Okun's Law, Labor Force Participation and Labor Productivity

Relating Real GDP Growth to Changes in Unemployment

Okun's Law: Can We Relate Y to U?

- How fast does the economy have to grow, to get the jobless rate to fall by a given percent?
  - Okun's law attempts to answer that question

- Okun's law is a simple formula that estimates the **rise** in real GDP that we will witness if we **lower** the jobless rate

- Okun's law also tells us how much real GDP will **fall** if we **raise** the jobless rate

Okun's Law: Can We Relate Y to U?

- Y = GDP = Output = Real Income

- $\Delta Y = \Delta GDP$

- $\Delta U = \Delta$Unemployment Rate

- Arthur Okun, economist from 1960's, came up with a relationship between $\%\Delta Y$ and ΔU

A Key Input: Long Term Sustainable Growth

- **Okun's Law** requires that we estimate a growth rate for U.S. GDP

- This growth rate, **LTSG**, is the growth that the economy **can sustain over the 'long horizon'**

- Think of it as the growth rate for the economy that doesn't get into trouble

Long Term Sustainable Growth?

- How fast a pace should you embrace, if you run a marathon?

  - 5 minutes per mile?

  - 6 minutes per mile?

  - 8 minutes per mile?

  - 10 minutes per mile?

What is the USA LTSG?

- Addressed when studying long-run economic growth

- The simple answer ➡ We can grow as fast as the sum of:

  - Labor force and

  - Labor productivity

What is the USA LTSG?

- Consensus today asserts that:

  - **Labor force** grows **0.5%** per year

  - **Labor productivity** grows **1.5%** per year

$$LTSG = 0.5\% + 1.5\% = 2\%$$

Okun's Law

$$\left(\frac{Change}{InOutput}\right) = \left(\begin{array}{c} L.R. \\ S.G \end{array}\right) - OkunCoefficient\left(\begin{array}{c} ChangeIn \\ Unemployment \end{array}\right)$$

- Using symbols:

$$\%\Delta Y = LTSG - 2 (\Delta U)$$

- The % change in output =
  - The economy's trend growth rate **minus**
 - 2 times the change in the unemployment rate

Okun's Law and Long Term Equilibrium

$$\%\Delta Y = LTSG - 2\,(\Delta U)$$

- Imagine the economy is growing at its long run sustainable speed (LTSG)

- By definition, it creates just enough jobs to absorb labor force growth

- The unemployment rate, therefore, is steady ➞ ΔU is zero

- $\%\Delta Y = LTSG$

Okun's Law and Economic Recovery

- A traditional recovery exhibits strong economic growth
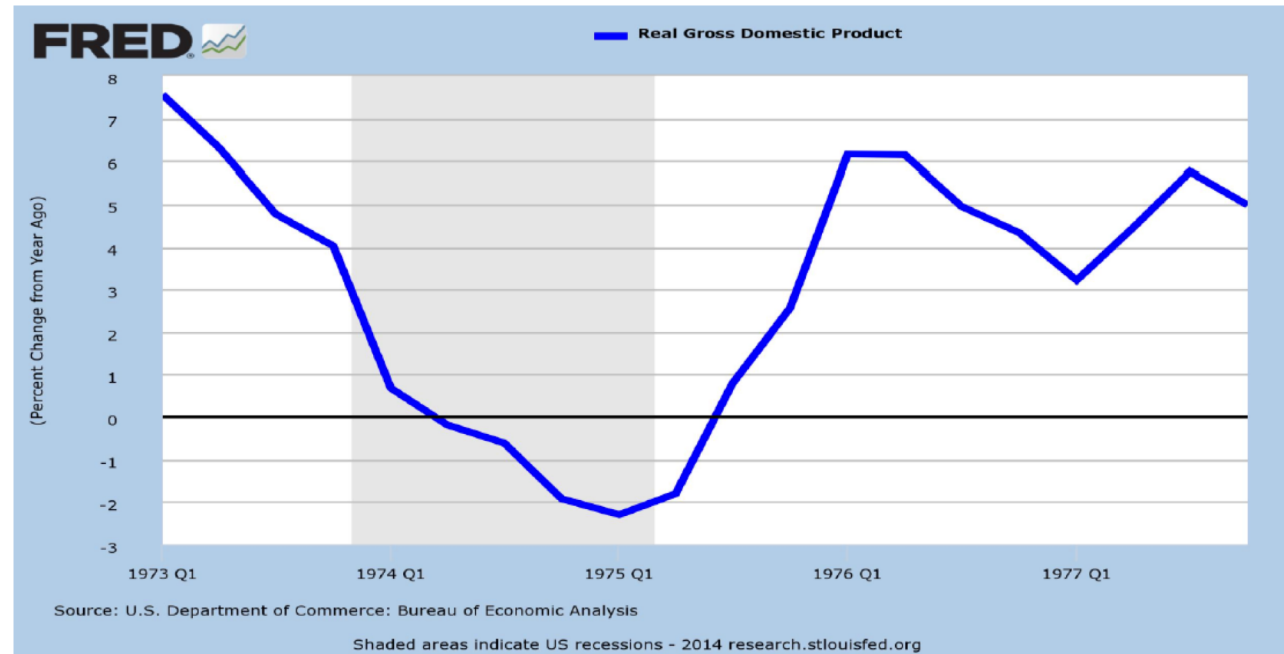
- Strong recoveries are associated with:
  - Strong productivity
  - Rebounds for the labor force participation rate

