UNIVERSITY OF CALIFORNIA
DEPARTMENT OF ECONOMICS

Economics 134
Spring 2018
Professor David Romer

LECTURE 20
HYSTERESIS
APRIL 9, 2018

I. OVERVIEW
- A. The aftermath of the Great Recession
- B. Possible channels through which cyclical fluctuations could have important effects on the path of normal output
  1. Technology and capital
  2. Employment

II. THE IMPACT OF PROLONGED RECESSIONS ON THE NATURAL RATE (BALL PAPER)
- A. Estimating the natural rate of unemployment
- B. Non-hysteresis theories of the increases in the natural rate
- C. Ball's test of hysteresis
- D. Concerns
  1. Omitted variable bias
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III. HYSTERESIS IN THE GREAT RECESSION (YAGAN PAPER)
- A. Basic idea
- B. Possible source of omitted variable bias
- C. How Yagan addresses the possible sources of omitted variable bias
- D. Data
- E. Results
- F. Discussion

IV. CONCLUDING COMMENTS

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Hysteresis

April 8, 2018

Announcements

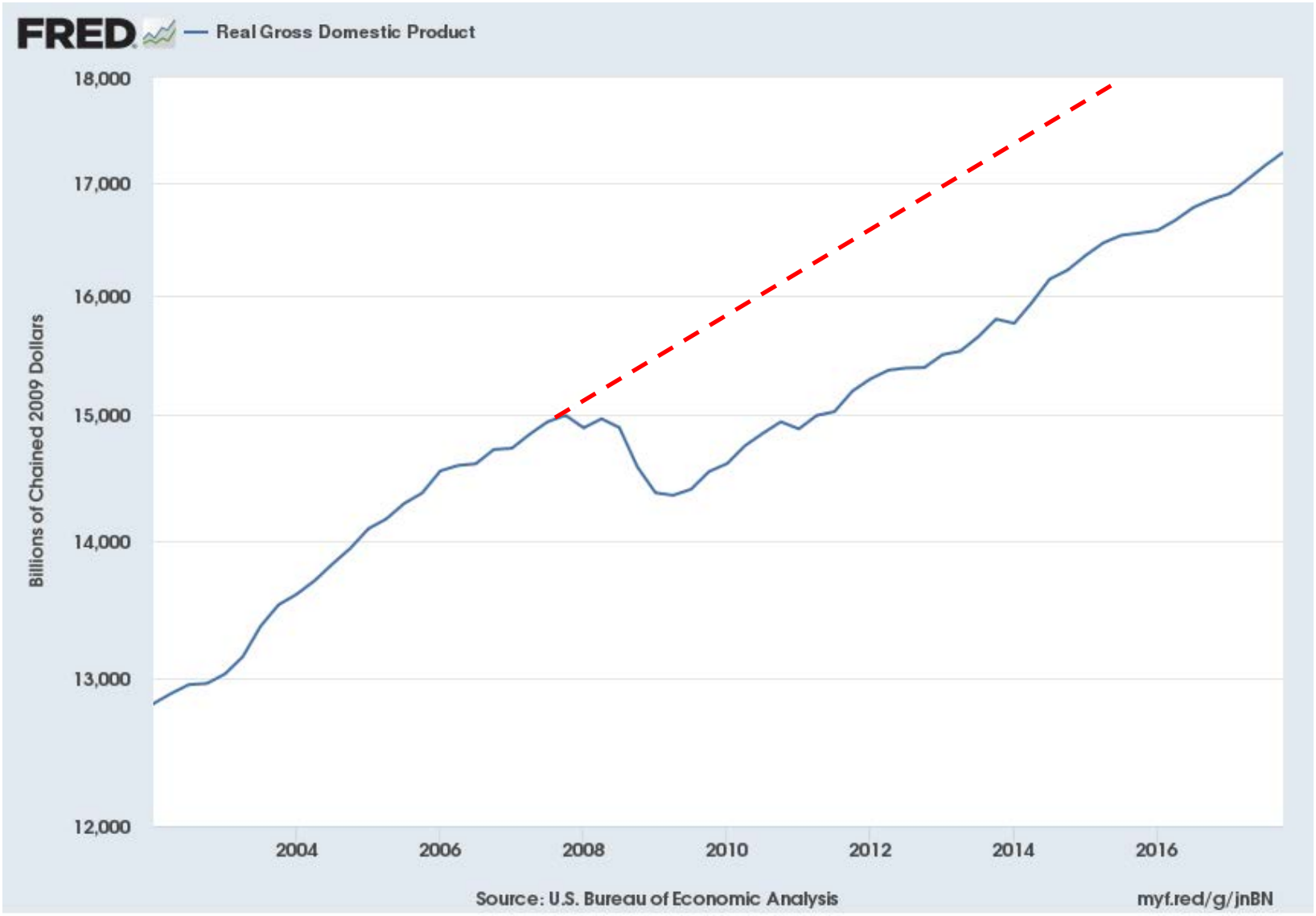
- Reminder: Your papers are due one week from today.
  - This might be a good time to reread the "Instructions" section of the essay assignment.
- My office hours this week are Tuesday (4/10), 4–5, and Wednesday (4/11), 1–2.

I. Overview

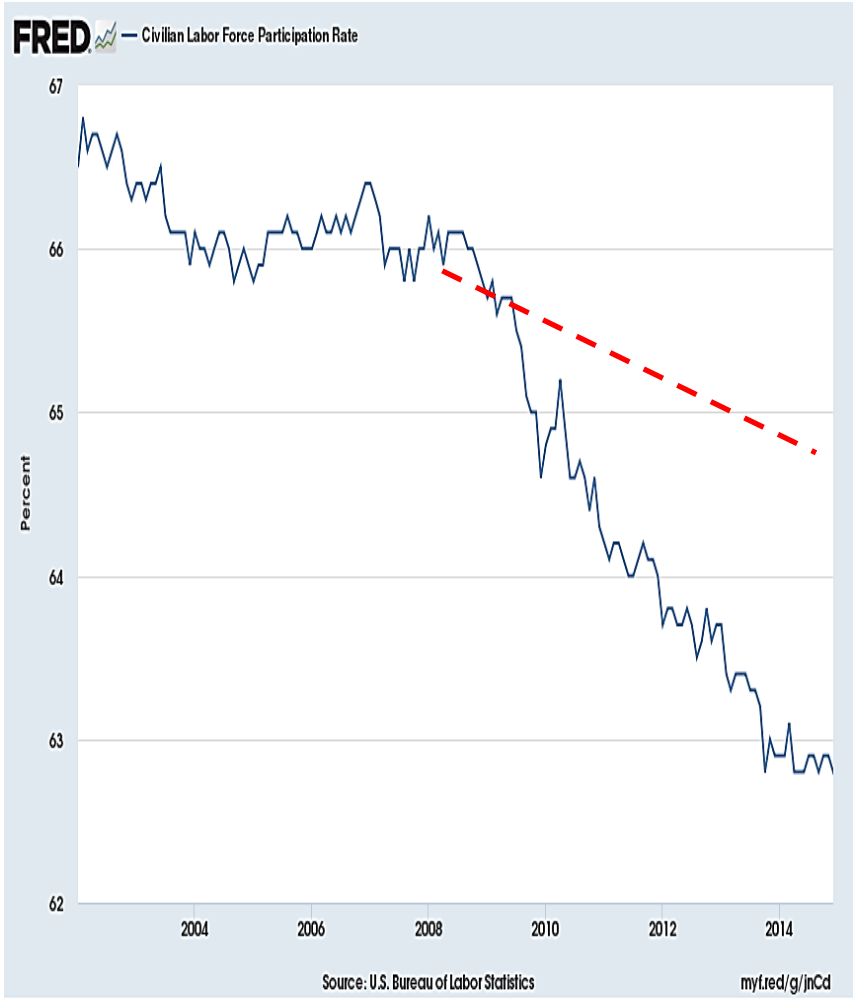
Our Models Have a Sharp Distinction between Cyclical Fluctuations and the Behavior of Potential Output

