Teaching with Data: FRED Interactives Preview

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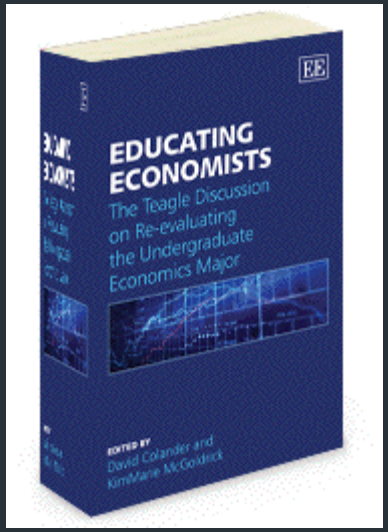
Introduction

Student Learning Goals



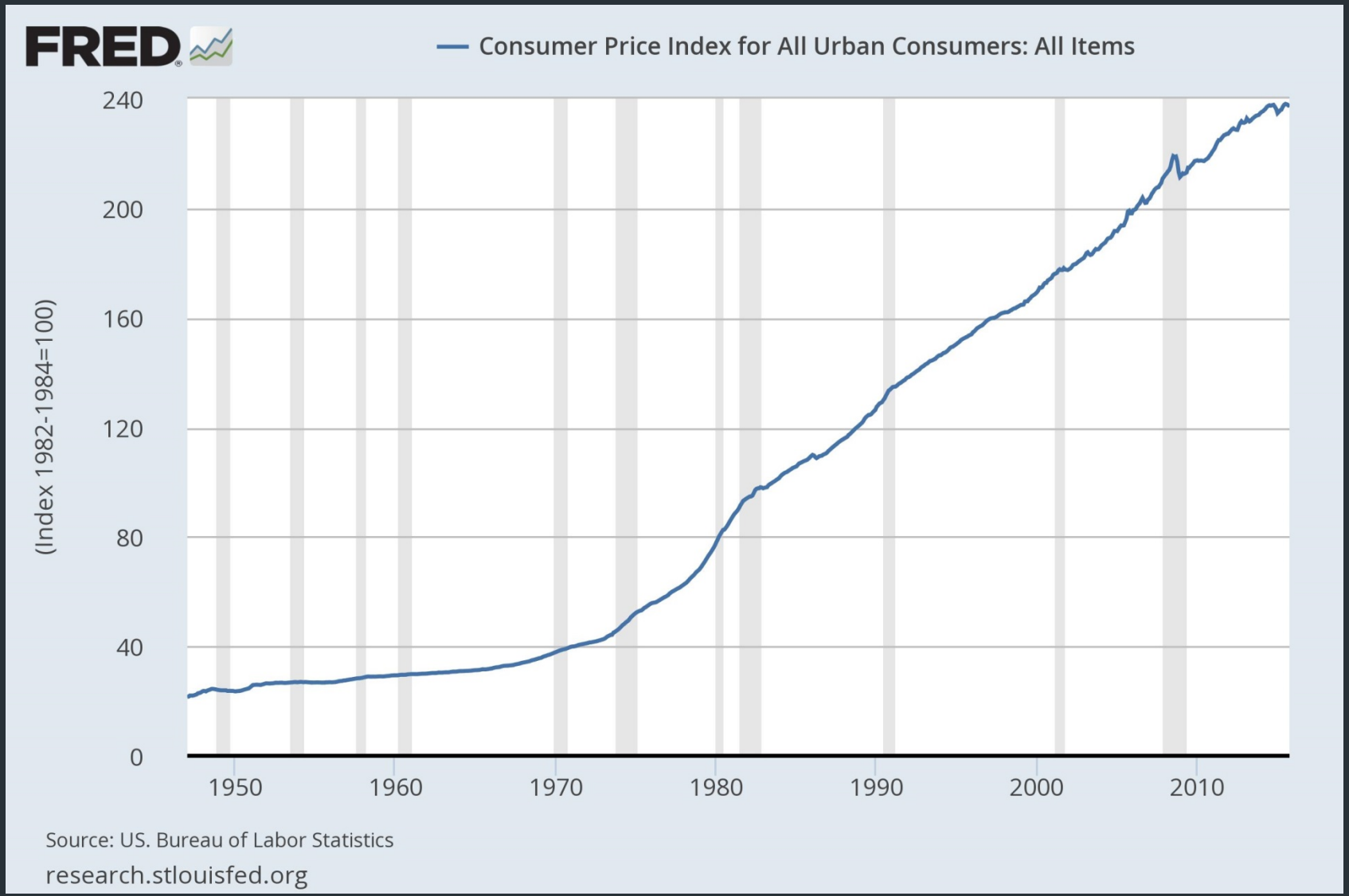
"Thinking like an economist"

Siegfried, J., et al. (1991). The Status and Prospects of the Economics Major. Journal of Economic Education Vol. 251, No. 3, pp. 197-224

