



# Quantitative Reasoning in the Social Sciences

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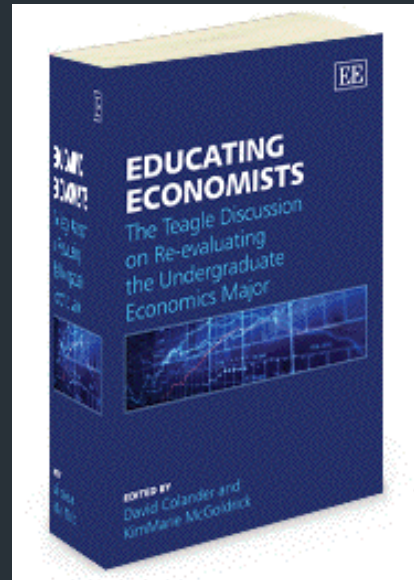
October 2014

# Outline



- Introduction
- Problem
- Response
- Hands-on Examples
- Conclusions

# Student Learning Goals



*“Thinking like an economist”*

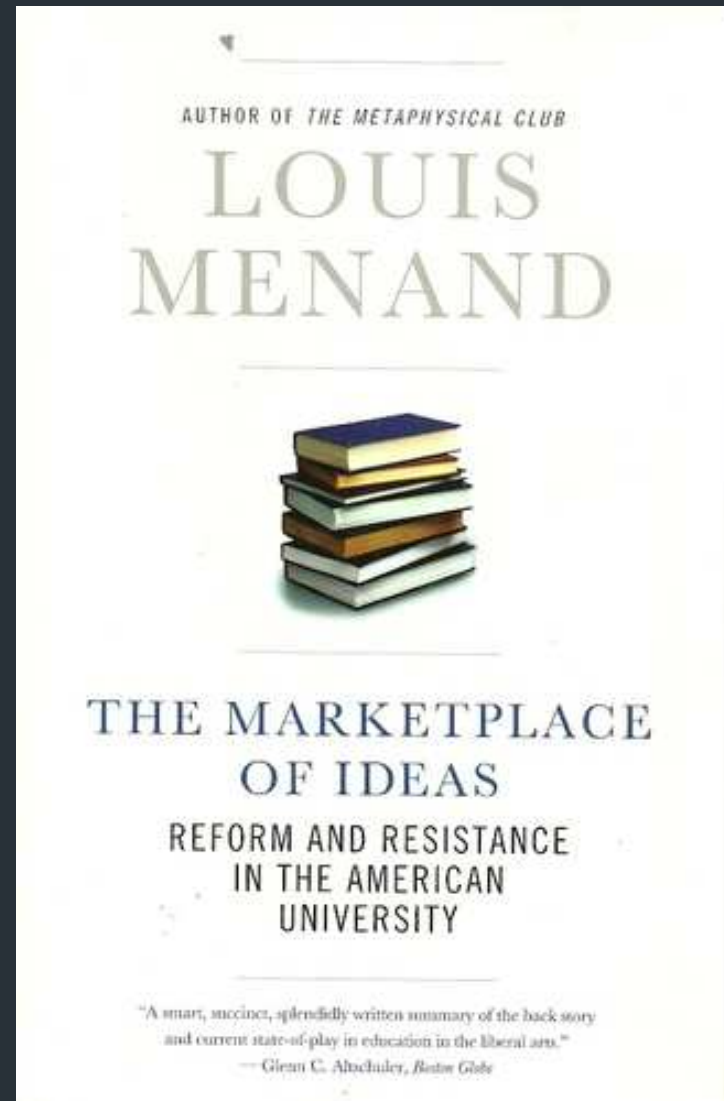
*Siegfried, J., Bartlett, R., Hansen, L., (1991), The Status and Prospects of the Economics Major. Journal of Economic Education Vol. 251, No. 3, pp. 197-224*

Problem



# Standard Curriculum

- Sequencing the Curriculum
  - Introductory course (x2)
  - Intermediate theory course (x2)
  - Upper division elective courses
  - Methods course
  - Capstone experience



Menand, L. (2001 and 2010) *The Marketplace of Ideas: Reform and Resistance in the American University*. W. W. Norton & Company, NY.

