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 THE CLASSICAL CASE
 

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p. 246

The polar opposite of the horizontal  $LM$  curve—which implies that monetary policy cannot affect the level of income—is the vertical  $LM$  curve. The  $LM$  curve is vertical when the demand for money is entirely unresponsive to the interest rate.

Recall from Chapter 10 [equation (7)] that the  $LM$  curve is described by

$$\frac{\bar{M}}{\bar{P}} = kY - hi \quad (1)$$

If  $h$  is zero, then corresponding to a given real money supply,  $\bar{M}/\bar{P}$ , there is a unique level of income, which implies that the  $LM$  curve is vertical at that level of income. (Sneak a look ahead at Figure 11-6.)

The vertical  $LM$  curve is called the *classical case*. Rewriting equation (1), with  $h$  set equal to zero and with  $P$  moved to the right-hand side, we obtain

$$\bar{M} = k(\bar{P} \times Y) \quad (2)$$

We see that the classical case implies that nominal GDP,  $P \times Y$ , depends only on the quantity of money. This is the classical *quantity theory of money*, which argues that the level of nominal income is determined solely by the quantity of money. The quantity theory was originally motivated by the belief that people would hold money in a quantity proportional to total transactions,  $P \times Y$ , irrespective of the interest rate. As we will see in Chapter 15, money does respond to the interest rate; nonetheless, the quantity theory remains useful for expositional purposes—and a sophisticated version of the quantity theory is still espoused by monetarists.

When the  $LM$  curve is vertical, a given change in the quantity of money has a maximal effect on the level of income. Check this by moving a vertical  $LM$  curve to the right and comparing the resultant change in income with the change produced by a similar horizontal shift of a nonvertical  $LM$  curve.

By drawing a vertical  $LM$  curve, you can also see that shifts in the  $IS$  curve do not affect the level of income when the  $LM$  curve is vertical. Thus, when the  $LM$  curve is vertical, monetary policy has a maximal effect on the level of income, and fiscal policy has no effect on income. The vertical  $LM$  curve, implying the comparative effectiveness of monetary over fiscal policy, is sometimes associated with the view that “only money matters” for the determination of output. Since the  $LM$  curve is vertical only when the demand for money does not depend on the interest rate, the interest sensitivity of the demand for money turns out to be an important issue in determining the effectiveness of alternative policies. The evidence, to be reviewed in Chapter 15, is that the interest rate does affect the demand for money.

# IS-LM framework

11.5.1

recall Ch. 10

$$Y^{re} = \frac{h}{h[1-c(1-t)]+k.b} (\bar{I} + \bar{G}) + \frac{b}{h[1-c(1-t)]+k.b} * \frac{\bar{T}}{b}$$

↑  
real

↑  
real

↑  
real

• a theory of real income determination.

$$P^{re} Y^{re} = \frac{h}{h[1-c(1-t)]+k.b} (P^{re} \bar{I} + P^{re} \bar{G}) +$$

$$\frac{b}{h[1-c(1-t)]+k.b} * \bar{T}$$

Nominal

Nominal

Nominal

• a theory of nominal income determination

• monetarist assumption (extreme case)

$$h \rightarrow 0 \quad [L = kY - hi]$$

$$b \rightarrow -\infty \quad [I = \bar{I} - bi]$$

$$P^{re} Y^{re} = 0 * (P^{re} \bar{I} + P^{re} \bar{G}) + \frac{1}{k} * \bar{T}$$

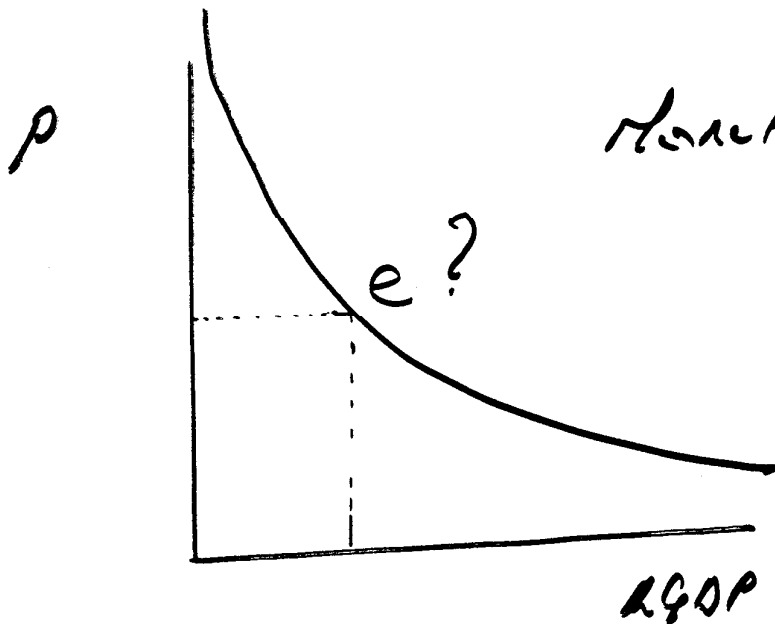
$$p^{ee} \cdot \gamma^{ee} = 0 \times (p^{ee} \bar{I} + p^{ee} \bar{G}) + \frac{1}{k} * \bar{\pi} \quad 11.5.2$$

