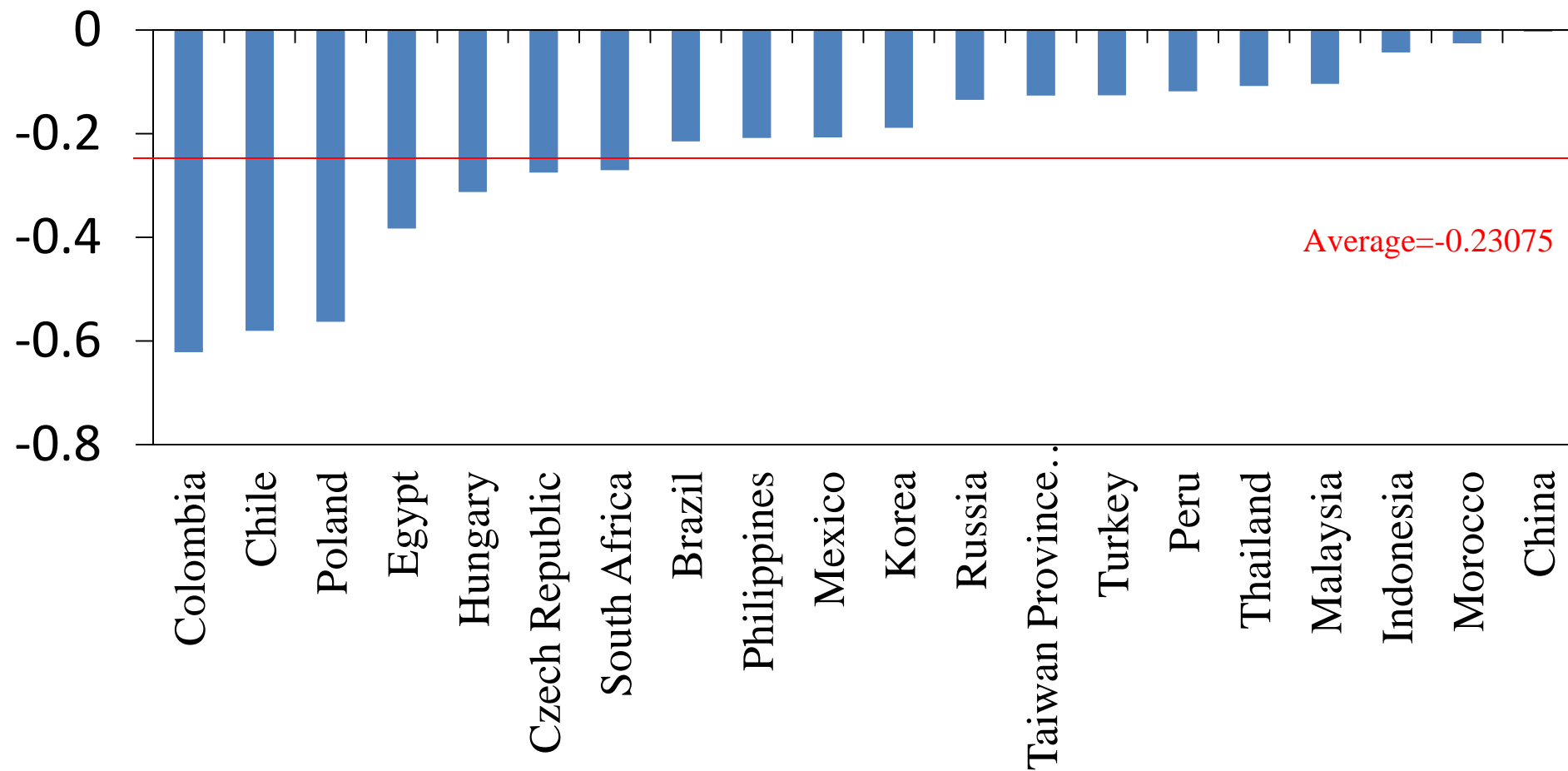
(based on "change" specification)



Notes: Ball and others (2013) do not cover Greece, Israel, Hong Kong SAR, and Singapore. These countries are marked with green.

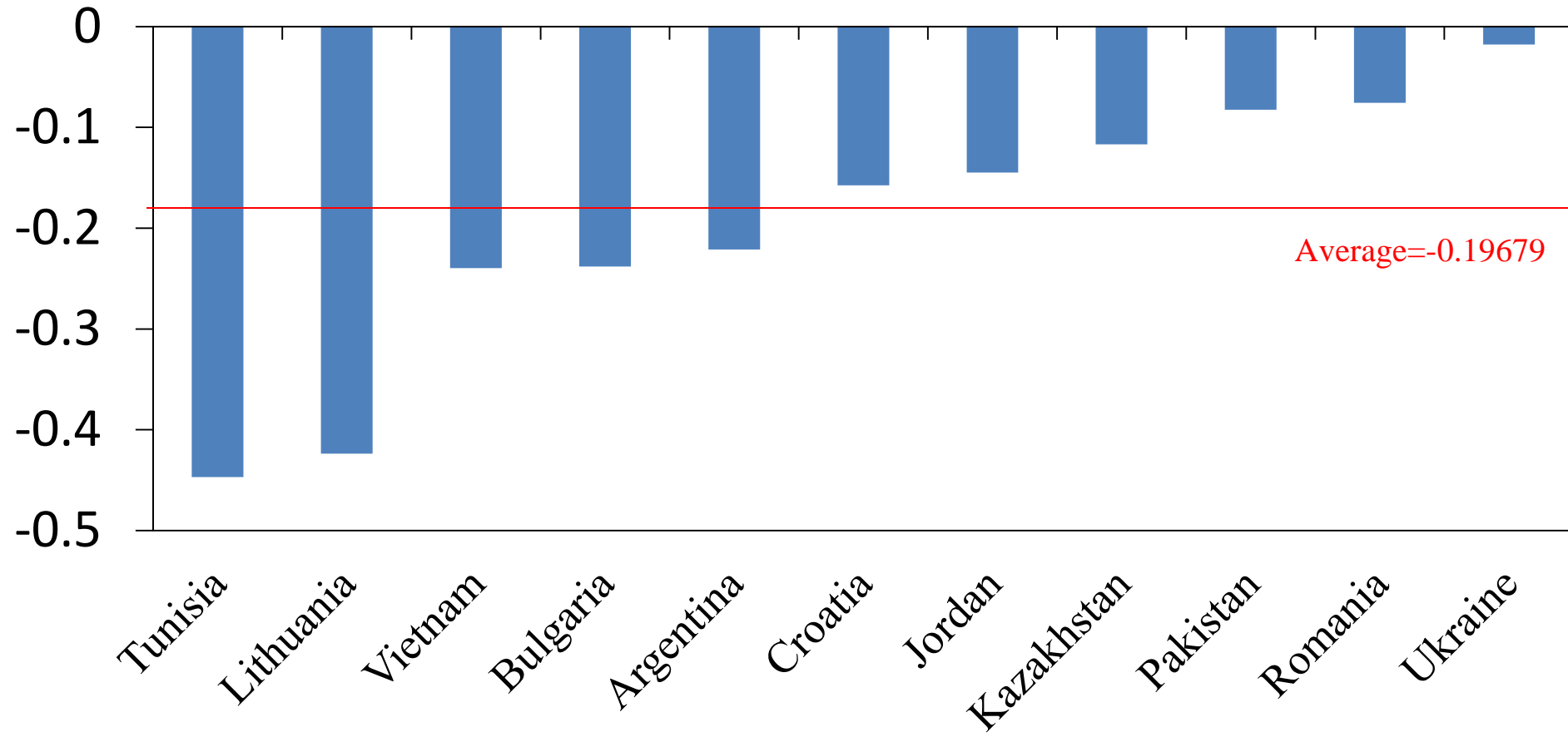
Okun's Law Coefficients: Emerging Market Economies

(based on "change" specification)