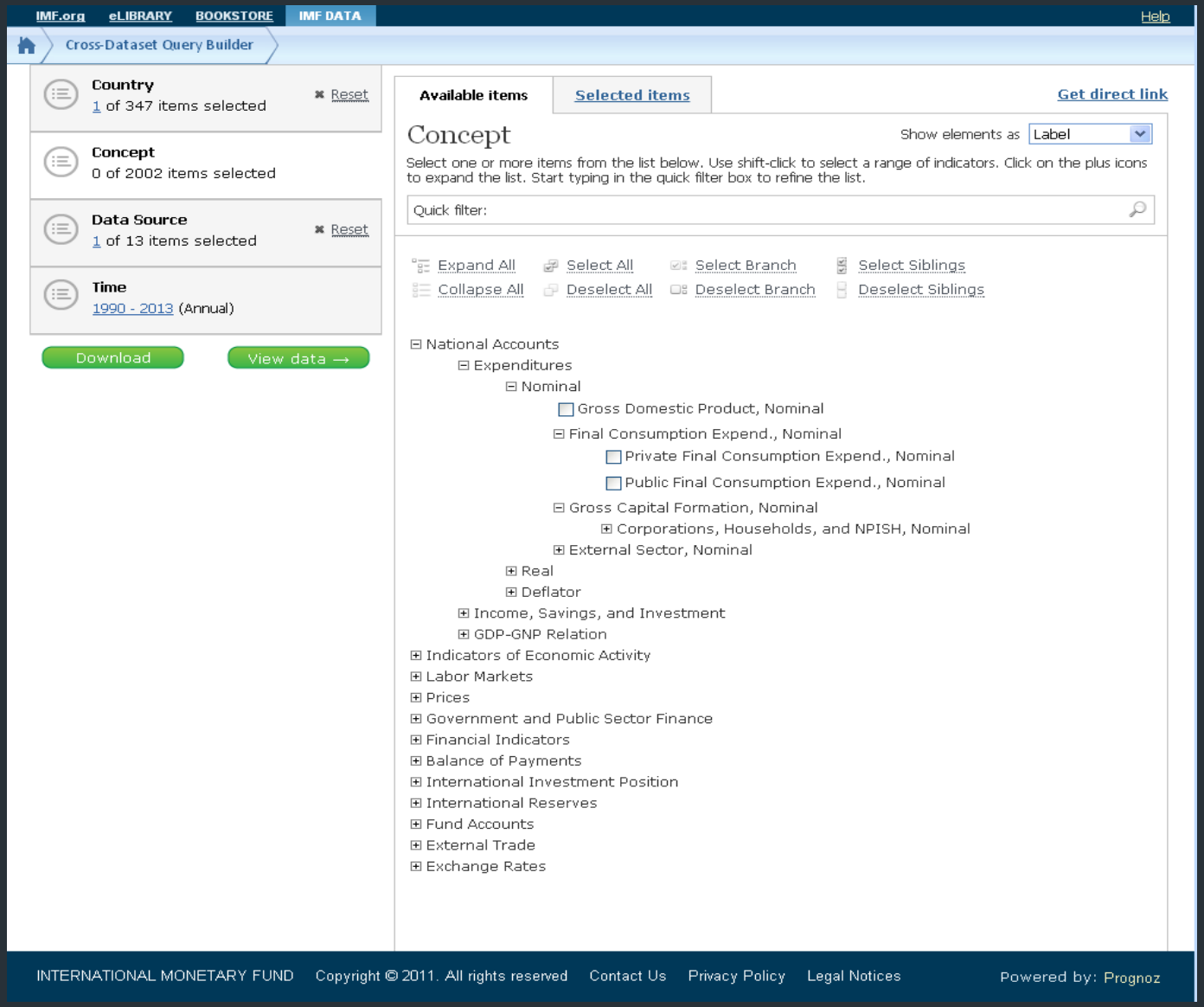
Traditional Pedagogy and Data

Theory first; Data illustrates	
Step #1: Lecturing on abstract concepts.	*Step #2*: Plotting data as illustrations.
Example	
“Inflation is the percentage growth of the CPI. The CPI is computed by first identifying the basket...”	*“This is how the CPI or the inflation rate look like”*