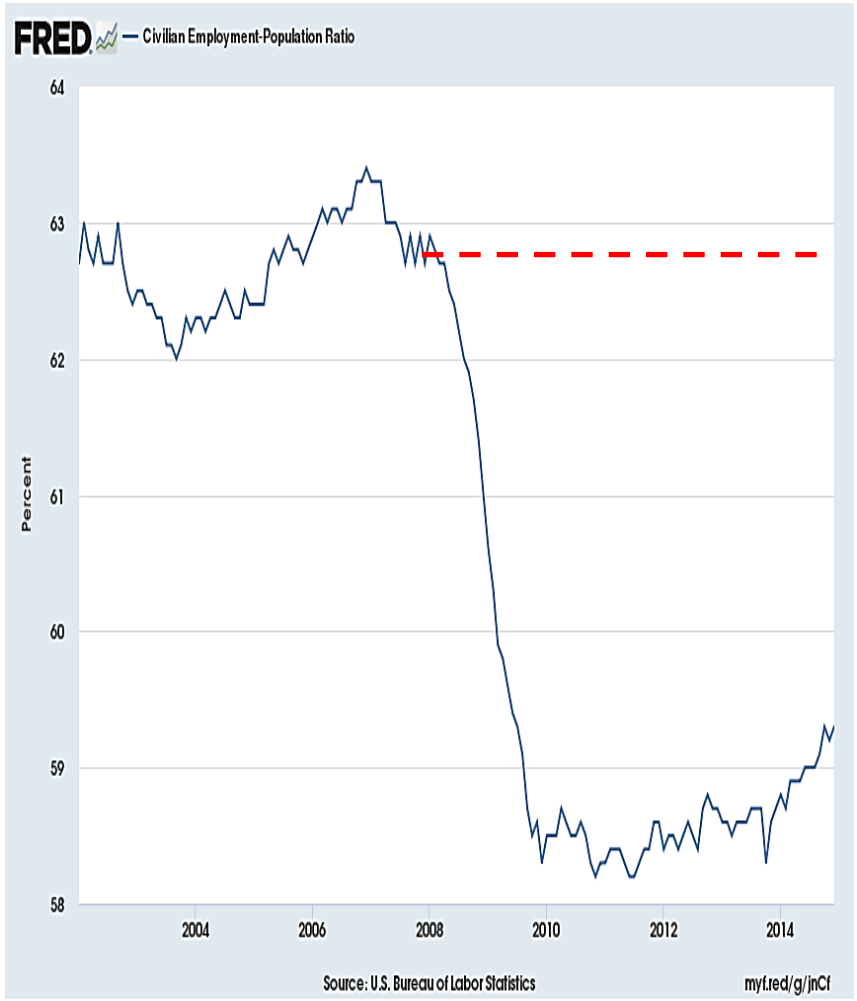
- In modeling fluctuations, we take the path of normal or potential output as exogenous.
- That is, departures of Y from $\overline{Y}$ are assumed not to affect the path of $\overline{Y}$.

Did the Great Recession Permanently Reduce GDP?



And Did It Permanently Reduce Labor Force Participation and Employment?





Possible Channels through which Cyclical Fluctuations Could Have an Important Effect on the Path of $\overline{Y}$

- Technology: A recession could cause some R&D and learning-by-doing that would otherwise occur to not take place.
- Investment: A recession could cause some investment (in physical and/or human capital) that would otherwise occur to not take place.

Possible Channels through which Cyclical Fluctuations Could Have an Important Effect on the Path of $\overline{Y}$ ***through Employment***

- Loss of skills because of potentially prolonged periods of unemployment.
- Loss of labor force attachment. (In the extreme, going on disability.)
- Stigma—firms may be reluctant to hire workers who are unemployed.
- Note: Lower normal ***employment*** may not involve a higher normal ***unemployment rate***.

The Idea That Cyclical Fluctuations Could Have Permanent (or Very Long-Term) Effects Is Known as “Hysteresis”

II. The Impact of Prolonged Recession on the Natural Rate (Ball Paper)

Why might prolonged cyclical unemployment lead to an increase in the natural rate?

- Labor supply effects: people become used to unemployment and may remain counted as unemployed, but aren't really looking for work (or putting downward pressure on wages).

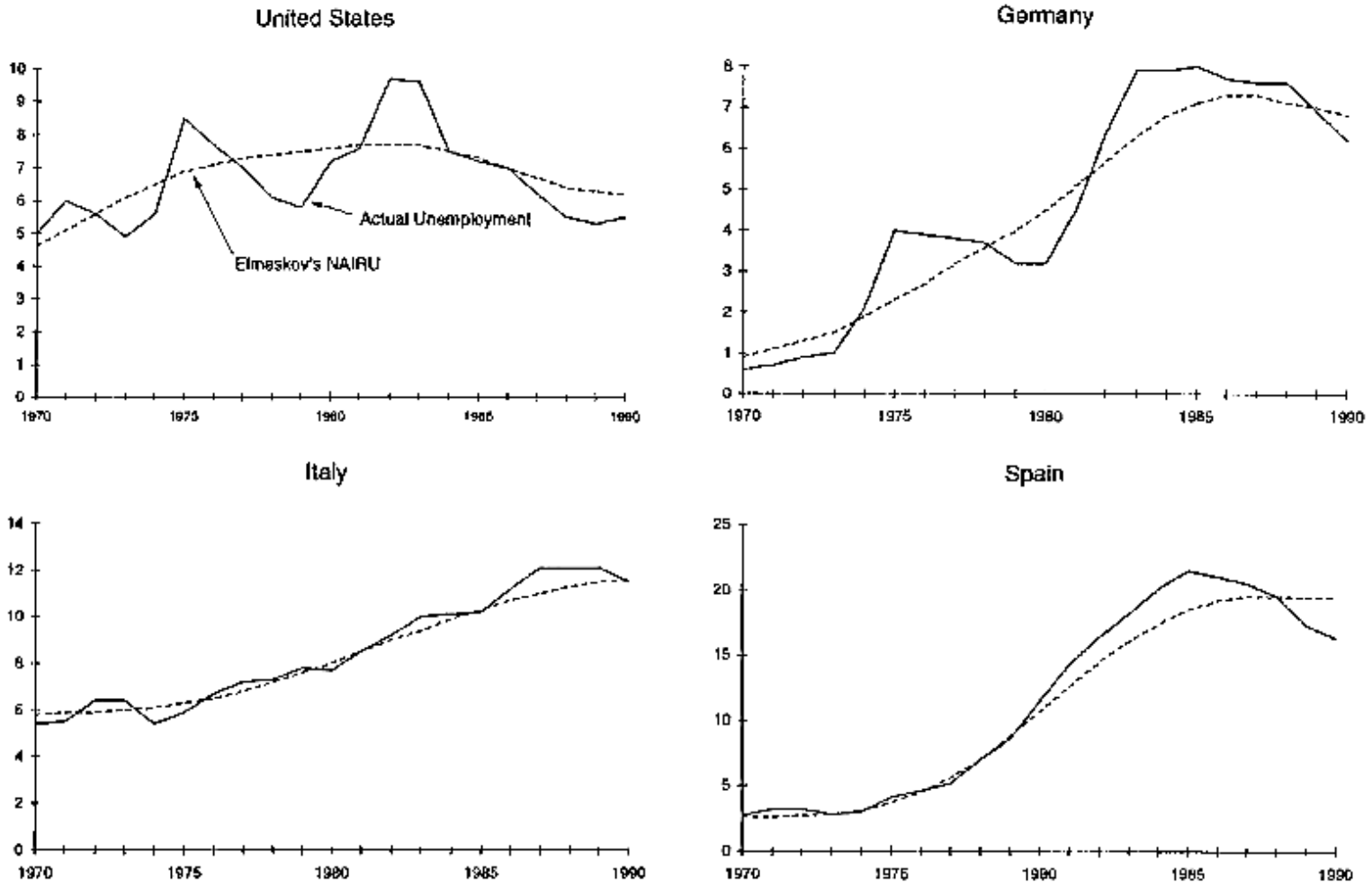
- Bargaining effects: Prolonged unemployment causes members to leave union, and so they aren't represented in bargaining.

