# Lectures 21 and 22

# Chapter 17: Alternative Approaches
# Chapter 16: Long-Run Growth

- Monetarism: $V = GDP/M$. Is $V$ constant over time?
- Supply side. Labor supply depends on after-tax real wage and nonlabor income. Laffer curve.
- New classical, rational expectations, Lucas supply function
- Real Business Cycles

# Monetarism

$GDP \equiv P \cdot Y$

$V \equiv \frac{GDP}{M}$ or $M \cdot V \equiv P \cdot Y$

? $M \cdot \bar{V} = P \cdot \bar{Y}$ : see plot of $V$

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# New Classical

$$Y = \bar{Y} + f(P - P^e)$$

(+ above the $P - P^e$ term)

1) $P^e = g(P_{-1}, P_{-2}, P_{-3})$

2) $P^e$ rational

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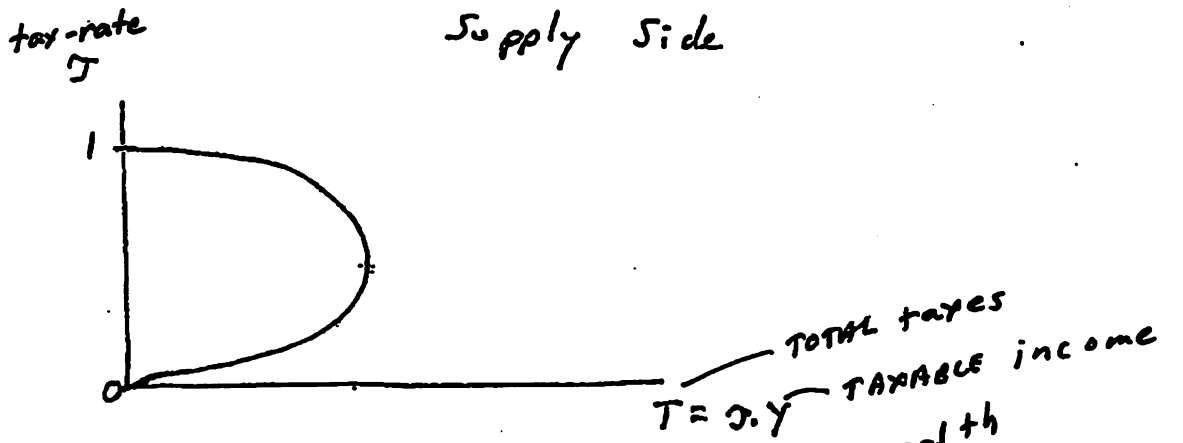
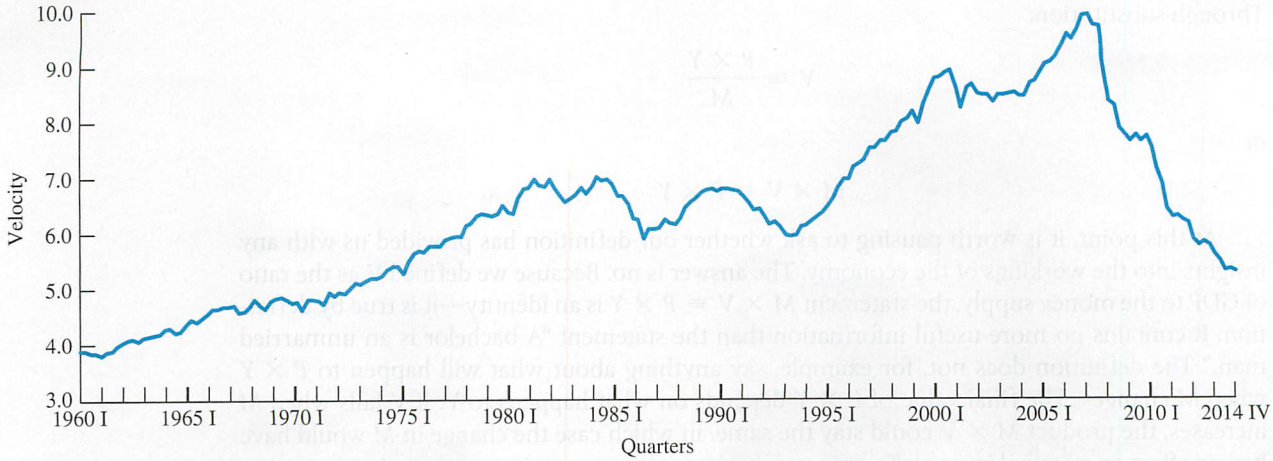
# Supply Side




In general:

$$L^S = f\left((1-\tau)\frac{W}{P}, YN, A_{-1}, r\right)$$

- $L^S$: labor supply
- $(1-\tau)\frac{W}{P}$: after-tax real wage
- $YN$: non labor income
- $A_{-1}$: wealth
- $r$: interest rate




▲ FIGURE 17.1 **The Velocity of Money, 1960 I–2014 IV** MyEconLab Real-time data

Velocity has not been constant over the period from 1960 to 2014. This was a long-term positive trend, which has now reversed.

show that velocity is far from constant. There was a positive trend until 2007, but also large fluctuations around this trend. For example, velocity rose from 6.4 in 1980 III to 7.0 in 1981 III, fell to 6.6 in 1983 I, rose to 7.0 in 1984 III, and fell to 5.9 in 1986 IV. Changes of a few tenths of a point may seem small, but they are actually large. For example, the money supply in 1986 IV was about $800 billion. If velocity changes by 0.3 with a money supply of this amount and if the money supply is unchanged, we have a change in nominal GDP ($P \times Y$) of $240 billion (0.3 × $800 billion), which is about 5 percent of the level of GDP in 1986. The change in velocity in since 2008 has been remarkable. Velocity fell from 9.8 in 2008 I to 5.3 in 2014 IV!