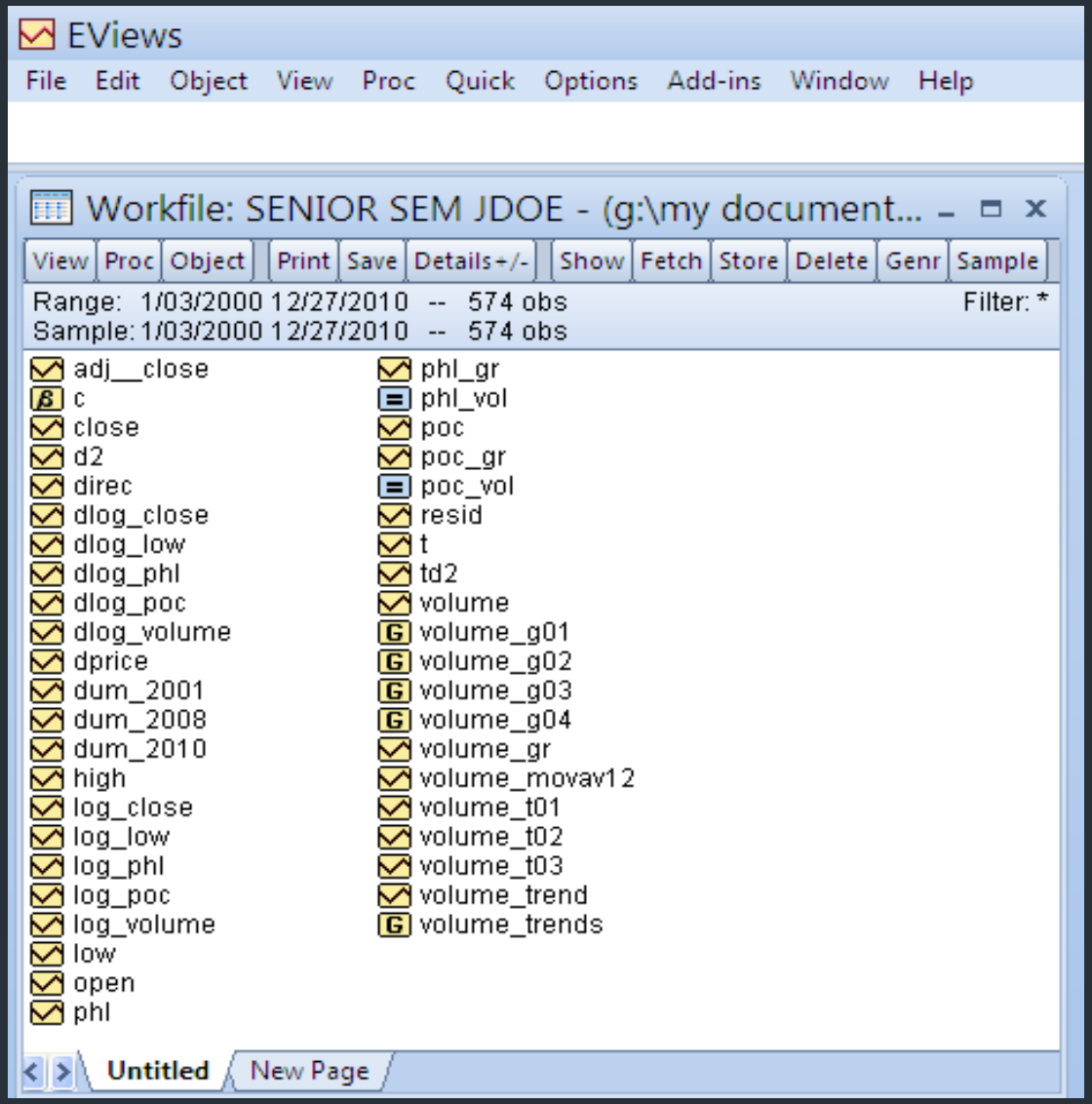
The Consumer Price Index



A World Awash in Data



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)

Data Analysis

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%		

Objective & Difficulty: TESTING THE CLICKERS / Low	
What statement best describes your familiarity with FRED?	
A	I have heard of FRED before
B	I have seen FRED before
C	I have occasionally used FRED
D	I frequently use FRED
E	Other

