## Fiscal Policy in the IS-LM model

First, we write the IS-LM model using specific functional forms. In particular, we focus on linear functions.

Consider the following functions:

Consumption function:  $C = C_0 + c(Y - T)$ 

Where  $C_0 > 0$  is a constant and 0 < c < 1 is the Marginal Propensity to Consume. Y is real income and T is the tax level, so (Y-T) is the disposable income.

Investment function:  $I = I_0 - br$ 

Where  $I_0 > 0$  is a constant and b > 0 measures the responsiveness of investments to the interest rate.

Government expenditure is exogenous and equal to G.

Tax level is exogenous and equal to T (you may assume that the tax level depends on income as we have done in one of the problem sets, however, nothing substantial will change in the analysis).

The equilibrium in the goods market is: Y = C + I + 6Using the functions defined above we have O $Y = C_0 + c(Y - T) + I_0 - br + C$ Solving for X $Y = \frac{1}{1 - c} [C_0 + I_0 + G - cT - br]_{1}$ 

Equation 1) is our IS curve. However, the IS curve as we plotted so far should be written as r as a function of Y.

Therefore, we can rewrite the **IS curve** as:

$$r = \frac{1}{b} [C_0 + I_0 + G - cT - Y(1 - c)]$$
 2)

Equations 1) and 2) are obviously the same thing written in a different way.

A bit of notation about the slope of the IS curve and the elasticity: when b is particularly large (or c is very close to 1) the slope of the IS curve in 2) is a small number in absolute value. This means that a big change in income will result in a small change in r. This implies that the IS curve is relatively flat. We call this situation as an IS curve that is **ELASTIC** with respect to Y (if a big change in Y

However, if the interest rate decreases a lot, Investment will increase substantially and so the level of income.

Here we have considered an **expansionary monetary policy** (*M* increases). A similar reasoning can be made for the case of a **restrictive monetary policy** (*M* decreases). In the case of a restrictive monetary policy the LM will shift to the left and the result will be a reduction in Income and an increase in the interest rate in equilibrium. However, the effectiveness of this policy will depend on the slope of the LM as in the case of an expansionary policy.

Obviously the effectiveness of monetary policy depends also on the slope of the IS curve.

In the following graph we consider two possible IS curves, one less elastic (IS) than the other (IS<sup>1</sup>). As we will see an increase in M will tend to have a bigger effect on Y the more elastic is the IS curve ( $Y_{new} > Y_I$ ).



If the IS curve is elastic it means that investments are very sensitive to the interest rate (b is large). A small decrease in the interest rate will have a big impact on I and therefore on Y.

**Conclusion**: for a given slope of the IS curve, monetary policy (expansionary or restrictive) is more effective in affecting the level of real income the less elastic is the LM curve. Given the slope of the LM curve, monetary policy (expansionary or restrictive) is more effective in affecting the level of real income the more elastic is the IS curve

## The Liquidity Trap: the Keynesian Case

The liquidity trap is also called the "Keynesian case" of the neoclassical synthesis since it represents the economic situation that is closer to the original ideas of Keynes on how an economic system should work.

A liquidity trap is a situation where the interest is very close to zero. At that interest rate people will hold any amount of money for any given level of income.

The point is: when the interest rate is close to zero, the cost opportunity of holding money is close to zero, so people will just keep all the money they have in their pocket instead of investing some of it into assets that will pay a return that is close to zero. We say that in this case money and less liquid assets are essentially the same thing.

This implies that the LM curve is infinitely elastic (completely flat) at this low interest rate.

In terms  $\mathcal{O}$  be stope of the block  $\mathcal{O}$  if means that  $h \to \infty$ , meaning that the demand for money is infinitely sensitive to r.

If there is a huge increase in Income and money demand increases, it is enough to have a small decrease in the interest rate to compensate the increase in the money demand.

So the first two basic elements of a liquidity trap are:

- 1) Interest rate extremely low, possibly zero;
- 2) The LM curve is completely flat at that low interest rate;

Now we introduce another element that makes the liquidity trap closer to Keynes' ideas. According to Keynes investments are not very sensitive to the interest rate, but they depend mainly on what Keynes called "*Animal Spirits*". You may think at the animal spirits as the subjective expectations of the investors about the future. The idea for Keynes is: an investor will undertake an investment if he expects that the investment is a good idea, independently on the level of the interest rate. You may



Result: income does not change and the interest rate increases more than in the case where the LM remains fixed.

## Is the general price level really fixed in the short-run?

The analysis done so far is based on the assumption that the general price level is fixed. Is this an assumption that holds in reality? To see this we should run an experiment and see how long to the general price ditions has occurred. level to change after a change in economic An empirical experiment of this site has been done to Bertanke and Gertler (1995).<sup>1</sup> **CR** (Vector Autor rescion that is a system of dynamic equations They estimate a re estimated) and they check after a positive shock in the interest rate (an to increase in the interest rate) the general price level does change. The increase in the interest rate is interpreted as a change in monetary policy. In particular it is interpreted as tight monetary policy (like a reduction in money supply). The experiment is as follow: first we increase the interest rate in the first period, then nothing else changes and we see over time how long it takes for the general price level to change. The result of their analysis is depicted in the following picture:

<sup>&</sup>lt;sup>1</sup> Bernanke and Gertler (1995), **Inside the Black Box: The Credit Channel of Monetary Policy Transmission**, *Journal of Economic Perspectives*, Vol. 9, No. 4. (Autumn, 1995), pp. 27-48.