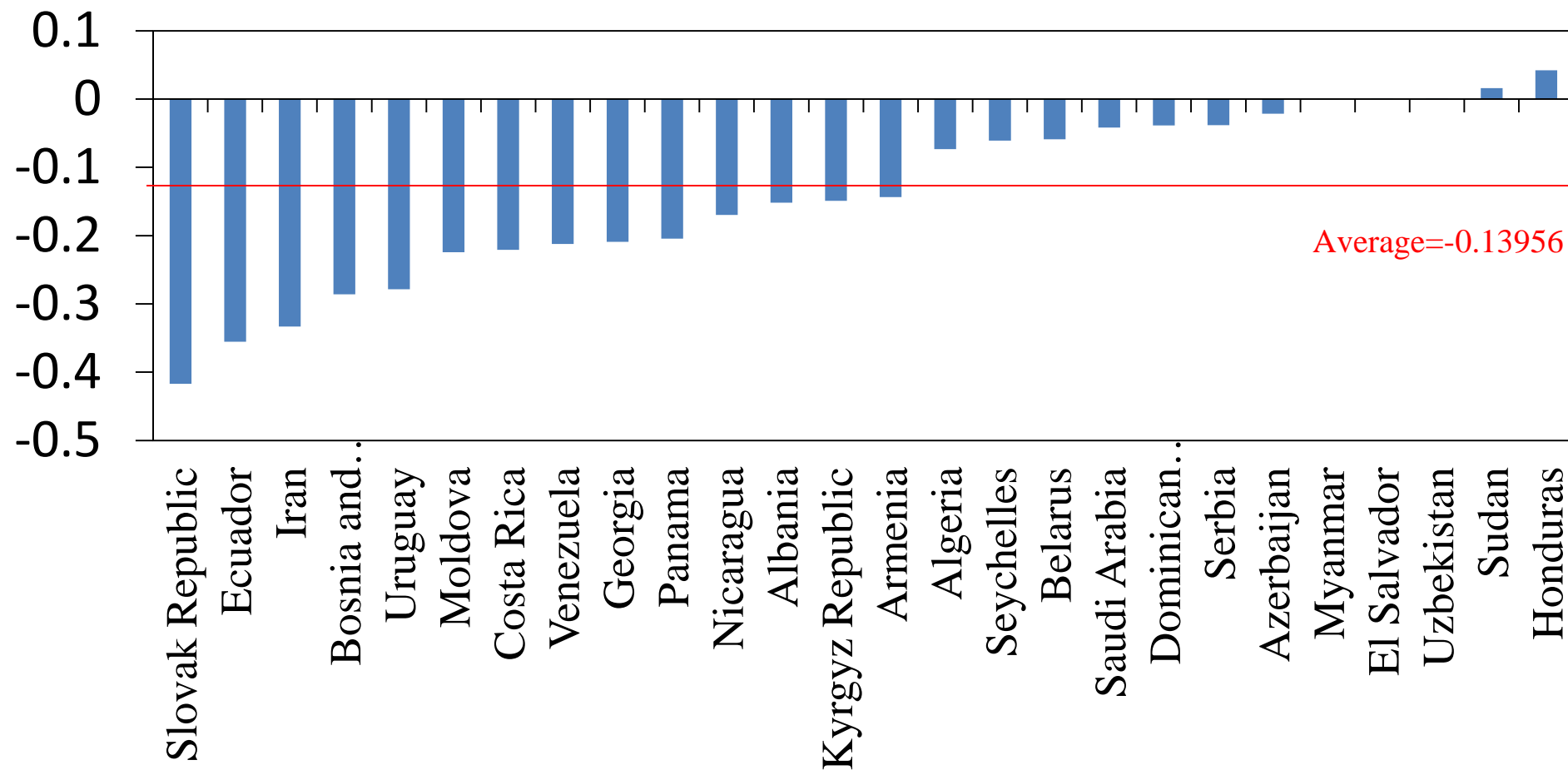
Okun's Law Coefficients: Frontier Market Economies

(based on "change" specification)



Okun's Law Coefficients: Other Developing Economies

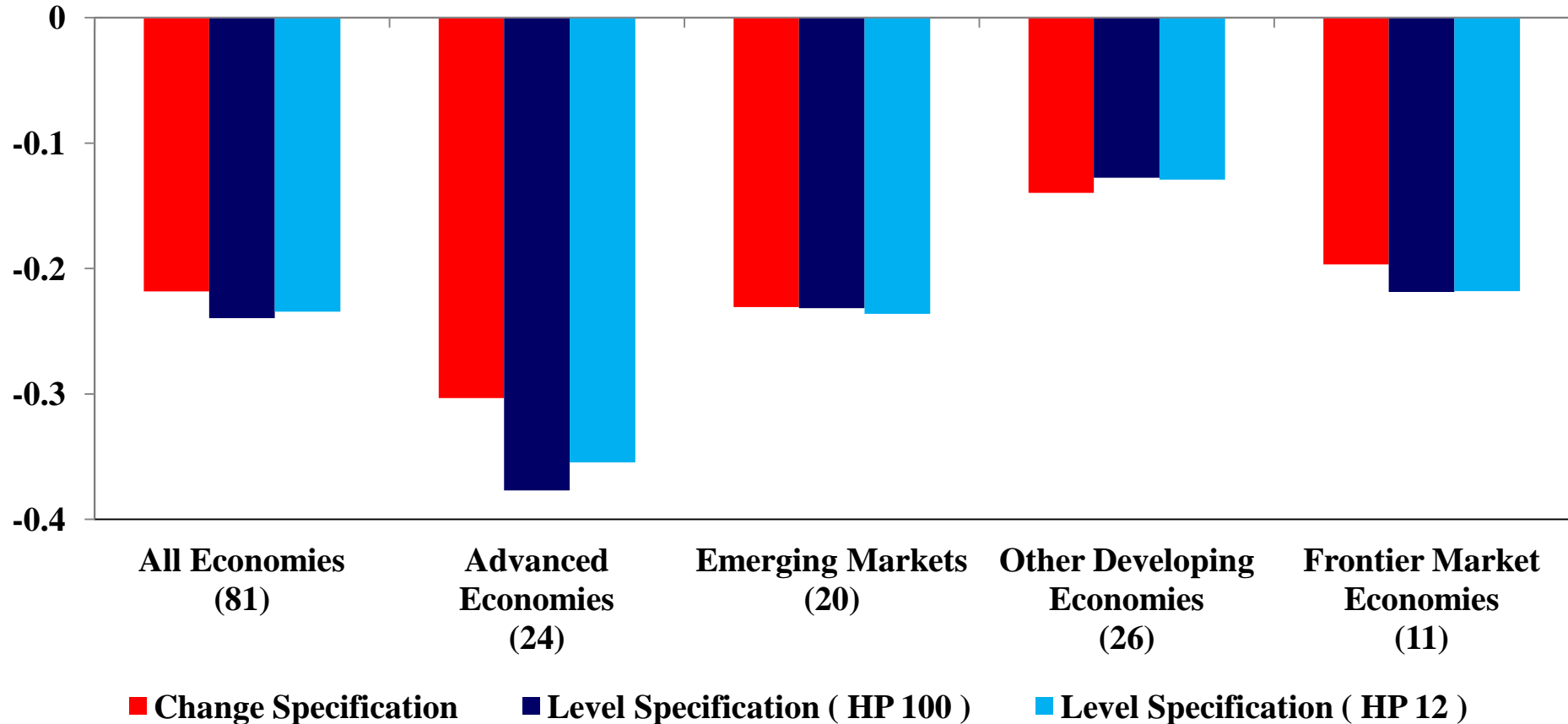
(based on "change" specification)



Okun's Law Coefficients:

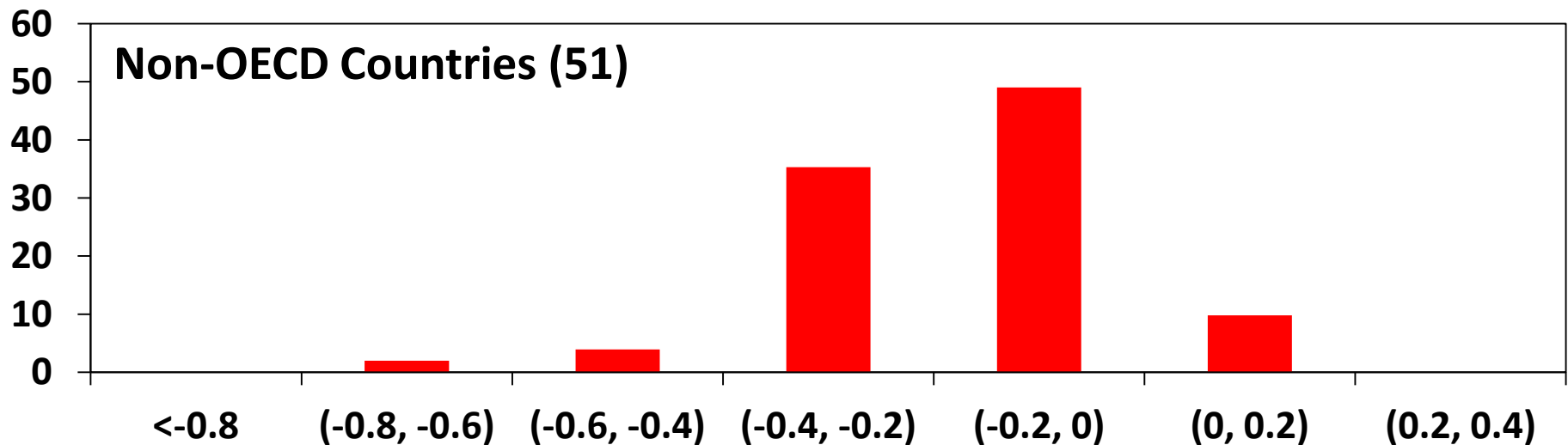
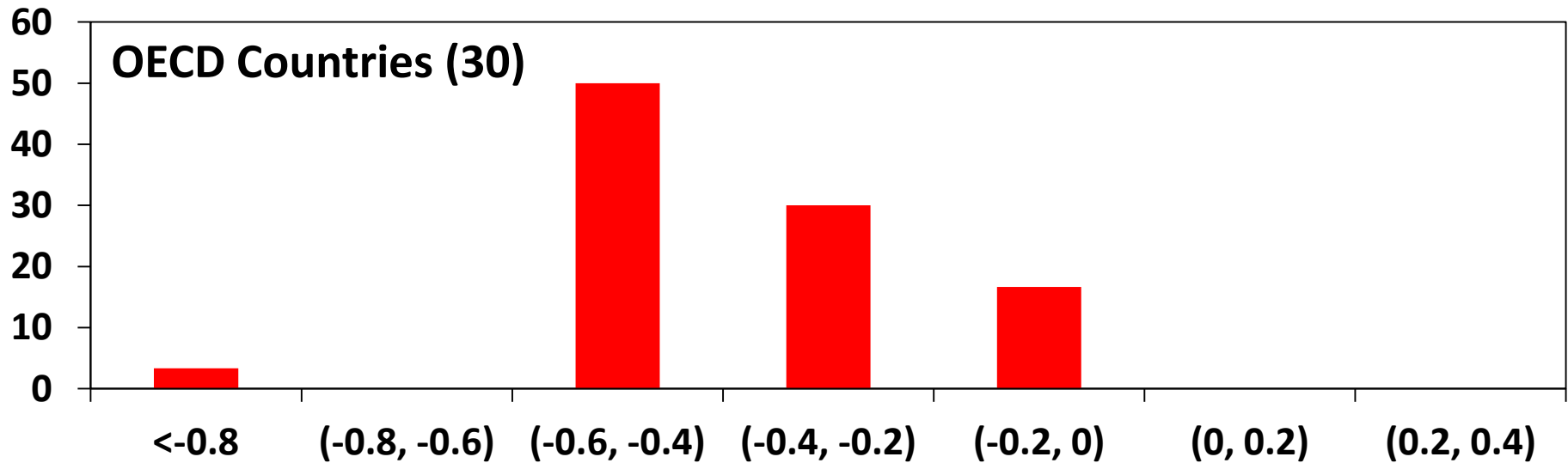
Summary

