



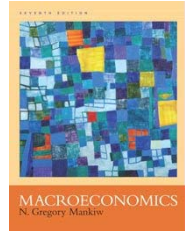
Business Conditions Analysis

ECON 736

Professor Yamin Ahmad

Lecture 2:

- Business Cycle Facts



In This Lecture...

- Part 1. Understanding Functions and Behavioral Equations
- Part 2. Business Cycle Facts
 - Co-movements of variables with output gap
 - Cyclical behavior
 - Procyclical
 - Countercyclical
 - Acyclical

Note: These lecture notes are incomplete without having attended lectures

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Regression Analysis: Analyzing Theory

- **Economic Theory** specifies a set of relationships between variables.
 - E.g. Demand equations, production functions, consumption function, etc.
- **Econometrics**: Empirically investigate economic theory using data to provide estimates of key (unknown) parameters in economic models
 - E.g. estimates of elasticities, marginal propensity to consume, etc.

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An Example: Consumption Function

- Consider a household's consumption function.
- Theory: Posit what kind of factors might influence household spending behavior?
 - Choose factors that you think might impact consumption when they change
- Possible Factors:-
 - Disposable Income
 - Real Interest rate
 - Expected future income
 - Stock Market
 - Weather
 - ...etc...

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An Example: Consumption Function

- How might we examine the effects of these different factors on consumption?
 - Step 2: Set consumption as a function of these variables, i.e. **regress** consumption on a set of explanatory variables
- Thus the consumption function might look like:

$$C = c_0 + c_1 Y_D + c_2 r + c_3 Y_f^e + c_4 Stock + c_5 Weather + \varepsilon_t$$

Dependent Variable

Parameters to be Estimated

Independent Variables

Shocks

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Analysis in this Class

$$C = c_0 + c_1 Y_D + c_2 r + c_3 Y_f^e + c_4 Stock + c_5 Weather + \varepsilon_t$$

In this class

- Given the consumption function above, we would wish to then examine the impact that the independent variables have on the dependent variable.
- E.g. what is the impact of a change in interest rates on consumption?

• Answer: $\Delta C = c_2 \Delta r$

$$\Rightarrow \frac{\Delta C}{\Delta r} = c_2$$

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The Business Cycle

What is a **Business Cycle**?

- The business cycle is the periodic but irregular up-and-down movement in production and jobs.

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The Business Cycle

- The NBER defines the phases and turning points of the business cycle as follows:
 - A **recession** is a significant decline in activity spread across the economy, lasting more than a few months, visible in industrial production, employment, real income, and wholesale-retail trade.
 - A recession begins just after the economy reaches a **peak** of activity and ends as the economy reaches its **trough**. Between trough and peak, the economy is in an **expansion**.

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Economic Growth and Fluctuations

Every business cycle has **two phases**:

1. A recession
2. An expansion

and **two turning points**:

1. A peak
2. A trough

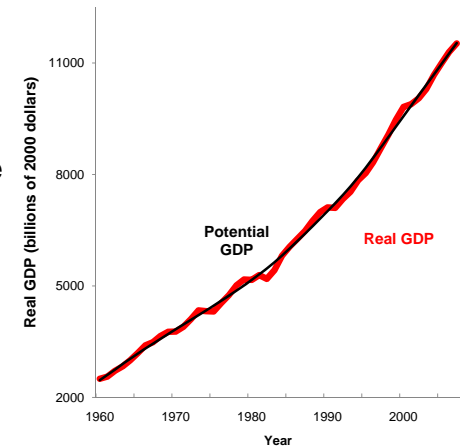
- A **recession** is a period during which real GDP decreases for at least two successive quarters.
- An **expansion** is a period during which real GDP increases.

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Economic Growth and Fluctuations

- Economic Growth in the United States
 - Figure 1 on the right shows real GDP in the United States from 1962 to 2007.



