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Transactions and Portfolio Crowding Out

This set of notes modifies the standard IS-LM model in such a way that when the government has to borrow (i.e., run a budget deficit), that raises interest rates in addition to higher interest rates arising from higher GDP and hence higher transactions demand for money. In the standard IS-LM model, all that matters to causing higher interest rate is the amount of increase in GDP resulting from higher government spending or lower taxes. In other words, financing a government budget deficit has no impact on interest rates in that model. The modified model adds a portfolio demand for money (i.e., households want to ascribe some share of their *wealth* in money as well as government bonds). It also describes how monetary policy can nullify that effect.

1. Standard IS-LM

Transactions crowding out of investment is the reduction in investment attributable to higher interest rates arising from a fiscal expansion (assuming the money supply is held constant). Note that given the investment function, *actual* investment might be higher or lower than it started out.

In the standard IS-LM model, when the marginal tax rate is zero, t_1=0, the IS schedule is given by:

(1) $$i = -\left(\frac{1-c_1-b_1}{b_2}\right)Y + \left(\frac{1}{b_2}\right)\Lambda_0$$ <IS curve>

The LM schedule is given by

(2) $$i = \left(\frac{\mu_0}{h}\right) - \left(\frac{1}{h}\right)\left(\frac{M_0}{P_0}\right) + \left(\frac{1}{h}\right)Y$$ <LM curve>

Rewriting in terms of money base, which the central bank actually controls:

(2a) $$i = \left(\frac{\mu_0}{h}\right) - \left(\frac{1}{h}\right)m\left(\frac{MB_0}{P_0}\right) + \left(\frac{1}{h}\right)Y$$ <LM curve'>

Where $M_0 = m \times MB_0$; "*m*" is the monetary multiplier, which links the money stock to money base. Solving for Y yields:

(3) $$Y_0 = \hat{\gamma}\left[\Lambda_0 + \frac{b_2 m}{h}\left(\frac{MB_0}{P_0}\right) - \frac{b_2\mu_0}{h}\right]$$ <Equilibrium income>

Where $$\hat{\gamma} \equiv \frac{1}{1-c_1-b_1+\dfrac{b_2}{h}}$$

Consider what is assumed in this case, so that one obtains this solution. Starting from an initial budget surplus of zero, when government spending is increased, the budget deficit widens. The resulting deficit has to be financed somehow. One way is via bond financing, that is the government sells bonds to finance the shortfall. ***If*** bond demand rises dollar for dollar with wealth [where $wealth/P = (MB/P) + (B/P)$], then the following occurs in the money and bond markets, and to the LM schedule (remember the bond market is the mirror image of the money market). See Panel A.

