



# Teaching with Data: FRED in Introductory Economics

Diego Mendez-Carbajo

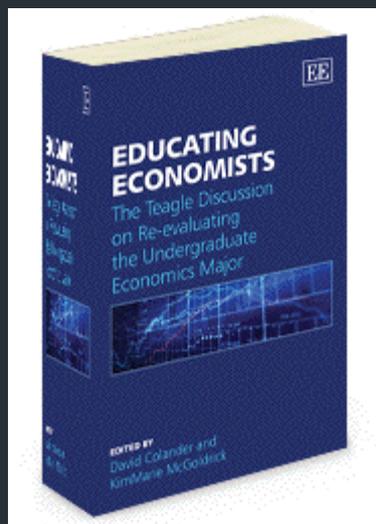
*Illinois Wesleyan University, Economics Department*

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# Introduction

# 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*

# Traditional Pedagogy and Data

## Theory first; Data illustrates

*Step #1: Lecturing on abstract concepts.*

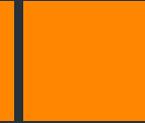
*Step #2: Plotting data as illustrations.*

## Example

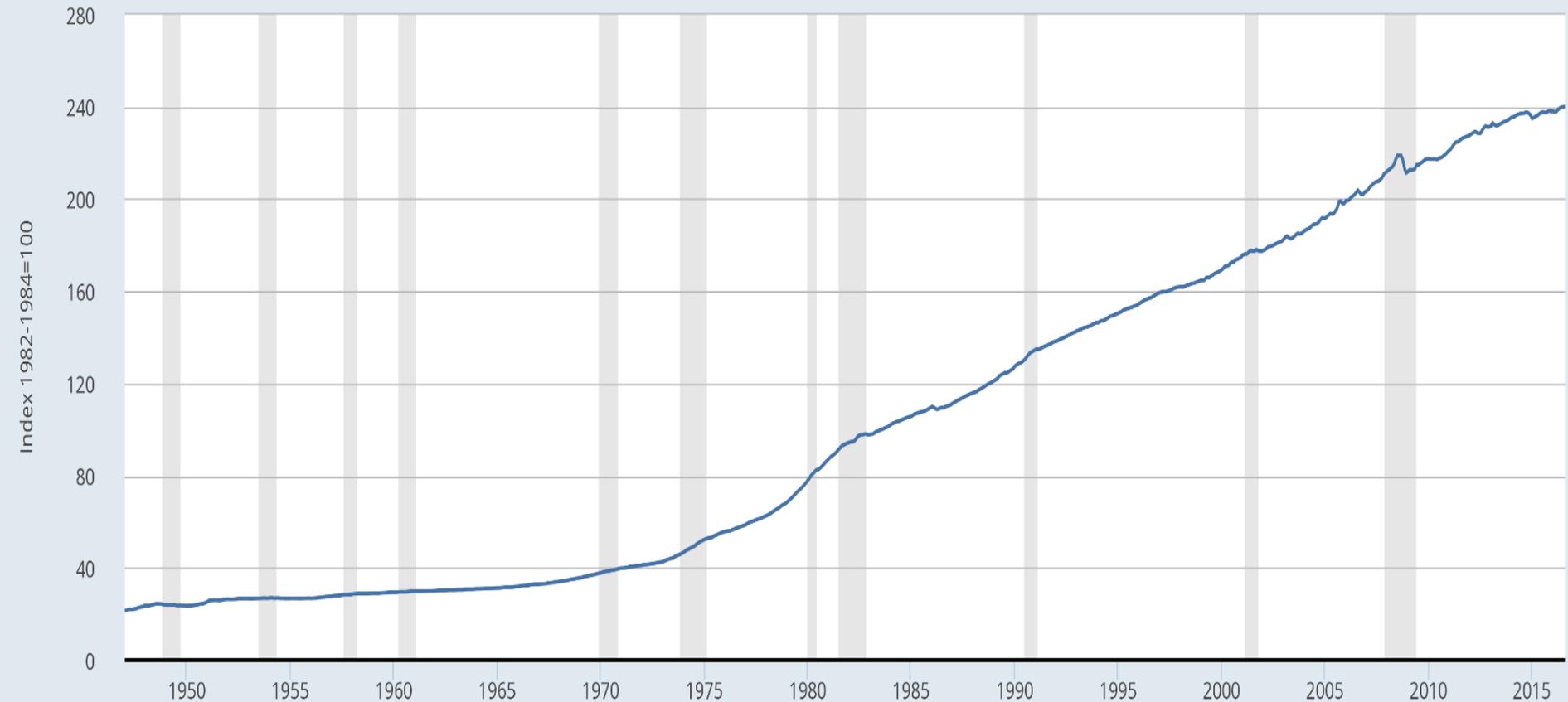
*“Inflation is the percentage growth of the CPI. The CPI is computed by first identifying the basket...”*