The debate over monetarist theories is more subtle than our discussion so far indicates. First, there are many definitions of the money supply. M1 is the money supply variable used for the graph in Figure 17.1, but there may be some other measure of the money supply that would lead to a smoother plot. For example, many people shifted their funds from checking account deposits to money market accounts when the latter became available in the late 1970s. Because GDP did not change as a result of this shift while M1 decreased, velocity—the ratio of GDP to M1—must have gone up. Suppose instead we measured the supply of money by M2 (which includes both checking accounts and money market accounts). In this case, the decrease in checking deposits would be exactly offset by the rise in money market account deposits and M2 would not change. With no change in GDP and no change in M2, the velocity of money would not change. Whether or not velocity is constant may depend partly on how we measure the money supply.

Second, there may be a time lag between a change in the money supply and its effects on nominal GDP. Suppose we experience a 10 percent increase in the money supply today, but it takes 1 year for nominal GDP to increase by 10 percent. If we measured the ratio of today's money supply to today's GDP, it would seem that velocity had fallen by 10 percent. However, if we measured today's money supply against GDP 1 year from now, when the increase in the supply of money had its full effect on income, velocity would have been constant.

The debate over the quantity theory of money is primarily empirical. It is a debate that can be resolved by looking at facts about the real world and seeing whether they are in accord with the predictions of theory. Is there a measure of the money supply and a choice of the time lag between a change in the money supply and its effects on nominal GDP such that V is in effect constant? If so, the monetarist theory is a useful approach to understanding how the macroeconomy works and how changes in the money supply will cause a proportionate increase in nominal GDP. If not, some other theory is likely to be more appropriate. (We discuss the testing of alternative theories at the end of this chapter.)

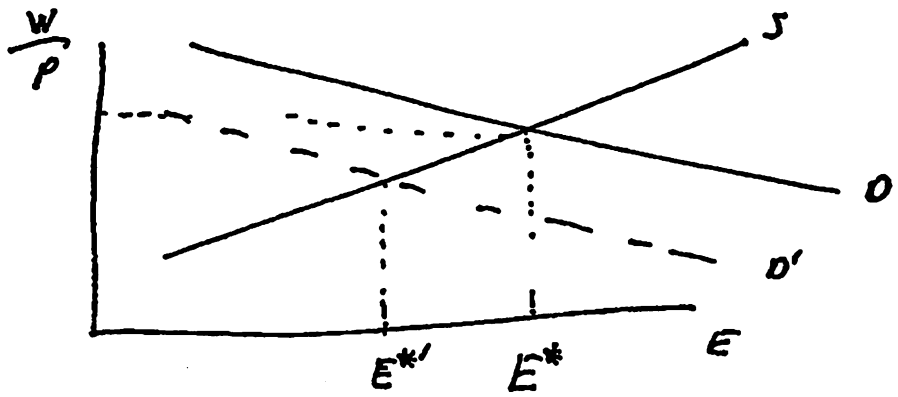
# Real Business Cycles

1) Markets clear
2) People optimize
3) Rational Expectations

How can cycles be generated?
Say bad shock to technology

E = employed

$$MP_E \downarrow \rightarrow \frac{W}{P} \downarrow \rightarrow E^S \downarrow$$




New Keynesian economics adds price stickiness

Measured U:

$U = L - E$, so U↑ when E↓ if L not changed

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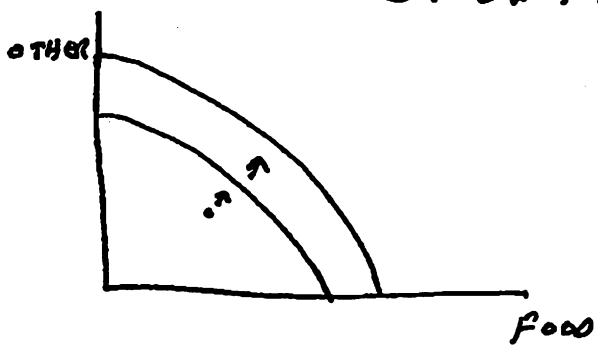
Testing

## Growth Theory

- Aggregate production function
- Physical capital
- Human capital
- Depreciation—what form? One-Hoss Shay
- Technical progress—embodied and disembodied

# Growth




$Y = A \cdot f(\overset{+}{h}, \overset{+}{L})$

$h \equiv h_{-1} - DEP + I$

? $DEP = \delta h_{-1}$

$\left[ h = I + I_{-1} + I_{-2} + \cdots + I_{-m} \right]$

↑ one horse shay

$L + HL \equiv POP$

Human Capital

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$$\Delta \log Y_t \equiv \log Y_t - \log Y_{t-1} \equiv \dot{Y}_t$$

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$$Y = A \cdot h^{\alpha} (L \cdot H)^{1-\alpha}$$

$$\log Y = \log A + \alpha \log h + (1-\alpha) \log L + (1-\alpha) \log H$$

$$\Delta \log Y = \Delta \log A + \alpha \Delta \log h + (1-\alpha) \Delta \log L + (1-\alpha) \Delta \log H$$

$$\dot{Y} = \dot{A} + \alpha \dot{h} + (1-\alpha) \dot{L} + (1-\alpha) \dot{H}$$

$.03 = .015 \quad .25(.015) \quad .75(.015) \quad .75(0)$

$\dot{POP} \simeq .01$