Fiscal Policy Can Reduce Unemployment: But There is a Better Alternative

Federal Reserve Bank of Atlanta

January 9th 2010

Roger E. A. Farmer

Department of Economics UCLA

The Goals of this Research

- To understand financial crises with a model of multiple steady state equilibria
- To understand the role of fiscal policy in restoring full employment

The Conclusions

- In response to a stock market crash of 20% unemployment is predicted to increase by 20%
- A balanced budget fiscal policy can restore full employment but labor income taxes would increase by 54% to 93%
- The multiplier is between 0.33 and 0.56

A Better Policy

- Direct intervention to support the value of the stock market
- Prevent both bubbles and crashes by stock market purchases financed with agency debt

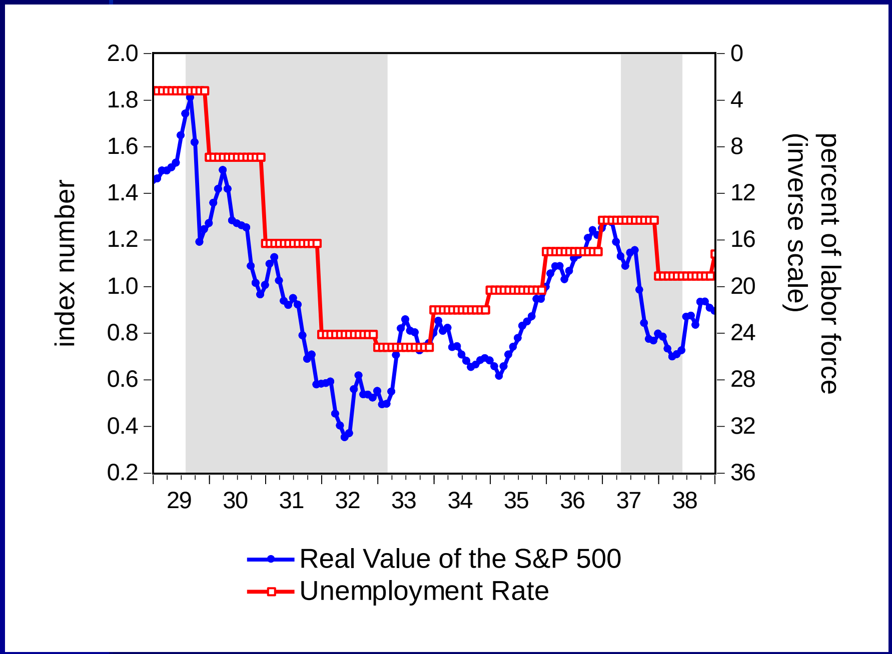
Connection with New-Keynesian Theory

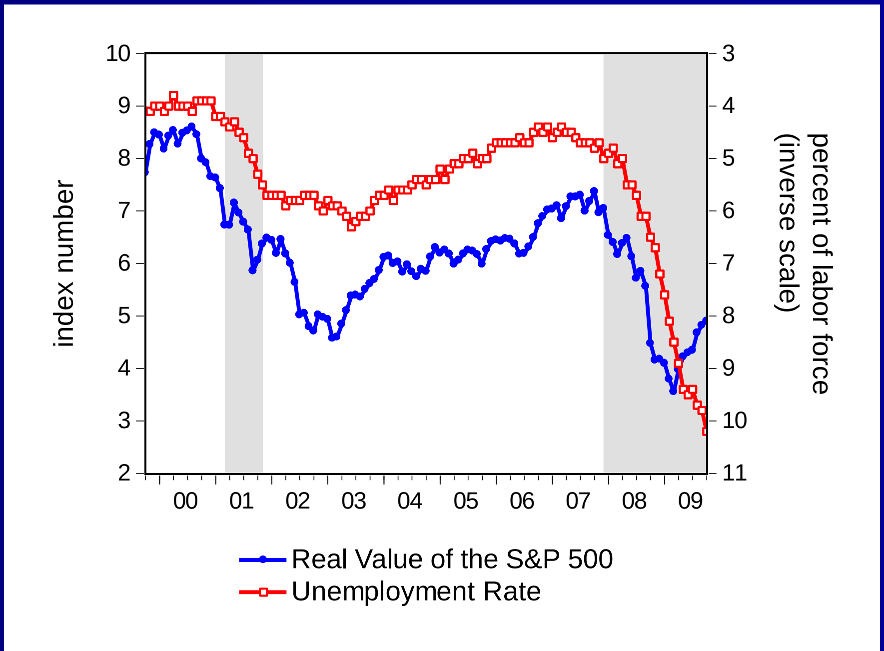
- New Keynesian economics assumes sticky prices. Deviations from the natural rate of unemployment are temporary.
- Old Keynesian economics assumes flexible prices. There is a continuum of steady state unemployment rates indexed by beliefs.

