The Disappointing Recovery in Output after 2009

Fernald, Hall, Stock, and Watson
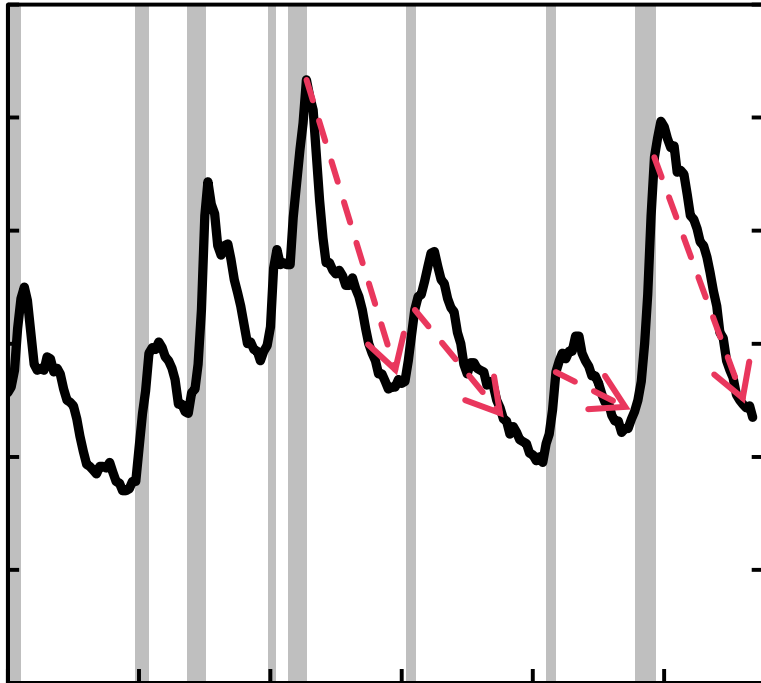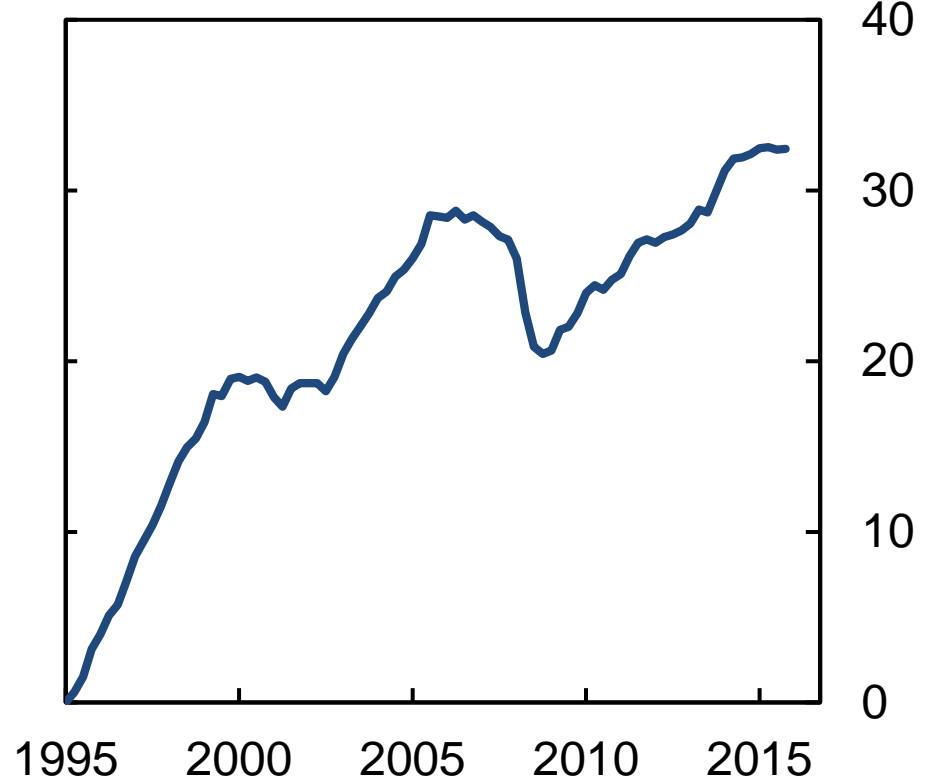
March 23, 2017