- Labor demand effects: Firms don't want to hire long-term unemployed, so employed don't worry about losing their job and so don't moderate wage demands.

Estimating the Natural Rate of Unemployment

- Recall our model of inflation: Inflation rises is unemployment is below the natural rate and falls if unemployment is above the natural rate.
- Ball therefore estimates the natural rate empirically.
- Essentially looks at the behavior of inflation to deduce if unemployment is above or below normal.
- For this to make sense, needs to assume that supply shocks and other errors in the usual Phillips curve relationship are small.

Fig. 4.1 The Natural Rate, 1970–1990



Source: Ball, “Disinflation and the NAIRU”

Possible Explanations for the Rise in the Natural Rate

- Labor markets have become less flexible and efficient in some countries.
    - Compare ΔU* and ***change*** in flexibility.
    - Doesn't work; little change in flexibility
- Labor market inflexibility interacts with other changes, like technological change.
    - Compare ΔU* and ***level*** of flexibility.
    - Also doesn't seem to work.

Table 4.3 Labor Market Variables and the Change in the NAIRU

Dependent Variable: Change in NAIRU from 1980 to 1990

Variable	Benefit duration	Replacement ratio	Coverage of collective bargaining	Employer coordination
$\bar{R}^2$	0.125	−0.053	0.039	0.050
Variable	Union coordination	Expenditure on labor market programs	All six variables	
$\bar{R}^2$	−0.048	−0.017	0.064	

Source: Ball, "Disinflation and the NAIRU"

Table 4.1 The Sample

	Change in NAIRU 1980–90 (%)	Decrease in Inflation 1980–90 (%)	Longest Disinflation (years)
Australia	1.1	2.9	2
Austria	1.4	3.0	3
Belgium	−0.5	3.3	4
Canada	0.6	5.4	4
Denmark	2.5	9.7	6
Finland	0.5	5.5	5
France	3.7	10.2	6
Germany	2.3	2.8	5
Ireland	9.3	15.0	7
Italy	3.6	15.1	7
Japan	0.3	4.7	3
Netherlands	2.7	4.0	3
New Zealand	4.6	11.0	2
Norway	2.3	6.8	4
Portugal	−1.4	3.2	3
Spain	8.7	8.9	8
Sweden	0.4	3.2	4
Switzerland	0.9	−1.4	3
United Kingdom	1.1	8.5	3
United States	−1.4	8.1	3

Source: Ball, “Disinflation and the NAIRU”

Ball's Test of Hysteresis

- Regress change in the natural rate 1980-1990 on:
  - Decline in inflation (a measure of how aggressive the disinflation there was, and so how big the resulting recession was);
  - Length of disinflation (squared).

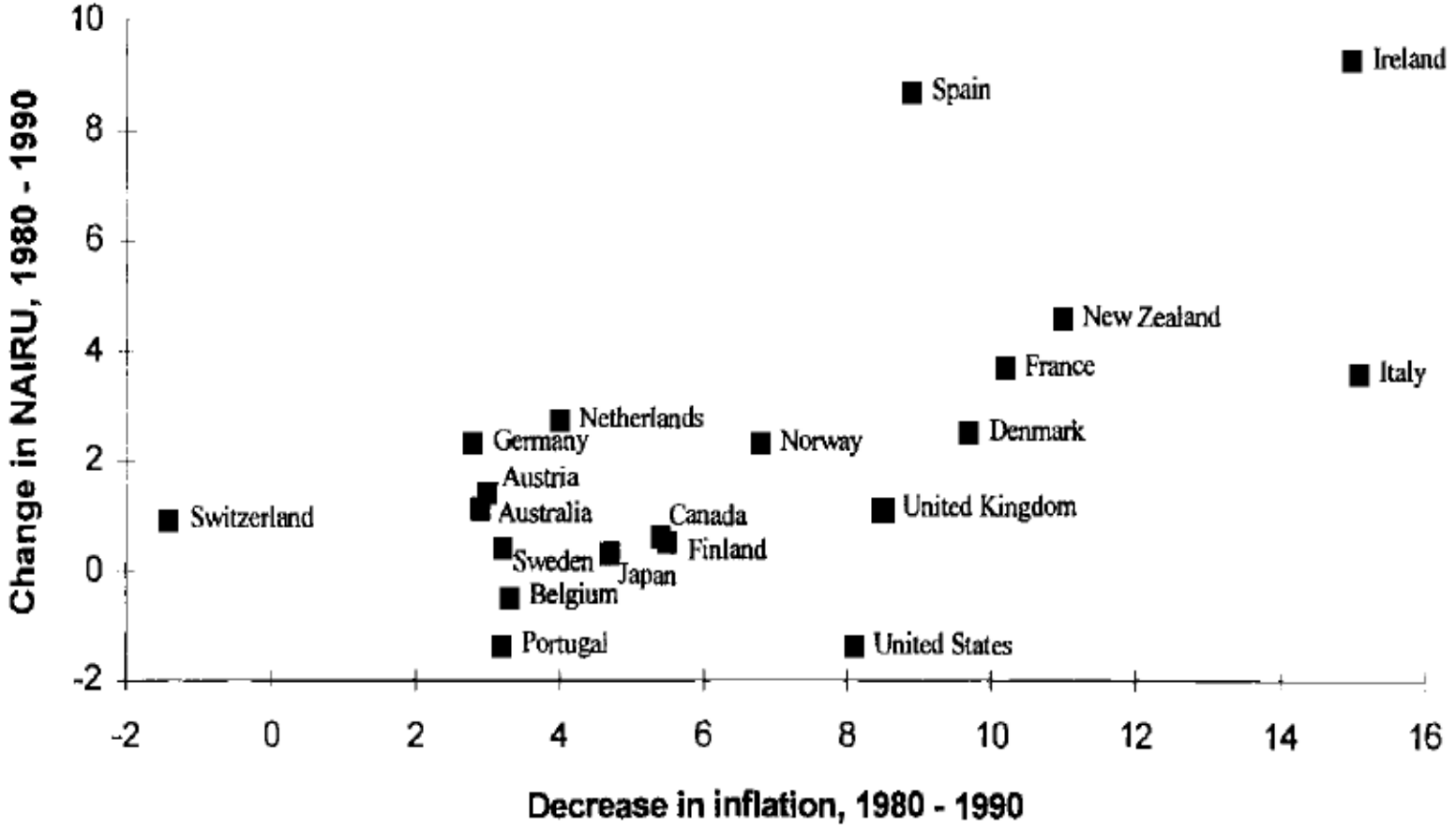
Table 4.2 **Disinflation and the Change in the NAIRU**

Dependent Variable: Change in NAIRU from 1980 to 1990			
Constant	−0.593	−0.444	−1.033
	(0.935)	(0.700)	(0.801)
Inflation decrease	0.420		0.183
	(0.121)		(0.131)
Length squared		0.123	0.095
		(0.026)	(0.033)
$\bar{R}^2$	0.367	0.528	0.552

Note: Standard errors are in parentheses.

