

Keynesian Economics I

The Keynesian System (I):
The Role of Aggregate Demand

Labor Market

Excess supply and excess demand are *not* equally strong forces in the labor market. The supply of workers is such that firms can always get the labor they require (at some price), but workers can do nothing to promote their own employment. He argues that the supply curve of labor may have no influence on the observed volume of employment or wage.

This is the process by which the labor market operates:

1. Firms decide at the beginning of the period how much employment to offer at the going wage.
2. Labor is given no opportunity to re-contract if fewer are hired than want to be.
3. If, at the end of the production period, entrepreneurs sell all of their output they expected to sell (they operate in a world of great uncertainty), then they will have no reason to change their labor demands.

Thus, if we did accept the labor supply curve and the partial equilibrium framework of the neoclassical theory, wages are sticky downward and employment is not always “full” because the adjustment mechanism presumed in the neoclassical theory is not present. Thus a Keynesian equilibrium may be reached, even though the marginal disutility of work lies well below the going wage.

Asymmetric Responses to Real Wage Changes

Consider the market response to a change in real wages. Specifically, what happens when real wages decline? Keynes argues that changes in real wages (w/p) can be accomplished in two ways. Nominal wages can be reduced, or the price level can rise.

But
$$N^s\left(\frac{\Delta w}{p}\right) \neq N^s\left(\frac{w}{\Delta p}\right) \neq N^d\left(\frac{\Delta w}{p}\right) \neq N^d\left(\frac{w}{\Delta p}\right)$$

It would be more appropriate to write:

$$N^d = N^d(w, p) \quad N^s = N^s(w, p)$$

Asymmetry, Continued

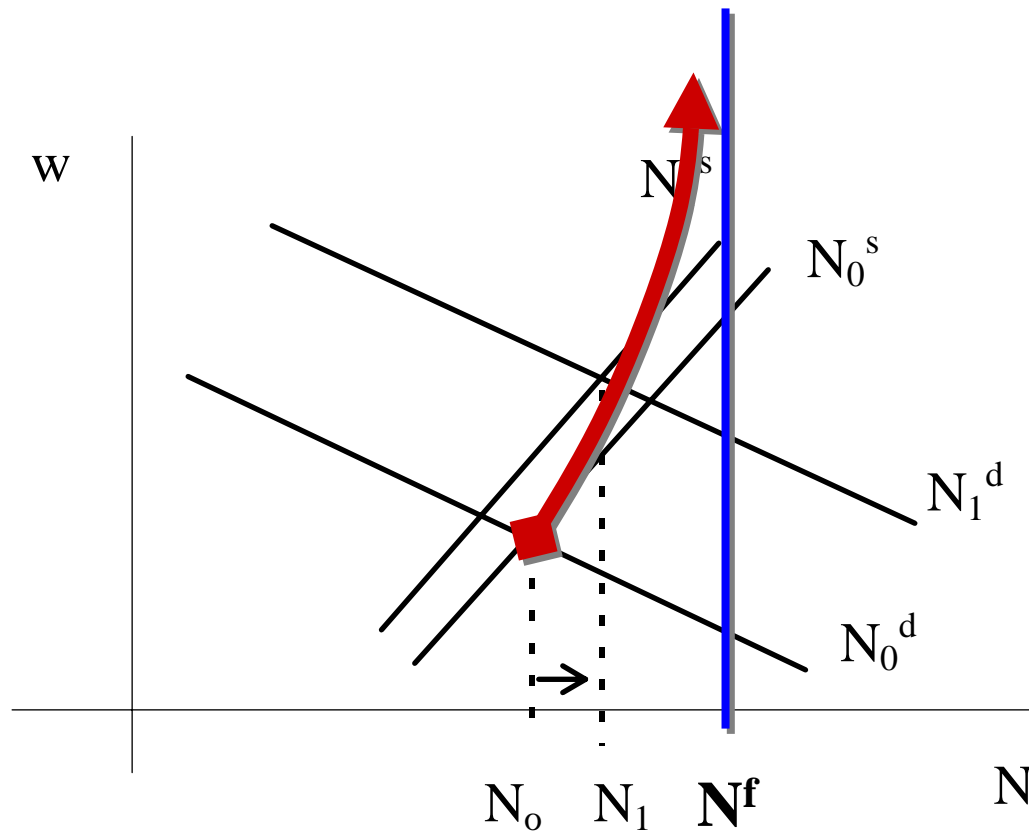
Workers will resist reductions in their nominal wages. There are several reasons:

1. Reductions on nominal wages are relative wage reductions.
2. Relative wage reductions damage the workers' market power.
3. Relative wage reductions damage the workers' self-image. A lower wage might be interpreted to mean an inferior worker.
4. Relative wage reductions damage the workers' future earning potential.

A price level increase is *not* a relative wage change. Firms, on the other hand, see price level increases as an opportunity for increased profits since the lags in the production process imply that the cost of inventories is at older, lower levels.

