A NEW MEASURE OF THE UNEMPLOYMENT GAP

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UNEMPLOYMENT GAP: KEY FOR STABILIZATION POLICIES

- in practice
  - US Humphrey–Hawkins Full Employment Act of 1978: government must maintain the economy at “full employment”
  - “full employment” $\neq$ zero unemployment
  - so need distance from “full employment”
- in theory
  - departure from efficiency
  - scope for stabilization through monetary policy, fiscal policy, social insurance, etc.

EXISTING MEASURES OF UNEMPLOYMENT GAP

- only US measure: CBO'S detrended unemployment
  - premise: unemployment is efficient on average
  - not true in most models
- real-time measurement: “impractical” [Hall 2005]; “extraordinarily difficult” [Mankiw 2005]
  - Hosios approach: issues with Nash bargaining
  - structural approach: neoclassical shocks are unobservable
  - Phillips-curve approach: NAIRU is imprecisely estimated

UNEMPLOYMENT GAP IN THIS PAPER

- formula based on matching model (DMP)
- sufficient-statistic approach
  - formula applies to any wage setting & labor demand
  - statistics are measurable in real time
- direct policy implications
  - monetary policy
  - fiscal policy

LABOR-MARKET MODEL

NOTATION

- labor force: h
- employment: $l(t) < h$
- unemployment: $h - l(t)$
- unemployment rate: $u(t) = [h - l(t)]/h$
- vacancies: $v(t)$
- labor market tightness: $\theta(t) = v(t)/[h - l(t)]$

MATCHING FUNCTION

- matching function: $m(t) = \omega\,[h - l(t)]^{\eta}\, v(t)^{1-\eta}$
  - $\eta \in (0, 1)$: matching elasticity
- job-finding rate:

$$f(\theta(t)) = \frac{m(t)}{h - l(t)} = \omega\theta(t)^{1-\eta}$$

- vacancy-filling rate:

$$q(\theta(t)) = \frac{m(t)}{v(t)} = \omega\theta(t)^{-\eta}$$

UNEMPLOYMENT RATE

- employment relationships separate at rate s
- given θ and s, unemployment rate converges to

$$u(\theta) = \frac{s}{s + f(\theta)}$$

- very fast convergence: we assume $u(t) = u(\theta(t))$
- then employment is

$$l(\theta) = [1 - u(\theta)]\, h$$

RECRUITING WEDGE

- ρ recruiters devoted to each vacancy
- employment (l) = producers (n) + recruiters

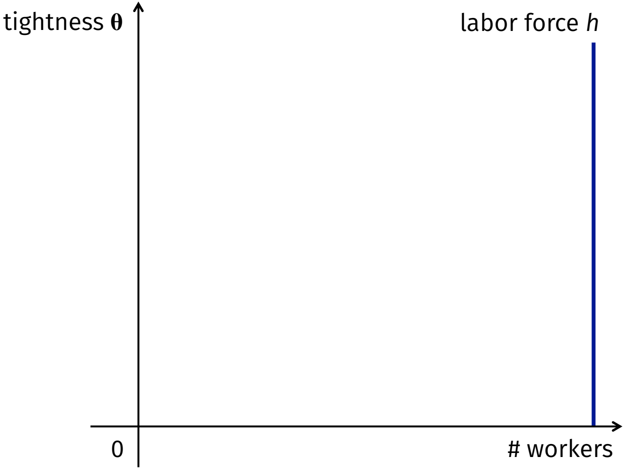
$$l = n + \rho \cdot v = n + \rho \cdot \frac{sl}{q(\theta)}$$

$$\text{so} \quad l = [1 + \tau(\theta)]\, n \quad \text{with} \quad \tau(\theta) \equiv \frac{s\rho}{q(\theta) - s\rho}$$