Source: Ball, "Disinflation and the NAIRU"

Fig. 4.2 Disinflation and the change in the natural rate



Source: Ball, "Disinflation and the NAIRU"

Might There Be Omitted Variable Bias?

- Recall the regression: $\Delta\bar{u}_i = a + b\Delta\pi_i + e_i$.
- Perhaps inflation rose more in countries where the natural rate had risen more.
- If so, disinflation would be greater in countries where the natural rate had risen more—but causation would be going from the rise in the natural rate to the size of the disinflation, not vice-versa.

Test for OVB or Reverse Causation

- Regress the change in the natural rate on the inflation rate in 1980 and 1990 separately.
- If high initial π is causing rise in the natural rate, π_{1980} should enter positively, and π_{1990} should not enter.
- Ball's hysteresis story implies that the two inflation rates should enter with equal and opposite signs.

Table 4.7 The Effects of Initial and Final Inflation

	Dependent Variable: Change in NAIRU from 1980 to 1990
Constant	0.566
	(1.422)
Inflation in 1980	0.404
	(0.121)
Inflation in 1990	−0.596
	(0.203)

Source: Ball, "Disinflation and the NAIRU"

Other Possible Concerns about Ball's Empirical Work

- Only 20 observations.
- Very simple.
- Feels like there is data-mining going on.
- Measurement error?

III. Hysteresis in the Great Recession (Yagan Paper)

Yagan's Basic Idea

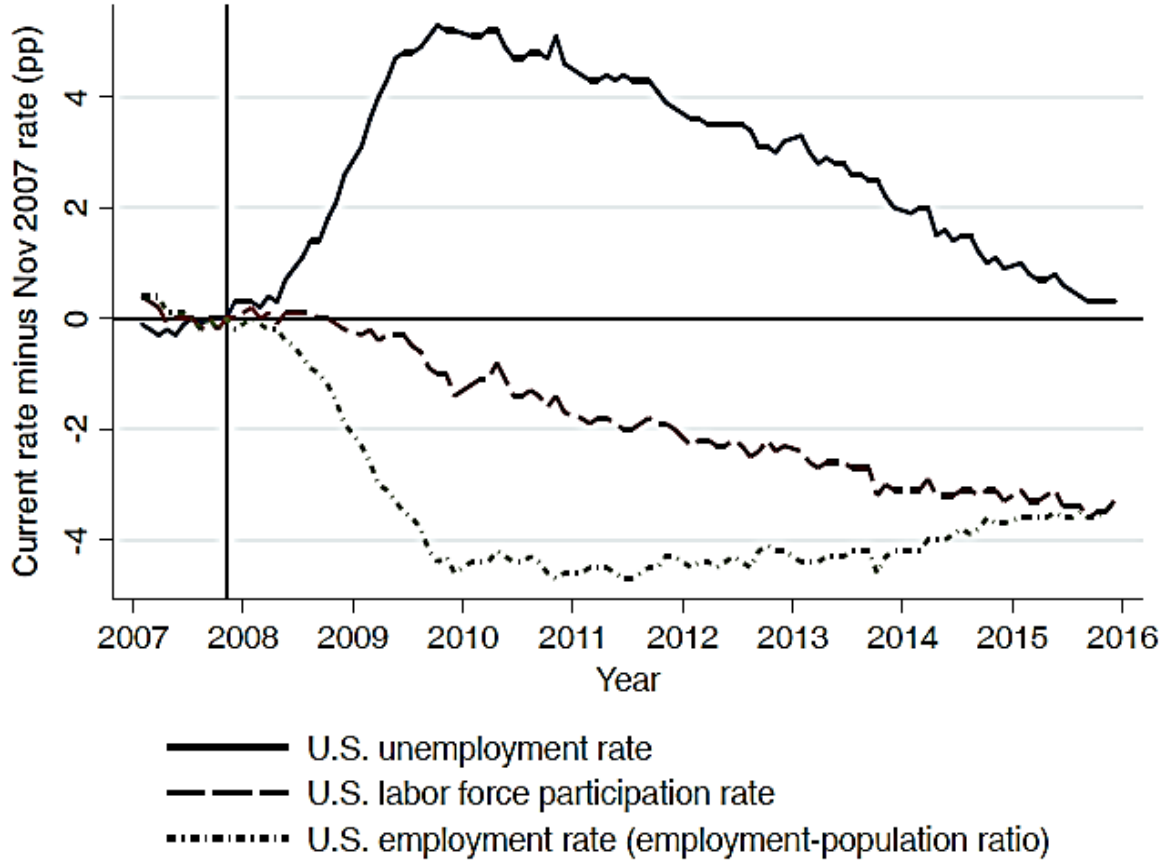
- Look at micro evidence: Were individuals in areas where unemployment rose more in the Great Recession less likely to be employed well after the end of the recession?

- The goal is to see if a cyclical fluctuation had long-lasting effects.

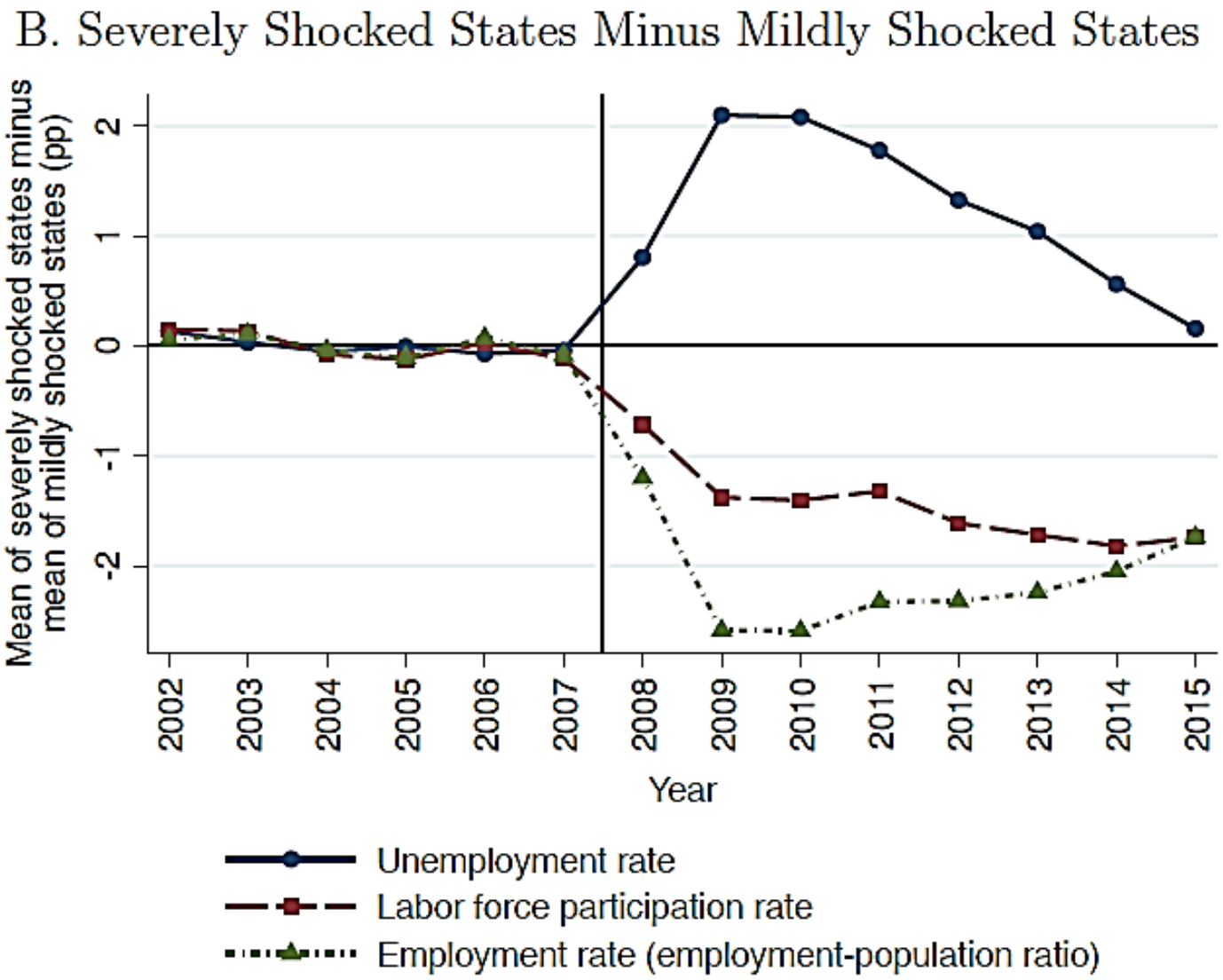
National and State-Level Patterns: National

