Is it money or credit, or both, or neither? Credit, money and Aggregate Demand Bernanke & Blinder (AER, 88)

Márcio G. P. Garcia Department of Economics - PUC-Rio <u>www.econ.puc-rio.br/mgarcia</u> <u>mgarcia@econ.puc-rio.br</u>

> Macro II October 4th, 2011

I thank Bruno Balassiano and Carol Machado for excellent research assistance.

1. Introduction

- Models with asymmetric information stresses the importance of financial intermediaries in the provision of credit and the special nature of bank loans.
- For the traditional analysis, contained in the LM curve, to hold, two conditions must hold:
 - 1. loans and other forms of <u>customer-market</u> credit must be taken as perfect substitutes to bonds (*auction-market* credit), and
 - 2. financial markets must clear only by prices.
 - BB develop a model that rejects 1, but keeps 2. (Stiglitz and Weiss (AER, 81) reject 2.)

2. A Simple IS-LM Model with Two Assets (1/8)

- The Bernanke and Blinder model ("Credit, Money, and Aggregate Demand", AER, May 1988), henceforth the BB model, is a simple IS-LM model with two assets.
- In models inspired by the traditional IS-LM model, "... loans and other forms of customer-market credit are viewed as perfect substitutes for auction-market credit ("bonds")". In the BB model, a third asset, loans, is added to money and bonds.
- Borrowers and lenders observe the relevant interest rates (*i* on bonds, and ρ on loans) and decide how to allocate their wealth.
- The loan demand is, therefore, represented by equation (1), where y(GNP) "... captures the transactions demand for credit":

$$L^{d} = L(\rho, i, y)$$
(1)

2. A Simple IS-LM Model with Two Assets (2/8)

 The loans supply is done through the banking sector. To understand how it works, let's display the simplified balance sheet of the representative bank:

Bank Balance Sheet			
Assets	Liabilities		
R (bank reserves)	D (deposits)		
B ^b (bonds)			
L ^s (loans supply)			

- Bank's assets are bank reserves (R), bonds (B^b), and loans (L^s).
- Bank's liabilities are deposits (D).
- Bank reserves (*R*) are composed of required reserves (τ.*D*) plus excess reserves (*E*). Therefore, from the bank's balance sheet:

$$B^{b} + L^{s} + R = D(1 - \tau) \quad (2)$$

2. A Simple IS-LM Model with Two Assets (3/8)

 The portfolio shares of bonds (β), loans (λ) and excess reserves (ε), β+λ+ε=1, are determined according to the returns (zero for excess reserves):

$$L^{s} = \lambda(\rho, i)D(1 - \tau) \quad (3)$$
$$B^{b} = \beta(\rho, i)D(1 - \tau) \quad (4)$$
$$E = \epsilon(i)D(1 - \tau) \quad (5)$$

- In this model, there is no paper currency. Money comprises only deposits (D). Equilibrium in the money market is represented by a conventional LM curve in the y x i space.
- Money supply (*D*, the model equivalent of M1) is given by the amount of reserves (*R*, the model equivalent to M0), under control of the central bank, multiplied by the money multiplier (*m*): $m(i) = 1/[\varepsilon(i)(1-\tau) + \tau] \qquad (6)$

2. A Simple IS-LM Model with Two Assets (4/8)

- Money demand (*D*) is quite conventional, depending on the interest rate and income (total wealth is assumed constant and *ipso facto* eliminated).
- Therefore, equilibrium in the money market is represented by the following LM curve, upward sloping in the *y* x *i* plane:

 $D(i, y) = m(i)R \qquad (7).$

2. A Simple IS-LM Model with Two Assets (5/8)

- Having determined the money market equilibrium, let's turn to equilibrium determination in the remaining markets: loans, bonds and goods.
- The equilibrium in the **loans market** is given by equation (8): $L(\rho, i, y) = \lambda(\rho, i)D(1 - \tau) \quad (8).$ - + + - + -
- Given loan demand, L(ρ, i, y), and money demand, D(i, y), the nonbank public's demand for bonds is implicitly defined because total financial wealth is supposed constant.
- Finally, let's turn to the goods market equilibrium. It is summarized by an IS curve where the loan rate, ρ, also enters:

$$y = Y(i, \rho)$$
 (9).

