The Global Economy

Business Cycle Indicators

NYU STERN

Where we're headed

- Short-term economic performance
- A series of topics
- On today's agenda
  - Indicators
  - Big inflations

The question

- How does the US economy look to you right now?
- How can you tell?

The idea

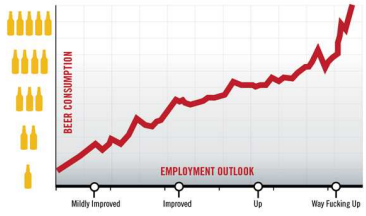
- Lots of indicators of economic activity
- We use their past patterns to assess
  - Current economic conditions
  - Near-term future economic conditions
- If (say) an increase in housing starts has been associated with good economic performance in the past …
- What if this time is different?

Joke of the day

- Why do economists add a digit after the decimal point to their forecasts?
- To show they have a sense of humor

Bonus joke of the day

- "Nation's Unemployment Outlook Improves Drastically After Fifth Beer," The Onion.



Forecasting

- John Maynard Keynes
  - You don't expect dentists to be able to forecast how many teeth you'll have when you're 80. You expect them to give good advice and fix problems.

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Courses related to this topic

- Real-world analysis of economic data (ECON-GB.2347)
  - Professor Peter D'Antonio, Citi, Director and Head of US Economic Forecasting, does this for a living
- Forecasting time series data (STAT-GB.0018)
  - Professor Cliff Hurvich, expert and pianist
  - Or Professor Rohit Deo, also an expert

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What's happening?

- Employment report comes out Friday at 8:30am
  - Consensus: up 240k in October
  - September: up 248k
  - Unemployment rate: consensus 5.9 (same as Sep)
  - More on Bloomberg calendar, FRED
- What do we learn from this?
- How will markets respond?

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Roadmap

- Indicators
- The cross-correlation function
- The business cycle scorecard

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Indicators

Indicators of economic activity

- Hundreds of them, more all the time
- See Bloomberg calendar (ditto WSJ, others)

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Indicators: terminology

- A variable is **procyclical** if it moves up and down with the economy, **countercyclical** if it moves in the opposite direction
- A variable **leads** the economy if its ups and downs come before, **lags** if its movements come after, **coincident** if they happen at the same time
- "The economy" = GDP growth

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Indicators: plan

- Look at monthly data (mostly yoy growth rates)
- Shift from GDP to industrial production
- For each one
  - Is it procyclical? Countercyclical?
  - Does it lead? Lag?
  - What does it suggest about current and future conditions?

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Indicators: FRED

- Plot and download data

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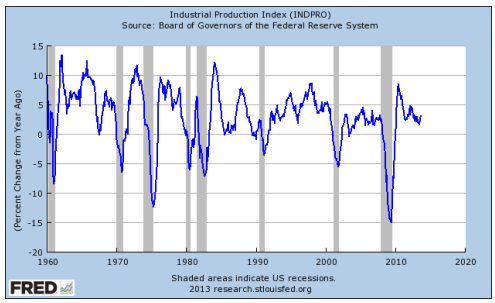
Industrial production (yoy growth)



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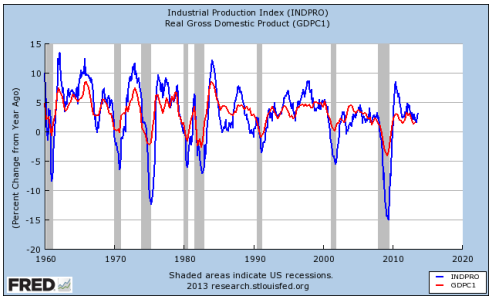
Industrial production and GDP (yoy)



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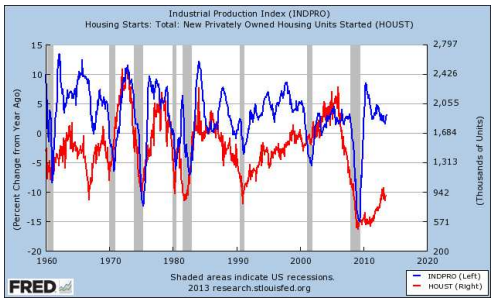
Housing starts (units, thousands)



