Has the Great Recession Raised U.S. Structural Unemployment?

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A unique recession …

- Financial crisis coupled with a housing collapse.
- Unemployment rate reached a 27-year high in late 2009
  - Second highest rate on record.
  - A record 5.5 million jobs lost in 2009.
  - Historically high unemployment rates for youth and men.
  - 1 in 6 people in the labor force with no high school diploma unemployed.
  - 1 in 10 people in the labor force with high-school diploma unemployed.
  - Historically high unemployment duration
  - All labor underutilization measures reached historic highs.

… with regional and sectoral flavors

- **Large regional disparities in**
  - Unemployment rates:
    - North Dakota, 3.9 percent in 2010.
    - Nevada, 14.9 percent in 2010.
  - Housing market performance
  - Sectoral shocks:
    - Ohio and Michigan (manufacturing)
    - New York and Delaware (financial services)
    - Hawaii (tourism)

Signs that structural unemployment has gone up

Job Vacancies and Unemployment
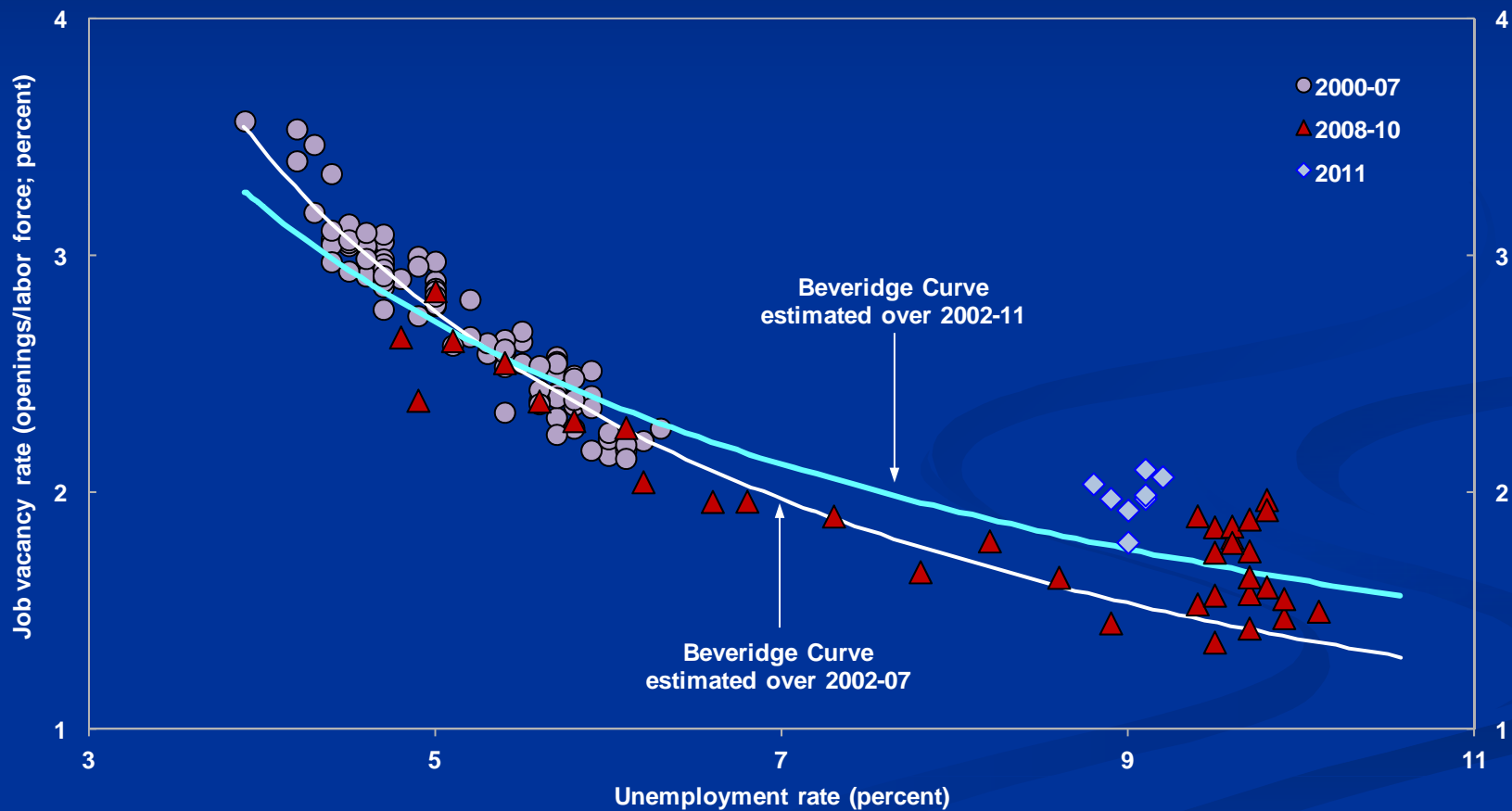
The paper

- Investigate the impact of housing/sectoral shocks on "structural" or "noncyclical" unemployment
    - Construct Skills Mismatch Index for 50 states & DC.
    - Investigate the role of skills mismatches and housing market conditions in explaining state-level unemployment rates after controlling for cyclical and other effects.
    - Panel state-level analysis.
- Use estimates to simulate increase in structural unemployment during the crisis (exact estimates quite uncertain)
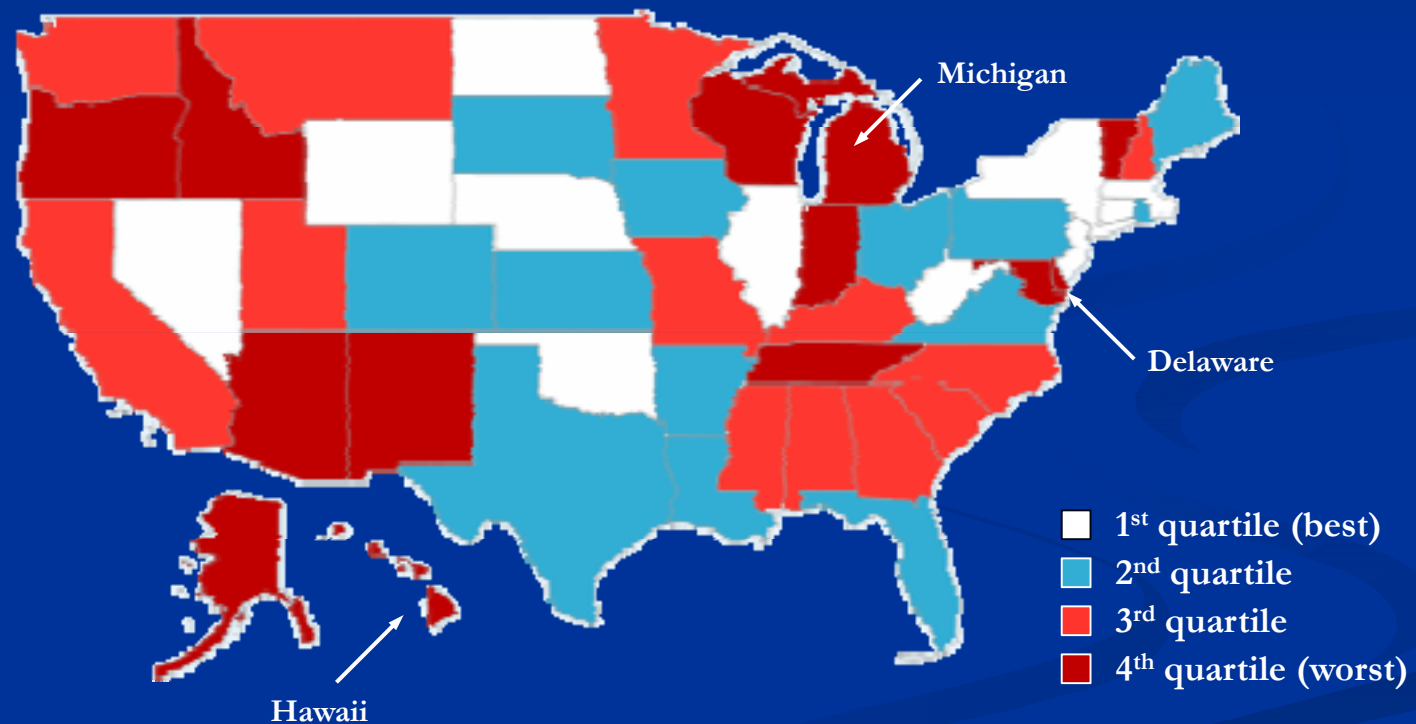
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Findings