(group average)



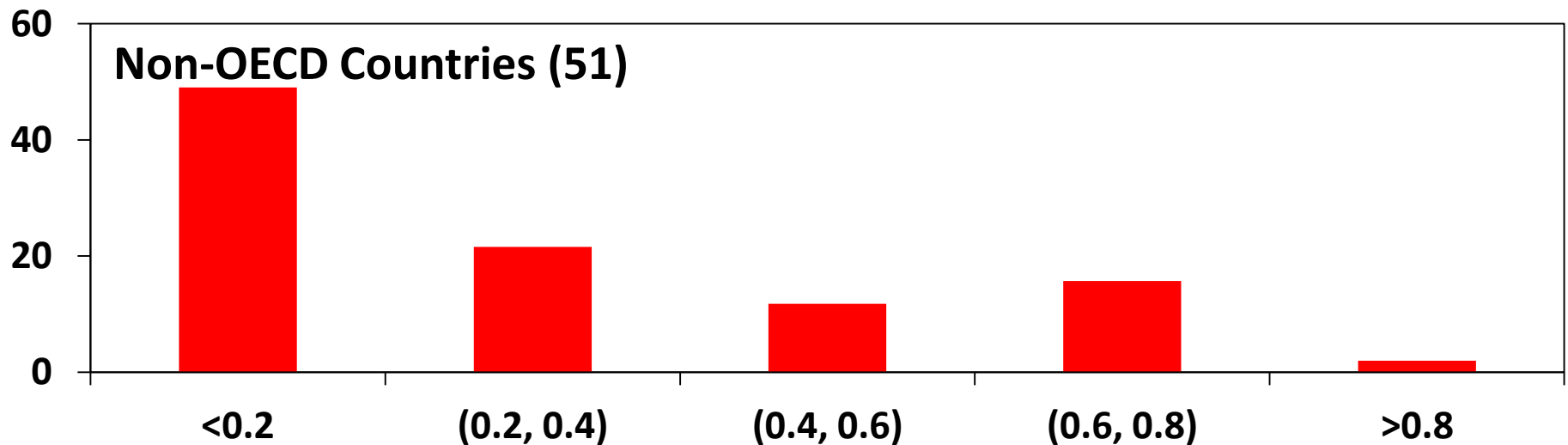
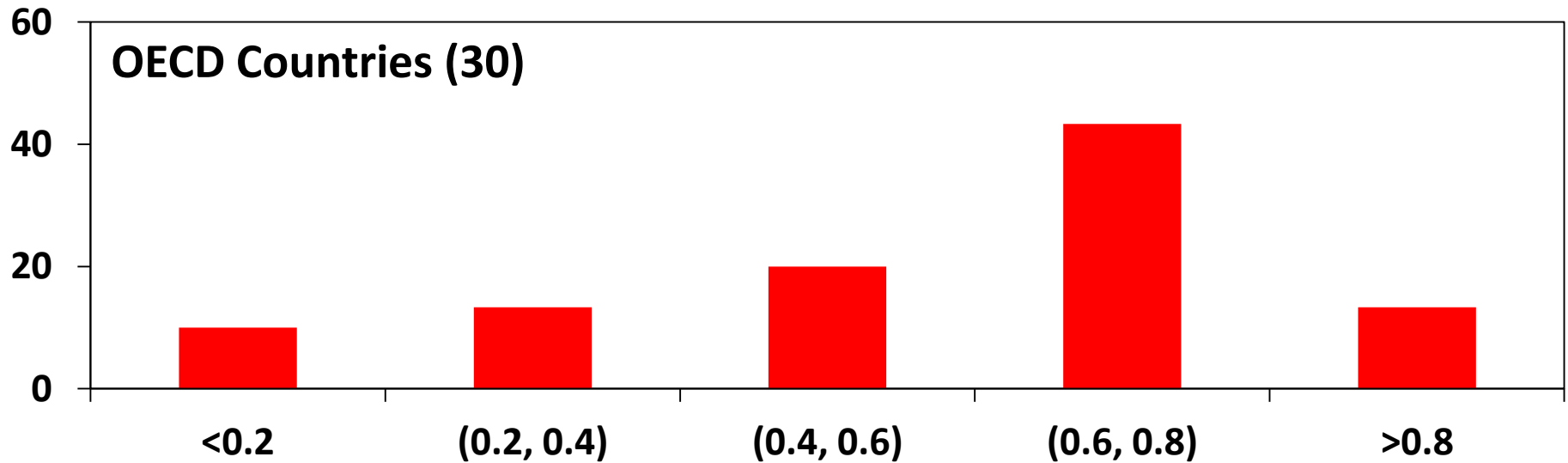
Distribution of Okun's Law Coefficients:

(in percent, based on "levels" specification)



Distribution of Okun's Law **R-sq**:

(in percent, based on “levels” specification)

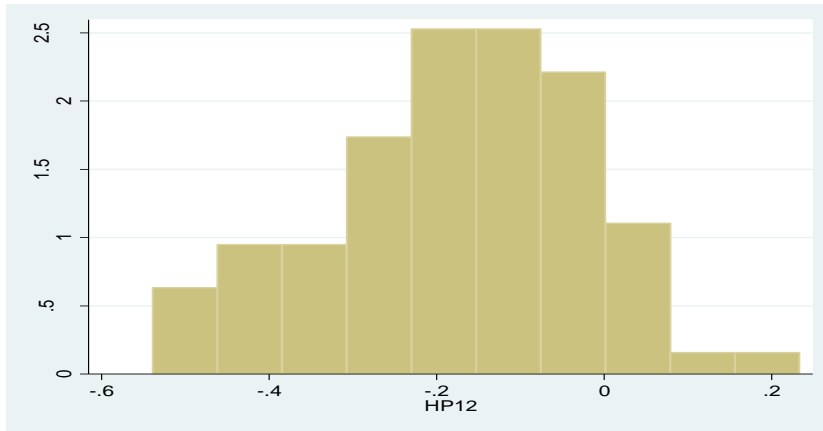


Okun's Law Coefficients: Regional Country Groups

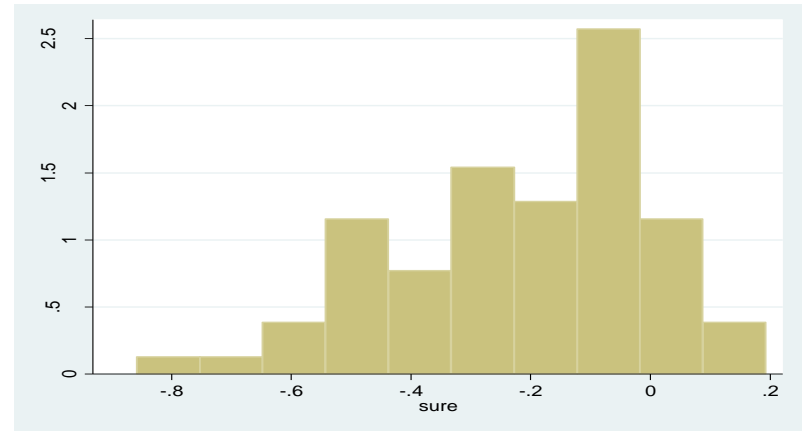
	Based on "level"		Based on "change"	
	mean	median	mean	median
South Asia, East Asia, and the Pacific	-0.166	-0.161	-0.138	-0.108
Americas	-0.239	-0.215	-0.224	-0.214
Europe	-0.362	-0.367	-0.289	-0.282
Middle East and North Africa	-0.154	-0.184	-0.173	-0.145
Emerging Europe and CIS	-0.187	-0.136	-0.188	-0.152
Sub-Saharan Africa	-0.178	-0.163	-0.170	-0.145