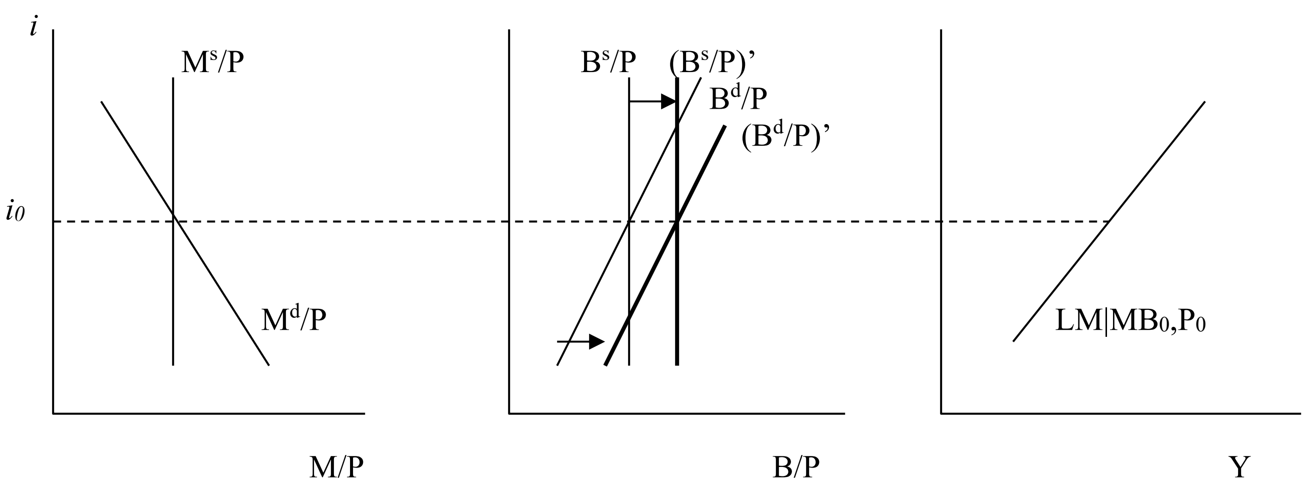
2. Portfolio Crowding Out

If on the other hand, money demand rises with wealth, *viz.*,

$$\frac{M^d}{P} = \mu_0 + Y - hi + j\left(\frac{wealth}{P}\right) \tag{4}$$

Where j has the interpretation of $\partial(M^d/P)/\,\partial(wealth/P)$ (and is equal to $1-\partial(B^d/P)/\,\partial(wealth/P)$), then a budget deficit that increases the stock of bonds outstanding will cause the following situation, illustrated in Panel B. Notice that now interest rates rise in response to the government deficit that increases the stock of bonds outstanding, and the LM shifts in response to a budget deficit. This will occur whenever $\partial(B^d/P)/\,\partial(wealth/P) < 1$ (or equivalently $\partial(M^d/P)/\,\partial(wealth/P) > 0$).

Panel A



Panel B

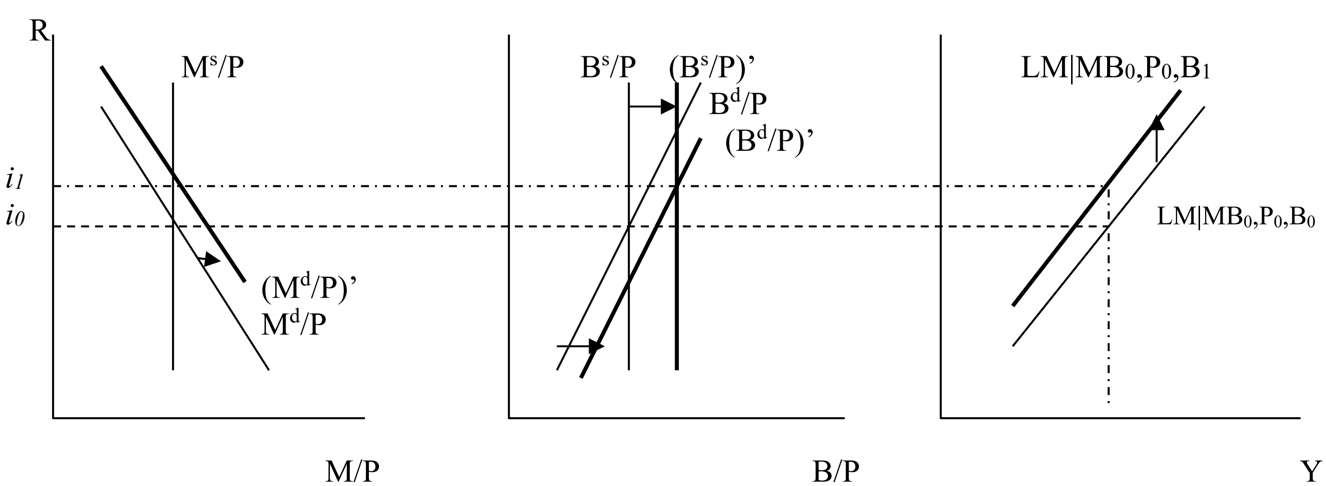


Figure 1: Money and Bond Markets

Note: The LM's position, with this new money demand function, depends upon the amount of wealth, and hence amount of bonds, outstanding. To see this, algebraically solve for the LM to obtain:

$$(5) \qquad i = \frac{\mu_0}{h} - \left(\frac{1}{h}\right)\left(\frac{mMB_0}{P_0}\right) + \frac{j}{h}\left(\frac{MB_0}{P_0} + \frac{B_0}{P_0}\right) + \left(\frac{1}{h}\right)Y$$

