
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?

- $Y = \text{GDP} = \text{Output} = \text{Real Income}$
- $\Delta Y = \Delta \text{GDP}$
- $\Delta U = \Delta \text{Unemployment Rate}$
- 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

$$\text{LTSG} = 0.5\% + 1.5\% = 2\%$$

Okun's Law

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

- Using symbols:

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

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

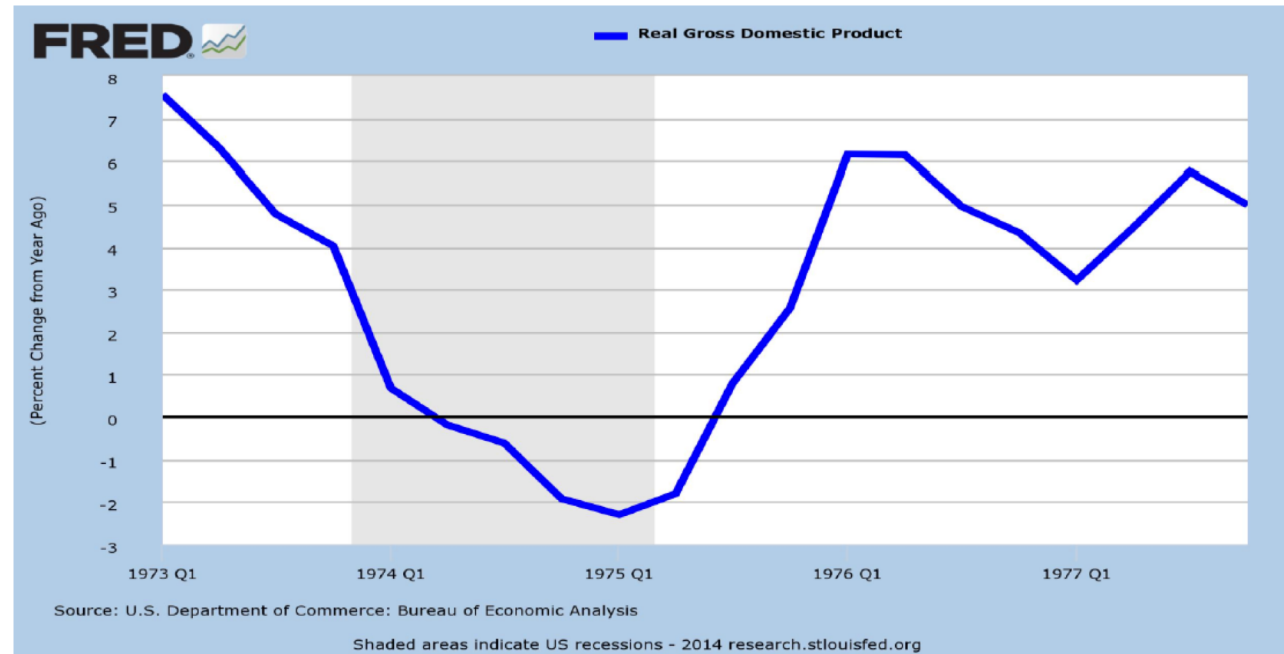
Okun's Law and Long Term Equilibrium

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

- 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 $\rightarrow \Delta U$ is zero
- $\% \Delta Y = LTSG$