Source: Bureau of Economic Analysis

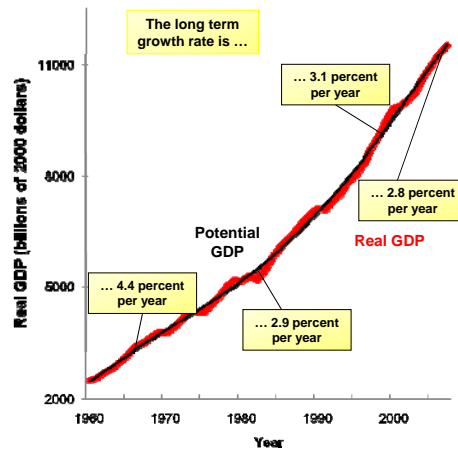
- The figure highlights:
 - Fluctuations of real GDP
 - Smoother growth of potential GDP

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Economic Growth and Fluctuations

- **Potential GDP** is the value of real GDP when all the economy's labour, capital, land, and entrepreneurial ability are fully employed.
- During the 1970s and early 1980s, real GDP growth slowed—a **productivity growth slowdown**.



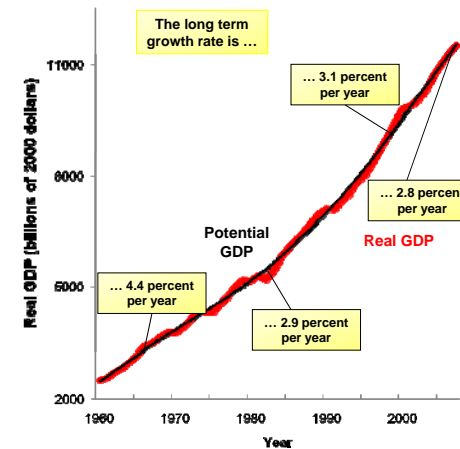
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Economic Growth and Fluctuations

- Real GDP fluctuates around potential GDP in a **business cycle**
 - a periodic but irregular up-and-down movement in production.

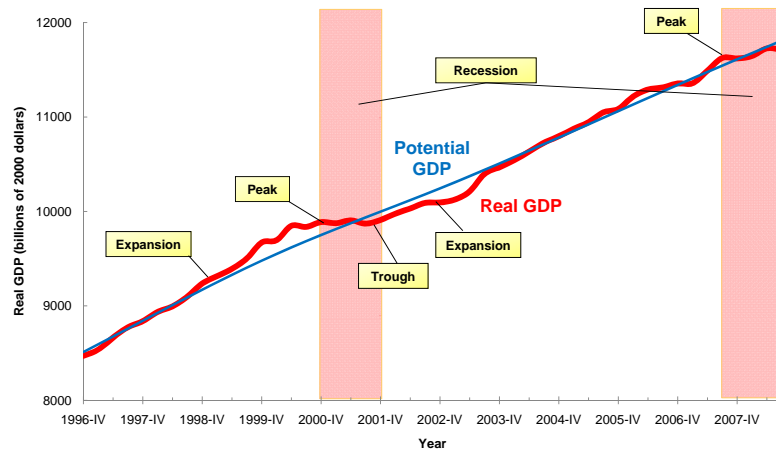


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Economic Growth and Fluctuations

- This figure shows the most recent U.S. cycles.



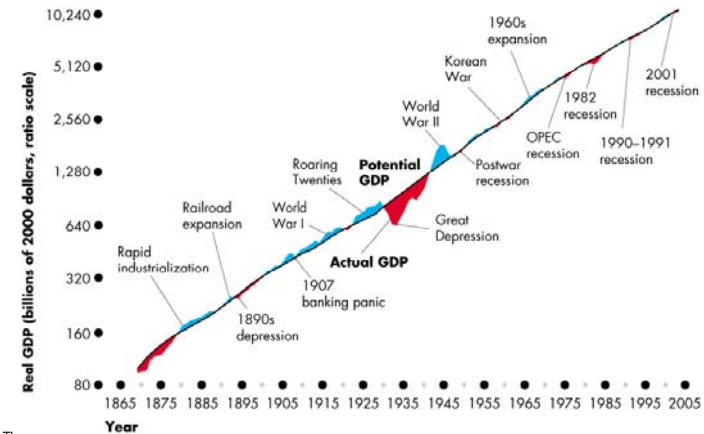
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Economic Growth and Fluctuations

