Local Labor Demand Shocks

UC3M, Labor Economics
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Labor demand shocks

Shocks in local labor demand:

- How do *area-level* employment, wages or prices respond to a temporary change in local labor demand? Are those effects transitory or persistent?
- Via which mechanisms do local labor markets adjust? Are population movements between areas the main adjustment mechanism?
- How are *individual* workers, and different groups of workers affected by local demand shocks?

Content

Classic evidence on the area-level response to local demand shocks:

- Bartik (1991)
- Blanchard and Katz (1992)

A model of local labor markets:

- Moretti (2012)

Response to specific demand shocks:

- Construction of the Trans-Alaska Pipeline System
- The Great Recession (U.S., plus some evidence for Spain)

Evidence on the mechanisms via which local labor markets and workers adjust to local shocks.

Bartik (1991)

Bartik (1991), "Who Who Benefits from State and Local Economic Development Policies?", Upjohn Press

Bartik studies the response of local labor markets (MSAs) in U.S. to local demand shocks. Conceptual points:

- Measures size of demand shock by local employment growth, regardless of source of demand shock (motivated in Appendix 4.1)
- Alternatively, construct "Bartik instrument" to isolate variation in employment growth due to demand shocks (explained in Appendix 4.2)
- But notes that transitory variation in local employment mostly caused by shifts in labor demand (not shifts in labor supply)

Bartik (1991)

Estimating equation

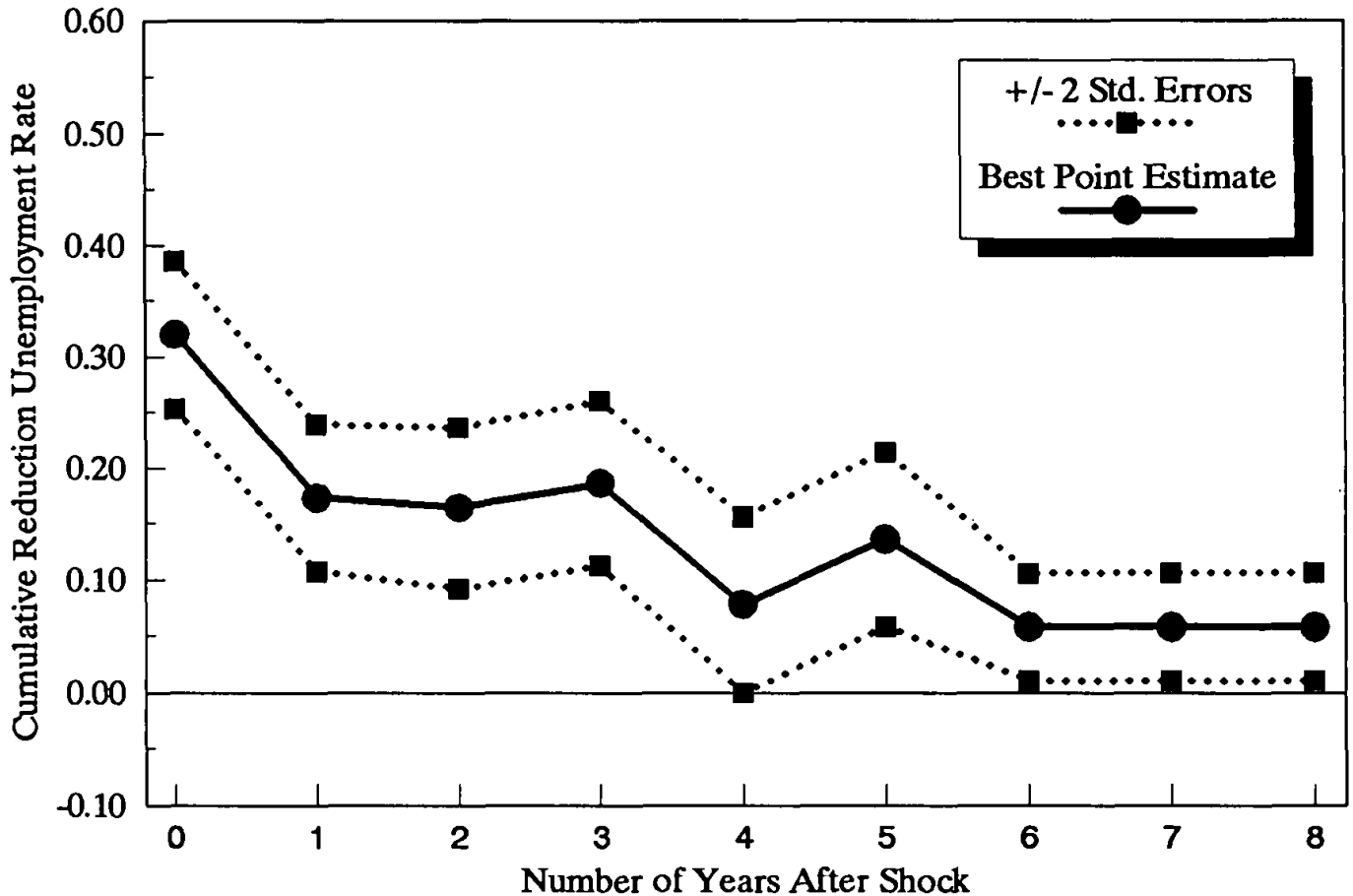
$$\Delta Y_{mt} = \mu_t + \beta_0 \Delta E_{mt} + \beta_1 \Delta E_{mt-1} + ... + \beta_8 \Delta E_{mt-8} + \varepsilon_{mt}$$

where ΔY_{mt} is change in outcome in region m at time t, μ_t are time fixed effects, ΔE_{mt} is employment growth, ε_{mt} is an error term,

- In some specifications, instruments for local employment change ΔE_{mt} with "Bartik instrument"
- Studies response in local unemployment rate, employment rate, prices and real wages ($\rightarrow$ more in Bartik's book)

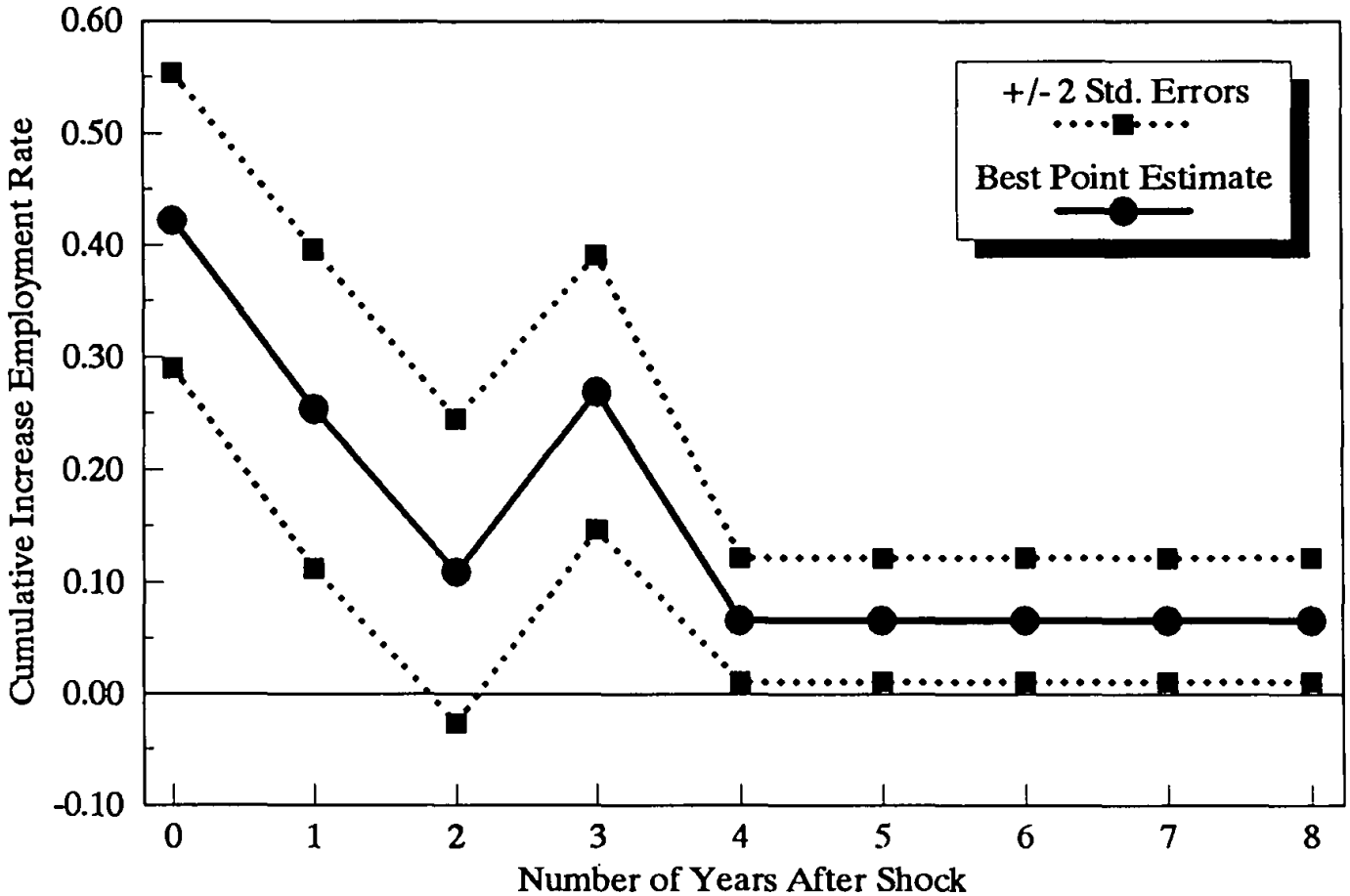
Bartik (1991)

Figure 4.1
Estimated Cumulative Effects of a 1 Percent Shock to Local Employment on Average Local Unemployment Rate, Using Aggregate Data