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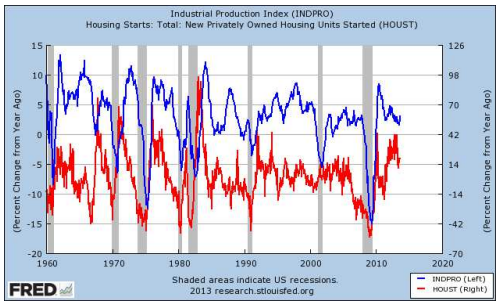
Housing starts (yoy growth)



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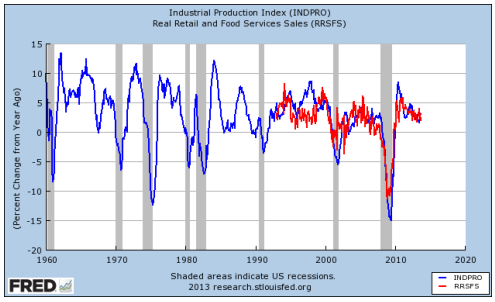
Retail sales (yoy growth)



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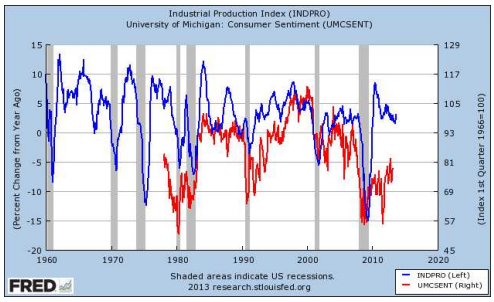
Consumer sentiment (index)



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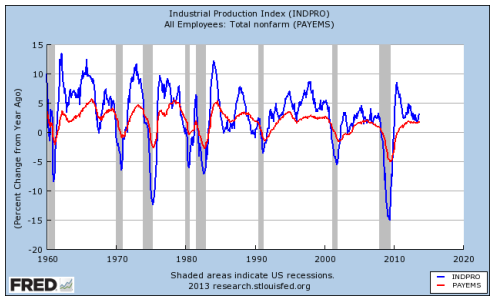
Employment (yoy growth)



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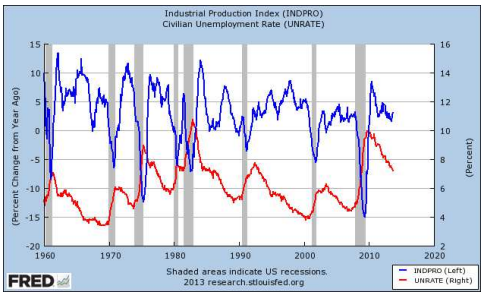
Unemployment rate



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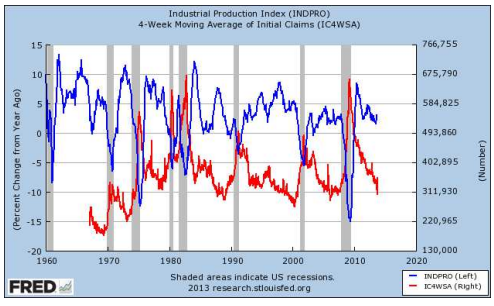
Initial claims for UI



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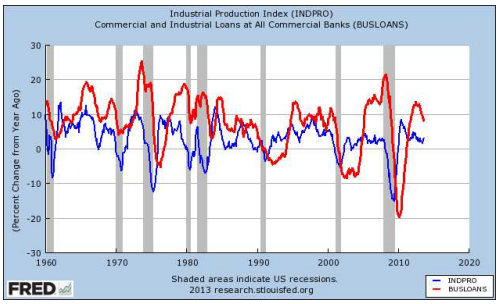
Commercial & industrial loans (yoy growth)



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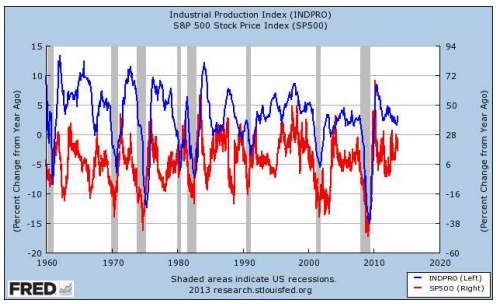
S&P 500 (yoy growth)



