# "The Stock Market Crash of 2008 Caused the Great Recession" by Roger Farmer

## 1   Introduction

- Collapse in housing prices, working through the stock market, caused the 2008 Great Recession

    - High correlation between unemployment and the stock market since 1929

    - Stable relationship before and after 1979

    - Farmer advocates asset market intervention rather than traditional Keynesian fiscal stimulus

    - Consumption function has not been stable since WWII (Ricardian equivalence)

- Empirical evidence

    - Normalize by money wage; no HP filter

    - Previous literature shows low frequency correlation between consumption and wealth

    - Farmer shows low frequency correlation between unemployment and wealth

- Figure 2:  Wealth index (stocks + housing) and unemployment during the Great Depression

- Figures 3 and 4:  Wealth and unemployment between 2000-2010

- Figure 5 & Table 1:   Stable long-run (1953-2011) relationship between the stock market and unemployment

- Figure 6:  More evidence of a stable relationship using an error-correction model

- Farmer's model

    - Consumption is consistent with Friedman's permanent income hypothesis

    - New Keynesian explanation grounded in microfundamentals

    - No reliance on sticky prices

    - Farmer's story:

        Shift in beliefs → Housing price crash → Stock market crash →

        Fall in permanent income → Drop in AD → Firms lay off workers →

        Higher steady state unemployment → Self-fulfilling prophecy

# What is Classical model?

**1.**
*"...a model based on the assumptions that wages and prices adjust to clear markets and that monetary policy does not influence real variables." [Mankiw, 2010]*

# The Classical model defined

- Cobb-Douglas production function
- $rr_t$ 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

$$L_t = exp(a_t),$$

where $a_t$ is the shock to labor supply.

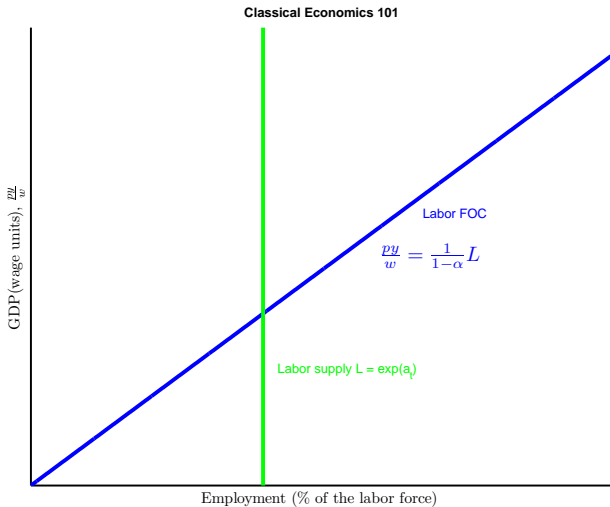# The Classical model defined (cont)

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

$$\frac{p_t y_t}{w_t} = \frac{1}{1-\alpha} L_t,$$

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

**Classical Economics 101**

Labor FOC

$$\frac{py}{w} = \frac{1}{1-\alpha}L$$

Labor supply L = exp(a$_l$)

GDP (wage units), $\frac{py}{w}$

Employment (% of the labor force)

# Implications for asset price movements

- Asset pricing equation

$$\frac{p_{k,t}}{w_t} = \frac{1}{\theta} \frac{p_t y_t}{w_t},$$

  where $\theta$ is a parameter that depends on the household's discount rate and on the parameters of technology.
- Fundamental shocks (preferences, technology, and endowments)

# What is the Keynesian model?

**1.**

*"...a model based on the assumptions that wages and prices do not adjust to clear markets and that aggregate demand determines the economy's output and employment."* [Mankiw, 2010]

