

Lecture 7

Inflation: Tracking Changes in the Overall Price Level

September 20th, 2019

But first: The Federal Reserve Eases interest rates:

- Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability. In light of the implications of global developments for the economic outlook as well as muted inflation pressures, the Committee decided to lower the target range for the federal funds rate to 1-3/4 to 2 percent.

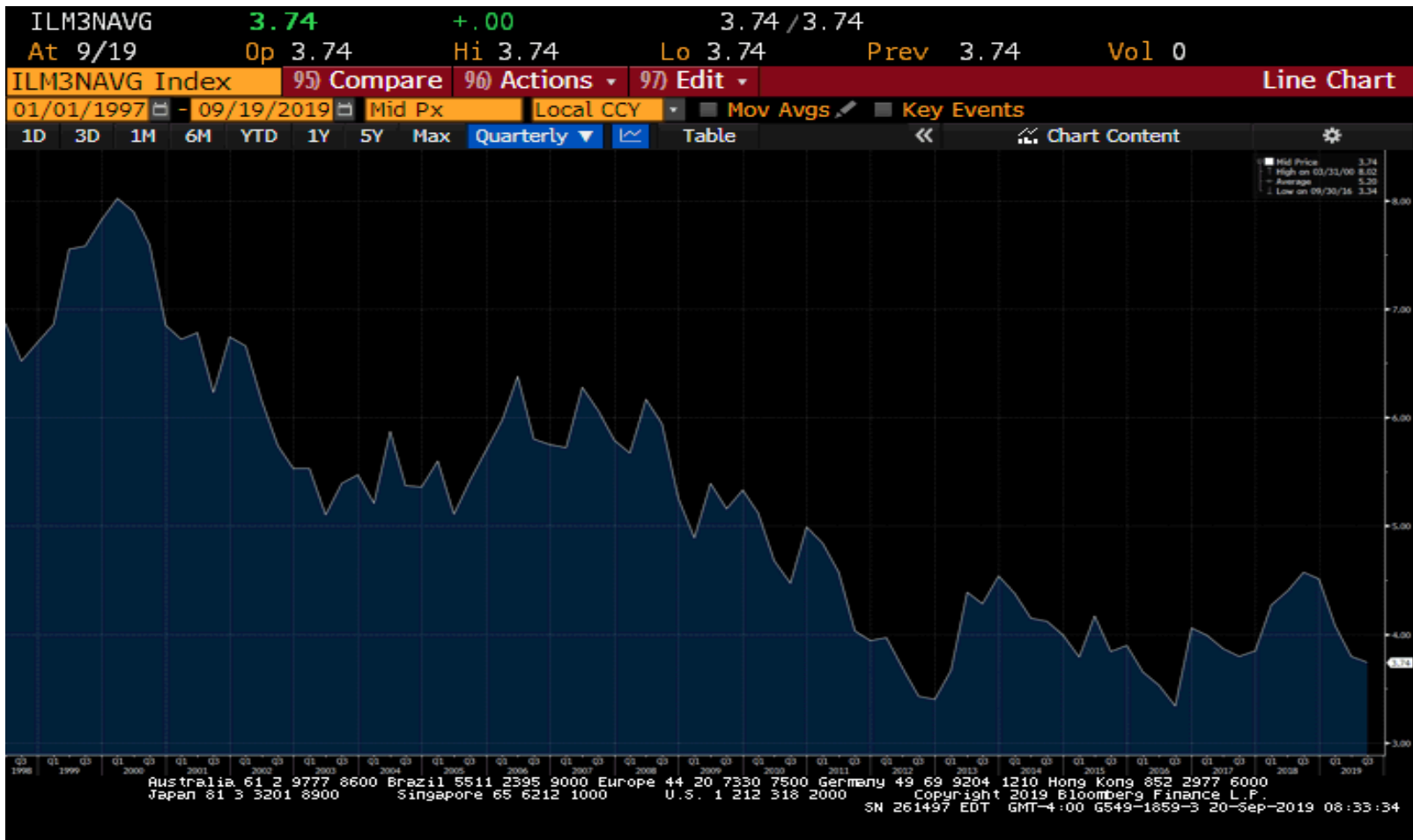
Lower interest rates?

