1 Okun’s rule of thumb

Okun’s law posits the following relationship between output (relative to full-employment output) and cyclical unemployment: \( \frac{y - \bar{y}}{\bar{y}} = -2(u - \bar{u}) \), where \( y \) is the actual level of output, \( \bar{y} \) is the level of full-employment (or potential) output, \( u \) is the actual unemployment rate, and \( \bar{u} \) is the natural rate of unemployment.

a. Real GDP was $16,312 billion in 2014Q4; for the same quarter, the Congressional Budget Office estimates real potential GDP at $16,892 billion and the natural rate of unemployment as 5.8%. Estimate the actual unemployment rate predicted by Okun’s law.

b. Counterfactually, if Congress boosted spending or cut taxes by an annualized rate of $100 billion in 2014Q4 - yielding that exact impact on GDP (to be revisited...) - what would be the effect on the unemployment rate, per Okun’s rule of thumb?

2 Full employment, investment, savings, and interest rates

An economy has full-employment output of 6000. Government purchases, \( G \), are 1200. Desired consumption and desired investment are

\[
C^d = 3600 - 2000r + 0.10Y \\
I^d = 1200 - 4000r
\]

a. Find an equation relating desired national saving, \( S^d \), to \( r \) and \( Y \).

b. Using both versions of the goods market equilibrium conditions \( Y = C^f + I^d + G \) and \( S^d = I^d \), find the real interest rate that clears the goods market. Assume that output equals full employment.

c. Government purchases rise to 1440. How does this increase change the equation describing desired national saving? Show the change graphically. What happens to the market-clearing real interest rate?
3 Deriving the consumption Euler equation
Lecture Notes 2.2: The Goods Market

Derive the two-period consumption Euler equation and calculate optimal present consumption $c_t$ and savings $S_t$ using the following utility function and parameters:

- $U(c_t, c_{t+1}) = u(c_t) + \beta u(c_{t+1})$
- $u(c_t) = \frac{c_t^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}}$
- $\beta = 0.96$
- $\sigma = 1.1$
- $r = 0.05$
- $y_t = 50,000$
- $y_{t+1} = 100,000$

What is the effect of the market-clearing real interest rate falling from 5% to 2%? Does the income effect or substitution effect dominate? And if $\sigma = 0.9$?