Solutions to Problem Set 4

Econ 101B Fall 2003

1. The "inflation tax" is paid by everyone who holds cash or money-denominated assets that lose value with inflation. The government collects this "tax" simply by printing more money.

2. Just replace in the quantity equation:

$$MV = PY \Leftrightarrow P = \frac{MV}{Y} = \frac{6 \times 2,500}{12,000} = 1.25$$

3. If the economy is along its balanced growth path $g(Y) = n + g = 3\% + 0 = 3\%$. Use the quantity equation in growth rates:

$$m + v = y + \pi \Leftrightarrow \pi = m + v - y = 0.1 + v - 0.03 = 0.07 + v$$

   So, unless the velocity of money is *falling* at a rate of 2% per year (an unlikely event), inflation should be at least 5% per year.

4. It would have to purchase $10 billion in short-term government bonds in the money market. Because the Fed would be increasing the demand of bonds, it would bid their price up *ceteris paribus*.

5. Start with the condition for the flow-of-funds equilibrium:

$$(Y^* - C - T) + (T - G) - NX = I$$

   As given in the problem, the rise in taxes decreases consumption spending, but only by the fraction C_y (the marginal propensity to consume). This then implies a fall in households' saving. Meanwhile, public savings are not changed, and net exports do not depend directly on the government budget constraint. All summed up, there is a fall in the supply of funds (savings) through the financial markets (in the diagram the savings function shifts to the left). Equilibrium will be restored by a rise in real interest rate r. From here it follows that: $\Delta I < 0$. In the foreign exchange market, the rise in the interest rate will lead to an *appreciation* of the dollar, because the rise in r make dollar-denominated assets more attractive to investors who then bid "up" the exchange rate: $\Delta\varepsilon > 0$.

NB: I am using the lectures' convention of expressing the exchange rate as the price of the dollar in units of foreign currency, such that a depreciation of the dollar is a fall in this price. The book uses the other convention: it expresses ε as the price in dollars of one unit of foreign currency. In general the only things that change are the interpretation you give to ε, and the signs of the coefficients of ε in the equations of the model. Still, beware of the difference.

However, this appreciation has a negative impact on net exports (which, incidentally compensates the increase in foreign savings): $\Delta NX < 0$. Finally, by definition of flexible-price model, $\Delta Y^* = 0$.

6. Consumption naturally rises, and that implies a fall in households' saving that decrease the supply of funds through the financial markets, as in the previous problem. Equilibrium will also be restored by a rise in real interest rate r. And the same qualitative consequences follow: $\Delta I < 0$, $\Delta\varepsilon > 0$, and $\Delta NX < 0$. Again, by definition, $\Delta Y^* = 0$.

7. Again, from the flow-of-funds equilibrium condition it is easy to see that the fall in consumption will decrease households' consumption and savings. However, contrary to problem 5, government savings will also rise, and by more. This increases total supply of funds (savings function shifts to the right), and decreases equilibrium real interest rate: $\Delta r < 0 \Rightarrow \Delta I > 0$. On the side of the foreign exchange market real exchange rate *depreciates:* $\Delta\varepsilon < 0 \Rightarrow \Delta NX > 0$ (counterpart of a fall in foreign savings). By assumption of the model $\Delta G = \Delta Y^* = 0$.

8. - a rise in foreign interest rates (r^f)
   - a world expansion (a rise in Y^f)
   - a speculative attack against the dollar ($\Delta\varepsilon_0 < 0$).

9. - a rise in government expenditure (G)
   - a fall in the interest responsiveness of investment (I_r)
   - a fall in the propensity to import (IM_y)

10. The exogenous shock to the model (the "irrational exuberance") translates into $\Delta C_0 = \$200$ billion. Only the investment and net exports functions are directly affected by interest rate, so we can summarize the impacts on the economy as follows:

    $\Delta C = \$200$

    $\Delta I = -I_r \Delta r = -90\Delta r$

    $\Delta NX = -X_\varepsilon \varepsilon_r \Delta r = -60\Delta r$

    Adding up:

$$\begin{aligned} \Delta Y^* &= \Delta C + \Delta I + \Delta G + \Delta NX \Leftrightarrow 0 = 200 - 90\Delta r - 60\Delta r \Leftrightarrow \\ &\Leftrightarrow \Delta r = 4/3 \end{aligned}$$

11. Within the model there are two broad alternatives that involve the use of fiscal policy to countervail the rise in consumption:

    - the government can reduce government spending by \$200 billion
    - or the government can raise taxes. In particular, it would have to raise the tax rate t such that:

      $$\Delta C_0 = C_y \Delta T \Leftrightarrow 200 = 0.75 \Delta t Y^* \Leftrightarrow \Delta t = 200/7,500 = 0.0266$$

      i.e. a rise of 2.66 percentage points in the tax rate (to 36%).

      Naturally, these two policies can also be combined in different proportions.

12. Basically a recomposing of aggregate demand from internal (and public) expenditure towards foreign and investment expenditure. The qualitative impacts would have been: $\Delta C < 0, \Delta r < 0, \Delta I > 0, \Delta \varepsilon < 0$ (depreciation), $\Delta NX > 0$, and $\Delta Y^* = 0$.

    As we are not given the value of the tax raise we'll just assess the quantitative impact of $\Delta G = -\$300$ billion:

    $$\Delta G = (I_r + X_\varepsilon \varepsilon_r) \Delta r \Leftrightarrow \Delta r = -300/(90 + 60) = -2$$

    And then: $\Delta I = -I_r \Delta r = \$180$ billion, $\Delta \varepsilon = \varepsilon_r \Delta r = -20$ foreign currency units per dollar, and $\Delta NX = -X_\varepsilon \varepsilon_r \Delta r = \$120$ billion.