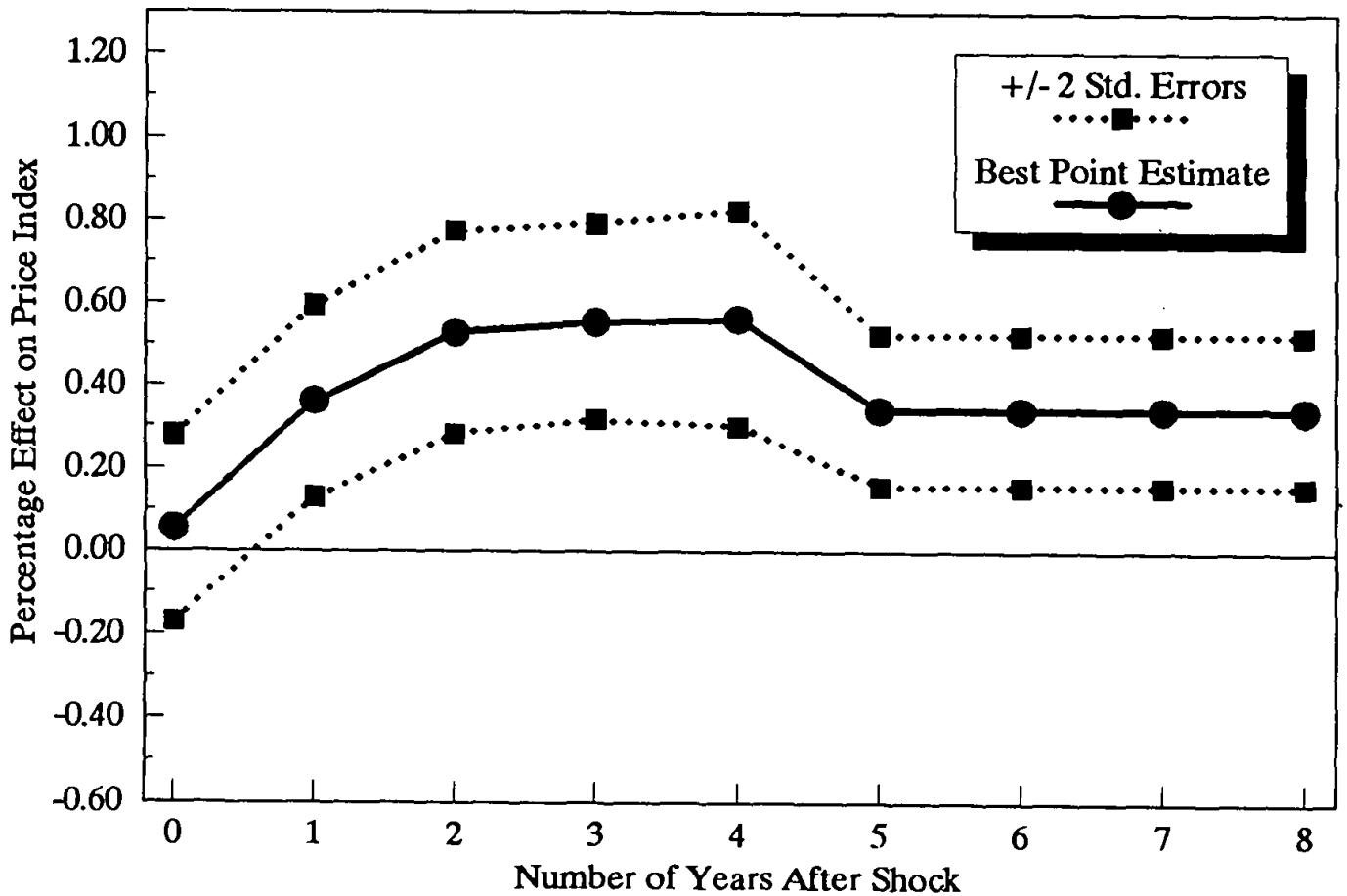
Bartik (1991)

Figure 4.2
Estimated Cumulative Effects of a 1 Percent Shock to Local Employment on Local Employment Rate, Using Micro Data



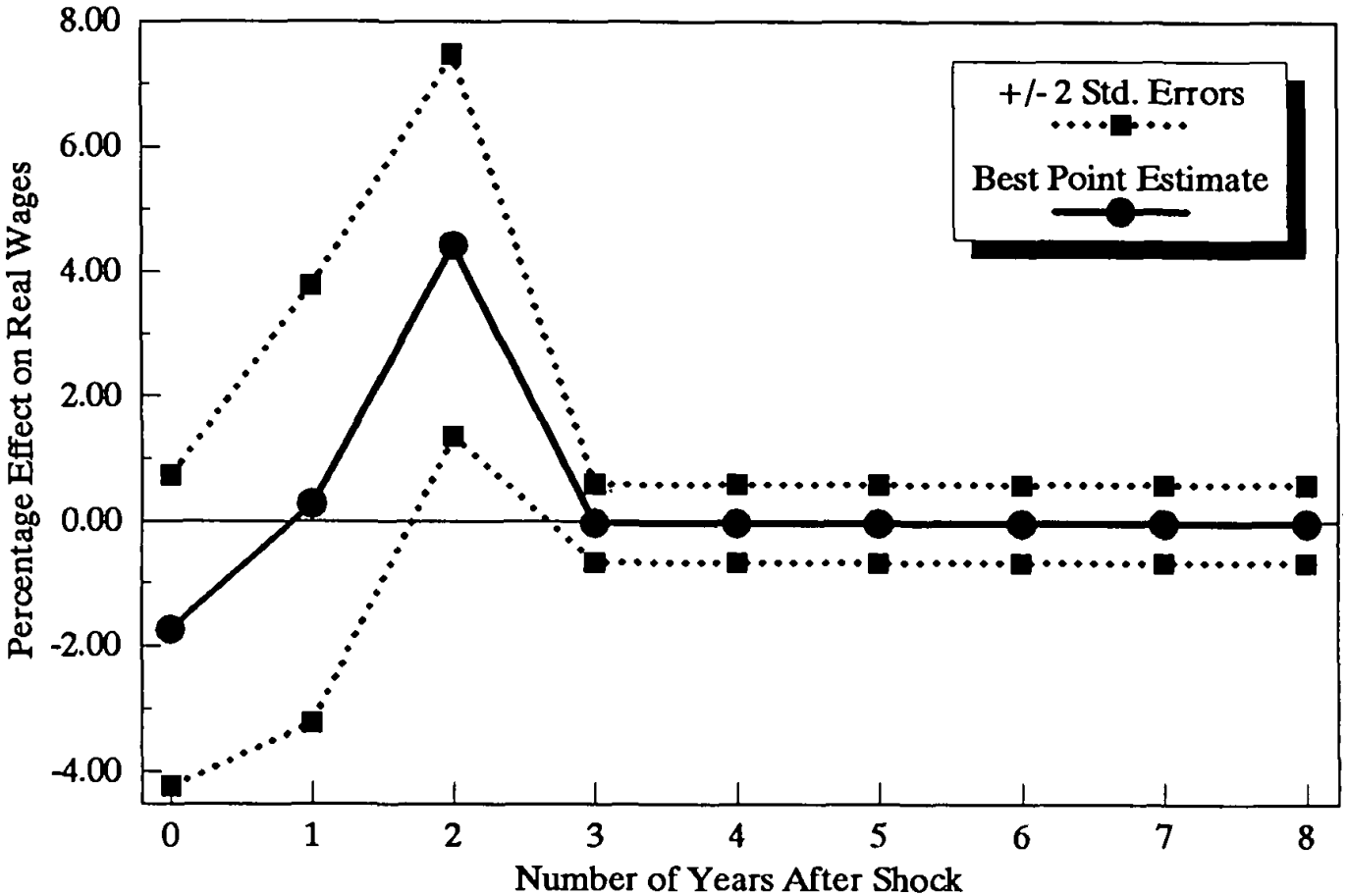
Bartik (1991)

Figure 5.1
Estimates of the Cumulative Percentage Effects of a 1 Percent Once-and-for-All Local Employment Shock on the MSA Shelter Price Index



Bartik (1991)

Figure 6.1
Percentage Effects of Demand-Induced 1 Percent Once-and-for-All Local Employment Shock on Real Wages, Micro Sample



Bartik (1991)

Bartik (1991)

- Argues that short-run local employment changes are mostly due to demand shocks

Main findings:

- Strong short-run impact
- Quick recovery of local labor markets
- But persistent (small) effects in employment rate, unemployment rate, prices. For example, 1-percent employment change reduces area's long-run unemployment rate by 0.07 percent.

Blanchard and Katz (1992)

Blanchard and Katz (1992), "Regional Evolutions." Brookings Papers on Economic Activity

Question:

- How do U.S. states adjust to adverse economic shocks – more specifically, local *demand* shocks?
- Considers joint movement of employment, unemployment, wages and prices

Empirical approach:

- Vector auto-regressions (VAR) on state-year level
- Assume that most of transitory variation in employment are caused by shifts in labor demand (not shifts in labor supply)
- Alternatively, construct observable demand shocks (defense spending or *Bartik instrument*)

Blanchard and Katz (1992)

