15 - Money Interest Rates and Exchange Rates

Money: functions; avoid double co-incidence of wants
medium of exchange
unit of account
store of value
all contribute to "ubiquitousness" of money

Demand
By individuals (and firms)
- expected return (vis à vis other assets; (viva))
- riskiness of expected return, (viva)
- liquidity (viva)

∴ In aggregate M^d:

$$\left(\frac{M}{P}\right)^d = L(R, Y) \quad \text{or} \quad M = P \cdot L(R, Y)$$

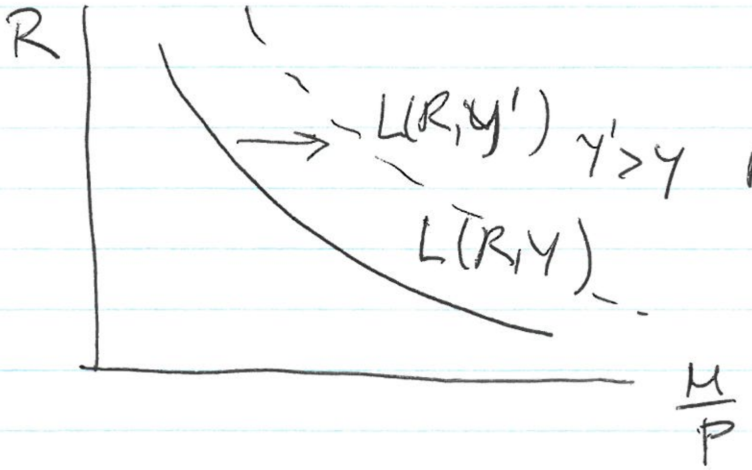
real money demand — really $R = R(R_1, R_2, R_3, \ldots R_n)$

What are the units of real money demand?

$$\frac{M \ \$}{P \ \$/\text{basket of good}} \doteq \text{baskets of good that can be purchased w/ money}$$

What are the units of $\frac{M}{Y}$? $\frac{\$}{\$/yr}$ ~ yrs.

fraction of years of income held in the form of money



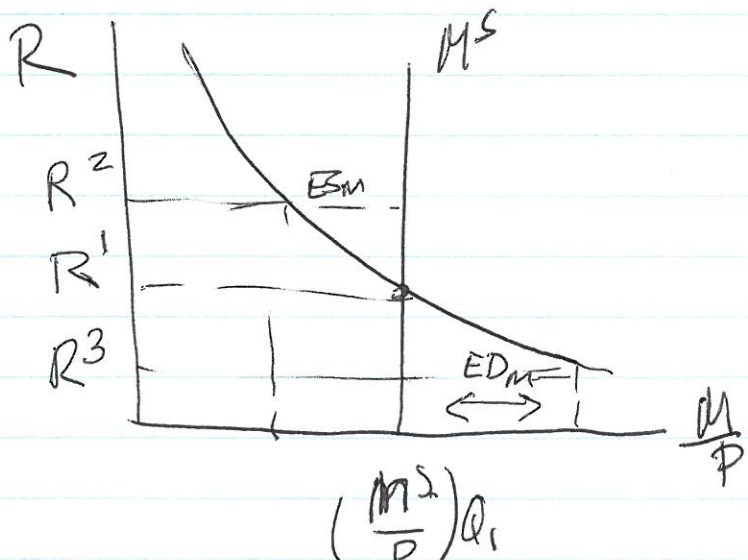
What is 'really' on the R-axis? "opportunity cost of holding money"

We simplify to R!

Equilibrium in money market

$$M^s = M^d \longrightarrow \frac{M^s}{P} = L(R, Y)$$

This is simplified since there is also a "supply of money function" which depends on things like the bank rate, various regulations, etc., etc.



@ R^2 people want to buy bonds (price of bonds is low

Relation Between Bond Price and the Rate of Interest

$$P_B = \frac{\$1/yr}{1+R} + \frac{1}{(1+R)^2} + \frac{1}{(1+R)^3} + \cdots + \frac{1}{(1+R)^n}$$

Suppose you have a bond that pays $1/year in perpetuity. Suppose the market rate of interest is R, then you would pay P_B.