*“This is how the CPI or the inflation rate look like”*

# The Consumer Price Index



— Consumer Price Index for All Urban Consumers: All Items



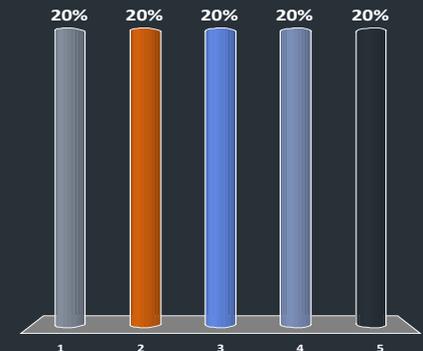
Source: US. Bureau of Labor Statistics

[fred.stlouisfed.org](http://fred.stlouisfed.org)

[myf.red/g/7aWa](https://myf.red/g/7aWa)

# What statement best describes your use of data for teaching and learning purposes?

1. I do not use data for teaching and learning purposes
2. I use data plots as lecture aids
3. I employ data-based in-class problem sets
4. I employ data-based out-of-class assignments
5. Other





# Alternative Approach

# Teaching and Learning with Data

## Data leads; Theory builds on visuals

*Step #1:* Data plots introduce and illustrate concepts.

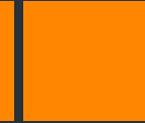
*Step #2:* Data-focused discussions lead lecturing on abstract concepts.

