

## Recent Extensions to the Market-Clearing Models

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## Goals:

- Can changes in the money supply have implications for real variables in the short run?
- What is the real business cycle model?
- Should monetary policy be proactive?

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## The Friedman-Lucas Money Surprise Model

- Monetary policy is not neutral in the short run because firms and household can not tell if a change in a nominal variable is due to a change in the money supply or a change in a real factor.
- You should only change behavior if a change in a real variable occurred.

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### What happens if there is an unanticipated increase in the money supply?

- The money supply increases, but workers only see that the nominal wage has increased.
- Households **think** the increase in the nominal wage was due to a temporary increase in  $z$ .

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- Step 1: The increase in  $M^s$  shifts the money supply curve to the right. The **belief** of workers that  $z$  increased causes labor supply to shift to the right, output supply to shift to the right, and consumption increases.
- Step 2. The real interest rate falls.

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- Step 3: The fall in the real interest rate causes labor supply to shift back some and the money demand curve to shift right.
- Step 4: Find the new equilibrium. We now see that an increase in the money supply causes real output to increase. Money is not neutral in the short run.

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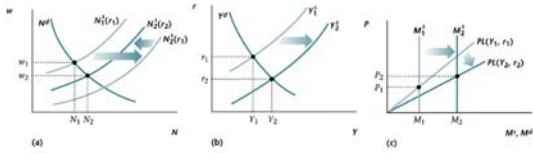
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**Figure 11.1** The Effects of an Unanticipated Increase in the Money Supply in the Money Surprise Model




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**Table 11.1** Data Versus Predictions of the Money Surprise Model with Monetary Shocks

Variable	Data	Model
Consumption	Procyclical	Procyclical
Investment	Procyclical	Procyclical
Price Level	Countercyclical	Procyclical
Money Supply	Procyclical	Procyclical
Employment	Procyclical	Procyclical
Real Wage	Procyclical	Countercyclical
Average Labor Productivity	Procyclical	Countercyclical

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### Implications of the Theory

- The economy is more efficient when the behavior of policy is well understood.
- We should use a constant money supply rule.
- The model implies the real wage and average labor productivity should be countercyclical. This is inconsistent with the data.

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## The Real Business Cycle Model(Kydland and Prescott)

- Business cycles are the results of persistent changes in TFP.
- Money Supply changes are correlated with output changes because the money supply is endogenous.

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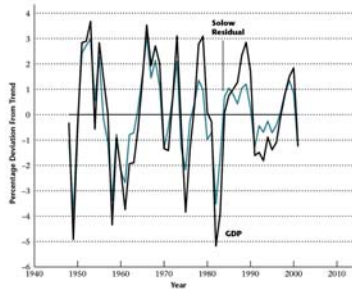
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## Figure 11.2 Solow Residuals and GDP



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- Step 1:  $z_1$  and  $z_2$  increase.
- Step 2: The increase in  $z_1$  causes the labor demand curve, and output supply curve to shift. The increase in  $z_2$  causes investment demand to increase and the output demand curve to shift to the right.
- Step 3: The real interest rate declines.

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- Step 4: As a result, the labor supply curve shifts to the right.
- Step 5: Summarize the effects of the changes in productivity.

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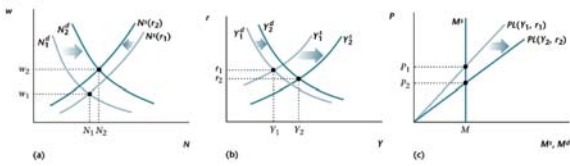
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**Figure 11.3** Effects of a Persistent Increase in Total Factor Productivity in the Real Business Cycle Model




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**Table 11.2** Data Versus Predictions of the Real Business Cycle Model with Productivity Shocks

Variable	Data	Model
Consumption	Procyclical	Procyclical
Investment	Procyclical	Procyclical
Price Level	Countercyclical	Countercyclical
Money Supply	Procyclical	—
Employment	Procyclical	Procyclical
Real Wage	Procyclical	Procyclical
Average Labor Productivity	Procyclical	Procyclical

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**Now, let us see what we mean by the statement that the money supply is endogenous.**

- The idea is that banks make more loans available in good times which leads to deposit creation and an increase in the money supply.
- Thus, money and output are positively correlated, but this does not imply causality.

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**Business Cycle Implications of the Model**

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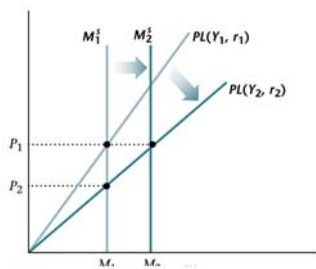
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**Figure 11.5** Procyclical Money Supply in the Real Business Cycle Model with Endogenous Money



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## Implications of the RBC Model

- No role for the government in managing the business cycle.

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## A Keynesian Coordination Failure Model

- The original Keynesian Model stress an active role for the government in managing the economy.
- This model is updated Keynesian model that that is market-clearing and stresses an active role for the government,

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## The Original Keynesian Model

- Developed to understand the Great Depression and to develop policies to improve the performance of the economy.
- The model was static
- The model stressed the demand side and sticky wages and prices.