① Sum of a geometric series $1 + x + x^2 + x^3 + \cdots + x^n$ as $n \to \infty$ is $\frac{1}{1-x}$ if $|x| < 1$

②
$$P_B = \left[1 + \left(\frac{1}{1+R}\right) + \left(\frac{1}{1+R}\right)^2 + \cdots + \left(\frac{1}{1+R}\right)^n - 1\right]$$

as $n \to \infty$

③
$$P_B = \frac{1}{1 - \left(\frac{1}{1+R}\right)} - 1$$

$$= \frac{1+R}{1+R-1} - 1$$

$$= \frac{1+R}{R} - \frac{R}{R} = \frac{1+R-R}{R}$$

$$P_B = \frac{\$1/yr}{R}$$

: You pay P_B for an income stream of $1/year when the market interest rate is R.

($\therefore$ inverse relationship)

Inflation and Exchange Rate Dynamics

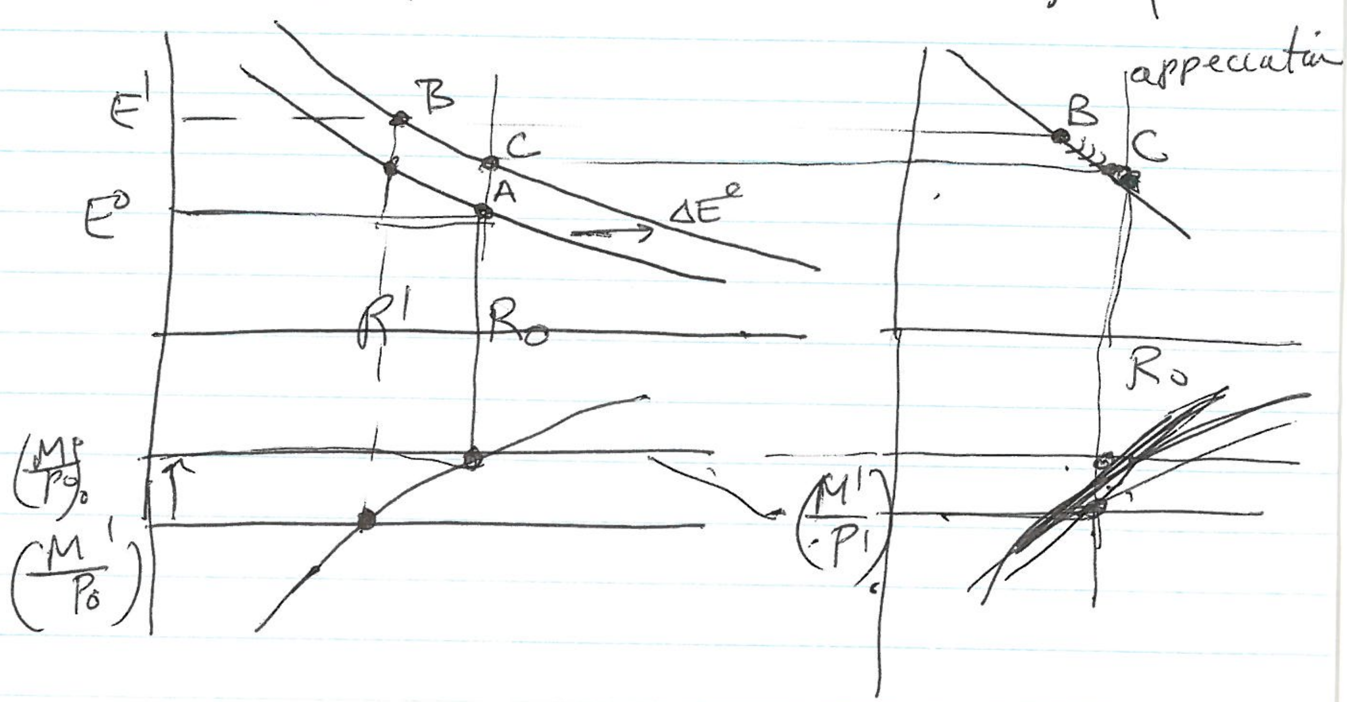
ΔP, $\frac{1}{P}\frac{\Delta P}{\Delta t} \equiv$ inflation $\quad \Delta M$, $\frac{1}{M}\frac{dM}{dt} = $ r.g.m.

