Cash-Flow Problems and Precautionary Balances

It is very common for firms and households to suffer cash-flow problems during recessions. Here we will focus primarily on firms.

During a recession, a firm’s sales, hence its total revenue, decreases while its fixed costs do not decrease (for example, the firm must still pay the interest on the loans it has taken out in the past to buy its plant and equipment). The firm may try to juggle its bills to make ends meet. In particular, it may fail to settle on a timely basis the trade credit it owes to other firms, stretching payment on the trade credit it owes from 30 days to 60 days to 90 days, and so on, in an effort to avoid financial embarrassment. In a worst-case scenario, if the recession is severe, the firm may find itself so pressed for cash that it will be forced into bankruptcy, unable to pay its creditors.

The nexus of trade credit between firms makes them interdependent, hence makes cash flow problems contagious: If a firm, because of its cash-flow problems, fails to pay its debt (trade credit) to other firms in a timely fashion, these other firms will also suffer cash-flow problems. Thus the troubles of one firm can easily become the troubles of many. In a worst-case scenario, if the recession is severe, some firms will be forced into bankruptcy, entirely defaulting on their trade credit from other firms, which in turn may lead to these other firms also being unable to pay their creditors, hence the possibility of chain bankruptcies: one firm going bankrupt after another, like dominos falling in a row.

Such chain bankruptcies occurred during the 1997-98 financial crisis in much of East Asia. For example, the father of Woojin, one of our graduate students from Korea, went bankrupt because he sold steel to a large Korean conglomerate (called a chaebol) on credit. When this chaebol went belly up during the crisis, Woojin’s father—who owned just a small business in Korea—also was forced into bankruptcy, unable to pay his creditors because the large conglomerate did not pay him for the steel he sold to it. Woojin’s father lost everything, even his family house that he had put up as collateral to a Korean bank, to raise capital for his small business.

1. Precautionary balances as a cushion

Firms will try to soften their vulnerability to other firms’ cash flow problems by increasing their precautionary balances during recessions—if they possibly can.

EXAMPLE: Suppose a seller of an intermediate input like prefabricated steel (you can think of him as Woojin’s father) sells $100,000 of steel each month, 50% in monetary exchange and 50% in credit exchange (trade credit). He has $100,000 of expenses at the beginning of each month. If the firms he has extended trade credit to pay promptly, he has no cash flow problems, being able to meet his $100,000 of obligations at the beginning of each month as illustrated in Figure 1 below. Imagine Woojin’s father writes $100,000 worth of checks at the beginning of each month, in payment of his obligations.

But if some other firm, say firm B, doesn’t pay Woojin’s father promptly because B is having cash-flow problems—say B puts off paying Woojin’s father $10,000 at the beginning of month T,—then in turn Woojin’s father will also have cash-flow problems: $10,000 of his checks will bounce in the beginning of month T (again see Figure 1). Needless to say, this is bad for Woojin’s father’s “credit rating,” including his reputation with his workers and his suppliers.

To avoid such an embarrassment, Woojin’s father may hold a “cushion” of precautionary balances during the recession, say his $M_{\text{prec}} = $20,000 (where “prec” stands for precautionary). Then if one of his business associates does not pay $10,000 to him in a
timely fashion, he will still be able to cover his fixed obligations without financial embarrassment—dipping into his precautionary balances as illustrated in Figure 2 below. None of his checks will bounce. To put Figure 2 into perspective, recall that in our initial presentation at the beginning of the class, we assumed only households hold asset balances; now we see that firms do too.

Of course, things could get really bad and a very large business associate could fail to pay—say someone who owes Woojin’s father $40,000 at the beginning of month $T$ rather than only $10,000. Then his $20,000 cushion would prove inadequate. Such was the sad fate of our friend’s father.