Other Robustness Checks

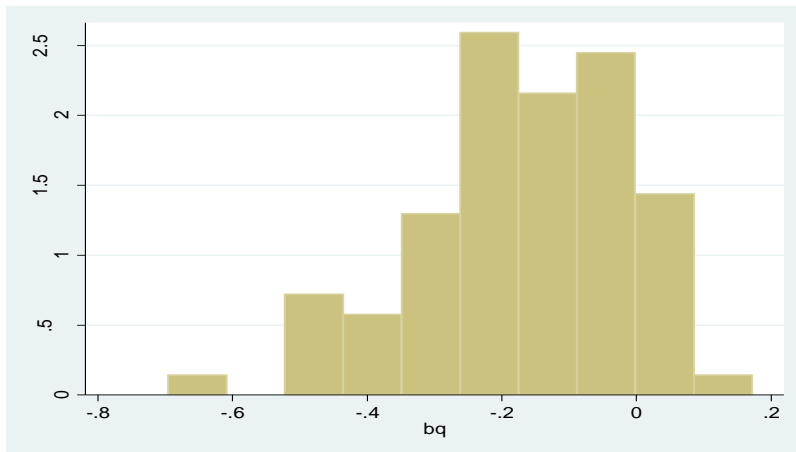
Panel A. HP 12



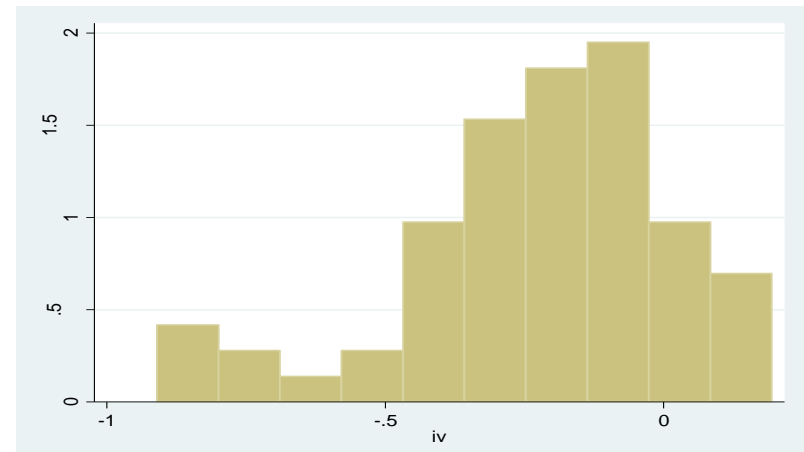
Panel B. SURE



Panel C. Innovation



Panel D. IV



Okun's Law in VAR Framework

- An adapted version of Blanchard's (1989) innovation approach (Weber, 1995)
- In the first step, a bivariate VAR for cyclical unemployment and cyclical output is estimated:

$$u_t^c = \sum_{i=1}^2 \gamma_{1i} u_{t-i}^c + \sum_{i=1}^2 \gamma_{2i} y_{t-i}^c + e_t^u$$

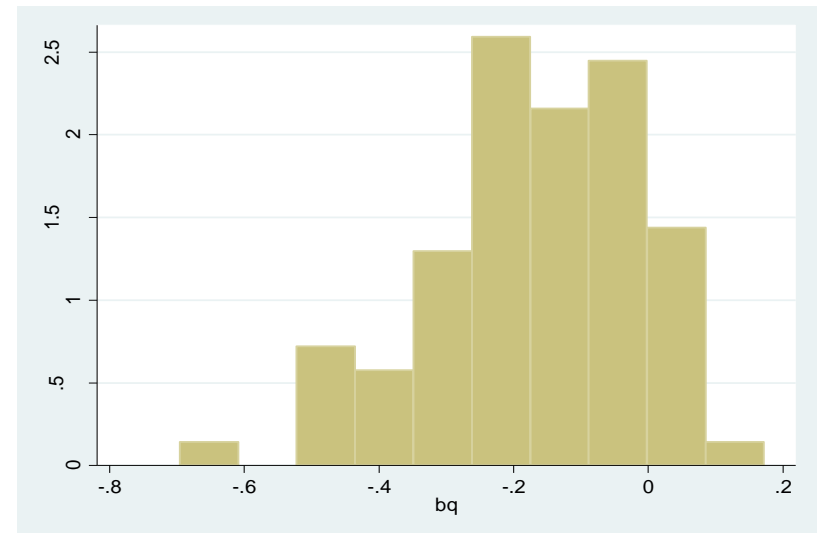
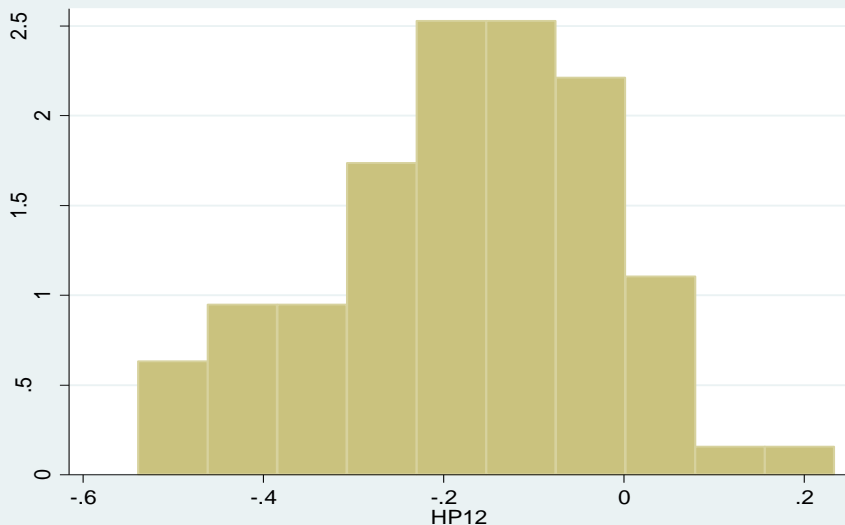
$$y_t^c = \sum_{i=1}^2 \gamma_{3i} y_{t-i}^c + \sum_{i=1}^2 \gamma_{4i} u_{t-i}^c + e_t^y$$

- In the second step, Okun's Law coefficient is estimated using the innovations in the equations above:

$$e_t^u = \beta e_t^y + \varepsilon_t$$

Distribution of Okun's Law coefficients :