Alternative Approach

Teaching and Learning with Data

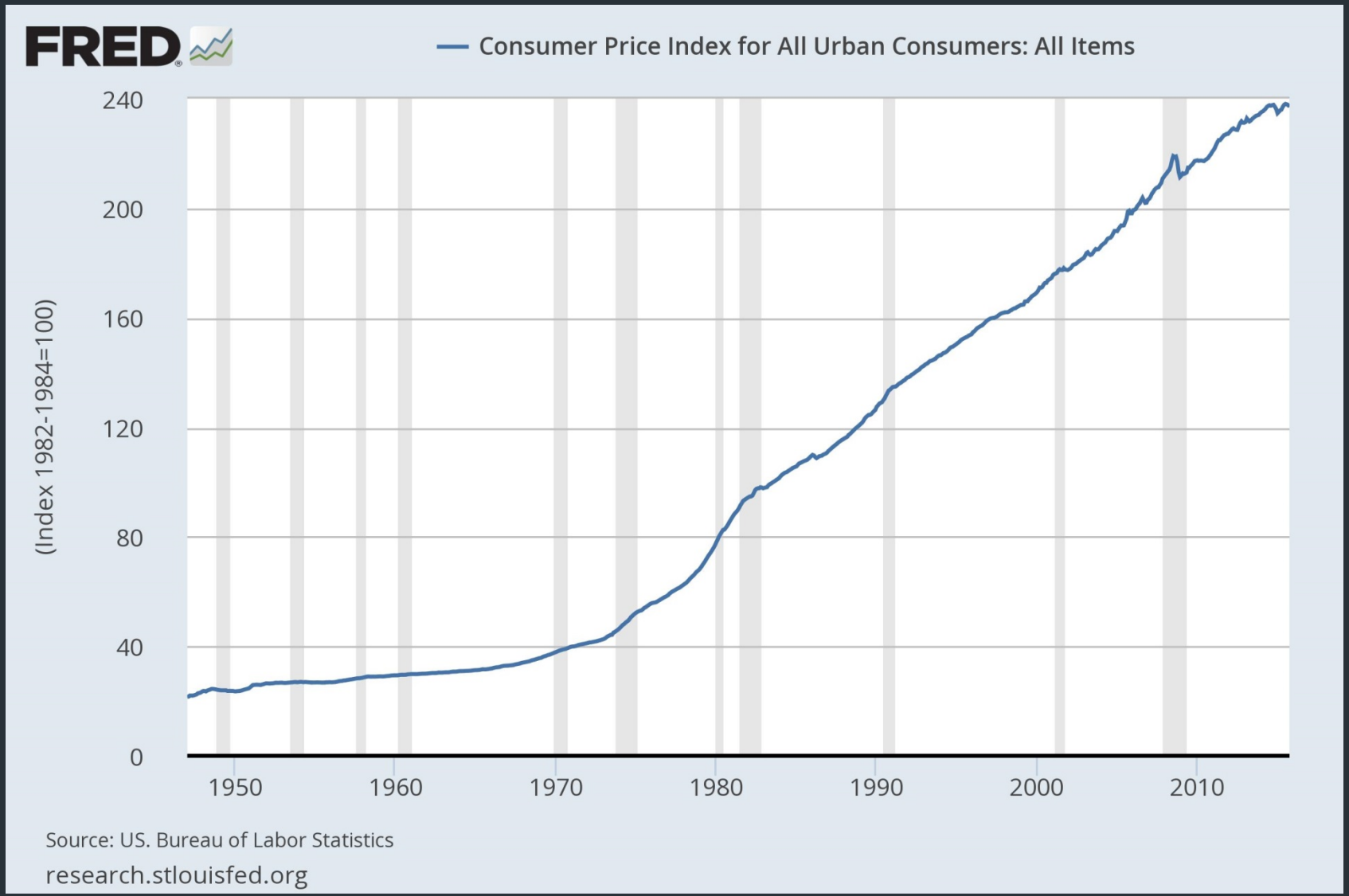
Data leads; Theory builds on visuals

Step #1: Data plots introduce and illustrate concepts.	*Step #2*: Data-focused discussions lead lecturing on abstract concepts.

Example

"The CPI measures the cost of living. Is its plot a flat or an upward sloping line?"	*"What does it mean, in terms of inflation, when the slope of the CPI plot becomes steeper?"*

The Consumer Price Index



Theoretical Foundation

- Bloom's (1956) educational taxomomy
- Tufte (2001) reasoning through graphics
- Mendez-Carbajo (2015) and (2016) interplay among numeracy, information literacy, and economic analysis

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ECONOMIC INSTRUCTION

Visualizing Data and the Online FRED Database

Diego Méndez-Carbajo

The author discusses a pedagogical strategy based on data visualization and analysis in the teaching of intermediate macroeconomics and financial economics. In these short projects, students collect and manipulate economic data from the online Federal Reserve Economic Database (FRED) in order to illustrate theoretical relationships discussed in class. All the data collection and manipulation tasks are conducted through the FRED Web site. The author argues that as students locate and effectively use the quantitative information that they need to evaluate abstract concepts, they are in effect developing the connection between theories and empirical evidence that underpins the discipline of economics.

Keywords: *data analysis, data manipulation, financial economics, intermediate macroeconomics*

JEL codes: *A22, C82, G12, G14, G15*

As Simkins and Maier (2009) convincingly argued in their description of pedagogical strategies to improve student learning in the economics major, Bloom's higher-order cognitive processes (Bloom 1956) and Siegfried and colleagues (1991) "thinking like an economist" learning goals are best achieved through learning that encourages students to "analyze trends and correlations in economic data, apply economic theory to real-world problems, and evaluate economic policies" (85).[1] The challenge, then, lies in designing course assignments that help students develop the intellectual proficiencies involved in "doing economics." I argue that the Web-based interface of the FRED database is an excellent resource for relating economic concepts and theories to data. The data-visualization and manipulation capabilities of the FRED Web site are significant pedagogical resources because as Tufte (2001, 9) put it, "at their best, graphics are instruments for reasoning about quantitative information."

Identifying with Velenchik's (1995) description of the "limitations of theory teaching" through classroom examples, I also find them "often abstracted from context" (31). When introducing

