Okun’s law and Multipliers

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Outline: Unit V, Section SF5

I. Okun's Law
II. Government Spending Multiplier
    A. Simple version
    B. Tax multiplier
III. Multiplier Complications

Current Events

- "US Dollar rally finds new life under Trump," WSJ, 11-13-16

- Infrastructure spending ↑ => G ↑ => Y ↑
- Strong economic data => Fed plans to raise r
  - If r ↑ =>
  - [NX decreases, US goods relatively more expensive]

Round Trip

ICE U.S. Dollar Index

Source: FactSet

THE WALL STREET JOURNAL

0. Brief Review

- AD = C + I + G + NX
- Consumer confidence ↑ => C ↑

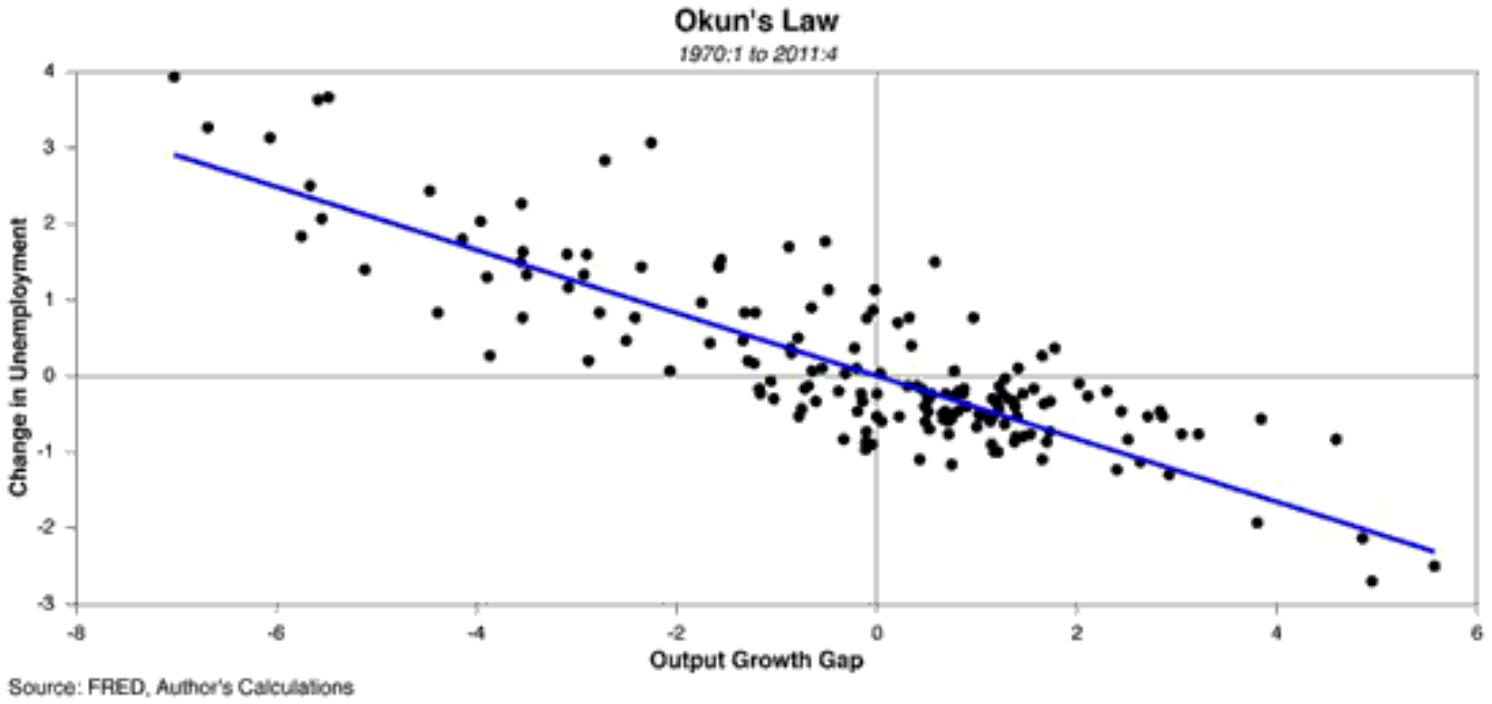
- Sticky-wage theory
  - E.g. Peanut butter factory with fixed wages in long-term contracts
- Sticky-price theory
  - E.g. seafood restaurants & Italian restaurants, each have varying degrees of menu costs

