

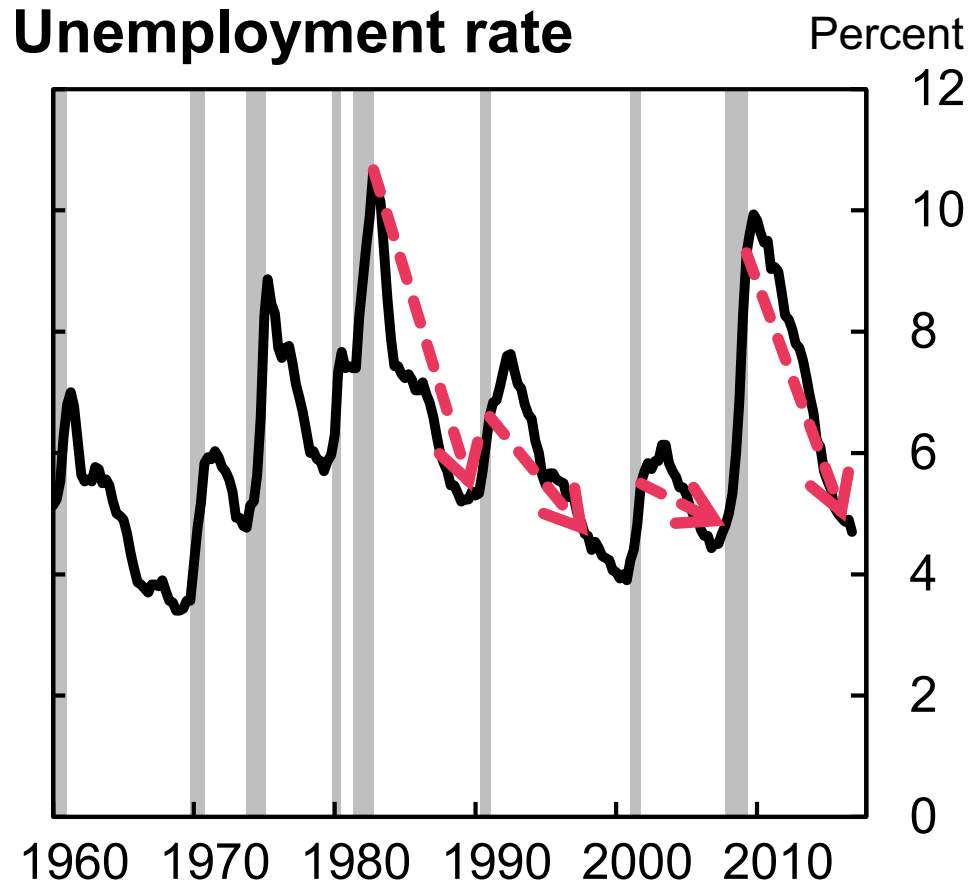
The Disappointing Recovery in U.S. Output after 2009