① Assume there is short-run "stickiness" in prices (+ wages)

ΔM caused $\Delta\uparrow$ demand for goods + services

② inflationary expectations

Now ΔM^s that is permanent (and can change expectations



A BRIEF HISTORY OF MONEY DEMAND

① IRVING FISHER

$$MV = PT$$

where M = money
P = the price level
T = the number of transactions
V = the 'velocity' of money – i.e. $V = \frac{PT}{M}$ or the number (value) of transactions per dollar

Fisher believed that the number of transactions T, and the velocity, V, were determined at least in part by institutional constraints – the structure of industry, the habits of payments, etc.

∴ V and T could be thought of as determined in the real economy and therefore changed slowly compared to changes in M and P.

∴ $$\frac{\Delta M}{M} = \frac{\Delta P}{P}$$

Money is valuable as a way of transacting goods, etc exchange

(2) Marshall, Pigou reworked the quantity equation

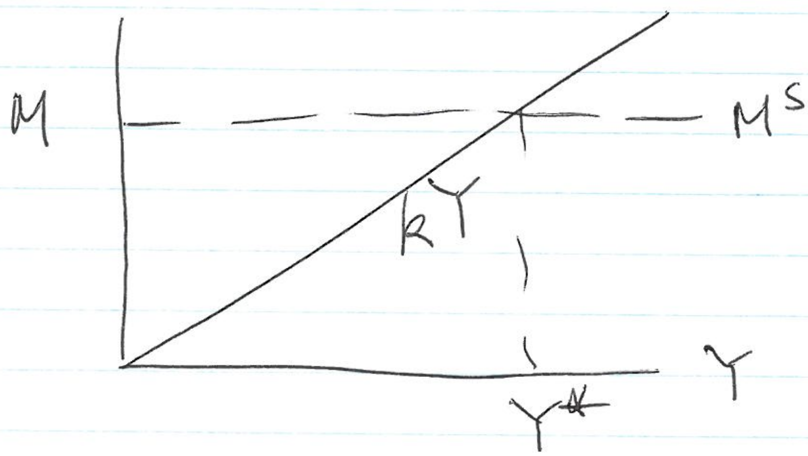
$$MV = PT \longrightarrow M = \frac{1}{V} PT$$

and PT all transactions became PT_f where T_f are final transactions or

$$M = \frac{1}{V} \cdot Y$$ where Y is nominal income

$\frac{1}{V}$ was renamed "k" (Cambridge k)

$M^d = kY$ $\qquad$ $M^d = M^s$



which gave a theory of income determination

(3) KEYNES reworked the theory arguing that money was an asset held as well as a tool useful for transactions

$$M^d = k \cdot Y - l R$$

so that the opportunity cost of holding money is its alternative, R, the rate of interest on bonds.

(4) FRIEDMAN

Money is an asset like any other

$$\left(\frac{M}{P}\right)^d = f(R_0, R_1, \ldots, R_n; \text{wealth})$$

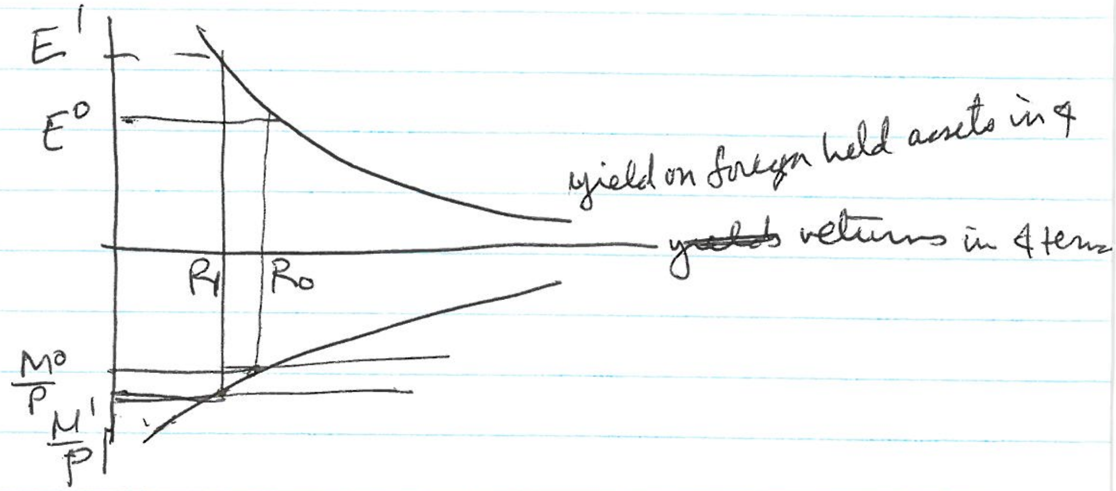
$\therefore$ more than just depends on income today, but on wealth.