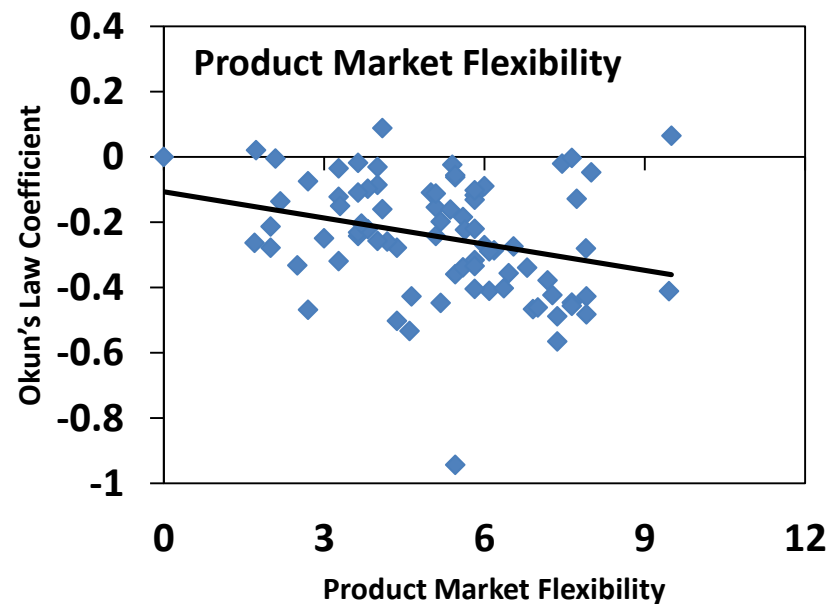
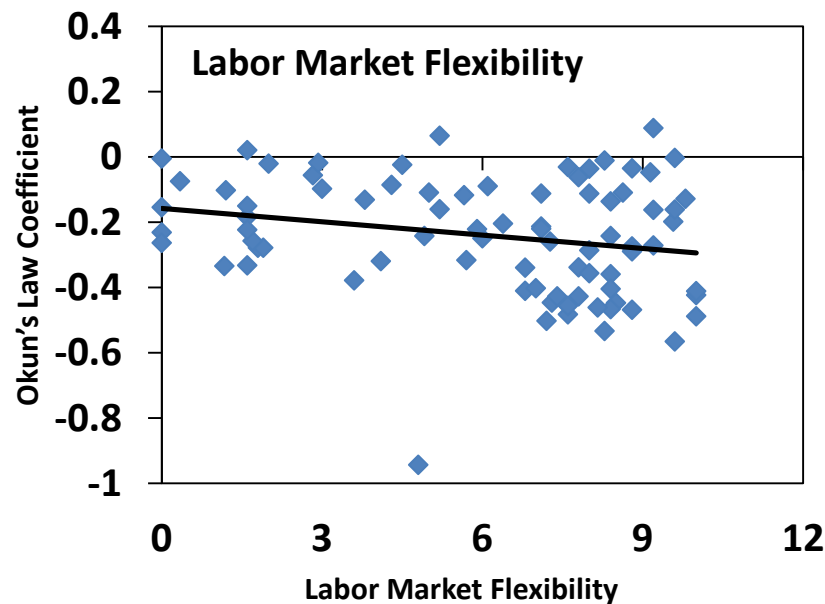
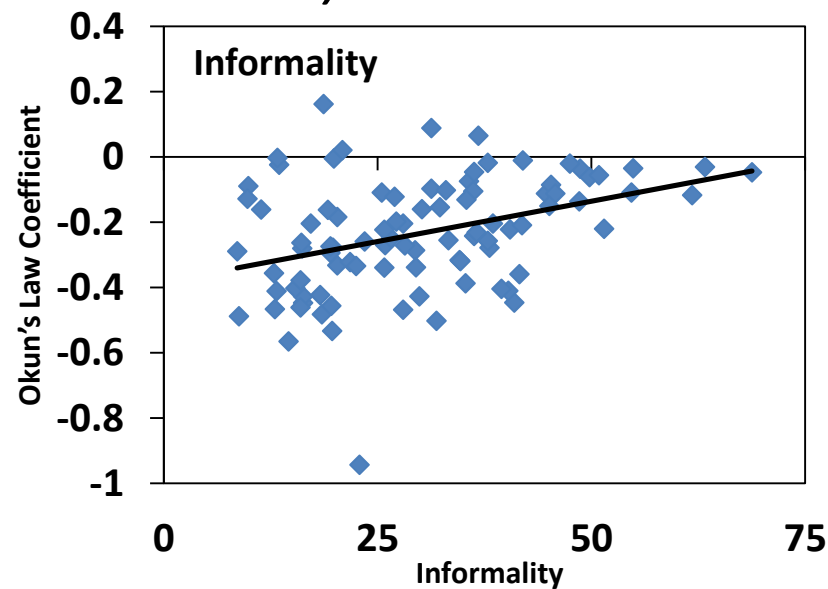
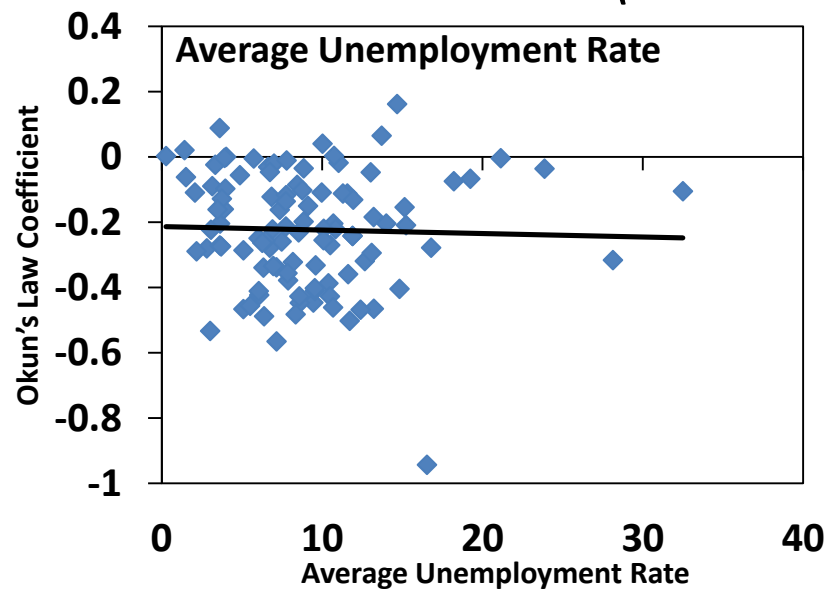
Single equation (left panel) vs. VAR (right panel)
For outside OECD



- Left panel: average is -0.2; majority of the estimates between -0.1 and -0.3.
- Right panel: average is -0.17; majority of the estimates between -0.1 and -0.3.
- The correlation between the two sets of Okun's coefficients is high (about 0.7)

Determinants of Okun's Law coefficient

(OECD and Non-OECD)

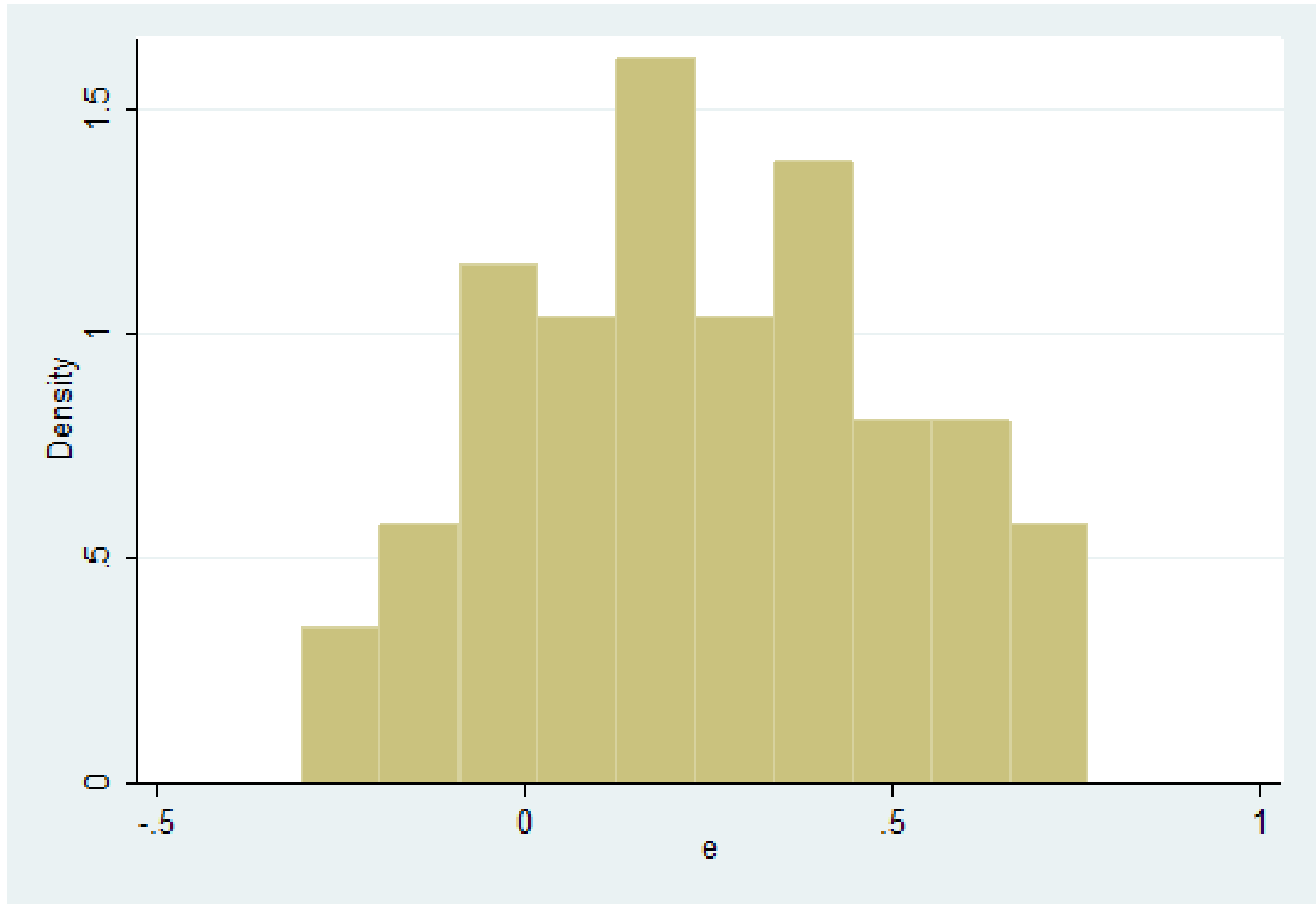


Determinants of Okun's Law Coefficients (OECD and Non-OECD)

	(1)	(2)	(3)
Average Unemployment	-0.017*** [-4.072]	-0.019*** [-4.569]	-0.020*** [-4.763]
Informality	0.004*** [5.468]	0.002*** [2.786]	0.002*** [3.062]
Services (% of GDP)	0.001 [0.946]	0.001 [1.116]	0.002 [1.660]
Labor Market Flexibility	-0.015** [-2.298]		-0.012* [-1.735]
Product Market Flexibility		-0.036*** [-3.110]	-0.029** [-2.369]
Constant	-0.151** [-2.089]	-0.014 [-0.155]	-0.019 [-0.204]
N	74	71	69
R²	0.412	0.467	0.488