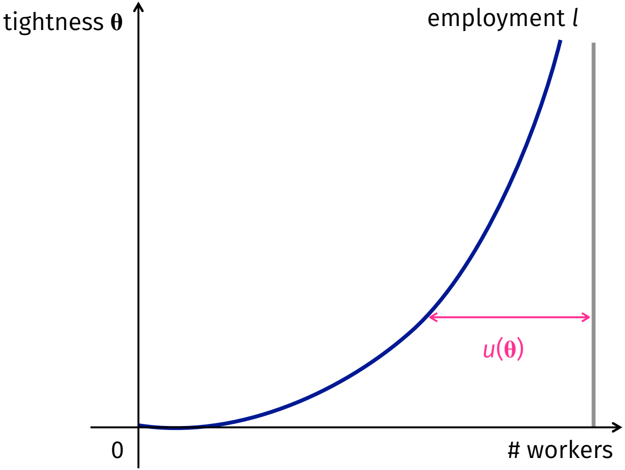
- $\tau(\theta) > 0$: recruiting wedge = # recruiters per producer
- number of producers is

$$n(\theta) = \frac{l(\theta)}{1 + \tau(\theta)}$$

LABOR MARKET: SUPPLY SIDE



LABOR MARKET: SUPPLY SIDE



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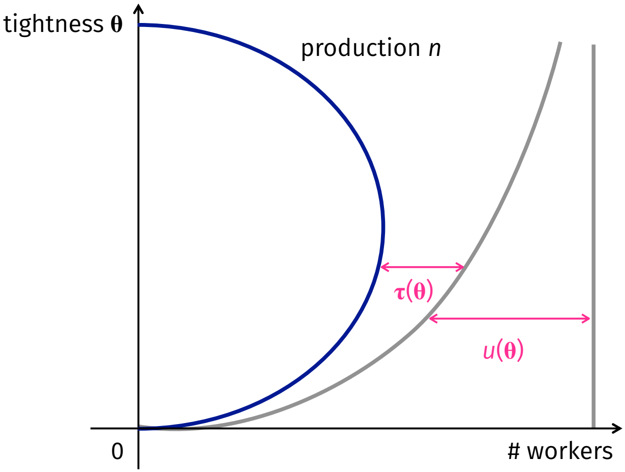

NONPECUNIARY VALUE OF UNEMPLOYMENT

- nonpecuniary value per jobseeker: $z < 1$
- amount of “services” produced during unemployment, relative to employment
  - home production
  - leisure
- no guarantee that $z > 0$
  - loss of mental health
  - loss of physical health
  - loss of human capital

AGGREGATE CONSUMPTION

- # producers in firms: $n(\theta)$
- # producers at home: $z \times [u(\theta)h]$
- aggregate # of producers: $n(\theta) + zu(\theta)h$
- aggregate consumption: $F(n(\theta) + zu(\theta)h)$
  - F: aggregate production function
- hence social welfare is determined by $n(\theta) + zu(\theta)h$

MEASURING THE UNEMPLOYMENT GAP

EFFICIENT TIGHTNESS

- efficient tightness θ^* maximizes social welfare $sw(\theta)$
- $sw'(\theta^*) = 0$ implicitly defines θ^*

$$u(\theta^*) = \frac{\eta}{1-\eta} \cdot \frac{\tau(\theta^*)}{1 - [1 + \tau(\theta^*)]\, z}$$

- θ^* depends on
  - matching process: η, $\tau(\cdot)$, $u(\cdot)$
  - nonpecuniary value of unemployment: z

EFFICIENT UNEMPLOYMENT

- first-order expansion of $\tau(u)$ from current u:

$$\ln(\tau^*) - \ln(\tau) = \frac{d\ln(\tau)}{d\ln(u)} \cdot [\ln(u^*) - \ln(u)]$$

- where

$$\frac{d\ln(\tau)}{d\ln(u)} = -\frac{\eta}{1-\eta} \cdot \frac{1+\tau}{1-u}$$
$$\tau^* = \frac{(1-z)u^*}{\eta/(1-\eta) - zu^*}$$