2. Cash flow problems and precautionary balances in IS–LM

2.1 Preliminaries

As in our model of fast money without precautionary balances, we will assume for simplicity that there is no government or foreign trade, so $Y = C + I$. We also will assume all big-ticket items are lumped together under Investment; so Consumption includes only everyday slow-money transactions. Consumption demand follows a typical Keynesian consumption function:

$$C = C_a + cY.$$ 

In the spirit of Mr. Keynes, we also will assume that all lenders are risk neutral and have the same inelastic interest rate expectations, $r^{e}_{LT}$. Hence, as you know, arbitrage between the 2 lending markets insures that in equilibrium the relationship between the short rate and the long rate is give by the formula:

$$r^{e}_{LT} = \frac{r^{e}_{LT}}{1 + r^{e}_{LT}} \times (1 + r^{e}_{ST})$$ \hspace{1cm} (1)

2.2 The LM when there is fast money and also the possibility of cash flow problems

Unlike Mr. Keynes’s story about the money wing, we will assume that money demand for transactions only depends on slow money
transactions:

\[
\left( \frac{M^d}{P} \right)_{tr} = kC. \tag{2}
\]

Further, to focus on cash flow problems, we will assume firms hold no precautionary balances when the economy is not in recession:

\[
\left( \frac{M^d}{P} \right)_{prec} = 0 \quad \text{when} \quad Y = Y^{FE}.
\]

But, because of cash flow problems during recessions, firms want to hold some precautionary balances when \( Y < Y^{FE} \). In particular, we will assume:

\[
\left( \frac{M^d}{P} \right)_{prec} = K \times (Y^{FE} - Y) + L(r_{LT}) \tag{3}
\]

when \( Y < Y^{FE} \). Suppose \( K \) is a positive constant; so the first term \( K \times (Y^{FE} - Y) \) says that the bigger the recession (read: the smaller is \( Y \)), the bigger the precautionary cushion that firms want to hold. The second term \( L(r_{LT}) \) is a function that depends on \( r_{LT} \); it gives the amount that firms’ precautionary demand for money increases when the cost of borrowing—hence the opportunity cost of holding money—decreases. Notice that I have written the liquidity preference function \( L(\cdot) \) as a function of the long rate \( r_{LT} \) rather than the short rate \( r_{ST} \). This is only for convenience—because I will want to draw the LM curve with \( r_{LT} \) on the vertical axis. As you know, the short rate \( r_{ST} \) rather than the long rate \( r_{LT} \) is the relevant rate for measuring the opportunity cost of holding money; so, in a sense, it would be more appropriate to write \( L = L(r_{ST}) \) rather than \( L = L(r_{LT}) \). But since in equilibrium there is a one-to-one relationship between the short and long rates of interest—given by Equation (1) above—we can write \( L \) as a function of \( r_{LT} \); and just keep in mind that firms’ opportunity cost of holding money really depends on \( r_{ST} \).

We will assume that \( L(r_{LT}) \) gets very large when \( r_{LT} \) gets very close to \( r_{min}^0 \), hence when \( r_{ST} \) gets very close to 0. That is, firms will want to hold a lot of precautionary balances in their checking accounts \( D \) when there is almost no opportunity cost to holding such balances. As we shall see, this assumption about the functional form of \( L(\cdot) \) will force the equilibrium short rate to be above zero, that is, it will force \( r_{ST}^* > 0 \) (see the EXAMPLE below). Hence in equilibrium lenders will hold no speculative balances in their checking accounts \( D \). Why? Recall we define “money” narrowly as \( M1 \) rather than as \( M2 \), so time deposits \( T \) do not count as “money.” Hence, since in equilibrium \( r_{ST} > 0 \), any speculative balances will be held in \( T \)—where it earn some interest—rather than in \( D \), so:

\[
\left( \frac{M^d}{P} \right)_{spec} = 0.
\]

Recalling Mr. Keynes’s 3 motives for holding money, it follows that when \( r_{ST} > 0 \), only 2 motives remain for holding (narrow) money:

\[
\frac{M^d}{P} = \left( \frac{M^d}{P} \right)_{tr} + \left( \frac{M^d}{P} \right)_{prec}.
\]