Connection with Search Theory

- Two kinds of multiplicity in search models
  - Finite multiplicities: Diamond 1982,1984
  - Steady state Continuum: Howitt and McAfee 1987
- Continuum follows from bilateral monopoly

Comparing 2008 with the Great Depression

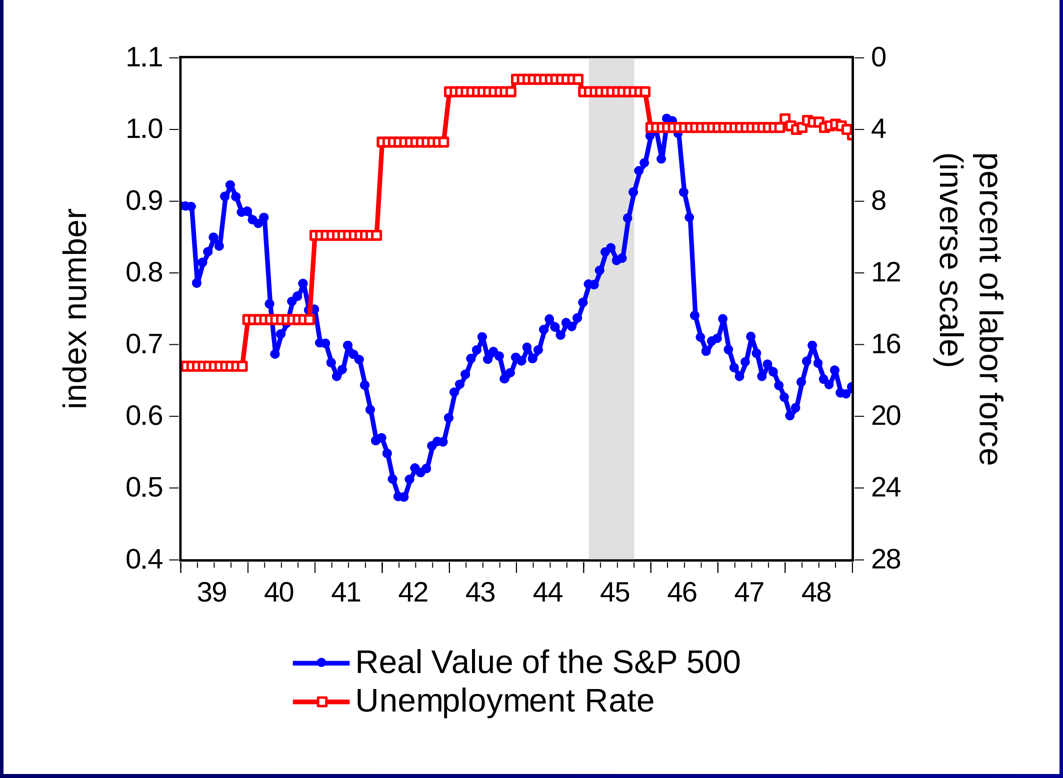




The Great Depression

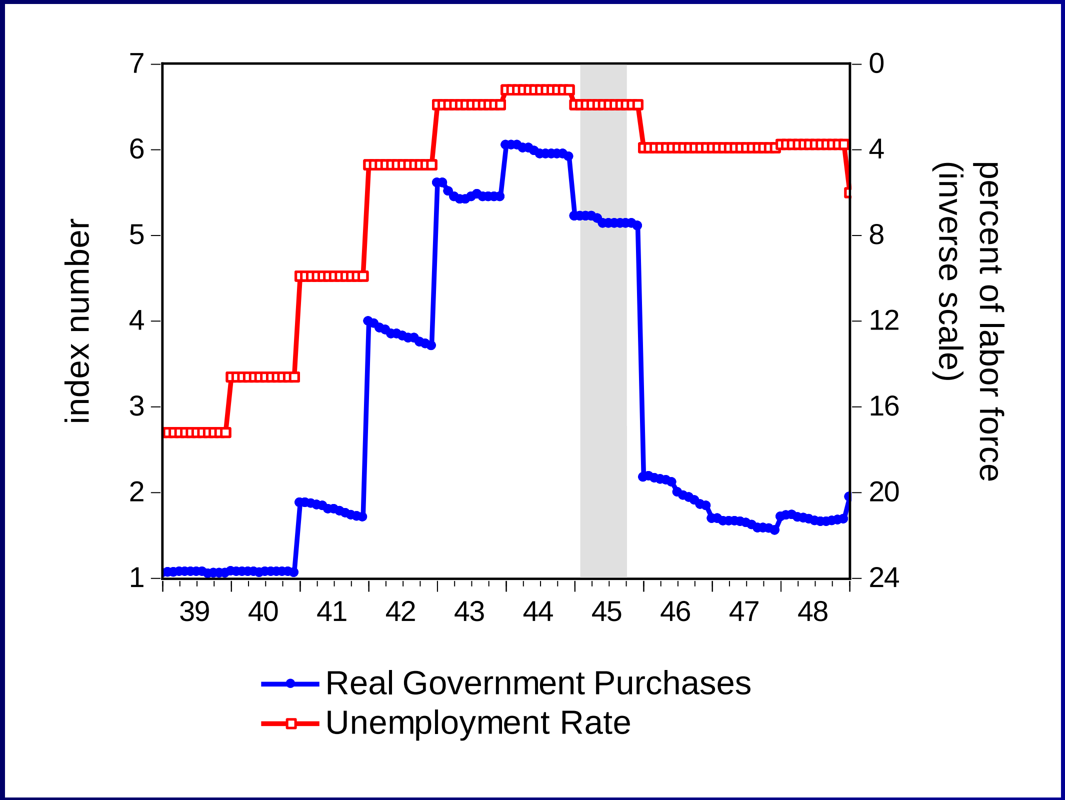
The 2008 Financial Crisis

The War-Time Recovery Doesn't Fit the Pattern



The Stock Market and Unemployment During WWII

Government Expenditure Was Important



Government Purchases and Unemployment During WWII

Structure of Talk

- I will explain the multiplicity in a representative agent version of the model
- I will explain how the model is altered to allow for overlapping generations
- I will present the results of a computational experiment

Main Idea

- Two Ideas in Keynes
- 1. Labor market is not a spot market
- 2. Animal Spirits
- This paper builds these two ideas into a micro-founded general equilibrium model

The Market Failure

- Labor market is a search market without the Nash Bargain
- Costly Search and Recruiting
- Externality supports different allocations as equilibria
- Animal spirits select an equilibrium

A Model

- 1 Lucas tree – non reproducible
- 1 good produced by labor and capital
- No disutility of work – everyone wants a job
- Everyone fired and rehired every period
- No uncertainty

The Labor Market

- Finding a job uses resources
- Two technologies
- Production technology
- Matching technology

Terminology

Z	Money value of GDP
z	Physical goods produced
K	Number of trees (Normalized to 1)
H	Time endowment of household (Normalized to 1)

Terminology

C Money value of consumption

G Money value of government purchases

Terminology

w	Money wage
r	Money rental rate
p_k	Relative price of a tree
p	Money price of a commodity
Q_t^s	Date *t* value of a dollar delivered at date *s*