- Skill mismatches have risen, often overlapping with areas facing bad housing conditions.

- Skills mismatches, housing market conditions, and interactions between the two affect are correlated to unemployment even after controlling for cyclical effects.

- "Structural unemployment" has risen between 1 and 1¾ percentage points (from 5 percent before the crisis).

- Skill mismatches explain less than half of the increase in structural unemployment. Housing conditions and interactions explain the rest.

Outline

- Are skill mismatches on the rise?

- Modeling structural unemployment

- Structural unemployment has risen

- Is policy intervention warranted?

Large disparities across states

Skill Mismatch Index by State, 2009

- ⬜ 1st quartile (best)
- 🟦 2nd quartile
- 🟥 3rd quartile
- 🟥 4th quartile (worst)

Large *increases* in SMI during recession

Increase in Skill Mismatch Index Since the Onset of the Recession
(in percent)

Michigan

Delaware

Hawaii

■ 1st quartile (best)
■ 2nd quartile
■ 3rd quartile
■ 4th quartile (worst)

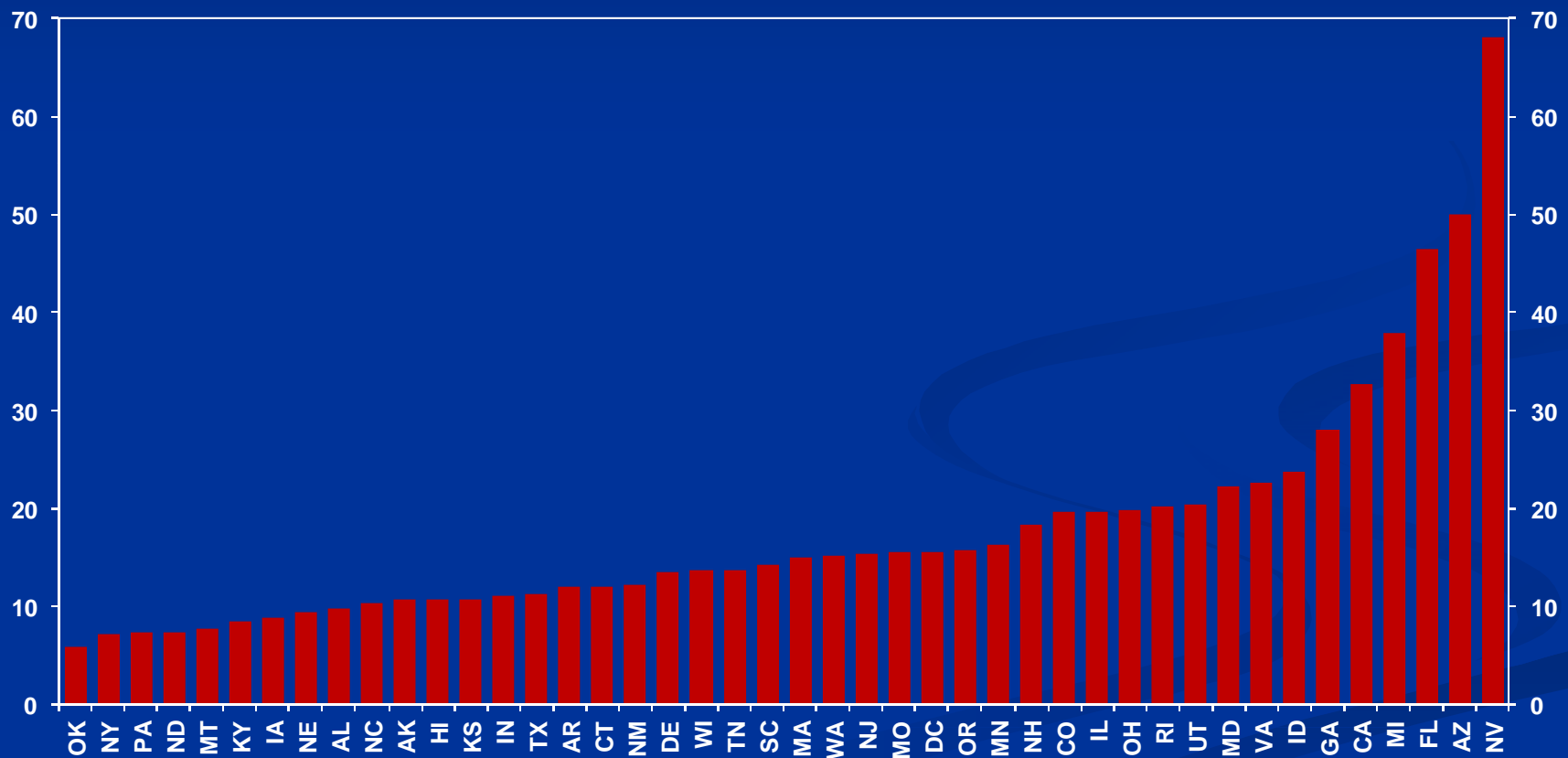Sources: Haver Analytics; U.S. Bureau of Labor Statistics; U.S. Census Bureau; and authors' calculations.
Notes: 1st quartile [-11.5,5.7], 2nd quartile [6.3,11.6], 3rd quartile [12.3,16.9], 4th quartile [17.2,29.4].
Calculate as the percent change from 2007 to 2009. Annual levels are the average of 12 months.
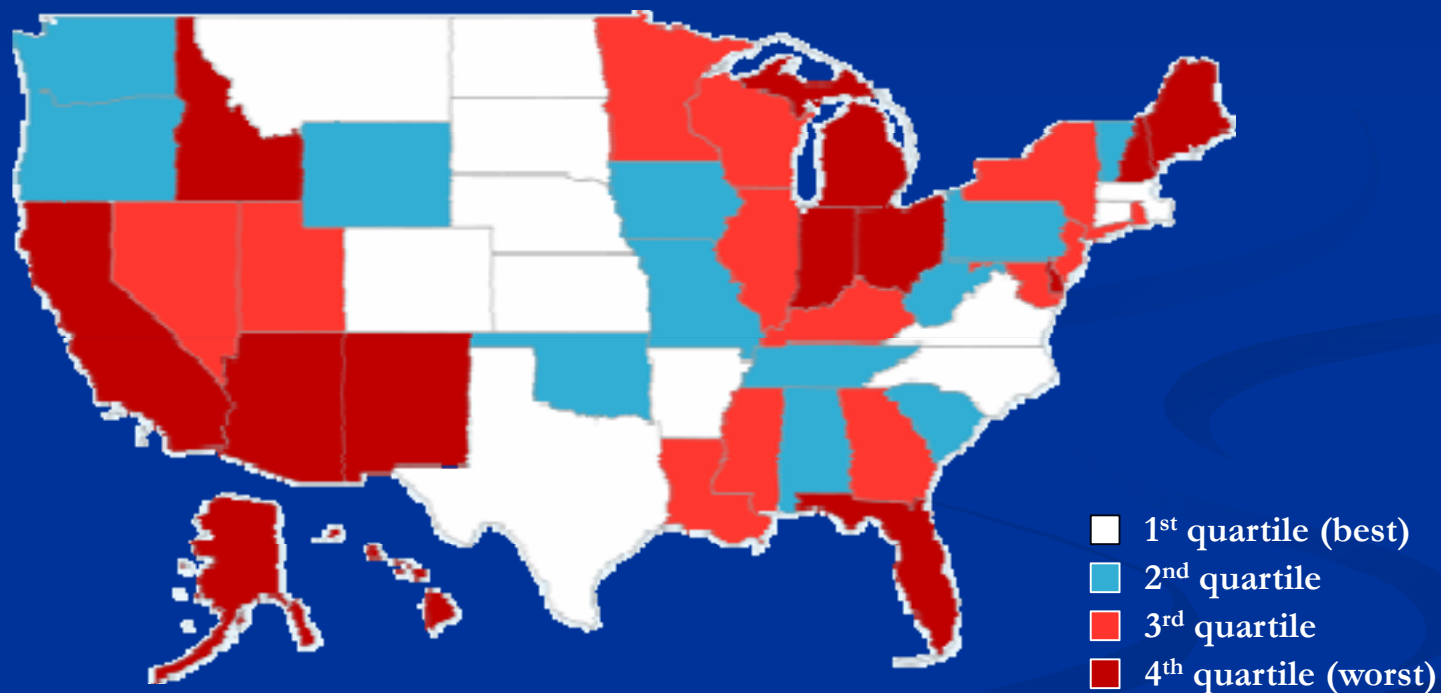
Housing conditions have also varied