Therefore, an increase in the price level is likely to meet with a greater positive response by firms than the negative response by workers (labor suppliers, i.e., households).

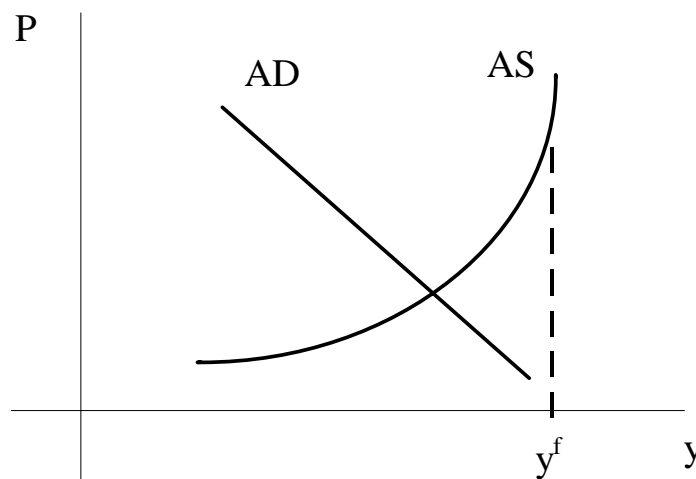
Asymmetry, Continued



Asymmetry, Continued

Thus, to Keynes, full employment is that “situation in which aggregate employment is inelastic in response to an increase in the effective demand for its output.” He argues that if the expansion of aggregate demand leads to higher employment, then prior to the expansion involuntary unemployment must have prevailed. Therefore, this is consistent with the AD-AS diagram below.

This amounts to a refutation of Say’s Law based on asymmetry of wage and price responses.



Some Accounting

Assume a closed economy:

Output = Aggregate Expenditure = National Product

$$Y = E = C + I + G = C + I_r + G$$

But Y is also income, and from income we purchase consumer goods (C), save (S), or pay taxes (T), so

$$Y = C + S + T$$

So that

$$C + S + T = C + I + G$$

Or

$$S + T = I + G$$

Which means that saving and taxes paid by the public must finance investment and government spending.

More Accounting

Similarly,

$$C + I_r + G = Y = C + I + G$$

Or, by canceling terms,

$$I_r = I$$

This gives us three equivalent conditions for equilibrium in the Keynesian model:

$$(1) Y = C + I + G$$

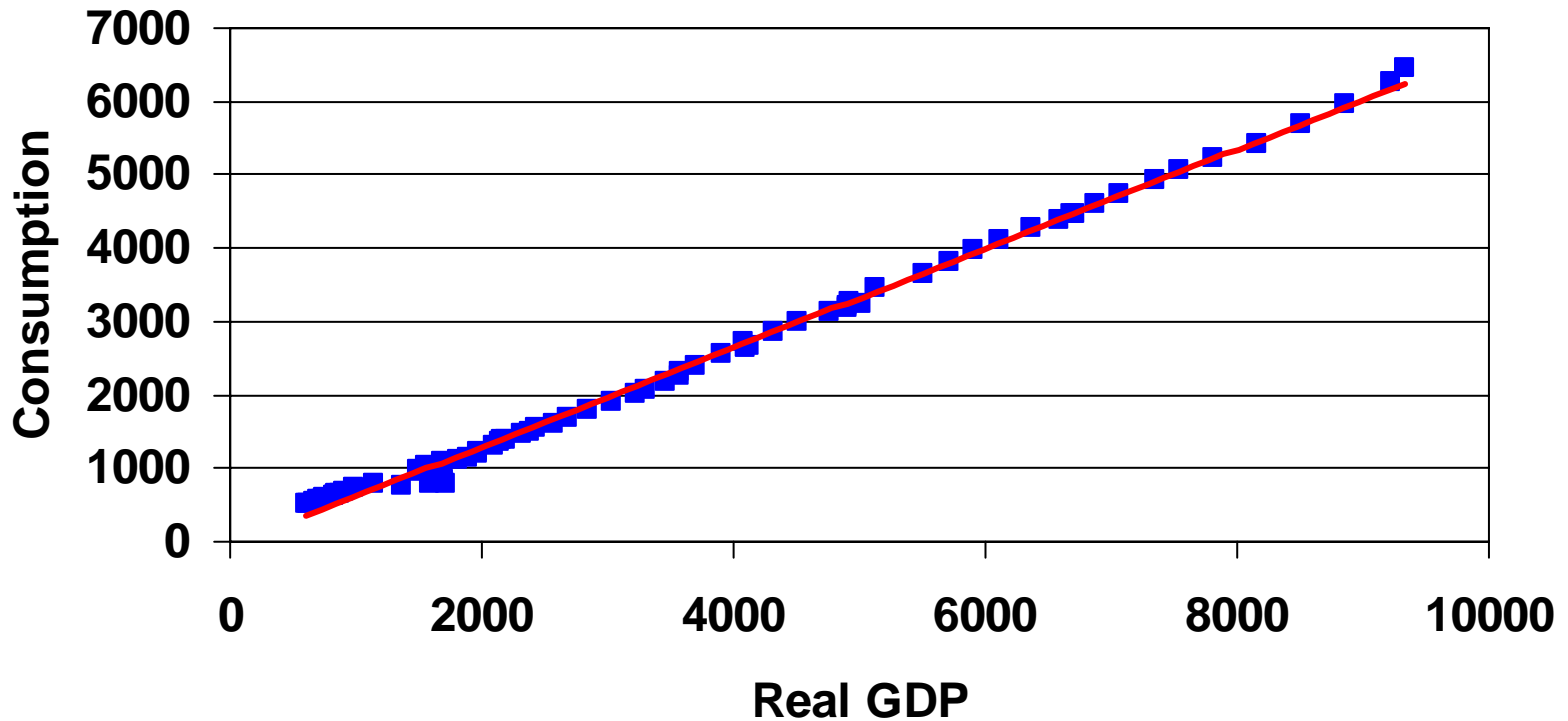
$$(2) S + T = I + G$$

$$(3) I_r = I$$

Keynes' Initial Assumptions

- On the short run, quantity adjustments are more important than price adjustments.
- Quantities demanded can change more rapidly than prices, which is why you can have temporary shortages of goods.
- **So aggregate expenditure (demand) determines the volume of goods that firms sell.**
- Producers, government, and consumers all make *plans* that may or may not be achieved.
 - In the short run, all plans are fixed, except for planned consumption expenditure because it alone varies with income.

Is C related to Income?



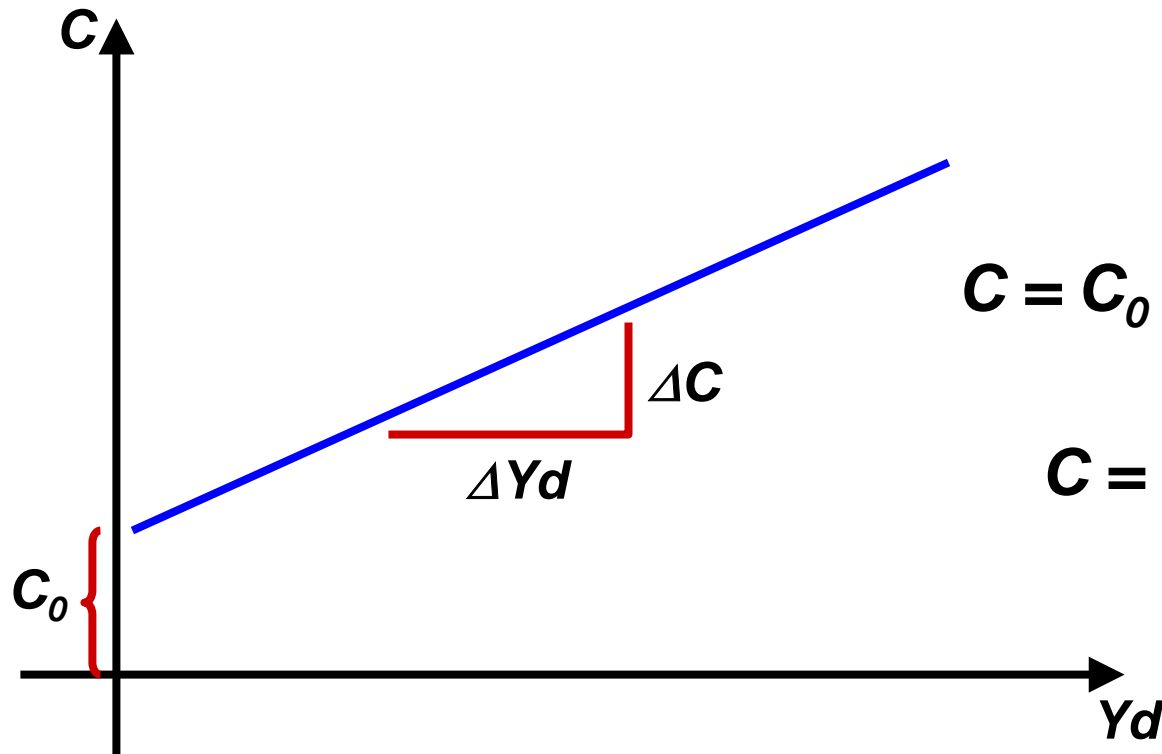
U.S. Annual Data, 1929 - 2001

Regression Results

- Over 99% of the variation in consumption expenditures is explained by GDP. ($R^2 = 99\%$)
- Slope is 0.67.
 - Roughly 67¢ out of every dollar of new income (GDP) is spent on consumption goods.
- This gives us good reason to suspect that Consumption follows a relationship like:
$$C = C_0 + cY \text{ or } C = C_0 + cY_d$$