Stimulate “big ticket” items

	<u>Jun-17</u>	<u>Dec-17</u>	<u>Nov-18</u>	<u>Apr-19</u>	<u>May-19</u>	<u>Aug-19</u>	A housing <u>Boom</u>
fixed rate mortgage	3.70%		4.85%		3.80%		1.80%
building permits (SF)		875,000		785,000		865,000	1,400,000
monthly nut on 200,000 mortgage	\$1,000/month		\$1,160/month				\$800/month

Mortgage rates: from 6.5% to 4%

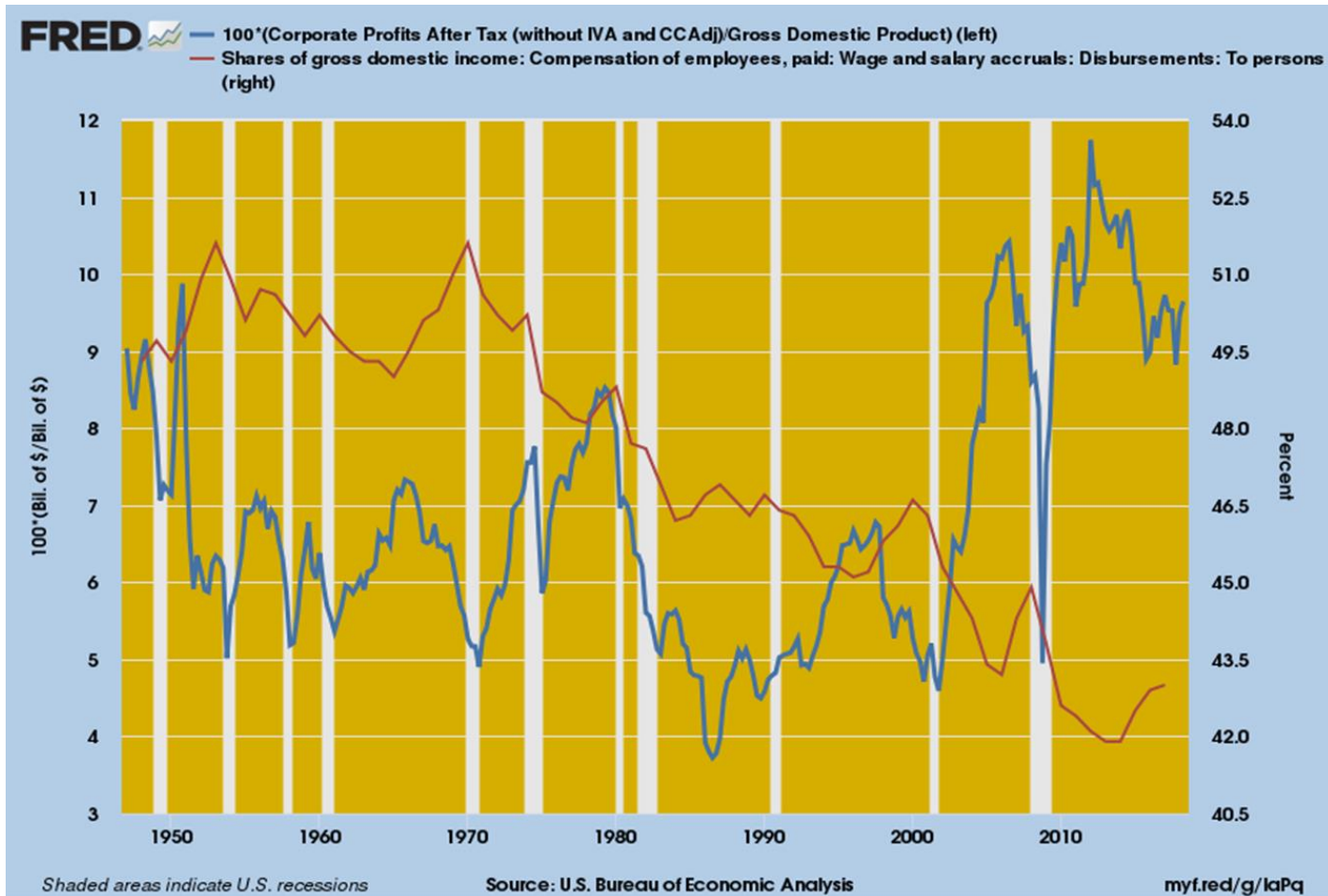
A move below 3% invites new buyers



Profits: from 6% to 10% (left)

Wages: from 50% to 43% (right)

10% of the USA population owns 84% of USA Stocks



Inflation: The Overall Price Level and its rate of change

- The overall price level is an index of a comprehensive basket of goods and services.
- The inflation rate is the speed with which the overall price level is changing.
- A rapidly rising price level, **hyperinflation**, is VERY DESTABILIZING
- A Rapidly falling price level, **deflation**, is VERY DESTABILIZING

The Three Uses for the Price index

- We use a price index to separate price changes from output shifts.
- We use a price index to guard against accelerating inflation pressures.
- We use a price index to guard against deflationary pressures.
- We attempt to keep the overall price level rising at a slow but steady rate.

Price level and inflation rate

We refer to the percentage increase in the price level from one year to the next as *inflation*.