Fernald, Hall, Stock, and Watson

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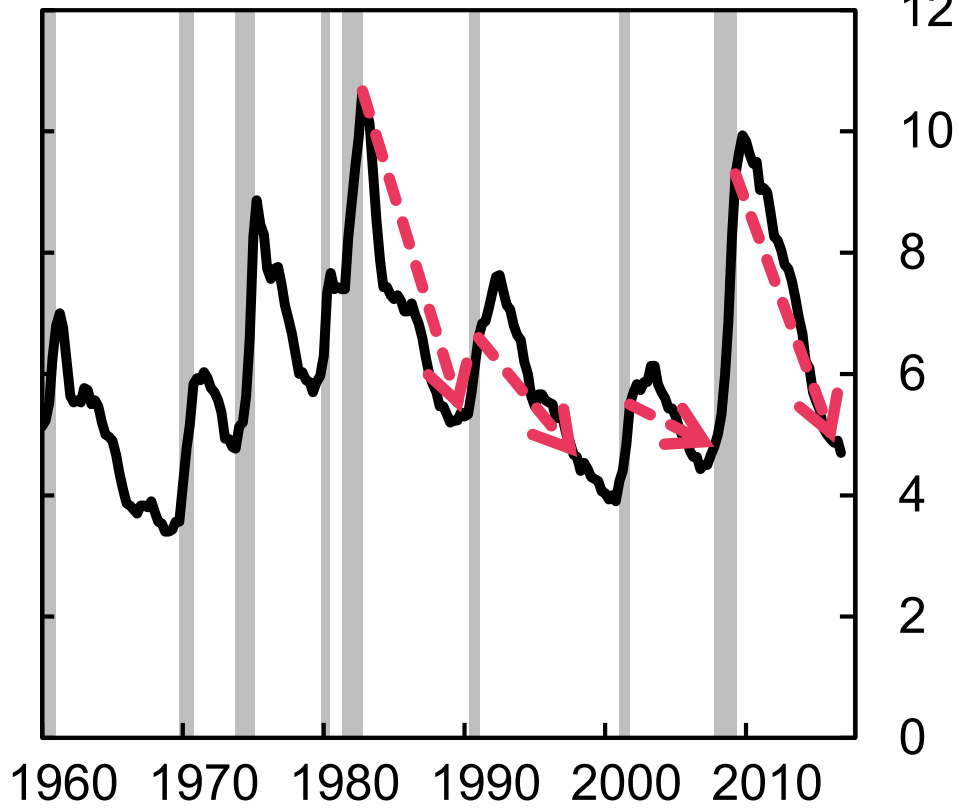
U.S. unemployment has fallen relatively fast



Question: Why has output grown so slowly since 2009?

