San Francisco State University
ECON 302
Michael Bar
Fall 2016

Problem set 6 - Answer key

Money and Banking

1. (10 points). Quantity theory.
   a. Write the quantity equation of money, both in levels and in growth rates.

   In levels:
   \[ M_t V_t = P_t Y_t \]

   In growth rates:
   \[ \tilde{M} + \tilde{V} = \tilde{P} + \tilde{Y} \]

   b. Suppose that velocity is fixed, the growth rate of real GDP is 1.5% and the FED wants to achieve inflation of 2%. What is the required growth of the money supply?

   \[ \frac{\tilde{M} + \tilde{V}}{\tilde{P} + \tilde{Y}} \]
   \[ \Rightarrow \tilde{M} = 3.5\% \]

2. (30 points). Suppose that the public wants to hold currency/deposit ratio of \( cd = 0.1 \), and the required reserve/deposit ratio is \( rd = 0.2 \). The initial consolidated balance sheet of commercial banks is as follows:

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<th>Assets</th>
<th>Liabilities</th>
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<tr>
<td>20</td>
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<tr>
<td>25</td>
<td>55</td>
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<tr>
<td>100</td>
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<td>R</td>
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<td>B_g</td>
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   a. Find the monetary base, the money supply and the money multiplier in this economy.

   \[ CU = cd \cdot D = 0.1 \cdot 100 = 10 \]
   \[ MB = R + CU = 20 + 10 = 30 \]
   \[ M = CU + D = 10 + 100 = 110 \]
   \[ mm = \left( \frac{1 + cd}{rd + cd} \right) = \left( \frac{1 + 0.1}{0.2 + 0.1} \right) = \frac{2}{3} \]
b. Now suppose that the FED performs an open market operation and buys government bonds from the commercial banks at the amount of 5. Find the new monetary base, the money supply and show the new balance sheet of the commercial banks.

\[ MB = 30 + 5 = 35 \]

\[ M = \left( \frac{1 + cd}{rd + cd} \right) \cdot MB = \left( \frac{1 + 0.1}{0.2 + 0.1} \right) \cdot 35 = 128 \frac{1}{3} \]

\[ D = \left( \frac{1}{rd + cd} \right) \cdot MB = \left( \frac{1}{0.2 + 0.1} \right) \cdot 35 = 116 \frac{2}{3} \]

\[ R = \left( \frac{rd}{rd + cd} \right) \cdot MB = \left( \frac{0.2}{0.2 + 0.1} \right) \cdot 35 = 23 \frac{1}{3} \]

\[ CU = \left( \frac{cd}{rd + cd} \right) \cdot MB = \left( \frac{0.1}{0.2 + 0.1} \right) \cdot 35 = 11 \frac{2}{3} \]

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<tbody>
<tr>
<td>( R = 23 \frac{1}{3} )</td>
<td>( D = 116 \frac{2}{3} )</td>
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<tr>
<td>( B_o = 20 )</td>
<td></td>
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<tr>
<td>( L = 73 \frac{1}{3} )</td>
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<tr>
<td>( 116 \frac{2}{3} )</td>
<td>( 116 \frac{2}{3} )</td>
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c. Suppose that instead of the open market operation, the FED reduces the required reserve ratio to 10%. Find the new monetary base, money multiplier, the money supply and present the new balance sheet of the commercial banks.

\[ MB = 30 \]

\[ mm = \frac{1 + cd}{rd + cd} = \frac{1 + 0.1}{0.1 + 0.1} = 5.5 \]

\[ M = \left( \frac{1 + cd}{rd + cd} \right) \cdot MB = \left( \frac{1 + 0.1}{0.1 + 0.1} \right) \cdot 30 = 165 \]

\[ D = \left( \frac{1}{rd + cd} \right) \cdot MB = \left( \frac{1}{0.1 + 0.1} \right) \cdot 30 = 150 \]

\[ R = \left( \frac{rd}{rd + cd} \right) \cdot MB = \left( \frac{0.1}{0.1 + 0.1} \right) \cdot 30 = 15 \]

