

ETC5512: Wild Caught Data

Week 3

Macroeconomic data

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Macroeconomic data

- Macroeconomic data dominates the news
- Everyone affected by interest, exchange, and inflation rates
- Data helps voters and governments understand challenges

Macroeconomic data

- 📊 Survey of Professional Forecasters
 - 🌐 <https://www.philadelphiahfed.org/research-and-data/real-time-center/survey-of-professional-forecasters>
- 📊 Real-time Data Set for Macroeconomist
 - 🌐 <https://www.philadelphiahfed.org/research-and-data/real-time-center/real-time-data>
- 📊 Federal Reserve Economic Data database
 - 🌐 <https://research.stlouisfed.org/econ/mccracken/fred-databases/>

Macroeconomic data

 Gross Domestic Product

 Consumer Price Index

 Unemployment rate

Macroeconomic data

Macroeconomics is the study of aggregate behavior

- 📊 How do we measure "the economy as a whole?"
- 📊 Aggregate micro data into macro data
- 📊 From price of a coffee to price in the whole economy

Macroeconomic data

Aggregation

Pros

- ➊ easier to look at one number than millions
- ➋ comparability across nations/times

Cons

- ➌ throwing away information
- ➍ easy to miss important details

Macroeconomic data

Aggregation

 Output measures

 GDP

 Price measures

 CPI

 Input measures

 Unemployment

Output measures

Two major measures of total output in the economy

 Gross Domestic Product (GDP)

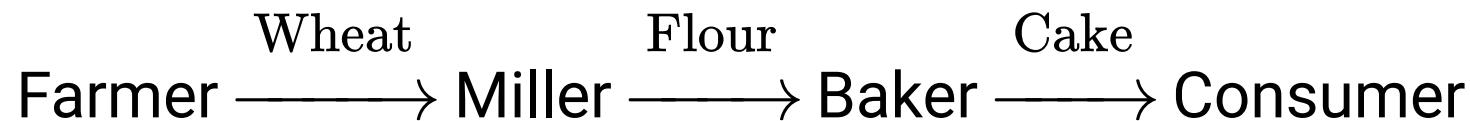
 Total value of goods and services produced
in the country in a certain period of time

 Gross National Product (GNP)

 Total value of goods and services produced
by nationals of the country in a certain period of time

Output measures

Suppose we had the following production process:



We only count the dollar value of the end use (cake) in GDP.

Output measures

We can construct nominal GDP as

$$GDP_t = \sum_i p_{it} \times q_{it}$$

where

p_{it} = price of good i in period t

q_{it} = quantity of good i in period t

Output measures

GDP higher so people are better off on average?

Only prices increased.

Look at real activity, not just at price adjustments.

Output measures

Real GDP fixes prices at a base year:

$$GDP_t = \sum_i p_{ib} \times q_{it}$$

where

p_{ib} = price of good i in a fixed base year b

Output measures

 Nominal GDP

• <https://fred.stlouisfed.org/graph/?g=qgx3>

 Real GDP

• <https://fred.stlouisfed.org/graph/?g=qgx4>

Output measures

Components of GDP

$$\begin{aligned} \text{GDP} = & \text{ Consumption} + \text{Investment} \\ & + \text{Gov Spending} + \text{Net Exports} \end{aligned}$$

Output measures

 Consumption

• <https://fred.stlouisfed.org/graph/?g=qgx7>

 Investment

• <https://fred.stlouisfed.org/graph/?g=qgx9>

 Government spending

• <https://fred.stlouisfed.org/graph/?g=qgxa>

 Net exports

• <https://fred.stlouisfed.org/graph/?g=qgxb>

Output measures

Problems real GDP:

Compare output 1960 to output 2020 with 1960 as base year

- ❑ Goods that exist in 2020 may not have existed in 1960.
- ❑ Ignores quality changes over time, may show up in prices.
- ❑ People substitute away from relatively high priced goods.

Price measures

- Macroeconomics cares about consumption, not prices
- Level of the price does not matter
- However, we do care about inflation

Price measures

Inflation: increase in the level of prices

Important because:

 Bond holders get paid fixed coupons

 Workers have annual salaries

 Hyperinflation affects incentives

Price measures

 Nominal wages

• <https://fred.stlouisfed.org/graph/?g=qgxf>

 Real wages

• <https://fred.stlouisfed.org/graph/?g=qgxg>

Price measures

Most commonly used price index is the Consumer Price Index

- Weighted average prices that household faces, weighted by the consumption share of each item
- Build ``basket of goods" that households consume (e.g. healthcare, food, gas, video games, etc.) and track price of that basket over time

Price measures

Limitations

 Substitution

 Rich and poor people face different inflation rates

 Generally misses sectoral differences:
healthcare prices skyrocketing,
while food & gas volatile up and down

Input measures

- Labor important input production
- Labor income largest part of median person's income

Input measures

How do we measure labor?

 Input to production?

Hours and human capital matter

 Worker well-being?

Hours and wage matter

Aggregate measures can miss important distributional considerations!