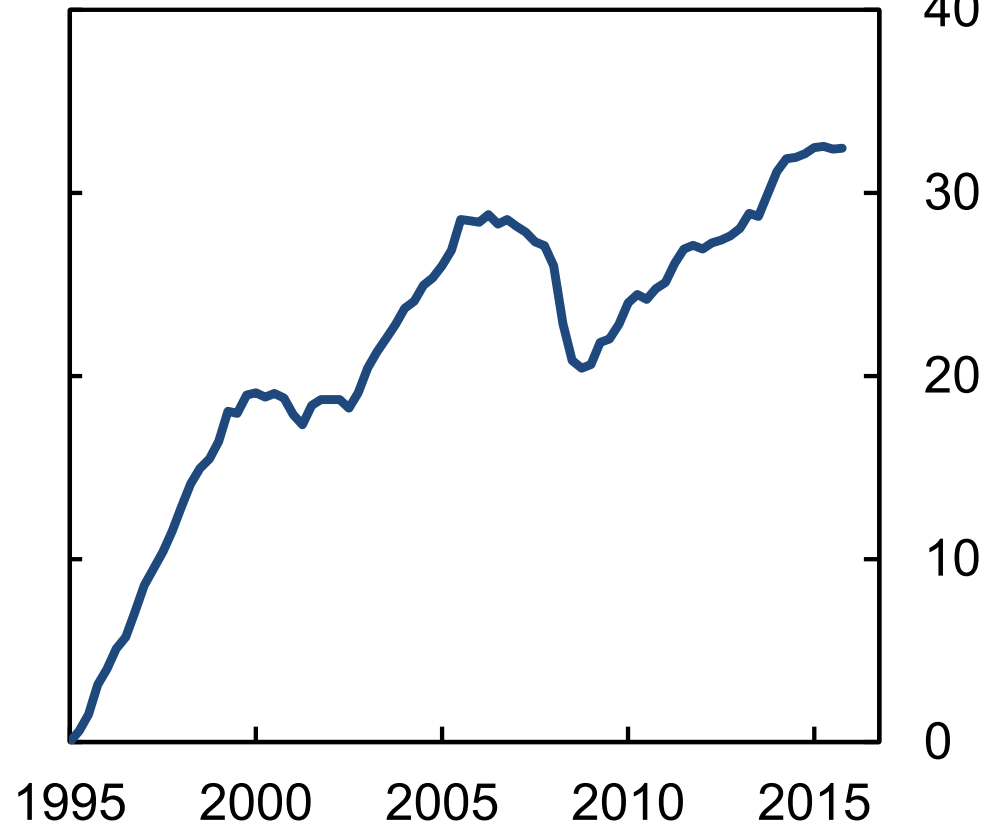
Unemployment rate

Percent



Output per capita, business

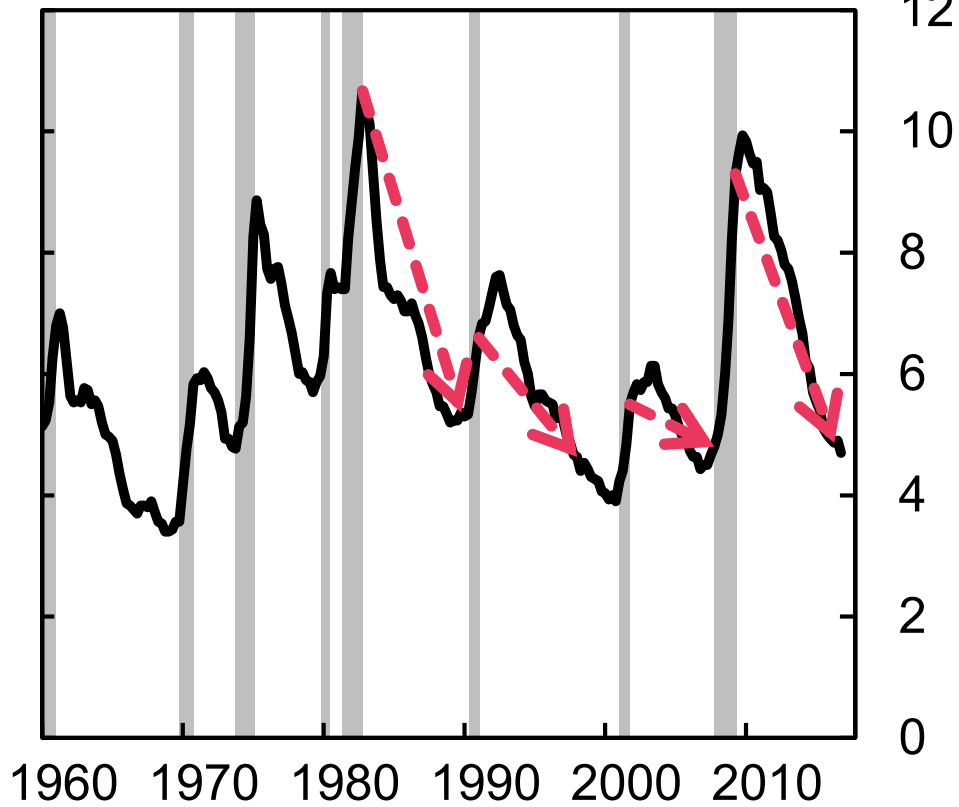
Log level