- This figure shows the long-term growth trend and cycles



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Production (Real GDP) as a Benchmark

- In Macroeconomics, we compare what happens to different variables in terms of how it relates to production in the economy (i.e. how does inflation, or unemployment relate to real GDP?)
- Definition:
 - > **Pro-cyclical**: the variable moves with the business cycle (i.e. it *increases* when production *increases* and vice versa)
 - > **Counter-cyclical**: the variable moves in the opposite direction of the business cycle (i.e. it *increases* when production *decreases* and vice versa)
 - > **Acyclical**: does not move with the business cycle

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Thinking About Cyclical...

- As a general rule of thumb:
 - > A variable, X, is **pro-cyclical** if $\text{Correlation}(X, \text{output gap})$ or $\text{Correlation}(X, \text{economic growth rate}) > 0.4$
 - > A variable, X, is **counter-cyclical** if $\text{Correlation}(X, \text{output gap})$ or $\text{Correlation}(X, \text{economic growth rate}) < -0.4$
 - > A variable, X, is **acyclical** if $-0.4 < \text{Correlation}(X, \text{output gap}) < 0.4$
- In general the closer the correlation is to +1 (-1) (i.e. the further away it is from zero), the greater the degree of pro-cyclical (counter-cyclical).

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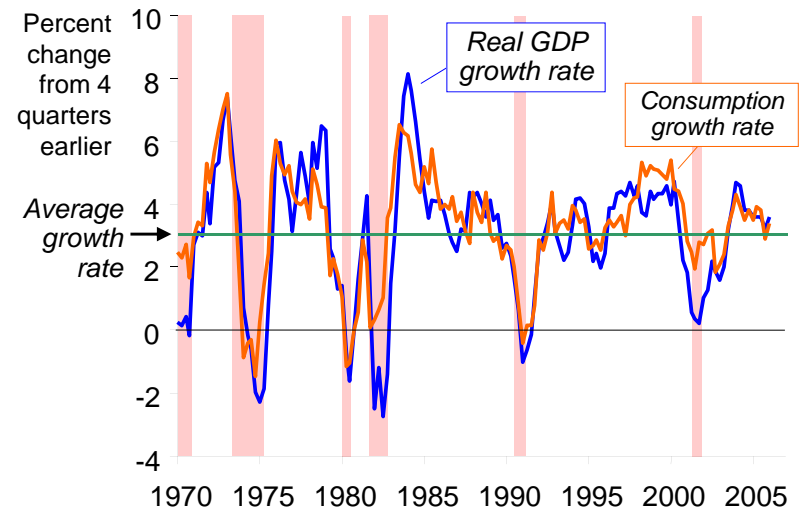
Some Facts about the Business Cycle

- GDP growth averages 3–3.5 percent per year over the long run with large fluctuations in the short run.
- Consumption and investment fluctuate with GDP, but consumption tends to be less volatile and investment more volatile than GDP.
 - Correlation of consumption and the output gap: 0.998
 - Correlation of investment and the output gap: 0.989
- Unemployment rises during recessions and falls during expansions.
 - Correlation of unemployment and GDP is approx -0.67
- **Okun's Law:** the negative relationship between GDP and unemployment.