$\therefore$

Comparative Statics

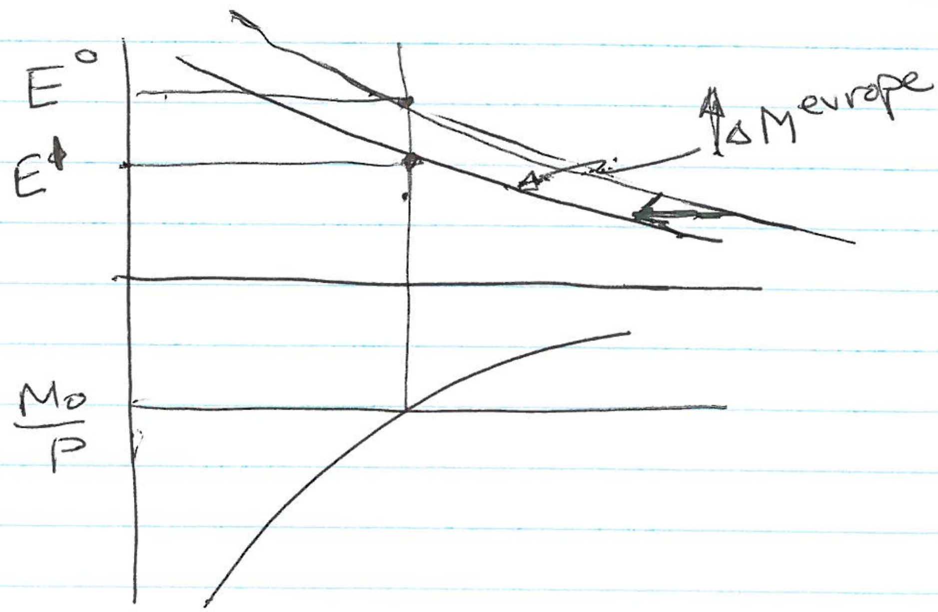
$\Delta M^S > 0$

$\Rightarrow$ depreciation



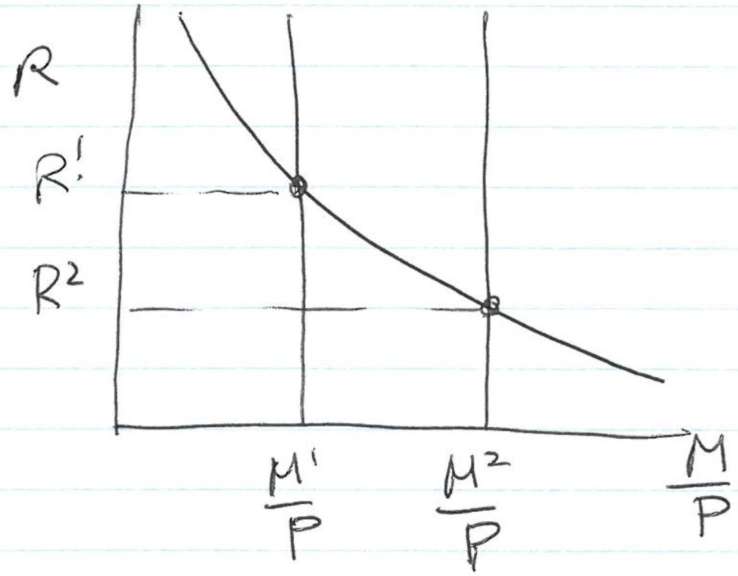
$\Delta M^F > 0$

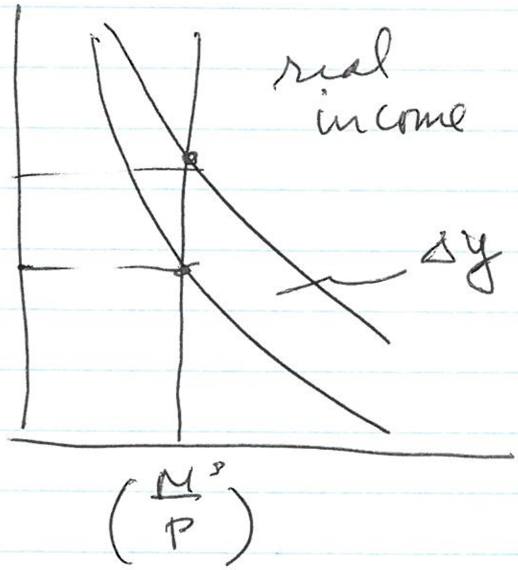
$\Rightarrow$ appreciation



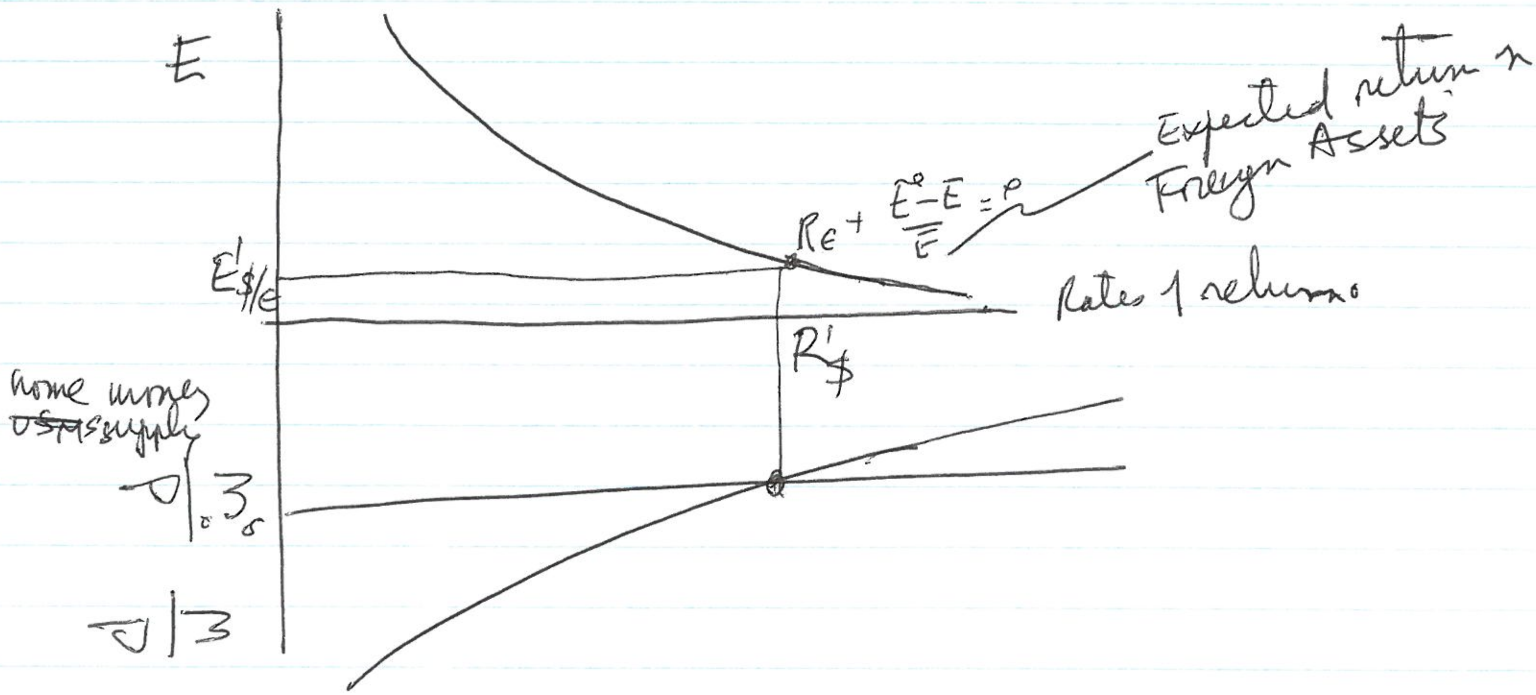
$$R_\$ = R_€ + \frac{E^e - E_t}{E_t}$$

Interest Rates + Money supply





And Exchange Rates