Answer: Deep recession superimposed upon slowing trend

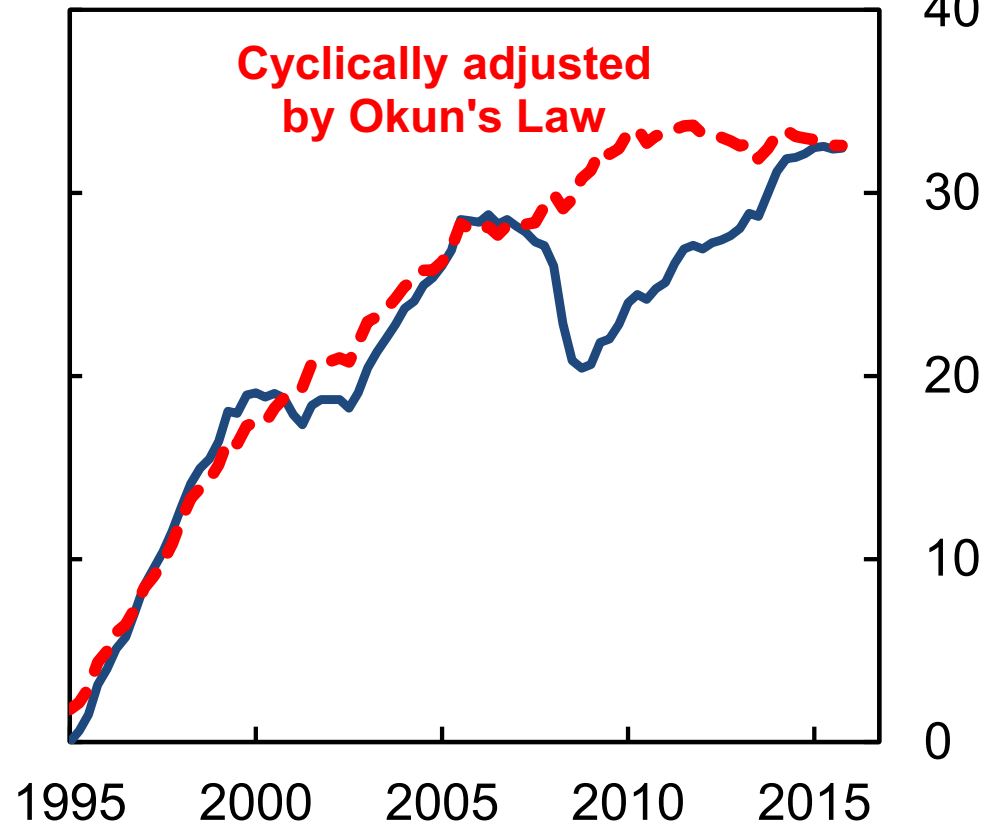
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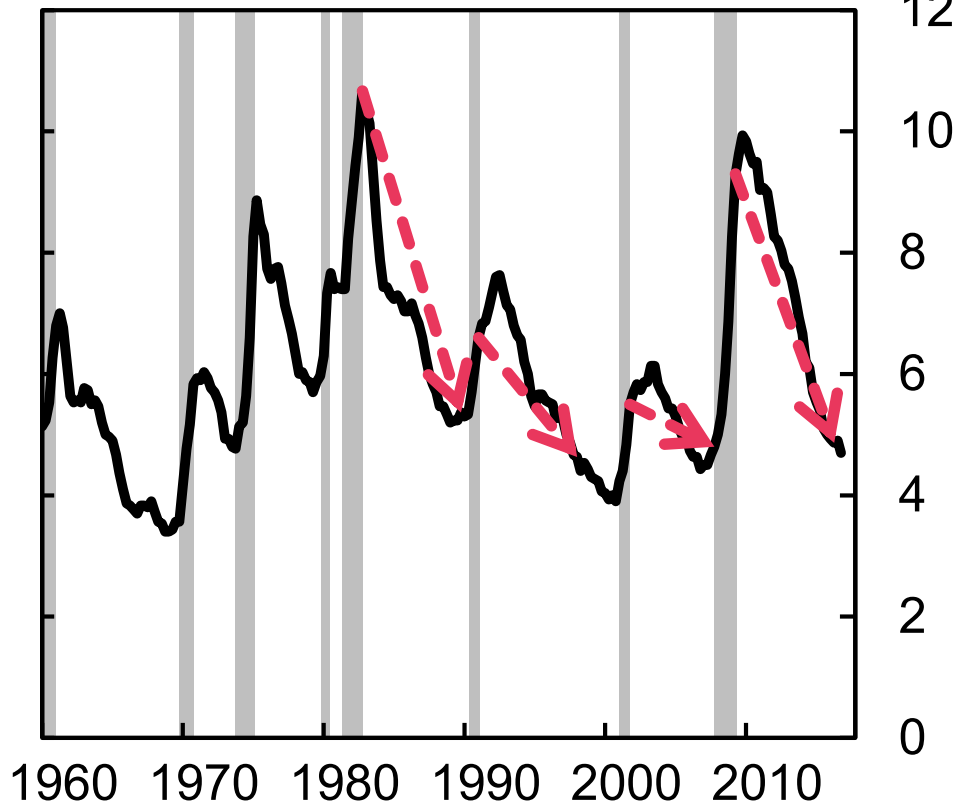