Consumption Function

$c = mpc = \Delta C / \Delta Yd =$ marginal propensity to consume

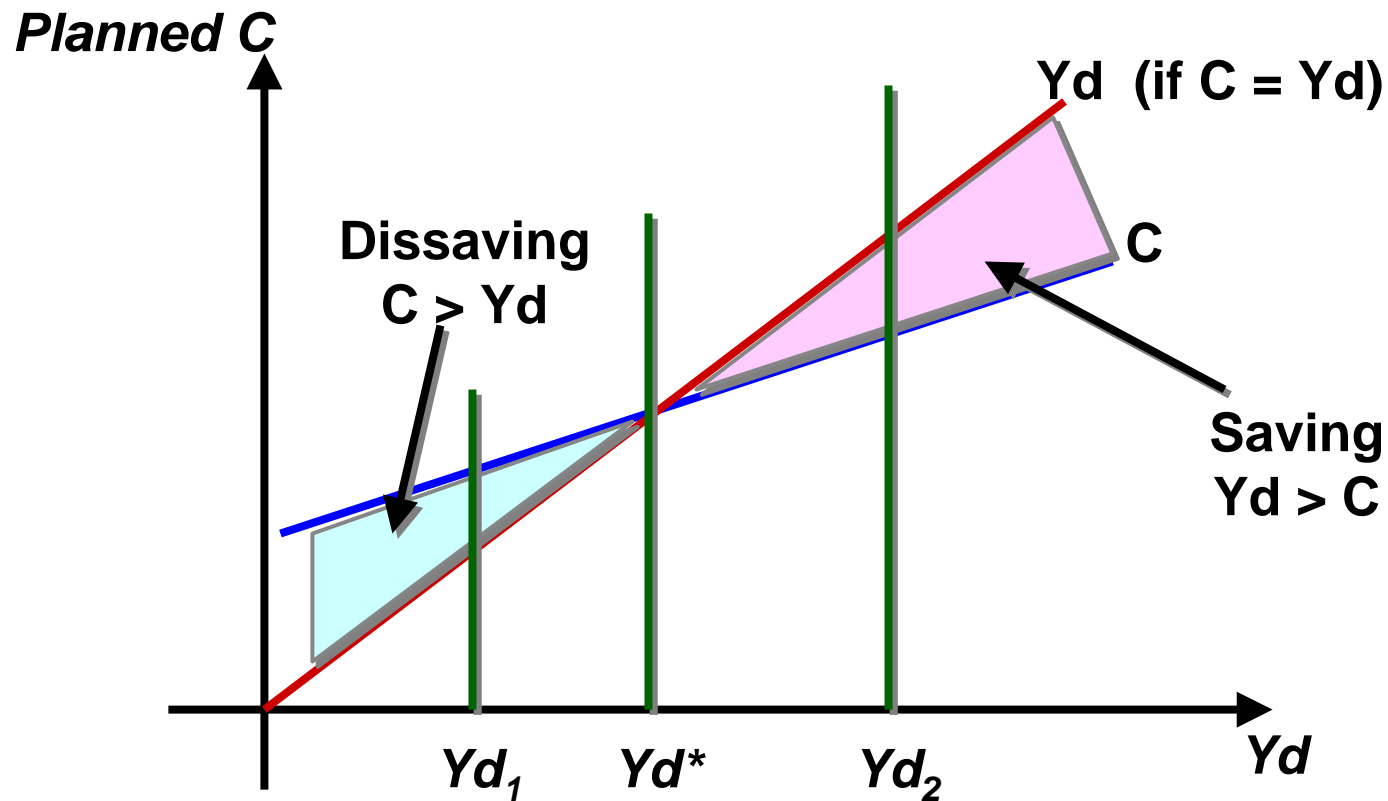


$$C = C_0 + mpc \times Yd$$

Or

$$C = C_0 + c Yd$$

Saving and Dissaving



Saving Function

- Since $Y = C + S + T$
and
 $Yd = Y - T$
- $Yd = C + S$
- So, if $C = C_0 + cYd$, then
 $S = -C_0 + (1-c)Yd$, or
- $S = S_0 + sYd$, or equivalently
 $S = S_0 + mps \times Yd$,
where mps = marginal propensity to save
- Note that: $mps + mpc = 1$

Note

- In the **classical model**:
 - $C = C(r)$
 - $S = S(r)$
- In the **Keynesian model**:
 - $C = C(Y_d)$
 - $S = S(Y_d)$

Investment

- **Capital goods have a long life.**
- **Capital goods take time to build.**
- **Large expenditure.**
- **Value of investment is related to the income stream it can generate over a very long time horizon.**
 - This requires business people to form expectations about *future* business conditions and profitability.
 - Investment is inherently risky.
- **As a result of these things, the investment expenditure tends to be erratic.**