### Example

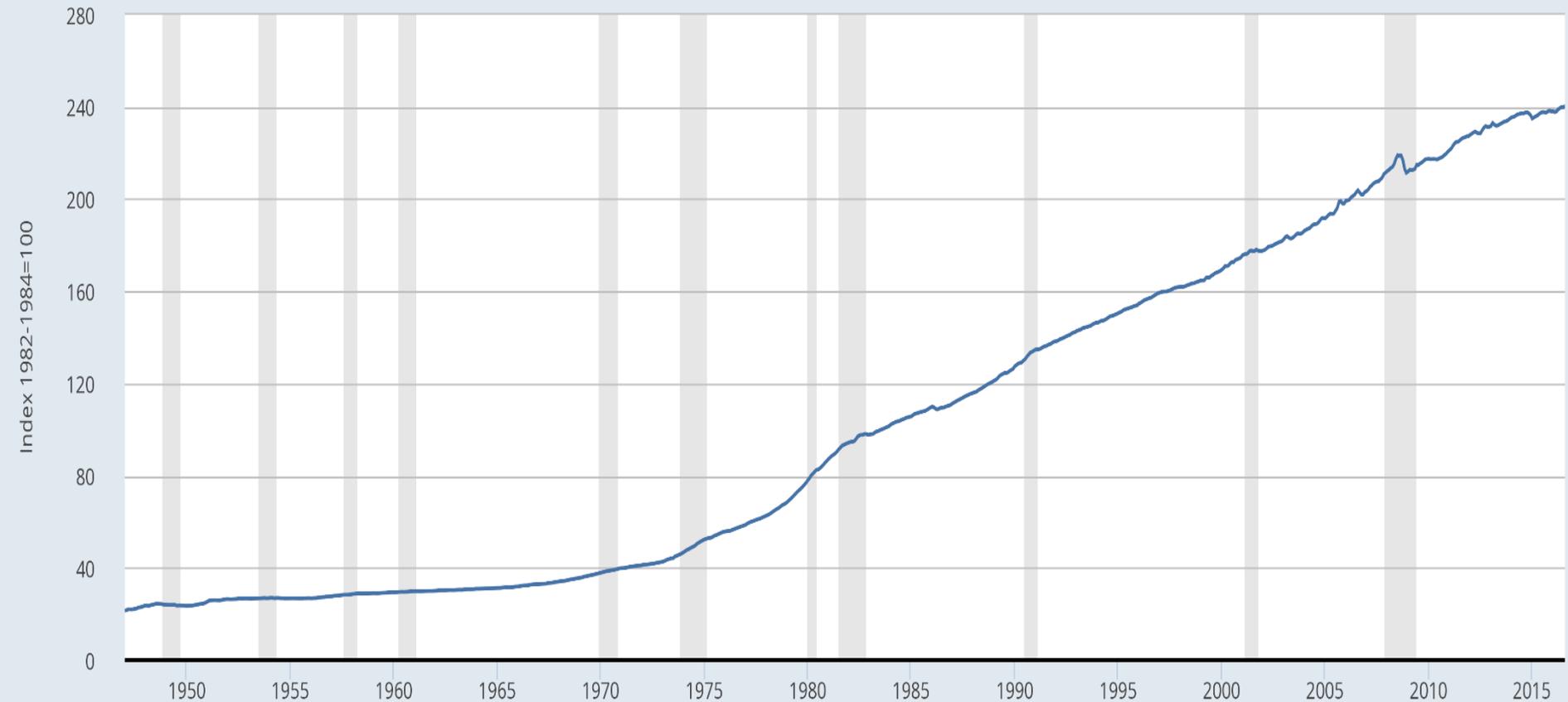
*“The CPI measures the cost of living. Is its plot a flat or an upward sloping line?”*

*“What does it mean, in terms of inflation, when the slope of the CPI plot becomes steeper?”*

# The Consumer Price Index



— Consumer Price Index for All Urban Consumers: All Items



Source: US. Bureau of Labor Statistics

[fred.stlouisfed.org](http://fred.stlouisfed.org)

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# Theoretical Foundation



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

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## ECONOMIC INSTRUCTION

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### Visualizing Data and the Online FRED Database

Diego Méndez-Carbajo

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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.

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

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

15 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"

20 (85).<sup>1</sup> 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

25 for reasoning about quantitative information."

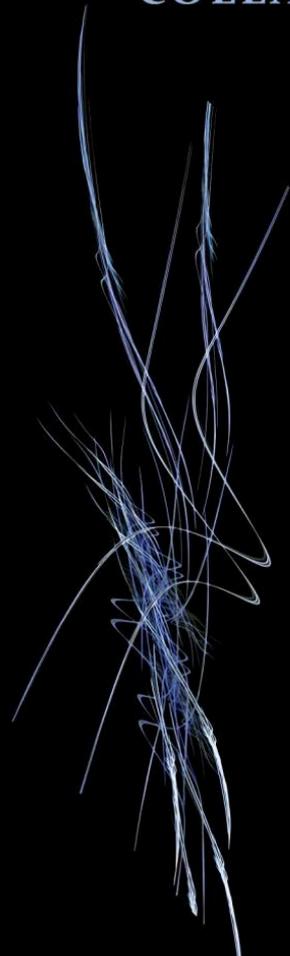
Identifying with Velenchik's (1995) description of the "limitations of theory teaching" through classroom examples, I also find them "often abstracted from context" (31). When introducing

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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](http://www.tandfonline.com/vece).