Figure 1: Persistent Employment Rate Declines after the Great Recession

A. Current U.S. Aggregate Minus November 2007 U.S. Aggregate



National and State-Level Patterns: State-Level



Possible Sources of Omitted-Variable Bias in the State-Level Evidence (That Is, Possible Reasons It Might Not Reflect a Causal Effect of the Great Recession on Long-Term Employment)

- Maybe falls in prices in areas where unemployment rose more attracted people who weren't planning to work, such as retirees.
- Especially: Maybe places with larger rises in unemployment in the Great Recession also faced worse long-term trends.
- Similarly, maybe places with larger rises in unemployment had ***lower*** unemployment relative to the local natural rate ***before*** the start of the Great Recession.

How Does Yagan Address the Possibility of Omitted-Variable Bias?

- Especially: Look at individual-level data, and control for individuals' characteristics.
- Basic specification:

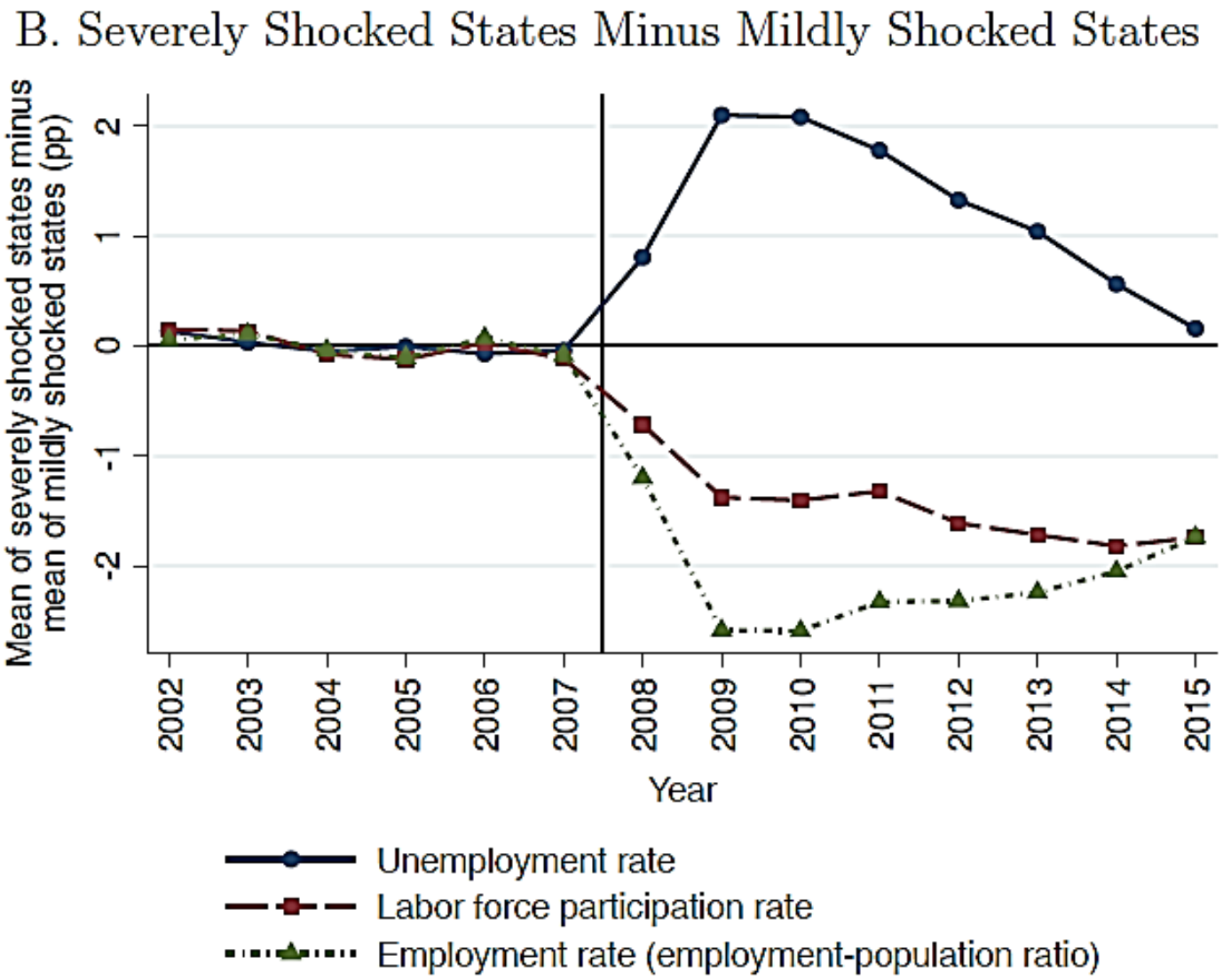
$$y_{i2015} = \beta SHOCK_{c(i2007)} + \theta_{g(i2006)} + \epsilon_{i2015}$$

where *i* indexes individuals, y_{i2015} is an outcome for individual *i* in 2015 (usually whether they were employed at all in 2015), $SHOCK_{c(i2007)}$ is the rise in unemployment in individual *i*'s area from 2007 to 2009, and $\theta_{g(i2006)}$ reflects controls for individual characteristics (such as age, education, industry in 2007).

How Else Does Yagan Address the Possibility of Omitted-Variable Bias?

- Look at similar individuals employed at the same retail chain (such as Safeway or Walmart) in areas subject to different Great Recession shocks.
- Look at "pre-trends": Were labor market outcomes before the Great Recession different in areas with small and large Great Recession shocks?
- Look at the behavior of the ***unemployment rate*** (as opposed to ***employment***).