Negative Equity by State, Second Quarter of 2010
(percent of mortgages)

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Hard hit areas by housing and skill mismatches

Composite Effect of the Crisis Since the Onset of the Recession

Legend:
- 1st quartile (best)
- 2nd quartile
- 3rd quartile
- 4th quartile (worst)

Sources: Haver Analytics; Mortgage Bankers Association; U.S. Bureau of Labor Statistics; U.S. Census Bureau; and authors' calculations.

Notes: 1st quartile [46,78], 2nd quartile [80,101], 3rd quartile [106,127], 4th quartile [132,176].
Calculate as the percent change from 2007 to 2009. Annual levels are the average of 12 months.

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Explaining cyclical and noncyclical variations in unemployment

- Time dummies would control for cyclical and other aggregate shocks and state-specific dummies would control for immutable, state-specific factors.

- State-specific cycles? Horse race between BEA data and other measures.

- Test whether remaining, noncyclical variation is related to housing market performance, mismatches, and their interactions.

Table 1. Okun Law Estimates with Alternative Measures of State-Level GDP

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: percentage-point change in unemployment rate (numbers in parentheses are p-values)					
	OLS					
Log-change in real GDP (BEA estimates) 1/	-0.136*** (0.00)			-0.059*** (0.00)		
Log-change in real GDP (Alternative Measure 1) 2/		-0.443*** (0.00)			-0.296*** (0.00)	
Log-change in real GDP (Alternative Measure 2) 3/			-0.374*** (0.00)			-0.166*** (0.00)
Time effects	No	No	No	Yes	Yes	Yes
Fixed state effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.15	0.51	0.50	0.61	0.77	0.80
Number of states, including D.C.	51	51	51	51	51	51
Observations	918	969	969	918	969	969

***Significant at a 1 percent level of significance.

1/ Data as published by the U.S. Bureau of Economic Analysis for the period 1990-2008 for 50 U.S. states plus the District of Columbia.

2/ $\Delta \ln(GDP_i) = \sum_j (\Delta \ln(GDP_j)*sh1_{ij})$, where GDP_i represents GDP of state i, GDP_j represents GDP of sector j at the national level, and $sh1_{ij}$ represents the share of employment in sector j in total state i employment. Δ and $\sum$ are the difference and sum operators. Ln represents natural logs. Calculations done for the period 1990-2009 for 50 U.S. states plus the District of Columbia.

3/ $\Delta \ln(GDP_i) = \Delta \sum_j (\ln(GDP_j*sh2_{ij})$, where GDP_i represents GDP of state i, GDP_j represents GDP of sector j at the national level, and $sh2_{ij}$ represents the share of employment in sector j in state i vis-a-vis aggregate sector j employment. Δ and $\sum$ are the difference and sum operators. Ln represents natural logs. Calculations done for the period 1990-2009 for 50 U.S. states plus the District of Columbia.

Table 2. Explaining State-Level Unemployment Rates /1
Using Housing Prices as a Proxy for State Housing Market Conditions

	(1)	(2)	(3)	(4)	(5) 2/
	Dependent variable: percentage-point change in unemployment rate *(numbers in parentheses are p-values)*				
	OLS				2SLS
Log-change in real GDP (Alternative Measure 1) 3/	-0.178***	-0.252***	-0.207***	-0.173**	-0.206**
	(0.00)	(0.00)	(0.01)	(0.04)	(0.02)
Log-change in skill mismatch index	0.041***		0.019***	0.030***	
	(0.00)		(0.01)	(0.00)	
Log-change in FHFA house price index		-0.028***	-0.024***	-0.026***	-0.064***
		(0.00)	(0.00)	(0.00)	(0.00)
Log-change in skill mismatch*log-change FHFA house price index				-0.003***	
				(0.00)	
Time effects 4/	Yes	Yes	Yes	Yes	Yes
Fixed state effects	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.77	0.78	0.78	0.79	---
Number of states, including D.C.	51	51	51	51	51
Observations	969	969	969	969	969

*Significant at a 10 percent level of significance, **significant at a 5 percent level of significance, ***significant at a 1 percent level of significance.

