Monetary Economics
Supervision 3

Samuel Lee

Section A

A.1

The Gordon growth model is a way of valuing the price of an equity based on the sum of all future dividend payments discounted to the present value. The model assumes some discount rate (or the interest rate) $\tilde{\imath}$ and dividends D_t grow at a constant rate g, where $g < \tilde{\imath}$. With these assumptions, the price of an equity is

$$p_t = \sum_{n=1}^{\infty} \frac{D_{t+n}}{(1+\tilde{\imath})^n} = \sum_{n=1}^{\infty} D_t \frac{(1+g)^n}{(1+\tilde{\imath})^n} = \frac{D_t(1+g)}{1+\tilde{\imath}} \sum_{n=0}^{\infty} \frac{(1+g)^n}{(1+\tilde{\imath})^n} = \frac{D_{t+1}}{1+\tilde{\imath}} \frac{1}{1-\frac{1+g}{1+\tilde{\imath}}} = \frac{D_{t+1}}{\tilde{\imath}-g}$$

With contractionary monetary policy, we expect $\tilde{\imath}$ to increase. Therefore equity prices should decrease. This makes sense since a higher $\tilde{\imath}$ indicates a higher opportunity cost of holding equities relative to the alternative of holding bonds.

A.2

When financial markets are informationally efficient, asset prices incorporate information from anticipated monetary policy decisions. This may mean that asset prices respond to policy decisions at the time of announcement rather than the time of enactment, but not that anticipated monetary policy decisions have no effect on asset prices. Therefore monetary policy still can have effects transmitted through asset price channels, and the statement is false.

A.3

The first way is through the traditional ('Keynesian') interest rate channel. Expansionary monetary policy lowers real interest rates and the cost of capital, which leads to a rise in spending on consumer durables and housing.

The second way can work through intertemporal substitution effects. A lower real interest rate lowers the opportunity cost of consuming more now as opposed to delaying purchases for later, and that can increase consumption spending.

The third way can work through wealth effects. If consumers hold a substantial part of their wealth in equities, a lower interest rate can lead to an increase in equity prices, and the increased wealth can lead to additional consumption spending. This can also work through house prices.

The fourth way can be through the bank lending channel. Expansionary monetary policy increases bank reserves and bank deposits which allows banks to make more loans. This can lead to higher consumption spending especially in consumers who used to face credit constraints.

Section B

B.1

(a)

For equilibrium in the money market, we must have $D^s = D^d$. Therefore,

$$\underbrace{\frac{1}{\tau}R}_{D^s} = \underbrace{Y - \kappa_M i_B + d_M}_{D^d}$$

$$i_B = \frac{1}{\kappa_M}Y - \frac{1}{\tau\kappa_M}R + \frac{1}{\kappa_M}d_M \qquad (LM)$$

and the LM curve is upward sloping in (i_B, Y) space just as we are used to. Monetary policy can affect the supply of reserves R through open market operations, or (only occasionally) by changing the legal minimum reserve requirement τ. Expansionary monetary policy will increase R or, equivalently, reduce τ, freeing up more deposits to be held by the public. This means that at any given level of output Y, there will have to be a lower bond interest rate i_B to clear the market and induce the public to hold the extra supply of deposits. This translates graphically into a rightward shift of the LM curve, and is consistent with the mathematical expression above.

(b)

To get the equilibrium loan interest rate i_L, we need the market for loans to clear, that is, $L^s = L^d$. We also know that deposits are inelastically supplied, so we can substitute $D = \frac{1}{\tau}R$. Therefore,

$$\underbrace{\lambda\frac{1-\tau}{\tau}R + s_L}_{L^s} = \underbrace{\mu Y - \kappa_L(i_L - i_B) + d_L}_{L^d}$$

$$i_L = i_B + \frac{\mu}{\kappa_L}Y - \frac{\lambda}{\kappa_L}\frac{1-\tau}{\tau}R - \frac{1}{\kappa_L}s_L + \frac{1}{\kappa_L}d_L$$

and we see that the loan interest rate i_L is increasing in the bond interest rate i_B, output Y, and the loan demand shock d_L, and decreasing in reserves R and the loan supply shock s_L. i_L is decreasing with respect to i_B because borrowers decide between loans and issuing bonds based on the differential between i_L and i_B; loans and bonds are imperfect substitutes. If i_B is high, issuing bonds is a relatively more expensive way of raising funds due to higher debt obligations in the future, and this increases the demand for loans and pushes up i_L.

