Fast Money in IS–LM

1 Preliminaries

To add fast money to the IS-LM macro model, let’s assume for simplicity that there is no government or foreign trade. So

\[ Y = C + I. \] (1)

Also for simplicity, let’s lump together all big ticket items. In particular, let’s re-classified all purchases of consumer durables into Investment \( I \) — think of \( C^{\text{durable}} \) as investment by households. Consequently, consumption \( C \) will just denote purchases of new non-durables, that is, everyday consumption:

\[ C = C^{\text{non-durable}}. \] (2)

Let’s also assume a typical Keynesian consumption function for everyday consumption:

\[ C = C_a + cY, \] (3)

where \( C_a \) is autonomous consumption (a positive constant) and \( c \) is the marginal propensity to consume (a fraction between 0 and 1). Typically we will think that the marginal propensity to consume, \( c \), is small because people are able to use their accumulated past saving (their Wealth) to keep their consumption of everyday goods fairly constant through the business cycle. So most of consumption demand equals autonomous consumption \( C_a \) (“autonomous” means independent of income).

Dividing both sides of the consumption function by \( Y \) shows that

\[ \frac{C}{Y} = \frac{C_a}{Y} + c. \]

So, \( \frac{C_a}{Y} \uparrow \) when \( Y \downarrow \), \[ \frac{C}{Y} \uparrow \] when \( Y \downarrow \). That is, the proportion of slow-money transactions goes up when \( Y \) goes down. Why? The intuition is that people dip into their savings to try to at least keep their everyday consumption steady when their income falls, e.g., when they are laid off. Using (1) this implies \( \frac{I}{Y} \downarrow \) when \( Y \downarrow \), that is, the economy loses mainly fast money transactions when \( Y \downarrow \). Caution: This does not mean that consumption \( C \) goes up during recession; it only means that the fraction of consumption \( C \) relative to total output goes up because investment \( I \) goes down more than \( C \) goes down.\(^1\)

2 Deriving the LM with fast money

Now to add fast money starting from CQT, assume money demand for transactions only depends on slow money transactions \( C \):

\[ \left( \frac{M^d}{P} \right)_t = kC, \] (4)

which we’ll call the fast money transaction demand function. The idea behind (4) can be understood in terms of our saw-tooth diagram with fast money: The amount of fast-money transactions \( I \) only affects the length of the “spikes,” and hence does not affect aggregate money demand; by contrast, the amount of slow-money transactions \( C \) affects the height of the “sawteeth,” and hence does affect aggregate money demand. Equation (4) should be contrasted to the CQT view that all transactions are slow money transactions, so \( \left( \frac{M^d}{P} \right)_t = kY \).

Recall the LM gives all combinations of \( r \) and \( Y \) that equilibrate the money market for a given real money supply. That is, the combinations of \( r \) nd \( Y \) that satisfy \( \frac{M^d}{P} = \frac{M^s}{P} \). Let’s assume until Section 4 below that people hold no asset balances, so total money demand equals transaction demand: \( \frac{M^d}{P} = \left( \frac{M^d}{P} \right)_t \). To derive the equation of the LM with fast money substitute (4) and the form of the consumption function into the money-market equilibrium condition that \( \frac{M^d}{P} = \frac{M^s}{P} \), yielding:

\[ \frac{M^d}{P} = kC = k(C_a + cY) = \frac{M^s}{P}. \]

\(^1\)It is crucial that \( C_a > 0 \). For example, if \( C = cY \), so consumption is just proportional to income, the fraction of slow money transactions to income would remain constant through the business cycle.
Solving for $Y$, after a little algebra one arrives at the equation of the LM with fast money and no asset balances:

$$Y = \frac{M^s}{P} \times \left[ \frac{1}{ck} - \frac{C_a}{c} \right].$$

(5)

The bracketed term in equation (5) is the value of velocity $V$ with fast money. Using the bracketed term check that, mathematically, when the money supply goes down, velocity $V$ will go down in a fast money world. The intuition we have already stressed: the consumption function (3) implies the economy mainly loses fast-money transactions when $Y \downarrow$, hence the average dollar will be able to do less transaction work when $Y$ goes down.

What difference does fast-money make? Since there are no asset balances so far, (5) still implies a vertical LM and a monetary theory of business cycles (see Figure 1). But fast money causes any shift in

$$r \quad \text{LM}\left(\frac{M}{P}\right) \quad Y = \frac{M}{P} \times \left[ \frac{1}{ck} - \frac{C_a}{c} \right]$$

Figure 1: LM with fast money and no asset balances

the LM to be magnified. That is, if $M \downarrow$, the LM will shift in more with fast money than in a CQT world, intensifying the recessionary pressures:

$$M \downarrow \Rightarrow V \downarrow \Rightarrow Y \downarrow \text{more than in a CQT world}.$$  

Another way to see the point is to recall that nominal liquidity equals $M \times V$, not just $M$; so in a fast-money world the economy loses more liquidity when $M \downarrow$.

Indeed, when the marginal propensity to consume $c$ is small, the LM will shift in a lot more with fast money. To illustrate, in a CQT world, if the money supply decreases by 100, $Y$ must decrease by $\Delta Y = 100 \times (1/k)$ to re-equilibrate the money market, that is, to decrease money demand by $k \Delta Y = 100$. By contrast, in a world with fast money, if $M$ decreases by 100, $Y$ must decrease by $\Delta Y = 100 \times (1/ck)$ to re-equilibrate the money market since when $Y$ decreases by $\Delta Y = 100 \times (1/ck)$, consumption decreases by $\Delta C = c \times \Delta Y = 100 \times (1/k)$, hence money demand decreases by $k \times \Delta C = 100$. For example, if $c = .1$, the LM will shift in 10 times as far after a decrease in $M$ (relative to a world with only slow-money transactions); even more dramatic, if $c = .05$, it will shift in 20 times as far after the same decrease in $M$. The intuition is that while $Y$ may go down a lot, $C$ will only go down a little bit if the marginal propensity to consume $c$ is small; and in a fast-money world, you need $C$ to go down to re-equilibrate the money market, that is, to decrease money demand as much as money supply fell. Even a huge drop in investment $I$ will not help at all to re-equilibrate the money market in a fast-money world.