Results robust to alternative measures of housing and skill mismatch shocks

- Using either changes in housing prices and foreclosure rates as measures of local housing conditions.

- Using the standard deviation of percent changes in sectoral employment as proxy for changes in skill mismatches.

Noncyclical unemployment has increased across states, but differently

Estimated Equilibrium Unemployment Rates at End-2009 by State
(in percent)

- Structural increase 2009
- Structural increase, 2008
- Equilibrium unemployment rate, 2007
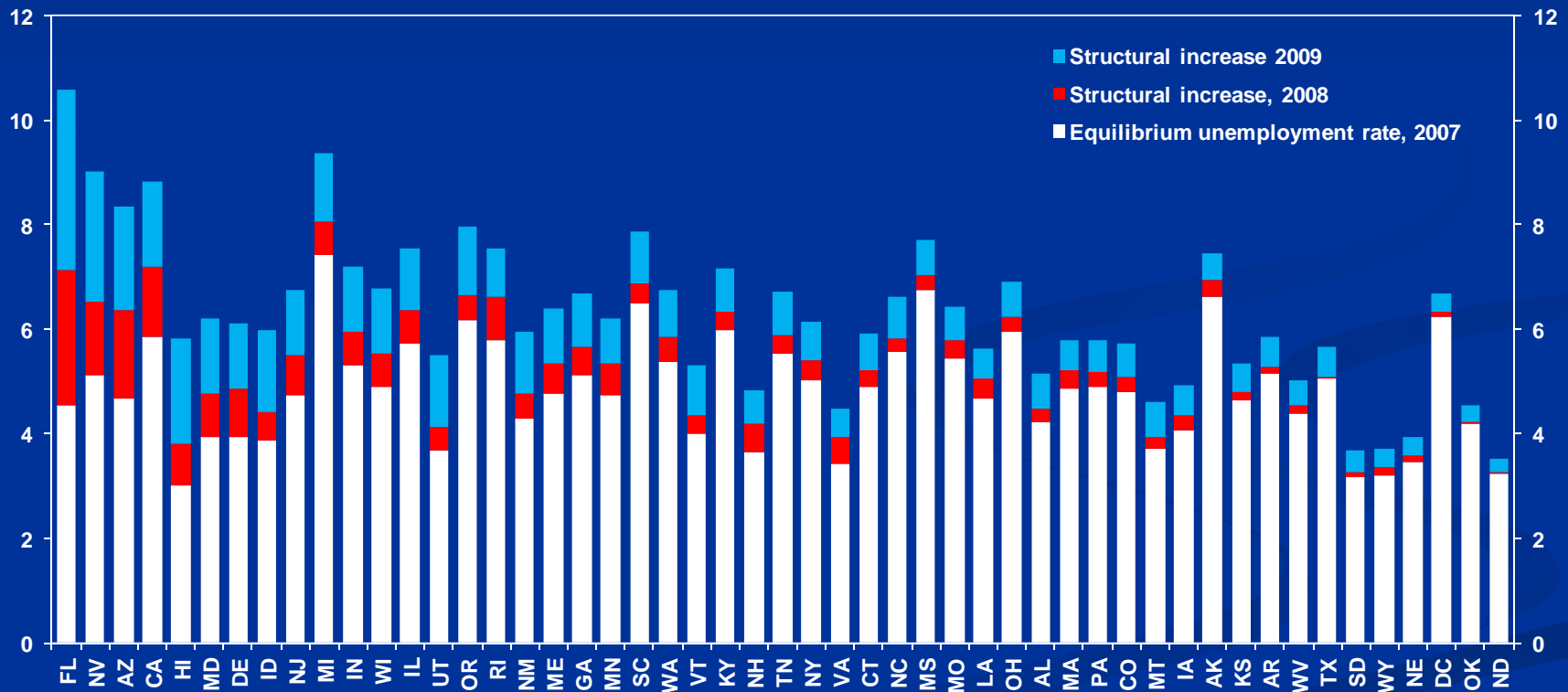
Sources: U.S. Bureau of Labor Statistics and authors' calculations.
1/ Equilibrium unemployment rate in 2007 is estimated using an HP-filter for the period 1990-2007 for each state. The structural increase in the unemployment rate in 2008 and 2009 is the increase in the fitted unemployment rate value, as predicted by the model, from the increases in skills mismatches and housing hurtles.

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Impact at the national level

- "Structural" unemployment has increased by 1 to 1¾ percentage points at the national level, (with less than half explained by SMI changes) from about 5 percent in 2007.

- Thus, there are still 2½ percentage points of purely cyclical unemployment in the U.S.

Other studies

- FRBSF has issued some nice work (which is representative of other work in the area):
  - Structural unemployment has increased by about 1¼ pp. Evidence: half of the shift in the Beveridge curve.
  - Between 0.4 to 0.8 pp due to extended UI benefits. Remainder due to mismatches of construction workers.
- Note: Shift could have been much larger depending on sample and half the shift is somewhat arbitrary. (See Minneapolis Fed.)
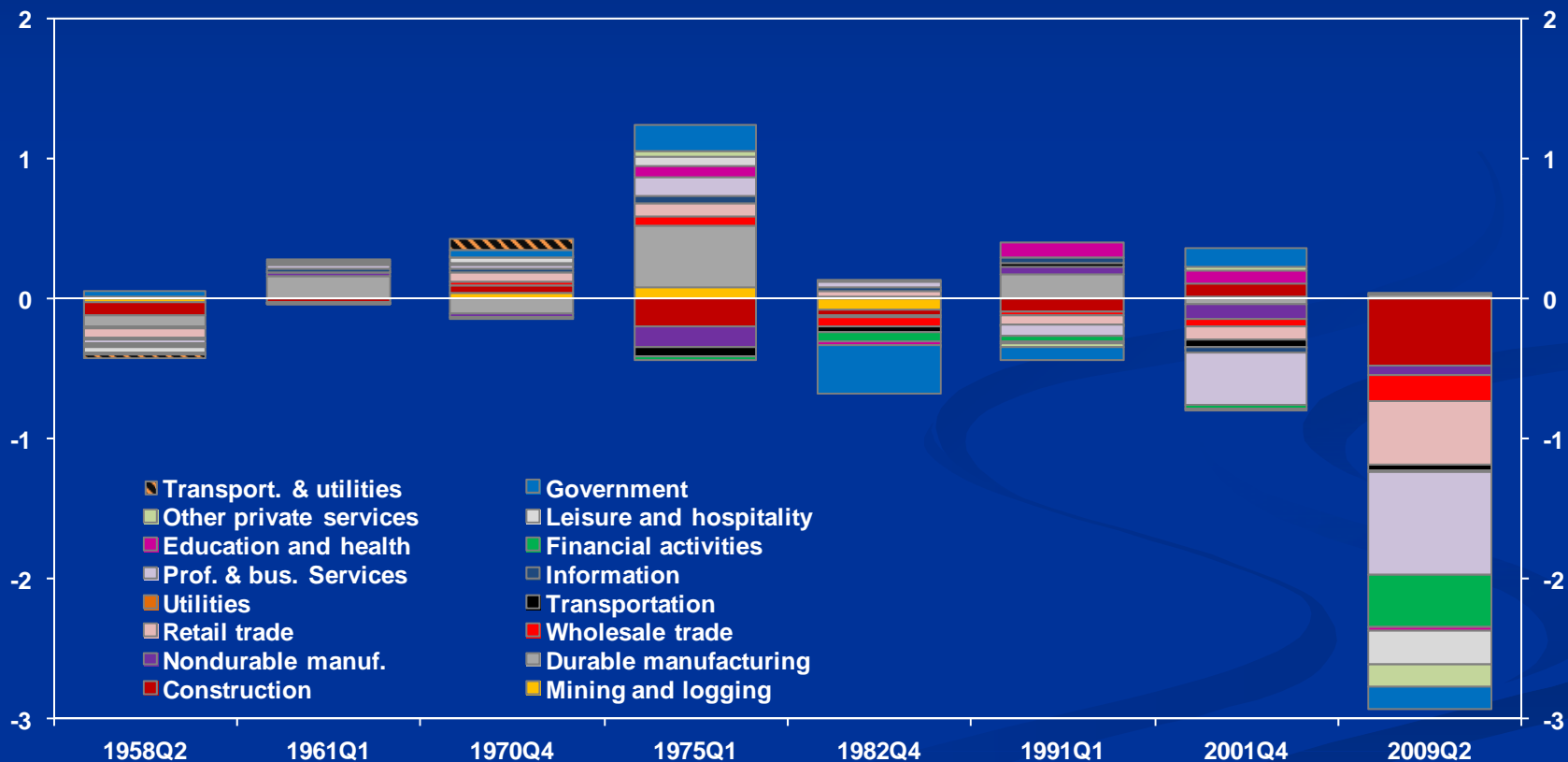
Remaining Issues