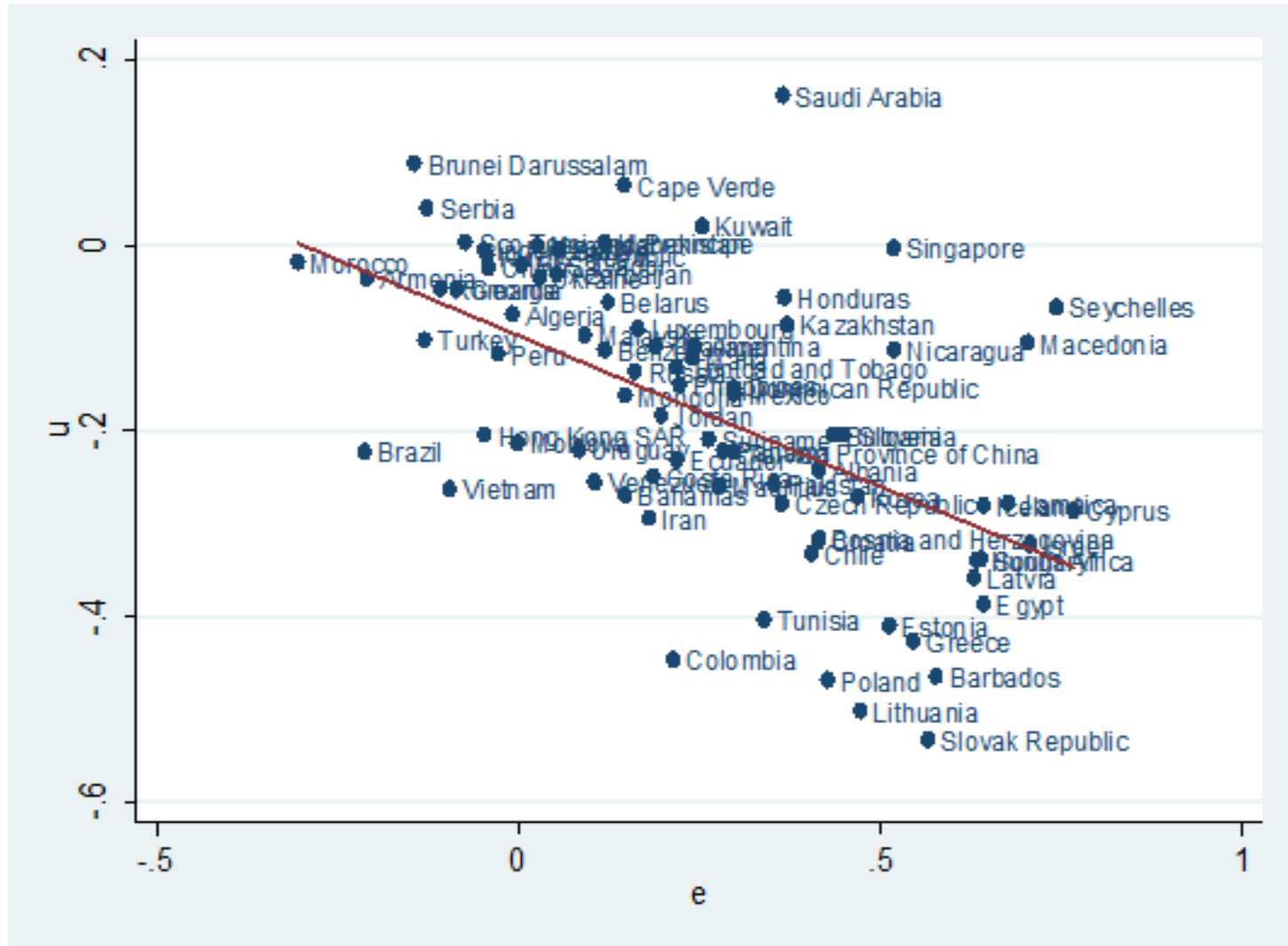
Note: t-statistics are in parenthesis. ***, **, and * indicates significance at 1, 5, and 10 percent levels, respectively.

Distribution of Employment Responsiveness



Okun's Law Coefficients:

Unemployment Elasticities vs. Employment Elasticities



Determinants of Okun's Law Coefficients (Employment Elasticities)

	(1)	(2)	(3)	(4)	(5)
Average Employment Growth	-0.017 [-0.885]			-0.036* [-1.793]	-0.023 [-1.040]
Informality		-0.006*** [-3.889]		-0.007*** [-4.257]	-0.004** [-2.264]
Services (% of GDP)			0.006*** [5.164]		0.005*** [2.990]
Constant	0.148*** [4.172]	0.383*** [5.610]	-0.153*** [-2.815]	0.465*** [5.715]	0.132 [0.966]
N	82	72	76	72	67
R²	0.01	0.178	0.265	0.214	0.314

Note: t-statistics are in parenthesis. ***, **, and * indicates significance at 1, 5, and 10 percent levels, respectively.

Determinants of Employment Elasticities (Non-OECD)

	(1)	(2)	(3)
Average Employment Growth	-0.026 [-1.109]	-0.039 [-1.543]	-0.031 [-1.251]
Informality	-0.004* [-1.884]	-0.003 [-1.522]	-0.003* [-1.716]
Services (% of GDP)	0.008*** [4.173]	0.004 [1.577]	0.006** [2.433]
Labor Market	0.086** [2.644]		0.084** [2.549]
Product Market		0.007 [0.566]	0.009 [0.693]
Constant	-0.625** [-2.272]	0.095 [0.653]	-0.589** [-2.094]
N	54	54	52
R²	0.455	0.349	0.45

Note: t-statistics are in paranthesis. ***, **, and * indicates significance at 1, 5, and 10 percent levels, respectively.

Okun Outside OECD

Tentative Conclusions

1. Law holds better-than-(we)-expected.
2. Coefficient for non-OECD countries is smaller (around -0.2 on average) than for OECD countries, but there is considerable heterogeneity
3. In this broader sample, variation in Okun's coefficient can be accounted for partially by country characteristics such as degree of informality and labor and product market flexibility

**DO FORECASTERS BELIEVE IN
OKUN'S LAW?**

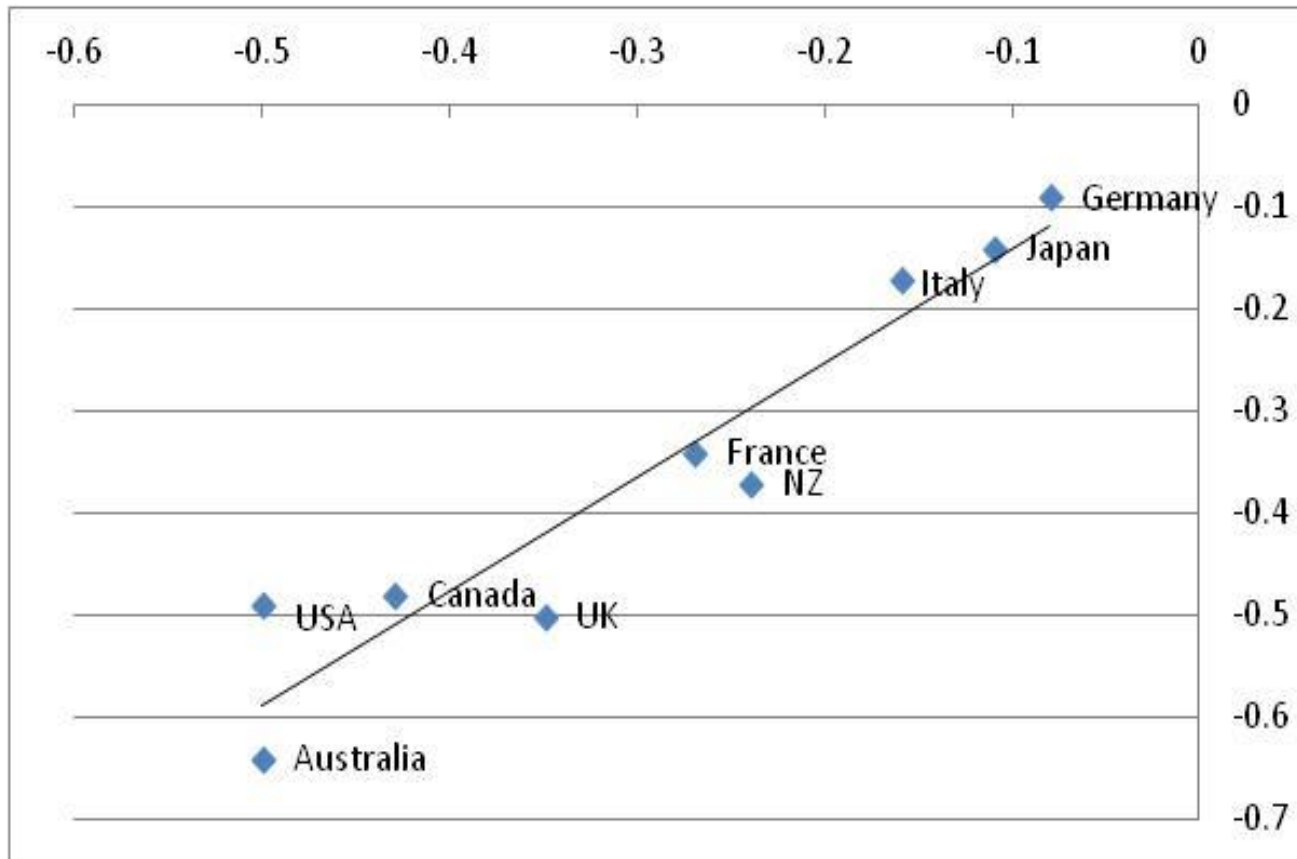
Data on Consensus Forecasts

- October 1989 to December 2012; 9 advanced economies
- Consensus (simple average) of analysts' monthly forecasts of unemployment rate and output growth for the current and next year
- Events being forecast:
 - Annual average unemployment rate and real GDP growth
- Every month a new forecast of the event is made
- 24 monthly forecasts made between January of the previous year and December of the year in question

Okun's Law with Forecasts

- Changes version: $\Delta U_t = \alpha + \beta \Delta Y_t + \omega_t$
- Estimate $E_h \Delta U_t = \alpha + \beta E_h \Delta y_t$ using Consensus Forecasts
 - Obtaining $E_h \Delta Y_t$ is easy since we directly have forecasts of real GDP growth.
 - We construct $E_h \Delta U_t = E_h U_t - E_h U_{t-1}$

Okun's Law: Forecasts vs. Data



Horizontal axis shows Okun coefficient estimated from the data for 1989 to 2012.