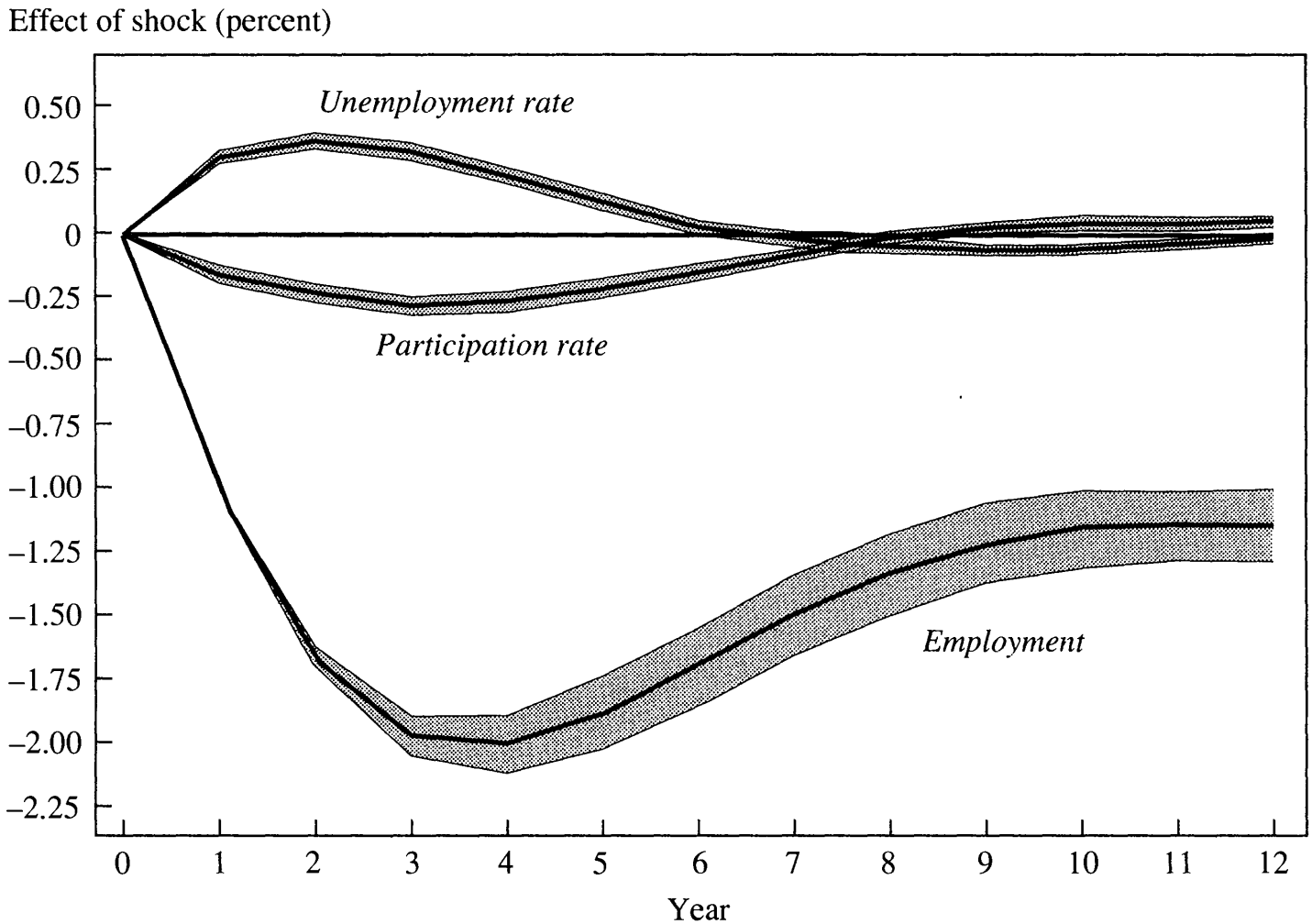
Estimate vector auto-regressions (VAR) on state-year level

$$\Delta e_{it} = \alpha_{i10} + \alpha_{i11}(L)\Delta e_{i,t-1} + \alpha_{i12}(L) le_{i,t-1} + \alpha_{i13}(L) lp_{i,t-1} + \varepsilon_{iet}$$
$$le_{it} = \alpha_{i20} + \alpha_{i21}(L)\Delta e_{it} + \alpha_{i22}(L) le_{i,t-1} + \alpha_{i23}(L) lp_{i,t-1} + \varepsilon_{iut}$$
$$lp_{it} = \alpha_{i30} + \alpha_{i31}(L)\Delta e_{it} + \alpha_{32}(L) le_{i,t-1} + \alpha_{i33}(L) lp_{i,t-1} + \varepsilon_{ipt}$$

where Δe_i is first-differenced of log employment in state i (as deviation from U.S. aggregate employment), le_i is log ratio of employment to labor force, lp_i is log ratio of labor force to population (can indirectly characterize other employment outcomes)

Blanchard and Katz (1992)

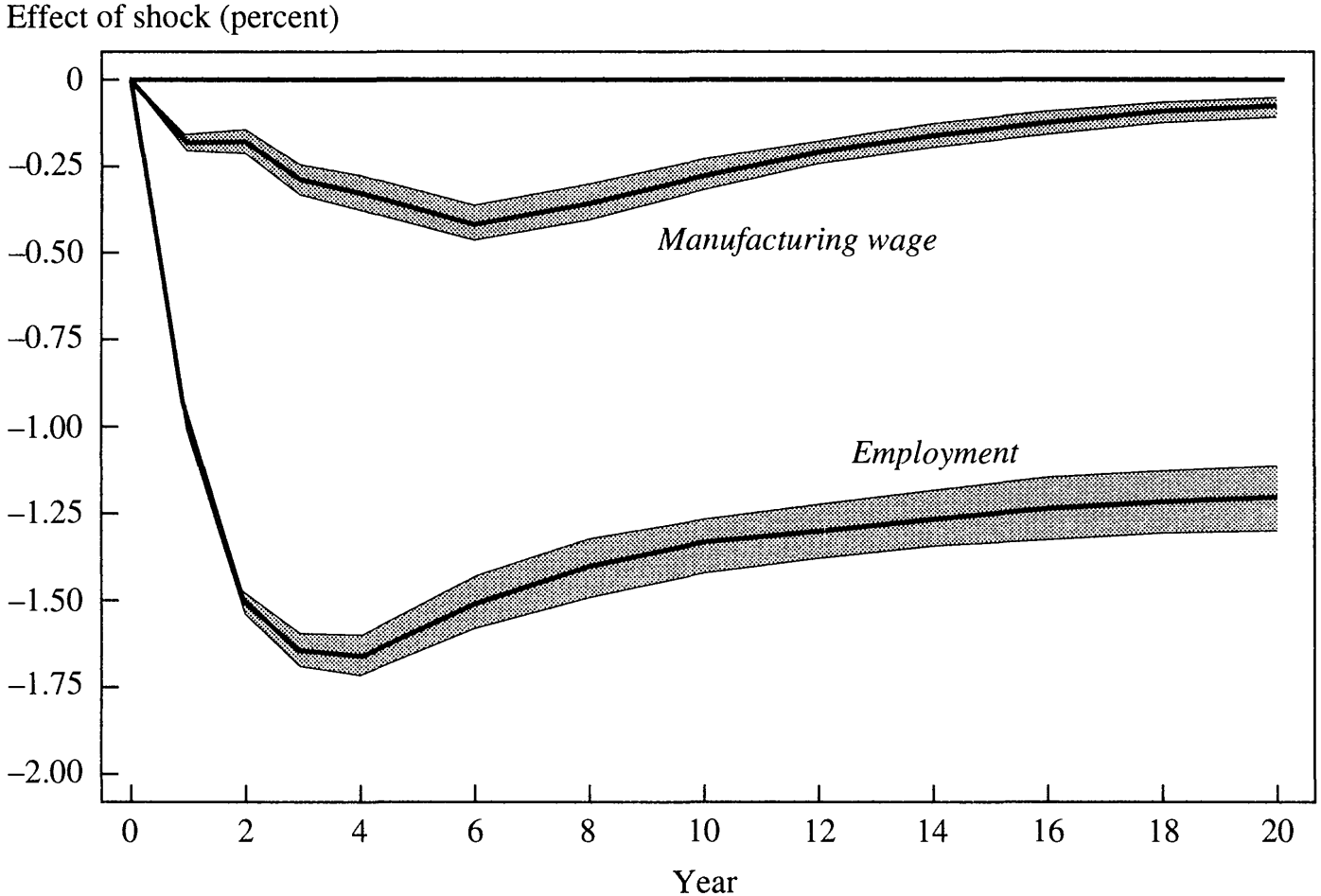
Figure 7. Response of Employment, Unemployment, and Labor Force Participation to an Employment Shock



Source: Authors' calculations based on the system of equations described in the text, using data described in the appendix. All 51 states are used in the estimation. The shock is a −1 percent shock to employment. Bands of one standard error are shown around each line.

Blanchard and Katz (1992)

Figure 11. Response of Employment and Manufacturing Wages to an Employment Shock



Source: Authors' calculations using data described in the appendix. The shock is a −1 percent shock to employment. Bands of one standard error are shown around each line.

Blanchard and Katz (1992)

Blanchard finds similar short-run effects as Bartik (1991), but much slower adjustment in local wages:

- Shocks in local employment are permanent (growth recovers, but not levels)
- Shocks in local unemployment rates are not permanent (recovery within half a decade)
- Shocks in local wages are semi-permanent (recovery within a decade)

Main mechanism: Labor mobility

> *"The conclusion favoring perfectly elastic long-run labor supply is inevitable, given the behavior of the three variables If employment in a state can change a great deal and tends to remain at the new level, but unemployment and labor force participation return to normal, then no other possible conclusion exists but that the population has changed to accommodate the higher employment.:*

Greenaway-McGrevy and Hood (2016)

Greenaway-McGrevy and Hood (2016), "Worker migration or job creation? Persistent shocks and regional recoveries", Journal of Urban Economics

- Compare role of job creation vs. labor mobility in local recovery process
- Note that local demand shocks are serially correlated:

  "If the structural shocks identified in the empirical model are persistent—in the sense that the economic shock occurs over several time periods—it is difficult to disentangle the increase in employment due to the endogenous labor demand response from the ongoing exogenous decrease in employment due to the original downturn."

- Estimates by Blanchard and Katz (1992) then partly reflect ongoing job destruction from original downturn (Jäger, Ruist and Stuhler 2018, make similar argument in migration context)

Greenaway-McGrevy and Hood (2016)

Greenaway-McGrevy and Hood (2016) consider similar data as Blanchard and Katz (1992), but

- Use Bartik instrument to isolate labor demand shocks
- Parametrize serial dependence in demand shock in their empirical model

Main findings:

- Find only limited population response. Instead, local job creation (i.e., a labor demand response on the firm side) is main driver of local recoveries in the U.S.
- Find slower local recovery than Blanchard and Katz, extending over more than 20 years.
- Because the migration response is limited and the labor demand response is protracted, local policies and shocks can have large and long-lasting effects on local residents

Greenaway-McGrevy and Hood (2016)