- Persistency of structural barriers to lower unemployment rates?

- Current "jobless" recovery is a problem => people are staying unemployed longer even after accounting for the weak recovery.

- As unemployment rates go down, would structural unemployment also decline?

- Better/more detailed mismatch measures.

- Policy intervention?

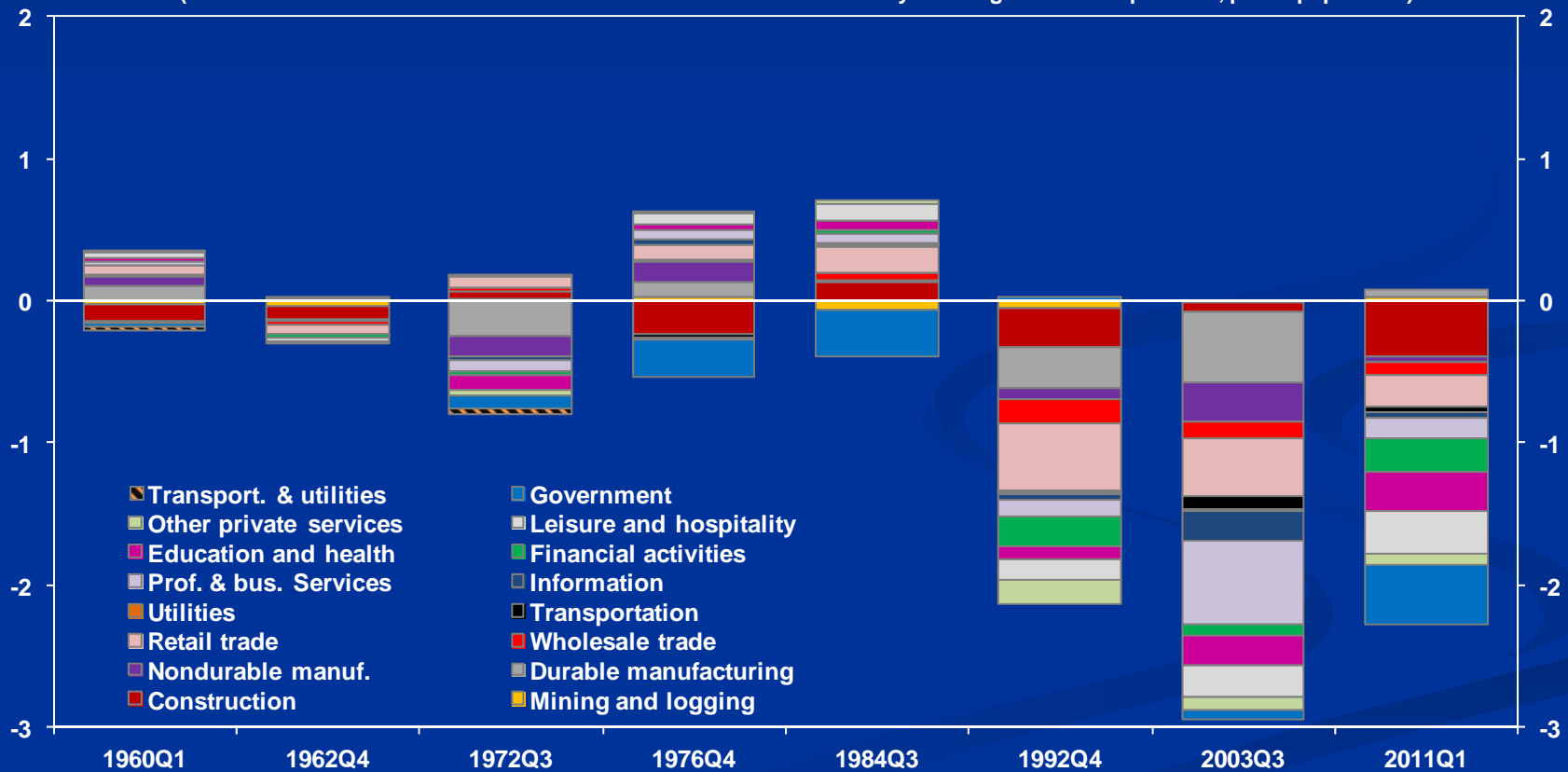- How can future dislocations be minimized?

High rate of job destruction …

Sectoral Employment Changes Above and Beyond Usual Patterns During Downturns
(cumulated deviation from model estimates from NBER business cycle peaks to troughs, pct of population)

Legend:
- Transport. & utilities
- Government
- Other private services
- Leisure and hospitality
- Education and health
- Financial activities
- Prof. & bus. Services
- Information
- Utilities
- Transportation
- Retail trade
- Wholesale trade
- Nondurable manuf.
- Durable manufacturing
- Construction
- Mining and logging

X-axis: 1958Q2 1961Q1 1970Q4 1975Q1 1982Q4 1991Q1 2001Q4 2009Q2

… and the recovery has been jobless

Sectoral Employment Changes Above and Beyond Usual Patterns During Recoveries
(cumulated deviations from model estimates from NBER business cycle trough to seven qtrs later, pct of population)

Legend:
- Transport. & utilities
- Other private services
- Education and health
- Prof. & bus. Services
- Utilities
- Retail trade
- Nondurable manuf.
- Construction
- Government
- Leisure and hospitality
- Financial activities
- Information
- Transportation
- Wholesale trade
- Durable manufacturing
- Mining and logging