i_L is increasing in Y and d_L for the same demand-side reasons. A higher Y increases the transactions demand for credit, while d_L is by definition a loan demand shock.

i_L is decreasing in R because a higher level of reserves, holding all else constant, increases the supply of deposits more-than-proportionally (this result hinges on τ being between 0 and 1, such that an increase in reserves does not, on net, eat up the amount of deposits available for lending). This allows banks to make more loans and a lower i_L is needed to clear the loan market. Again, s_L is by definition a loan supply shock and therefore works through the same supply-side effects as R.

(c)

When there is equilibrium in the loan market and goods market, i_L must be equal to the equilibrium value derived in (b). Therefore,

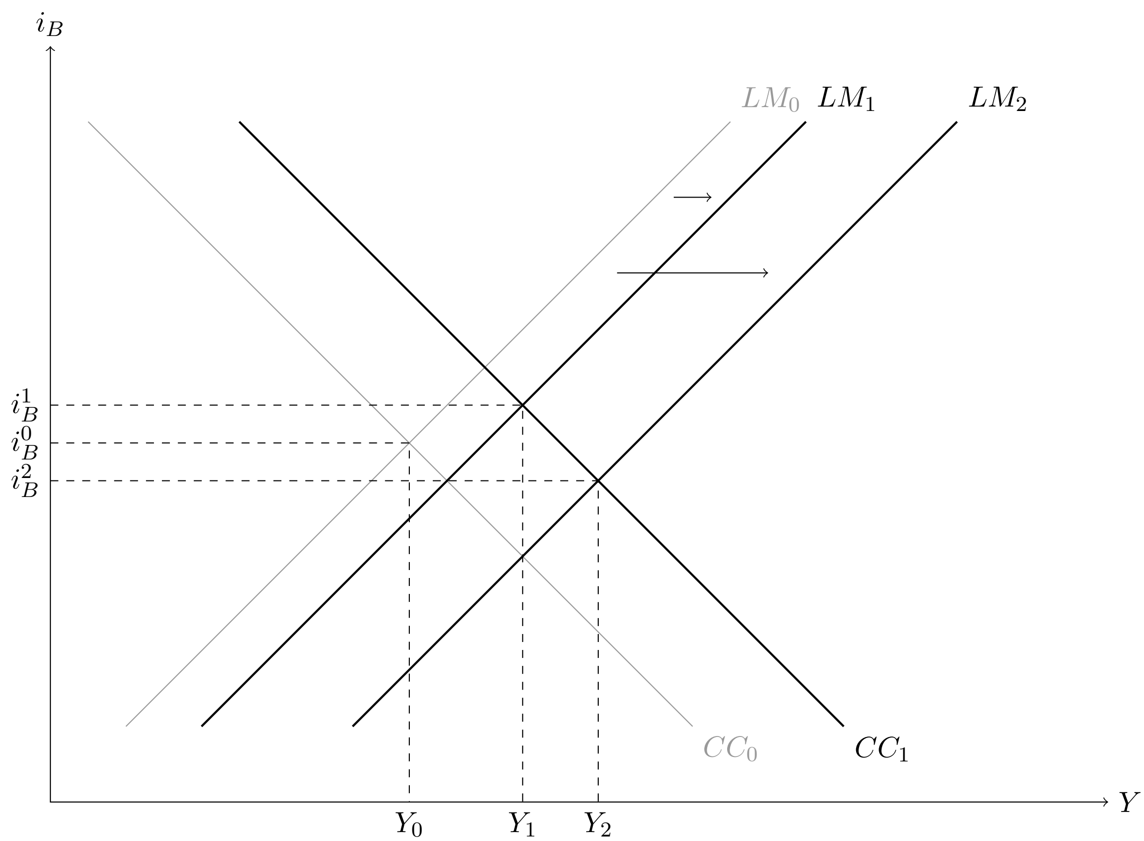
$$Y = -\gamma_L\left(i_B + \frac{\mu}{\kappa_L}Y - \frac{\lambda}{\kappa_L}\frac{1-\tau}{\tau}R - \frac{1}{\kappa_L}s_L + \frac{1}{\kappa_L}d_L\right) - \gamma_B i_B + d_Y$$

