

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/232775962>

The IS-LM Framework

Article · January 2007

CITATIONS

0

READS

342

2 authors, including:



Ram Pratap Sinha

Government College of Engineering and Leather Technology

115 PUBLICATIONS 155 CITATIONS

SEE PROFILE

Some of the authors of this publication are also working on these related projects:



Workshop on Data Envelopment Analysis with R [View project](#)



Performance Benchmarking of Indian General Insurance companies [View project](#)

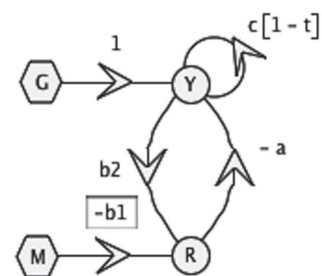
SCMS JOURNAL OF INDIAN MANAGEMENT

Contents

Volume 4	January-March 2007	Number 1
<i>Title of the Article</i>	<i>Author</i>	<i>Page No.</i>
Internet Radio Technology: Scope in Indian Education System	Vinith Kumar Nair and Krishnan M.	05-09
On the Future of Location- Based Advertising	Shin Wee Chuang and Tanasak Krabuanrat	10-15
Portfolio Size and Diversification	Lokanandha Reddy Irala and Prakash Patil	16-20
Method of Research in Management	Mostafa Moballegghi and Shivaraj B.	21-27
Capital Adequacy: Regulation and Bank Evidences	Sudhindra Bhat	28-35
Financing Pattern: Indian Corporate Sector	Sanjay J. Bhayani	36-50
Institutional Investors Choosing a Stockbroker	Rooma Roshnee Ramsaran-Fowdar	51-55
Pre-requisites: Organizational Commitment	Jyoti Sharma	56-66
Job Contentment: University Academics	Vanniarajan T. and Anbazhagan B.	67-72
Effect: Stock Volatility on ESOPS	Sai Giridhar B. and Sri Ram R.	73-81
Performance Evaluation: Choice Mutual Funds	Sathya Swaroop Debasish	82-89
Financial Sector: The IS-LM Framework	Ram Pratap Sinha and Debansu Ray	90-94
Anti-Dumping Law, A Trade Barrier?	Kishore G. Kulkarni and Alexa Strear	95-104
The High Impact Leader	Satheesh Kumar T.N.	105-106
Psychological Capital	Rakhee Sudhir	107-108
Change Management	Sabesan S.	109-110

Financial Sector The IS-LM Framework

Ram Pratap Sinha and Debansu Ray

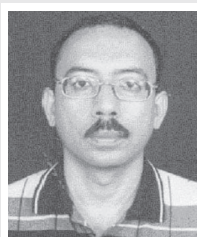


The seminal contribution of J.R. Hicks (1937) in the form of IS-LM analysis expressed Keynesian ideas in terms of a general equilibrium framework. However, in the original IS-LM framework there was no explicit role of the financial sector. The integration of the financial sector into the framework can facilitate the analysis of financial sector disturbances and their impact on the macro economy.

In (neo)classical economics there has been a clear dichotomy between the real and monetary sector. The real sector is concerned about the allocation of scarce resources among competing uses and determines the relative prices. The monetary sector, on the other hand, is concerned about the determination of monetary prices depending on the quantity of money in circulation and the cash holding behaviour of the community. The salient feature of the (neo)classical framework is the neutrality of money in the matter of resource allocation.

The contribution of J.M. Keynes (1936) signified a major departure from the (neo)classical tradition. Keynes first pointed out the nexus between the real sector and the monetary sector in

terms of speculative demand for money. It was, however, left to Prof. John Hicks (1937) to express Keynesian ideas in terms of a general equilibrium framework popularly known as the IS-LM analysis.



Prof. Ram Pratap Sinha, Assistant Professor and Head, Department of Economics, A.B.N. Seal College, Cooch Behar, Email: rp1153@rediffmail.com



Dr. Debansu Ray, Senior Lecturer, Institute of Business Management, Jadavpur University, Kolkata-700032, West Bengal, Email: ray-debansu@yahoo.co.in

The introduction of IS-LM analysis in the field of macroeconomic analysis opened new horizons for theoretical modelling. On the one hand, the IS-LM framework provided neat exposition of general equilibrium in terms of product and money markets. On the other hand, comparative static exercises using the IS-LM framework allowed policy makers, economists to consider the impact of various macro measures on real output and interest rates.