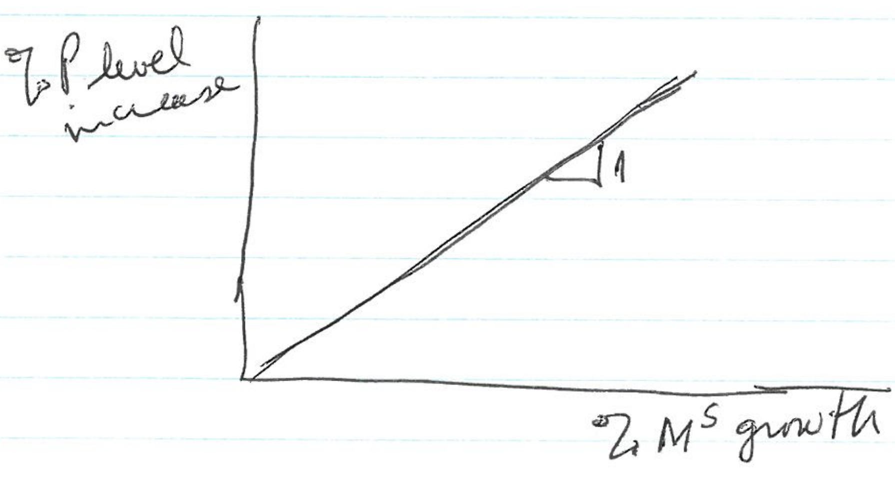


Money + Prices ~ Levels

$$\frac{M^s}{p} = L(R, Y)$$

$$\Rightarrow P = \frac{M^s}{L(Y, R)}$$

In the long-run a change in the money-supply
- think of pieces of paper - has no effect on
~~real~~ interest rates or real output
(The level of money.)
- currency reform in France in 1959 ~~ff~~
had no effect on any economic activity.