Okun's Law and Economic Recovery

- A traditional recovery exhibits strong economic growth



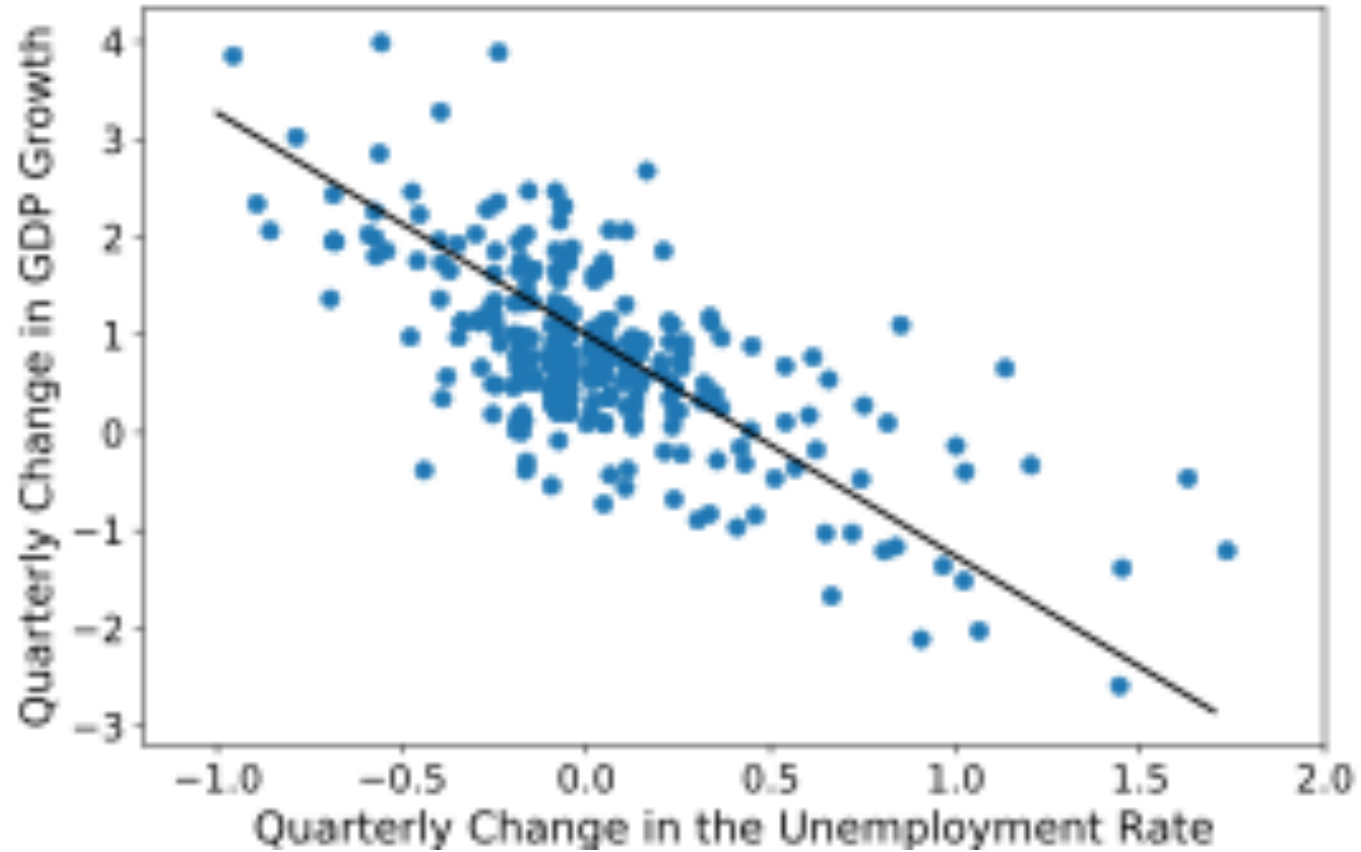
- Strong recoveries are associated with:
 - Strong productivity
 - Rebounds for the labor force participation rate

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 $\% \Delta Y$ Should Be, Given ΔU :

- $\% \Delta Y = LTSG - 2 (\Delta U)$
- $LTSG = 2\% \text{ per year} \rightarrow (1.02)^3 = 6.1\% \text{ over 3 years}$
 - $\% \Delta Y = 6.1\% - 2 (4.3\% - 6.1\%)$
 - $\% \Delta Y = 6.1\% - 2 (-1.8\%)$
 - $\% \Delta Y = 6.1\% + 3.6\%$
 - $\% \Delta Y = 9.7\%$
- $9.7\% \text{ over 3 years} = 3.1\% \text{ per year}$
 - $(1.097)^{(1/3)} = 3.1\%$

Now Let's Look At Actual $\% \Delta Y$:

- 2014:Q2 Real GDP = \$15,936
- 2017:Q2 Real GDP = \$17,030
- $\% \Delta Y = [(\$17,030 / \$15,936) - 1] \times 100$
- $\% \Delta Y = 6.86\%$ over 3 years
- What was the annualized growth rate for Y?
- $(1.0686)^{(1/3)} = \mathbf{2.2\%}$

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?
$$[(17/14.8) - 1] \times 100 = 14.8\%$$
- What was the annualized real growth rate?
$$(1.148)^{(1/8)} = 1.74\%$$