# INFORMATION LITERACY: RESEARCH AND COLLABORATION ACROSS DISCIPLINES



Edited by  
**Barbara J. D'Angelo**  
**Sandra Jamieson**  
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**Janice R. Walker**



# The Activity

# Learning Through FRED

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**CPI**  
+1.1 % Chg. from Yr. Ago on Aug 2016

**Real GDP**  
1.4 % Chg. from Preceding Period on Q2 2016

**IP**  
-0.4 % Chg. on Aug 2016

**10-Yr. Treas. Rate**  
1.63 % on 2016-10-03

**US/Euro FX Rate**  
1.1238 U.S. \$ to 1 Euro on 2016-09-30

**Civ. Unemploy. Rate**  
4.9 % on Aug 2016

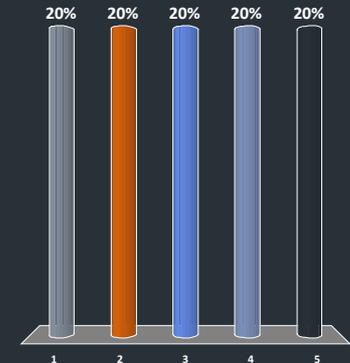
**Payroll Employment**  
+151 Chg., Thous. of Persons on Aug 2016

**Initial Jobless Claims, 4-Week Moving Average**  
256000 on 2016-09-24

<https://fred.stlouisfed.org/>

# What statement best describes your familiarity with FRED?

1. I have heard of FRED before
2. I have seen FRED before
3. I have occasionally used FRED
4. I frequently use FRED
5. Other





Hands-On Example

# Transforming Series: 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:  $w = (W / \text{CPI}) * 100$

# Setup – FRED Database (I)

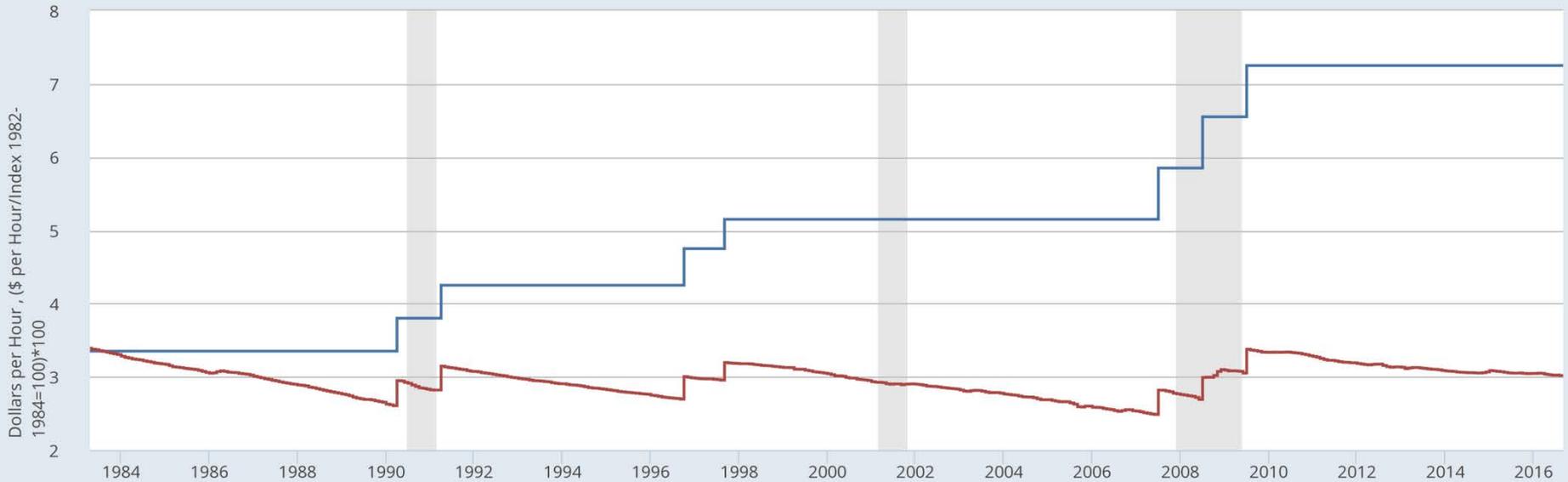
- Federal minimum wage
  - Search: Federal Minimum Hourly Wage for Nonfarm Workers for the United States, Dollars per Hour, Not Seasonally Adjusted (FEDMINNFRWG)
  - Add to Graph
  - Modify data range: 1983-08-01 to 2015-10-01