Terminology

L Employment

X Production workers

V Recruiters

$$L = X + V$$

Technologies

$$z = K^{1-\alpha} X^{\alpha}$$

Production technology

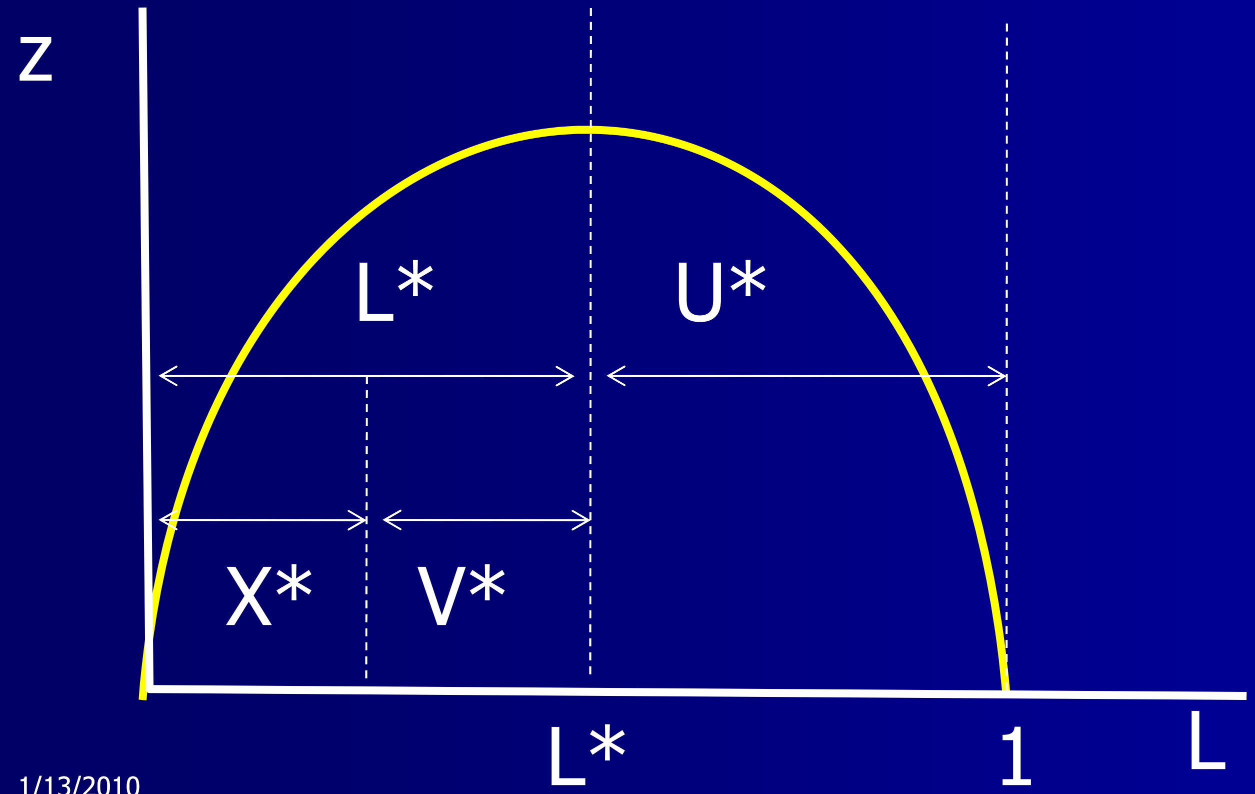
$$L = H^{1/2} V^{1/2}$$

Match technology

$$H \leq 1 \qquad K \leq 1$$

Planning Problem

$$z = \left[L \left(1 - L \right) \right]^{\alpha}$$



Decentralization

- Agents take wages and prices as given
- Households take hiring probability as given
- Firms take hiring effectiveness as given
- All markets clear