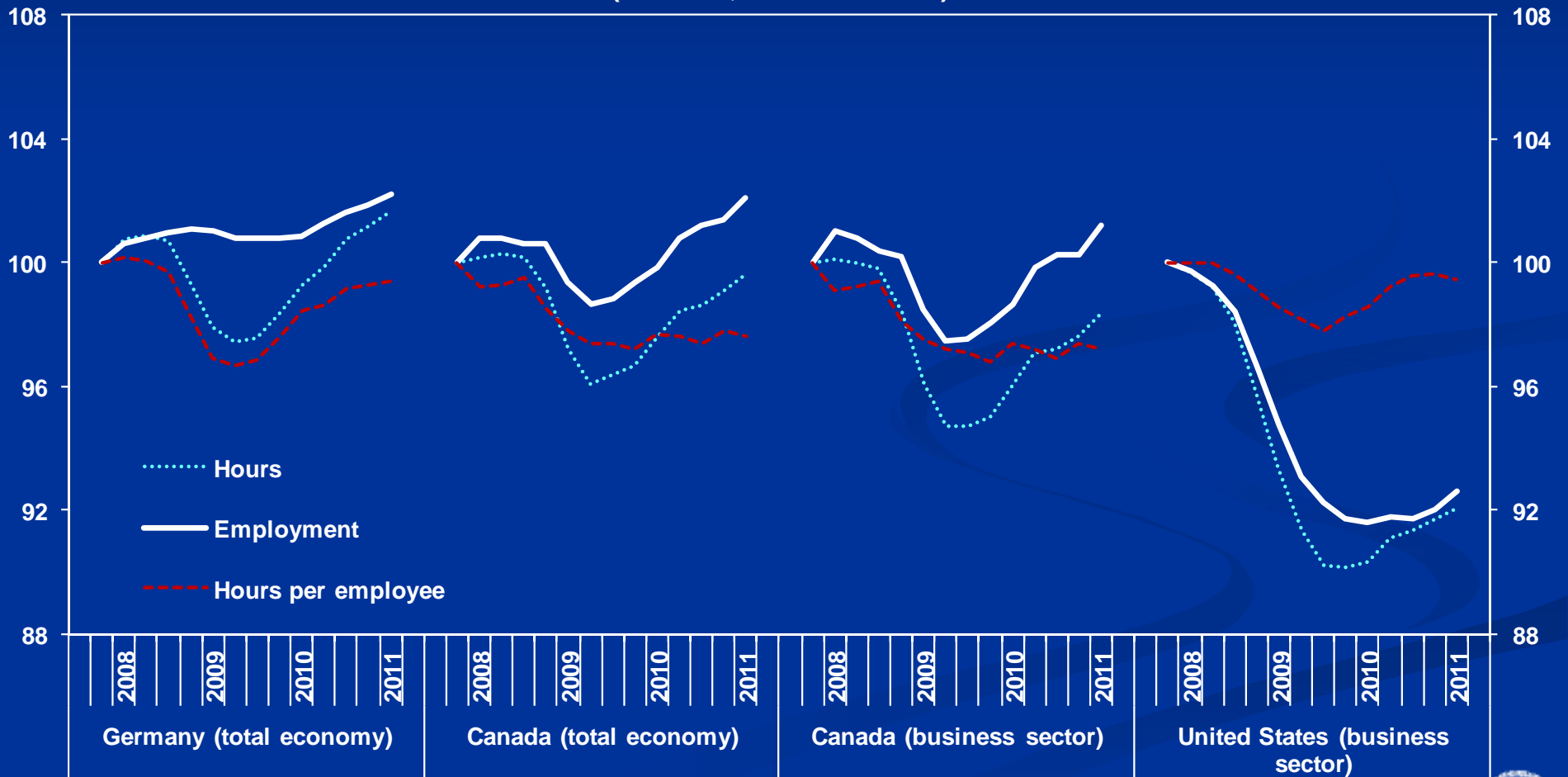X-axis categories: 1960Q1, 1962Q4, 1972Q3, 1976Q4, 1984Q3, 1992Q4, 2003Q3, 2011Q1

Is policy intervention warranted?

- Still large cyclical component, so broad policy stimulus is welcome.

- Subsidies for hiring could also help.

- Training programs (even if there are no jobs out there!)/placement services across state borders.

- Policies to tackle housing market could also be important.
    - Mortgage modifications
    - "Cramdowns"

One lesson for the future:
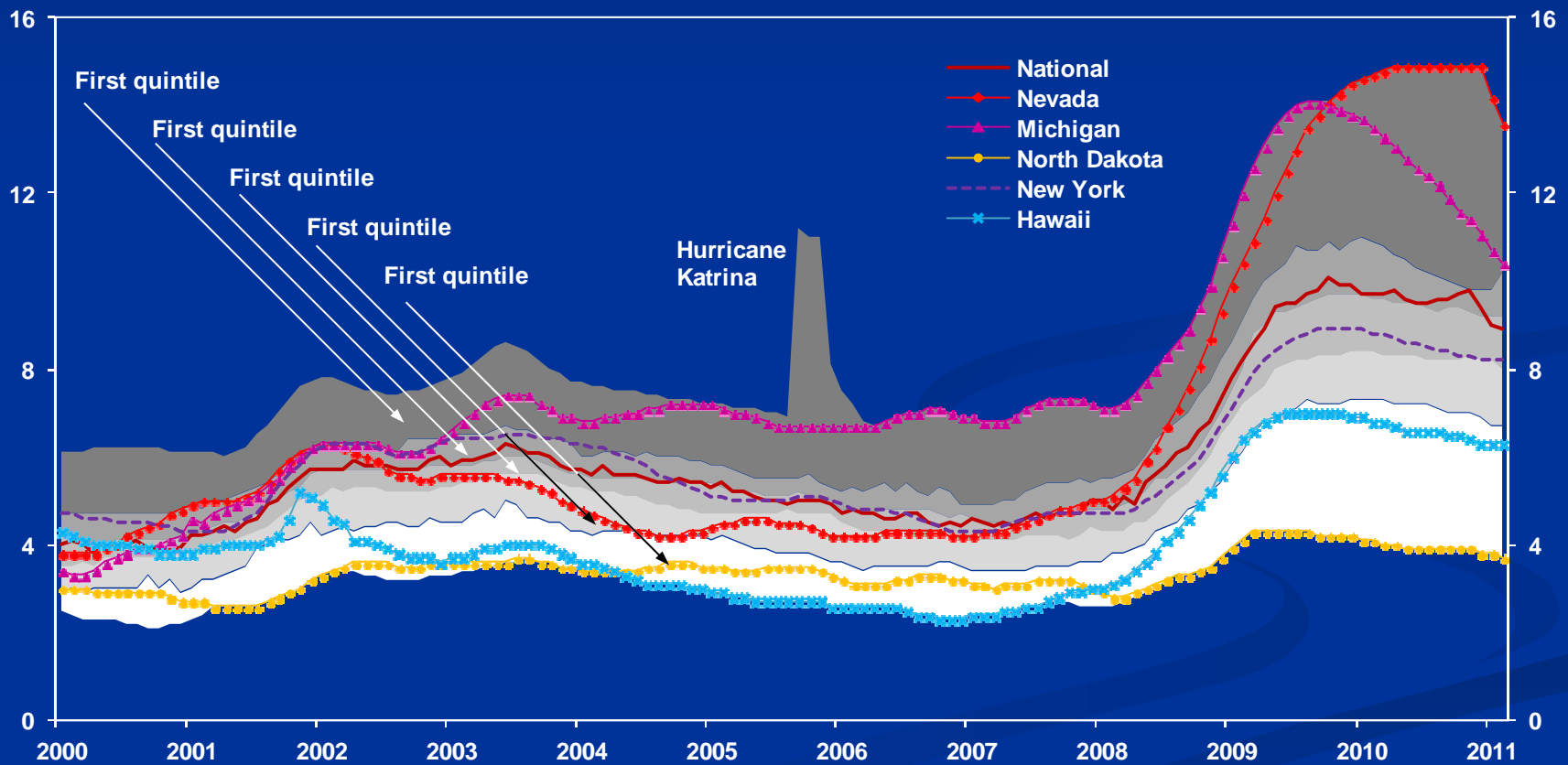# Hours versus employment adjustment