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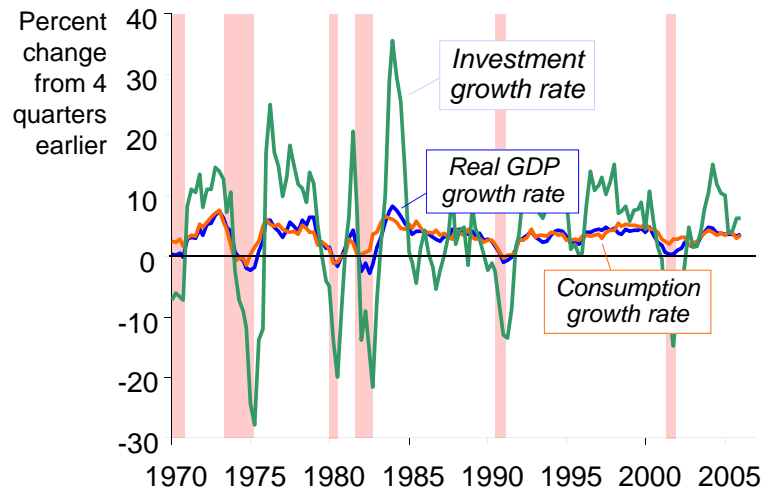
Growth rates of Real GDP, Consumption



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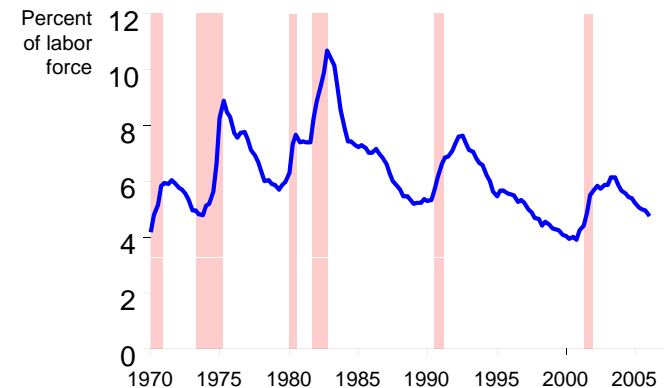
Growth rates of Real GDP, Consumption, Investment



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Unemployment

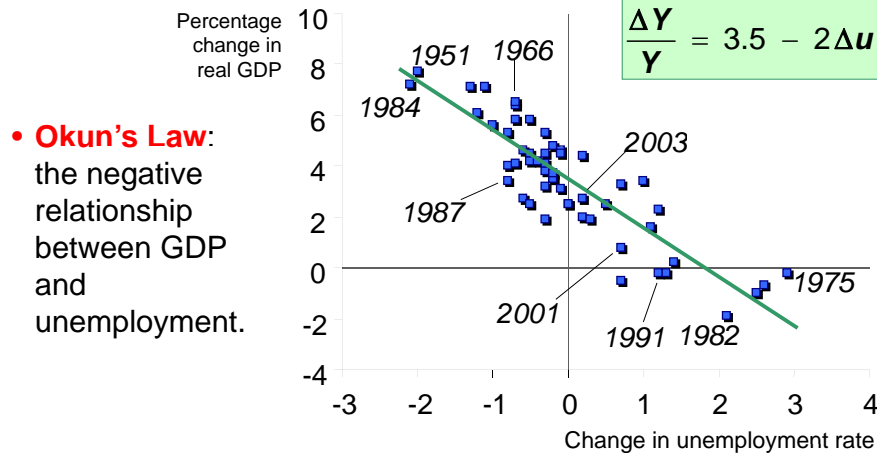


- Unemployment rises in recessions and falls in expansions
- Unemployment rate is a lagging indicator