More Terminology

$\tilde{q}$ Probability of a worker being hired

q One recruiter hires this many workers

$$L = \tilde{q}H$$

$$L = qV$$

Firm's Problem

$$\max p_t z_t - w_t L_t - r_t K_t$$

$$L_t = q_t V_t$$

$$L_t = X_t + V_t$$

$$z_t \le K_t^{\alpha} X_t^{1-\alpha}$$

Firm's Problem

$$\max p_t K_t^{\alpha}\left[L_t\left(1-\frac{1}{q_t}\right)\right]^{1-\alpha} - w_t L_t - r_t K_t$$

$$\alpha Z_t = r_t K_t$$

Firm acts like a firm in an auction market but takes *q* as given

$$\boxed{(1-\alpha) Z_t = w_t L_t}$$

q is an externality that represents market tightness.
For any given q there is a zero profit equilibrium

Normalization

$$w_t = 1$$

$$\boxed{Z_t = \frac{1}{1-\alpha} L_t}$$

Comparison with the Classical Model

Classical	Old Keynesian
$(1-\alpha)Z = wL$	$(1-\alpha)Z = wL$
$L = 1$	$w = 1$
$w = \frac{(1-\alpha)Z}{L}$	$L = (1-\alpha)Z$

Household's Problem

$$\max u = \sum_{t=0}^{\infty} \beta^t \log\left(c_t\right)$$

$$p_{k,t} K_{t+1} + p_t c_t \leq \left(p_{k,t} + r_t\right) K_t + w_t \tilde{q}_t$$

Solution

$$H_t = 1$$

$$h_t = \sum_{s=t}^{\infty} Q_t^s w_t L_t$$

$$C_t = (1-\beta)\left[p_{k,t} K_t + h_t \right]$$

No Arbitrage Implies

$$p_{k,t} = Q_t^{t+1}\left(p_{k,t+1} + \alpha C_{t+1}\right)$$

$$Q_t^{t+1} = \frac{\beta C_t}{C_{t+1}}$$

$$\boxed{p_{k,t} = C_t \frac{\beta\alpha}{1-\beta}}$$

Proposition

- There is a bound *b* such that for every bounded sequence of asset prices there is an equilibrium where

Equilibrium (No Government)

$$Z_t = C_t = \frac{1-\beta}{\beta\alpha} p_{k,t} \qquad z_t = c_t = \left[L_t \left(1 - \frac{1}{q_t} \right) \right]^{1-\alpha}$$

$$L_t = \frac{C_t}{1-\alpha} \qquad p_t = \frac{C_t}{c_t} \qquad \tilde{q}_t = L_t$$

$$U_t = 1 - L_t \qquad q_t = \frac{1}{L_t} \qquad V_t = L_t^2$$

What Determines Z?

- Z is aggregate demand
- Construct an infinite horizon model with a Blanchard-Weil population structure.
- Explore the role of fiscal policy.

Household's Problem

$$\max u = \sum_{t=0}^{\infty} (\beta\pi)^t \log(c_t)$$

$$p_{k,t} K_{t+1} + p_t c_t \le \left(p_{k,t} + r_t \right) K_t + w_t \tilde{q}_t \left(1 - \tau_t\right)$$

Definition

$$\tilde{\beta} = \frac{1-\pi\left(1-\beta\pi\right)}{\pi}$$

$$\tilde{\alpha} = \frac{\left(1-\beta\pi\right)\left(1-\pi\right)}{1-\pi\left(1-\beta\pi\right)}$$

The Model

$$C_t = \frac{1}{R_t \tilde{\beta}} C_{t+1} + \tilde{\alpha}\left(Z_t + p_{k,t} + B_t - \tau_t\left(1-\alpha\right)Z_t\right)$$

$$R_t = \frac{p_{k,t+1} + \alpha Z_{t+1}}{p_{k,t}}$$

The Model Continued

$$Z_t = C_t + G_t$$

$$L_t = (1-\alpha) Z_t$$

$$\tau_t = \frac{1}{(1-\alpha) Z_t} \left(\frac{R_t B_t - B_{t+1}}{R_t} + G_t \right)$$