# Traditional View of Data

The screenshot displays the IMF.org Cross-Dataset Query Builder interface. The top navigation bar includes links for IMF.org, eLIBRARY, BOOKSTORE, IMF DATA, and Help. The main header is 'Cross-Dataset Query Builder'. On the left, there are four filter categories: Country (1 of 347 items selected), Concept (0 of 2002 items selected), Data Source (1 of 13 items selected), and Time (1990 - 2013 (Annual)). Below these filters are 'Download' and 'View data' buttons. The main content area is titled 'Available items' and 'Selected items'. It features a 'Concept' section with a search box and a 'Quick filter' box. Below this is a list of actions: Expand All, Select All, Select Branch, Select Siblings, Collapse All, Deselect All, Deselect Branch, and Deselect Siblings. The main list shows a tree structure of economic indicators, including National Accounts, Expenditures, and various GDP-related metrics.

IMF.org eLIBRARY BOOKSTORE IMF DATA Help

Home Cross-Dataset Query Builder

Country 1 of 347 items selected \* Reset

Concept 0 of 2002 items selected

Data Source 1 of 13 items selected \* Reset

Time 1990 - 2013 (Annual)

Download View data →

Available items Selected items Get direct link

Concept Show elements as Label

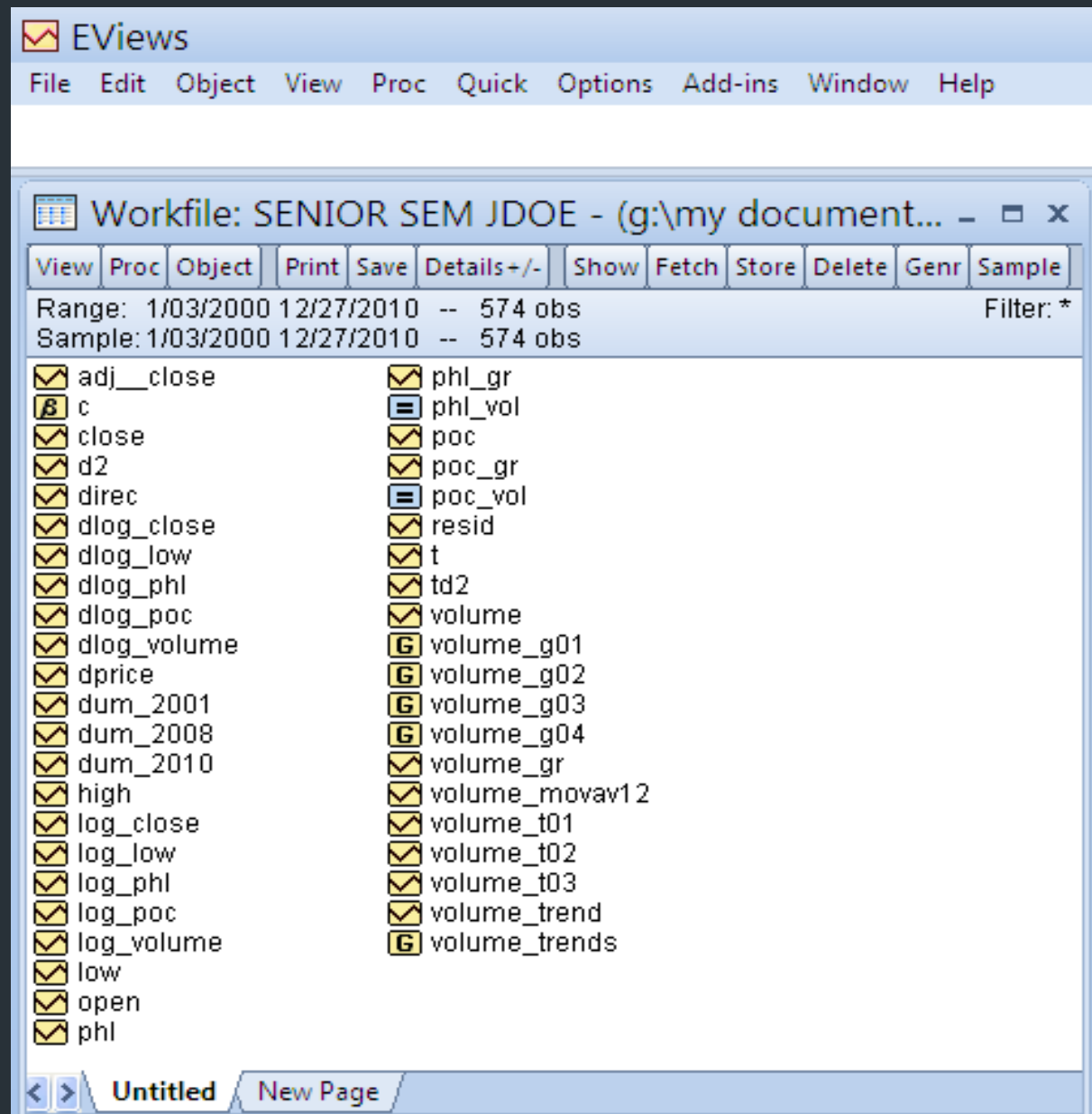
Select one or more items from the list below. Use shift-click to select a range of indicators. Click on the plus icons to expand the list. Start typing in the quick filter box to refine the list.

