A quick review of business cycle facts

Chapter 3
Natural logarithm of per capita real GNP: Trend and actual
In general, we can talk about peaks and troughs:

- A **peak** is a relatively large positive deviation from trend.
- A **trough** is a relatively large negative deviation from trend.

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.
Is this somehow connected to recessions?

A series of positive deviations from trend in RGDP culminating in a peak represent a **boom**.

A series of negative deviations from trend in RGDP culminating in a trough represent a **recession**.
Business cycles are persistent!

When RGDP is above trend, it tends to stay above trend.

When RGDP is below trend, it tends to stay below trend.
But other than what’s previously been said, we cannot say more!

The time series of deviations from trend in RGDP is choppy.

There is no regularity in the frequency.

There is no regularity in the amplitude.
So, is there any hope of anticipating business cycles?

While short-term forecasting is relatively easy (with luck!) …

… long-term forecasting is nearly impossible!

This is why we say that business cycles are unpredictable!
Macroeconomic variables often fluctuate together in patterns that exhibit strong regularities. These patterns are known as **comovements**.

To identify comovements we often rely in observation of the variables’ graphs. Generally, graphs of macroeconomic variables come in two different flavors:

1. Time series graphs.
2. Scatter plot graphs.
An example of a time-series graph is the following, comparing GNP and GDP!

The variables move across time.

The Y-axis has the values for the variable(s)!

You always see how time is evolving in the X-axis!
A scatter plot graph is relatively easy to spot:

Government expenditures and net exports as a percent of Real GDP, 1947-2003

One variable is here …

… and the other variable is here!
Note that this is *not* a scatter plot graph!

GDP in real terms, 1947-2002

We have time (years) here!
When looking at graphs, we want to distinguish between series that exhibit positive or negative correlation! In a time series graph.

(a) Positive Correlation Between $x$ and $y$

(b) Negative Correlation Between $x$ and $y$
For a scatter plot graph, it's even easier!
We are mostly interested in how individual economic variables comove with GDP.

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

2. Negatively correlated deviations generate a **countercyclical** variable.

3. Variables which are neither procyclical nor countercyclical are called **acyclical**.
More definitions:

1. If a macro variable helps in predicting the future path of RGDP, we say that it is a **leading variable**.

2. If RGDP helps in predicting the future path of the variable, it is a **lagging variable**.

3. Variables which neither lead nor lag RGDP are called **coincident variables**.

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![Graph (a)](image-a.png)  
**x** is a leading variable  
![Graph (b)](image-b.png)  
**y** is a lagging variable
Finally, we are interested in the **volatility** of the macroeconomic variables.

A measure of cyclical variability is the **standard deviation** of the percentage deviations from trend.
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!

Else, it just doesn’t work.
Hence, let’s take a look at Consumption and GDP:

Cyclicality?
Procyclical

Lead / lag?
Coincident

Volatility to GDP?
Smaller
Investment and GDP:

Cyclicality?
Procyclical

Lead / lag?
Coincident

Volatility to GDP?
Larger
Prices (the implicit GDP price deflator) and GDP:

- Cyclicality?
- Countercyclical
- Lead / lag?
- Coincident
- Volatility to GDP?
- Smaller
Money supply and GDP:

Cyclicality?
Procyclical

Lead / lag?
Leading

Volatility to GDP?
Smaller
Employment and GDP:

Cyclicality?
Procyclical
Lead / lag?
Lagging
Volatility to GDP?
Smaller
Average labor productivity and GDP:

- **Cyclicality?**
  - Procyclical

- **Lead / lag?**
  - Coincident

- **Volatility to GDP?**
  - Smaller
Summing up! *This is what our model should replicate!*

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