Unemployment has fallen relatively fast
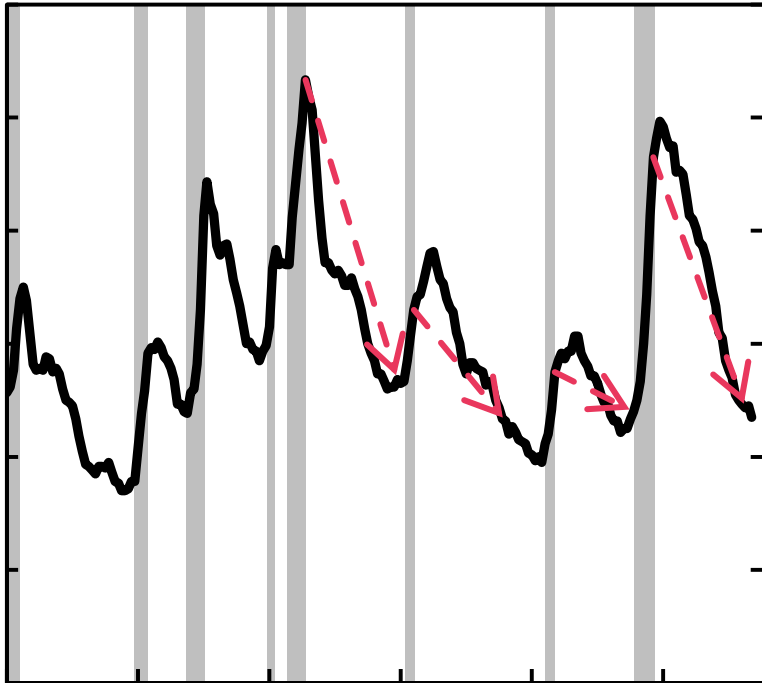
Question: Why has output grown so slowly since 2009?