Present Value and MEC

In the **classical model**, the business decision maker compared the interest rate to the current marginal productivity of capital:

$$r = \frac{dY}{dK}$$

Keynes reminds us of the long life and income stream available from capital, and compares the interest rate to the present value of the future profit stream of the capital. He does this by finding the discount factor d that makes the price of the capital equal to the future stream of income:

$$P_K = \sum_{i=j}^n \frac{\pi_i}{(1+d)^i}$$

He then compares d to the interest rate. If $d > r$, then investment is profitable. The variable d is called the **marginal efficiency of capital**.¹⁷

Capital Market Sequence

1. The MEC is constructed.
2. The Money market yields r .
3. The decisionmaker confronts the MEC with r , and makes the investment decision.
4. The resulting investment changes Y and $S = S(Y)$ is determined.

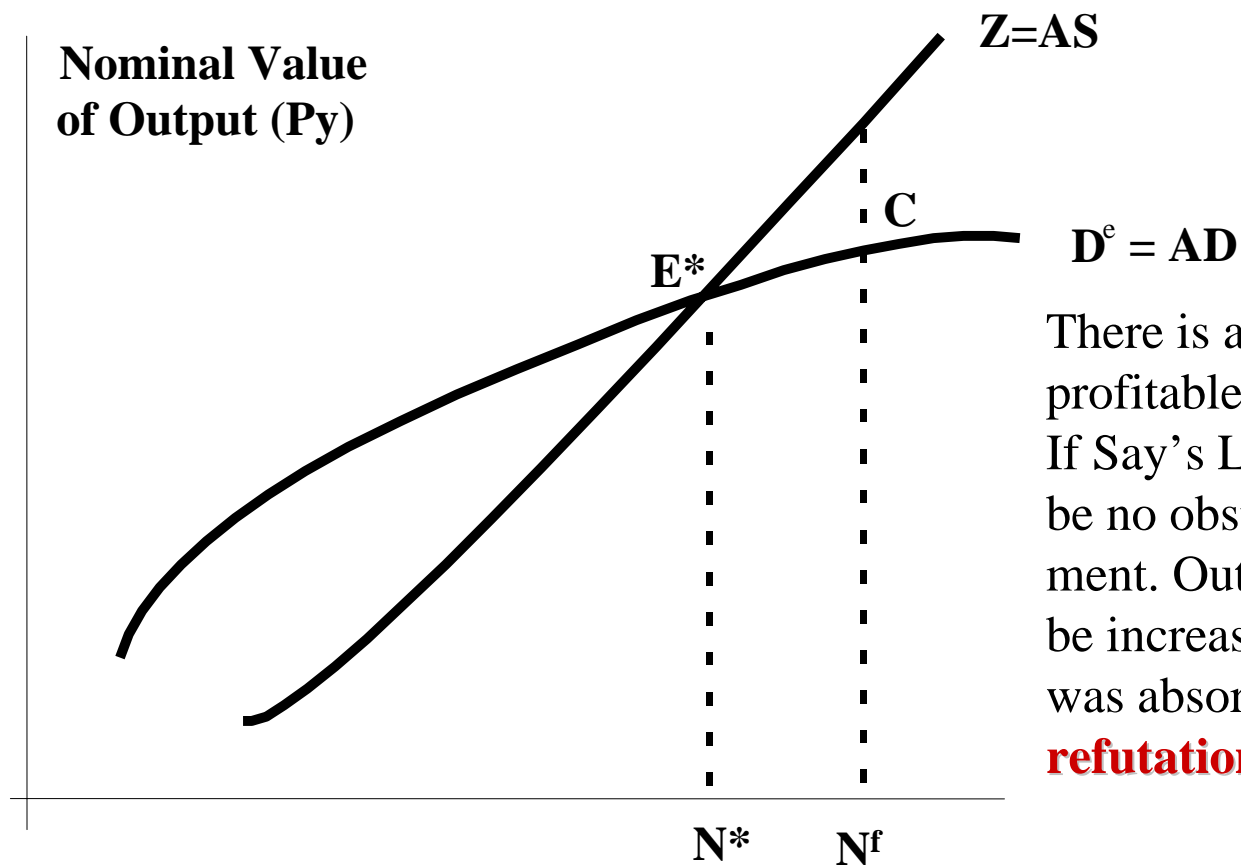
Therefore, investment is a function of the supply price of capital, the rate of interest, and long-term expectations. A decline may occur as a result of an increase in P_K , an increase in r , or if the MEC collapses as a result of negative expectations about the future.

During periods of grossly negative expectations about the future (like the great depression), the investment decision becomes dominated by the expectations term and unresponsive to interest rate changes. The investment schedule becomes quite interest inelastic, so nearly vertical in (I,r) -space.