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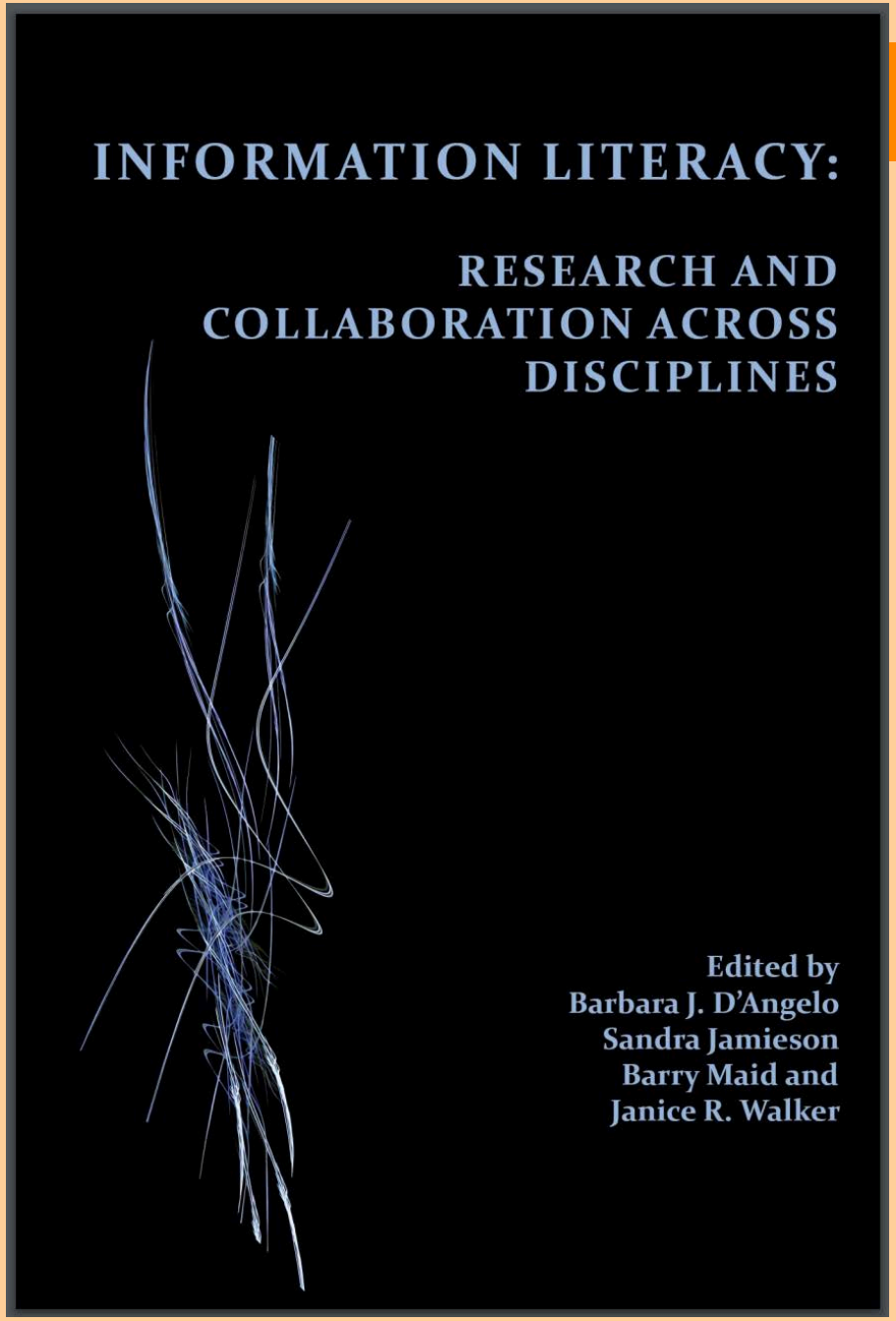
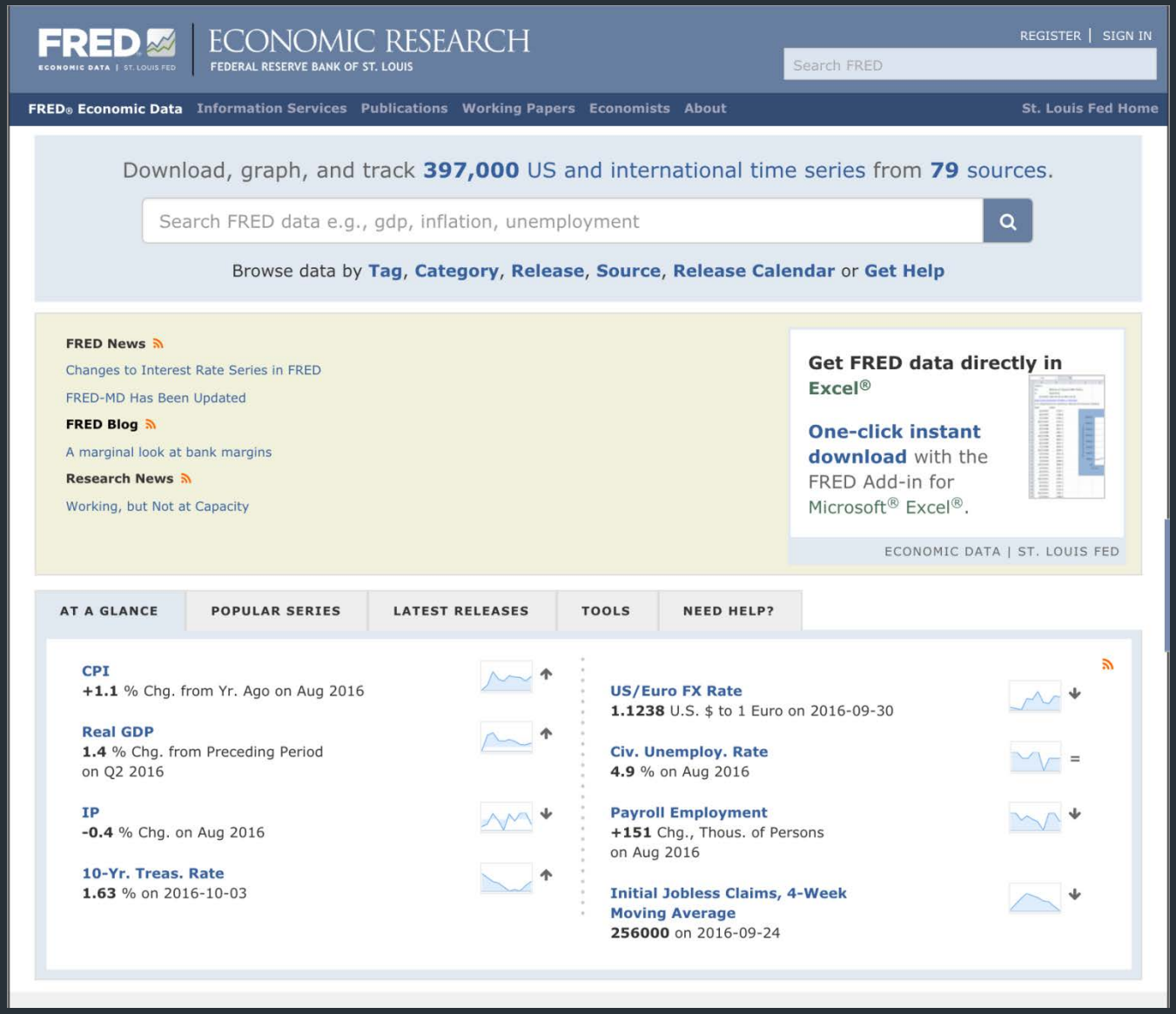
Color versions of one or more of the figures in this article can be found online at www.tandfonline.com/vece.