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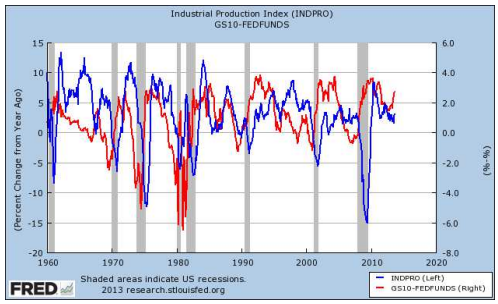
Term spread (10y – fed funds)



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Indicator summary

- Think about which indicators are
  - Procyclical
  - Countercyclical
  - Leading
  - Lagging
  - Coincident
- Which ones do you like best?

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Cross-correlations

Cross-correlation function

- A graphical tool for identifying leads and lags
- Also pro- and countercylicality

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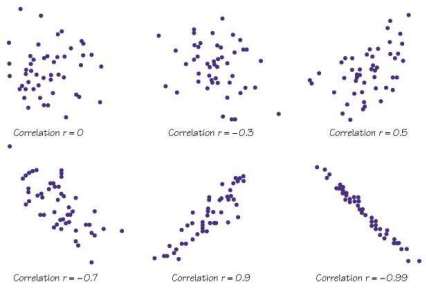
Review: correlations

- Correlations: a measure of (linear) association between two variables
- Conveniently scaled between –1 and +1
- The farther from zero, the stronger the association
- Link to nontechnical guide on Course Outline

Review: correlations



The cross-correlation function

- Look at the correlation between x and y
- Think of y as economic growth, x as the indicator
- **Shift y back and forth in time (to see leads and lags)**
- Formally

$$ccf(k) = corr[x(t),y(t-k)]$$

  - If k<0: x leads y [or y lags x]
  - If k>0: x lags y [or y leads x]

Contemporaneous correlation

Date	x(t)	y(t)
1	2.43	8.47
2	1.19	2.29
3	0.13	7.36
4	0.56	6.39
5	0.38	6.02
6	0.96	0.22
7	1.87	3.60

Reminder:
- ccf(k) = corr[x(t),y(t-k)]

For k = 0:
- ccf(0) = corr[x(t),y(t)]

Use data marked
- Red for x
- Blue for y

Lagging correlation

Date	x(t)	y(t-1)
1	2.43	8.47
2	1.19	2.29
3	0.13	7.36
4	0.56	6.39
5	0.38	6.02
6	0.96	0.22
7	1.87	3.60

Reminder:
- ccf(k) = corr[x(t),y(t-k)]

For k = +1:
- ccf(1) = corr[x(t),y(t-1)]
- Means: x lags y

Use data marked
- Red for x
- Blue for y
- Note lost observation

Leading correlation

Date	x(t)	y(t+1)
1	2.43	8.47
2	1.19	2.29
3	0.13	7.36
4	0.56	6.39
5	0.38	6.02
6	0.96	0.22
7	1.87	3.60

Reminder:
- ccf(k) = corr[x(t),y(t-k)]

For k = -1:
- ccf(1) = corr[x(t),y(t+1)]
- Means: x leads y

Use data marked
- Red for x
- Blue for y
- Note lost observation

Cross correlation graphs

- Pictures: plot ccf(k) against k
  - y = IP growth
  - x = indicator
- Sample period: 1960 to present [why?]
- Most variables are yoy growth rates [why?]
- Does indicator lead or lag IP growth?

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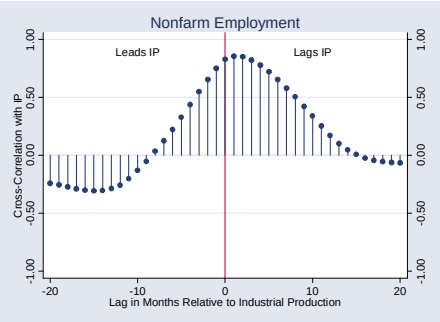
Does employment lead or lag?