Plugging in our functional forms, (2) and (3), this expands to:

\[
\frac{M^d}{P} = kC + K(Y^{FE} - Y) + L(r).
\]

Also plugging in our functional form for the consumption function, this expands further (after a little bit of re-arrangement) to:

\[
\frac{M^d}{P} = [kC_a + KY^{FE}] + [(kc - K) \times Y] + L(r_{LT}). \tag{4}
\]

Notice the first bracketed term is a constant, the second bracketed term depends on income, and the third term depends on the opportunity cost of holding money.

The LM is the set of all combinations of \( Y \) and \( r \) that satisfy the money market equilibrium condition that money demand equals money supply:

\[
\frac{M^d}{P} = \frac{M^s}{P}.
\]
Plugging in (4) and doing a bit of re-arrangement, we arrive at the equation of the LM with fast money and precautionary balances:

\[ Y = \frac{M^d}{P} - \left[ kC_a + KY^{FE} \right] - \frac{L(r_{LT})}{kC - K}, \]  
(5)

EXAMPLE: Suppose \( C_a = 500, c = .2, k = 1, K = .1, \) and \( Y^{FE} = 1,000. \) Plugging these values into (3) shows that the demand for precautionary balances in the example economy is given by:

\[ (\frac{M^d}{P})_{prec} = 100 - .1Y + L(r_{LT}). \]  
(6)

Similarly, plugging these values into (5) shows that the LM with fast money and precautionary balances is given by the equation

\[ Y = 10 \times \frac{M^s}{P} - 6,000 - 10L(r_{LT}). \]  
(7)

Now also suppose \( r^e_{LT} = 10\% \), so \( r^0_{min} \approx 9.1\%. \) And suppose:

\[ L(r_{LT}) = \begin{cases} 
0 & \text{if } r_{LT} \geq .093 \\
\frac{r_{LT} - .093}{500} & \text{if } .091 < r_{LT} < .093 \\
\infty & \text{if } r_{LT} \leq .091.
\end{cases} \]

This functional form for \( L(r_{LT}) \) says that the demand for precautionary balances is not interest sensitive as long as \( r_{LT} \geq 9.3\% \), hence as long as \( r_{ST} \geq 2.3\% \) (using equation (1)). But once the opportunity cost of holding precautionary balances is very low — \( r_{LT} < 9.3\% \) hence \( r_{ST} < 2.3\% \) — precautionary balances increase as \( r_{LT} \) decreases (hence as \( r_{ST} \) decreases). Indeed as \( r_{LT} \) approaches \( r^0_{min} \approx 9.1\% \) (hence as \( r_{ST} \) approaches 0%), firms’ demand for precautionary balances gets arbitrarily large, as illustrated in Figure 3 (left). The figure shows how firms’ desired precautionary balances vary with the opportunity cost of holding money for two values of \( Y \): \( Y = 900 \) and also for \( Y = 800 \) (both below the full employment level of 1000). Notice equation (6) — in particular, the assumption that \( K = .1 \) — implies the demand for precautionary balances shifts to the right by $1 every time \( Y \) drops by 10: the bigger the recession, the bigger the desire for a precautionary cushion. Also notice that the demand for precautionary balances approaches \( \infty \) as \( r_{LT} \) approaches \( r^0_{min} \), hence as \( r_{ST} \) approaches zero. So \( r_{ST} = 0 \) will lead to an excess demand for money; in other words, in equilibrium, \( r_{ST} \) will have to be greater than 0. Assuming \( \frac{M^s}{P} = 700 \), the LM with fast money and precautionary balances is illustrated in Figure 3 (right). Notice that, in terms of the money market, there are enough real balances in the economy to do all the needed transactions for full employment as long as the IS crosses the LM at some \( r_{LT} \geq 9.3\% \).

Problem Set 5 will give you some practice in putting IS and LM together.