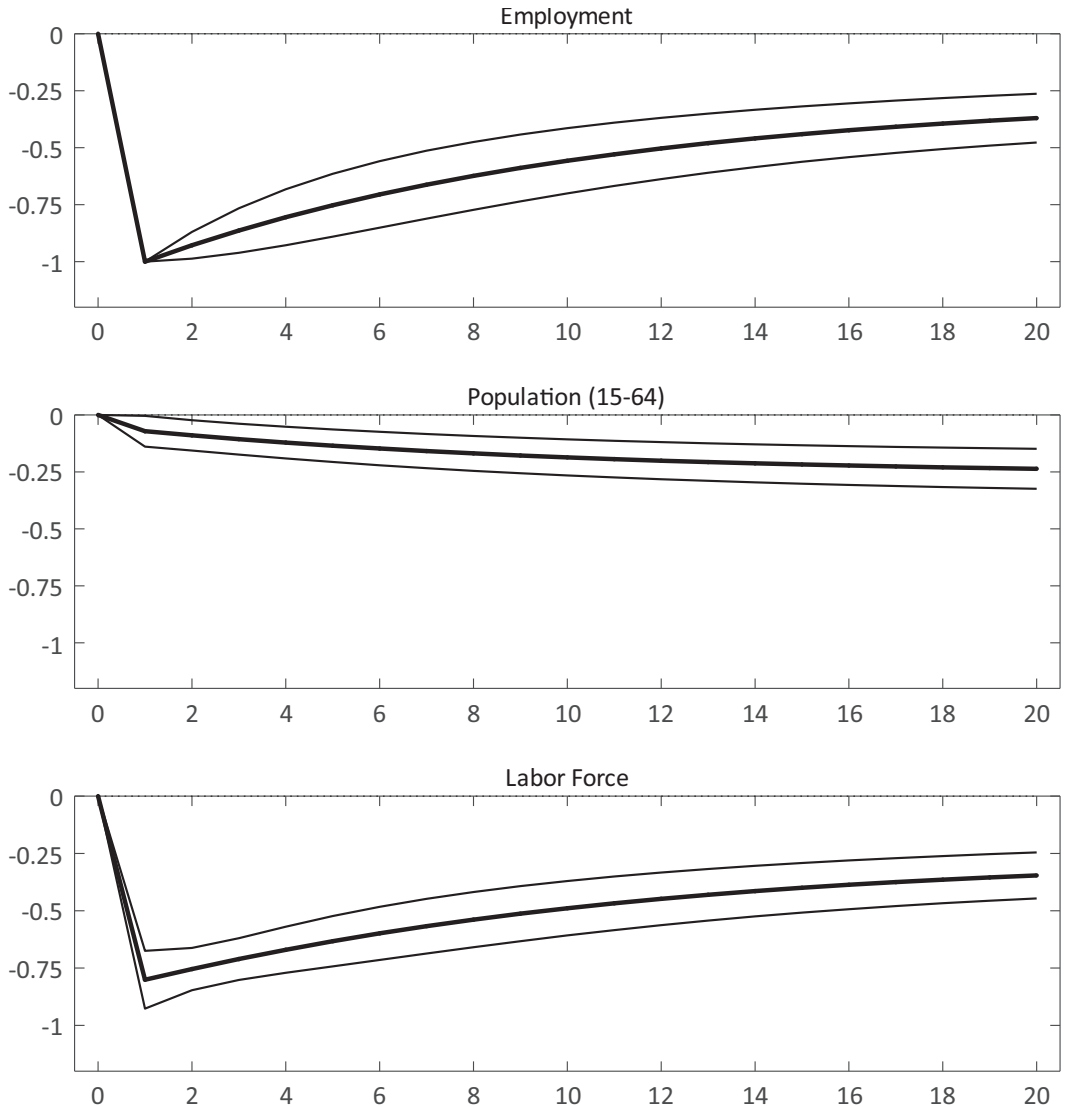


Fig. 5. Responses to a serially uncorrelated −1% labor demand shock using Bartik shift shares. Error bands represent 90% confidence intervals.

A model of local labor markets

Moretti (2011), "Local Labor Markets", Handbook of Labor Economics (editors: O. Ashenfelter and D. Card)

A model of local labor markets. Consider two "cities":

- Each city is a competitive economy that produces a single internationally traded good using labor, land and a local amenity, with constant returns to scale
- Workers' indirect utility depends on nominal wages, cost of housing and local amenities
- Labor is perfectly mobile so that the local labor supply is infinitely elastic
- Land is the only immobile factor and its supply is fixed

Difference to Rosen-Roback (1979, 1982) framework:

- Idiosyncratic locational preferences, housing supply not fixed, shocks not fully capitalized into house prices

Labor Supply

Indirect utility of worker i locating in city c:

$$U_{ic} = w_c - r_c + A_c + e_{ic}$$

where w_c is nominal log wage, r_c housing costs, A_c local amenities,

$$e_{ia} - e_{ib} \sim U[-s, s]$$

are idiosyncratic preferences between city a and city b

Equilibrium conditions

Relative labor supply:

In eq. marginal worker needs to be indifferent between cities, $e_{ia} - e_{ib} = (w_b - r_b) - (w_a - r_a) + (A_b - A_a)$. So relative labor supply given by

$$w_b - w_a = (r_b - r_a) + (A_a - A_b) + s\frac{N_b - N_a}{N}$$

where N_c is log of number of workers in city c, $N = N_a + N_b$ assumed fixed.

Production

Production function of tradable good (assume price P=1):

$$y_c = x_c n_c^h k_c^{1-h}$$

with capital perfectly elastic. In logs ...

$$ln\, y_c = X_c + hN_c + (1-h)K_c$$

Labor demand:

Perf. competition, capital infinitely supplied at price i, factor labor receives marginal productivity:

$$w_c = X_c - (1-h)N_c + (1-h)K_c + ln\, h$$

Equilibrium conditions

Relative housing demand:

Assume each worker consumes one unit of housing, so (relative) housing demand is equal to (relative) labor supply.

$$r_b = r_a + (w_b - w_a) + (A_b - A_a) - s\frac{N_b - N_a}{N}$$

Housing supply:

$$r_c = z + \lambda_c N_c$$

If $\lambda_c = 0$ then housing supply is perfectly elastic.

Labor Demand Shock

Increase in productivity in city b of $X_{b2} - X_{b1} = \Delta > 0$.

- **Change in nominal wages** in city b:

$$w_{b2} - w_{b1} = \Delta$$

  is independent of employment or housing response

- **Change in employment:**

$$N_{b2} - N_{b1} = \frac{N}{N(\lambda_b + \lambda_a) + 2s}\Delta \geq 0$$

  because some workers are attracted by higher wages

- **Change in house prices:**

$$r_{b2} - r_{b1} \quad = \quad \lambda_b \frac{N}{N(\lambda_b + \lambda_a) + 2s}\Delta \geq 0$$

  so incidence of shock shared between workers and landowners.

Labor Demand Shock

Because nominal wages increase more than housing costs, real wages increase. Real wage increase more in city b than in city a:

- **Change in real wage in city b:**

$$(w_{b2} - w_{b1}) - (r_{b2} - r_{b1}) = \frac{\lambda_a N + 2s}{N(\lambda_a + \lambda_b) + 2s}\Delta$$

  if $s = 0$ and $k_a = 0$ then shock does not increase real wages

- **Change in real wage in city a:**

$$(w_{a2} - w_{a1}) - (r_{a2} - r_{a1}) = \frac{\lambda_a N}{N(\lambda_a + \lambda_b) + 2s}\Delta$$

- Due to labor mobility, wage increase also in city a. But with locational preferences ($s > 0$), the effect of the demand shock will be concentrated in the area where it occurs.

Labor Demand Shock

Since city b offers higher real wages in period 2, the new marginal worker in period 2 has stronger preferences for city a:

$$(e_{a2} - e_{b2}) - (e_{a1} - e_{b1}) = \frac{2s\Delta}{N(\lambda_a + \lambda_b) + 2s} \geq 0$$

Interesting special cases (see Moretti Section 3.1.3):

1. If labor is completely immobile ($s = \infty$)
2. If labor is perfectly mobile ($s = 0$)
3. If housing supply is fixed ($\lambda_b = \infty$)
4. If housing supply is infinitely elastic ($\lambda_b = 0$)

Extensions in Moretti (2011):

- Heterogeneous labor
- Agglomeration effects

Blanchard and Katz (1992)

Transitory aggregate shocks have persistent negative local impacts?

- Blanchard and Katz (1992) find quick local recovery of employment rate and wages
- Greenaway and Hood, 2016 find slower adjustment

Many other literatures find persistent effect of area- or firm-level shocks on **individual** outcomes. Examples:

- Impact of mass layoffs on worker-level outcomes ($\rightarrow$ Slides on imperfect competition)
- Impact of trade on worker-level outcomes (e.g. Autor, Dorn, Hanson and Song 2014)

Consider two specific shocks here:

1. Carrington (1996) on "TAPS"
2. Yagan (2018) on the Great Recession

Carrington (1996)

Carrington (1996) "The Alaskan Labor Market during the Pipeline Era," Journal of Political Economy

Background:

- After oil discovery, construction of Trans-Alaska Pipeline System (TAPS) between 1975 and 1977
- Interpret TAPS as a major positive shock in local labor demand

Method:

- Simple differences over time (no control group)

Carrington (1996)

Main findings:

- Large temporary positive effect on earnings, employment,
- Employment and population returned quickly to pre-97 trend

Interpretation:

- Local labor supply is quite elastic (both intensive and extensive margin)
- But only modest short-run interindustry elasticity. Some workers unwilling or unable to change industries in response to large temporary changes in industry relative wages.

Carrington (1996)

