Okun's Law, Labor Force Participation and Labor Productivity

Relating Real GDP Growth to Changes in Unemployment

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 Relates Y to U

- Y = GDP = Output = Real Income
- %ΔY = %ΔGDP = Percentage change in GDP
- $\Delta U = U_t - U_{t-1}$ = Change in unemployment rate
- Arthur Okun, economist from 1960's, came up with a relationship between %ΔY and ΔU

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

What is the USA LTSG?

- Addressed when studying long-run economic growth

- Simple answer: We can grow as fast as the sum of 2 growth rates:
  - Labor force
  - Labor productivity

- 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

$$\text{Percent Change in Output} = \text{LTSG} - \text{Okun's Coefficient} * \left(\text{Change in Unemployment Rate}\right)$$

- Using symbols:

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

- 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

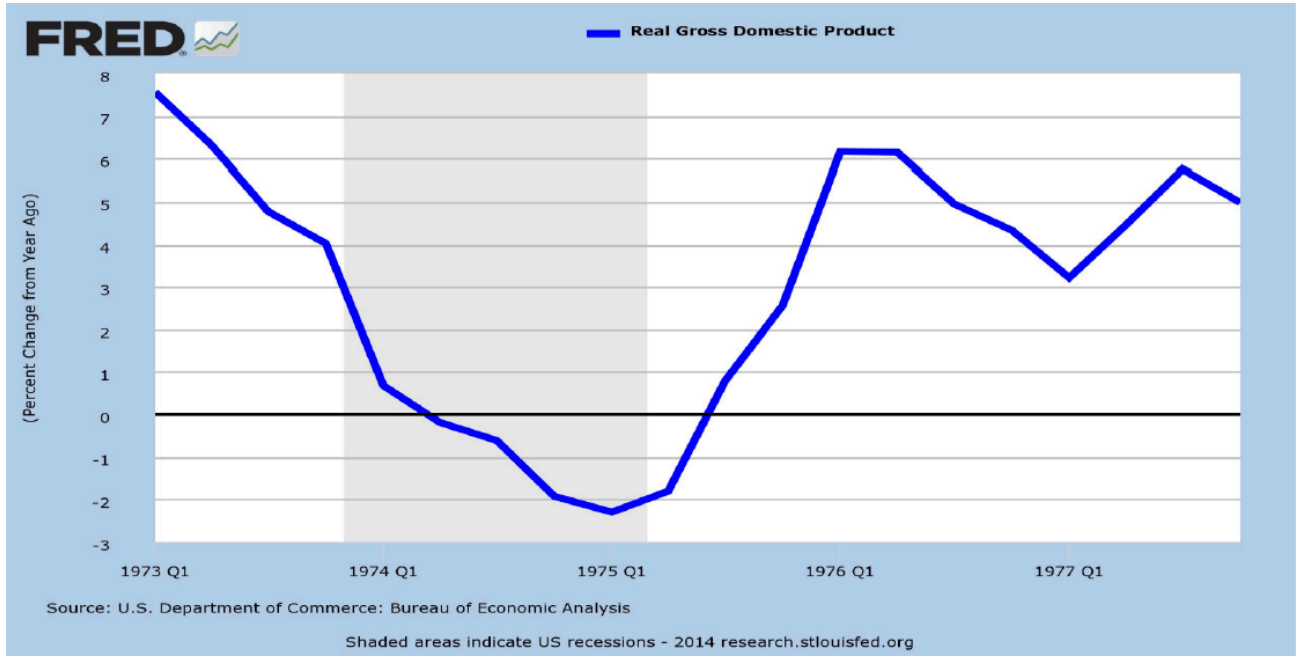
$$\%\Delta \boldsymbol{Y} = \boldsymbol{LTSG} - \mathbf{2}\,(\Delta \boldsymbol{U})$$

- 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

$$\Delta \boldsymbol{U} = 0 \text{ and } \%\Delta \boldsymbol{Y} = \boldsymbol{LTSG}$$