3 The term structure of interest rates in a credit crunch recession

Figure 1 assumes a 2-asset world in which, in addition to money, there is only one generic financial asset, paying interest rate $r$. Let us now assume instead a 3-asset economy in which there are two financial assets other than money, time deposits $T$ paying $r_{ST}$ and bonds $b$ paying $r_{LT}$. Let us also assume that all lenders have the same inelastic interest rate expectations $r^e_L$; so, for the usual reason, the LM with $r_{LT}$ on the vertical axis will now have a floor at $r^e_{min}$. Although this floor will not be important for our analysis of a money shock in this section because $M \downarrow \Rightarrow r \uparrow$, it will be important for our analysis of a real shock in the next section.

In this 3-asset world, after a fall in the money supply, both the short and long rates will rise (a credit crunch). But $r_{ST}$ will increase more than $r_{LT}$. Why? Lenders will view the increase in $r_{LT}$ as only temporary; hence they will anticipate capital gains from lending long-term this year while $r_{LT}$ is high hence $P_0$ is low. (Recall our analysis in the Mr. Keynes handout: in equilibrium, $r_{ST} = r_{LT} + \gamma_b$. So $\gamma_b > 0$ implies $r_{ST} > r_{LT}$.)

2
Figure 2 below illustrates, assuming the economy is initially in long-run full-employment equilibrium with \( r_{ST} = r_{LT} = r^*_{LT} = 10\% \). Then the money supply drops sharply from \( M_1 \) to \( M_2 \), leading to

\[
\begin{align*}
\text{r}_{LT}^* &\approx 11\% \\
\text{r}_{min}^0 &\approx 9.1\%
\end{align*}
\]

Figure 2: THE LONG RATE DURING A CREDIT CRUNCH

\( r_{LT}^* \) increasing to 11\%. What will happen to the short rate? Using Equation (2) in the Mr. Keynes handout, the short rate would increase to 21\% (!) during the credit crunch. Thus the term structure of interest rates would temporarily be downward sloping, as illustrated in Figure 3

Figure 3: A TEMPORARY INVERSION IN THE TERM STRUCTURE

Note: We actually reached short rates close to 20\% in the early 1980’s, when Mr. Volcker — the chairman of the Fed before Mr. Greenspan — decreased the growth in the money supply sharply in an effort to squeeze out the high inflation rate in the U.S., leading to a huge credit crunch recession in 1981-2. As you would guess, the long rate also went up during this time, but less than the short rate. For example, the interest rate on corporate Aaa bonds—that is, highly rated, hence very safe long term bonds—went up from 11.9\% in 1980 to 14.2\% in 1981. The Great Volcker Recession of 1981-2 was our worst recession since the Great Depression, with the unemployment rate reaching 9.7\%!

4 Idle balances after a real shock

Let us now consider a real rather than monetary shock, still assuming everyone has the same fixed \( r^*_{LT} \). The usual picture of a liquidity trap recession is unchanged when there is fast money (see Figure 4). But

Figure 4: ARE THE IDLE SPECULATIVE BALANCES AT POINT B A LARGE POOL OR A SMALL PUDDLE IF \( Y \downarrow \) A LOT?

with fast money, the amount of idle balances held during a liquidity trap recession are much smaller because money demand goes down
much less. The reason we have already emphasized: the economy loses mainly fast money transactions during a recession, which does not affect money demand.

Let’s check our intuition. Here are the formal calculations. At full employment—before the fall in investment opportunities—there are no idle balances, so at point $A$ in Figure 4:

$$
\text{idle balances} = \frac{M^s}{P} - kC^{FE} = \frac{M^s}{P} - k(C_a + cY^{FE}) = 0
$$

But after the fall, less money is needed for transactions since $C_a$ a bit, so idle balances arise. In particular, at point $B$ in Figure 4:

$$
\text{idle balances} = \frac{M^s}{P} - kC^{SR} = \frac{M^s}{P} - k(C_a + cY^{SR}) = k(C_a + cY^{FE}) - k(C_a + cY^{SR}) = \left\lfloor ck\Delta Y \right\rfloor
$$

where $\Delta Y \equiv Y^{FE} - Y^{SR}$. [To go from the second line to the third, use the fact that there are no idle balances at full employment, so $\frac{M^s}{P} = k(C_a + cY^{FE})$.] Comparing this to the idle balances in a liquidity trap without fast money — namely $\left\lfloor k\Delta Y \right\rfloor$ — we see that the amount of idle balances is a lot smaller with fast money. Indeed, $ck\Delta Y$ approaches 0 as $c$ approaches 0, even if $\Delta Y$ is large (a large recession). What’s the significance? Recall in Mr. Keynes’s story of recessions, because speculative balances are large after a big drop in the IS, the pressure for the short rate $r_{ST}$ to drop all the way to zero is large: there is a large excess supply of money to lend short term as long as $r_{ST} > 0$. Once the realistic fact that the economy mainly loses fast money transactions during recessions is added to Mr. Keynes’s story, what appears to be a “large pool” of idle balances begins to look more like a “small puddle.” If we can find some use for this small excess supply of money other than sitting as idle speculative balances, we have the prospect of extending Mr. Keynes’s story to permit recessions following a real shock without $r_{ST}^* = 0$. Thus, we are getting closer to escaping even more from CQT!