# Setup – FRED Database (I)

- Federal minimum wage (real)
  - EDIT GRAPH
  - 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:  $(a/b)*100$



- Federal Minimum Hourly Wage for Nonfarm Workers for the United States
- (Federal Minimum Hourly Wage for Nonfarm Workers for the United States/Consumer Price Index for All Urban Consumers: All Items)\*100





Hands-On Example (III)

# FRED Interactives: A Sneak Preview

## FRED Graph

DOWNLOAD 

1Y | 5Y | 10Y | Max

1970-01-01 to 2011-07-01

EDIT GRAPH 

FRED  — Gross Domestic Product  
— Real Gross Domestic Product



Shaded areas indicate US recessions

fred.stlouisfed.org 

1

Welcome

2

Pre-Test

3

Concept Presentation

4

Read It

Nominal GDP is:

 Give me a hint...

- the sum of all environmentally harmful goods and services produced in the United States, adjusted for price changes.
- the market value of all final goods and services produced within the borders of a country in a year, measured in today's prices.
- the market value of all final goods and services produced within the borders of a country in a year adjusted for price changes.
- the market value of all goods and services produced by U.S. firms, adjusted for price changes.

< Step 3 of 3



How confident?



Submit Answer 

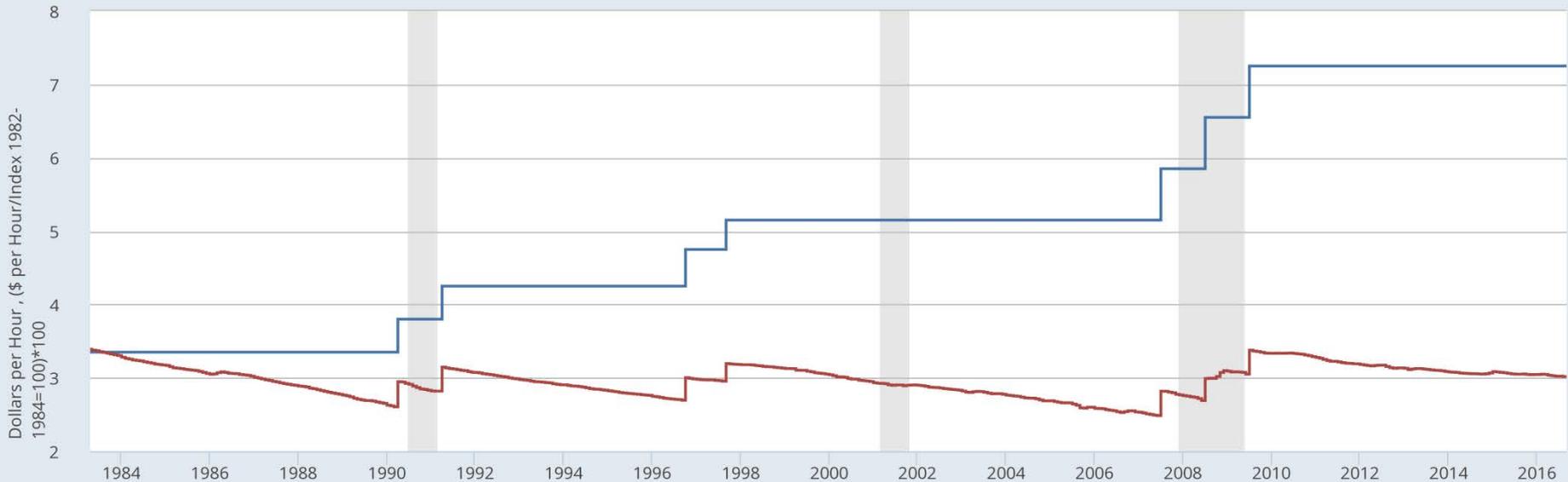
# Setup – FRED Graph

- Direct your browser to:

<https://fred.stlouisfed.org/graph/?g=7P5Y>

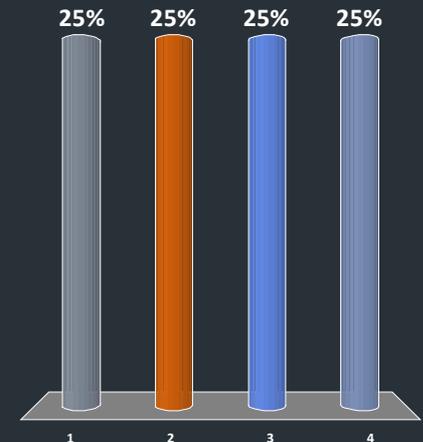


— Federal Minimum Hourly Wage for Nonfarm Workers for the United States  
— (Federal Minimum Hourly Wage for Nonfarm Workers for the United States/Consumer Price Index for All Urban Consumers: All Items)\*100



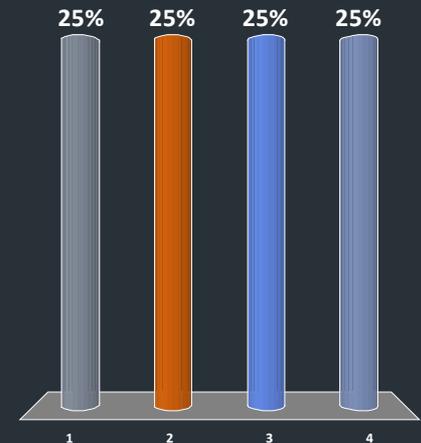
# What organization reports the federal minimum hourly wage for nonfarm workers for the United States?

1. FRED (Federal Reserve Economic Database)
2. U.S. Department of Labor
3. United States Department of Commerce
4. Board of Governors of the Federal Reserve System



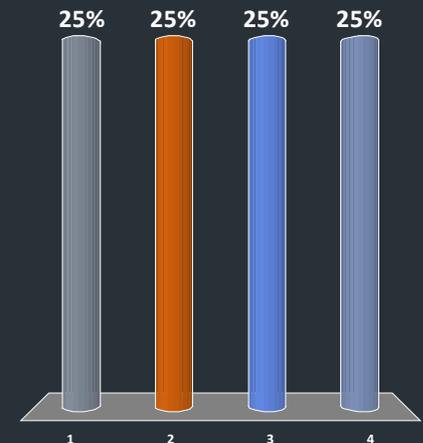
# What is the highest frequency of reporting the federal minimum hourly wage for nonfarm workers for the United States?

1. Monthly
2. Quarterly
3. Semi-annual
4. Annual



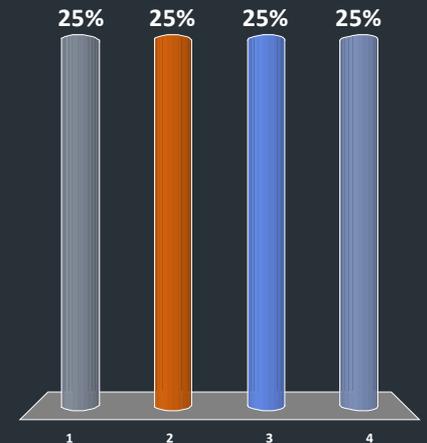
As of July 2009, what is the value of the nominal federal minimum hourly wage for nonfarm workers for the United States?