I. Okun's Law

Recall:

- Natural μ = NAIRU <=> Potential GDP
  - Frictional unemployment
  - Structural unemployment
- Business cycles => Cyclical unemployment
  - NBER dates booms/recessions
    - "2 consecutive quarters of declining GDP" Shishkin
- CEA 60s, Arthur Okun Chair
  - Okun's Law: Empirical relationship between Y and μ

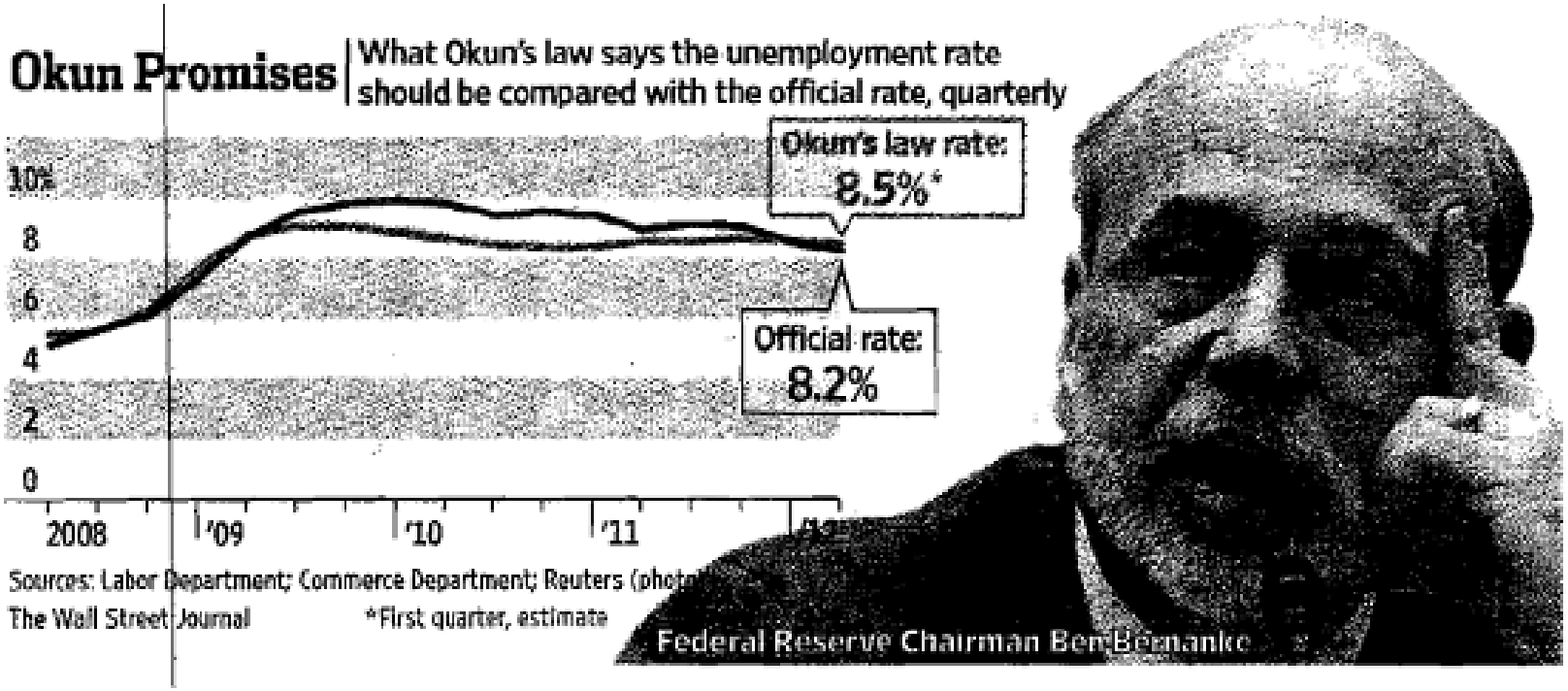
Δμ
(% point)