- given η, z, u, τ, solve for u^* in first-order expansion

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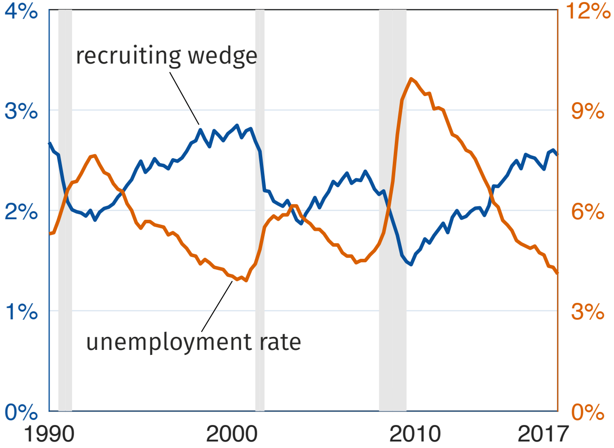
MATCHING ELASTICITY: $\eta = 0.6$

	η	source
Petrongolo, Pissarides [2001]	0.5–0.7	metastudy
Shimer [2005]	0.7	CPS
Rogerson, Shimer [2011]	0.6	JOLTS
Borowczyk-Martins, Jolivet, Postel-Vinay [2013]	0.3	JOLTS

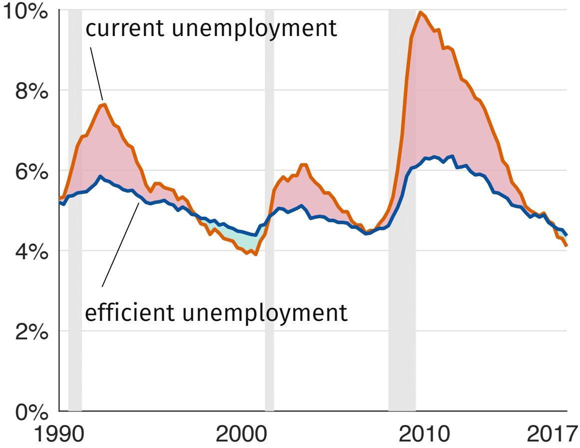
NONPECUNIARY VALUE OF UNEMPLOYMENT: $z = 0.2$

	z	source
Blanchflower, Oswald [2004]	-3	GSS
Di Tella, MacCulloch, Oswald [2003]	-0.6	Eurobarometer
Borgschulte, Martorell [2016]	-1	veterans
Shimer [2005]	0.4	calibration
Hall, Milgrom [2008]	0.7	calibration
Hagedorn, Manovskii [2008]	0.96	calibration

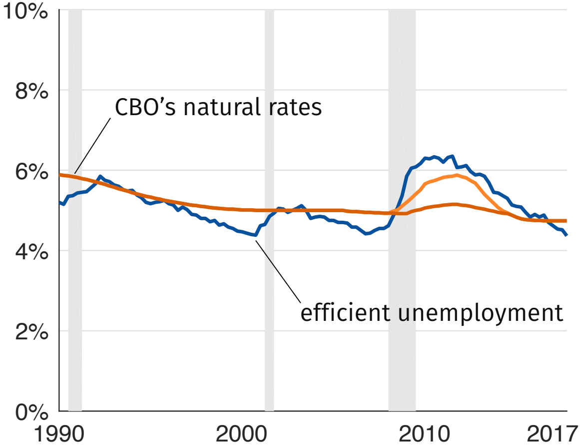
RECRUITING WEDGE:LANDAIS, MICHAILLAT, SAEZ [2018]