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Okun's Law

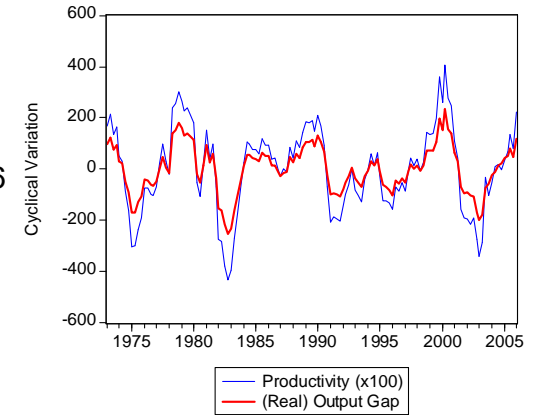


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Output Gap and Productivity

- The correlation between productivity and real GDP is approximately 0.9996
- This indicates that productivity is highly procyclical



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Business Cycle Facts (Quantities)

1. Output movements persist (but not periodic)
2. Industries move together
3. Consumption, Investment and Imports are procyclical
 - they move with the business cycle and this is highlighted by positive correlations
4. Unemployment is countercyclical, but productivity is procyclical

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Business Cycle Facts (Prices)

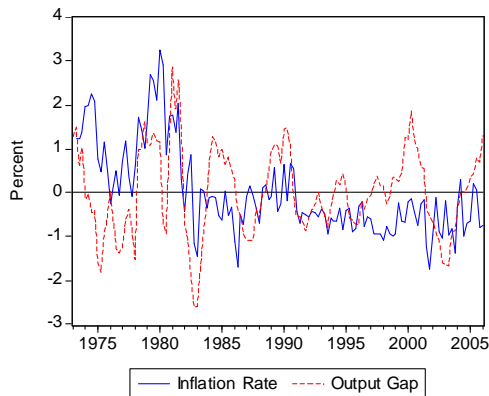
5. Prices/Inflation is procyclical.
6. Real wages are acyclical or mildly procyclical.
7. Short term interest rates are procyclical.
8. Money and velocity are procyclical.

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Output Gap and Inflation

- The correlation between the CPI and GDP is 0.979.
- The correlation between inflation and GDP is approximately 0.301.
- This indicates that prices are highly procyclical, whilst inflation is mildly procyclical

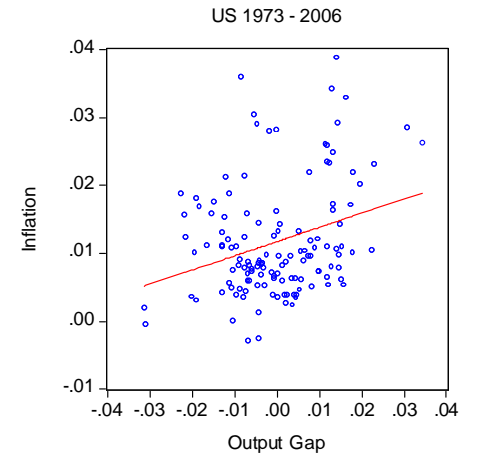


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Inflation v. Output Gap

- This scatter plot highlights the positive relationship observed between inflation and the output gap.
- The bigger output is (above potential), the greater the amount of inflation!

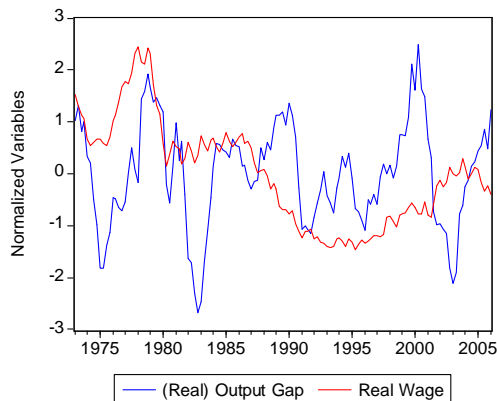


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Output Gap and Real Wage

- The correlation between real wages and real GDP is approximately 0.124
- This indicates that real wages are acyclical (– i.e. that they are independent of the business cycle) or at best, very mildly procyclical.