The Activity

Learning Through FRED



Hands-On Example

Comparative Advantage

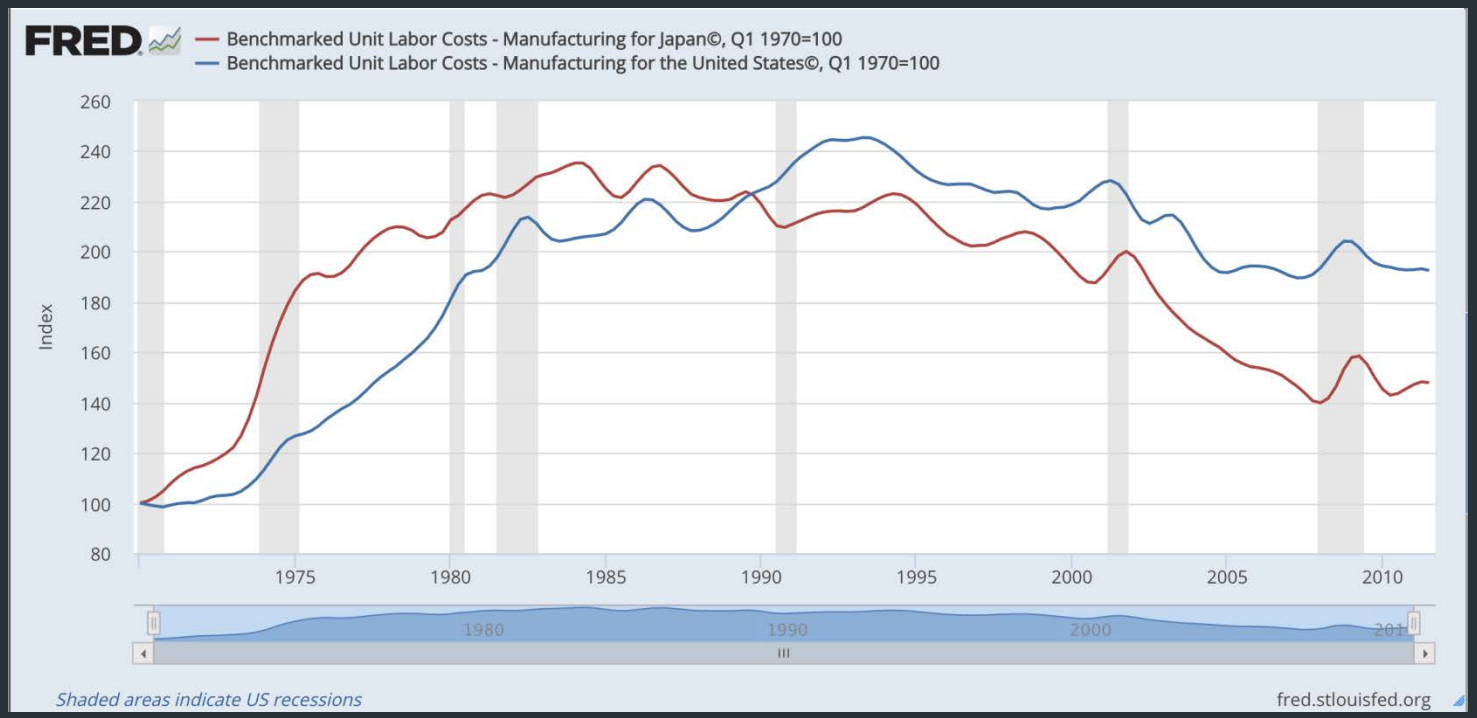
Setup – Theoretical Concept

- Absolute and Comparative Advantage
  - The cost of labor affects the price of manufactured goods.
  - A comparison of manufacturing labor costs across countries quantifies the comparative advantage of the United States.

Setup – FRED Graph

- Direct your browser to:

  https://fred.stlouisfed.org/graph/?g=7yUl



Objective & Difficulty: INFORMATION LITERACY / Low	
What organization computes the Benchmarked Unit Labor Costs (Manufacturing) for the United States and Japan?	
A	(FRED) Federal Reserve Economic Database
B	United States Department of Commerce
C	Board of Governors of the Federal Reserve System
D	Organization for Economic Co-operation and Development (OECD)

Objective & Difficulty: INFORMATION LITERACY / Low	
What is the highest frequency of computation of the Benchmarked Unit Labor Costs (Manufacturing) for the United States and Japan?	
A	Monthly
B	Quarterly
C	Semi-annual
D	Annual

Objective & Difficulty: NUMERACY / Low	
In 1970 (the base period in this graph), what is the value of the manufacturing unit labor costs in the United States and in Japan?	
A	0.5168
B	217.4
C	193.2
D	100

Objective & Difficulty: NUMERACY / Medium	
Where did unit labor costs grow faster between 1970 and 1984?	
A	In the United States
B	In Japan

Objective & Difficulty: ECONOMIC ANALYSIS / Medium	
Between 1970 and 1989, which country had the comparative advantage in manufacturing unit labor costs?	
A	The United States
B	Japan

Objective & Difficulty: ECONOMIC ANALYSIS / Medium	
Since 1989, what country has had the comparative advantage in manufacturing unit labor costs?	
A	The United States
B	Japan

Objective & Difficulty: NUMERACY AND ECONOMIC ANALYSIS / High	
Since 1994, the United States' comparative disadvantage in manufacturing unit labor costs has _____ relative to Japan?	
A	Increased
B	Decreased
C	Stayed the same

Read It!: Focus on Info Lit

Objective & Difficulty: INFORMATION LITERACY / Low	
What do the grayed bars in the FRED graph represent?	
Hint: Read the text at the bottom left corner of the FRED graph	
A	A type of graph
B	A logarithmic (log) scale
C	Expansions
D	Recessions