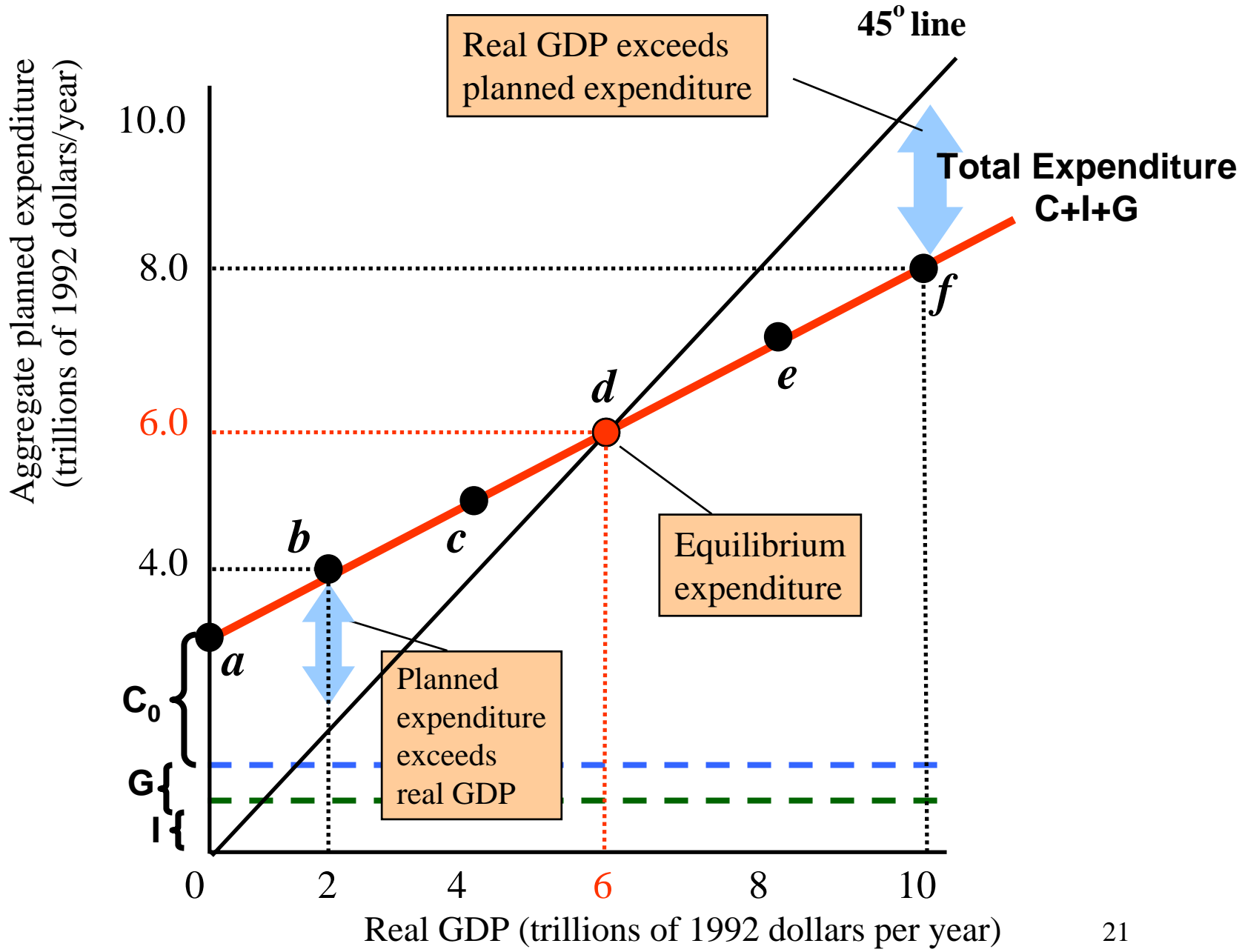
Investment and the MEC

- The **MEC** is essentially the modern finance concept called *the internal rate of return*.
- The businessperson's formation of **expectations** about the future profit stream is pure speculation, and tends to make investment erratic.
- Although this is a more sophisticated look at investment than the classicals, still we have that investment depends upon interest rates (and expectations). $I = I(r)$
- Note that $I \neq I(Y)$ and $I \neq I(Y_d)$