Comparison of Labor Input Cutbacks in the United States, Canada, and Germany
**(indexes, 2007:Q4 = 100)**

Legend:
- Hours (dotted)
- Employment (solid)
- Hours per employee (dashed)

X-axis groups: Germany (total economy), Canada (total economy), Canada (business sector), United States (business sector), each spanning 2008–2011.

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Thanks!

With a regional flavor…
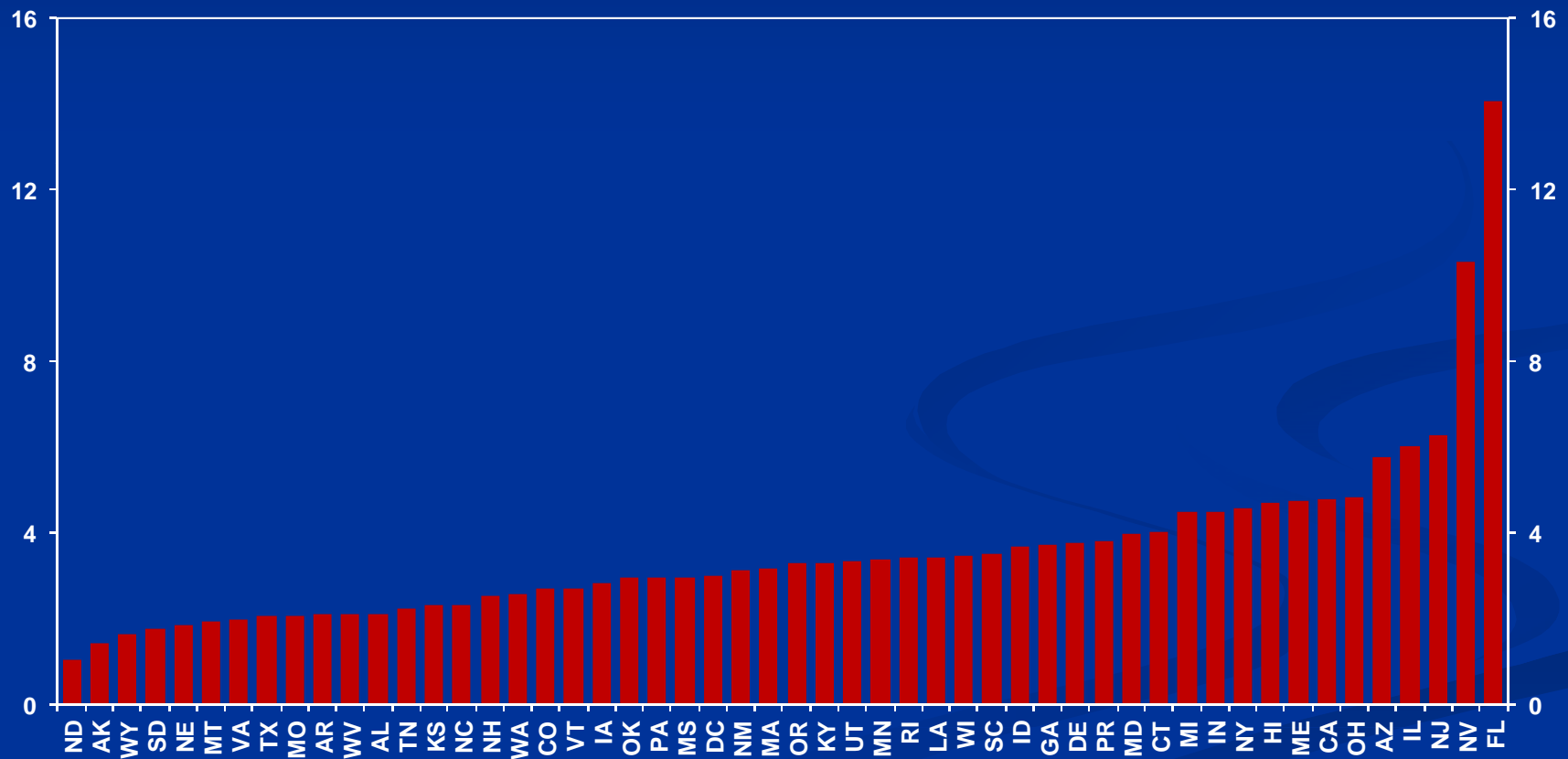
State Unemployment Rates
(percent)

… with a regional flavor (con't)