Output per capita, business Log level

Answer: Deep recession superimposed upon slowing trend

Output per capita, business Log level

Cyclically adjusted by Okun's Law
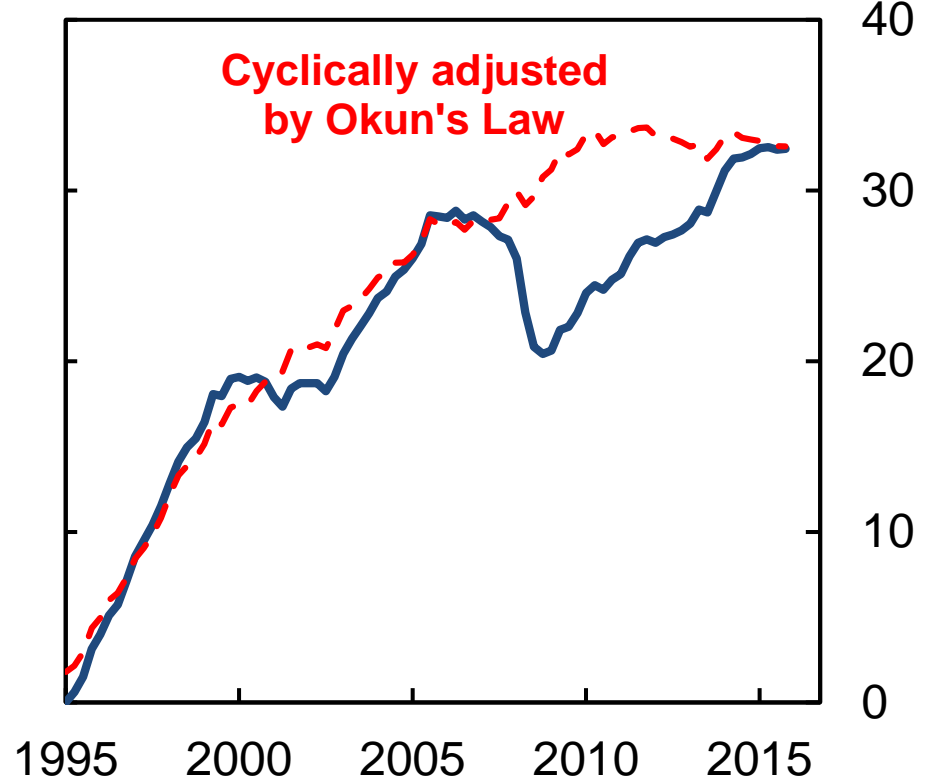
Answer: Deep recession superimposed upon slowing trend
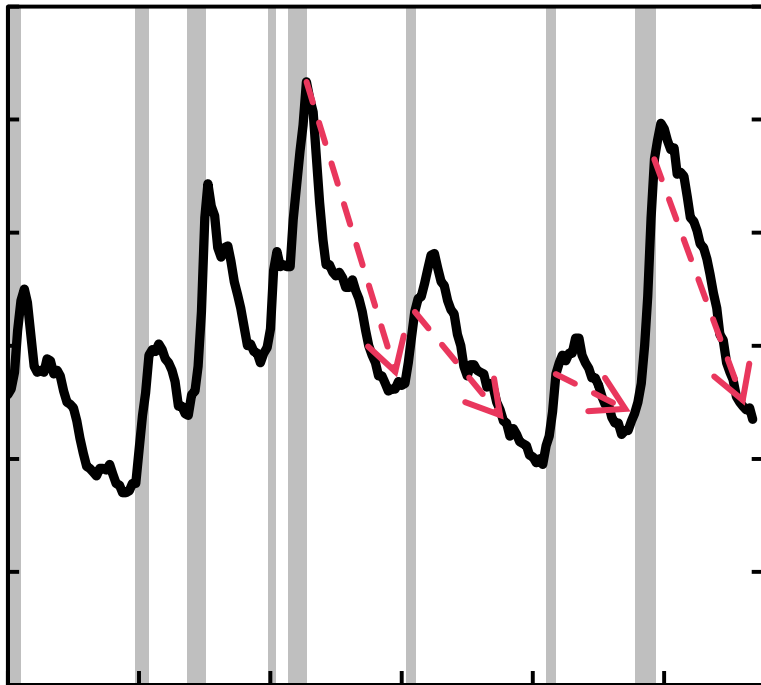
Output per capita, business Log level
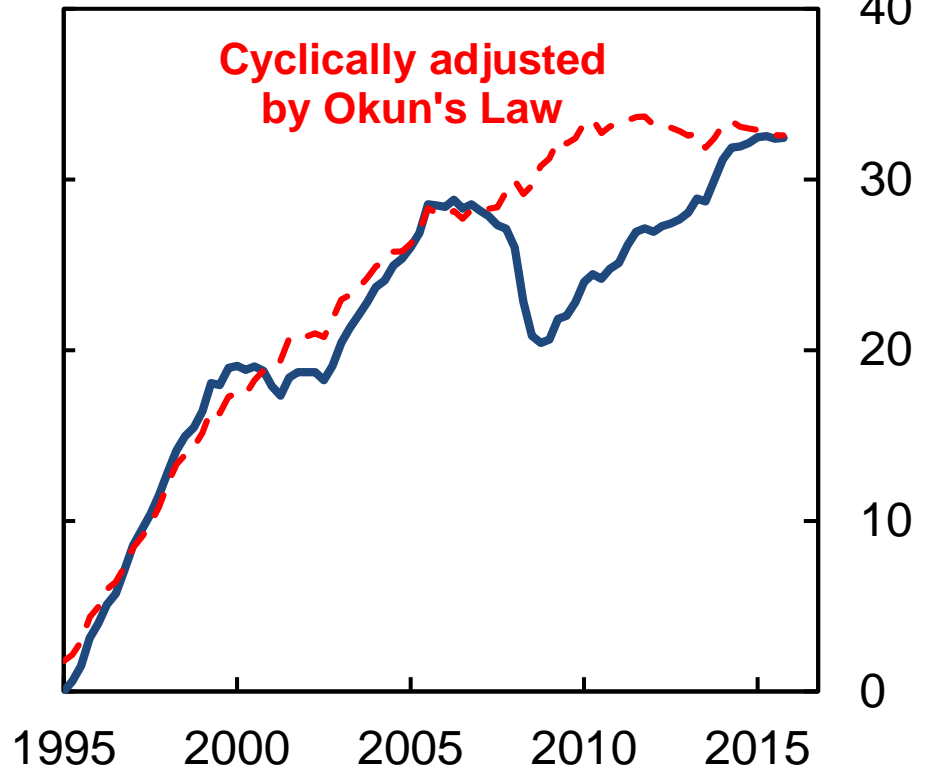
- TFP has grown slowly and labor force participation plunged
  - Powerful forces independent of the recession and slow recovery itself