Quick filter:

Expand All Select All Select Branch Select Siblings  
Collapse All Deselect All Deselect Branch Deselect Siblings

- [-] National Accounts
  - [-] Expenditures
    - [-] Nominal
      - Gross Domestic Product, Nominal
      - [-] Final Consumption Expend., Nominal
        - Private Final Consumption Expend., Nominal
        - Public Final Consumption Expend., Nominal
      - [-] Gross Capital Formation, Nominal
        - [-] Corporations, Households, and NPISH, Nominal
      - [-] External Sector, Nominal
    - [-] Real
      - [-] Deflator
    - [-] Income, Savings, and Investment
    - [-] GDP-GNP Relation
  - [-] Indicators of Economic Activity
  - [-] Labor Markets
  - [-] Prices
  - [-] Government and Public Sector Finance
  - [-] Financial Indicators
  - [-] Balance of Payments
  - [-] International Investment Position
  - [-] International Reserves
  - [-] Fund Accounts
  - [-] External Trade
  - [-] Exchange Rates

# Traditional Work with Data





# Weak Output

## Data Description

	Unemployment	Interest rates	Growth Rate	Exp/GDP	FDI/GDP
Estonia	33.219(.957)	6.710(.473)	-2.830(.125)	5.424(.377)	.465(-.017)
Latvia	-1.765(.041)	.310(-.019)	-2.559(.102)	16.891(.858)	-.371(-.018)
Lithuania	23.355(.917)	9.518(.646)	-1.845(.048)	2.776(.123)	1.367(.017)

### Model 2: Top 5% income share:

Variable	Unstandardized Coefficient	Significance Level
Lagged top 5% income share	.842	.000***
Top marginal tax rate	-.013	.047**
GDP Growth	-.006	.868
GDP (2000\$)	2.455E-013	.074*
Export + Imports	.018	.105
Private credit	.002	.535
R square: .96		
Level of significance: *** 1% , ** 5% , * 10%		

Data Analysis

# Student Work Suffers

## Scores by Student Learning Goal and Subheading

$N = 22$

Subheading	Area	Assessment	Average Score	S.D.
3.1	Literature Review		5.05	1.21
3.2	Use of Theories		5.11	1.31
3.3	Empirical Methods	<i>Strong</i>	5.59	1.33
3.4	Figures and Tables		4.91	1.51
3.5	Interpretation		4.68	1.49
4.1	Organization		5.41	1.26
4.2	Oral Skills	<i>Strong</i>	N.A.	N.A.
4.3	Writing Skills		5.64	1.29
5.1	Research Question		5.45	1.41
5.2a	Mastery of Data		5.30	1.53
5.2b	Mastery of Methods	<i>Strong</i>	5.36	1.29
5.3	Conclusions		4.32	1.32

Response



# The Activity

- Quantitative case studies
  - Data collection and analysis guided through discussion questions
  - Topics related to theoretical concepts and theories

# Theoretical Foundation



- Bloom's (1956) educational taxonomy
- Easton (1983) and Erskin *et al.* (1998) case method teaching pedagogy

# Information Literacy Strategy



- Goad (2002):
  - Formulating a question
  - Pinpointing what you want to know
  - Organizing information
  - Planning a search
  - Evaluating the materials

# Information Literacy Goals



- Shapiro and Hughes (1996):
  - Tool literacy
  - Resource literacy
  - Social-structure literacy
  - Research literacy
  - Publishing literacy
  - Emerging technology literacy
  - Critical literacy