The Okun Coefficient: Two Reasons It's Bigger than 1

$$\%\Delta Y = LTSG - 2\,(\Delta U)$$

- A fall for unemployment of 1 percentage point, delivers **MORE THAN a 1%** rise for employment, **if LFPR is rising**

- A **pop for productivity**, above its trend rate means output will grow **faster than LTSG**

Okun's Law in Practice, 1948-2016
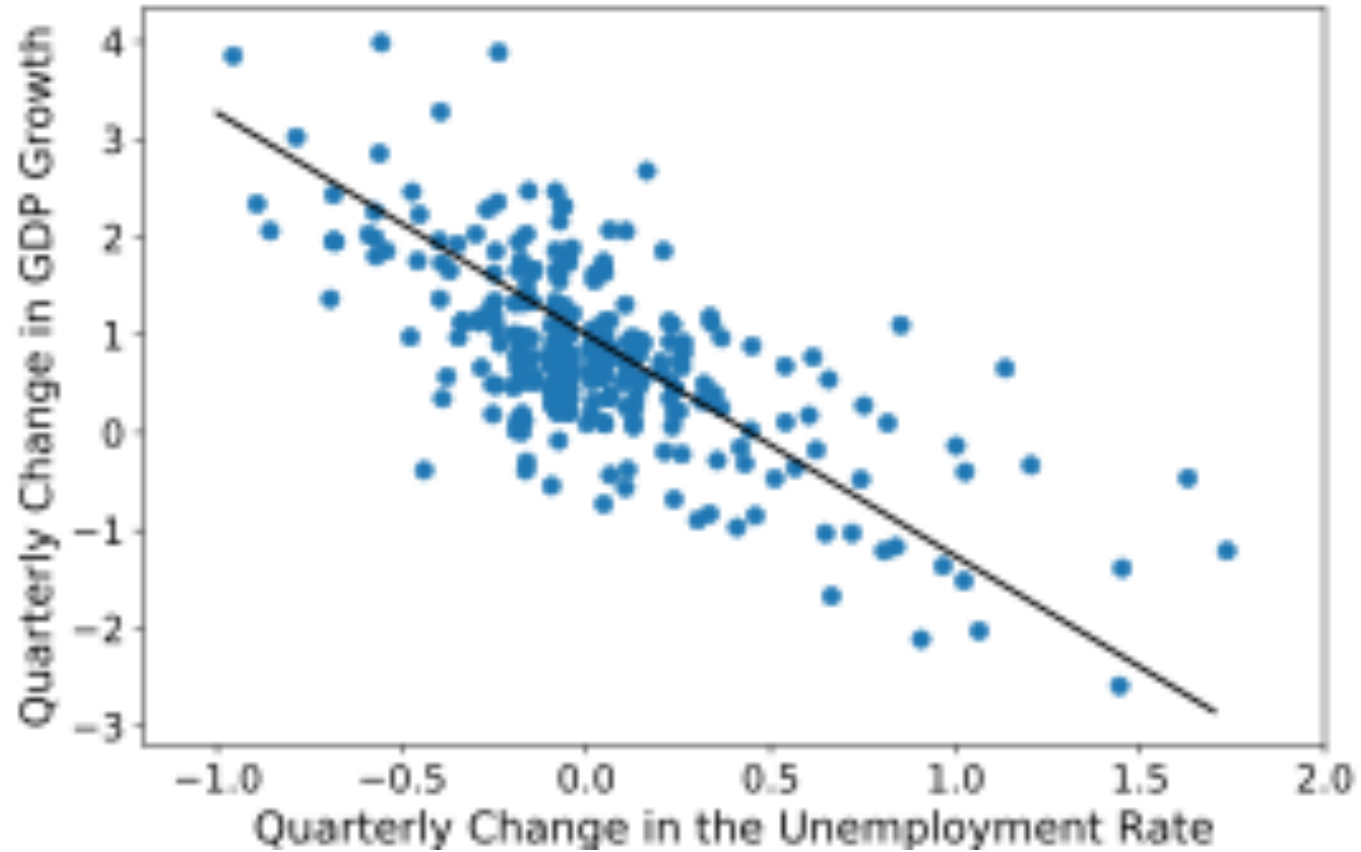
Mid-2014 to Mid-2017: Okun's Law Is Broken!