• the theory of nominal income determination

$$\frac{\partial (p^{ee} \cdot \gamma^{ee})}{\partial (p^{ee} \bar{I})} = 0 \quad \text{verbalize}$$

$$\frac{\partial (p^{ee} \cdot \gamma^{ee})}{\partial (p^{ee} \bar{G})} = 0 \quad \text{verbalize}$$

$$\frac{\partial (p^{ee} \cdot \gamma^{ee})}{\partial (\bar{\pi})} = \frac{1}{k} \quad \text{verbalize}$$



characteristic AD curve

$$p^{ee} \cdot \gamma^{ee} = \frac{1}{k} * \bar{\pi}$$

a rectangular hyperbola

note: along AD both wmm. + fin. mkt. are in equilibrium.

# Perfectly AD Curve

11.5.3

$$P^{22} \cdot Y^{22} = \frac{1}{k} * \bar{M} = \text{a constant}$$

$$\frac{\Delta P^{22}}{P^{22}} + \frac{\Delta Y^{22}}{Y^{22}} = 0$$

$$\frac{\Delta Y^{22}}{Y^{22}} = -1.0 * \frac{\Delta P^{22}}{P^{22}}$$

- price elasticity of demand is -1.0

## Puzzle

$$P^{22} \cdot Y^{22} = \frac{1}{k} * \bar{M}$$

1 equation 2 unknowns

### Additional equation

Ch 10; Ch 11

$$P^{22} = \bar{P}$$

Ch. 11 "Quantity Theory" p. 263

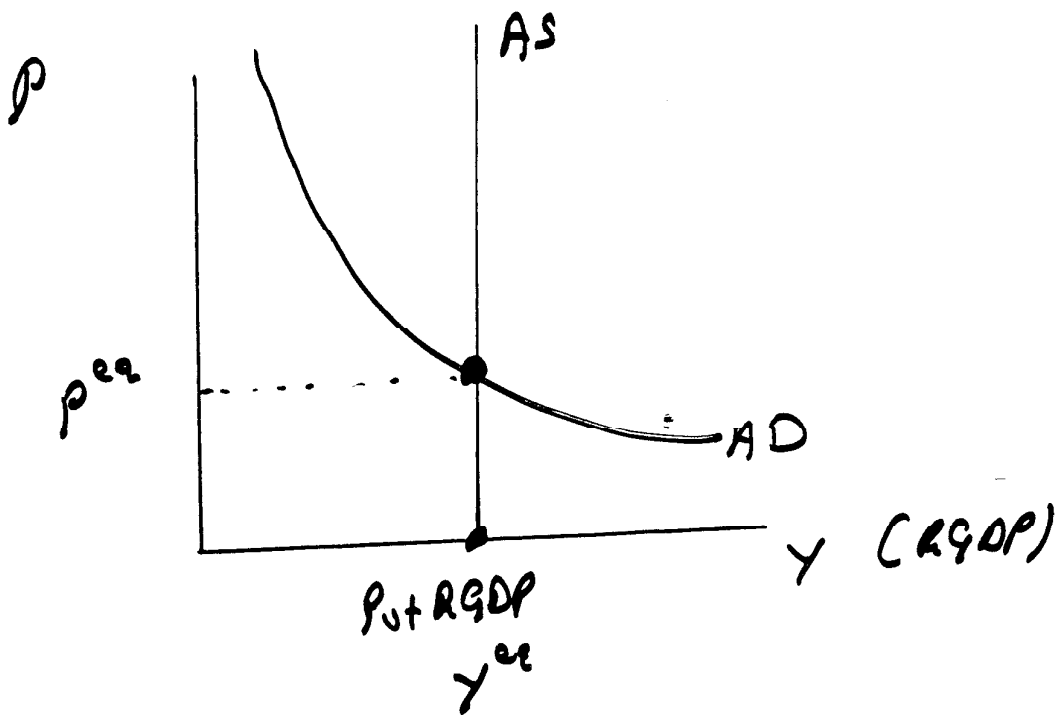
$$\rightarrow Y^{22} = \text{Pot RGDP} = \bar{Y} \text{ f.e.}$$