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

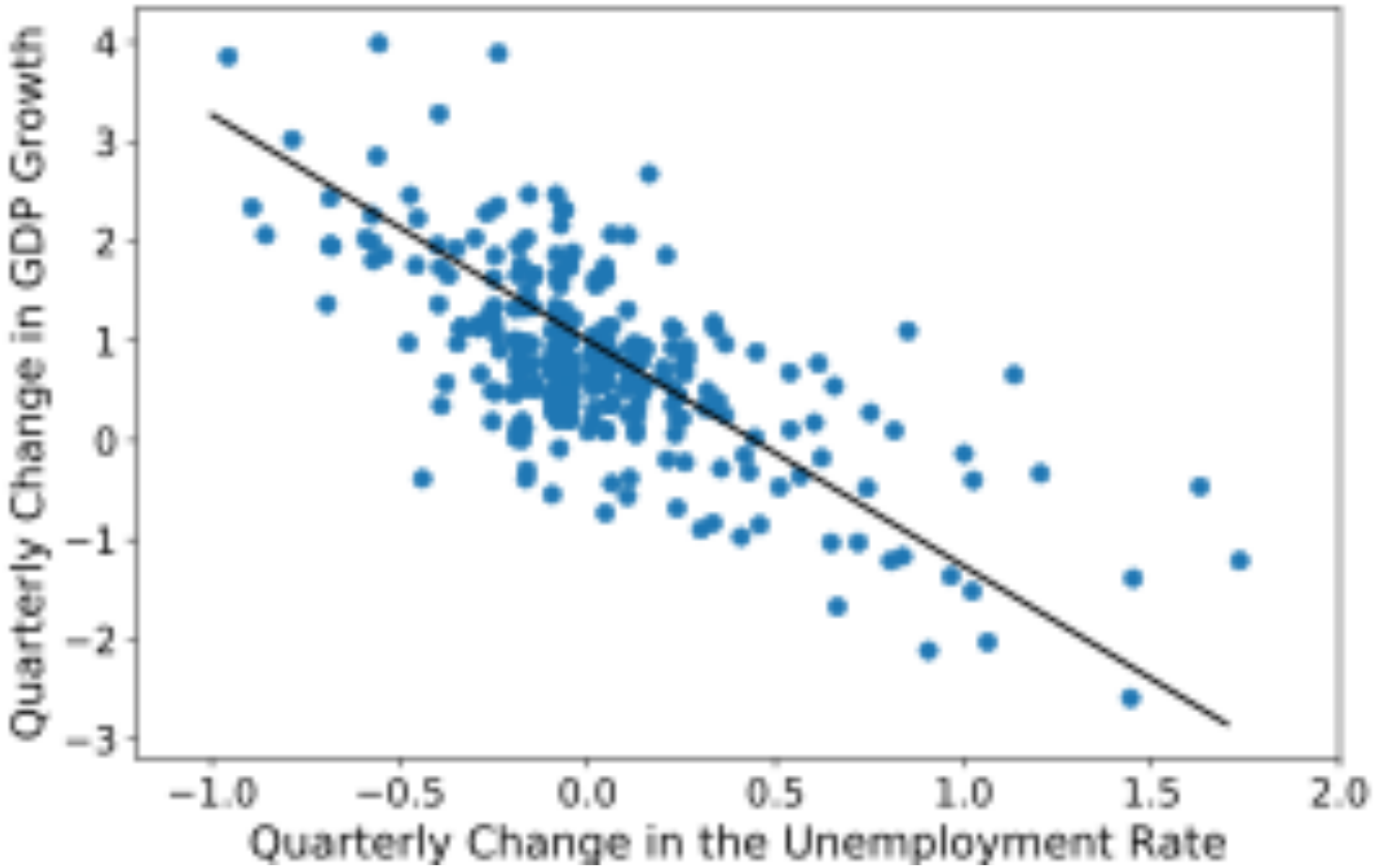
Okun's Coefficient: Two Reasons It's Bigger than 1

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

- 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 Was Broken!

- **2014:Q2** Unemployment rate = **6.1%**
- **2017:Q2** Unemployment rate = **4.3%**
- Let's test the formula over those 12 quarters:
  - What the formula says %ΔY should have been
  - What %ΔY actually was

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

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

- LTSG = 2% per year ➞ (1.02)^^{3} = 6.1% over 3 years
  - $\%\Delta \boldsymbol{Y}$ = 6.1% − $\mathbf{2}$ (4.3% − 6.1%)
    - $\%\Delta \boldsymbol{Y}$ = 6.1% − $\mathbf{2}$ (−1.8%)
      - $\%\Delta \boldsymbol{Y}$ = 6.1% + 3.6%
        - $\%\Delta \boldsymbol{Y}$ = 9.7% over 3 years
          - 9.7% over 3 years = 3.1% per year
            - [(1.097)^$^{(1/3)}$ -1] x 100 = **3.1%**

Now Let's Look At Actual %ΔY

- 2014:Q2 Real GDP = $15,936 billion
- 2017:Q2 Real GDP = $17,030 billion

- $\%\Delta \boldsymbol{Y}$ = [($17,030 / $15,936) - 1] x 100
- $\%\Delta \boldsymbol{Y}$ = 6.86% over 3 years

- What was the annualized growth rate for Y?

  [1.0686^(1/3) – 1] x 100 or [(17,030/15,936)^(1/3) - 1] x 100 = **2.2%**

Okun Was Too Optimistic Over Those 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 Okun's coefficient of "2" 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?

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

- What was the annualized real growth rate?

$$[(1.148)^{(1/8)} - 1] \times 100 = \mathbf{1.74\%}$$

Compare 2009-17 Annualized Growth Rate to Our LTSG

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

- Without doing any math, we know that Okun's law would look for an 8 year **RISE** in unemployment, why?
  - 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 happen to U3 during those years?