# Hands-On Example (I)





# Money & Banking Topics (I)

- Stock Prices
- Bond Prices
  - Corporate Bond Risk Premium
  - Inflation Expectations
  - Nominal vs Real Interest Rates
- Interest Rates
  - The Term Spread
  - Sovereign Debt Risk Premiums

# Money & Banking Topics (and II)

- Exchange Rates
  - Nominal vs. Real Exchange Rates
  - PPP Theory of ER Determination
- Financial Derivatives
  - The Interest Rate Swap Spread

# Setup – Information Session



# Setup – Theoretical Concept

- The Fisher Equation:  $i = r + \pi$ 
  - $i$ , nominal interest rate
  - $r$ , real interest rate
  - $\pi$ , inflation rate
  
- It follows:  $r = i - \pi$

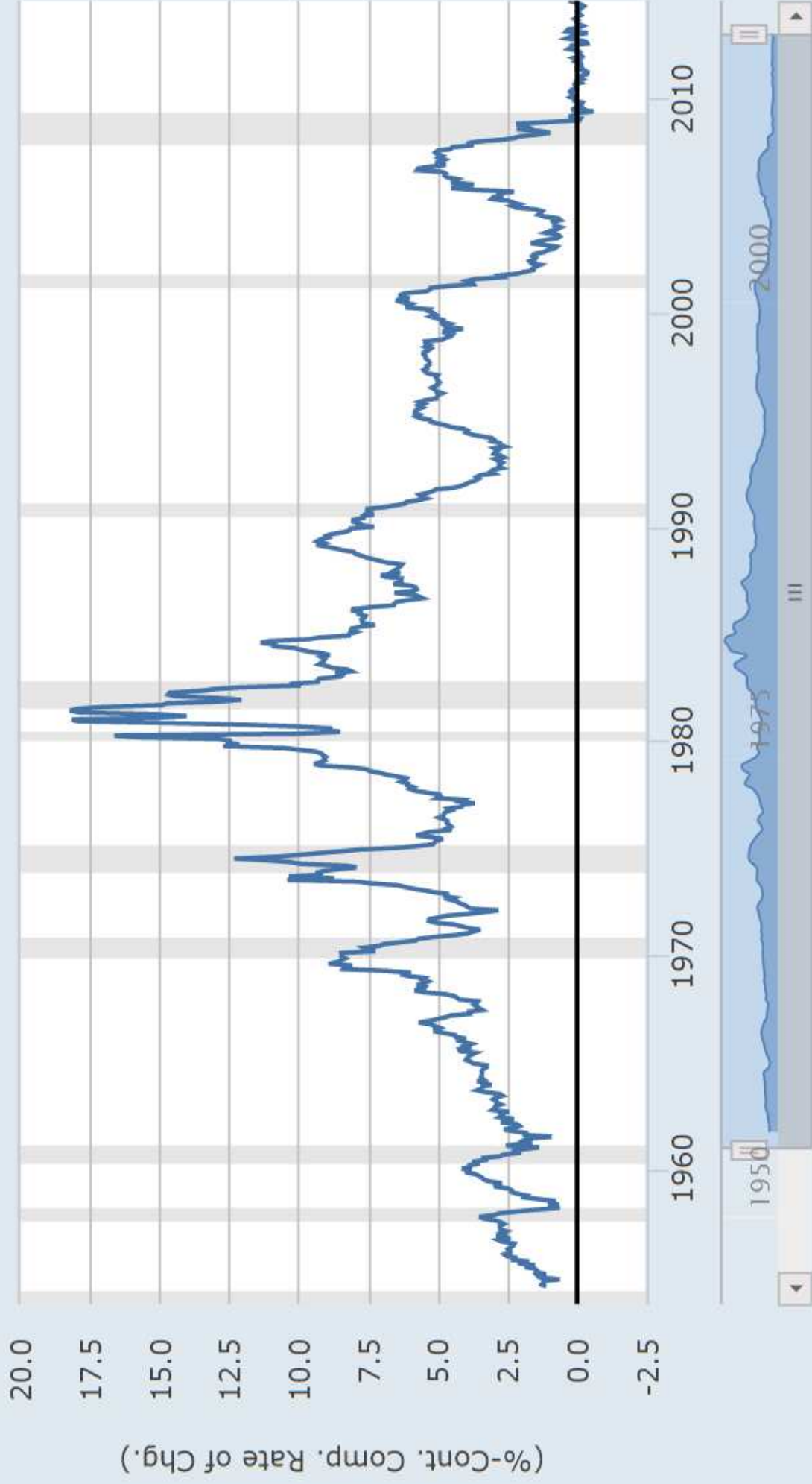
Fisher I. 1930. *The Theory of Interest*. New York: A. M. Kelly