Act GDP Growth – Pot GDP Growth

%Δ Act GDP – %Δ Pot GDP

1. Okun's Law: Actual GDP must grow about 2.5% faster than potential GDP grows, for unemployment to fall by 1%, *on average.*
   a. *Slope = 1/2.5*
2. Numerical examples:
   a. %Δ Pot GDP = 2.5%, %Δ Act GDP = 2.5% => Δμ = 0%
   b. %Δ Pot GDP = 2.5%, %Δ Act GDP = 5% => Δμ = -1%



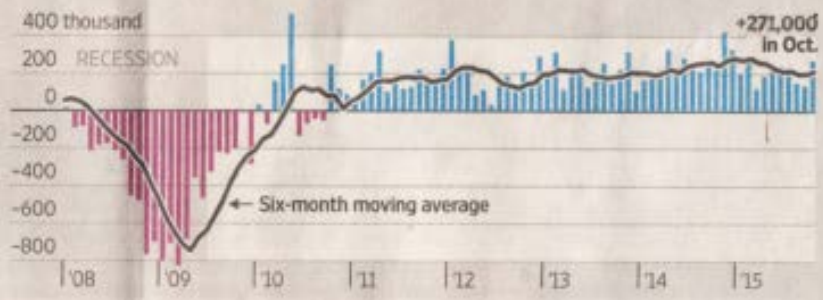
- Actual GDP growth > Potential GDP growth (just barely) 04-7-12
  => μ decreases (just barely)

- When μ decreases by 1%, why does labor grow by more than 1%?
  - Implicit contracts: full-time workers now work more (μ no change)
  - Part-time workers convert to full-time workers (μ no change)
  - Discouraged workers rejoin the labor force (μ↑)

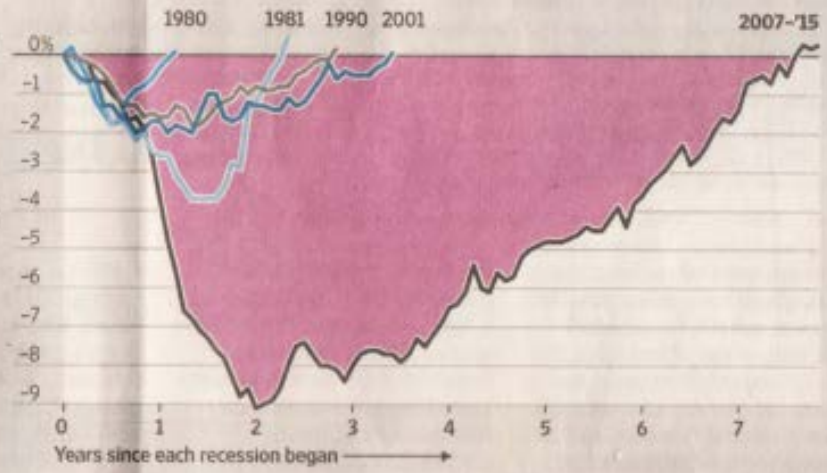
"An easier jobs report for the Fed Okun's law," WSJ, 04-07-12

Signs of a Resurgence

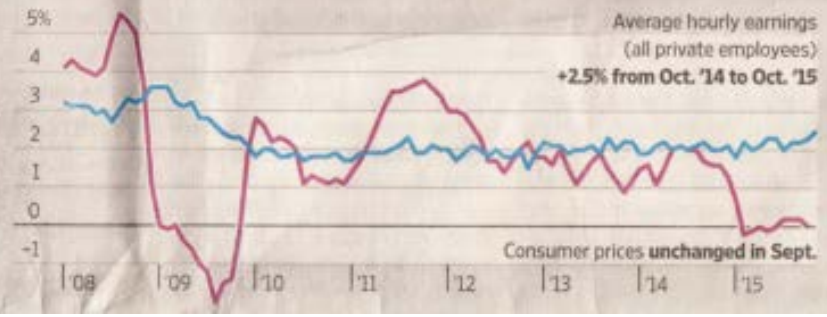
The labor market is rebounding, with a strong gain in **nonfarm payrolls** in October...