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 → $(1.02)^8 = 17.2\%$

$$\%\Delta \boldsymbol{Y} = \boldsymbol{LTSG} - \mathbf{2}\,(\boldsymbol{U}_{2017} - \boldsymbol{U}_{2009})$$

- $14.8\% = 17.2\% - \mathbf{2}\,(\boldsymbol{U}_{2017} - \boldsymbol{U}_{2009})$
- Note: $\boldsymbol{U}_{2009} = 9.3\%$ → $-2.4\% = -\mathbf{2}\,(\boldsymbol{U}_{2017} - 9.3\%)$
- $1.2\% = \boldsymbol{U}_{2017} - 9.3\%$ → $\boldsymbol{U}_{2017} = \mathbf{10.5\%}$

- 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 → $\frac{108.1}{102.1}$ = 5.8% → $1.058^{\wedge(1/8)}$ = 0.86% /yr.

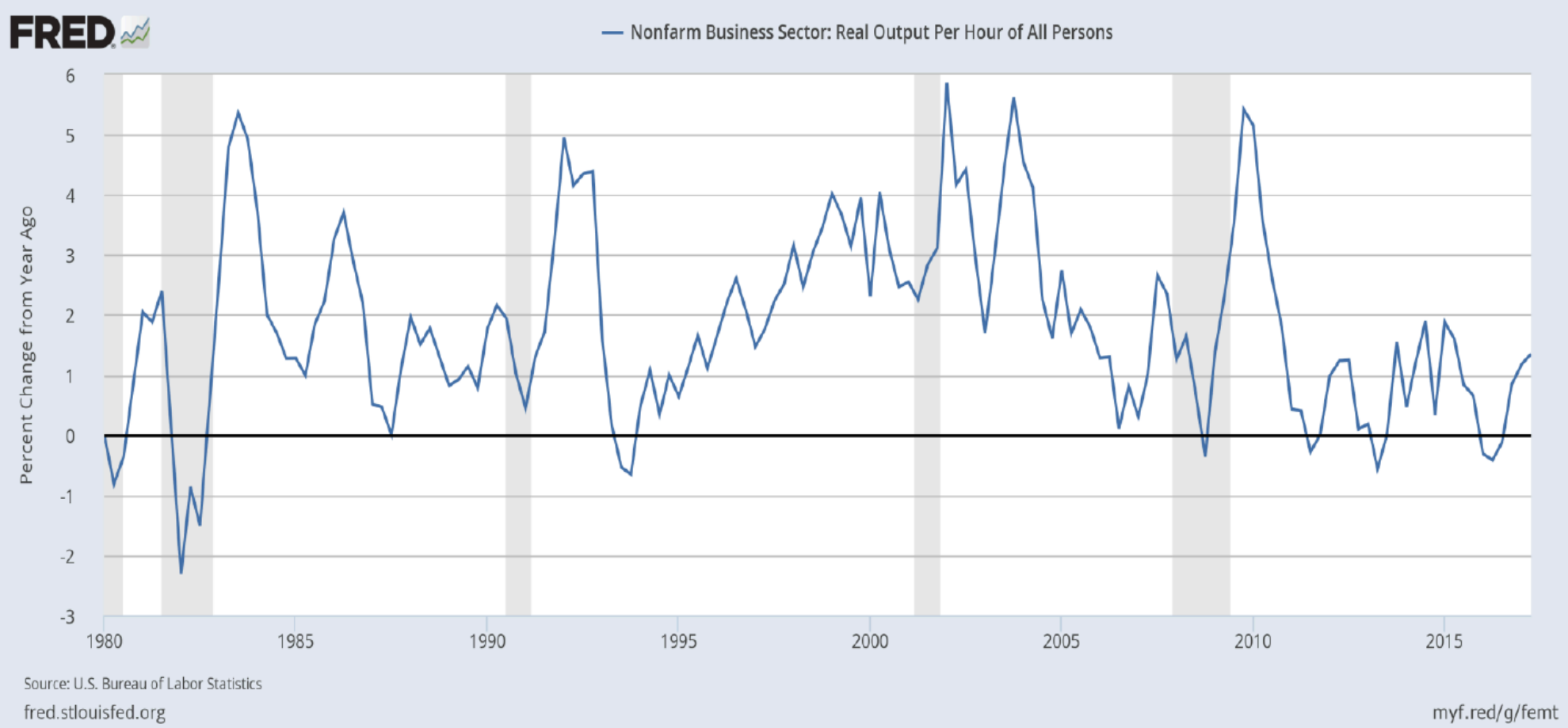
2017:Q2 LP = 108.1

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

2009:Q2 LFPR = 65.7

2017:Q2 LFPR = 62.8

Labor Productivity



LFPR: 2015-2018 Stabilization