Objective & Difficulty: INFORMATION LITERACY / Low	
What is the suggested citation for the Benchmarked Unit Labor Costs - Manufacturing for the United States©?	
Hint: Read the NOTES below the FRED graph	
A	Organization for Economic Co-operation and Development, Benchmarked Unit Labor Costs - Manufacturing for the United States© [ULQBBU02USQ662N] and Japan© [ULQBBU02JPQ662N]
B	Benchmarked Unit Labor Costs - Manufacturing for the United States© [ULQBBU02USQ662N] and Japan© [ULQBBU02JPQ662N], retrieved from FRED, Federal Reserve Bank of St. Louis [today's date]
C	Organization for Economic Co-operation and Development, Benchmarked Unit Labor Costs - Manufacturing for Japan© [ULQBBU02JPQ662N], retrieved from FRED, Federal Reserve Bank of St. Louis https://research.stlouisfed.org/fred2/series/ULQBBU02JPQ662N [today's date]
D	Organization for Economic Co-operation and Development, Benchmarked Unit Labor Costs - Manufacturing for the United States© [ULQBBU02USQ662N], retrieved from FRED, Federal Reserve Bank of St. Louis https://research.stlouisfed.org/fred2/series/ULQBBU02USQ662N [today's date]

Objective & Difficulty: INFORMATION LITERACY / High	
Which elements are included in the suggested citation?	
Hint: Read the NOTES below the FRED graph	
A	Data Source; Series Name; Series ID; URL Address; Date Accessed
B	Data Source; Series Name; Series ID; Retrieval Site; URL Address; Date Accessed
C	Data Source; Series Name; Series ID; Series Units; Retrieval Site; URL Address; Date Accessed
D	Data Source; Series Name; Series ID; Retrieval Site; URL Address; Date Updated

Objective & Difficulty: INFORMATION LITERACY/ Moderate	
What does the © symbol at the end of “Benchmarked Unit Labor Costs - Manufacturing for the United States©” mean?	
Hint: Read the NOTES below the FRED graph	
A	That the name of the series is registered with a national patent office.
B	That the data contained in the series have been verified by FRED staff.
C	That the source of the data is a private organization.
D	That the organization compiling the data retains certain copyrights on its distribution.

Objective & Difficulty: INFORMATION LITERACY / Low	
What is the lowest frequency of computation of the Benchmarked Unit Labor Costs (Manufacturing) for the United States and Japan?	
Hint: Review "Modify frequency" (EDIT GRAPH > EDIT LINES) on the FRED graph	
A	Monthly
B	Quarterly
C	Semi-annual
D	Annual

Hands-On Example

Nominal and Real Minimum Wage

Setup – Theoretical Concept

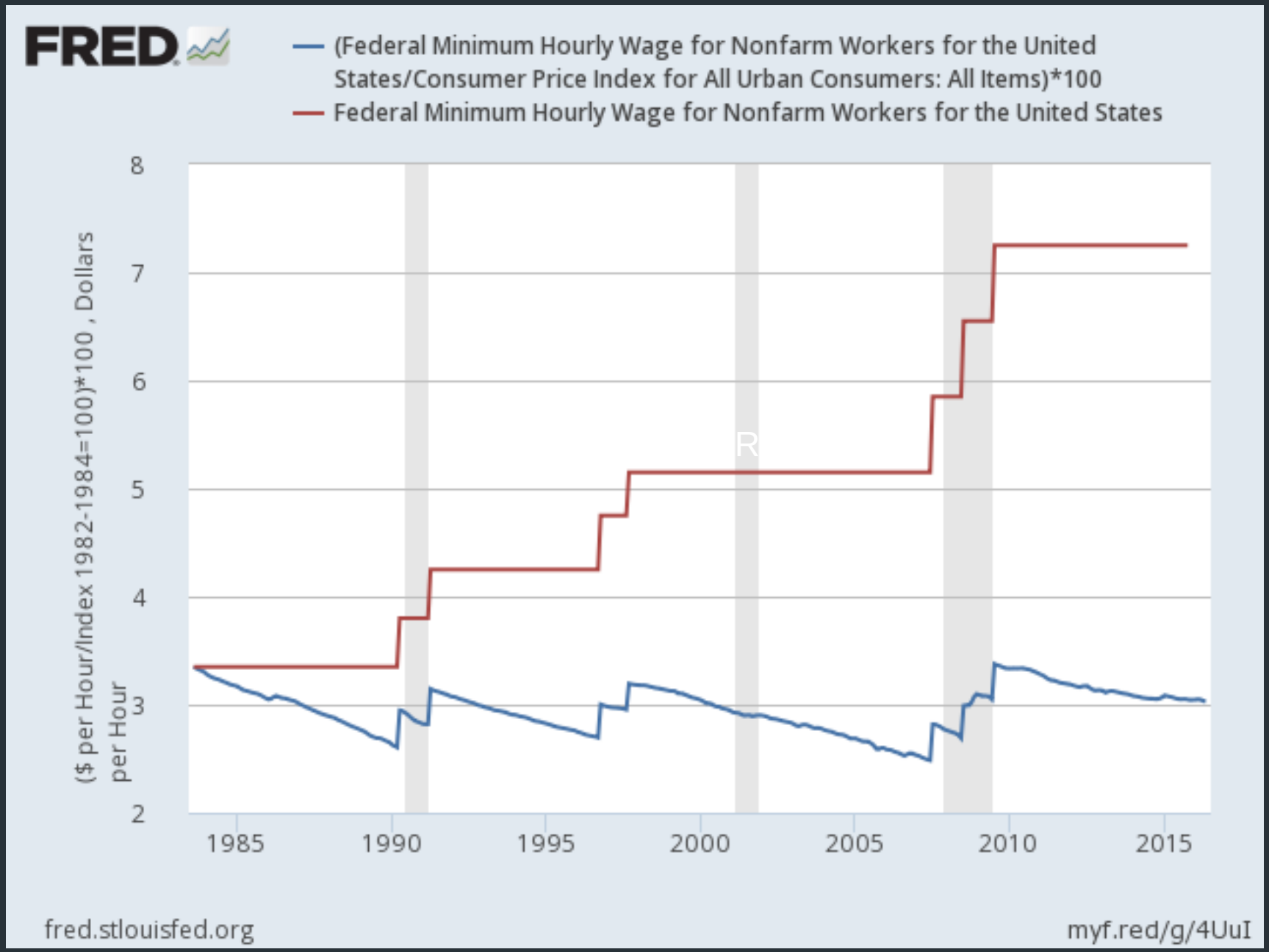
- Nominal and Real Wages
  - Nominal wages (W) are expressed in current dollars.
  - Real wages (w) are expressed in constant dollars.
  - Real wages are nominal wages adjusted for inflation: $w = (W / CPI) * 100$