Input measures

 Employment to population ratio

 Unemployment rate:
people unemployed over people in labor force

- To be unemployed, you must not be working currently, and have searched for a job at least once in the last 2 weeks
- To be in the labor force, you must be employed or unemployed according to previous definition

Input measures

 Unemployment rate

• <https://fred.stlouisfed.org/graph/?g=qgxl>

 Employment to population ratio

• <https://fred.stlouisfed.org/graph/?g=qgxm>

• <https://fred.stlouisfed.org/graph/?g=qgxn>

Macroeconomic variables

Stock variables

-  A stock is a quantity measured at a point in time (investment)

Flow variables

-  A flow is a quantity measured per unit of time (capital)

Macroeconomic variables

Economic index

- Price or quantity compared with a base value
- Time series summarising movements in a group of variables
- Base equals 100, index number is 100 times ratio to base

Macroeconomic variables

Economic indices

 S&P 500

 Consumer price index

 Big Mac Index

Economic indices

 S&P 500

• <https://fred.stlouisfed.org/graph/?g=qgxA>

 Consumer price index

• <https://fred.stlouisfed.org/graph/?g=IGqc>

 Big Mac Index

• <https://www.economist.com/news/2020/01/15/the-big-mac-index>

Variable transformations

 Change

$$\text{• } x(t) - x(t-1)$$

 Change from Year Ago

$$\text{• } x(t) - x(t-n_{\text{obs_per_yr}})$$

 Percent Change

$$\text{• } ((x(t)/x(t-1)) - 1) \times 100$$

 Percent Change from Year Ago

$$\text{• } ((x(t)/x(t-n_{\text{obs_per_yr}})) - 1) \times 100$$

Variable transformations

📊 Compounded Annual Rate of Change

$$⌚ (((x(t)/x(t-1)) \times (n_{obs_per_yr})) - 1) \times 100$$

📊 Continuously Compounded Rate of Change

$$⌚ (\ln(x(t)) - \ln(x(t-1))) \times 100$$

📊 Continuously Compounded Annual Rate of Change

$$⌚ ((\ln(x(t)) - \ln(x(t-1))) \times 100) \times n_{obs_per_yr}$$

📊 Natural Log

$$⌚ \ln(x(t))$$

Variable transformations

 Set units

• [https://alfred.stlouisfed.org/series/downloaddata?
seid=INDPRO](https://alfred.stlouisfed.org/series/downloaddata?seid=INDPRO)

Seasonal adjustments

- 📊 Seasonal fluctuations may not reflect economic conditions
 - Always a spike in consumption spending around Christmas
 - Spikes in tourism around summer time

- 📊 Statistical bodies adjust for seasonality for you

Seasonal adjustments

 Not Seasonally Adjusted

• <https://fred.stlouisfed.org/graph/?g=qgxN>

 Seasonally Adjusted

• <https://fred.stlouisfed.org/graph/?g=mgw0>

Database

An economic database consists of
economic data time series from scores of
national, international, public, and private sources.

FRED, Federal Reserve Economic Data, is a U.S. database

Revisions

 Economic data for past observation periods are revised as more accurate estimates become available.

 Revision:

 a change in value for any reference point of the time series for a statistic when released to the public by an official national or supranational statistical agency.

Revisions

Government statistical agencies

 Release early estimates

 Over time better:

-  Samples
-  Weights
-  Methodology

 Release improved data

Revisions

- 📊 1st month: incomplete sample
- 📊 Next months: revisions based on more complete samples
- 📊 After year: annual business reports and seasonal factors
- 📊 5-10 years: methodological and base year revisions

Revisions

📊 1st month: incomplete sample

📍 <https://alfred.stlouisfed.org/graph/?g=qgyq>

📊 Next months: revisions based on more complete samples

📍 <https://alfred.stlouisfed.org/graph/?g=qgyn>

📊 After year: annual business reports and seasonal factors

📍 <https://alfred.stlouisfed.org/graph/?g=qgyn>

📊 5-10 years: methodological and base year revisions

📍 <https://alfred.stlouisfed.org/graph/?g=qgyi>

Vintage

Vintage

- the set of data for a given time series that represented the latest estimate for each reference point in the time series at a particular moment in time.

Vintage

- 📊 Each column shows the data that one would observe if one used a database at the date shown in the column header; we call this the vintage date.
- 📊 Each row represents the dates for which the economic activity is measured.

Real-time Database

A real-time database is a collection of historical vintages of the same time series, indexed by the date on which each vintage became available to the public.

ALFRED, ArchivaL Federal Reserve Economic Data, is a collection of vintage versions of U.S. economic data.

Vintages

 Vintage data

• [https://alfred.stlouisfed.org/series/downloaddata?
seid=GDPC1](https://alfred.stlouisfed.org/series/downloaddata?seid=GDPC1)

Forecasting

- Use current database
- Real-time forecasters do not have same data
- Databases revised over time

Forecasting

Forecasts in real-time vs forecasts using latest available data

- 📊 Changes in the data affect the jumping-off point for forecasts
- 📊 Effects on the estimated coefficients of a model
- 📊 Changes in the model specification
- 📊 Revisions source of forecast uncertainty

Forecasting

Which vintage should be used to evaluate a set of forecasts?

- 📊 Assume that a forecaster forecasts the first release?
- 📊 Or forecaster is after some measure of "truth"?



That's it!



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