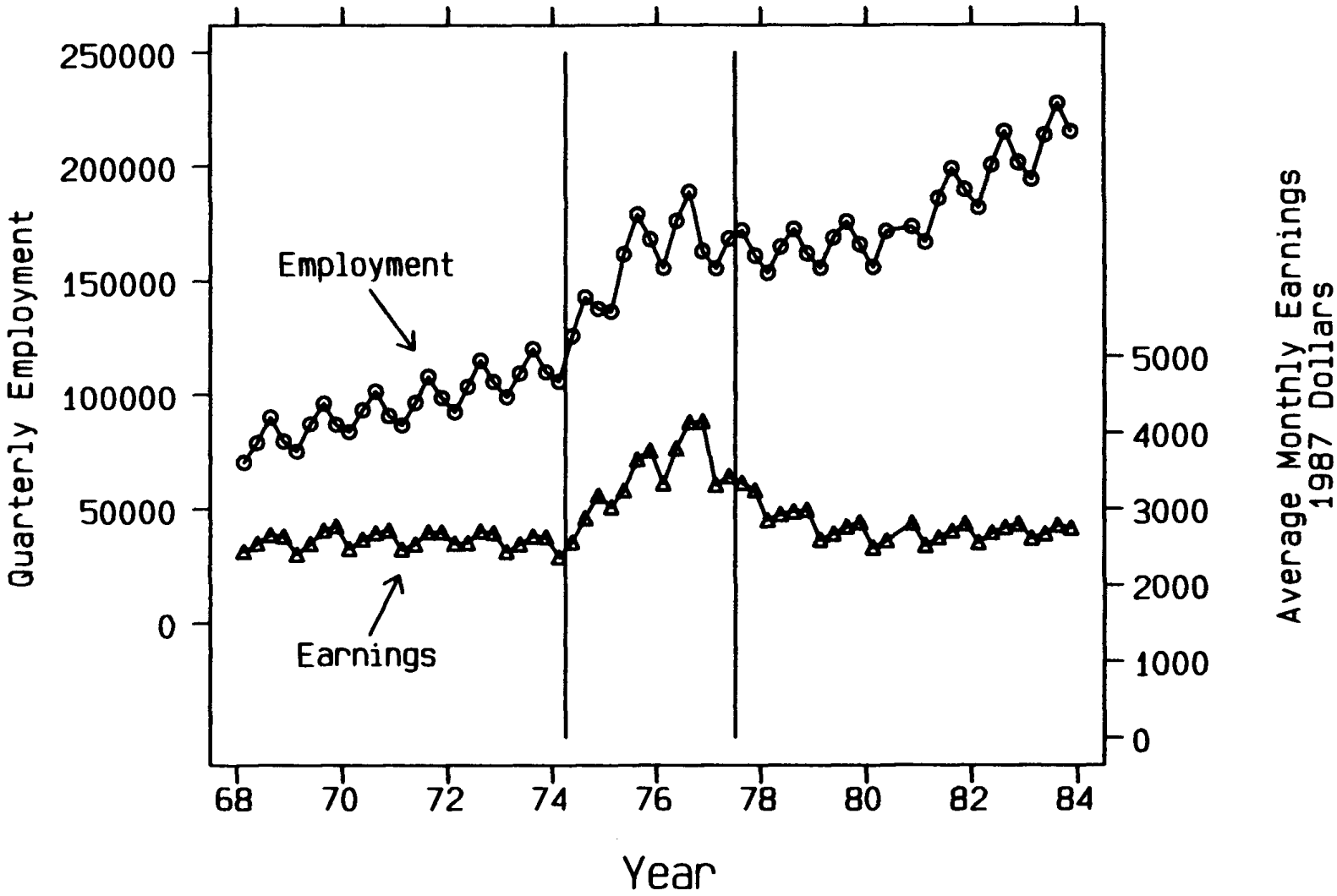


FIG. 3.—Employment and earnings: all industries

Carrington (1996)

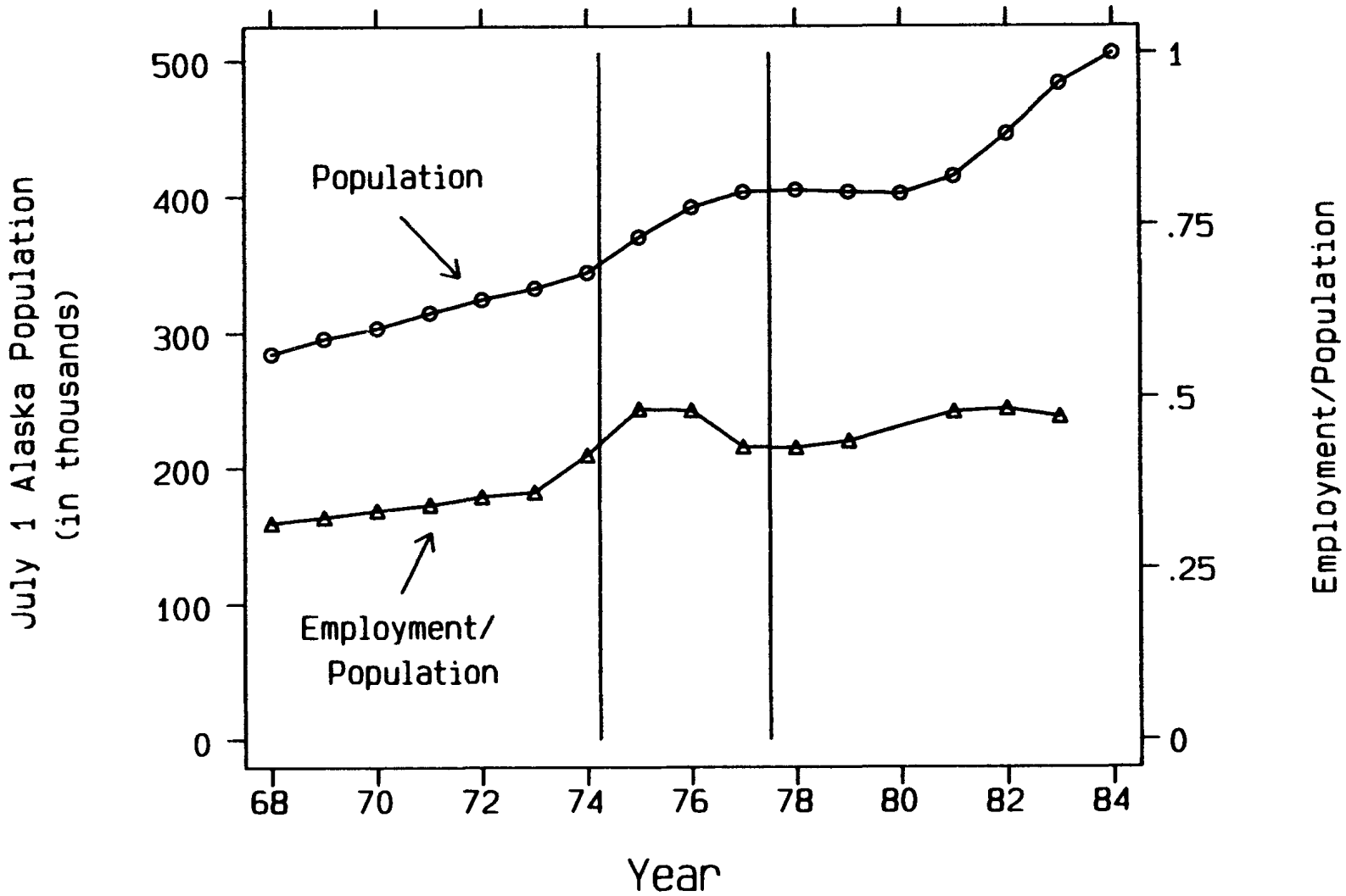


FIG. 5.—Population and employment/population

Yagan (2018)

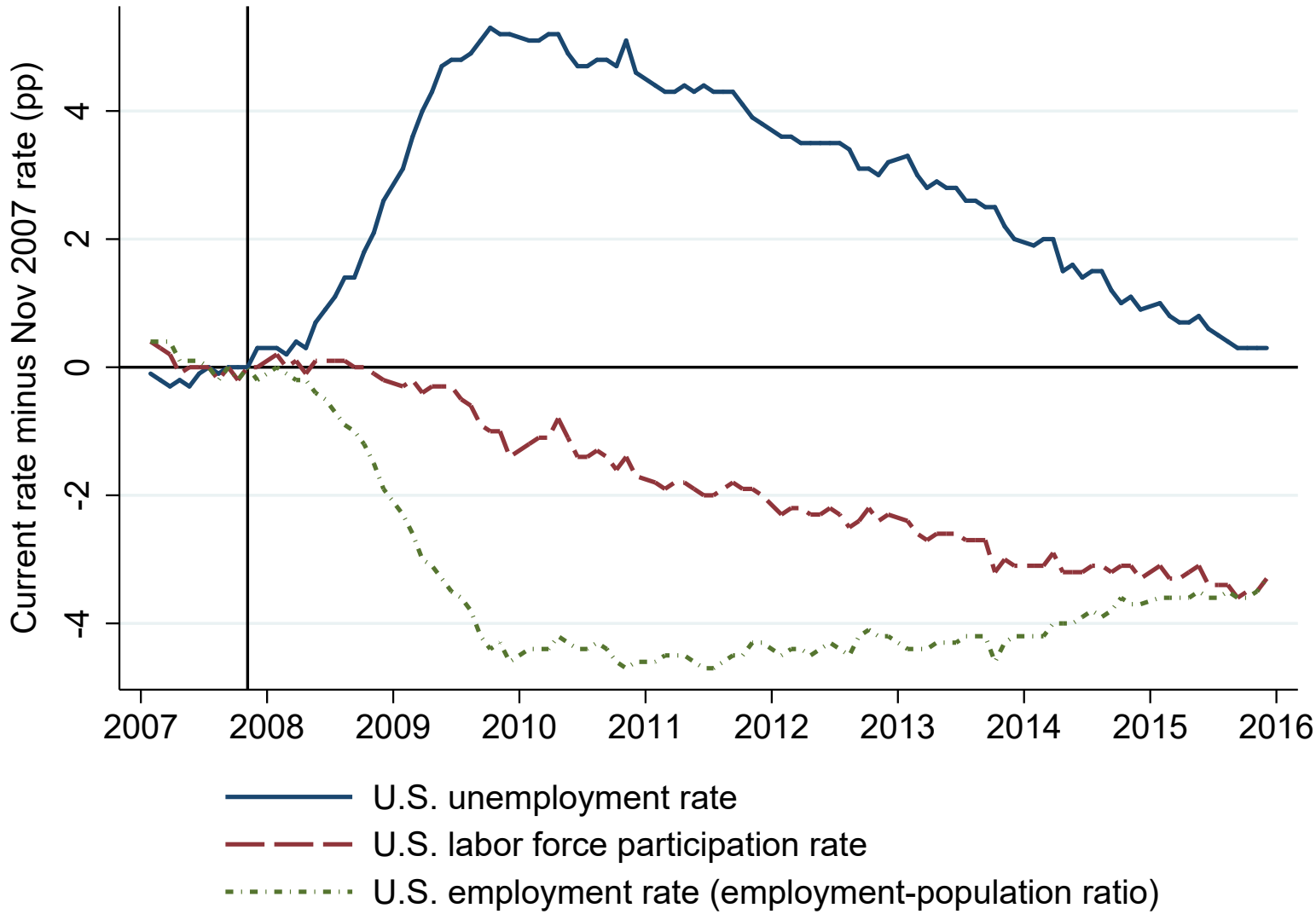
Yagan (2018), "Employment Hysteresis from the Great Recession" Working Paper

> *"This paper uses U.S. local areas as a laboratory to test for long-term impacts of the Great Recession"*