You will observe that the vertical intercept depends upon stocks of both money and bonds. Substituting this revised LM curve into the IS curve yields:

$$(6) \qquad Y_0 = \hat{\gamma}\left[\Lambda_0 + \frac{b_2}{h}\left(\frac{mMB_0}{P_0}\right) - \frac{b_2 j}{h}\left(\frac{MB_0}{P_0} + \frac{B_0}{P_0}\right) - \frac{b_2\mu_0}{h}\right]$$

Notice that the stock of bonds now enters into the determination of equilibrium income.

The linkage to fiscal policy becomes obvious when one considers how budget deficits are financed.

(7) $\qquad BuS \equiv T - G$

Recall, for simplicity, we have set t_1=0; now work with the budget deficit, *BuD*,

(8) $\qquad -BuS \equiv BuD \equiv G - T = GO_0 - t_0 = \Delta(B/P)$

This budget deficit has to be financed somehow; this constraint is reflected in the last term on the right hand side of (8). In other words, if the government spends more than it takes in in terms of revenue, then it must borrow by issuing new debt.

So if one considers an increase in government spending on goods and services, ΔGO, ***starting from an initial budget deficit of zero***, then:

(9) $\qquad \Delta GO = \Delta(B/P)$

Now consider the total differential of (6):

$$(10) \qquad \Delta Y = \hat{\gamma}\left[\Delta\Lambda_0 + \frac{b_2 m}{h}\Delta\left(\frac{MB}{P}\right) - \frac{b_2 j}{h}\Delta\left(\frac{MB}{P} + \frac{B}{P}\right) - \frac{b_2\Delta\mu}{h}\right]$$

And "zero out" those terms that are constant when only government spending is changed. Assume monetary policy holds the money base constant.

$$\Delta\left(\frac{MB}{P}\right) = 0 = \Delta\mu$$

And substitute (9) in:

$$(11) \qquad \Delta Y = \hat{\gamma}\left[\Delta GO - \frac{b_2 j}{h}\Delta GO\right]$$

This implies the multiplier for government spending on goods and services is:

(12) $$\frac{\Delta Y}{\Delta GO} = \hat{\gamma}\left[1 - \frac{b_2 j}{h}\right] < \hat{\gamma} \equiv \frac{1}{1 - c_1 - b_1 + \frac{b_2}{h}}$$

Thus the change in output for a change in government spending will be the same as in the standard case, as long as money demand does not depend upon wealth ($j = 0$). The larger either b_2 or j, the smaller the multiplier.

This quantitative result should point the way to the economic intuition. The initial output increase is mitigated by the fact that when the government has to bond finance the resulting budget deficit, it has to offer higher interest rates to induce the public to hold the additional bonds.

This means that in this model, output can actually fall in response to an increase in government spending (that is, nothing rules out Y_1 ending up less than Y_0). The difference between Y_1 and Y''_0 is called "portfolio crowding out" of income, to differentiate it from "transactions crowding out" of income, which is the difference between Y'_0 and Y''_0. *Transactions* crowding out (what is discussed in the textbook) arises because higher income spurred by higher government spending raises money demand and, given the fixed money supply, higher equilibrium interest rates.

Portfolio crowding out arises because higher government spending (in the absence of a fully offsetting increase in tax revenues) is associated with higher bond sales, hence higher wealth, and hence higher demand for money which, given the fixed money supply, results in higher interest rates for all income levels.

That's why in the figure below, as the IS curve shifts out (white arrow), the increased bond issuance associated with the resulting budget deficit induces an upward shift in the LM curve (light gray arrow).