$$i_B = -\frac{\kappa_L + \gamma_L\mu}{\kappa_L(\gamma_L+\gamma_B)}Y + \frac{\gamma_L\lambda}{\kappa_L(\gamma_L+\gamma_B)}\frac{1-\tau}{\tau}R + \frac{\gamma_L}{\kappa_L(\gamma_L+\gamma_B)}s_L - \frac{\gamma_L}{\kappa_L(\gamma_L+\gamma_B)}d_L + \frac{1}{\gamma_L+\gamma_B}d_Y \quad (CC)$$

Again, monetary policy can change R or τ. Expansionary monetary policy increases R or reduces τ, such that the supply of loans increases. As discussed in (b), this leads to a lower equilibrium level of i_L given i_B. Since in the goods market equilibrium, Y is decreasing in i_L, the lower equilibrium level of i_L given i_B means that any given i_B is now consistent with a higher Y in the CC equilibrium. The CC curve shifts to the right as a result of the credit channel of monetary policy.

(d)

The effects of expansionary monetary policy which increases R on the LM and CC curve have both been discussed in (a) and (c): in short, both curves shift to the right.



As depicted above, a monetary expansion that increases R unambiguously increases Y from Y_0 to either Y_1 or Y_2. There are ambiguous effects on i_B depending on whether LM shifts more than

CC, and the possibilities of two different shifts in LM are depicted above (the same ambiguity could be illustrated by having two different shifts in CC as well).

The shift in LM from LM_0 to LM_1 or LM_2 works through the traditional interest rate channel: an increase in R increases the supply of deposits, and the public is induced to buy up bonds with the excess deposits which exerts downward pressure on i_B. This lowers the real interest rate and cost of capital. In equilibrium, interest-sensitive spending such as expenditure on investment and consumer durables increases.

The shift in CC from CC_0 to CC_1 works through the credit or bank lending channel: an increase in R increases the level of deposits from which banks are able to make loans. If there are bank-dependent borrowers in the economy, the increase in bank capital could lead to more loans made to such borrowers, further increasing spending and output beyond that induced by the interest rate channel. The downward pressure on i_B from the interest rate channel is muted due to this increased spending.

(e)

From the LM and CC equations, changes in R will affect the LM curve but not the CC curve if $\tau = 1$. In this case the coefficient on R in the CC curve becomes 0, and there is no longer a lending channel of monetary policy. This is essentially because an increase in reserves no longer leads to an increase in the supply of loans; banks now have to hold 100% of their deposits as reserves, and have no excess capital to make loans with.

Section C

C.1

The credit channel essentially works by increasing the supply of loans than can be made to borrowers who are dependent on banks for external financing. In terms of the effects of monetary policy on output, the credit channel works in the same direction as the interest rate channel. The credit channel does not represent an 'alternative' to the traditional interest rate channel; the two are not mutually exclusive.

If we take the Bernanke-Blinder model in B.1 as a reference, there is nothing in the credit channel that really requires the interest channel to work per se, so in that sense the credit channel is 'independent' of the traditional interest rate channel. However, we can see that for the permissible range of values for the parameters, the interest rate channel will always be operative while the credit channel can sometimes be inoperative. Therefore, if the model is to be trusted, from empirical observation it will seem as though the credit channel only works when the interest rate channel works, while the converse is not true. If we really trust the model, however, then strictly speaking the credit channel does not require the interest rate channel to work: we only need the presence of bank-dependent borrowers for the credit channel to operate. It does not matter if these borrowers do not change their spending patterns in response to the changing cost of capital as per the interest rate channel; they just have to be credit-constrained in their external financing. In fact, if we let the interest sensitivity of money demand κ_M tend to infinity, the interest rate channel will be inoperative while the credit channel will still work. This will be encountered in a liquidity trap, where i_B remains at 0 no matter what R is.