Differences in House Prices by State
(percent change, year/year)
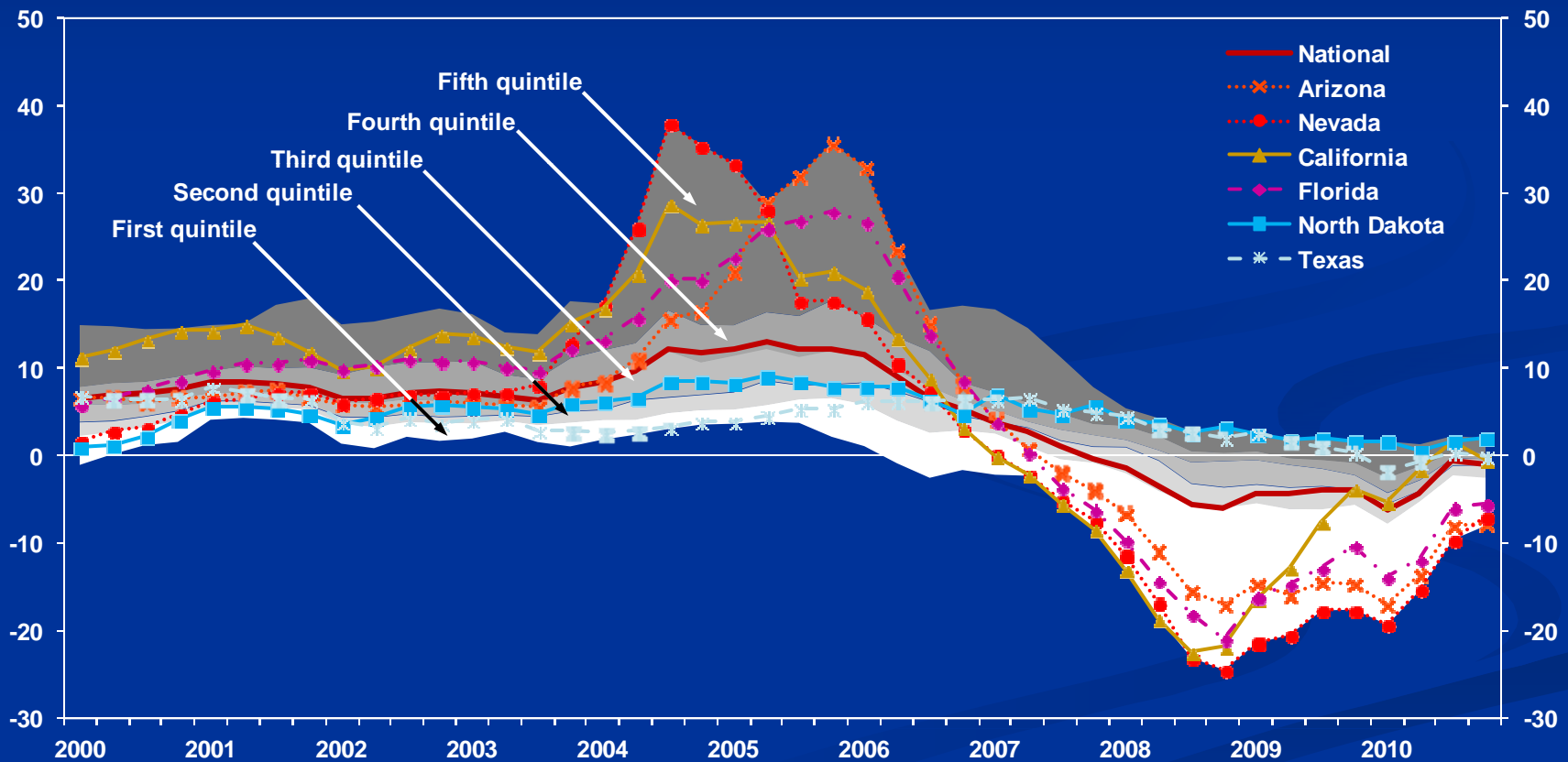
Housing conditions have also varied (cont'd)

Inventories of Foreclosed Houses by State, Second Quarter of 2010
(percent of mortgages)

Are skills mismatches on the rise?

- Skills mismatch index for each state i at time t:

$$\text{Skill Mismatch Index}_{it} = \sum_{j=1}^{3} (S_{ijt} - M_{ijt})^2$$

- Where
  - j indexes skill level, t denotes time, and i identifies state.
  - S_{ijt} is the percent of population in state i with skill level j at time t.
  - M_{ijt} is the percentage of employees in state i with skill level j at time t.

Skills supply by state

- Proportion of population 25 years of age or older with:
    - Less than a high-school diploma → low skilled.
    - High-school diploma, but less than bachelors' degree → semi-skilled.
    - Bachelors' degree or above → high skilled.
- Census data

Skills demand by state

- **Proportion of employees by skill level:**
  - Divide industries by skill level (based on proportion of employees by skill level in 2006 from the Current Population Survey).
  - Employment data from the Current Employment Statistics database.

U.S. Industries and Skill Levels

Low skilled	Semi-skilled	High skilled
Mining & Logging	Manufacturing	Information
Construction	Trade, Transportation & utilities	Financial activities
	Leisure & hospitality	Education & health care
	Other services	Professional & business services
		Government

Modeling structural unemployment

- **The model:**
  - State panel analysis.
  - Sample: 1991-2009.
  - OLS and 2SLS specifications.

$$\Delta u_{it} = \beta_s S_i + \beta_T S_t + \beta_r \Delta y_{it} + \beta_m \Delta m_{it} + \beta_h \Delta h_{it} + \beta_{mh} \Delta m_{it} \cdot \Delta h_{it} + e_{it}$$

Change in Unemployment rate

Time dummy

Log difference skill mismatch Index (SMI)

Interaction between (SMI) and housing

State dummy

Log difference state GDP (Okun)

Log difference housing

Disturbance

How to control for state-level business cycles?

- **Use different measures of state-level GDP**
  - BEA readily-available measure: subject to criticism
  - Use information on state-level employment to distribute aggregate, sector-level gross product originating data across states.
  - Magnitude (compared to cross-country and U.S. national estimates) and explanatory power in a simple difference Okun's Law as a decision criterion.

$$\Delta u_{it} = \beta_S S_i + \beta_T T_t + \beta_Y \Delta y_{it} + \eta_{it}$$

Table 3. Explaining State-Level Unemployment Rates 1/
Using Foreclosure Rates as a Proxy for State Housing Market Conditions

	(1)	(2)	(3)	(4)	(5) 2/
	Dependent variable: percentage-point change in unemployment rate *(numbers in parentheses are p-values)*				
	OLS				2SLS
Log-change in real GDP (Alternative Measure 1) 3/	-0.178*** (0.00)	-0.267*** (0.00)	-0.171*** (0.00)	-0.166** (0.00)	-0.264*** (0.00)
Log-change in skill mismatch index	0.041*** (0.00)		0.034*** (0.00)	0.032*** (0.00)	
Percentage-point (pp.) change in foreclosure rate		0.396*** (0.00)	0.362*** (0.00)	0.332*** (0.00)	0.666*** (0.00)
Log-change in skill mismatch*pp. change in foreclosure rate				0.012 (0.17)	
Time effects 4/	Yes	Yes	Yes	Yes	Yes
Fixed state effects	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.77	0.78	0.79	0.79	---
Number of states, including D.C.	51	51	51	51	51
Observations	969	969	969	969	969

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Table 4. Explaining State-Level Unemployment Rates /1
Using Housing Prices as a Proxy for State Housing Market Conditions
Alternative Measure of Skill Mismatch Shocks

	(1)	(2)	(3)	(4)
	Dependent variable: percentage-point change in unemployment rate *(numbers in parentheses are p-values)*			
	OLS			
Log-change in real GDP (Alternative Measure 1) 2/	-0.200*** (0.00)	-0.252*** (0.00)	-0.195** (0.02)	-0.186** (0.03)
Std. deviation of sectoral employment growth	0.113*** (0.00)		0.071*** (0.00)	0.109*** (0.00)
Log-change in FHFA house price index		-0.028*** (0.00)	-0.029*** (0.00)	-0.005 (0.61)
Std. deviation of sectoral employment growth*log-change FHFA house				-0.011*** (0.00)
Time effects 3/	Yes	Yes	Yes	Yes
Fixed state effects	Yes	Yes	Yes	Yes
Adj. R-squared	0.77	0.78	0.78	0.79
Number of states, including D.C.	51	51	51	51
Observations	969	969	969	969