Steady State

$$Z = H(R)\left(p_k + \frac{B}{R}\right) + G$$

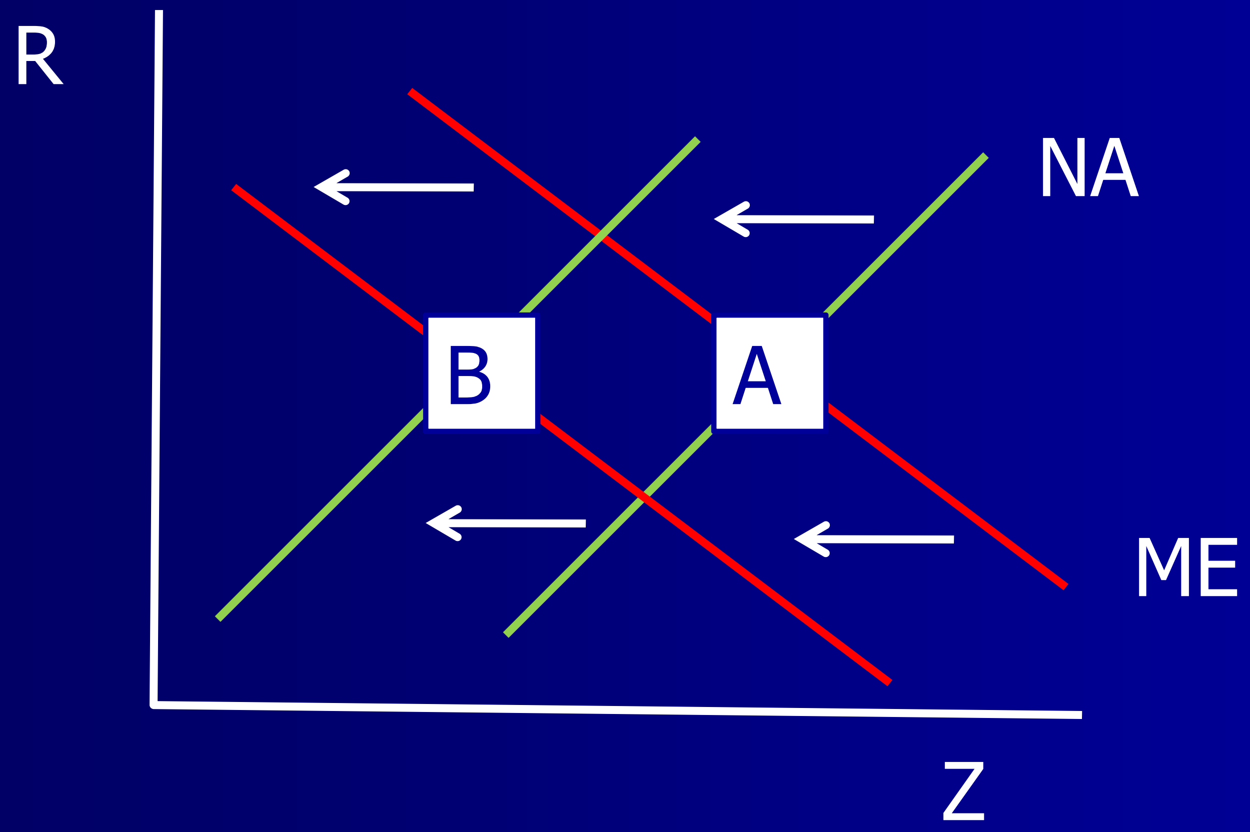
Market Equilibrium

$$R = 1 + \frac{\alpha Z}{p_k}$$

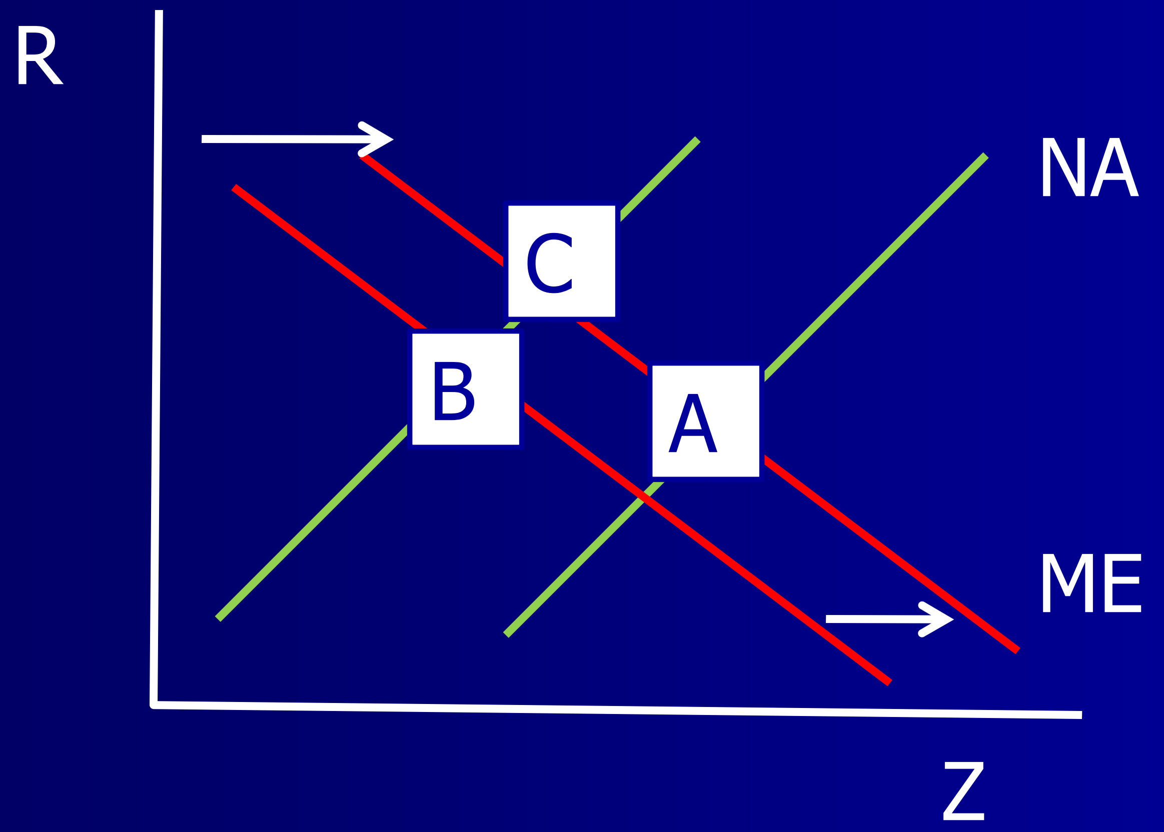
No Arbitrage

$$\tau = \frac{1}{(1-\alpha)Z}\left(\frac{(R-1)B}{R} + G\right)$$

A Market Crash



Fiscal Policy



Disc. Factor	Life Expectancy	Stimulus % GDP	Tax incr. % Wage Inc	Cons Drop % GDP	Multiplier	Opt Int. Rate % per yr.	New Int. Rate
β=0.97	67	67	100	-47	0.30	3.7	4.7
β=1		36	54	-16	0.56	0.09	1.1
β=0.97	50	61	93	-41	0.33	4.0	5.9
β=1		36	54	-16	0.56	1.2	1.5
β=0.97	20	47	72	-27	0.43	5.8	7.2
β=1		36	54	-16	0.56	3.0	3.8
β=0.97	12.5	43	65	-23	0.47	7.7	9.6
β=1		35	53	-15	0.57	5.0	6.2