Controlling for cyclical recovery from deep recession

- Decompose variable y_t into trend (μ_t)-cycle (c_t)-irregular (z_t):

$$Y_t = \mu_t + c_t + z_t$$

- <u>Method 1</u>: (Discussed in paper) Dynamic factor model from 2009 perspective to get $\widehat{\mu}_t + \widehat{c}_t$

- <u>Method 2</u>: Okun's Law to control for cycle (c_t).

$$Y_t = \mu_t + \beta(L)\Delta U_t + z_t$$

  - Cyclically adjusted "residual": $y_t - \widehat{c}_t = y_t - \widehat{\beta}(L)\Delta U_t = \widehat{\mu}_t + \widehat{z}_t$

Hours per capita and labor productivity fall short

	Data, Post-2009 recovery	Cyclically adjusted			
		Post-2009 recovery	Three previous recovs.	Shortfall (c)-(b)	Cumul. shortfall
	(a)	(b)	(c)	(d)	(e)
Bus. output per capita	1.7	0.3	2.1	**1.8**	**13.5**
Bus. labor hours per capita	0.6	-0.8	-0.1	0.7	5.0
Output/ hour (labor prod.)	1.1	1.0	2.1	1.1	8.1

Entries are percent or percentage point differences. Columns (a) to (d) are annualized. "Three previous recoveries" average the first 28 quarters from the troughs of 1982 and 1991, and the 24 quarters of the expansion after the 2001 trough.

TFP explains shortfall in labor productivity

$$\Delta \log(\text{Output}) = \Delta \log TFP + \alpha \Delta \log(\text{Capital}) + (1\text{-}\alpha)\Delta \log\left(\text{Hours*Labor Qual.}\right)$$

$$\Rightarrow \Delta \log\left(\frac{\text{Output}}{\text{Hour}}\right) = \frac{\Delta \log TFP}{(1-\alpha)} + \left(\frac{\alpha}{1-\alpha}\right) \cdot \Delta \log\left(\frac{\text{Capital}}{\text{Output}}\right) + \Delta \log\left(\text{Labor Qual.}\right)$$

	Data, Post-2009 recovery	Cyclically adjusted			
		Post-2009 recovery	Three previous recovs.	Shortfall (c)-(b)	Cumul. shortfall
	(a)	(b)	(c)	(d)	(e)
Output/ hour (labor prod.)	1.1	1.0	2.1	1.1	8.1
TFP / (1 -α)	1.4	0.5	1.5	**1.0**	**7.0**
(Cap/output)×α/(1-α)	-0.7	0.1	0.2	0.1	0.6
Labor quality	0.3	0.4	0.5	0.1	0.4

Entries are percent or percentage point differences. Columns (a) to (d) are annualized.