A decrease in the price level is referred to as **deflation**

If inflation slows, from one year to the next, that is **disinflation**

If the price index rises in 2020, by 4%, **inflation** was 4%.

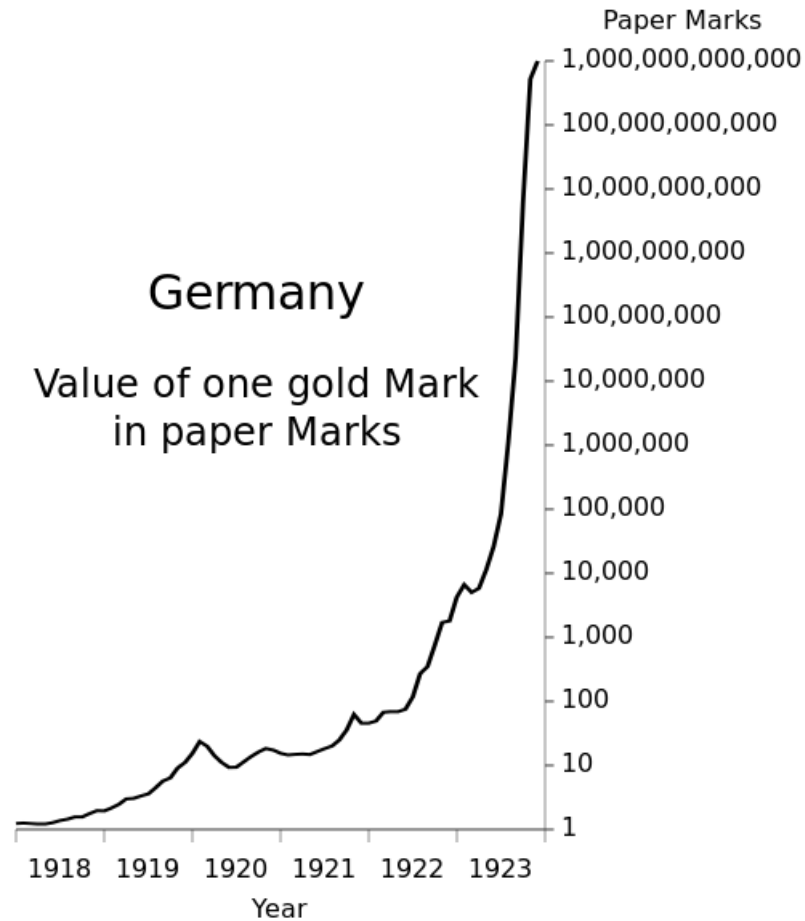
If the price index falls in 2020, by 2%, **deflation** was 2%.

If inflation was 4% in 2020 and 1% in 2021, we experienced a period of **disinflation**.

An explosive rise for the price index? **Hyperinflation**

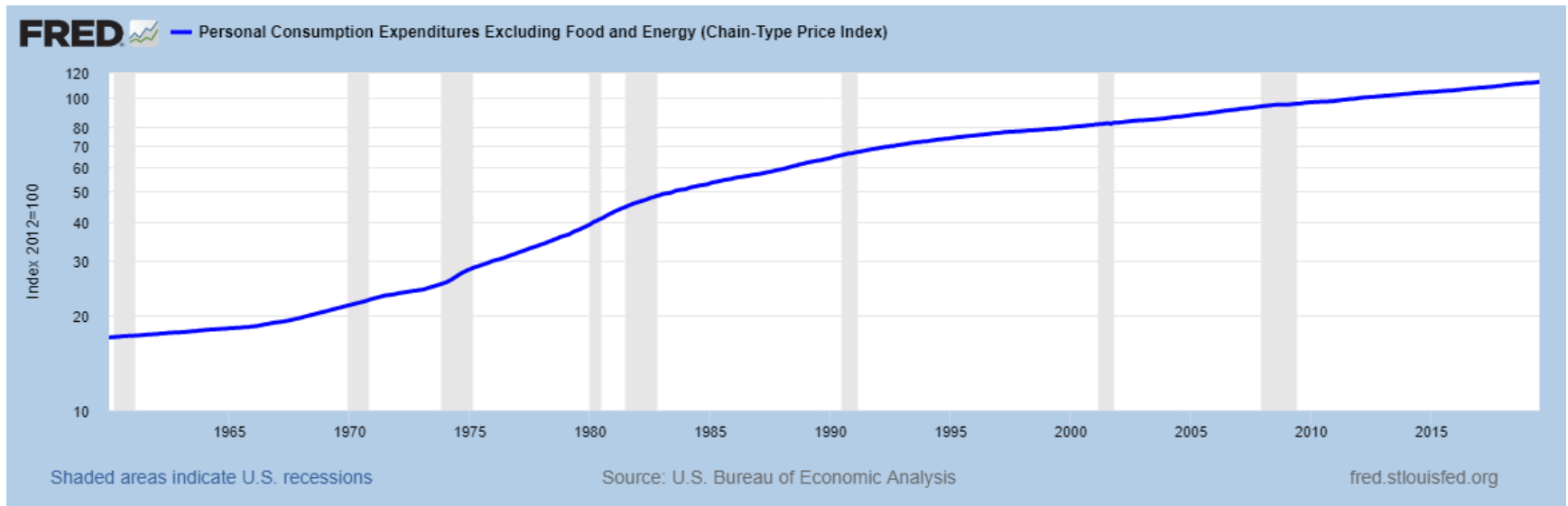
Hyperinflation: Weimar Germany, 1918-1923