Setup – FRED Database (I)

- Federal minimum wage
  - Search: Federal Minimum Hourly Wage for Nonfarm Workers for the United States, Dollars per Hour, Not Seasonally Adjusted (FEDMINNFRWG)
  - Add to Graph
  - Modify data range: 1983-08-01 to 2015-10-01

Setup – FRED Database (I)

- Federal minimum wage (real)
  - ADD LINE: Federal Minimum Hourly Wage for Nonfarm Workers for the United States, Dollars per Hour, Not Seasonally Adjusted (FEDMINNFRWG)
  - Customize data: Add > CPIAUCSL
  - Formula: (a/b)*100


FRED
(Federal Minimum Hourly Wage for Nonfarm Workers for the United States/Consumer Price Index for All Urban Consumers: All Items)*100
Federal Minimum Hourly Wage for Nonfarm Workers for the United States
($ per Hour/Index 1982-1984=100)*100 , Dollars per Hour
8
7
6
5
4
3
2
1985
1990
1995
2000
2005
2010
2015
fred.stlouisfed.org
myf.red/g/4UuI

Objective & Difficulty: INFORMATION LITERACY / Low	
What organization reports the federal minimum hourly wage for nonfarm workers for the United States?	
A	FRED (Federal Reserve Economic Database)
B	U.S. Department of Labor
C	United States Department of Commerce
D	Board of Governors of the Federal Reserve System

Objective & Difficulty: INFORMATION LITERACY / Low	
What is the highest frequency of reporting the federal minimum hourly wage for nonfarm workers for the United States?	
A	Monthly
B	Quarterly
C	Semi-annual
D	Annual

Objective & Difficulty: NUMERACY / Low	
As of July 2009, what is the value of the nominal federal minimum hourly wage for nonfarm workers for the United States?	
A	$6.55
B	$3.37
C	$7.25
D	100

Objective & Difficulty: NUMERACY / Low	
As of July 2009, what is the value of the real federal minimum hourly wage for nonfarm workers for the United States?	
A	$6.55
B	$3.37
C	$7.25
D	100

Objective & Difficulty: ECONOMIC ANALYSIS / Medium	
Between September 1997 and June 2007, the real purchasing power of the federal minimum hourly wage for nonfarm workers for the United States	
A	Decreased
B	Remained constant
C	Increased

Objective & Difficulty: ECONOMIC ANALYSIS / Medium	
Between September 1997 and June 2007, the nominal purchasing power of the federal minimum hourly wage for nonfarm workers for the United States	
A	Decreased
B	Remained constant
C	Increased

Objective & Difficulty: NUMERACY AND ECONOMIC ANALYSIS / High	
The reason why real minimum wages decrease in value while nominal minimum wages remain constant is that	
A	The cost of living increases
B	The cost of living remains constant
C	The cost of living decreases

Objective & Difficulty: NUMERACY AND ECONOMIC ANALYSIS / High	
Between July 2008 and December 2008, real minimum wages increased in value while nominal minimum wages remained constant because	
A	The cost of living increased
B	The cost of living remained constant
C	The cost of living decreased

FRED Interactives

Course Structure (I)

Introduction	Static text with: ● Student learning goals ● Related theoretical concept(s) ● Other FRED Interactives of potential interest ● Background skills
Pre-Test	Multiple choice graph-specific questions on: ● Numeracy skills ● Information literacy skills ● Economic analysis
Concept Presentation	2- to 3-minute video

Course Structure (II)

FRED Graph Build It!	Instructions to complete FRED graph-related tasks: ● Search for data by name ● Format the data: units, frequency, range ● Format the graph: type, axis
Analyze Graph Read It!	Multiple choice graph-specific questions on: ● Numeracy skills ● Information literacy skills ● Economic analysis

Course Structure (III)

New FRED Graph Build It!	Instructions to complete FRED graph-related tasks: ● Search for data by name ● Format the data: units, frequency, range ● Format the graph: type, axis
Post-Test	Multiple choice questions on: ● Numeracy skills ● Information literacy skills ● Economic analysis

What is Coming Up Next?

- Testing
- Piloting
- Additional content development
  - Summer-Fall 2017

Thank You.
Questions?