- Let's test the formula over those 12 quarters:

- **2014:Q2**   Unemployment rate = **6.1%**

- **2017:Q2**   Unemployment rate = **4.3%**

Let's Calculate What %ΔY Should Be, Given ΔU:

- $\%\Delta Y = \mathbf{LTSG} - \mathbf{2}\,(\Delta U)$

- LTSG = 2% per year ➡ $(1.02)^3$ = 6.1% over 3 years

- $\%\Delta Y = 6.1\% - \mathbf{2}\,(4.3\% - 6.1\%)$

- $\%\Delta Y = 6.1\% - \mathbf{2}\,(-1.8\%)$

- $\%\Delta Y = 6.1\% + 3.6\%$

- $\%\Delta Y = 9.7\%$

- 9.7% over 3 years = 3.1% per year

- $(1.097)^{(1/3)}$ = **3.1%**

Now Let's Look At Actual %ΔY:

- 2014:Q2   Real GDP = $15,936

- 2017:Q2   Real GDP = $17,030

- %ΔY = [($17,030 / $15,936) - 1] x 100
- %ΔY = 6.86% over 3 years

- What was the annualized growth rate for Y?
- $(1.0686)^{(1/3)}$ = **2.2%**

Okun Was Too Optimistic Over the Past Three Years

- Based upon a fall in the unemployment rate to **4.3%** from **6.1%**, real GDP should have grown much **faster than LTSG**
    - That is what the "2" value for the Okun constant suggests

- Growth of **3.1%** is what the equation suggests

- Instead we had growth of only **2.2%**

Did Okun's Law Work Over the 8 Years of Recovery?

- Great Recession ended 2009:Q2

- 2009:Q2 Real GDP: $14.8 trillion

- 2017:Q2 Real GDP: $17.0 trillion

- How much did real GDP grow over the 8-year period?

$$[(17/14.8) - 1] \times 100 = \textbf{14.8\%}$$

- What was the annualized real growth rate?