In the original IS-LM framework, no

explicit mention has been made of the financial markets and intermediaries. The bond market was considered to be a mirror image of the money market. While this simplified the analysis of financial sector macro economy to a considerable extent, this also deprived the possibility of discussing the effects of financial sector problems on the economy.

The present paper is an attempt to consider the financial sector within the IS-LM framework and consider/analyze the implication of such inclusion for the economy. The present paper is divided into four sections. Section I considers the implication of explicit introduction of the bond market in the IS-LM analysis but ignores the existence of the banking system. Section II introduces the banking sector. However, it is assumed that only the quantum channel is available from monetary control. Section III removes this assumption so that money is now endogenous i.e. bank deposit supply is interest elastic. Section IV considers how financial market problems can have its spill over effect on the real sector.

Section I:-IS-LM Analysis with a Bond Market

At the outset, we consider a simple macro model with one output, two financial assets (money & bond) and three types of economic agents: individuals, firms & government. The underlying assumptions are as follows:

- 1) Real saving in the economy is determined by real income & the real interest rate on bonds i.e. $S = S(Y, R_b)$, $dS/dY > 0$, $dS/dR_b > 0$.
- 2) Money is demanded by households and firms (M_h and M_f) while its supply is exogenously given (M_o).
- 3) Bonds are supplied by firms (B_f) and the government (B_g) while they are demanded by households: B_{gh} and B_{fh} are the money value of bonds held by households.
- 4) Government spending in each period are partly money financed and partly bond financed i.e. $G = 1/P [dB_g/dt + dM_o/dt]$.

General Equilibrium for the Economy

The economy is in equilibrium when all the output and input markets clear.

Product Market Equilibrium

Product market equilibrium requires that $S(Y, R_b) = I(R_b) + G$ — (1) i. e. in equilibrium, real saving must be equal to real private investment plus real government expenditure.

Asset Market Equilibrium

In the asset market, equilibrium requires that the value of assets demanded must equal the value of assets supplied i.e.

$$M_h(Y, R_b) + M_f(Y, R_b) + B_{fh}(Y, R_b) + B_{gh}(Y, R_b) = B_f(R_b) + B_g + M_o \text{---(2)}$$

We can rearrange equation (2) to write $M_h + M_f - M_o = B_f + B_g - (B_{fh} + B_{gh})$ — (3).

Equation (3) shows that the bond market is mirror image of the money market & vice versa. Thus an excess demand in the money market ($M_h + M_f > M_o$) will cause an excess supply in the bond market ($B_f + B_g - B_{fh} - B_{gh} > 0$).

Labour Market Equilibrium

Throughout our analysis, we have ignored the labour market. Our assumption is that due to the operation of Walras' law, the labour market will be in equilibrium when the other three markets clear. Therefore we have continued our analysis with the remaining three markets. Introduction of the Bond Market: Implication for the General Equilibrium: The conventional IS-LM analysis describes general equilibrium in terms of the following:

The commodity market is in equilibrium when producer's production plans are realised i.e.

- i) $S = I + G$ — (I)
- ii) The money market is in equilibrium when money demand is equal to money supply $M_h + M_f = M_o$ — (ii).

However in our present framework, we must add the third condition, which is that the producer's financing plans must be realised.

$$dB_f/dt = dB_{fh}/dt \text{---(iii)}$$

Here B_{fh} is the value of firm issued bonds held by households.

Condition (iii) is of crucial importance for general equilibrium. Condition (i) is a flow condition corresponding to the product market. We must have a parallel flow condition for the bond market, which is given by (iii). Condition (iii) can be derived from the following:

$$I = 1/p \{dBf/dt - dMf/dt\}$$

$$S = 1/p \{dB_{fh}/dt + dB_{gh}/dt + dMh/dt\}$$

$$G = 1/p (dBg/dt + dMo/dt)$$

Then from $S = I + G$ we have

$$1/p \{dMh/dt + dB_{gh}/dt + dB_{fh}/dt\} = 1/p \{dBf/dt - dMf/dt\} + 1/p \{dBg/dt + dMo/dt\}$$

$$dB_{fh}/dt + dMh/dt = dBf/dt - dMf/dt + dMo/dt$$

Money market equilibrium requires that

$$dMh/dt + dMf/dt = dMo/dt \Rightarrow dB_{fh}/dt = dBf/dt$$

Non-fulfillment of condition (iii) has negative implication for the real sector as the realised output will be lower than the optimal output as assumed by the fulfillment of all three condition described above.