Vertical axis shows Okun coefficient estimated from forecasts for the same time period.

Review of Nordhaus (R.E.Stat., 1987)

$$r_{t,h} = \beta_0 + \beta_1 * r_{t,h+k} + u_{t,h}$$

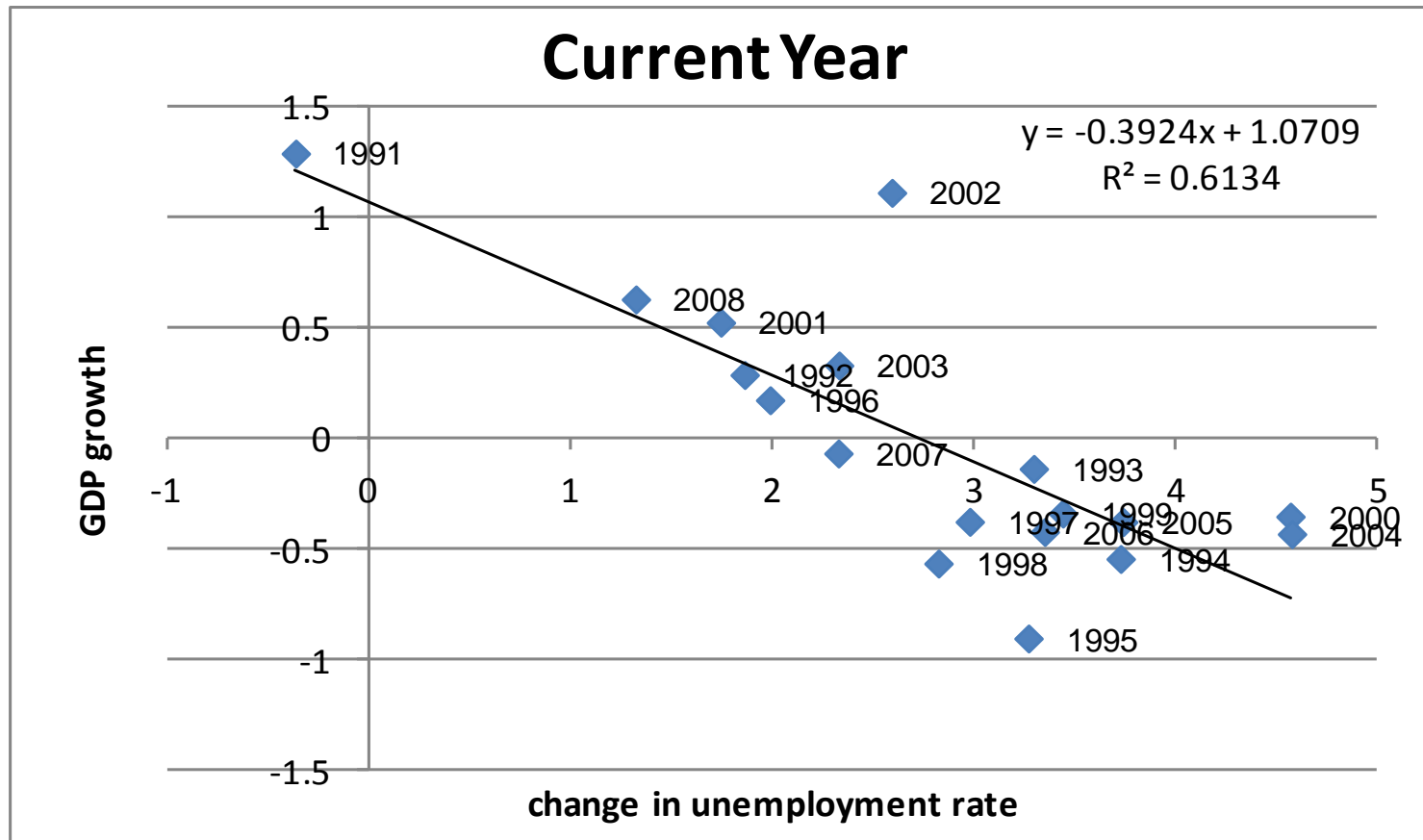
- A sequence of forecasts of the same event should follow a martingale
- Regress forecast revision $r_{t,h}$ on past revision $r_{t,h+k}$
- $\beta_1=0$ implies no information rigidity
- The test does not require use of outcomes (“actual data” (thus circumventing the issue of which vintage to use)

Extension by Isiklar, Lahiri & Loundgani (J. Applied Econometrics, 2006)

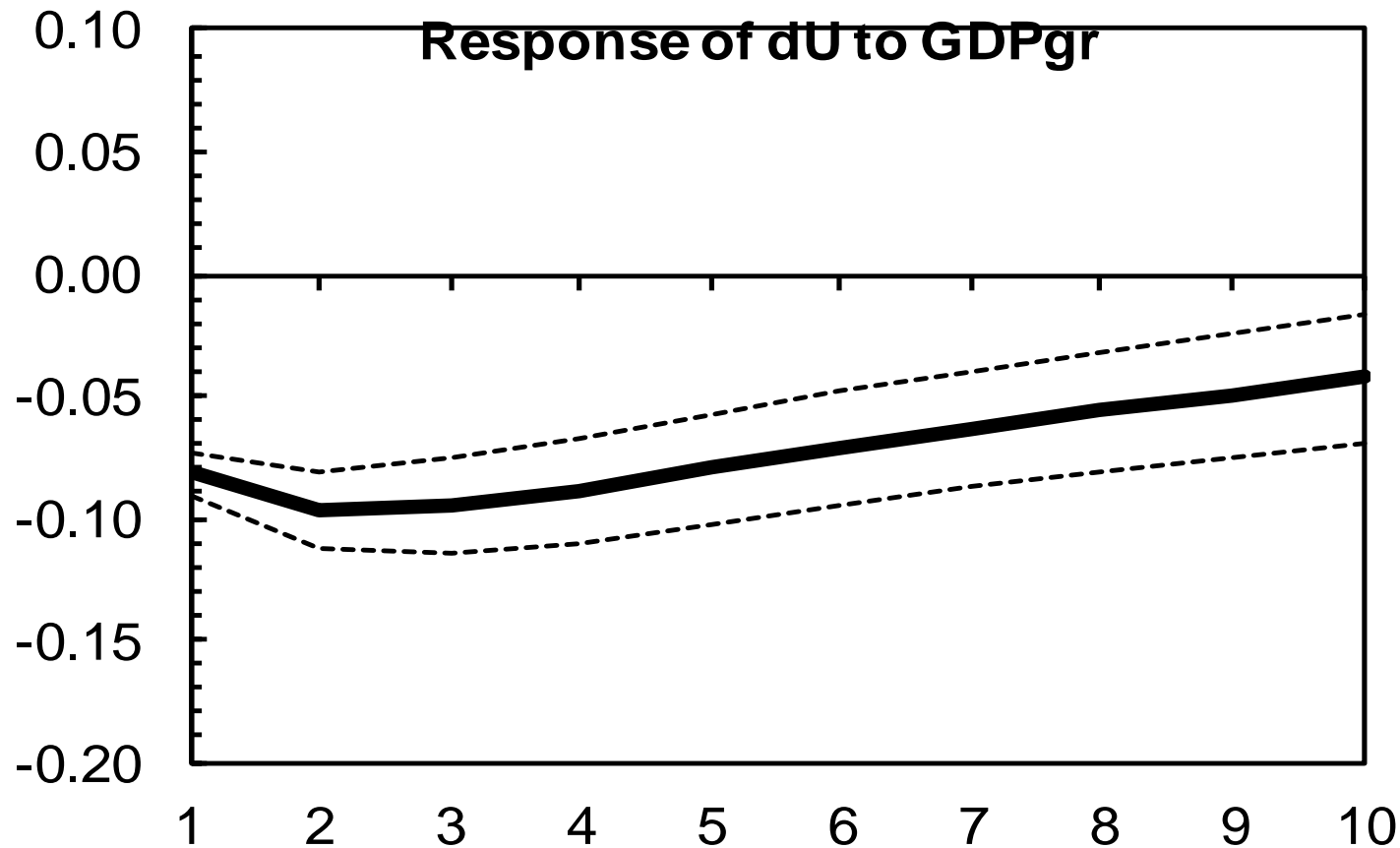
$$r_{t,h} = c + B_1 r_{t,h+1} + B_2 r_{t,h+2} + \dots + B_p r_{t,h+p} + \varepsilon_{t,h}$$

- Under the null of full information rational expectations forecast revisions should reflect all new information: All the B coefficients should be zero
- In a **multi-country context**, $r_{t,h}$ is a Jx1 vector containing forecast revisions of the J countries and B_k is the JxJ matrix of coefficients
- In a **multi-variable context**, $r_{t,h}$ is a Jx1 vector containing forecast revisions of the J variables.
- Generalized impulse responses and variance decompositions (Pesaran and Shin, 1998).