# Setup – FRED Database

- <https://research.stlouisfed.org/fred2/>
  - Graph: FEDFUNDS
  - Add Data Series > Modify Existing Series
  - Type: CPI
  - Units: Continuously Compounded Rate of Change
  - Create Your Own Data Transformation:  
Formula :  $a-b$  > Apply



Effective Federal Funds Rate-Consumer Price Index for All Urban Consumers: All Items

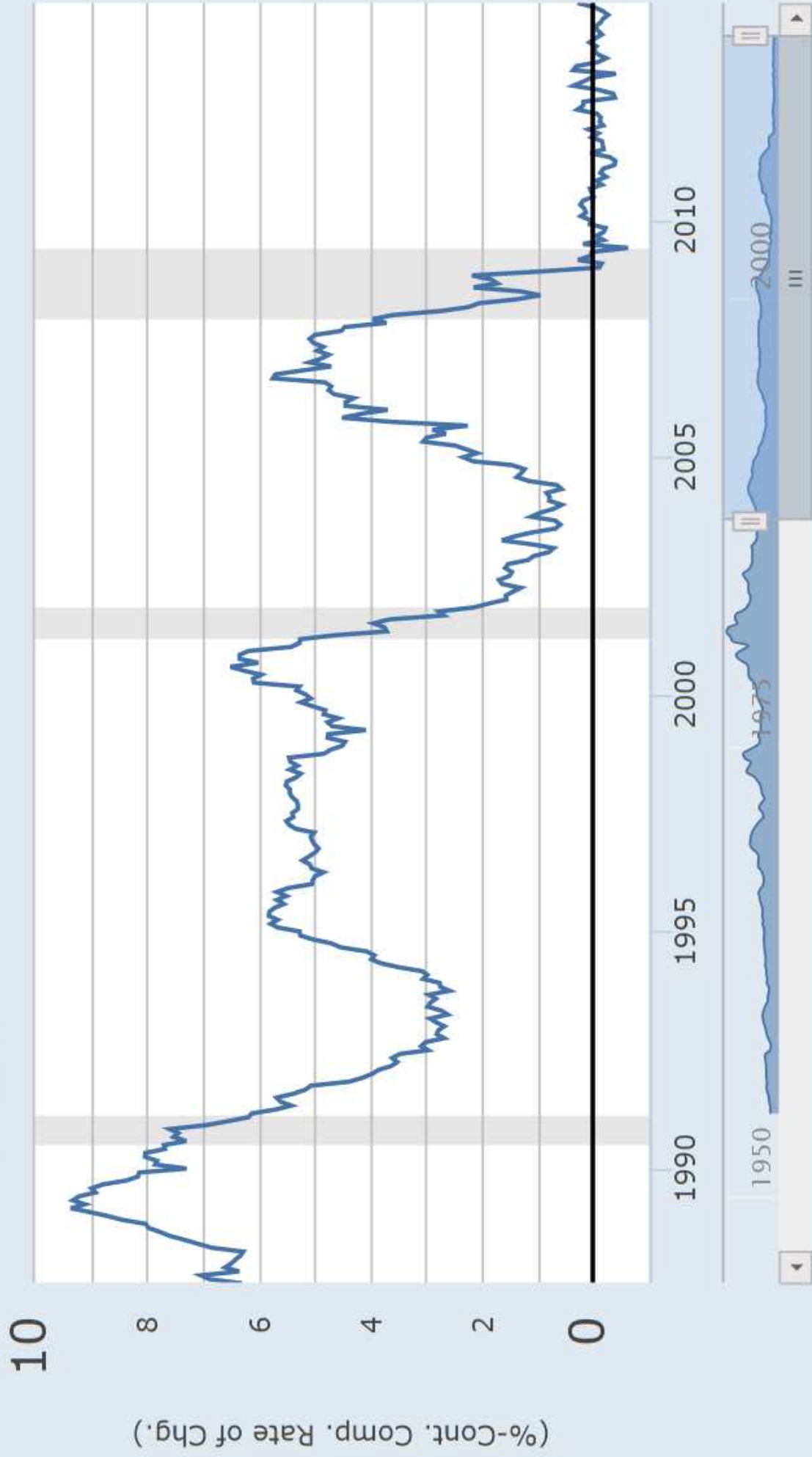


Shaded areas indicate US recessions - 2014 research.stlouisfed.org

**FRED**



Effective Federal Funds Rate-Consumer Price Index for All Urban Consumers:  
All Items



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# Setup – Discussion Questions

- Real Interest Rates

- How does the real Federal Funds rate change in value during expansions? Why?
- How does the real Federal Funds rate change in value during contractions? Why?
- What does a negative real Federal Funds rate mean?