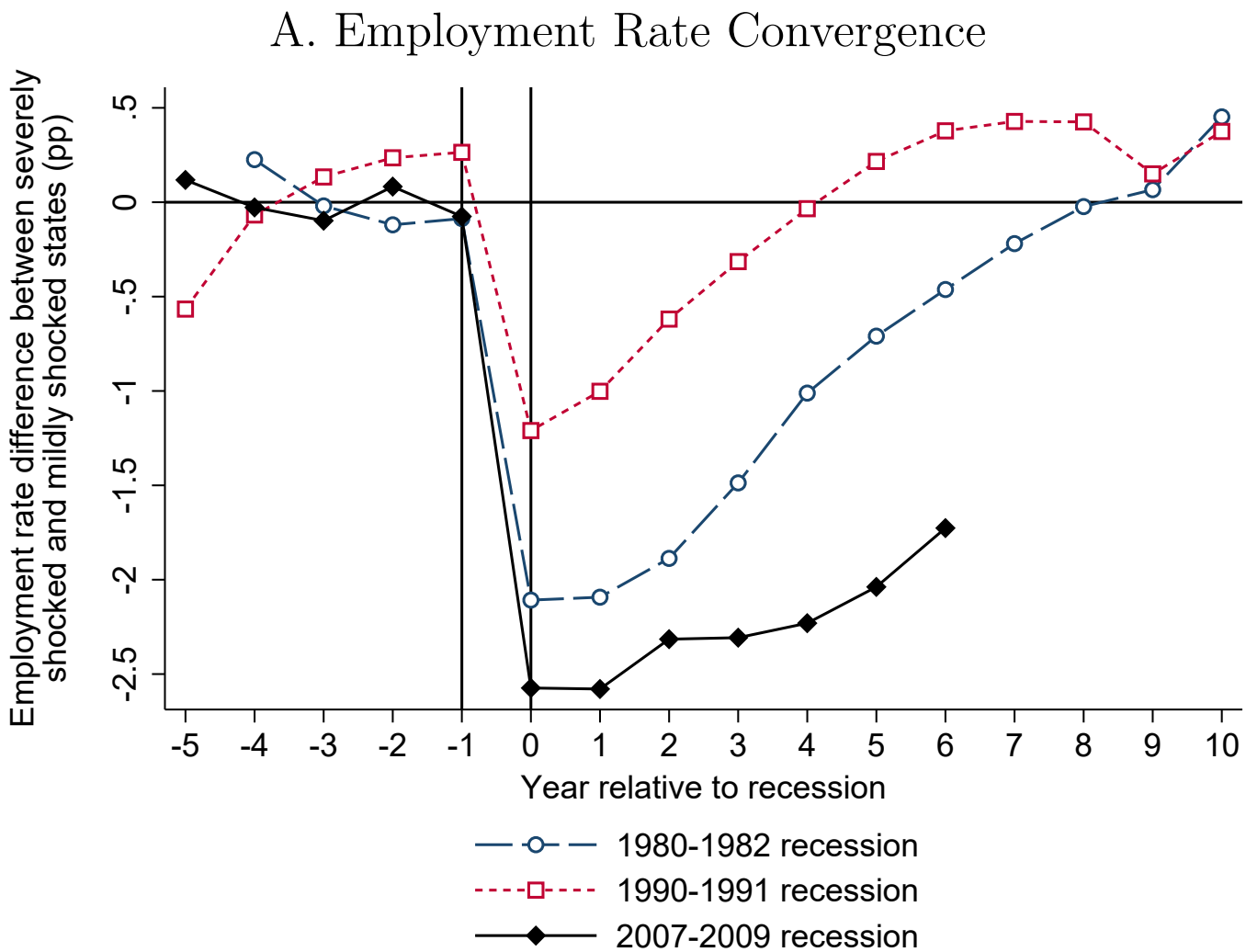
Studies labor market outcomes of workers over time, distinguishing between those located in an area that did badly during the Great Recession and those located in areas that did less badly.

Yagan (2018)

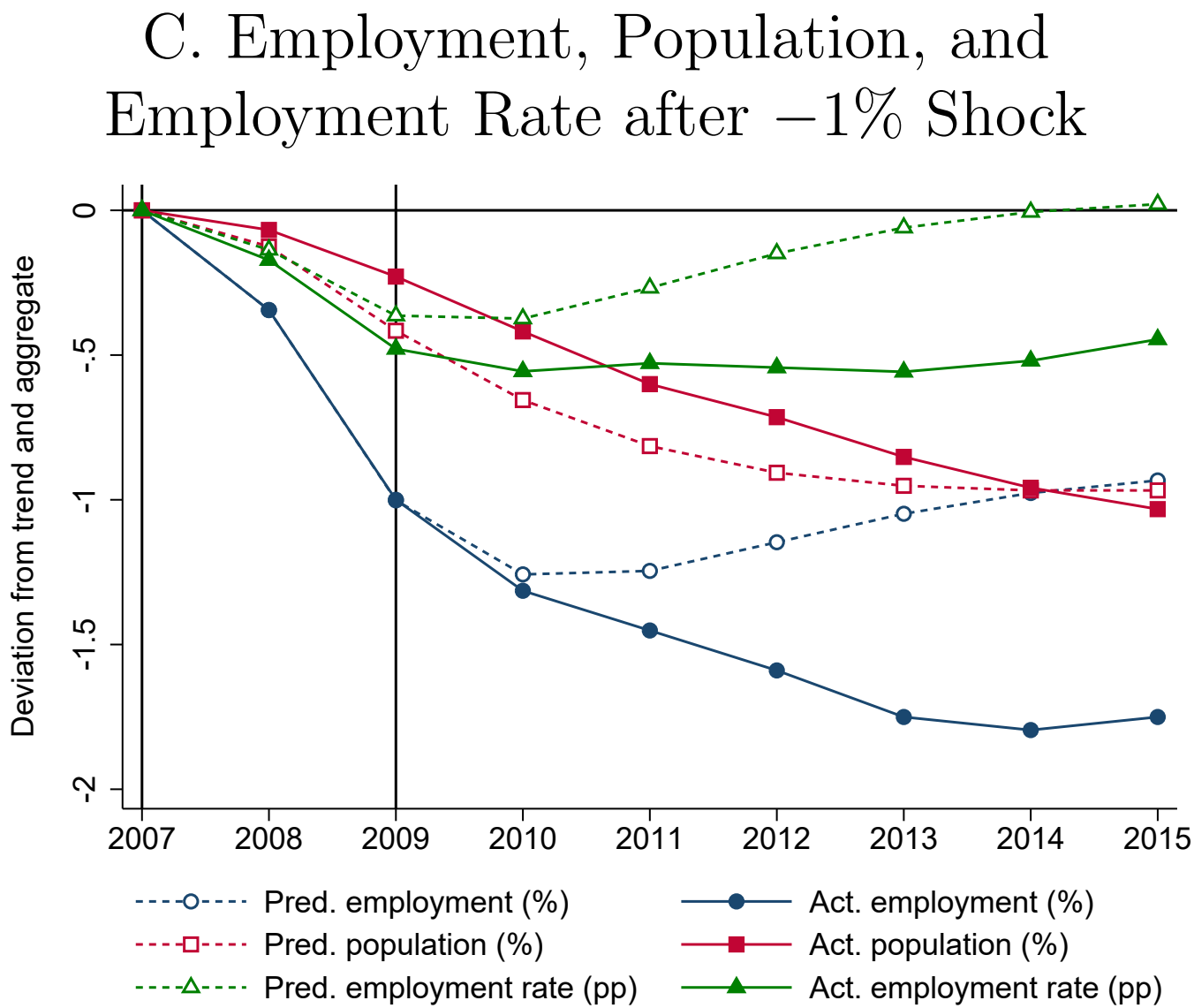
A. Current U.S. Aggregate Minus November 2007 U.S. Aggregate



Yagan (2018)

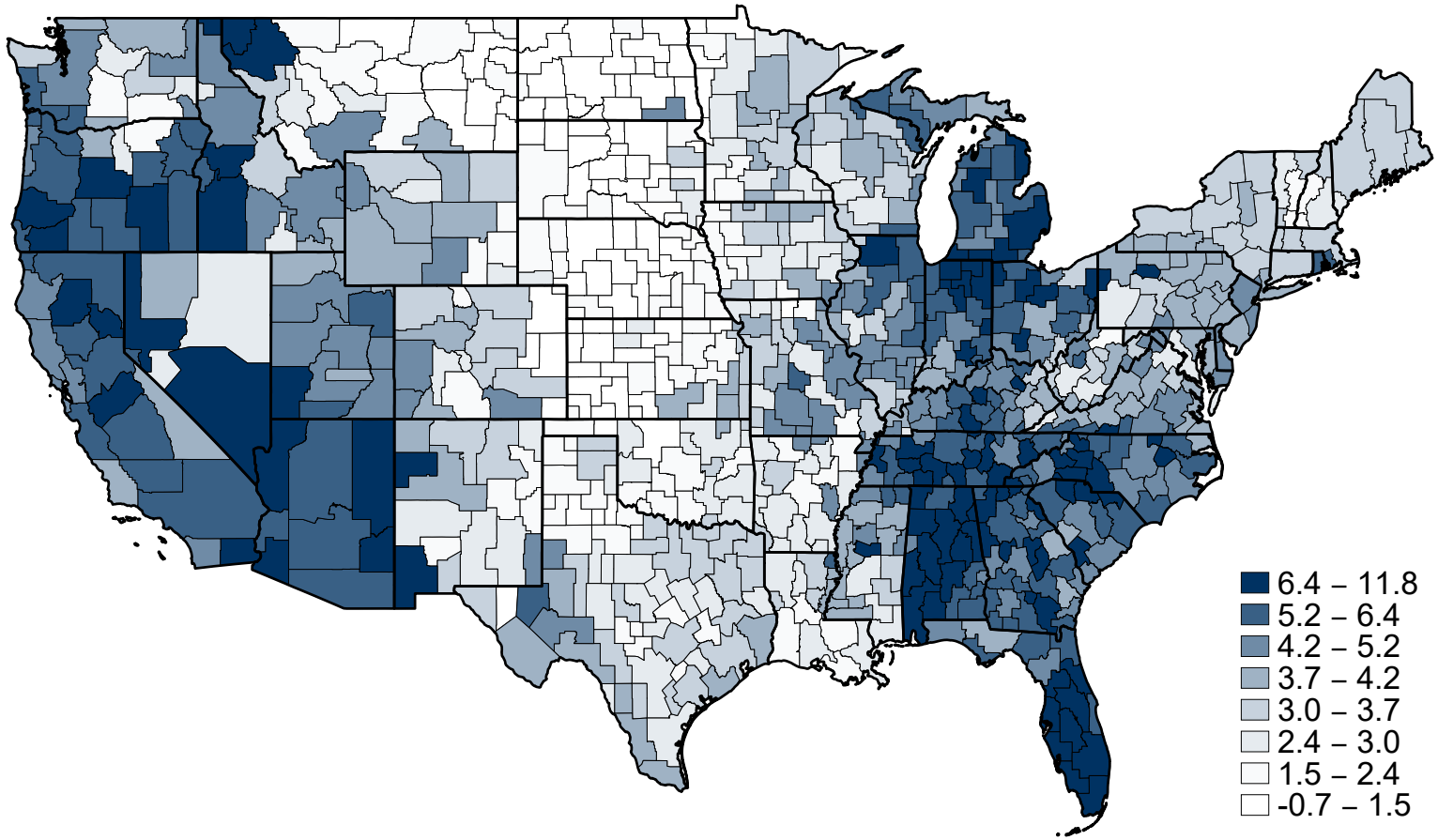

A. Employment Rate Convergence
Employment rate difference between severely shocked and mildly shocked states (pp)
.5
0
-.5
-1
-1.5
-2
-2.5
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
10
Year relative to recession
1980-1982 recession
1990-1991 recession
2007-2009 recession

