Regularities in GDP Fluctuations

Business Cycles are fluctuations about trend in real GDP.

[Diagram showing peak, trough, and amplitude of business cycles with trend line and time axis.]
Regularity in GDP Fluctuations

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- Persistent positive deviations from trend are booms and persistent negative deviations from trend are recessions.

- The amplitude of the business cycle is the maximum deviation from trend.

- The frequency of the business cycle is the number of peaks in RGDP that occur per year.
Irregularities in GDP Fluctuations

- The fluctuations in GDP about trend are quite choppy.
- There is no regularity in the amplitude of fluctuations in real GDP about trend.
- There is no regularity in the frequency of fluctuations in real GDP about trend.

Source: U.S. Department of Commerce.
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So, is there any hope of anticipating business cycles?

- While short-term forecasting is relatively easy (sometimes)
- long-term forecasting is nearly impossible.
- This is why we say that business cycles are unpredictable.

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Other Macro Indicators

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- To identify comovements we often rely on observation of the variables graphs.

Generally, graphs of macroeconomic variables come in two different flavors:

  - Scatter plots
  - Time-series plots
Time-series Plots

Example: variables X and Y
Time-series Plots

- Example: variables X and Y
- Variable values are on the Y-axis. Time is on the X-axis.
**Scatter Plots**

- Example: variables X and Y
Scatter Plots

- Example: variables X and Y
- One variable is on the X-axis, and the other on the Y-axis.
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Correlation With Real GDP

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- An economic variable is procyclical if its deviations from trend are positively correlated with deviations from trend in RGDP.

- An economic variable is countercyclical if its deviations from trend are negatively correlated with deviations from trend in RGDP.

- Variables which are neither procyclical nor countercyclical are called acyclical.
If a macro variable helps in predicting the future path of RGDP, we say call it a leading variable.
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If RGDP helps in predicting the future path of the variable, it is a lagging variable.
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Variables which neither lead nor lag RGDP are called coincident variables.
Another Measure

Volatility: a measure of cyclical variability is the standard deviation of the percentage deviations from trend.
Example: Imports and RGDP (scatter plot)

Example: Imports and RGDP (time-series plot)

Example: Imports and RGDP (Time-series Plot)

- Imports are procyclical and more volatile than RGDP.
MODEL AND BEHAVIOR OF KEY MACROECONOMIC VARIABLES

If we are to construct a macroeconomic model which helps us understand business cycles and the economy, it’d better be the case that it is able to replicate the regularities and comovements that we observe in RGDP and its components!
Model and Behavior of Key Macroeconomic Variables

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- Components of GDP: consumption and investment.

- Nominal variables: price level and money supply.

- Labor market variables: employment, real wage, average labor productivity.
Consumption and GDP

- Procyclical or countercyclical?
- Lead or lag?
- More volatile than GDP?

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Consumption and GDP

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- More volatile than GDP?
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Investment and GDP

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*Source: U.S. Department of Commerce, Bureau of Economic Analysis.*
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- More volatile than GDP?
  - No

Money Supply and GDP

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Employment and GDP

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Employment and GDP

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Employment and GDP

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  - Procyclical

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- More volatile than GDP?
  - No

Average Labor Productivity and GDP

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- Lead or lag?
- Coincident
- More volatile than GDP?
- No

Our models should be able to replicate the following table.

<table>
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<tr>
<th></th>
<th>Cyclicality</th>
<th>Lead/Lag</th>
<th>Variability Relative to GDP</th>
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<tr>
<td>Consumption</td>
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<td>Coincident</td>
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<tr>
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<td>Coincident</td>
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<tr>
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<tr>
<td>Real Wage</td>
<td>Procyclical</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Average Labor Productivity</td>
<td>Procyclical</td>
<td>Coincident</td>
<td>Smaller</td>
</tr>
</tbody>
</table>