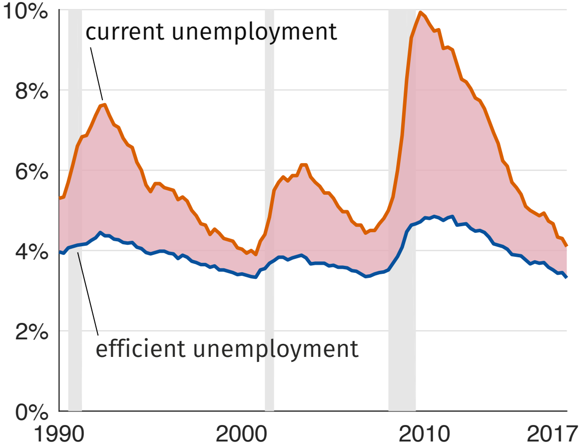
EFFICIENT UNEMPLOYMENT & UNEMPLOYMENT GAP



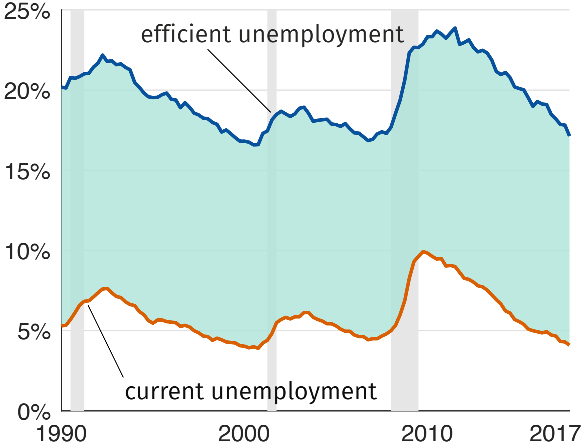
COMPARISON WITH THE CBO's MEASURE



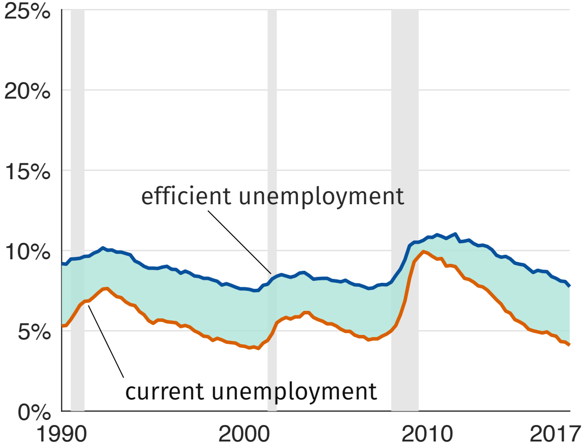
MICROEVIDENCE: $z = -0.6$



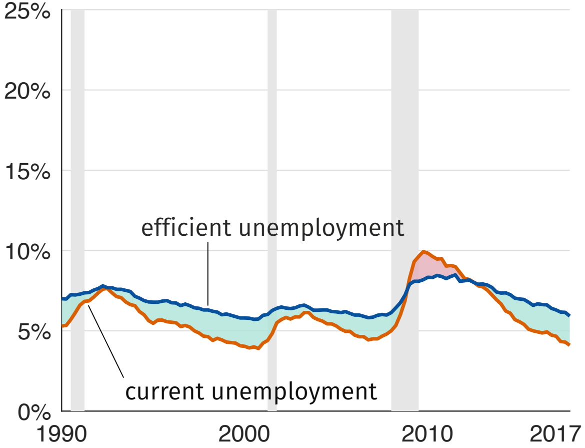
HAGEDORN & MANOVSKII: $z = 0.96$



HALL & MILGROM: $z = 0.7$



SHIMER: $z = 0.4$



25%
20%
15%
10%
5%
0%
1990
2000
2010
2017
efficient unemployment
current unemployment

MONETARY POLICY

NEO-WICKSELLIAN FRAMEWORK

1. unemployment determined by interest rate: $u = u(i)$
2. productive efficiency at u^*
3. divine coincidence: desirable inflation at u^*