Ch 6, 7: Short Run Aggregate Supply Curve  
 $Y^{\text{supply}} = Y(P, \bar{w}, \bar{K})$

3 possible approaches

# Quantity Theory

11.5.4



recall

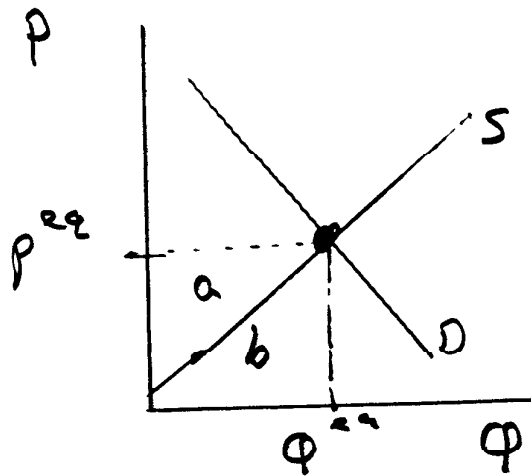
$$P^e \cdot Y^e = 0 \times (P^e \cdot \bar{I} + P^e \cdot \bar{G}) + \frac{1}{k} + \bar{M}$$

	$\Delta$ Autonomous private spending	$\Delta$ Autonomous public spending	$\Delta$ Money Base
$\Delta Y^e$	0	0	0
$\Delta P^e$	0	0	+
$\Delta N^e$	0	0	0
$\Delta (w/p)^e$	0	0	0

# The quantity theory theory of money

8.263

11.5.07



historical perspective

$Q$ : final good or service "apples"

$$P^{\text{eq}} * Q^{\text{eq}} \equiv a + b$$

$$\text{"GDP"} \equiv \text{prod. surplus} + TVC$$

$$\equiv \text{"rent"} + \text{"depreciation"} + \text{"profits"} + \text{"wages"}$$

$$\equiv \text{Value Added (no indirect taxes)}$$

$$\boxed{\text{"GDP"} \equiv VA \equiv Y}$$

## key assumptions

- money only serves as a medium of exchange, not as a store of value
- each coin changes hands  $V$  times per year

$$\rightarrow M^{\text{ee. demand}} = \frac{P^{\text{ee}} \cdot Q^{\text{ee}}}{\bar{V}} \quad 11.5.6$$

•  $\bar{V}$  is assumed to be exogenous

• note that  $\frac{1}{\bar{V}} = k$

recall

$$L = \left( \frac{M}{P} \right)^{\text{Demand}} = k \cdot Y - h \cdot i$$

but in our case  $h = 0$   
and  $P$  is flexible

therefore

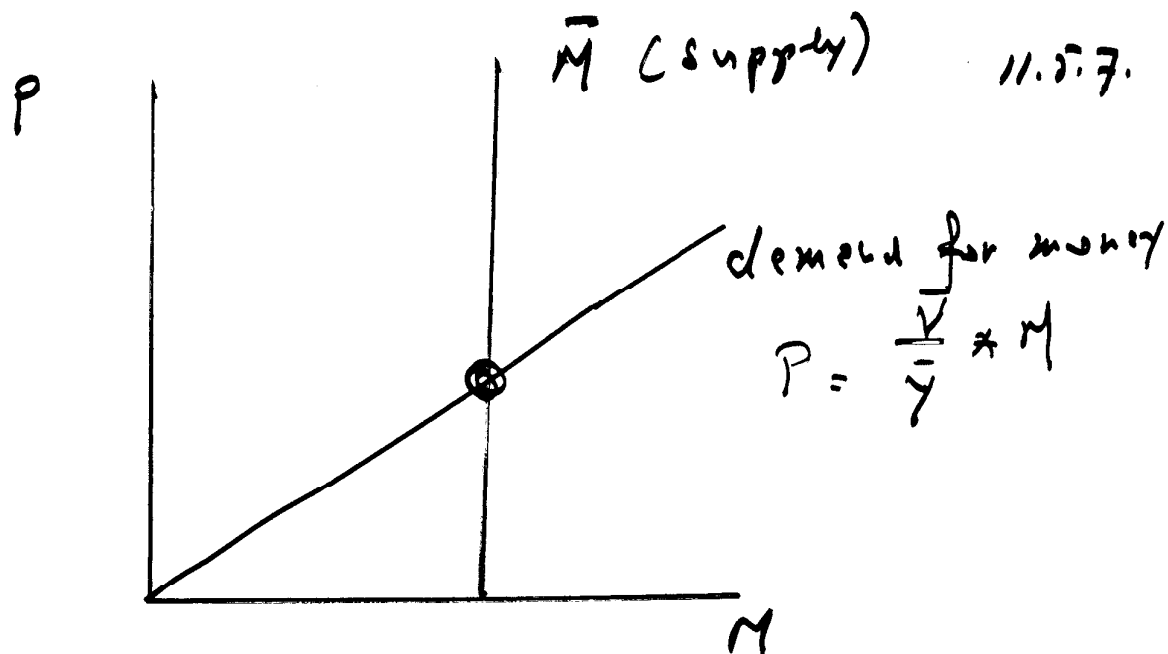
$$\rightarrow M^{\text{Demand}} = k \cdot P^{\text{ee}} \cdot Y^{\text{ee}}$$