TFP (not capital) explains weak labor productivity growth

(Capital/output)·(α/(1-α))
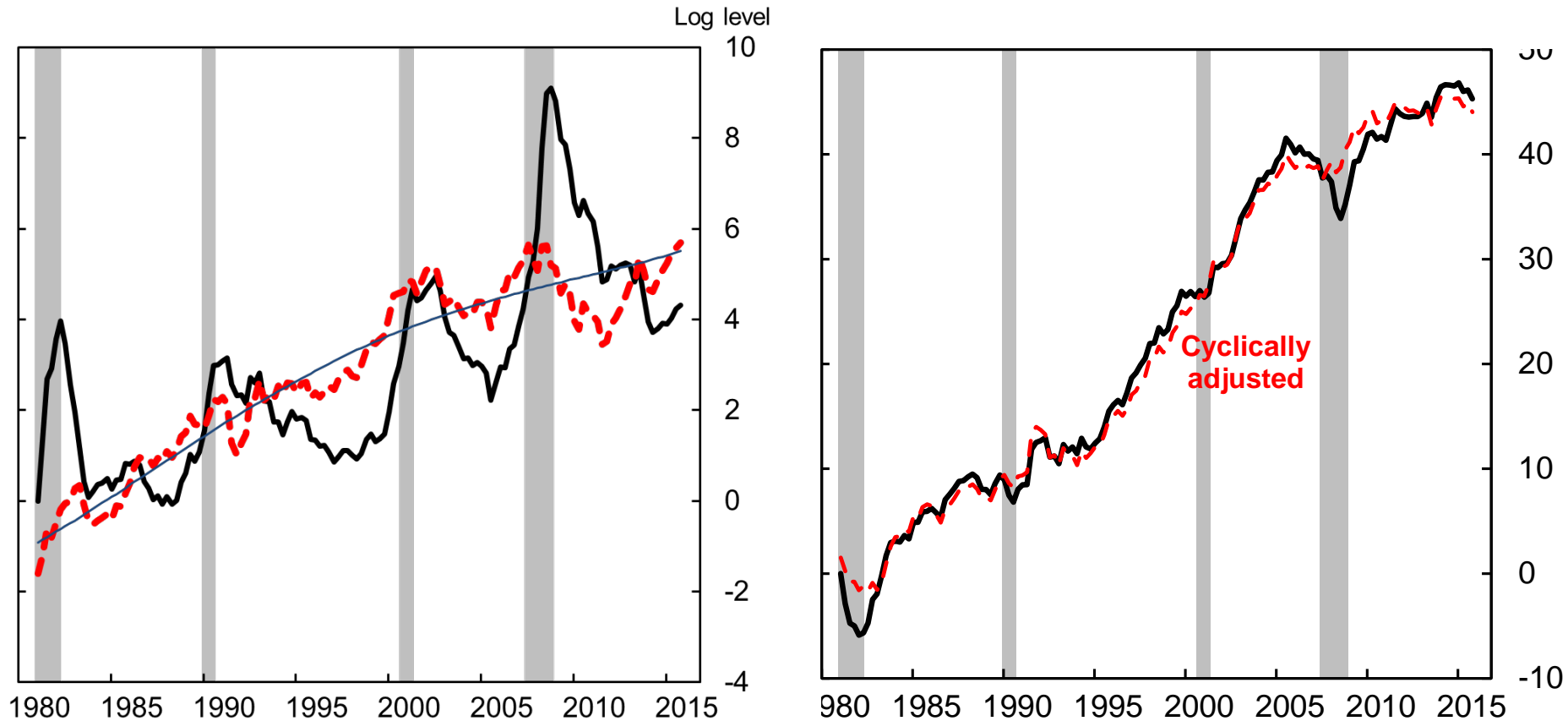
Notes: Cumulated log changes (times 100), normalized to have same means over period shown. Biweight trend (BW=60 quarters) in left panel estimated on cyclically adjusted data 1947-2016.

