

# 1 The stock market and unemployment: three models compared

## 1.1 Classical Economics

The classical model defined

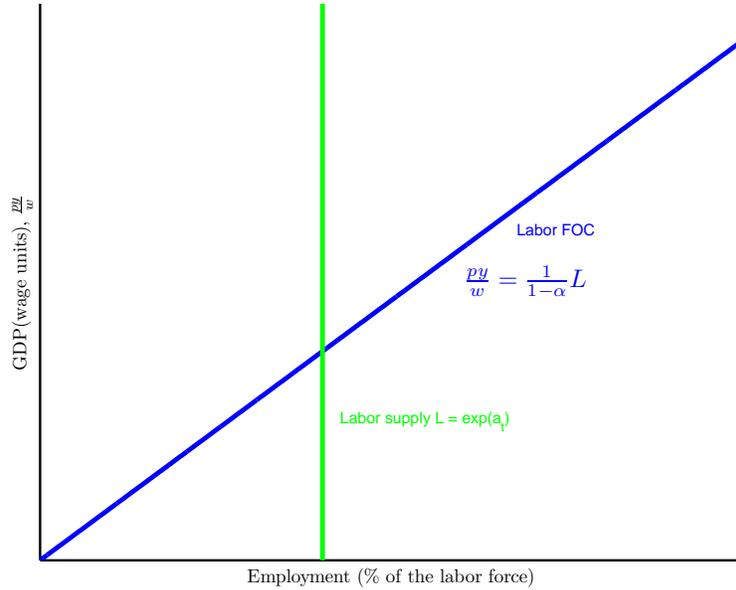


Figure 1: Classical Economics 101.

Consider a model with a large number of identical representative households, which maximize the discounted value of expected utility.

Using Cobb-Douglas production function, households receive utility from the consumption of a unique commodity which is manufactured from labor  $L$  and non-reproducible capital  $K$ .

$rr_t$  is the rental rate of capital, measured in dollars.

$p_{k,t}$  is the price of capital good traded on asset market.

$p_t$  is the price of the commodity.

The labor supply is

$$L_t = \exp(a_t), \quad (1)$$

where  $a_t$  is the shock to labor supply.

The first-order condition for the optimal use of labor is

$$\frac{p_t y_t}{w_t} = \frac{1}{1-\alpha} L_t, \quad (2)$$

where  $\alpha$  is the capital's share of national income.

## Implications for asset price movements

The connection between GDP and wealth implies the following asset pricing equation, where  $\theta$  is a parameter that depends on the household's discount rate and on the parameters of technology

$$\frac{p_{k,t}}{w_t} = \frac{1}{\theta} \frac{p_t y_t}{w_t} \quad (3)$$

In the classical model, the stock market falls in response to a shock to fundamentals (preferences, technology, and endowments). The two latter shocks are assumed to be fixed so that a depression could be caused by a decrease in  $a_t$ .

However, during the Great Depression, these fundamental shocks did not explain why the U.S. unemployment rate jumped from 3% to 24% within 3 years and remained above 15% for a decade.

## 1.2 Keynesian Economics

### The Keynesian model defined

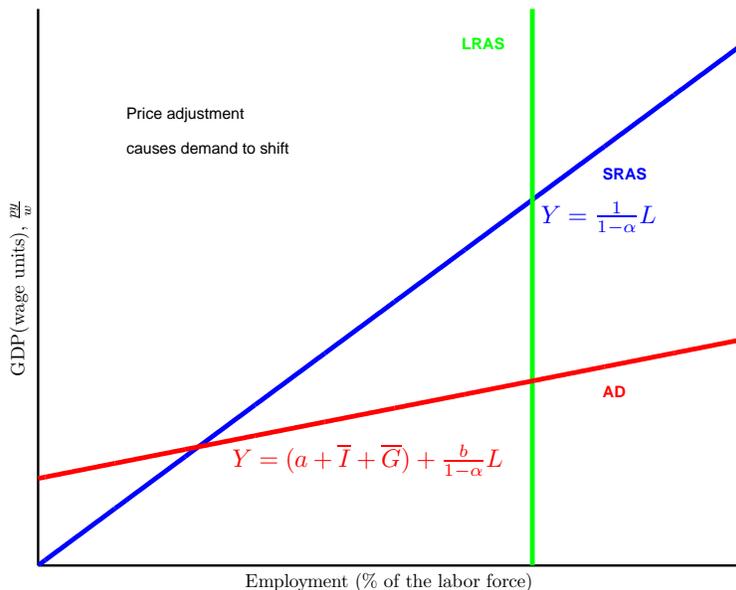


Figure 2: Keynesian Economics 101.

GDP,  $Y = py/w$ , measured by wage units, includes three components: consumption  $C$ , fixed investment  $I = \bar{I}$ , and fixed government purchases  $G = \bar{G}$ .

$$Y = C + \bar{I} + \bar{G} \quad (4)$$

Consumer depends on income

$$C = a + bY \quad (5)$$

The short-run aggregate supply is

$$Y = \frac{1}{1-\alpha} L, \quad (6)$$

where  $Y$  is defined as nominal GDP divided by the wage.

