**Algebra of LM Curve**

(Version for those with some knowledge or even a faint recollection of differential calculus)

Assuming Demand for Money, Md = L ( Y, r)

and further assuming

(1) ∂ Md /∂ Y > 0 (Demand for Money is increasing in Y, Income)

(2) ∂ Md /∂ r < 0 (Demand for Money is decreasing in r, the average interest rate)

and

1. Supply of Money, Ms, is exogenously determined and stable in the frame of comparative static analysis.

Then the locus of monetary equilibrium in Y-r space is defined by the equation

Ms = L (Y, r).

Now if Ms is constant in the time frame of analysis, then upon taking total differentials we get

d Ms = ∂ Md /∂ Y . dY + ∂ Md /∂ r . dr = 0

⇒ ∂ Md / ∂r . dr = - (∂ Md /∂ Y . dY)

⇒ dr = - (∂ Md /∂ Y).d Y ) / (∂ Md / ∂r)

⇒ dr / dY = - (∂ Md /∂ Y). / (∂ Md / ∂r).

Thus dr / dY = ( - ). ( +) / ( - ) = ( + )

(Version for those with no knowledge nor even any acquaintance with differential calculus)

Assuming Demand for Money, Md = L ( Y, r) = a.Y + b.r

where and further assuming

(1) a > 0 (Demand for Money is increasing in Y, Income)

(2) b < 0 (Demand for Money is decreasing in r, the average interest rate)

and

1. Supply of Money, Ms, is exogenously determined and stable in the frame of comparative static analysis.

Then the locus of monetary equilibrium in Y-r space is defined by the equation

Ms = a.Y + b.r (⇒ ΔMs/ΔY = a and ΔMs/Δr = b)

⇒ ΔMs = a.ΔY + b.Δr

Now if Ms is constant in the time frame of analysis, then

Δ Ms = a.ΔY + b.Δr = 0

⇒ b.Δr = - (a.ΔY)

⇒ Δr/ ΔY) = (-a) / b

Thus Δr/ ΔY) = ( - ) / ( - ) = ( + )