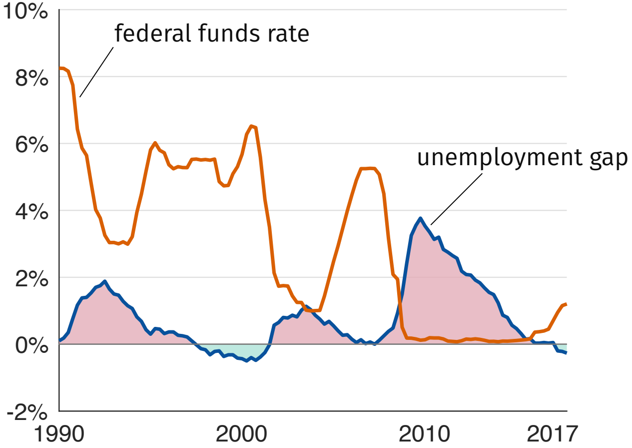
- optimal policy: set interest rate at i^* to obtain u^*
- Taylor expansion from suboptimal $[i_0, u_0]$:

$$u^* \approx u_0 + \frac{du}{di} \cdot (i^* - i_0) \quad \text{so} \quad i^* - i_0 \approx -\frac{u_0 - u^*}{du/di}$$

MONETARY MULTIPLIER: $du/di = 0.5$

	du/di	method
Bernanke, Blinder [1992]	0.6	VAR
Leeper, Sims, Zha [1996]	0.1	VAR
Christiano, Eichenbaum, Evans [1996]	0.1	VAR
Bernanke, Boivin, Eliasz [2005]	0.2	FAVAR
Romer, Romer [2003]	0.9	narrative
Coibion [2012]	0.5	narrative

INFORMAL ASSESSMENT OF FED'S BEHAVIOR



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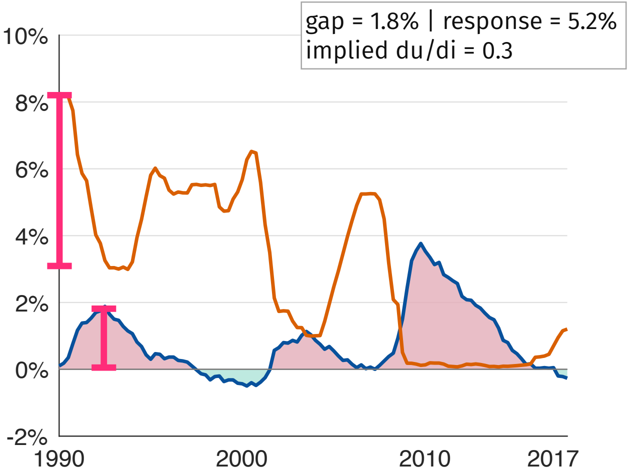

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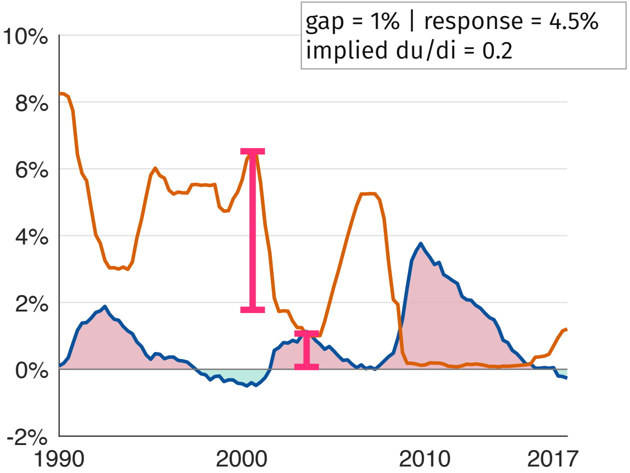