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**Table 12.2** Data vs. Predictions of the Keynesian Sticky Wage Model with Investment Shocks

Variable	Data	Model
Consumption	Procyclical	Procyclical
Investment	Procyclical	Procyclical
Price Level	Countercyclical	Procyclical
Money Supply	Procyclical	Procyclical
Employment	Procyclical	Procyclical
Real Wage	Procyclical	Countercyclical
Average Labor Productivity	Procyclical	Countercyclical

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### The Coordination Failure Model

- Basic Idea- it is difficult for private sector workers and producers to coordinate their actions.
- Strategic Complementarities-one person's willingness to engage in some activity increases with the number of people engaged in that activity.
- Results in multiple equilibrium

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### A Production Function with Increasing Returns to Scale

- Increasing returns to scale – doubling of the input results in output more than doubling.
- Result of strategic complementarities among firms

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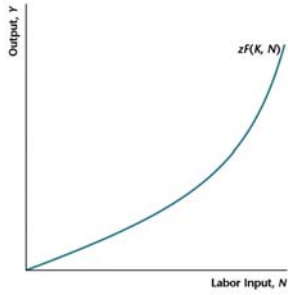
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**Figure 11.9** A Production Function with Increasing Returns to Scale



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**The Labor Demand Curve is upward sloping**

- A production function with increasing returns to scale results in an upward sloping labor demand curve.
- The marginal product of labor increases with more employment.

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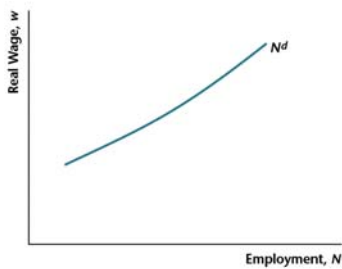
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**Figure 11.10** Aggregate Labor Demand with Sufficient Increasing Returns to Scale



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## Derivation of the Output Supply Curve

- The output supply curve is derived by using the labor market diagram in conjunction with the production function and studying the effects of changes in the real interest rate.

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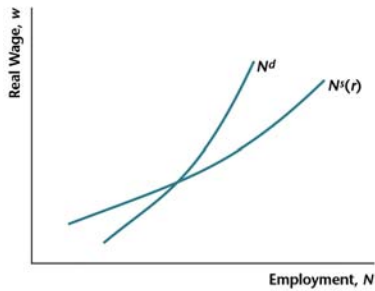
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**Figure 11.11** The Labor Market in the Coordination Failure Model




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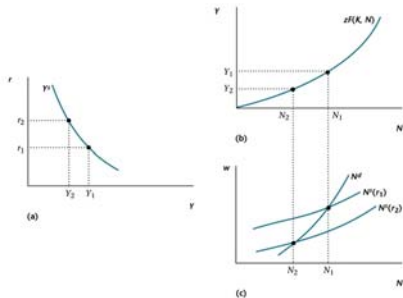
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**Figure 11.12** The Output Supply Curve in the Coordination Failure Model




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## The Coordination Failure Model

- Draw labor market, output market, and money market diagrams.
- The output market shows there are two equilibria; one good and one bad
- Business cycles could result from changes if consumers and firms are either optimistic or pessimistic.

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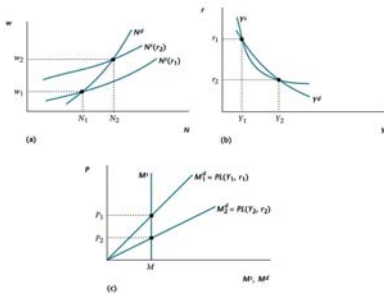
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**Figure 11.13** Multiple Equilibria in the Coordination Failure Model




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- Government has a role in keeping the economy at the good equilibrium.

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**Table 11.3** Data Versus Predictions of the Coordination Failure Model

Variable	Data	Model
Consumption	Procyclical	Procyclical
Investment	Procyclical	Procyclical
Price Level	Countercyclical	Countercyclical
Money Supply	Procyclical	—
Employment	Procyclical	Procyclical
Real Wage	Procyclical	Procyclical
Average Labor Productivity	Procyclical	Procyclical

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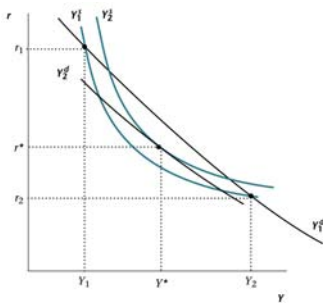
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**Figure 11.16** Stabilizing Fiscal Policy in the Coordination Failure Model




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**How does the model explain why the money supply is procyclical?**

- Individuals are optimistic when the money supply is higher.
- The money demand curve shifts right as Y is high.
- We find that money and output are positively correlated.

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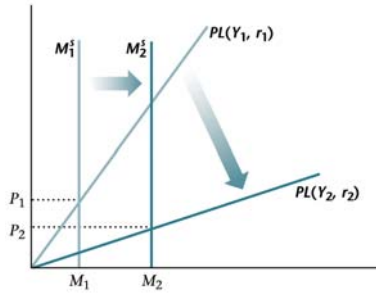
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**Figure 11.15** Procyclical Money Supply in the Coordination Failure Model



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### Critique of the Coordination failure Model

- Little evidence for increasing returns to scale
- Model relies in changes in unobserved variables to generate business cycles.

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