...and the overall number of **full-time workers** moving above prerecession levels, though at a slower pace than after earlier recessions...



...finally delivering stronger **wage growth** despite low **overall inflation**.



Change over the past year in payrolls (■■) and average hourly earnings (—●), seasonally adjusted

*Earnings figures are only available through September for these sectors.

Source: Labor Department

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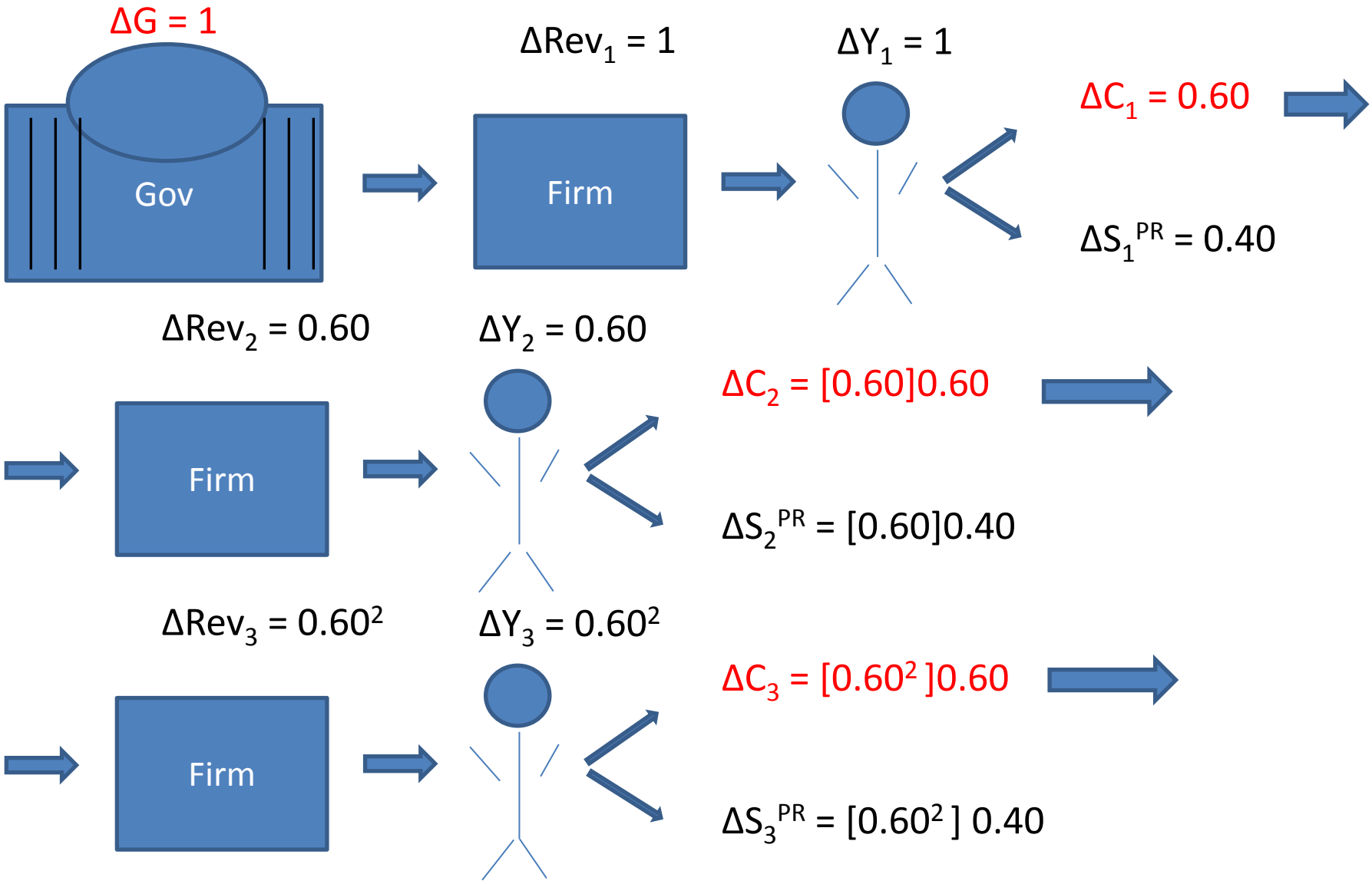
II.A. Government Spending Multiplier