Timing suggests recession didn't cause weak TFP growth

- Intuitive that innovation might fall in recessions
  - Recent examples of this (old) story: Reifschneider, Wascher, and Wilcox (2013), Anzoategui et al (2016), others
- Challenge for U.S.: TFP slowed before recession

Non-recession stories for slow TFP growth

- Mismeasurement got worse?
  - No evidence (Byrne et al, 2016, Syverson, 2016)
- Regulation/lack of dynamism?
  - Timing doesn't work for post-2008 regulation. Besides:
    - TFP in energy, finance-intensive industries do *better* after 2008
  - No link between industry TFP growth and industry-specific regulation
- Return to normal after exceptional IT-linked decade?
  - Unusual period was late 1990s/early 2000s (Gordon 2016; Fernald 2015)
 - Every story at time emphasized transformative role of IT

Participation explains shortfall in hours per capita

$$\text{hours/capita} = \left(\frac{\text{hours}}{\text{worker}}\right) \times \left(\frac{\text{workers}}{\text{HH empl}}\right) \times \left(\frac{\text{HH empl}}{\text{Lab. force}}\right) \times \left(\frac{\text{Lab. force}}{\text{Pop.}}\right)$$

	Data, Post-2009 recovery	Cyclically adjusted			
		Post-2009 recovery	Three previous recovs.	Shortfall (c)-(b)	Cumul. shortfall
	(a)	(b)	(c)	(d)	(e)
Bus. labor hours per capita	0.6	-0.8	-0.1	0.7	5.0
Hrs/worker, business	0.2	-0.1	-0.1	0.0	-0.2
Bus. empl / CPS empl	0.4	0.0	-0.1	-0.1	-0.8
CPS employment rate	0.7	0.0	0.0	0.0	0.0
Lab. Force Partic. Rate	-0.7	-0.7	0.2	**0.8**	**6.1**

Entries are percent or percentage point differences. Columns (a) to (d) are annualized.