Section II: Introduction of the Banking System (Exogenous Money)

Following the approach of Bernanke & Blinder (1988), we now introduce banking system in our framework. We define banks as financial intermediaries, which collect deposit D^h from households, and allocates this between loans & bonds (L^b and B^b respectively). The above modification has the following implication for our system:

- (a) Households now allocate their saving between two types of financial assets bank deposits and bonds. The households holding of these two are denoted by D^h B^h respectively.
- (b) Firms can now mobilise resources either by taking loans or by issuing bonds. Thus $I(Rb, RI) = B^f(Rb, RI) + L^f(Rb, RI) - M^f(Y)$ ————(4)

- (c) Banks have three types of fasset (cash reserves, loans and bonds)
 $D^b = D^h = R + L^b + B^b$ ———— (5)
 We assume that only households maintain bank deposits.
- (d) The quantum of deposits collected by bank is linked to their reserves i.e.
 $D^h = R/V$ where V is the deposit multiplier. Thus
 $L^b + B^b = R/V - R = R(1/V - 1)$ ————(6)
- (e) The allocation of funds mobilised by banks between loans bonds depend on portfolio optimisation exercise. We can write
 $L^b = L(Rb, rL) R$ ———— (7)
 $dL^b/dRb < 0, dL^b/dRI > 0$
 and $B^b = B(Rb, RI)R$ ————(8)
 $dB^b/dRb > 0, dB^b/dRI < 0$
- (f) Money market equilibrium requires that
 $M_o = M^f + M^h + R = M^d(Y, Rb, RI)$ where M^h and M^f refer to money demands of house holds and firms respectively.

Conditions for General Equilibrium in the Macro Economy:

Following the introduction of the banking sector, the familiar IS curve equation is to be replaced by the following two equations:

$$I(Rb, RI) + G = S(Y, Rb)$$
 ————(9)
 Which ensures equilibrium in goods market
 $L^f(Rb, RI) = L(Rb, RI) R$ ————(10)

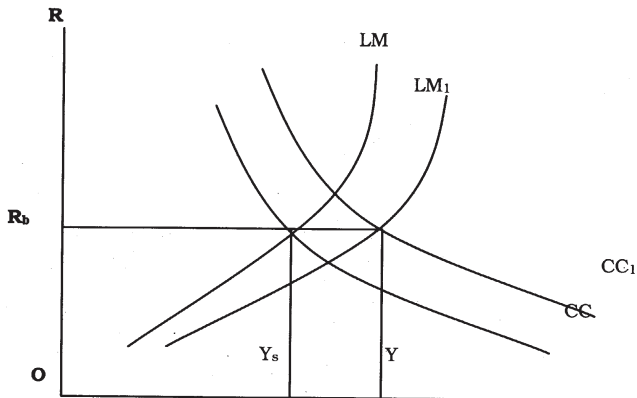
Which ensures equilibrium in the credit market. The equilibrium-lending rate RI can be found out from equation ————(10).

$RI = Q(Rb, R)$ —(1) Using this in equation (11) yields the CC (commodities and credit) curve $I(Rb, R) + G = S(Y, Rb)$ ————(12).

The General Equilibrium

General Equilibrium analysis is now carried out in terms of CC & LM curves. The CC curve has a negative slope and is subject to parametric shift for changes in the value of v (the deposit multiplier) and in R (cash balance held by banks in the form of reserves).

In the case of a decline in v , deposits mobilized by banks will go up leading to more allocable funds for the banking sector.



As a result of this, the LM curve will shift in the rightward direction. At the same time, the CC curve will move in the rightward direction because the volume of Credit will go up following a decline in v , thus there will be unambiguous positive effect on Y . However the effect on R_b is not clear—it depends on the relative impact on the CC & LM curves.

A similar result will be obtained in the case of increase in R . If banks have more access to reserves, they can increase their credit supply to firms, which in turn can invest more without significantly changing their demand for bonds.