2. A Simple IS-LM Model with Two Assets (6/8)

- The key novelty of the BB model is precisely that _ρ affects the IS curve. Since, by the equilibrium in the loans market (equation (8)), _ρ depends on *D*, which, in turn, by the equilibrium in the money market (equation (7)), depends on *R*, monetary policy, i.e. the amount of bank reserves (*R*), will also influence directly the goods market equilibrium.
- The graphical representation is undertaken in the same familiar y x i plane, although a tridimensional y x i x ρ representation could also be used.
- To represent the model in the *y* x *i* plane, we start by replacing *D* in the loans market equilibrium (equation (8)) by money supply, m(i)R, yielding: $L(\rho, i, y) = \lambda(\rho, i)m(i)R(1-\tau)$
- Then, the resulting equation can be solved to yield ρ as a function of the other variables: *i*, *y*, *R* and τ :

$$\rho = \emptyset(i, y, R, \tau) \quad (10).$$

2. A Simple IS-LM Model with Two Assets (7/8)

- In (10), the derivative of ρ with respect to *i* is usually positive, because when *i* increases, banks tend to allocate more of the free deposits to bonds, thereby lowering the amount of loans. Given a downward sloped demand curve for loans, this will increase ρ. This effect is akin to the substitution effect in consumer theory.
- However, there is another effect, akin to the income effect. When *i* increases, the money multiplier also increases, yielding more deposits from the same amount of bank reserves, *R*. If this "income" effect is very strong, it may overcome the former "substitution" effect, and make ρ a negative function of *i*.

$$\rho = \emptyset(i, y, R, \tau) \quad (10).$$

2. A Simple IS-LM Model with Two Assets (8/8)

 Substituting the ρ, given by (10), into the goods market equilibrium condition (9), we get the new IS, which is baptized by BB as the CC ("commodities and credit") curve, in honor of the late Don Patinkin.

$$y = Y\{i, [\emptyset(i, y, R, \tau)]\}$$
(11).
- - + + - +

 The CC curve is also downward sloping in the y x i plane, for the same reasons of the typical IS curve. However, it now responds to shifts in R, as well as to shocks in the loan market, affecting either the supply or the demand side.

3. Money expansion in the BB model (1/2)



3. Money expansion in the BB model (2/2)

- Chart 1 shows what happens when the CB expands the quantity of bank reserves. The initial equilibrium is at [E].
- The CB issues bank reserves (*R*). The effect is to shift both the LM and the CC curves to the right, with [E'] being the new equilibrium. Given the shift of the CC curve, the resulting interest rate is always higher than it would be the case in the traditional IS-LM model, at [E''], where the IS curve does not respond to changes in *R*.
- In fact, BB calls attention to the possibility that "... a rise in bank reserves might conceivably raise the rate of interest in the credit model" (p. 437).

TABLE 1—EFFECTS OF SHOCKS ON OBSERVABLE VARIABLES

Rise in:	(1) Income	(2) Money	(3) Credit	(4) Interest Rate ^a
Bank Reserves	+	+	+	_
Money Demand	_	+	-	+
Credit Supply	+	+	+	+
Credit Demand		-	+	-
Commodity Demand	+	+	+	+

*On bonds.

TABLE 2—SIMPLE CORRELATIONS OF GROWTH RATES OF GNP WITH GROWTH RATES OF FINANCIAL AGGREGATES, 1973–85^{a,b}

Period	With Money	With Credit	
1953:1-1973:4	.51,.37	.17,.11	
1974:1-1979:3	.50, .54	.50, .51	
1979:4-1985:4	.11,.34	.38, .47	

*Growth rates are first differences of natural logarithms.

^bCorrelations in nominal terms come first; correlations in real terms come second.