\[ CU = \left( \frac{cd}{rd + cd} \right) \cdot MB = \left( \frac{0.1}{0.1 + 0.1} \right) \cdot 30 = 15 \]
<table>
<thead>
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<tr>
<td>$R = 15$</td>
<td>$D = 150$</td>
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<td>$B_G = 25$</td>
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<td>$L = 110$</td>
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3. (15 points). Answer the following questions about the structure of the Federal Reserve System. You can use the resources posted on the course webpage.
   a. This group has broad control over the growth of the nation's money supply (circle one answer):
      i. Advisory Councils  
      ii. Federal Open Market Committee  
      iii. Board of Governors  
      iv. Member Banks
   b. How many districts make up the Federal Reserve System (circle one answer)?
      i. 3  
      ii. 12  
      iii. 25  
      iv. 52
   c. Which of the following is NOT one of the 3 primary responsibilities of the Federal Reserve System (circle one answer)?
      i. Printing money and minting coins  
      ii. Conducting the U.S. monetary policy  
      iii. Banking supervision  
      iv. Providing financial services to the commercial banks (such as check clearing).

4. (15 points). Answer the following questions based on Ben Bernanke’s speech on monetary policy (“Implementing Monetary Policy”) posted on the course web page.
   a. Can the FED directly control interest rates on mortgages?
      No. The FED has more or less full control over the Federal Funds Rate, but other interest rates are affected only indirectly by the FED’s actions.
   b. How can the FED indirectly control the long-term interest rates in the economy?
      The FED can influence public’s expectations about future monetary policies through announcements. For these announcements to be perceived as credible, the FED needs to establish a “track record” of previous policies and clarify to the public how the FED responds to different economic situations. This is called “transparency” of monetary policy. For more about the importance of transparency, read the interview with Bernanke posted on the course web page.
   c. How can the FOMC learn about the impact of their announcements on the public’s expectations about future interest rate? Be explicit.
      The FOMC can learn about public’s expectations from the prices of futures contracts on the funds rate.
5. (20 points). Answer the following questions based on Narayana Kocherlakota’s speech (“Monetary Policy Actions and Fiscal Policy Substitutes”).
   a. What is the price stability objective of the FED? Circle the correct answer.
      i. Inflation of 0%
      ii. Inflation of 0% – 1%
      iii. Inflation of 1.5% – 2.5%
      iv. Inflation of 3% – 5%
      v. A moving target
   b. What is the main goal of Quantitative Easing (QE)?
      Lowering the long-run real interest rate.
   c. According to the speaker, the FED’s policy of buying $600 billion of treasury securities (long-term government bonds), affects the long-term real interest rates in two ways (circle two correct answers):
      i. Convincing the public that the FED is committed to low interest rates in the future
      ii. Creating inflation
      iii. Lowering the portfolio risk (aka systematic risk, or beta risk) of the private sector, and thereby lowering the risk premium on other long-term bonds
      iv. Lowering taxes on labor
      v. Increasing taxes on consumption
   d. Why the speaker is not concerned that QE will lead to inflation? Circle the correct answer.
      i. QE does not increase bank reserves
      ii. The banks already have significant excess reserves, which are not used to create new money
      iii. QE increases the tax on consumption
      iv. QE lowers the tax on investment
      v. QE lowers the tax on labor

6. (30 points). Excel required. Use the data for HW6 posted on the course webpage.
   a. Present a fully labeled graph of the monetary base since January 2000.
b. Based on the graph of monetary base, we can clearly see that the FED is trying to increase the money supply in the economy since 2008. True/False, circle the correct answer and briefly explain.

\[ M = MB \cdot mm \]

thus if the money multiplier is unchanged, an increase in monetary base will lead to an increase in the money supply.

c. Present a fully labeled graph of the money multiplier since January 2000.

d. Based on the above graph, we can conclude that the money supply did not increase as much as the monetary base since 2008. True/False, circle the correct answer and briefly explain.

The money multiplier \( mm = M1/MB \) dropped sharply, which means that the growth of money supply (the numerator) was much less than the growth of the monetary base (the denominator).
e. Present a fully labeled graph of excess reserves that commercial banks held since January 2000.

![Excess Reserves Graph]

f. Based on the above graph, we see that commercial banks always keep the minimum required reserves. True/False, circle the correct answer and explain briefly.

This is true throughout the 2000's, but recently (since 2008) we see that banks keep much more reserves than what is required. This means that the banks are acting cautiously now about giving loans.