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

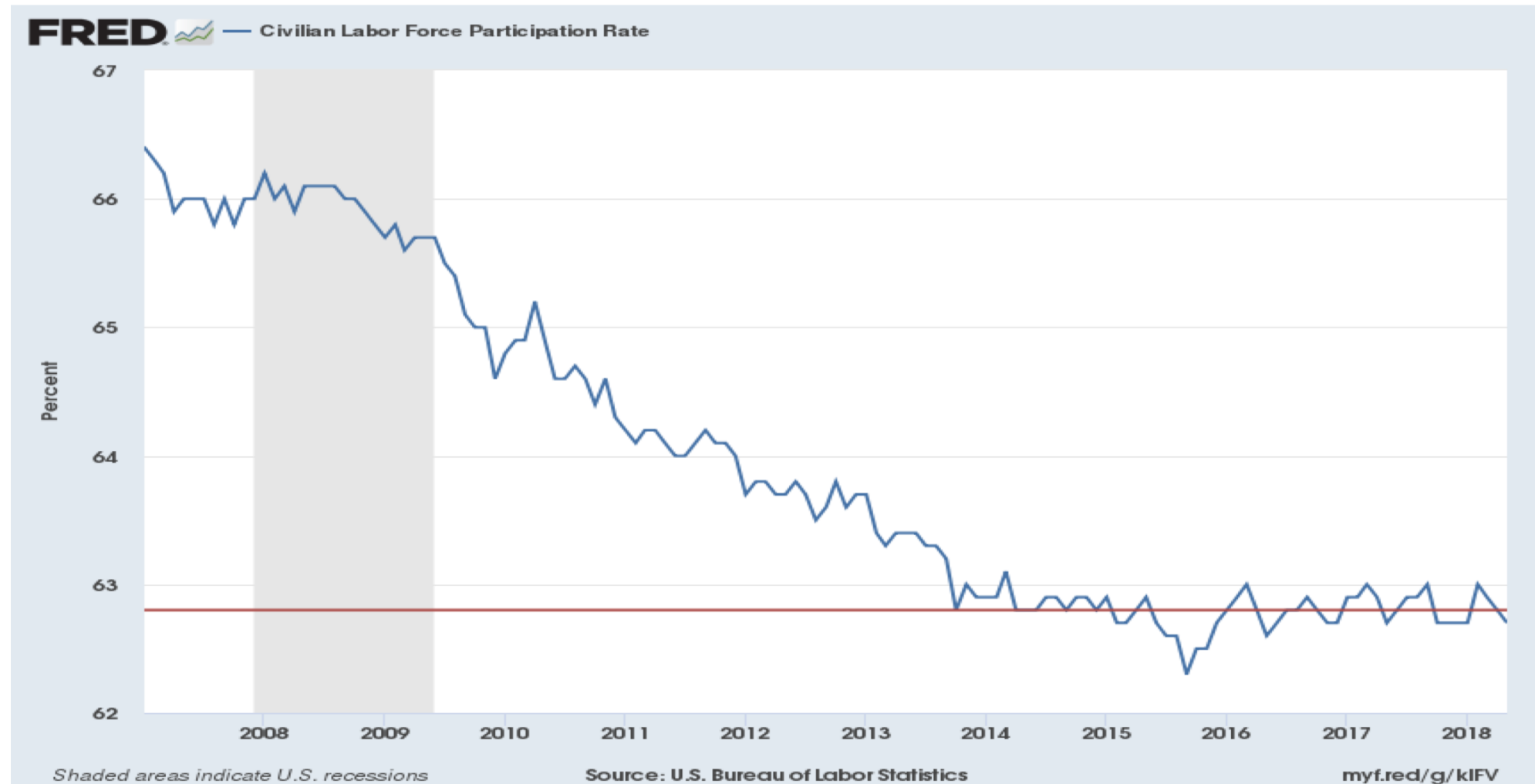
What Okun's Law Suggest for U3 Over the 8 Years?

- 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: $U_{2009} = 9.3\%$ $\rightarrow -2.4\% = -2 (U_{2017} - 9.3\%)$
- $1.2\% = U_{2017} - 9.3\%$ $\rightarrow U_{2017} = 10.5\%$
- 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 $\frac{108.1}{102.1} = 5.8\%$ $\rightarrow 1.058^{(1/8)} = 0.86\% \text{ /yr.}$
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