with equilibrium in the money market

$$M^{\text{Demand}} = \bar{M} = k \cdot P^{\text{ee}} \cdot Y^{\text{ee}}$$

1 equation 2 unknowns

"the effective demand for money"



note something very important here

• Classical - monetarist

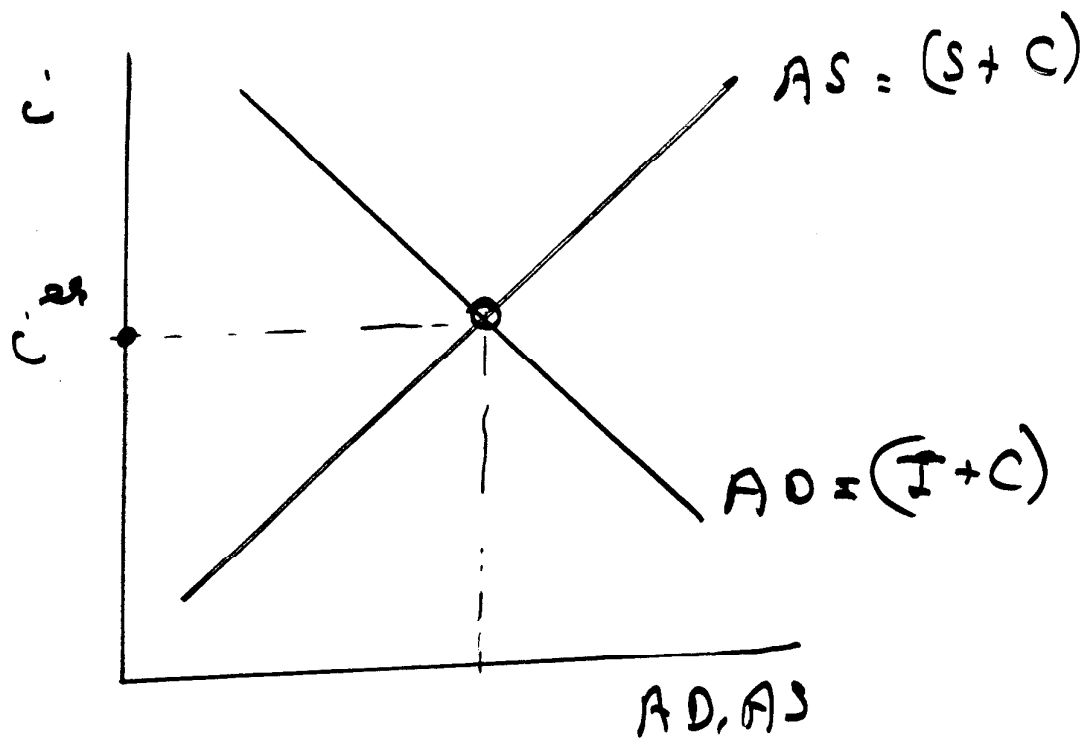
• the supply of and demand for money as a medium of exchange determine the value of money (i.e.  $1/P$ )

• Keynes - monetarist

• the supply and demand for money (as a medium of exchange and store of value) determine the nominal rate of interest

• True classical view (Ricardo) 11.5.0

- Savings and investment determine the real rate of interest
- Aggregate demand and supply of commodities determine the real rate of interest



if  $AD = AS$   
if  $I + C = S + C$   
then  $I = S$