1. \$6.55
2. \$3.37
3. \$7.25
4. 100



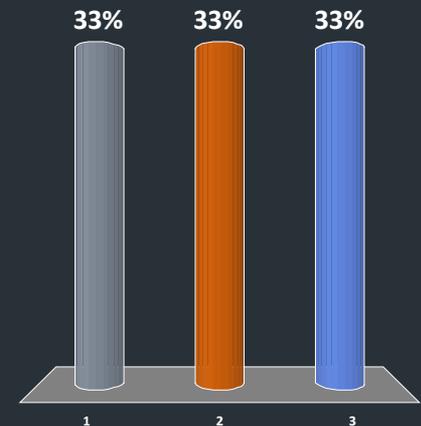
As of July 2009, what is the value of the real federal minimum hourly wage for nonfarm workers for the United States?

1. \$6.55
2. \$3.37
3. \$7.25
4. 100



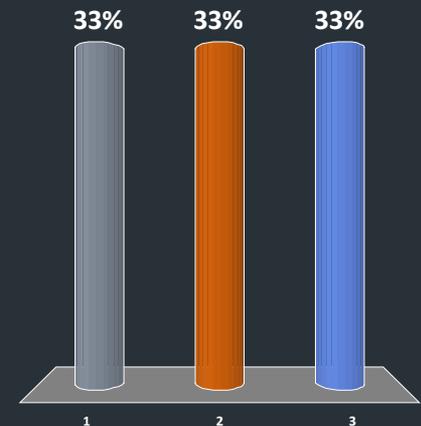
Between September 1997 and June 2007, the real purchasing power of the federal minimum hourly wage for nonfarm workers for the United States

1. Decreased
2. Remained constant
3. Increased



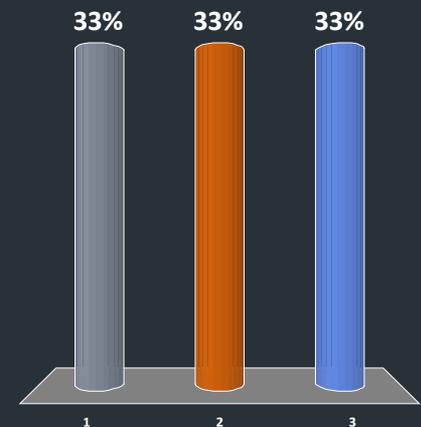
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1. Decreased
2. Remained constant
3. Increased



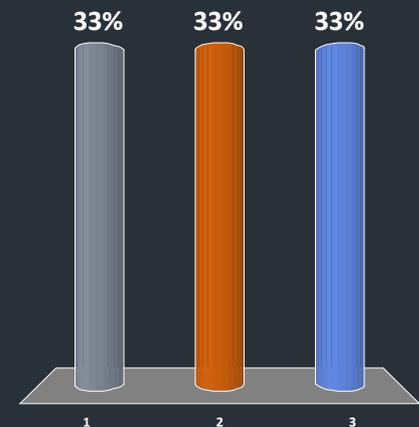
The reason why real minimum wages decrease in value while nominal minimum wages remain constant is that

1. The cost of living increases
2. The cost of living remains constant
3. The cost of living decreases



Between July 2008 and December 2008, real minimum wages increased in value while nominal minimum wages remained constant because

1. The cost of living increased
2. The cost of living remained constant
3. The cost of living decreased



# Conclusions



# 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”*

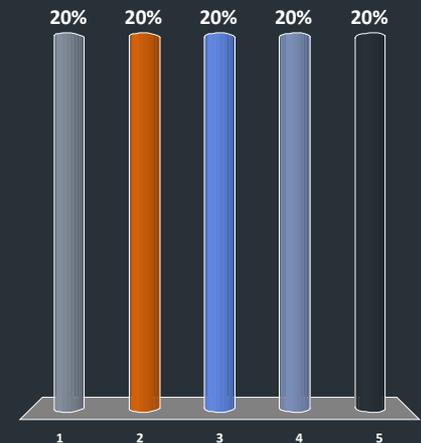
# Instructor Reflections



- 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

# What statement best describes your interest in FRED?

1. This is interesting but too complicated to use
2. This is interesting but I am too busy to use it
3. I may use FRED in my teaching
4. I will definitely try and use FRED in my teaching
5. Other





What is Coming Up Next?

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

Thank You.  
Questions?