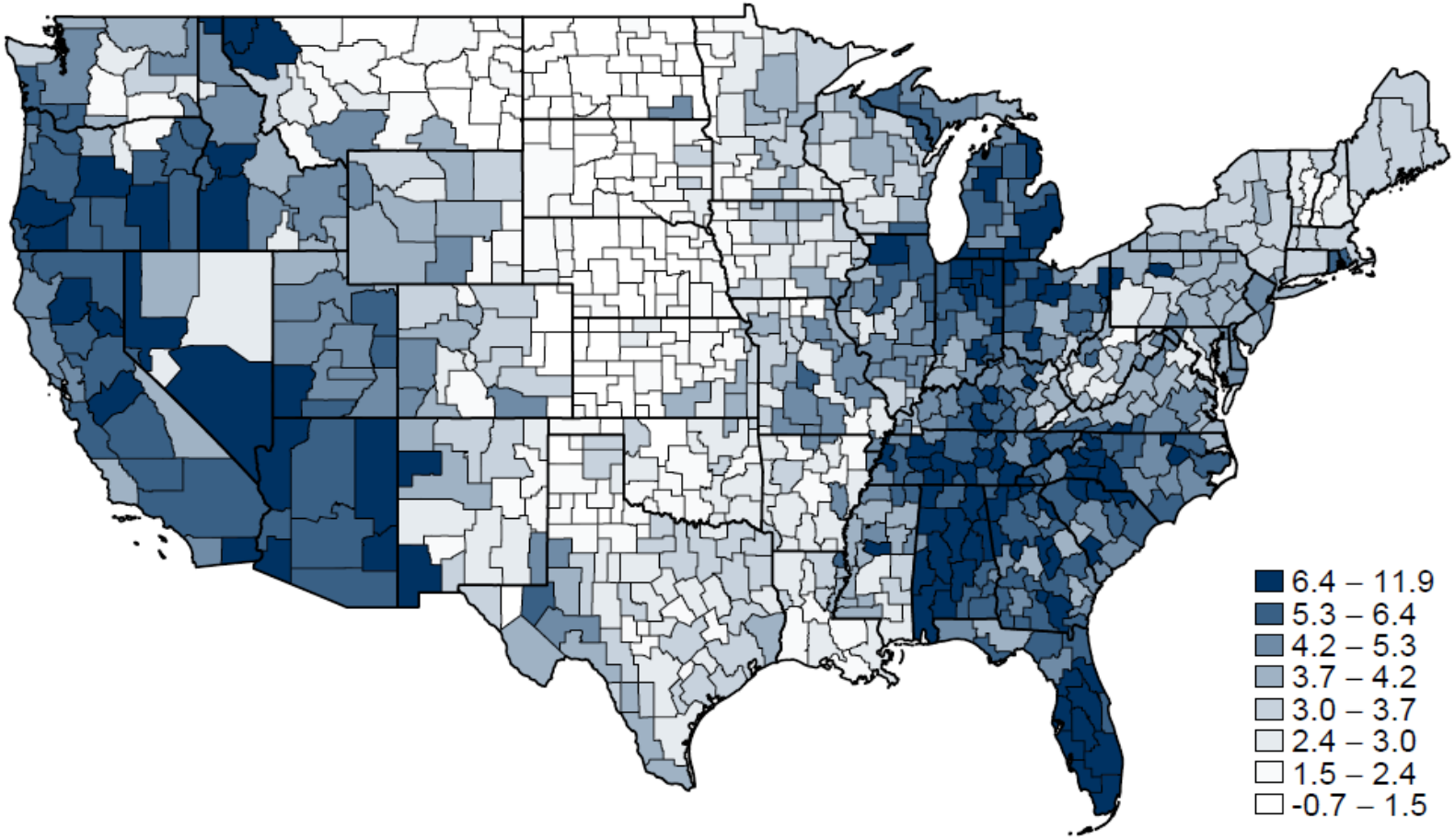
National and State-Level Patterns: State-Level



Data

- From “anonymized tax records,” 2% sample of Americans aged 30-49 on 1/1/2007.
- N = 1.4 million!
- Great Recession unemployment shocks for ≈ 700 “Commuting Zones.”

Figure 3: Great Recession Local Shocks

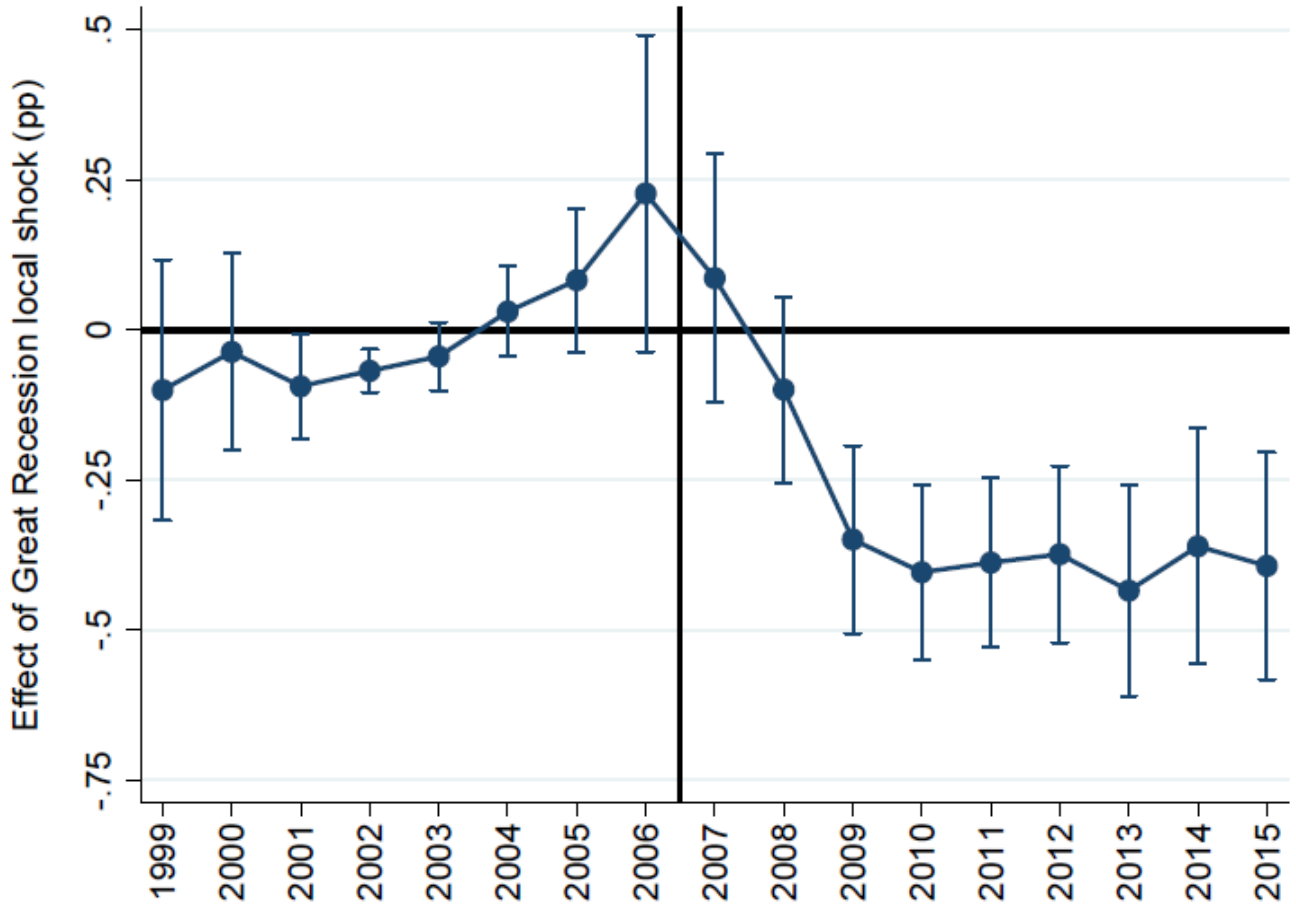


Notes: This map depicts unweighted octiles (divisions by increments of 12.5 percentiles) of Great Recession local shocks across Commuting Zones (CZs). CZs span the entire United States and are collections of counties that share strong commuting ties. Each CZ's shock equals the CZ's 2009 LAUS unemployment rate minus the CZ's 2007 LAUS unemployment rate. In the individual-level analysis, I assign each individual to the Great Recession local shock of the individual's January 2007 CZ.