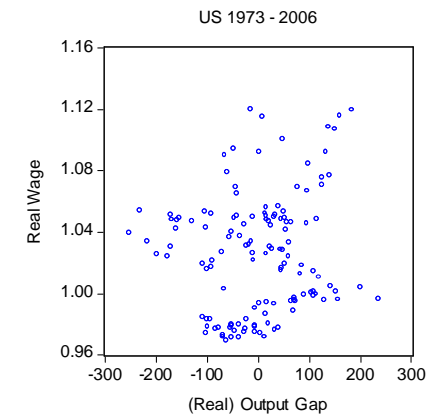


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Real Wage v. Output Gap

- This scatter plot highlights the lack of a relationship between real wages and the output gap.
- It is not possible to figure out which direction the line of best fit should go!

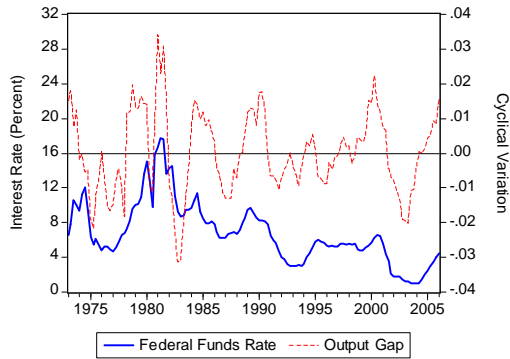


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Output Gap and Short Interest Rate

- The correlation between short term interest rates and GDP is approximately 0.401
- This indicates that nominal interest rates are procyclical

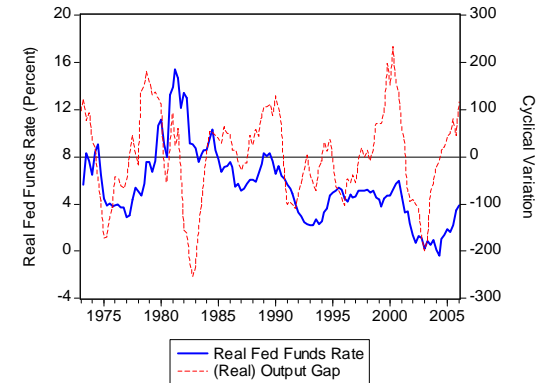


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Output Gap and Real Short Interest Rate

- The correlation between short term interest rates and Real GDP is approximately 0.384
- This indicates that real interest rates are (mildly) procyclical

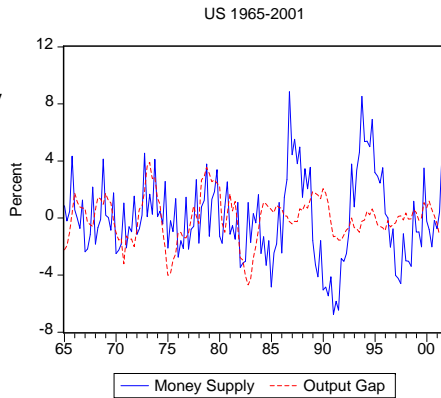


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Output Gap and Money Supply

- The correlation between money supply and GDP is approximately 0.967
- This indicates that the money supply is highly procyclical

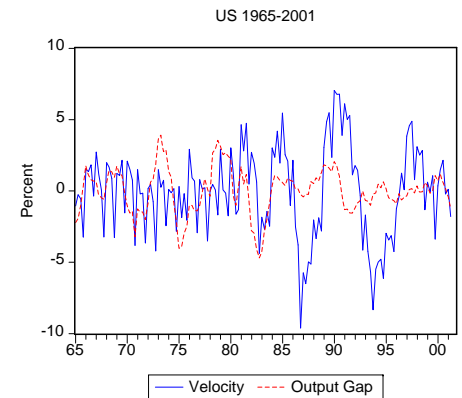


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Output Gap and Velocity

- The correlation between velocity and GDP is approximately 0.826
- This indicates that velocity is highly procyclical



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