$$(1.148)^{\wedge(1/8)} = \textbf{1.74\%}$$

Compare 2009-17 Annualized Growth Rate to Our LTSG

$$\%\Delta Y = LTSG - 2(\Delta U)$$

- Without doing any math, we know that Okun's law would look for an 8 year **RISE** in unemployment
  - If there is NO CHANGE in the unemployment rate, the second term of the formula drops out
  - The formula tells us that, with steady U3, real GDP grows at its long-term sustainable rate
  - If U3 were unchanged in 2009-2017, Okun's law predicts 8 years of 2% growth
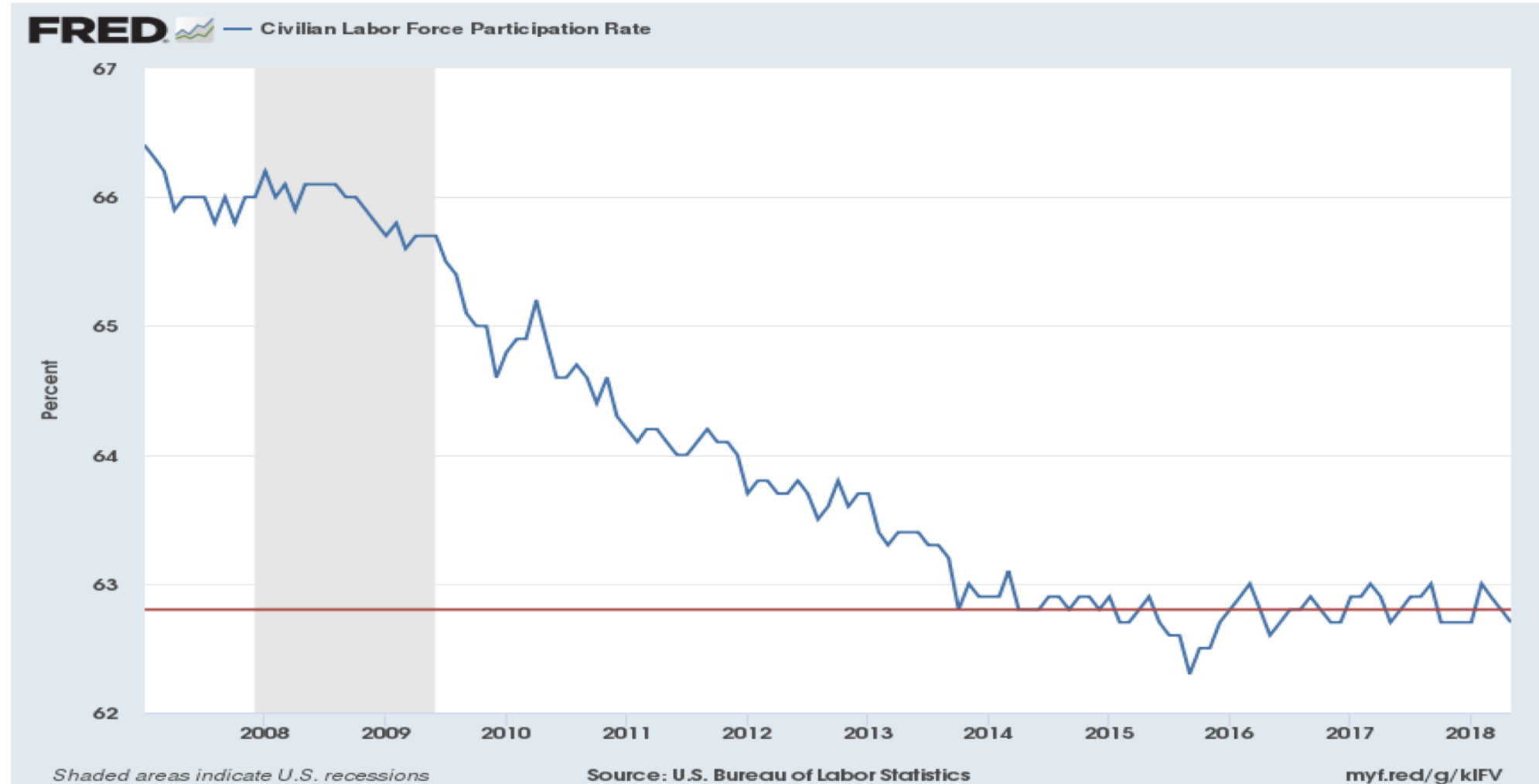
What Okun's Law Suggest for U3 Over the 8 Years?

- LTSG = 0.5% Labor Force + 1.5% Labor Productivity = 2%

- 2% growth for 8 years $\rightarrow$ $(1.02)^8 = 17.2\%$

  - $\%\Delta Y = LTSG - 2 (U_{2017} - U_{2009})$

- $14.8\% = 17.2\% - 2 (U_{2017} - U_{2009})$

- Note: $U_{2009} = 9.3\%$ $\rightarrow$ $-2.4\% = - 2 (U_{2017} - 9.3\%)$

- $1.2\% = U_{2017} - 9.3\%$ $\rightarrow$ $U_{2017} = \textbf{10.5\%}$

- Wow! Okun's law suggests that the jobless rate should have **gone up**, instead of plunging to 4.3% from 9.3%

Okun's Law and Productivity/LFPR in this Cycle

- How did unemployment fall to 4.3%, alongside such terribly weak real GDP growth?

  - **Labor productivity**, 8-year average of 0.86%, is much **below** historical averages or consensus notions of its trend

    2009:Q4 LP = 102.1 $\rightarrow$ $\dfrac{108.1}{102.1}$ = 5.8% $\rightarrow 1.058^{(1/8)}$ = 0.86% /yr.

    2017:Q2 LP = 108.1

  - **Labor force participation rate fell**, rather than rose, over the period:

    2009:Q2 LFPR = 65.7

    2017:Q2 LFPR = 62.8

LFPR: 2015-2018 Stabilization

Labor Productivity

Source: U.S. Bureau of Labor Statistics
fred.stlouisfed.org