Yagan (2018)


C. Employment, Population, and Employment Rate after −1% Shock
Deviation from trend and aggregate
0
-.5
-1
-1.5
-2
2007
2008
2009
2010
2011
2012
2013
2014
2015
Pred. employment (%)
Act. employment (%)
Pred. population (%)
Act. population (%)
Pred. employment rate (pp)
Act. employment rate (pp)

Yagan (2018)

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.

Yagan (2018)

Estimate worker-level event study

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

where y_{i2015} is some outcome in year 2015, $SHOCK_{C(i2007)}$ is the "recession shock" to individual i living in area c in 2007, $\theta g(i2006)$ are fixed effects for groups g defined based on year-2006 individuals

- Argues $SHOCK_{c(i2007)}$ is one-time shock in labor demand (not serially correlated local shocks as in Greenaway et al 2017)
- β is the causal effect of Great Recession local shocks and their underlying causes on *individual* outcomes in 2015

Extensions:

- Event-study design with different coefficients for each period
- Main, retail chain and mass layoff samples

Yagan (2018)

Why consider individual- instead of area-level outcomes?

- Area-level evidence may reflect post-2007 sorting of workers ($\rightarrow$ see paper)
- Can control for age-earnings-industry fixed effects

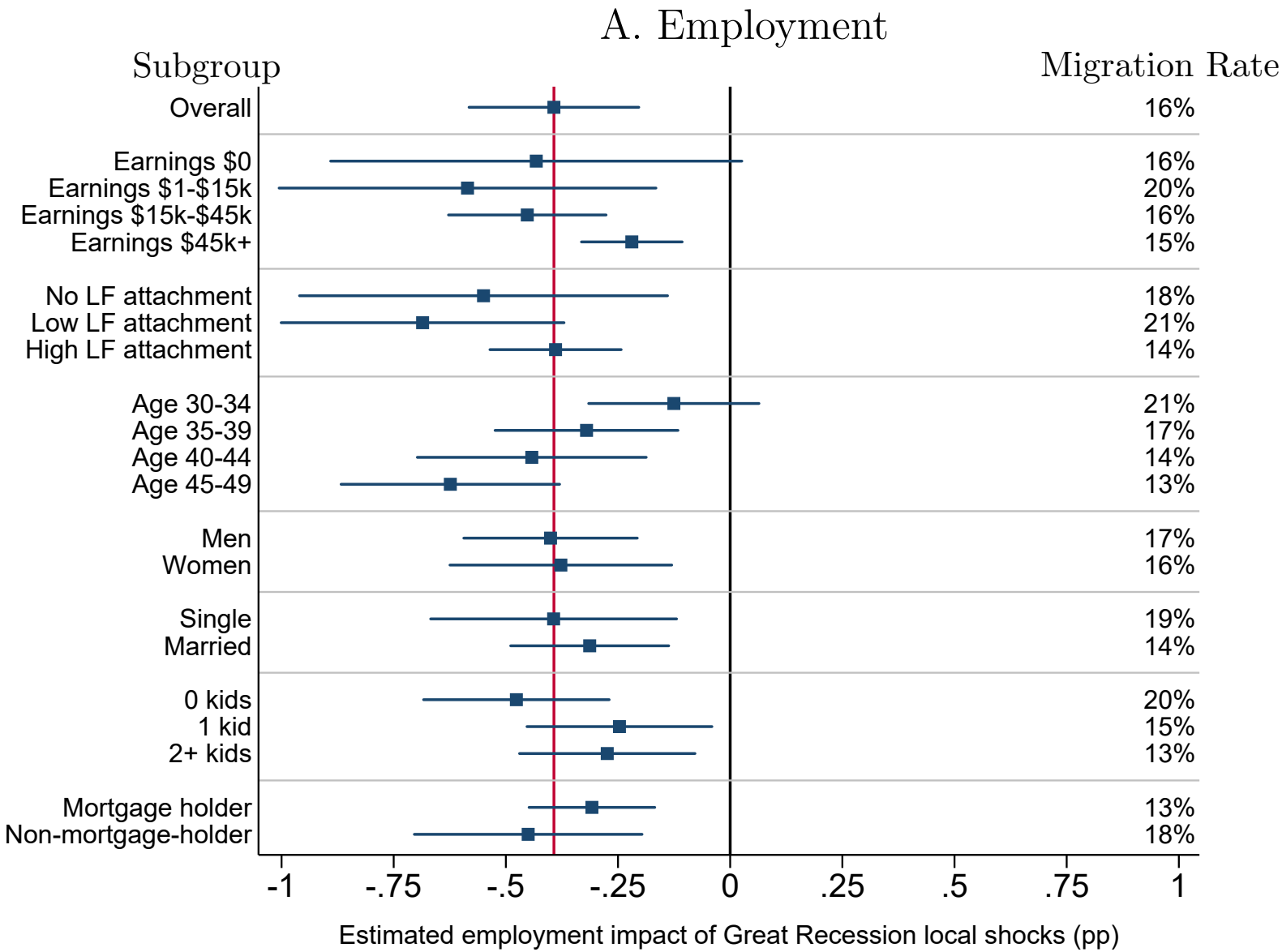
Extensions:

- Event-study design with different coefficients for each period
- Main, retail chain and mass layoff samples

Yagan (2018)


A. Employment Impact of Great Recession Local Shocks
Effect of Great Recession local shock (pp)
.5
.25
0
-.25
-.5
-.75
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

Yagan (2018)


A. Employment
Subgroup
Migration Rate
Overall
16%
Earnings $0
Earnings $1-$15k
Earnings $15k-$45k
Earnings $45k+
16%
20%
16%
15%
No LF attachment
Low LF attachment
High LF attachment
18%
21%
14%
Age 30-34
Age 35-39
Age 40-44
Age 45-49
21%
17%
14%
13%
Men
Women
17%
16%
Single
Married
19%
14%
0 kids
1 kid
2+ kids
20%
15%
13%
Mortgage holder
Non-mortgage-holder
13%
18%
-1
-.75
-.5
-.25
0
.25
.5
.75
1
Estimated employment impact of Great Recession local shocks (pp)

Yagan (2018)

Main findings

- Local and individual employment rates do not recover from local impact of Great recession ("hysteresis")
- Area-level conditions have large and persistent effects on individual employment outcomes

Implications

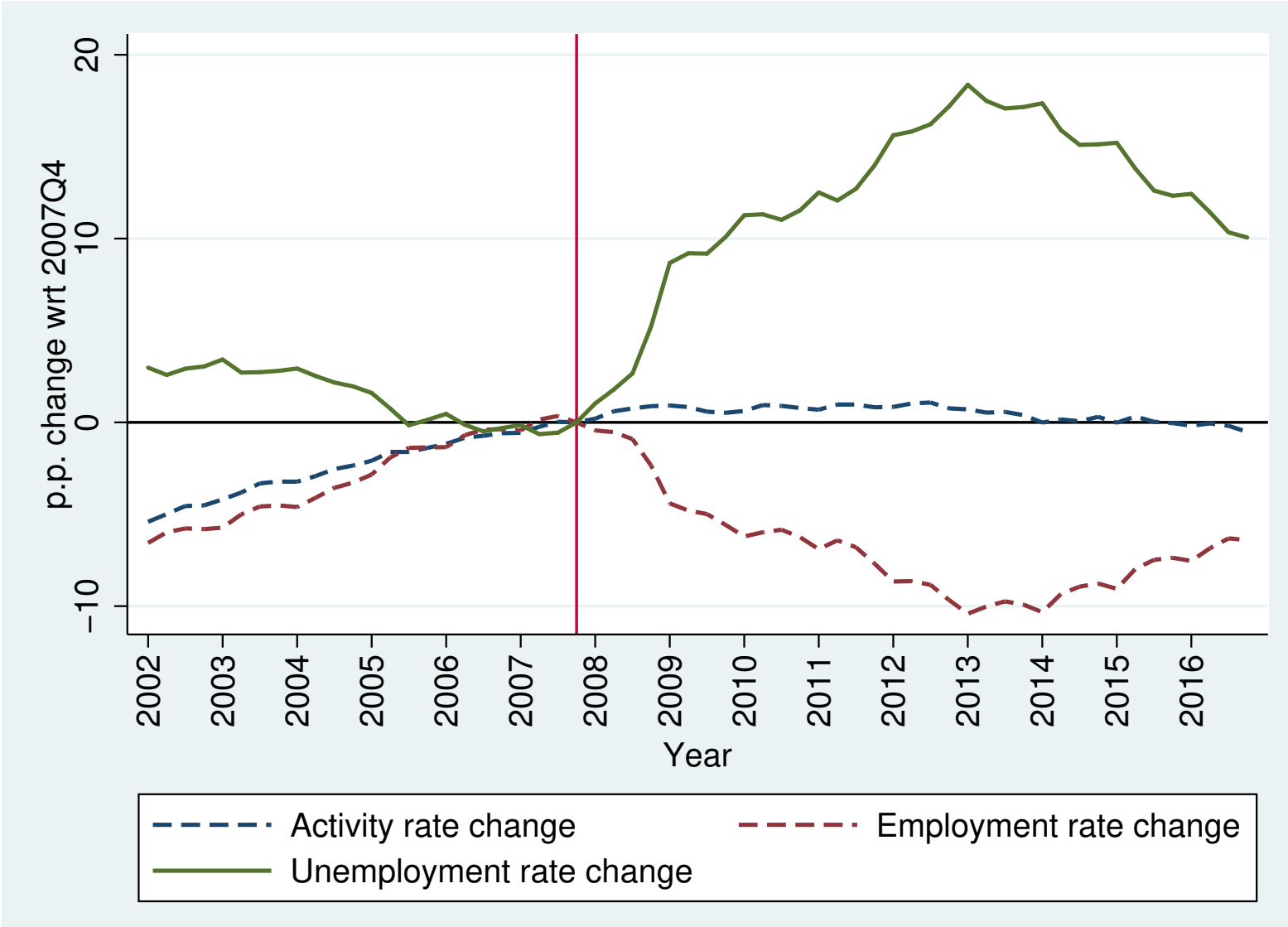
1. "Naive extrapolation" of local-shock-based estimate would suggest that the Great Recession caused more than half of the 2007-2015 decline in U.S. employment
2. Unemployment rate (as considered in matching models) is not a reliable indicator for economic recovery. Consider labor force participation.