# Setup – Discussion Questions


Courses

Home ▶ My courses ▶ ECON302-1-F12 ▶ 27 August - 2 September ▶ IFS: GDP Components
You are logged in as **Diego Mendez-Carabajo** (Logout)

**Navigation**

**Settings**

- ▼ Forum administration
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  - ▣ Locally assigned roles
  - ▣ Permissions
  - ▣ Check permissions
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  - ▣ Restore
  - ▶ Subscription mode
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- ▶ My profile settings

Complete the data compilation and answer the following questions ahead of class:

1. Which GDP component is the largest? Which is the smallest?
2. Is there a trend in their evolution over time? Does this trend change direction?
3. Are there any noticeable peaks or troughs that you can identify?
4. Do net exports (NX=Exports-Imports) add or detract from overall GDP?
5. What events could have caused specific ups and downs in the series?

Click on the forum discussion below and reply to the main discussion to post your answer to the five separate questions.

Do NOT "Add a New Question" as everybody would be able to read your answers whether they have posted their own answers or not.

**Ask Ames**


- [A-Z List of Databases](#)
- [A-Z List of Journals](#)
- [ILLiad](#)
- [E-Reserves](#)
- [Ames Research Guides](#)
- [RefWorks](#)
- [Google Scholar](#)
- [Find your librarian](#)

**Activities**

- [Assignments](#)
- [Choices](#)
- [Forums](#)
- [Quizzes](#)
- [Resources](#)

**My private files**

- [Applied\\_Finance](#)

Discussion	Started by	Replies	Last post
<a href="#">IFS: GDP Components</a>	 <a href="#">Diego Mendez-Carabajo</a>	19	Dung Do <small>Thu, 30 Aug 2012, 08:27 AM</small>

# Setup – Class Discussion



# Hands-On Example (II)



# Setup – Information Session





# Intermediate Macro Topics (I)

- GDP Components
- Uses of Saving Identity
- Productivity and Unemployment
- Growth and Productivity
- Money Supply and Inflation
- Real Interest Rates
- The Phillips Curve

# Setup – Theoretical Concept

- The Phillips Curve:  $\pi = f(u)$ 
  - $\pi$ , inflation rate
  - $u$ , unemployment rate

Phillips (1958). “The Relation Between Unemployment and the Rate of Change of Money Wages in the United Kingdom, 1861-1957” *Economica* 25(100), pp. 283-99.

Samuelson and Solow (1960). “Analytical Aspects of Anti-Inflation Policy” *American Economic Review Papers and Proceedings* 50(2), pp. 177-94.