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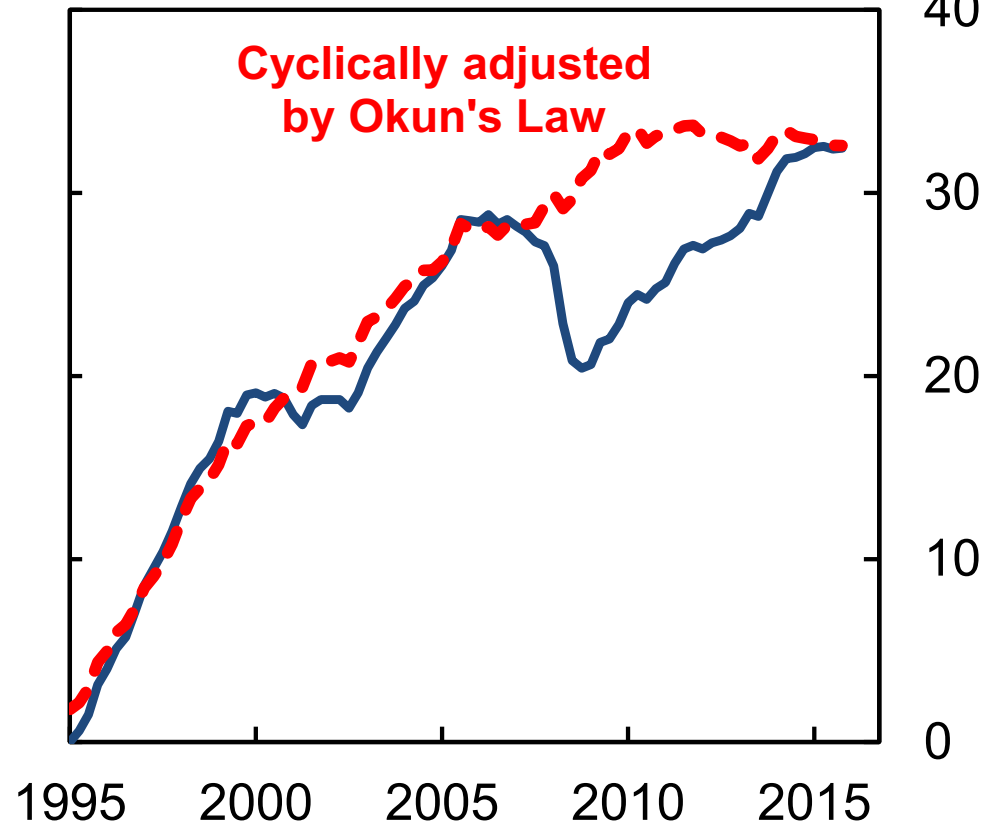
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Log level