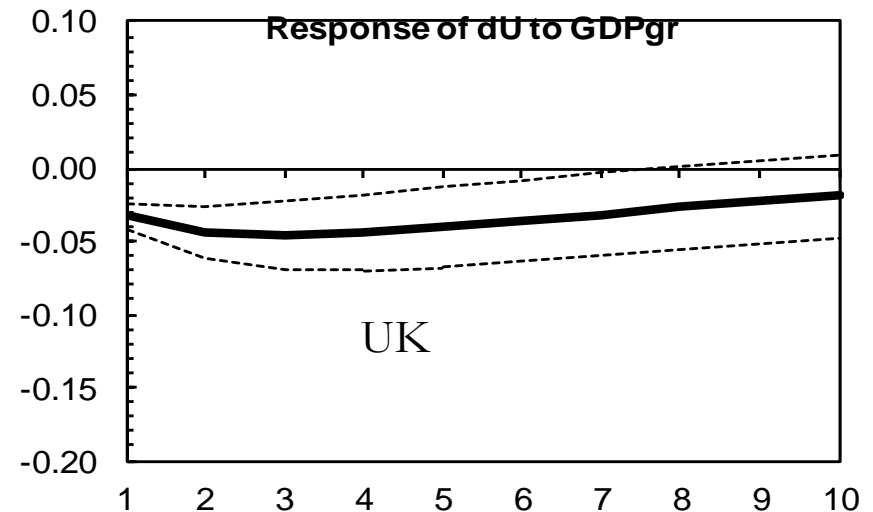
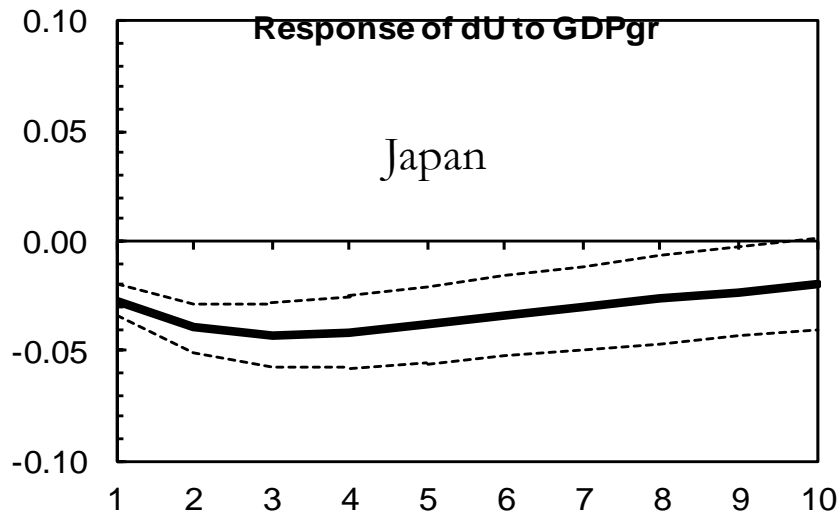
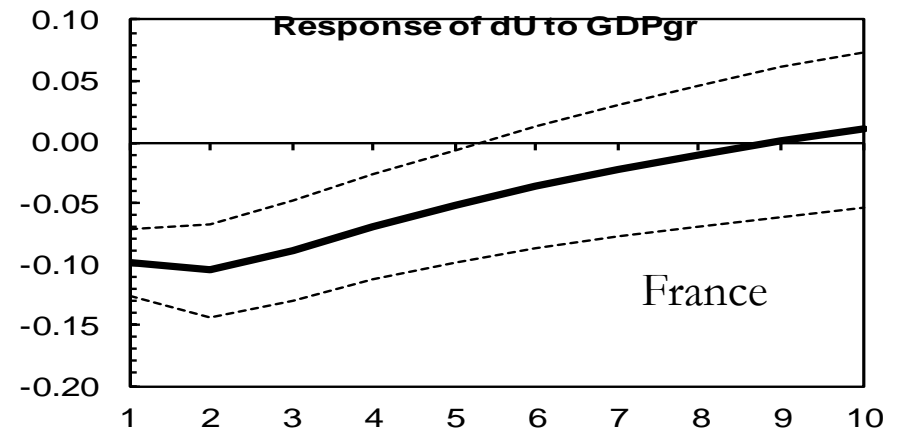
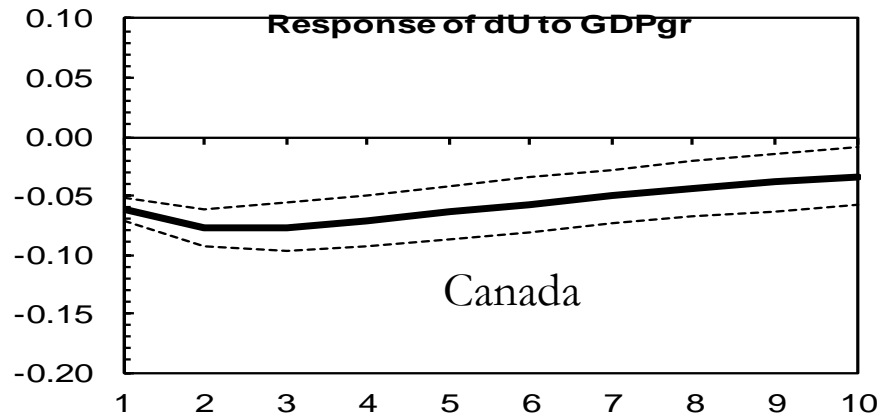
Revisions in unemployment forecasts vs. revisions in GDP forecasts: US



Response of Unemployment Revisions to GDP Forecast Revisions, US 1989-2009

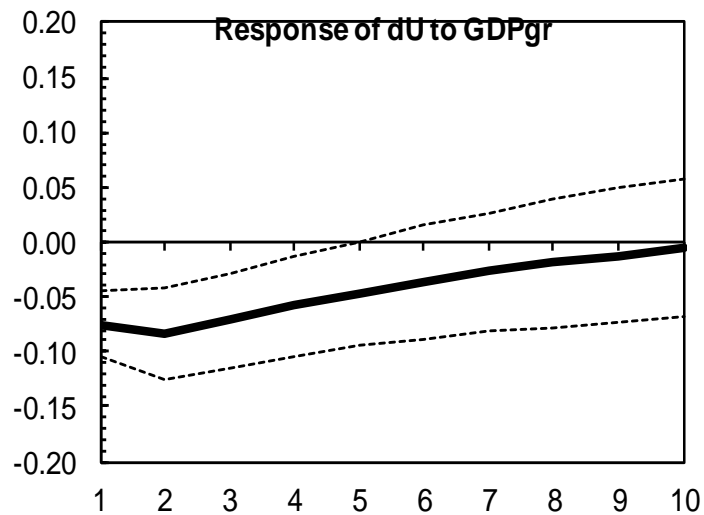


Country VARs IRF, 1989-2009

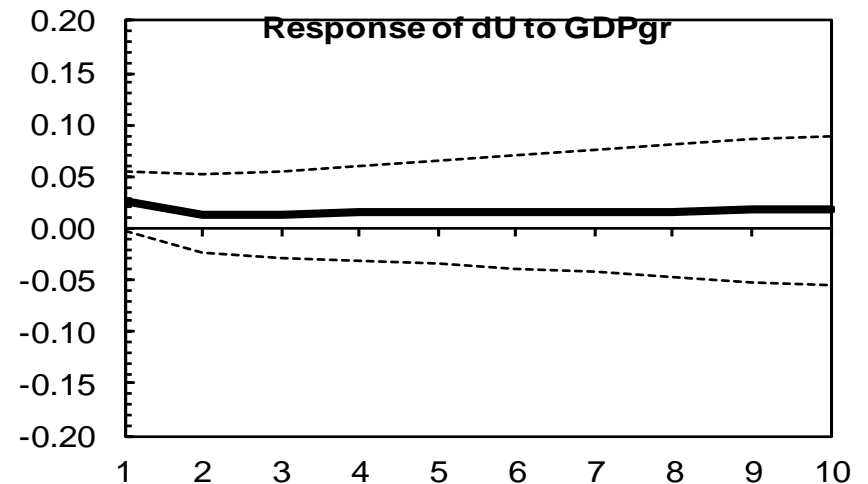


Country VAR's IRF, 1989-2009

Germany



Italy



Conclusions

- Okun's Law is a stable relationship by the standards of macroeconomics
 - Holds for many countries, but coefficients differ across countries (and for states within countries) for reasons that are only partially understood
 - For advanced economies: (1) held up reasonably well during the Great Recession; (2) holds for all age groups, but greater variation across countries in younger age groups.
- Forecasters believe Okun's Law holds
 - Strong correlation between Okun coefficients estimated from data and forecasts
 - Forecasts revisions consistent with the law: upward revisions in real GDP forecasts followed by downward revisions in unemployment forecasts.