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How to tell

- Find the largest correlation
- Procyclical or countercyclical?
  - If positive, procyclical
  - If negative, countercyclical
- Leading or lagging
  - If to the left, leading
  - If to the right, lagging

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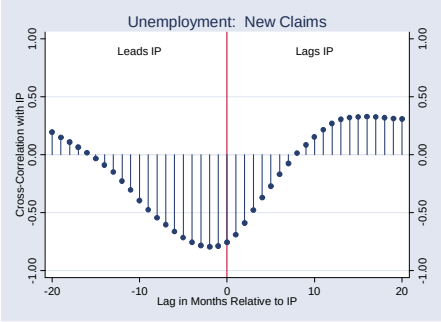
Initial ("new") claims for UI (yoy growth)



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Housing starts (yoy growth)

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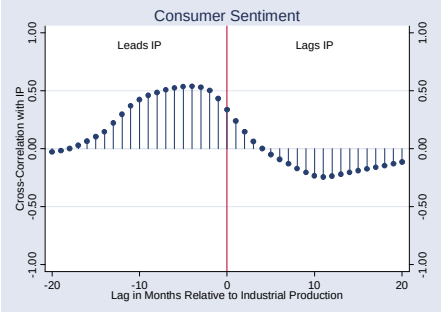
Consumer sentiment (yoy growth)



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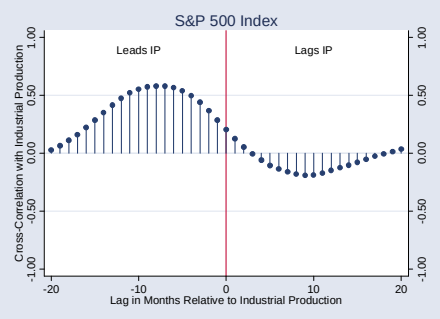
S&P 500 (yoy growth)



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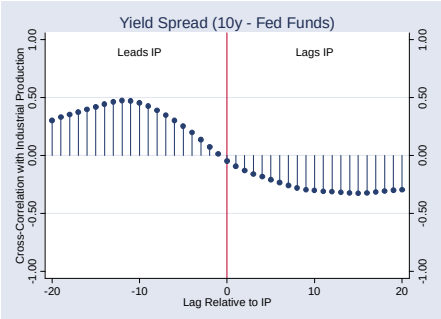
Yield spread



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Good indicators

- Which ones have high correlations?
- Which ones lead?
- Which ones do you like best?
- Warning: even the best indicators forecast the future imperfectly [poorly?]

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Computing cross-correlations

- How do we compute them?
  - Method 1: use Excel to calculate each point [see link]
  - Method 2: use some kind of statistical software [R? Python?]

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Business cycle scorecard

Business cycle scorecard

- We often find indicators pointing in different directions
- Therefore: summarize them somehow
- For each indicator:
  - Graph indicator over time
  - Add lines for mean, +/- one std deviation
  - Rate indicator as strong positive, positive, negative, strong negative
- Scorecard: track total overall tendencies

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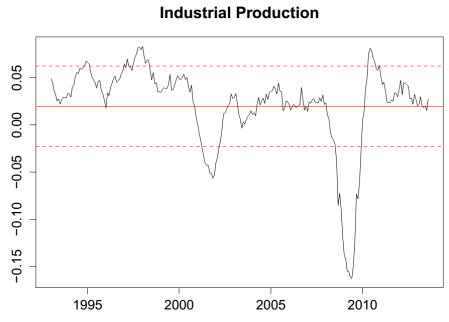
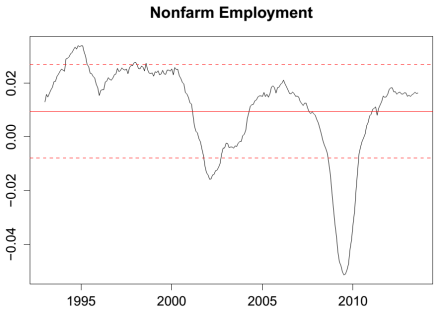
Business cycle scorecard



Business cycle scorecard



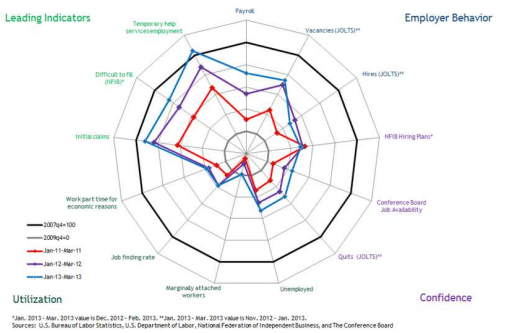
Business cycle scorecard

Indicator	Strong Negative	Negative	Positive	Strong Positive
Ind. Prod.				
Total				

Business cycle scorecard

- Coming up: Problem Set #3 due next week
  - Download indicators from FRED
  - Compute cross-correlation functions
  - Construct business cycle scorecard
  - Start soon!