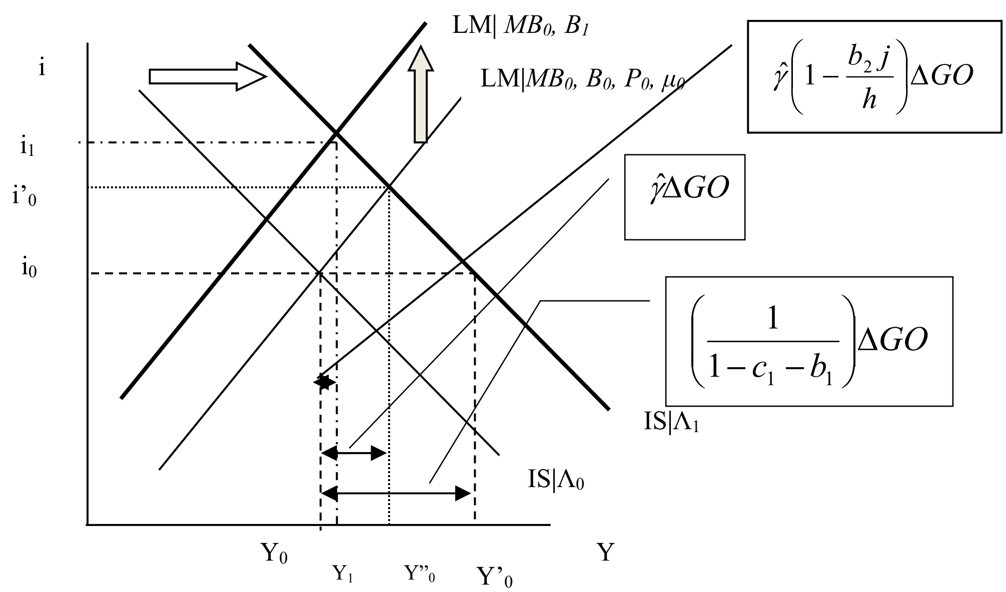


Figure 2: Crowding Out: Transactions and Portfolio Motivations

Notice that in principle $\frac{\Delta Y}{\Delta GO} \equiv \hat{\gamma}\left(1 - \frac{b_2 j}{h}\right)$ could be greater or less than zero. In particular, if j is very large (i.e., as wealth goes up, households want to hold a lot of their incremental wealth in the form of money, rather than bonds), then the more likely portfolio crowding out is to occur.

3. Crowding Out When Monetary Policy Is Accommodative, or the Economy Is in a Liquidity Trap, or Foreigners Want to Buy More Treasury Bonds

In the above analysis, the money supply is held fixed. In other words, monetary policy is not accommodative. Consider what happens if the central bank "monetizes" the new debt that arises from the fiscal policy, so that the change in government spending equals the real change in the money base; then equation (10) becomes:

$$\Delta Y = \hat{\gamma}\left[\Delta GO + \frac{b_2 m}{h}\Delta\left(\frac{MB}{P}\right) - \frac{b_2 j}{h}\Delta\left(\frac{MB}{P}\right)\right]$$

$$\Delta Y = \hat{\gamma}\left[\Delta GO + \frac{b_2 m}{h}\Delta GO - \frac{b_2 j}{h}\Delta GO\right]$$

$$\Delta Y = \hat{\gamma}\left[1 + \frac{b_2(m-j)}{h}\right]\Delta GO$$

In this case, the change in income is unambiguously positive, since j is bounded between 0 and 1, and, m is usually larger than one. Finally, if the central bank completely accommodates, by committing to keeping the interest rate constant, then one recovers the standard simple Keynesian conclusion regarding the multiplier.