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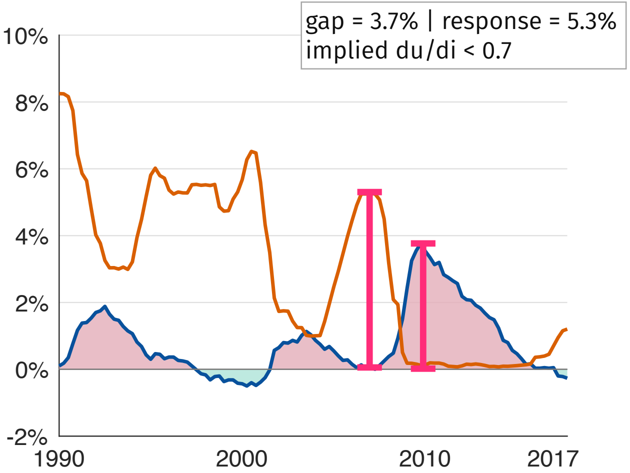

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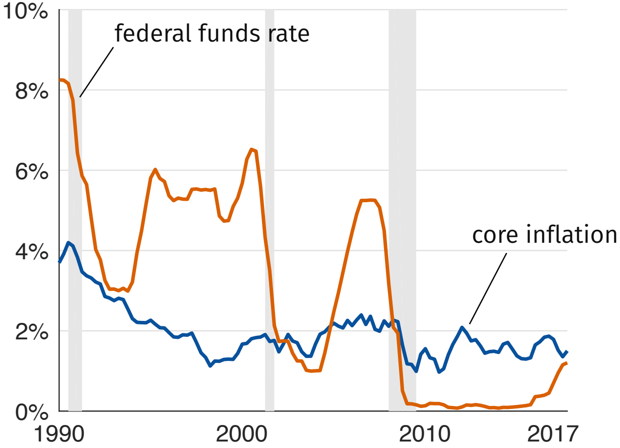


FORMAL EVIDENCE

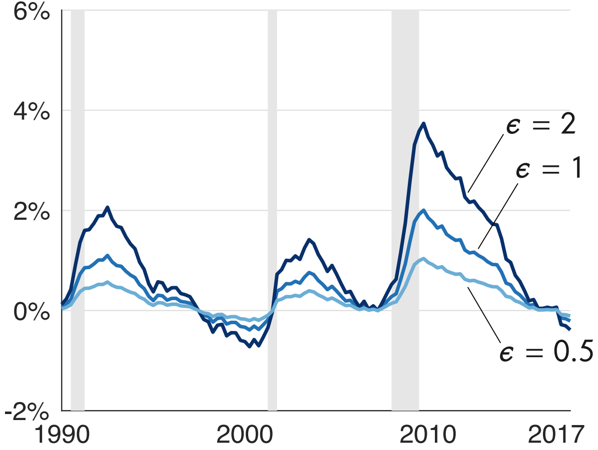
- VARs in US data to determine causal effect of unemployment on federal funds rate
- Bernanke, Blinder [1992]
  - unemployment $\uparrow$by 18 bps $\longrightarrow$ ffr $\downarrow$by 30 bps
  - implied $du/di = 18/30 = 0.6$
- Stock, Watson [2001]
  - unemployment $\uparrow$by 1 pp $\longrightarrow$ ffr $\downarrow$by 3.5 pps
  - implied $du/di = 1/3.5 = 0.3$
  - variance of ffr comes from unemployment, not inflation