Effects of a Fiscal Stimulus

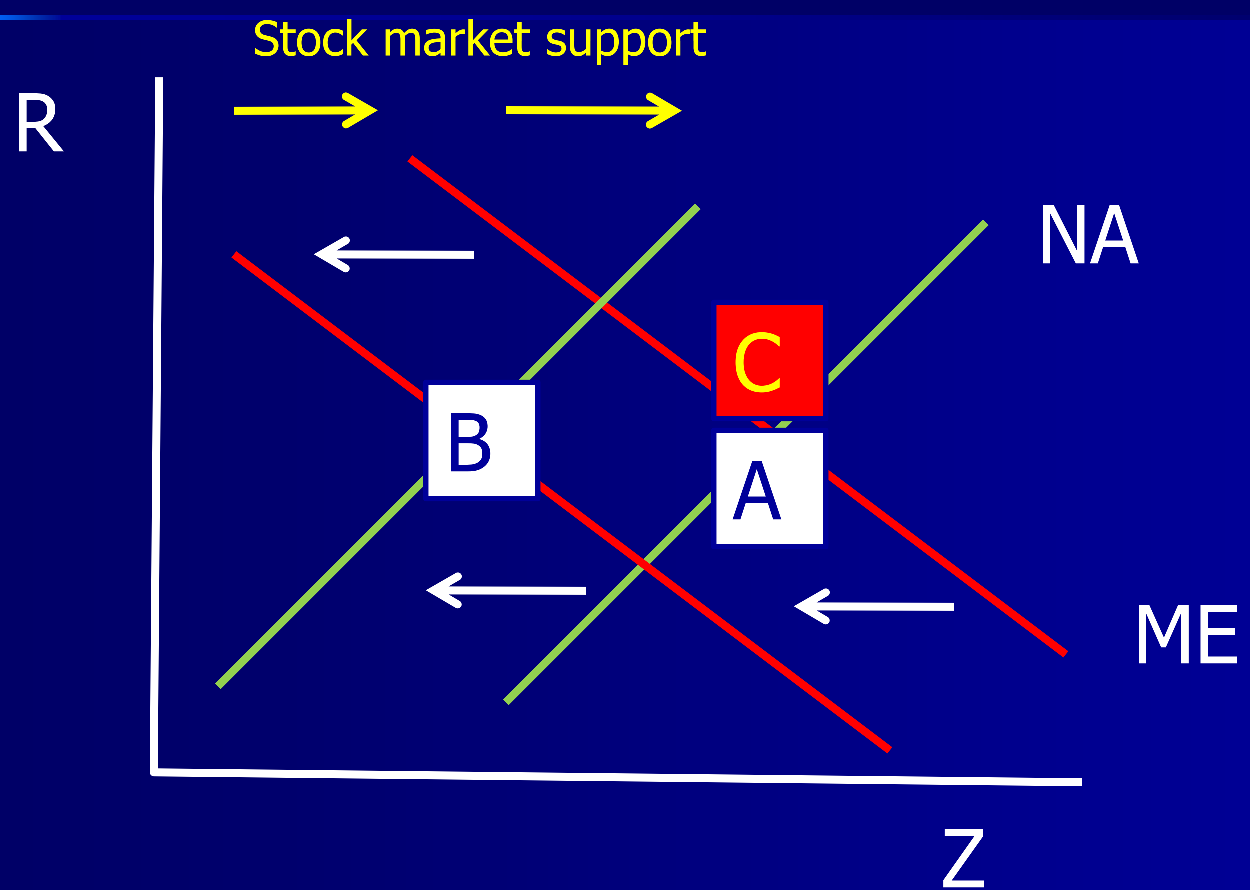
Welfare Cost

- Loss of confidence causes 20% drop in steady state consumption
- Restoring full employment reduces consumption by a further 41% of full employment GDP
- Welfare unambiguously falls

Welfare Cost if G yields Utility

- Assume Cobb Douglas Utility and C and G have equal weights
- Confidence drop of 20% reduces steady state consumption by 20%
- Restoring full employment with the wrong balance of G and C leads to a further 17% drop of utility in units of steady state consumption

Is there a Better Policy?



Summary

- Unemployment depends on self-fulfilling beliefs
- The Great Depression and the 2008 Financial Crisis were caused by self-fulfilling drops in confidence
- Fiscal policy may not be the best solution