- 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 Δy_t into trend (μ_t)-cycle (c_t)-irregular (z_t):

$$\Delta y_t = \mu_t + c_t + z_t$$

- Method 1: (Discussed in paper) Dynamic factor model from 2009 perspective to get $\hat{\mu}_t + \hat{c}_t$
- Method 2: Okun's Law to control for cycle (c_t).

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

– Cyclically adjusted “residual”: $y_t - \hat{c}_t = y_t - \hat{\beta}(L)\Delta U_t = \hat{\mu}_t + \hat{z}_t$

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)
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

	Data, Post-2009 recovery	Cyclically adjusted			
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TFP explains shortfall in labor productivity

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

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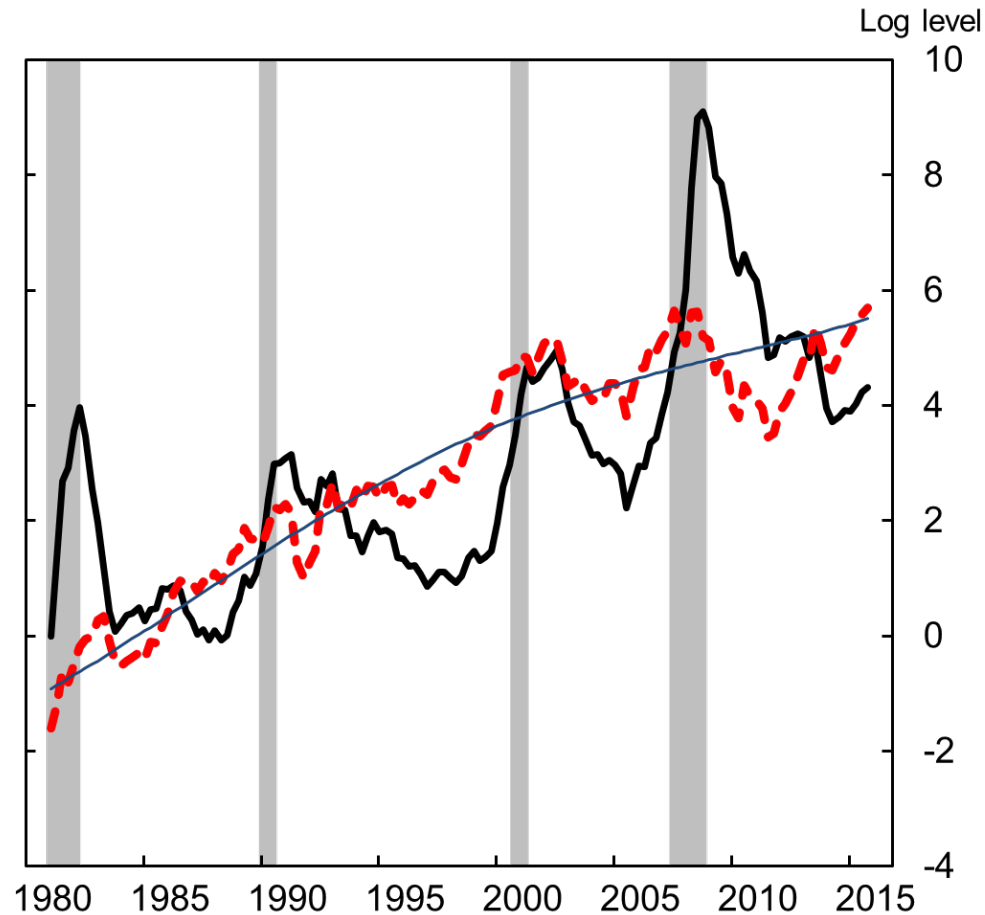
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TFP / (1 - α)	1.4	0.5	1.5	1.0	7.0
(Cap/output) $\times\alpha/(1-\alpha)$	-0.7	0.1	0.2	0.1	0.6
Labor quality	0.3	0.4	0.5	0.1	0.4

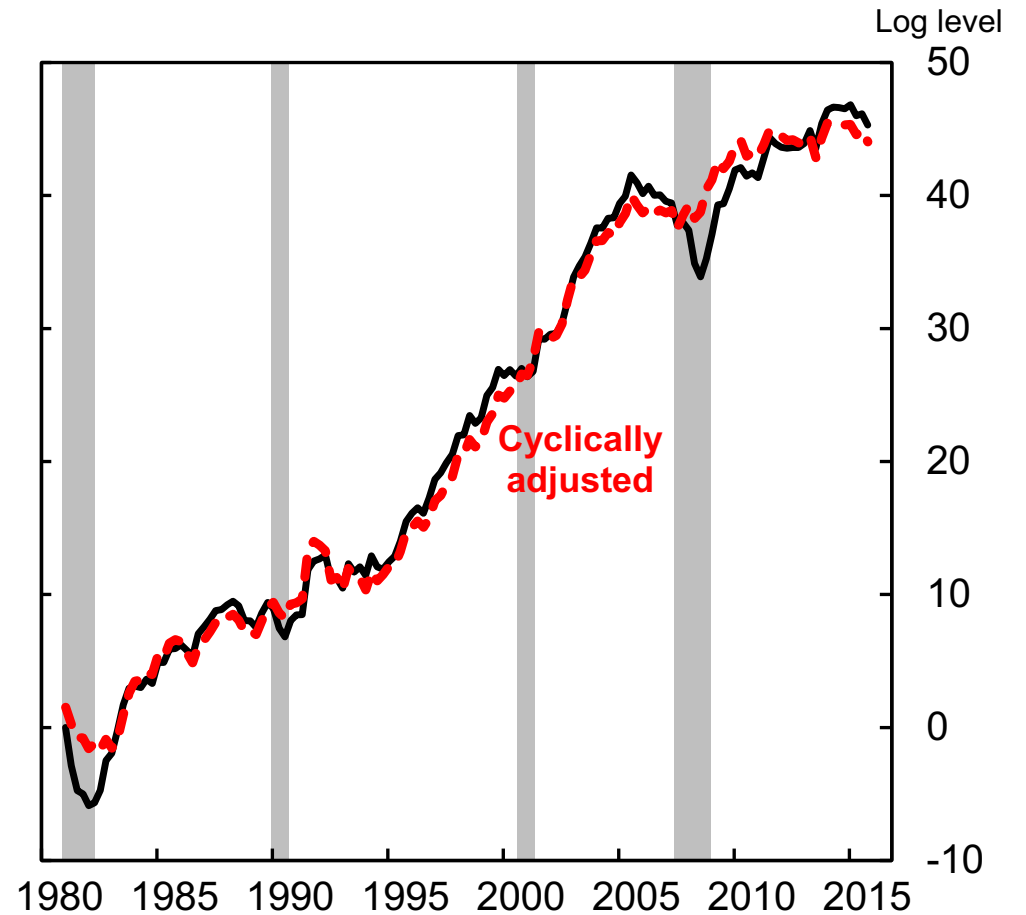
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TFP (not capital) explains weak labor productivity growth