Section III: Endogenous Money

We now consider a modified frame work

- (a) Banks now pay an interest rate of R_d on the deposits. R_d is related to the lending/investment rates in the following manner.

$$R_d = (1 - v) \cdot R_m - m_d \quad (13)$$

$$R_m = wR_l + (1-w) R_b$$

When is m_d the perunit bank deposit maintenance cost

- (b) Since firms can either borrow directly by issuing bonds or can take loans, we assume that $R_l = R_b + k \quad k > 0$

- (c) Banks hold three types of assets:

$$L^b + B^b + R = D^b(Y, R_d) \quad D^b = \text{bank deposit}$$

$$R = R(M_d) = aM_d(Y, R_d, R_b) \quad (14)$$

Differentiating, we can get the LM curve equation

$$(dY/dR_b)_{LM} = -1/dM_d/dY (dM_d/dR_d * dR_d/dR_b + dM_d/dR_s) \quad (15)$$

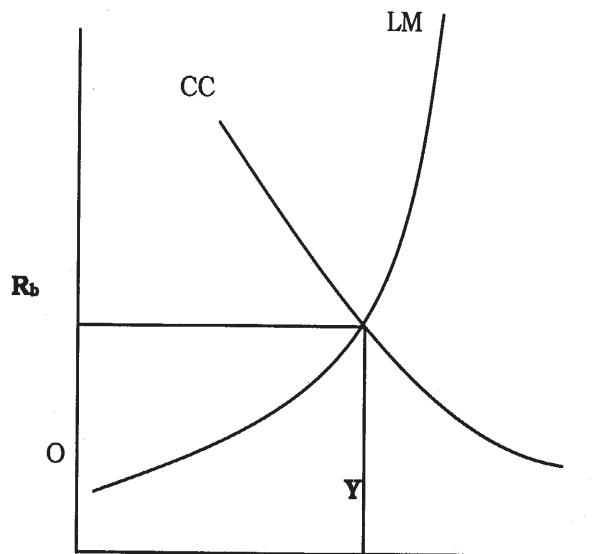
If the demand for money is very sensitive of the deposit rate, the expression can be negative so that LM curve can be downward sloping.

The CC curve is obtained from the IS equation:

$$I(R_b, R_l) + G = S(Y, R_b, R_d) \quad (16)$$

By incorporating the equilibrium values of R_l and R_d as a function of R_b . Thus we have $I(R_b) + G = S(Y, R_b)$ (17).

The curve is decreasing in the (Y, R_b) plane. The curve is different from the previous one in the sense that this one is independent of R i.e. in the present framework; the quantum channel is ineffective unless it is able to influence the interest rates. The effect of a change in R_b on Y is unambiguous: a decline in R_b increases Y and vice-versa. However, the impact of R_b on M_d depends on the sign and magnitude of dM_d/dR_b .



Section IV: Macroeconomic Consequences of Financial Market Failure

The incorporation of financial markets in the IS-LM framework

provide useful insights about how disturbances in the financial sector can have spillover effect on the real sector in the presence of asymmetric information, for example, banks may be subjected to the problems of adverse selection (inability to distinguish between borrowers according to their risk types) and moral hazard (borrowers having hidden private agenda). When such problems exist, both the CC and LM curves will shift in the leftward direction leading to a sub-optimal equilibrium output (Y_s) instead of Y . Monetary policy is ineffective here in shifting the output level. On the other hand, expansionary fiscal policy can aggravate the problem by increasing the rate of interest. The analysis thus shows the importance of a sound financial system (characterized by transparency and greater dissemination of information) in bringing about high and sustainable real sector growth rate.

References

- Bernanke, B., and A. Blinder, Credi. "Money and Aggregate Demand." *American Economic Review*. Vol. 78(2), 435-439, 1988.
- Brunner, Karl. & Meltzer, A.M., "Money, Debt & Economic Activity." September/October Vol. 80, 951-977, 1972.
- Keynes, J.M., "The General Theory of Employment." *Interest & Money*. Harcourt, Brace, 1936.
- Hicks, J.R., "Mr. Keynes & the Classics: A Suggested Interpretation." *Econometrica*. Vol. 5, 147-59, 1937.
- Patinkin, Don. "Money, Interest & Prices" Harper & Row, New York: 1965.
- Tobin, James. "A General Equilibrium Approach To Monetary Theory." *Journal of Money, Credit & Banking*, November, Vol. 2, 461-472, 1970.