Hours per capita fell because participation fell
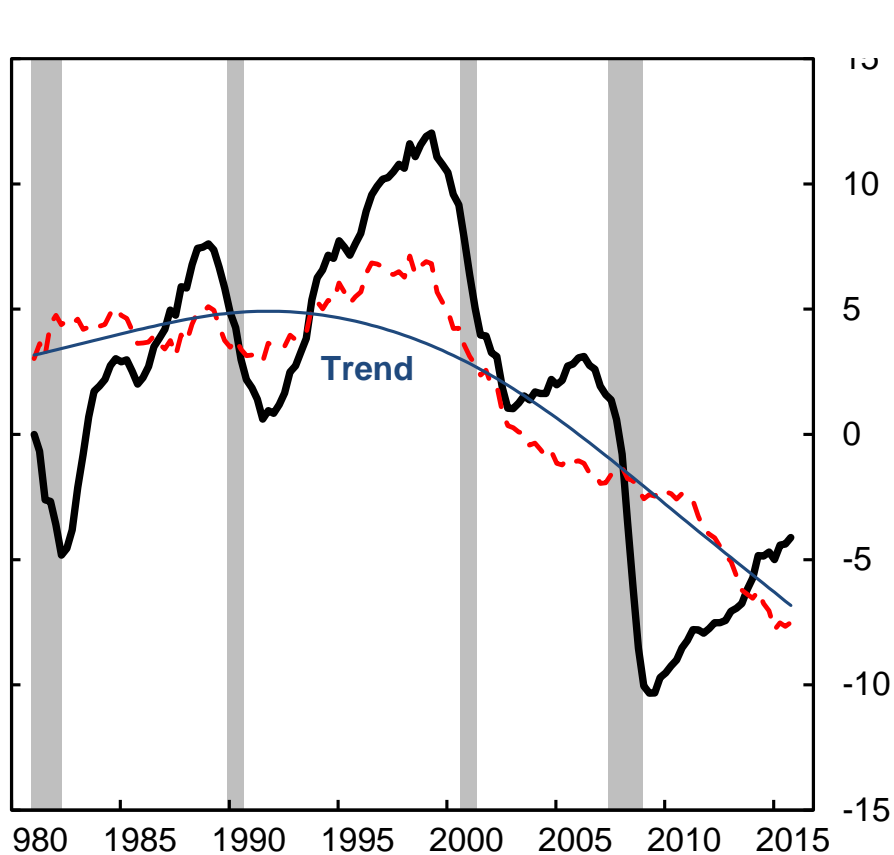
Participation rate
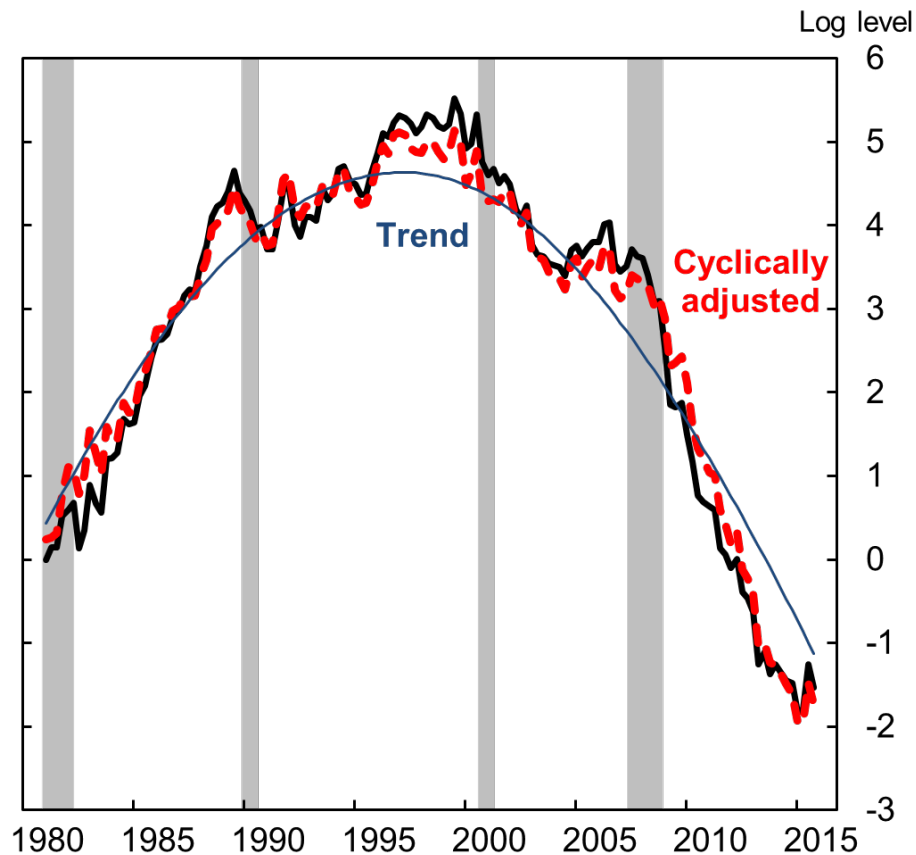
Notes: Cumulated log changes (times 100), normalized to have same means over period shown. Biweight trend (BW=60 quarters) estimated on cyclically adjusted data 1947-2016.

Did weak aggregate demand matter?

- Headwinds plausibly *delayed* the recovery to full employment
  - DFM: Government spending unusually low relative to 2009 forecast

Takeaway: Deep recession superimposed on slowing trend

- Disappointing growth since 2009 from non-cyclical slow TFP growth and falling participation

- Will growth pick up in the future?
  - Population is still aging, educational attainment has plateaued, and cyclical boost is behind us…So the headwinds are fierce.