The Keynesian model does not apply the classical assumption that households are on their labor supply curves. Rather, the long-run aggregate supply curve is a benchmark that defines full employment. Any deviations from the left of this benchmark can be called “involuntary unemployment” (figure 2).

### The Keynesian explanation of the Great Depression

Suppose that animal spirits caused a drop in investment, shifting down the aggregate demand curve in figure 8. This drop in investment led to an increase in unemployment rate. According to Keynesians, the way to restore full employment is to increase government purchases to replace the missing investment expenditure.

In the short run, the intersection of aggregate demand and short-run aggregate supply determines employment and real GDP. However, in the long run, price and wage adjustment would cause all three curves to intersect at the same point.

The adjustment to the natural rate of employment is through an upward shift of the aggregate demand curve caused either by an increase in investment expenditure or as a wealth effect on consumption.

Price adjustment required to restore full employment might take a very long time and would involve considerable lost output if unemployment were to remain high for an extended period. Increase in government expenditure can restore the full employment quickly.

## 1.3 Farmerian Economics

### Farmerian economics defined

Consider a general Cobb-Douglas production function

$$y = AK^\alpha L^{1-\alpha}, \tag{7}$$

where  $y$  is output in physical units,  $K$  is capital,  $L$  is labor, and  $A$  is a productivity parameter.

Labor market search implies that the productivity parameter  $A$  is related to aggregate employment by

$$A = (1 - \bar{L})^{1-\alpha}, \tag{8}$$

where  $(1 - \bar{L})$  is the aggregate unemployment rate.

Employment is demand determined and firms sell as much output as is demanded.

Any unemployment rate is consistent with profit maximization behavior and rational forward looking households.

### Closing Farmer’s model with a belief function

The connection between the value of asset prices and aggregate GDP is

$$Y_t = \theta \frac{p_{k,t}}{w_t} \tag{9}$$

Asset prices are assumed to evolve independently and to be driven by self-fulfilling beliefs.

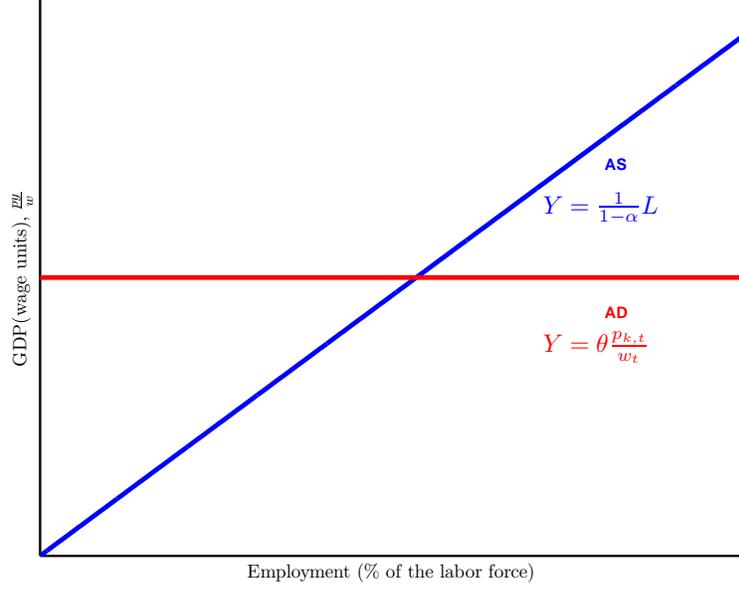


Figure 3: Farmerian Economics 101.

The belief function is

$$E_t \left[ \frac{p_{k,t+1}}{w_{t+1}} \right] \equiv X_t, \quad (10)$$

$$\log X_t = \log X_{t-1} + f(\Delta U_{t-1}) + \epsilon_t, \quad (11)$$

where

$X_t$  is the beliefs about the future real value of the stock market, which is highly persistent,

$U_{t-1}$  is the lag of the observed unemployment rate,

$\epsilon_t$  is a randomly permanent shock to beliefs arising from animal spirits of market participants.

### The belief function is consistent with rational expectations

The assumption of rational expectations are

$$\frac{p_{k,t}}{w_t} = E_{t-1} \left[ \frac{p_{k,t}}{w_t} \right] + \eta_t \quad (12)$$

$$E_{t-1} [\eta_t] = 0 \quad (13)$$

where  $\eta_t$  is a *non-fundamental* forecast error.

Belief function is an equilibrium selection mechanism that resolves a potential indeterminacy of equilibrium by coordinating the expectations of agents, which George Soro has called the “mood of the markets”.

## Farmer's model compared to Keynesian economics

High and persistent unemployment is an *equilibrium* phenomenon.

Allocating workers between the activities of search and production results in the optimal unemployment rate, but there is no tendency to converge back to this rate.

The shift of AD does not depend on  $G$ , but depend on the stock market.

No amount of government fiscal stimulus can *permanently* restore full employment.

A *temporary unanticipated* fiscal stimulus can reduce unemployment in the short run, but it cannot solve the problem in the long run.

To restore full employment, Farmer shows that real value of wealth can be increased through direct government intervention in the stock market.