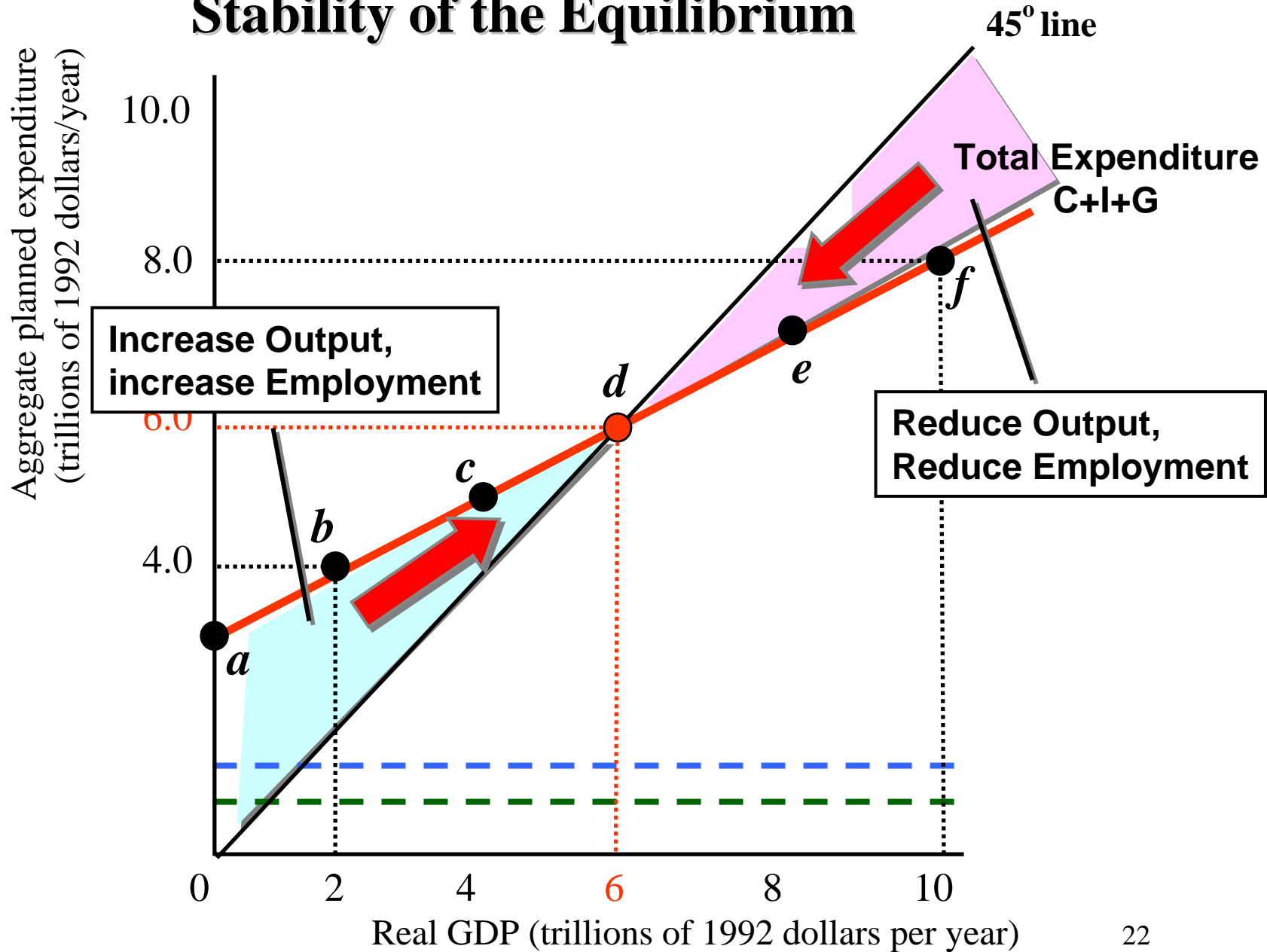
Original AE Model



There is a limit to the profitable expansion of output. If Say's Law held, there could be no obstacle to full employment. Output could profitably be increased until excess labor was absorbed. **Thus, this is a refutation of Say's Law.**



Stability of the Equilibrium



Algebra of the Model

$$Y = C + I + G$$

but $C = C_0 + c(Y-T)$, so

$$Y = C_0 + c(Y-T) + I + G$$

$$Y = C_0 + cY - cT + I + G$$

$$Y - cY = C_0 + I + G - cT$$

$$Y(1-c) = C_0 + I + G - cT$$

$$Y^* = \frac{1}{1-c} [C_0 + I + G - cT]$$

But this means that

$$\Delta Y = \frac{1}{1-c} \Delta G$$

$$\Delta Y = \frac{1}{1-c} \Delta I$$

$$\Delta Y = \frac{1}{1-c} \Delta C$$

but

$$\Delta Y = \frac{-c}{1-c} \Delta T$$

Multipliers (1)

- Thus $1/(1-c)$ is called the **aggregate expenditure multiplier** or **autonomous expenditure multiplier**.
 - It is positive.
 - An increase in autonomous spending has a amplified impact on GDP.
- But $-c/(1-c)$ is the **tax multiplier**.
 - It is negative.
 - An increase in taxes reduces GDP.
- This implies that deficit spending can have a powerful effect for stimulating the economy.