Scorecard: my goal



Source: Macroblog, April 2013.

What have we learned?

- Lots of things move up and down with the economy
- We can use these patterns to assess current and near-term future conditions
- Useful tools
  - Cross-correlation function
  - Business cycle scorecard
- Where can I learn more?
  - Indicators course: ECON-GB.2347, D'Antonio
  - Forecasting course: STAT-GB.0018, Deo and Hurvich

Midterm

- Answers posted
- Grade distribution
  - Maximum: 103 (out of 110)
  - 80th percentile: 97
  - 65th: 93
  - 50th: 87
  - 25th : 80

The Global Economy

Hyperinflation

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The Global Economy

Inflation and Monetary Policy

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Terminology

- The **price level** is a measure of average prices
  - We label it P
  - Measured in units of currency (how many dollars it takes to buy some collection of goods)
- **Inflation** is the rate of growth of the price level
  - Buying goods takes more currency
  - Or: a unit of currency buys less (same thing, of course)
- We call it **deflation** if growth rate is negative
- **Hyperinflation** is inflation > 100% per year

The idea

- Study inflation by looking at extreme cases
- [Like studying the flu via ebola?]

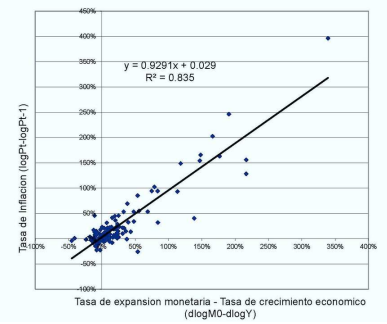
The idea

- Tom Sargent, interview
  - The way to start a hyperinflation is run sustained government deficits and then have the monetary authority print money to pay for it. That always works. How do you stop a hyperinflation? You stop doing it. This isn't high economic theory.
- What is he saying? Does it make sense to you?

The idea

- La Nacion, via Google translate, March 25, 2012
  - [Argentina's] Central Bank president, Mercedes Marco del Pont, said it "is totally false to say that the issue [of money] generates inflation." She continued: "only in Argentina does the idea remain that the expansion of the money [supply] generates inflation."
- What is she saying? Does it make sense to you?

The idea: Argentine data



Source: Foco Economico, March 2012.

Roadmap

- Terminology
- Hyperinflation show and tell
- Money and inflation: the quantity theory
- Money supply mechanics
- How deficits enter the picture

Hyperinflation show and tell

German currency

October 1923: 20 USD = 1 billion RM

Argentine currency

This note dates from 1980s. What's it worth now?

Turkish currencies

After 2008

Before 2008

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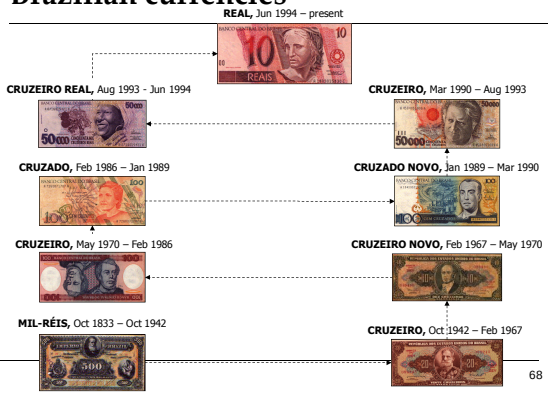
Brazilian currencies



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Highest inflation rates ever

Example	Highest Daily Inflation
Hungary, Jul 1946	207%
Zimbabwe, Nov 2008	98%
Yugoslavia, Jan 1994	65%
Germany, Oct 1923	21%

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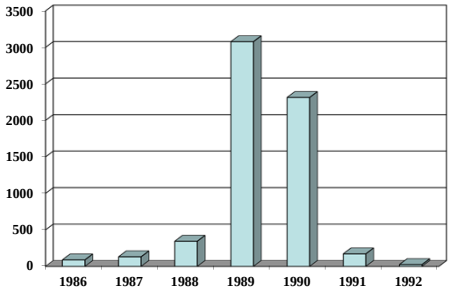
Inflation in Argentina (annual %)



Source: EIU database.