# Setup – FRED Database

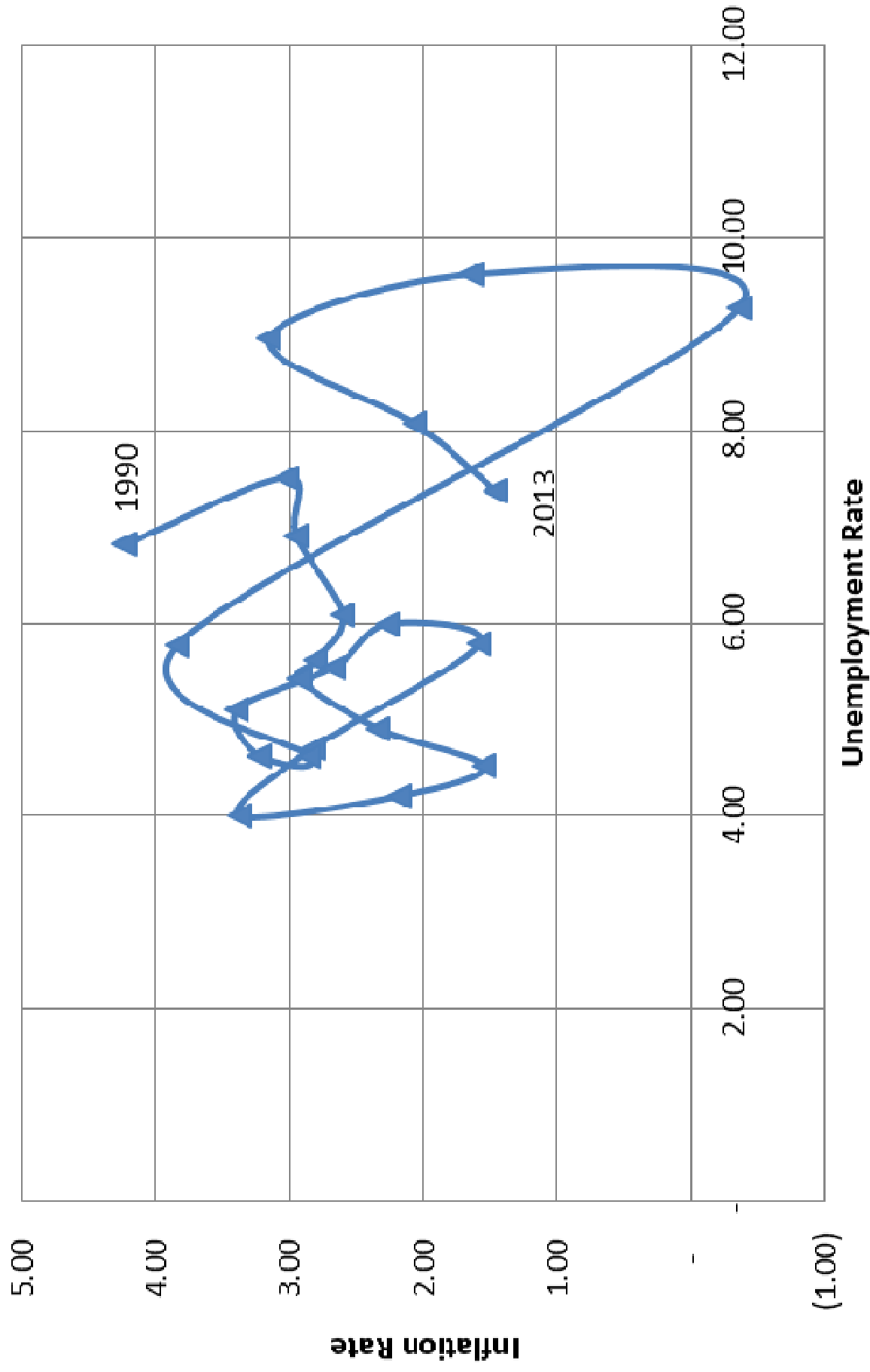
- <https://research.stlouisfed.org/fred2/>
  - Graph: UNRATE
  - Select dates: 1990-01-01 / 2014-01-01
  - Frequency: Annual
  - Add New Series > CPI
  - Units: Continuously Compounded Rate of Change
  - Download Data > Open *fedgraph.xls*

# Setup – MS Excel

- Open fedgraph.xls
  - Select: data under UNRATE and CPIAUCSL\_CCH
  - Insert > Charts > Scatter (with line)



# USA Phillips Curve




# Setup – Discussion Questions

- The Phillips Curve

- What is, generally speaking, the slope of the spaghetti line connecting all the data?
- For which years does the Phillips Curve seem to “hold true”?
- Why would the Phillips Curve shift?
- What is the natural rate of unemployment?

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# Setup – Class Discussion





## Additional Pedagogical Resources

*Starting Point:*

*Teaching and Learning Economics*

<http://serc.carleton.edu/econ/index.html>

# Conclusions



# Design Strategies



- Identify “quantifiable” topics
- Create out-of-class data retrieval and analysis exercises
- Involve librarians
- Create discussion questions based on the data
- Organize in-class open-ended discussions of student work

# Student Reflections

- *“I feel using real data to help support economic theories was extremely useful”*
- *“Learning how to analyze graphs and data and how to properly interpret that data were valuable skills to learn”*
- *“I have a better perspective on actual Economics, I feel better informed”*



# Instructor Reflections



- Student thinking becomes more sophisticated and context-rich
- More fluid application of economic theories and concepts
- More critical assessment of theories
- Topics and research ideas carry on to the capstone course

Thank You.  
Questions?