Multipliers (2)

- Clearly taxes slow an economy, having a negative effect on GDP and therefore employment.
- Note that if $\Delta G = \Delta T$, a balanced budget :

$$\Delta Y = \frac{1}{1-c} \Delta G + \frac{-c}{1-c} \Delta G$$

$$\Delta Y = \frac{1-c}{1-c} \Delta G$$

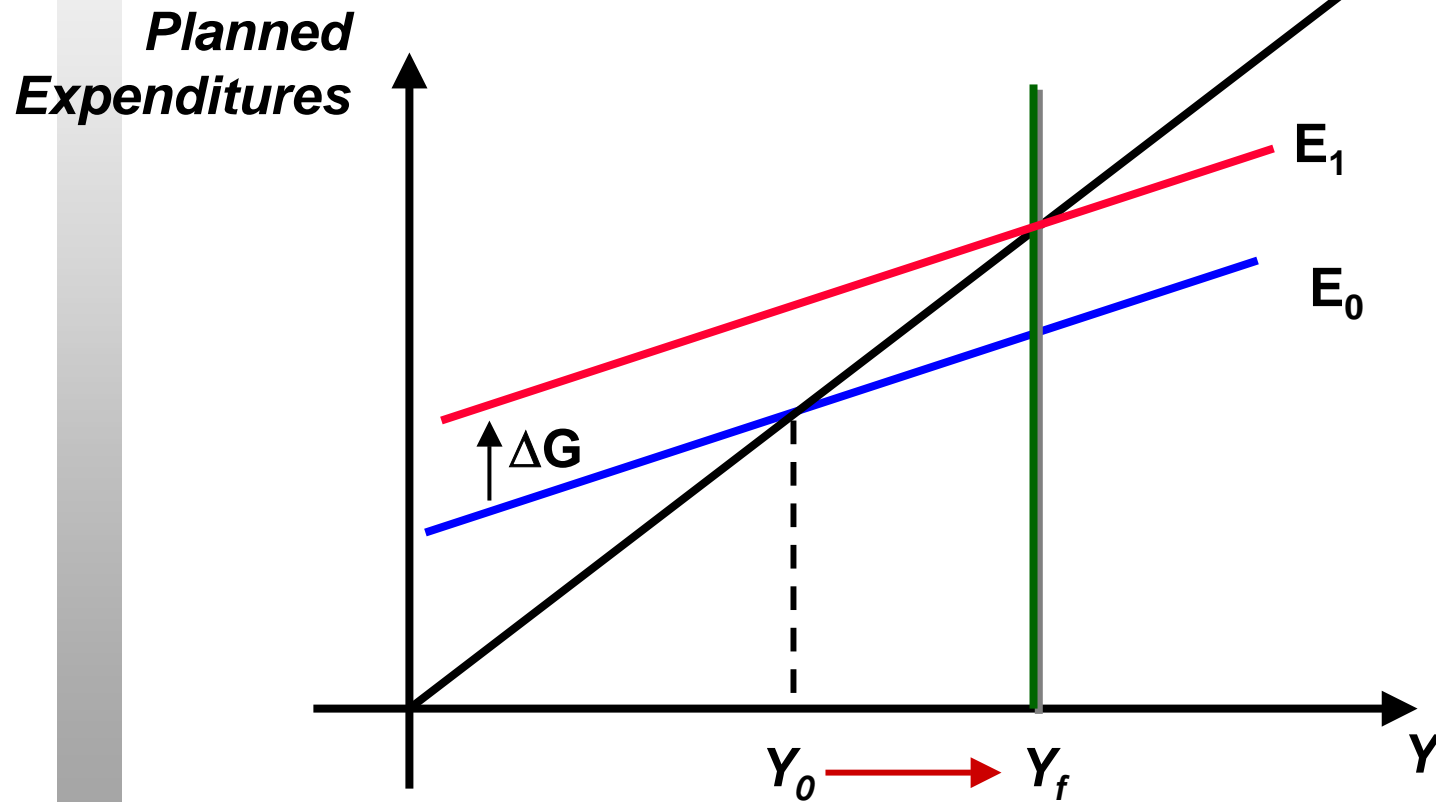
$$\Delta Y = \Delta G$$

- Thus the balanced budget multiplier is 1.

Multipliers (3)

- **As an example, if the $mpc = 0.9$, then $1/(1 - 0.9) = 1/(0.1) = 10$!**
- **For every \$1 increase in government spending, GDP will increase by \$10 !**
- **But also for every \$1 that taxes are increased, GDP falls by \$9 !**
- **With a balanced budget ($G=T$), every \$1 increase in G will increase GDP by only \$1.**

Fiscal Policy



Adding the Foreign Sector

- The **demand for imports** is
 $Z = Z_0 + zY$, $Z_0 > 0$, $0 < z < 1$
- Little “z” is the **marginal propensity to import**.
- Exports are thought to be exogenously determined—they don’t depend on conditions in our economy, but rather the conditions in the economy of the buyer nation.

Adapting the Multiplier

- Now we have some new components to the multipliers:

$$Y = \frac{1}{1 - c + z} [C_0 + I + G + X - Z_0]$$

- Note that we leave out taxes for the moment.
- Because the marginal propensity to import is greater than one, the multiplier is now smaller.