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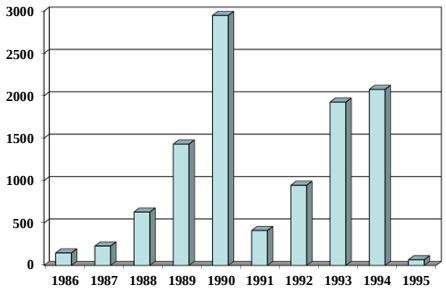
Inflation in Brazil (annual %)



Source: EIU database.

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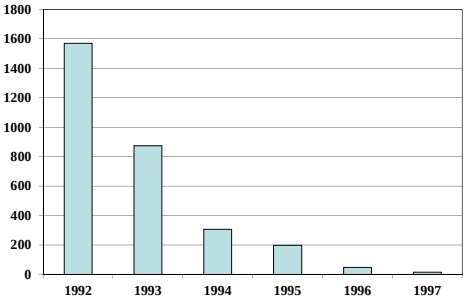
Inflation in Russia (annual %)



Source: EIU database.

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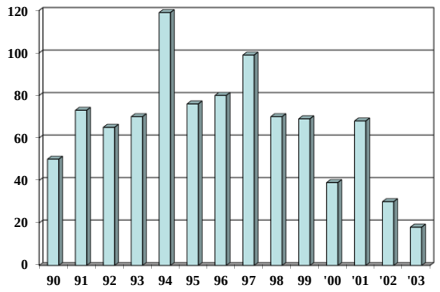
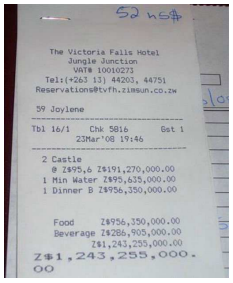
Inflation in Turkey (annual %)



Source: EIU database.

Buying lunch in Zimbabwe



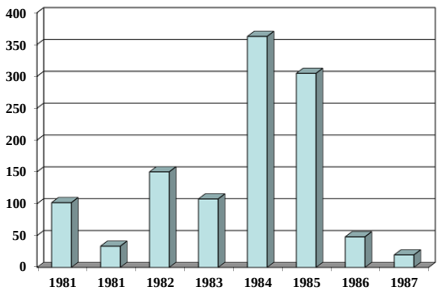
Zimbabwe timeline

- December 2006: inflation over 1000%
- February 2007: inflation ruled illegal
- October 2008: inflation over 200 million percent!
- January 2009:
  - Transactions permitted in foreign currency
  - Soldiers and teachers to be paid in USD
- February 2009: 12 zeros knocked off
- April 2009: government abandons currency, people use USD (also South African rand – ZAR)

Zimbabwe timeline

- Long sad history…

Inflation in Israel (annual %)



Source: EIU database.

Israel in the 1980s

- American Rabbi visiting Israel:
  - During Israel's hyperinflation, I had a mortgage at a 5% fixed annual interest rate. As inflation increased, fixed rate mortgage payments became laughably easy to make, because salaries more or less kept pace with inflation. Finally, I received a notice canceling my mortgage, because the cost of record-keeping had become more than the monthly payment.

Iran

- Graeme Wood, "Hyperinflation vacation," The Atlantic, April 2013:
  - The Iranian rial was hovering under 40,000 to one U.S. dollar, weaker by nearly half compared with six months earlier. Authorities tried to ban currency trading for a few weeks in October, when the inflation rate peaked.
  - Wood's First Rule of Budget Travel: where there is runaway inflation, there are great deals for travelers with hard cash. So in January, I boarded a flight from Dubai to Kish, an Iranian holiday resort in the Persian Gulf.

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Other examples

- Personal experiences with hyperinflation?