$(\text{Capital/output}) \cdot (\alpha / (1 - \alpha))$



TFP/(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
 - Stadler (1990), Fatás (2000), Reifschneider, Wascher, and Wilcox (2013), Anzoategui et al (2016), others
- Challenge for U.S.: TFP slowed before recession
 - Pre-recession recognition—e.g., Oliner, Sichel, and Stiroh (2007); Jorgenson, Ho, and Stiroh (2008)
 - SPF 10-year productivity projections had already fallen ½ percentage point between 2005 and (January) 2008

Non-recession stories for slow TFP growth

- 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
- Mismeasurement got much worse than in past?
 - Little evidence (Byrne et al, 2016, Syverson, 2016)
- 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

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Participation explains shortfall in hours per capita

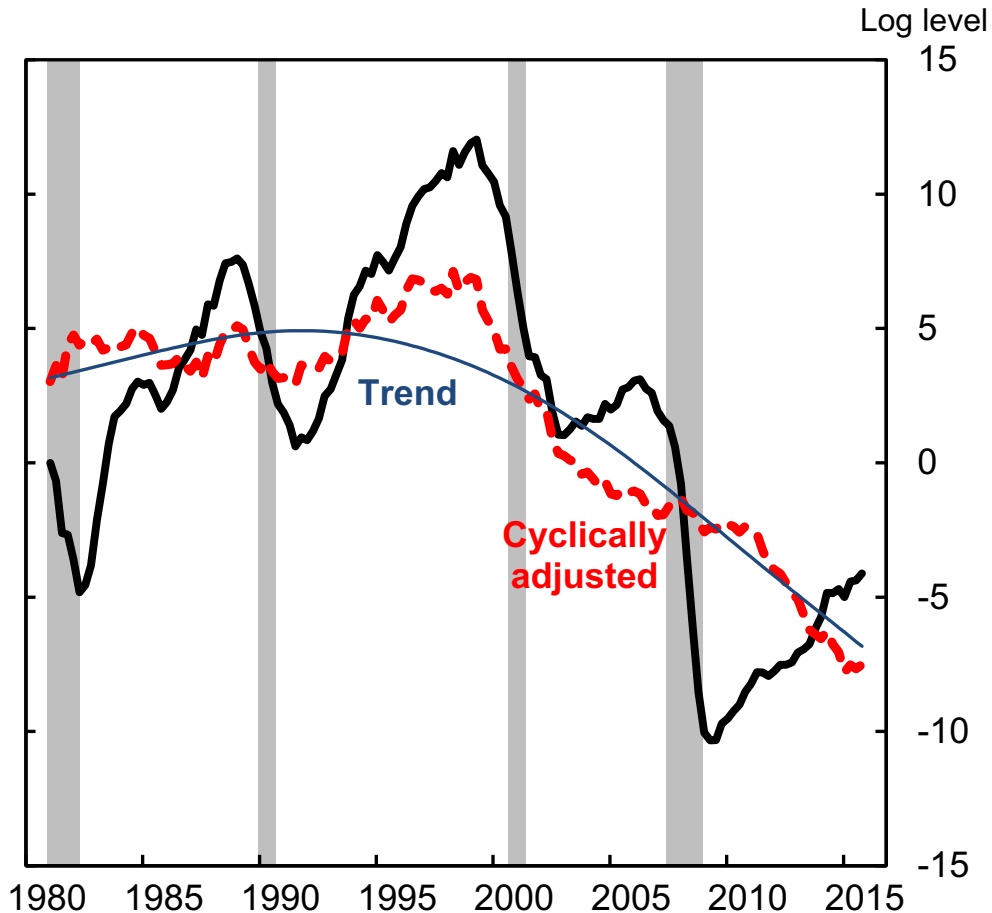
$$\text{hours/capita} = \left(\frac{\text{hours}}{\text{worker}} \right) \times \left(\frac{\text{workers}}{\text{HH empl}} \right) \times \left(\frac{\text{HH empl}}{\text{Lab. force}} \right) \times \left(\frac{\text{Lab. force}}{\text{Pop.}} \right)$$

