Elements of Macroeconomics: Homework #7

Question I

Assume the U.S. economy can grow at 2.5% per year.
Assume the Federal Reserve thinks the ideal inflation rate is 2%
Assume the natural rate of unemployment is 4.5%
The current unemployment rate is 3.5%
Assume the Fed thinks \( r^* \), the real interest rate at which the economy neither speeds up nor slows down, is 1%

a) In 2018, the Federal Reserve Chair revisits the arguments of Milton Friedman in favor of the monetarist approach to conducting monetary policy. He decides to adopt monetarism as a policy, based on the quantity theory of money. At what rate will he aim to increase the money supply?

b) Over the next year, suppose the new Fed Chair succeeds in delivering his target for money supply growth. Nonetheless, suppose further that the approach followed by the Fed leads to expected growth for real GDP but a 4% rise for the price level. What false assumption in the application of this approach explains this outcome? Use a formula to explain how the performance for output growth and price increases can match the growth rate in the money supply.

c) The Fed decides to revert to conducting monetary policy using interest rate policy. Which famous rule does it follow? Write down the equation.

d) At this point, unemployment is 3.5% and inflation is 4%. If the Fed follows the interest rate rule of part (c), what will the fed funds rate be?
e) After a year of this policy, inflation has attained its ideal level, but unemployment has risen to 8.5%. What should the fed funds rate be according to the rule in part (c)? Why might this be an issue?

f) How could the Fed conduct policy through quantitative easing (QE) when facing the issue raised in part (e)? Graphically depict your answer using the expanded loanable funds model.
Question II

In 2020 a major drought hits across the globe, severely affecting crop yields. Furthermore, a swine flu epidemic kills significant numbers of pigs and mad cow disease reduces the world’s supply of beef. Food prices leap in 2020.

In 2021 the trade war with China escalates casing panic and corporate spreads to leap.

Throughout this period the government maintains a constant budget deficit of $1 trillion.

The table below shows some macroeconomic data for this period:

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>Key Equilibrium Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>U3 unemployment</td>
<td>4.0%</td>
<td>5.0%</td>
<td>8.0%</td>
<td>8.0%</td>
<td>LTSG = 2.5%</td>
</tr>
<tr>
<td>CPI inflation</td>
<td>2.0%</td>
<td>6.0%</td>
<td>2.0%</td>
<td>0.0%</td>
<td>U* = 4%</td>
</tr>
<tr>
<td>CPI, excluding food</td>
<td>2.0%</td>
<td>2.0%</td>
<td>2.0%</td>
<td>2.0%</td>
<td></td>
</tr>
<tr>
<td>Food Index</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corp-Govt 10 yr Spread</td>
<td>2.0%</td>
<td>2.5%</td>
<td>5.0%</td>
<td>3.0%</td>
<td></td>
</tr>
<tr>
<td>Fed Funds rate</td>
<td>3.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-year Govt Bond yield</td>
<td></td>
<td></td>
<td>2.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-year yield minus TIPS yield</td>
<td>2.0%</td>
<td>2.5%</td>
<td>1.0%</td>
<td>1.0%</td>
<td></td>
</tr>
<tr>
<td>Federal Govt. Deficit</td>
<td>$1 trillion</td>
<td>$1 trillion</td>
<td>$1 trillion</td>
<td>$1 trillion</td>
<td></td>
</tr>
</tbody>
</table>

Note: Inflation expectations, provided above, are derived from the treasury 10-year TIPS spread.

The government finances the deficit almost entirely using treasury bills (50%) and 10 year bonds (50%)

1. Assume a standard Phillips curve successfully predicts the CPI:ex food. Based upon the information given in the tables above, compute the CPI:ex food, for 2020 through to 2022.

2. Use your answers to question “1” and the information in the table to compute the food price index for 2020 through 2022.
3. The graph below shows the T-bill quadrant of the three quadrant loanable funds diagram for 2021. Assuming the Federal Reserve does not buy any T-bills in 2021, label the graph and draw the government demand curve for T-bills.

4. Now assume that the Federal Reserve buys T-bills until it hits the zero lower bound. Draw on the same graph above the new government demand curve for T-bills. How many T-bills did the Federal Reserve buy?
5. The quadrant below shows the 10 year government bond yield quadrant of the three quadrant loanable funds model, with the supply curve drawn assuming the Federal Reserve does not purchase either T-bills or 10 year treasury bonds in 2021. Label the quadrant and draw the government demand curve for 10 year government bonds.

6. As before, assume the government purchases T-bills until it reaches the zero lower bound, but does not interfere in the 10 year bond market. Assume that the spread between the 10 year bonds and T-bills remains the same as if the Fed had not purchased any T-bills. Draw on the quadrant above the shift that occurs and state the new 10 year (nominal) government bond yield.

7. In 2022 the Federal Reserve realizes it needs to do more to recover from the recession and decides to engage in quantitative easing. It decides to buy $200 billion on 10 year government bonds (as well as the required amount to hit the zero lower bound in the T-bill market). On the 10 year government bond quadrant above, draw the shift that occurs and state the new 10 year (nominal) government bond yield.
8. Now consider the Corporate Bond Market, the third quadrant of our loanable funds model drawn below. Assuming the Federal Reserve hits the zero lower bound in the T-bill market in 2021, but does not quantitative easing, label the quadrant and draw a supply curve that is consistent with the data for 2021 in the table at the beginning of the question.

![10 year Corp. Bond market](image)

9. Assuming in 2022 the Federal Reserve also does quantitative easing, buying $200 billion of 10 year government bonds, draw a supply curve in the quadrant above that is consistent with the data for 2022 from the table at the beginning of the question. By how much does corporate borrowing change from 2021 to 2022?