FISCAL POLICY

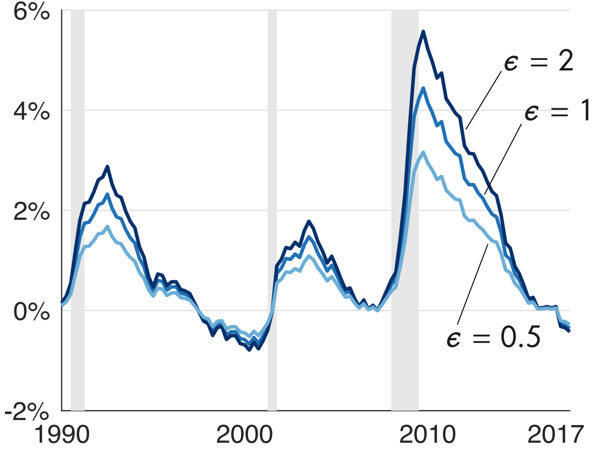
OPTIMAL STIMULUS SPENDING

- total consumption = public consumption + private consumption
- stimulus spending ≡ public spending − Samuelson spending
  - Samuelson [1954]: MU(private consum.) = MU(public consum.)
- optimal stimulus = $G(\epsilon$, multiplier$)\times$ unemployment gap
  - $\epsilon > 0$: elasticity of substitution between public & private consumption
  - multiplier: decrease in unemployment rate when public spending increases by 1% of GDP
  - Michaillat, Saez [2019]

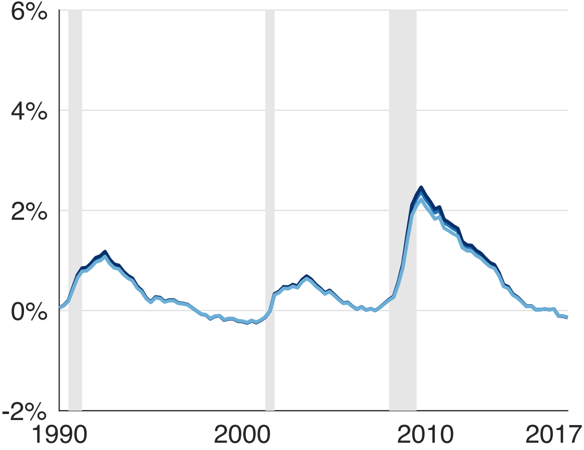
OPTIMAL STIMULUS SPENDING | MULTIPLIER = 0.1



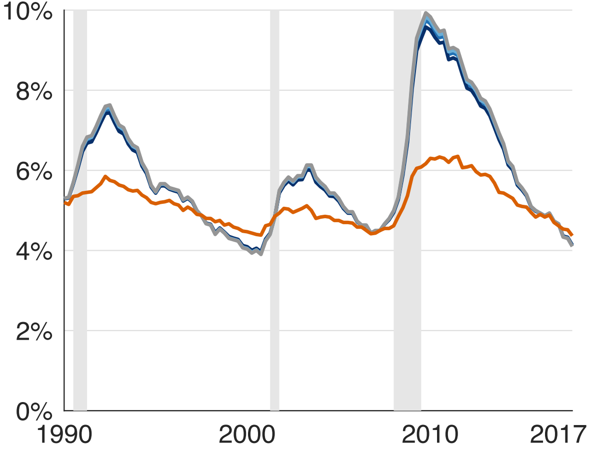
OPTIMAL STIMULUS SPENDING | MULTIPLIER = 0.5



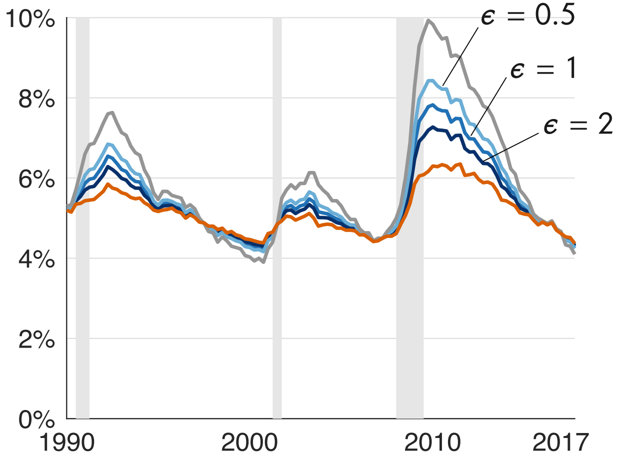
OPTIMAL STIMULUS SPENDING | MULTIPLIER = 1.5



RESULTING UNEMPLOYMENT | MULTIPLIER = 0.1



RESULTING UNEMPLOYMENT | MULTIPLIER = 0.5



RESULTING UNEMPLOYMENT | MULTIPLIER = 1.5