Main Results

Figure 4: Employment and Earnings Impacts of Great Recession Local Shocks

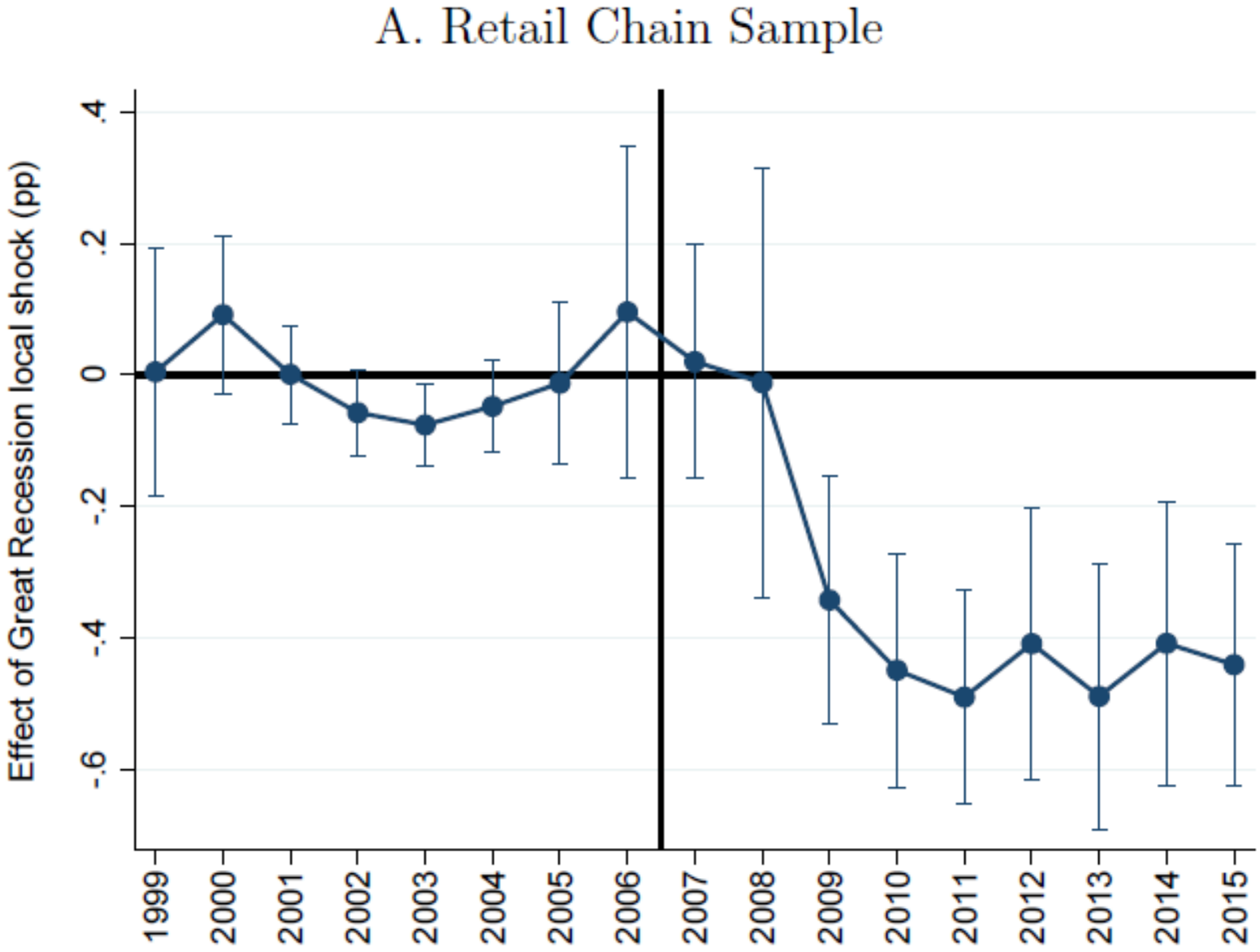
A. Employment Impact of Great Recession Local Shocks



Main Results

2015 Impacts of Great Recession Local Shocks

Outcome relative to pre-2007 mean:	Employed in 2015						
	(pp) (1)	(pp) (2)	(pp) (3)	(pp) (4)	(pp) (5)	(pp) (6)	(pp) (7)
Great Recession local shock	-0.412	-0.425	-0.417	-0.393		-0.366	-0.364
	(0.112)	(0.112)	(0.099)	(0.097)		(0.089)	(0.089)
Most severely shocked quintile					-1.746		
					(0.471)		
Fourth shock quintile					-1.144		
					(0.434)		
Third shock quintile					-0.793		
					(0.356)		
Second shock quintile					-0.181		
					(0.320)		
Age FEs		X					
Age-Earnings FEs			X				
Age-Earnings-Industry FEs				X	X	X	X
Unemployment persistence in 2007 CZ						X	
Unemployment persistence in 2015 CZ							X
N	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974	1,357,974
R^2	0.00	0.00	0.01	0.07	0.07	0.07	0.07
Outcome mean	-7.23	-7.23	-7.23	-7.23	-7.23	-7.23	-7.23
Absolute outcome mean	79.1	79.1	79.1	79.1	79.1	79.1	79.1
Std. dev. of Great Recession local shocks	1.49	1.49	1.49	1.49	1.49	1.49	1.49
Interquartile range of G.R. local shocks	2.31	2.31	2.31	2.31	2.31	2.31	2.31


A. Retail Chain Sample
Effect of Great Recession local shock (pp)
.4
.2
0
-.2
-.4
-.6
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