- Assumptions
  - MPC = α = 0.60
  - Loops occur quickly
  - Ignore T and I for now (for simplicity)

- Suppose the government spends $1, what happens to AE?
  - "Government spending program X will create new jobs… which in turn will stimulate additional spending…. Which will further create new jobs….," State of the Union Address 20YZ



$AE = C + I + G + NX \Leftrightarrow \Delta AE = \Delta C + \Delta I + \Delta G + \Delta NX$

$\Delta AE = 1 + 0.60 + 0.60^2 + \ldots = 1/(1\text{-}0.6) = 1/(1\text{-MPC}) = 2.50$

=> Gov spending multiplier = 1/(1-MPC) = 2.50

AD curve shift with multiplier effects [1 + 1.5]

Government Spending Multiplier

- Assumptions
  - $I = K_1$ [does not depend on r]
  - $T = K_2$ [does not depend on Y, or r]
  - $C = C_0 + \alpha(Y - T) = C_0 + \alpha(Y_D)$ [does not depend on r]

    C_0 = Fixed consumption, α = MPC

Simple version:

$$Y = C + I + G$$

$$Y = \left(C_0 + C_y(Y - T)\right) + I + G$$

$$\left(1 - C_y\right)Y = C_0 + I - C_y T + G$$

$$Y = \frac{C_0}{(1-\alpha)} + \frac{1}{(1-\alpha)} I - \frac{\alpha}{(1-\alpha)} T + \frac{1}{(1-\alpha)} G$$

$$Y = k + \frac{1}{(1-\alpha)} I - \frac{\alpha}{(1-\alpha)} T + \frac{1}{(1-\alpha)} G$$

II.B. Tax multiplier

$$Y = k + \frac{1}{(1-\alpha)} I - \frac{\alpha}{(1-\alpha)} T + \frac{1}{(1-\alpha)} G$$

- Government spending multiplier
  - $\frac{dy}{dG} = \frac{1}{(1-\alpha)} = 2.5$, if $\alpha = 0.60$
- Tax multiplier
  - $\frac{dy}{dT} = -\frac{\alpha}{(1-\alpha)} = -1.5$, if $\alpha = 0.60$
  - Size of tax multiplier < Size of Gov multiplier
    - \$1 tax cut => ΔC = 0.60 + ….
    - \$1 Gov spending => ΔG = 1, ΔC = 0.60 + ….
- Investment multiplier
  - $\frac{dy}{dI} = \frac{1}{(1-\alpha)} = 2.5$, if $\alpha = 0.60$

III. Multiplier Complications

- Interest-rate effect (see next graph)
  - Use money market or "building block" model
  - G ↑=> Y ↑=> M^D shifts out => i ↑ => r ↑ =>
    C↓, I ↓, NX ↓
  - Government spending ↑ => Crowds out some C, I, NX
- Income effect
  - If Y ↑ =>
    - C ↑: Directly modeled
    - I ↑: Demand for G&S spur investment
      => investment accelerator or "crowding in"
    - NX ↓: Y^{DOM} ↑ => IM ↑

Money Market

AD curve: Interest-rate effect

Summary of increase in G

Components of AE	Interest-Rate Effect	Income Effect	Total Effect
C	↓	↑ Modeled ($MPC = C_y$)	↑
I	↓	↑	↑/↓
G	NC	NC	↑ Assumed
NX	↓	↓	↓
Total AE	↓	↑	↑