# The Keynesian model defined

- GDP, measured by wage units:

$$Y = C + \bar{I} + \overline{G}$$
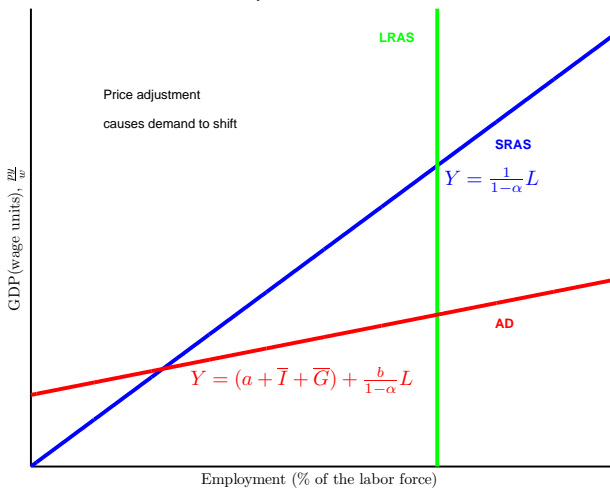
- Consumption:

$$C = a + bY$$

- The short-run aggregate supply:

$$Y = \frac{1}{1 - \alpha}L$$

Keynesian Economics 101

GDP(wage units), $\frac{PY}{w}$

Employment (% of the labor force)

LRAS

Price adjustment

causes demand to shift

SRAS

$Y = \frac{1}{1-\alpha}L$

AD

$Y = (a + \overline{I} + \overline{G}) + \frac{b}{1-\alpha}L$

# The Keynesian explanation of the Great Depression

- The downward shift of AD due to a drop in investment
- Increase in government purchases to restore full employment
- The intersection of SRAS and AD in the short run
- The upward shift of AD caused by
  - **–** an increase in investment expenditure
  - **–** a wealth effect on consumption
- Price and wage adjustment in the long run

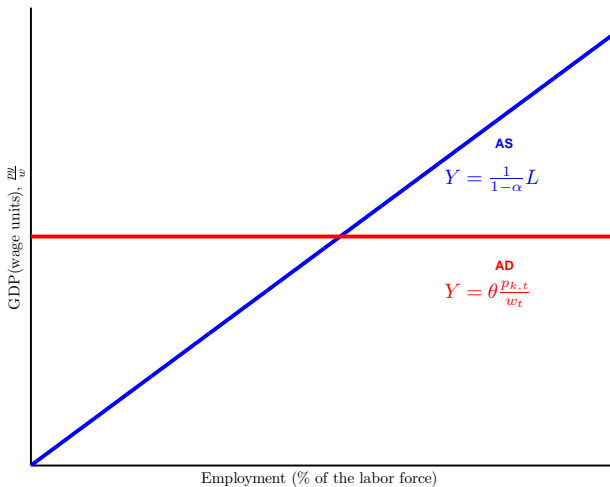# Farmerian economics defined

- Cobb-Douglas production function:

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

- Productivity parameter $A$:

$$A = (1 - \overline{L})^{1-\alpha}$$

- Employment is demand determined
- Firms sell as much output as is demanded

**Famerian Economics 101**

GDP (wage units), $\frac{p_y}{w}$

**AS**

$Y = \frac{1}{1-\alpha}L$

**AD**

$Y = \theta \frac{p_{k,t}}{w_t}$

Employment (% of the labor force)

# Closing Farmer's model with a belief function

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

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

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

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

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

where

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

- $U_{t-1}$ is one 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

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

$$E_{t-1}\left[\eta_t\right] = 0$$

where $\eta_t$ is a *non-fundamental* forecast error.
- The *" mood of the markets"* by George Soro

# Farmer's model compared to Keynesian economics

- High and persistent unemployment as an equilibrium phenomenon
- Optimal unemployment rate as a result of allocating workers between the activities of search and production
- The effect of the stock market on the shift of AD curve
- The temporary effect of fiscal stimulus on the natural rate of employment
- Real value of wealth as a solution to restore full employment

# 2 Conclusions

- Why Farmer is not a Classical economist

  - Not plausible that changes in regulatory environment led to 5% persistently higher unemployment

  - Liquidity constraints cannot explain the persistent unemployment

  - Shock to beliefs → Fall in stock market wealth → Reduced consumption →

    Reduced AD → Increased unemployment (with multiplier effect)

- Why Farmer is not a traditional Keynesian economist

  - Keynesian multiplier relies on stable relationship between aggregate consumption and income

  - Crowding out (Figure 12)

  - Government spending will not restore AD