Problem Set 4 Answers

Due **on Canvas** on Tuesday, November 16th, 11pm. Be sure to put your name on your problem set. Put "boxes" around your answers to the algebraic questions.

1. Consider a Taylor rule of the following form:

$$i_t^{FedFunds} = \pi_t + 0.5 \times (y_t - y_t^*) + 0.5 \times (\pi_t - \pi_t^*) + r_t^*$$

1.1 Calculate the implied Fed funds rate for 2021Q3, assuming the equilibrium real rate is 2.0%, and target inflation rate is 2%. You will need to obtain information on the output gap and inflation rate. Show your work.

You can obtain information St. Louis Fed FRED system on potential GDP (expressed in 2012$) and actual GDP, to calculate the output gap. You can also obtain data for *core* personal consumption expenditure deflator inflation from there as well (use four quarter inflation in your calculations).

From FRED:

	FEDFUNDS/100	GDP12	GDP12_POT_CBOJUL21	LOG(GDP12/GDP12_POT_CBOJUL21)	PCONS_CORE	(PCONS_CORE/PCONS_CORE(-4))-1
	fedfunds	real GDP	real potential GDP	output gap	Core PCE deflator	Core inflation rate
2020 Q3	0.000933	18560.8	19424.2	-0.0455	113.9	0.015
2020 Q4	0.0009	18767.8	19512.0	-0.0389	114.3	0.014
2021 Q1	0.0008	19055.7	19602.5	-0.0283	115.0	0.017
2021 Q2	0.0007	19368.3	19697.4	-0.0168	116.7	0.034
2021 Q3	0.0009	19465.2	19795.8	-0.0168	118.0	0.036

2021Q3 GDP is 19465.2 in 2012$, and Potential GDP is 19795.8 in 2012$,. Hence, the 2021Q3 output gap calculated in log terms is -1.68%. The core PCE inflation rate (4 quarter) is **3.60%**.

1.2 Show what happens to the implied Fed Funds rate if the target inflation rate is raised to 4%.

2. Suppose the demand for reserves is stable. Use a graph of the market for Bank Reserves to show how the Open Market Trading Desk would implement a decision by the FOMC to raise the target federal funds rate. You should assume that the discount and deposit rates are adjusted so that the spreads between them and the target federal funds rate are maintained.

To achieve a higher target for the federal funds rate, the Open Market Trading Desk would carry out open market sales, shifting the supply of reserves to the left until demand and supply of reserves intersect at the new target federal funds rate. (Move from point A to point B on the graph.) The corresponding rise in the discount and deposit rates to maintain the spreads means that the supply and demand curves for reserves become perfectly elastic at higher rates.
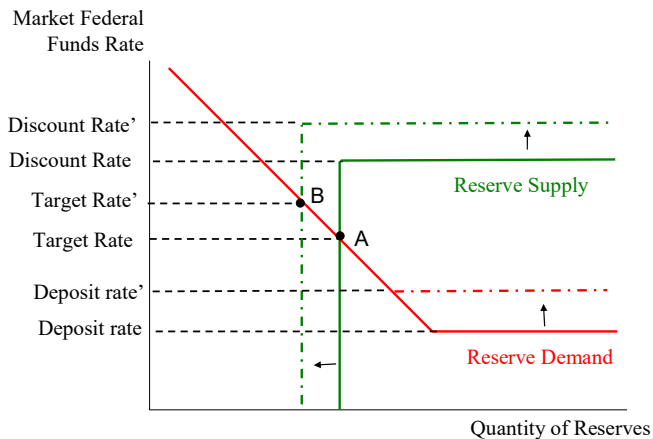
3. Suppose, one morning, the Open Market Trading Desk drastically under-estimates the demand for reserves when deciding the quantity of reserves to supply to the market. Use the graph of the Market for Bank Reserves to show why the market federal funds rate will not exceed the discount rate regardless of how large the gap between estimated and actual reserve demand.

If the actual demand for reserves were larger than the estimated demand, the actual reserve demand curve ($R^{d'}$) would be farther to the right than the estimated demand curve ($R^{d}*$). If the gap is large enough, the demand and supply curves for reserves would intersect on the horizontal portion of the reserve supply curve. As banks can get whatever quantity of reserves they need through discount loans, they will not be willing to borrow in the federal funds market at a rate above the discount rate. Therefore, no matter how great the underestimate of reserve demand, the market federal funds rate will not rise above the discount rate.

Federal Funds Rate

R^{d*}

$R^{d'}$

$i_{ff}'' = i_{d}$

R^{s}

i_{ff}^{*}

$i_{ff}' = i_{or}$

NBR*

Quantity of Reserves, R
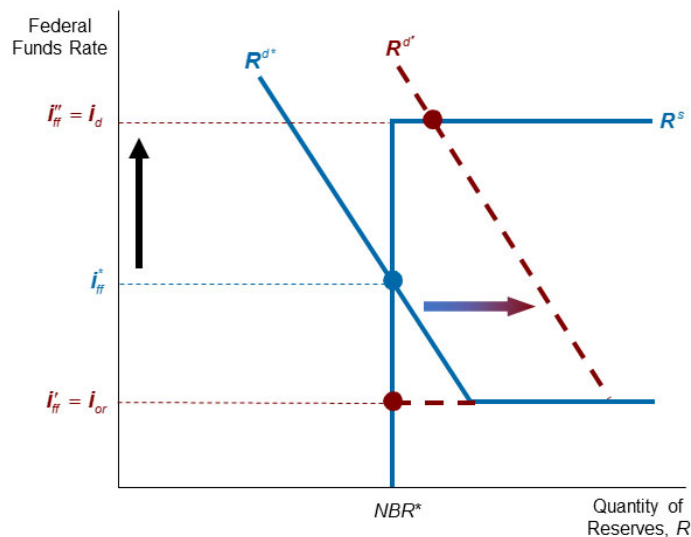
If demand is greater than expected (**Rd***) and ends up at **Rd'**, then the federal funds rate would rise to a maximum equal to the discount rate.