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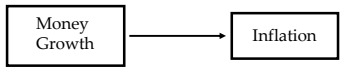
The quantity theory of money

Quantity theory: picture



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Quantity theory: words

- The more currency (money) in circulation, the less each unit is worth

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Quantity theory: math

- One equation (a production function for transactions)

$$M V = P Y$$

  - M = stock of money in circulation (amount of currency)
  - V = velocity (how often a unit of currency is used in a year)
  - P = price level (the GDP deflator or other price index)
  - Y = real GDP

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Quantity theory: math

- One equation (technology for transactions)

$$M V = P Y$$

- In growth rates

$$\gamma_M + \gamma_V = \gamma_P + \gamma_Y$$

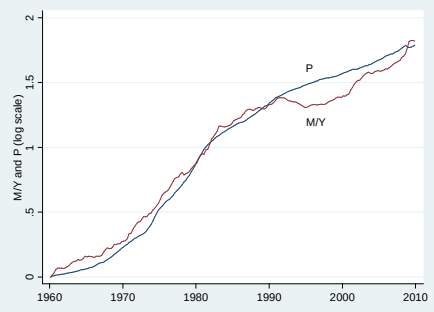
  - γ_M = growth of money supply (think: currency)
  - γ_V = growth of velocity
  - γ_P = growth of price level (the inflation rate)
  - γ_Y = growth of real GDP

Quantity theory

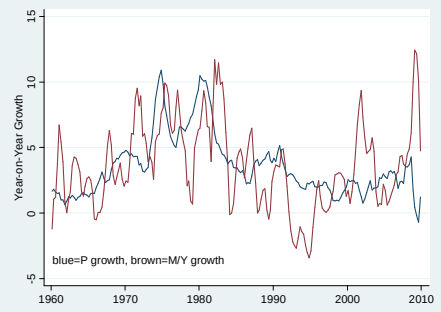
- Two hypotheses
  - V is constant ($\gamma_V = 0$)
  - Y not affected by changes in M
    [Or: changes in Y small relative to changes in M]
- One conclusion
  - Money growth causes inflation

$$\gamma_P = \gamma_M - \gamma_Y$$

Quantity theory: long-run evidence



Quantity theory: short-run evidence



Quantity theory: small inflations

- Lots of other things relevant in small inflations
- Link between money and prices not as tight
- More on this next week

Money supply mechanics

Money supply mechanics

- How the central bank manages the money supply
  - Money = currency for our purposes
  - Supply changed by buying/selling bonds in market
- Works through balance sheets for
  - Treasury
  - Central bank
  - Private agents (households and firms)

Money supply mechanics

Treasury

Assets		Liabilities	
		Bonds	200

Central bank

Assets		Liabilities	
Bonds	0	Money	0

Households and firms

Assets		Liabilities	
Money	0		
Bonds	200		

- Where does treasury debt come from?
- Where does money supply come from?

Money supply mechanics

Treasury

Assets		Liabilities	
		Bonds	200

Central bank

Assets		Liabilities	
Bonds	20	Money	20

Households and firms

Assets		Liabilities	
Money	20		
Bonds	180		

- How does central bank increase money supply?
- Why do households go along?

Money supply mechanics

Treasury

Assets		Liabilities	
		Bonds	200

Central bank

Assets		Liabilities	
Bonds	20	Money	20

Households and firms

Assets		Liabilities	
Money	20		
Bonds	180		

- Where do deficits come in?
- Does there need to be a connection with money growth?
- Why so in hyperinflations?

Quantity theory: revised picture

Hyperinflation recap

- Hyperinflations – always! – stem from
  - Lack of fiscal discipline [= government deficit]
  - Accommodation by central bank [= printing money]
- How to end them: "stop doing it"
  - Balance government budget
  - Make central bank independent, prohibit it from buying debt directly from Treasury

Fiscal dominance in the US and EU

- **Fiscal dominance** means
  - Government debt and deficit are so large that the only alternative to explicit default is printing money
- US/Fed view of the world
  - Need aggressive monetary policy to recover from crisis
- EU/ECB view of the world
  - Need to resist inflation with tight monetary policy
  - US guilty of "soft fiscal dominance"

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What have we learned?

- Hyperinflation comes from
  - Large increases in money supply
  - Triggered by government deficits
- Solution: Stop doing it.
- Essential tools
  - Quantity theory
  - Central bank balance sheet

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For the ride home

- Would the US be better off with gold?
- Would Argentina be better off using USD?

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Problem Set #3

- Due in a week
- Technically demanding, start soon
- Post questions on the Google Group

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