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		(a)	(b)	(c)	(d)
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

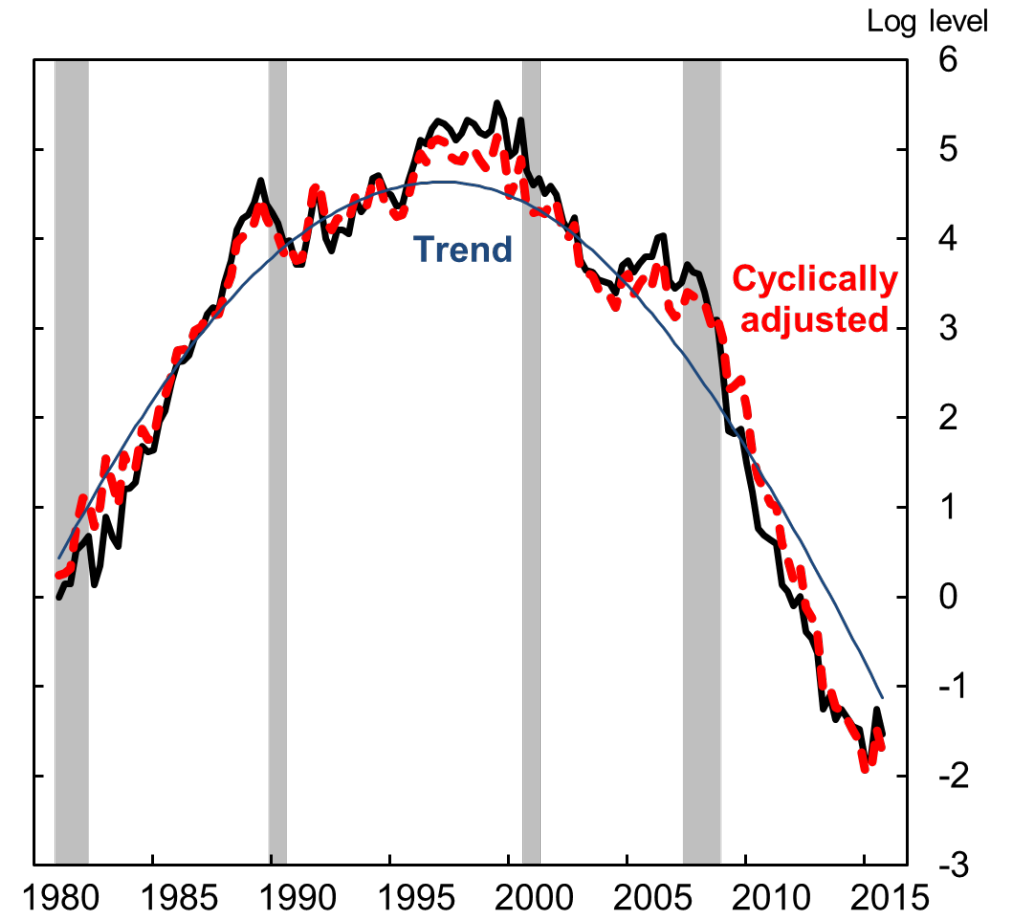
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Hours per capita fell because participation fell

Hours per capita



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.