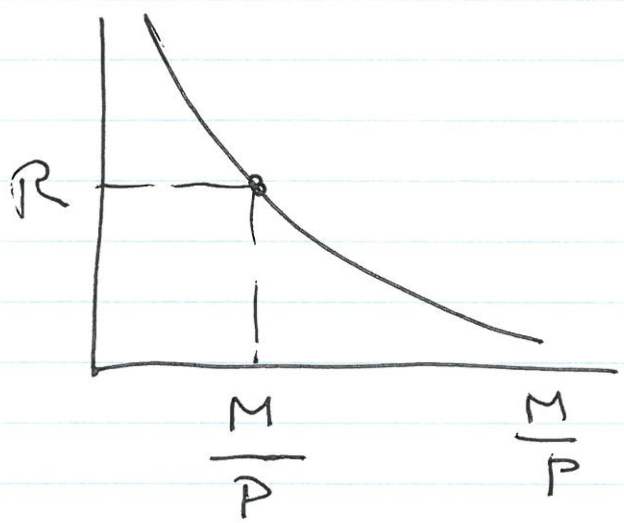
permanent $\Delta M \Rightarrow \Delta P$ and ΔE

Rates of Change

What would we expect as a relationship between money growth and prices

$$\frac{M}{P} = L(R, Y) \qquad \frac{M}{P} = k y e^{-\alpha R}$$

$$M = k P y$$



$$\frac{1}{M}\frac{\Delta M}{dt} = \frac{1}{P}\frac{dP}{dt} + \frac{1}{y}\frac{dy}{dt}$$

$$\mu = \pi + \lambda$$

$$\mu - \lambda = \pi$$