Yagan's Illustrative Extrapolation

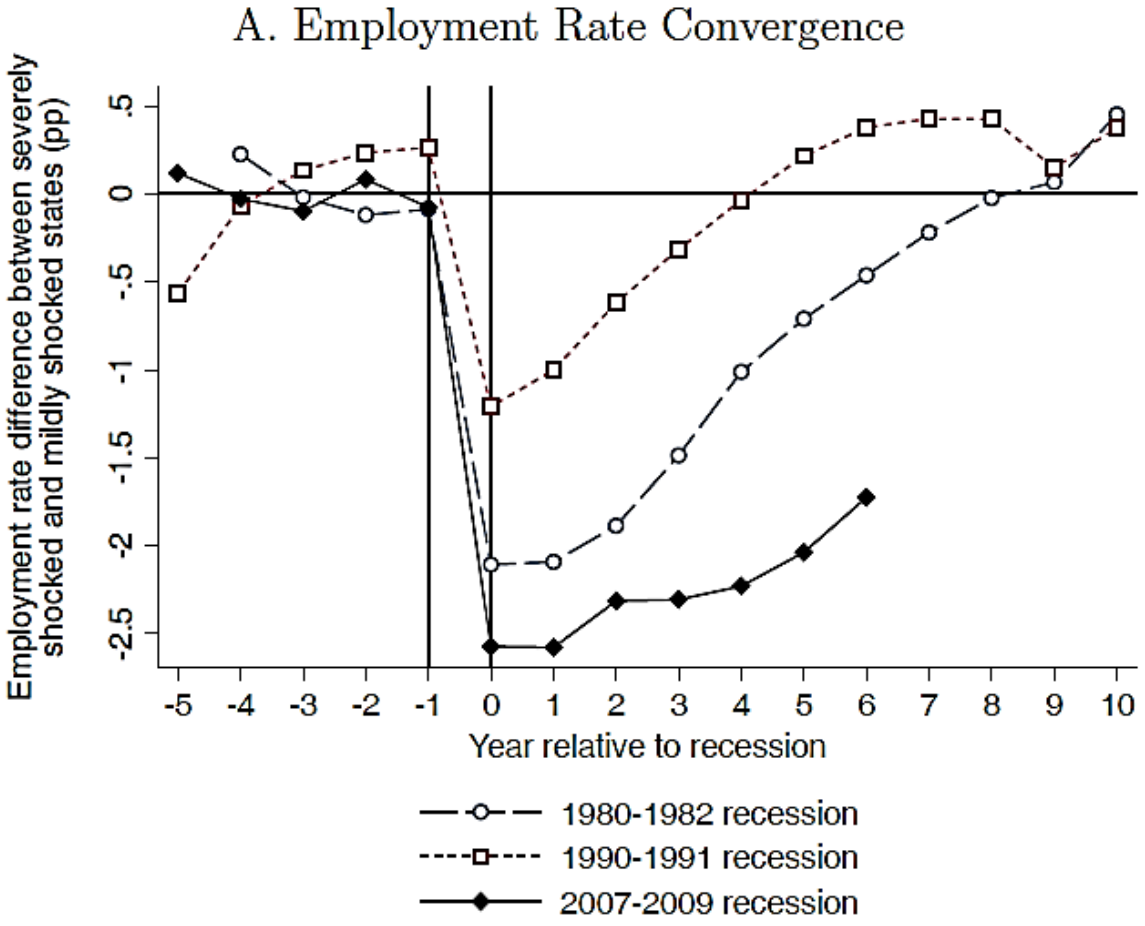
- "[T]he aggregate U.S. unemployment rate increased 4:63 percentage points from 2007 to 2009 …. Table 2 column 4 reported that exposure to a one-percentage-point-higher local unemployment spike 2007-2009 caused a 0:393 percentage-point decline in any 2015 employment. Based on these two inputs, simple extrapolation suggests that the Great Recession caused a 1.82 (= 4:63 x 0:393) percentage-point decline in the U.S. working-age employment rate."

Mechanisms

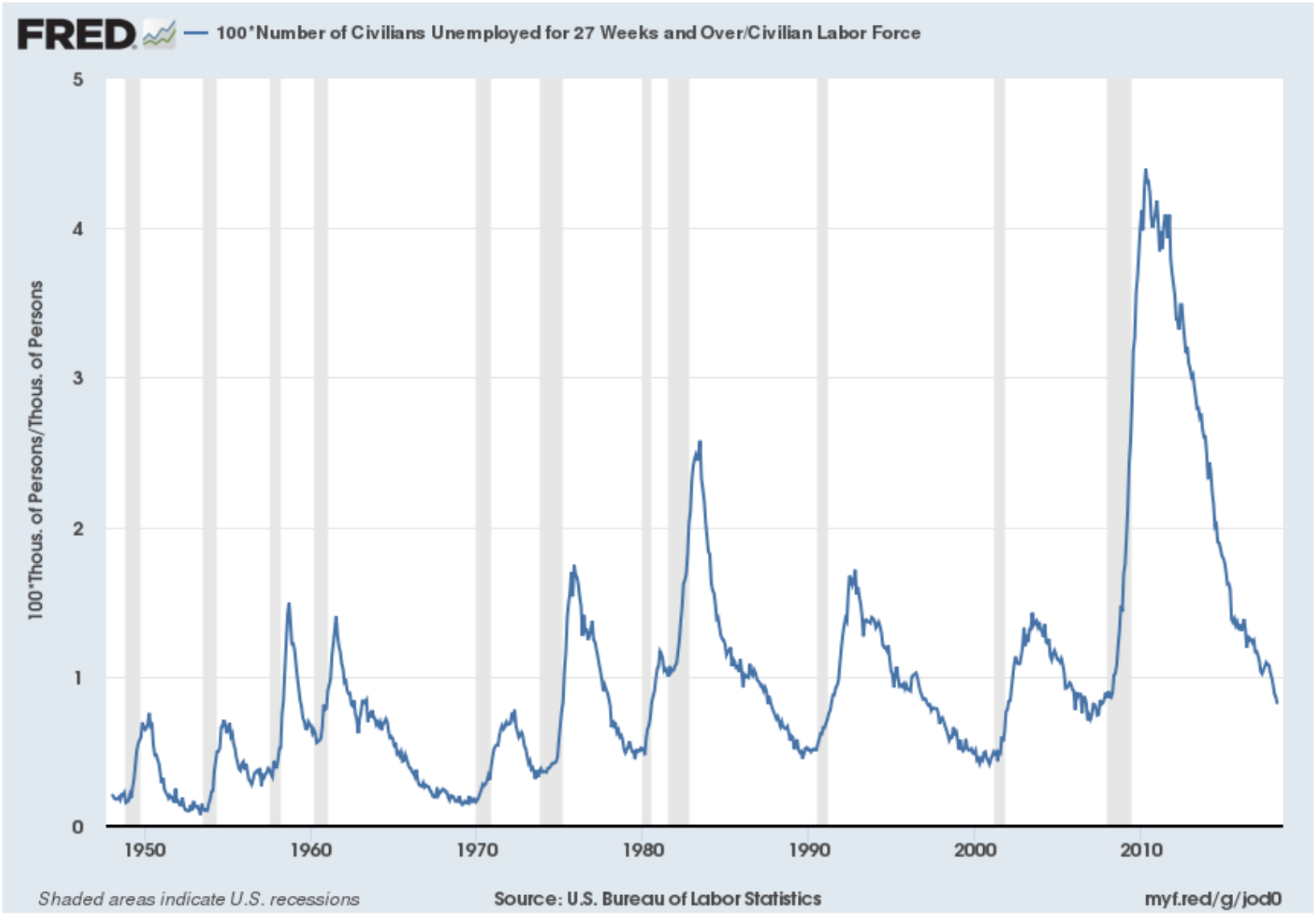
- Yagan presents evidence that his results are not driven by lack of migration, loss of "job-specific rents," or loss of firm-specific human capital.
- He argues that the evidence suggests only a small role for enrollment in Disability Insurance.
- "Two other candidate mechanisms—general human capital decay during long non-employment spells and persistently low labor demand—are each consistent with the results."

How Should We Interpret the Fact That We Do Not Observe Similar Patterns Following Other Recessions?

Figure 2: Great Recession Local Convergence in Comparison to History



Long-Term Unemployment (% of Labor Force)



IV. Concluding Comments

“Long-Lasting” Does Not Necessarily Mean “Permanent”

- “Finally, employment hysteresis through 2015 does not imply employment hysteresis forever, and it will be valuable to estimate and explain subsequent dynamics. For example, the age-25-54 U.S. headline employment rate rose 0.7 percentage points from December 2015 to December 2016, primarily via labor force entry. This upward trend is consistent with the potential for employment recovery.” (Yagan, p. 35.)

The Data through March 2018

The Data for People of Prime Working Age

How Might Policymakers Deal with Hysteresis?

- Perhaps getting cyclical unemployment down quickly can prevent a rise in the natural rate.

- Perhaps a period of particularly low unemployment (an inflationary boom) can have hysteresis effect in the good direction (lowering the NAIRU).

A Question to Think about for Next Time

- What is the intellectual content of the Galbraith reading?
- That is, how would you translate the reading into the language of hypotheses and evidence?