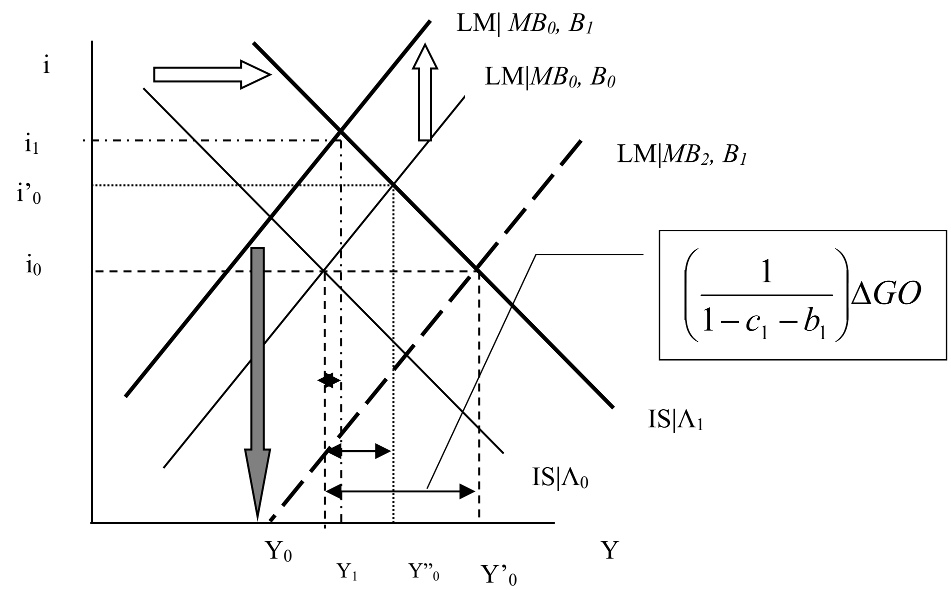


Figure 3: Portfolio Crowding Out with Interest Rate Targeting

When the central bank commits to keep the interest rate constant (i_0 in this case), then the LM must be shifted downward (dark gray arrow). Hence, in this case, portfolio crowding out is irrelevant, except insofar as the central bank takes on more government debt on its balance sheet.

If the economy is in a liquidity trap to begin with, then the same result applies: the multiplier is the same as in the simple Keynesian model.

Finally, suppose foreigners (e.g., foreign central banks) exogenously increase their holdings of government bonds, so $\Delta\mu < 0$. This shifts down the LM curve (black arrow).

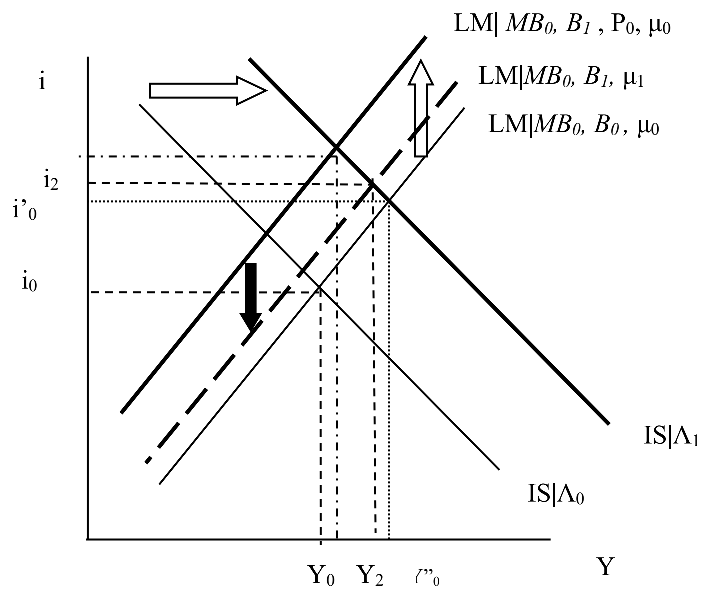


Figure 4: Portfolio Crowding Out with Foreign Central Bank Purchases

The interest rate is lower, and GDP higher, when foreign central banks purchase domestic government bonds, than when they do not.

Application: The United States has benefited -- in terms of lower interest rates and less crowding out -- from foreign central bank purchases for many of the years since 2000. Those purchases have continued because US Treasury bonds are viewed as extremely safe, and liquid.

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