Vairo (2018)

Similar application for Spain: Vairo, Maren (2018), "Worker level adjustment to local demand shocks in the Spanish Great Recession", MSc Thesis, UC3M

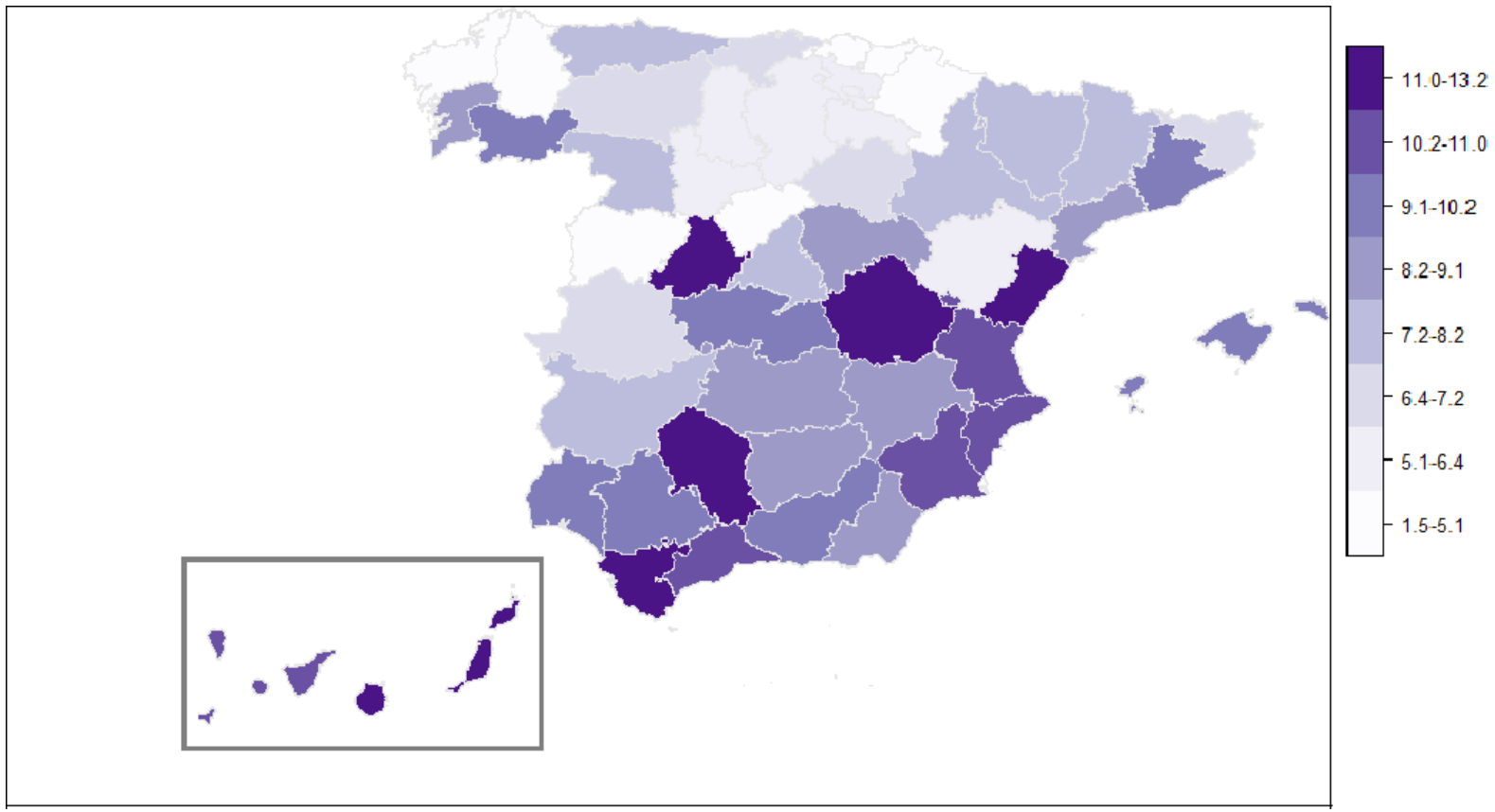
- Similar setup as in Yagan (2018), but uses Bartik instrument to instrument local demand shocks
- Local effect of Great Recession has long-lasting effects on workers' earnings and employment
- Workers did not respond to the local shock by transitioning to other regions, industries or occupations
- Persistence caused by combination of (i) low individual mobility and (ii) persistent contraction in local labor demand?

Vairo (2018)


20
10
0
−10
p.p. change wrt 2007Q4
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Year
Activity rate change
Employment rate change
Unemployment rate change

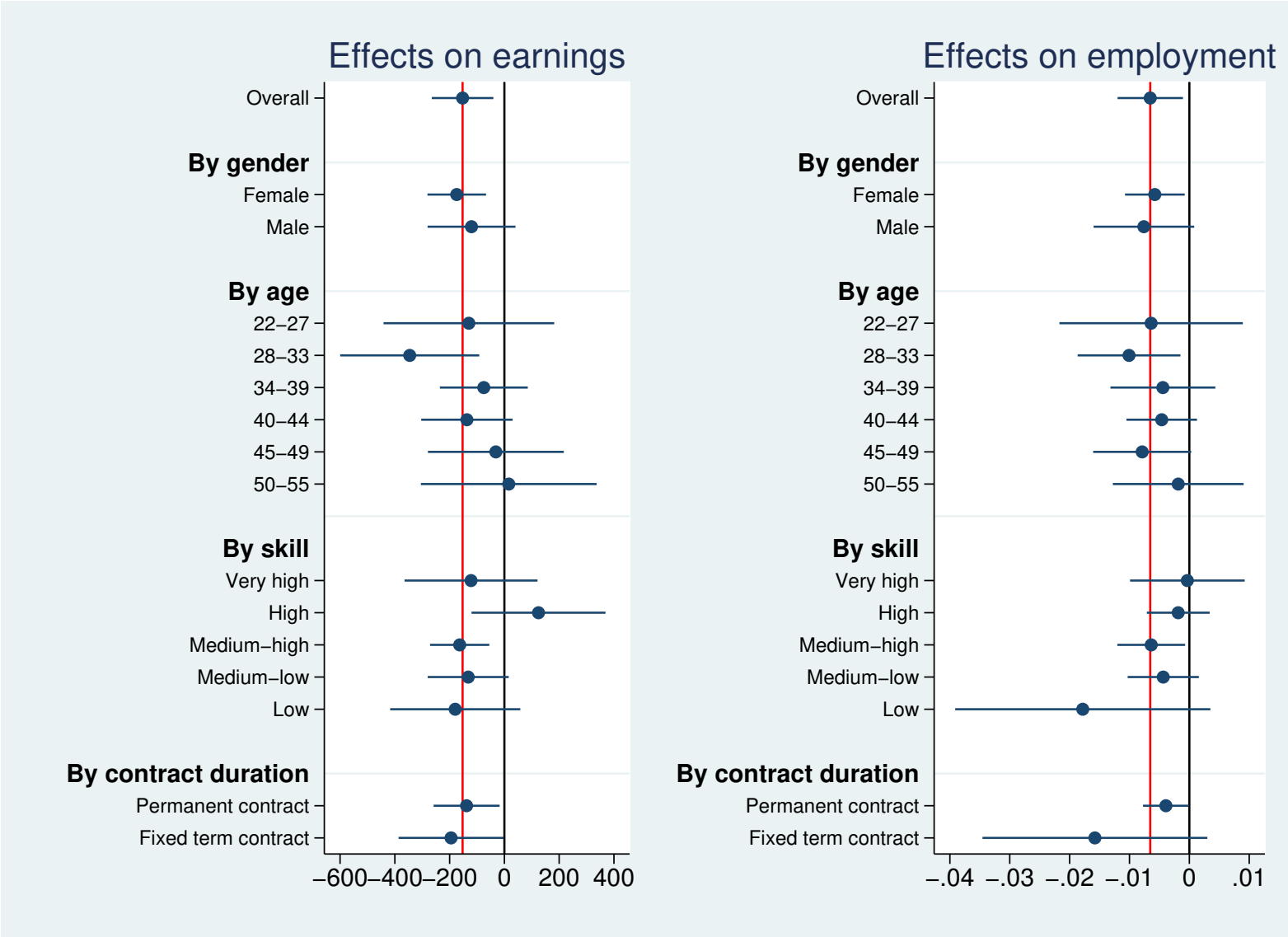
Vairo (2018)

Figure 2: Regional variation in the Spanish Great Recession



((a)) 2008-2010 unemployment rate changes, by Spanish provinces

Vairo (2018)


Effects on earnings
Overall
By gender
Female
Male
By age
22–27
28–33
34–39
40–44
45–49
50–55
By skill
Very high
High
Medium–high
Medium–low
Low
By contract duration
Permanent contract
Fixed term contract
–600 –400 –200 0 200 400
Effects on employment
Overall
By gender
Female
Male
By age
22–27
28–33
34–39
40–44
45–49
50–55
By skill
Very high
High
Medium–high
Medium–low
Low
By contract duration
Permanent contract
Fixed term contract
–.04 –.03 –.02 –.01 0 .01