From 1 to 1 trillion paper Marks for 1 gold mark

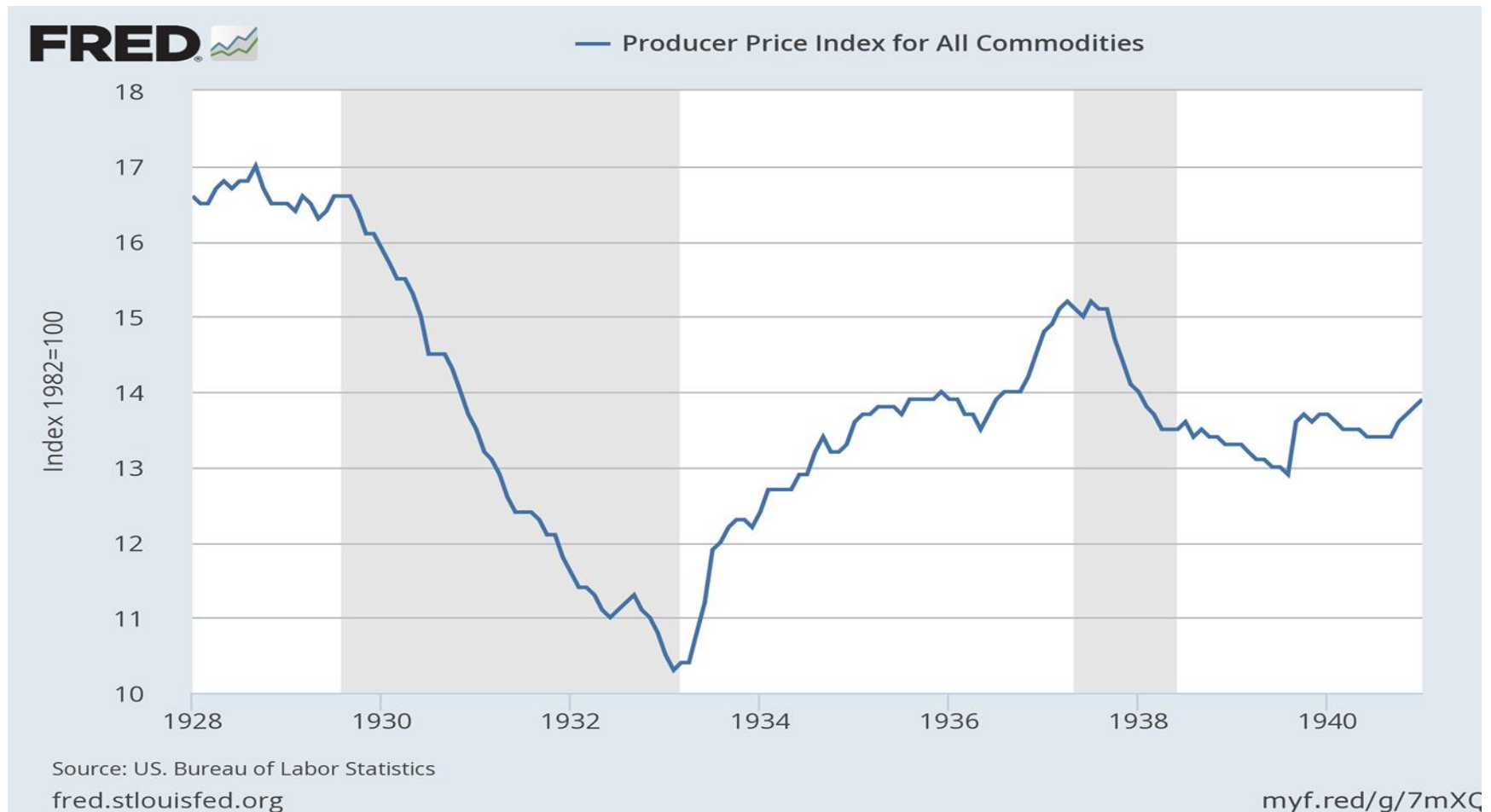


One index of prices: the PCE deflator

(excluding food and energy)

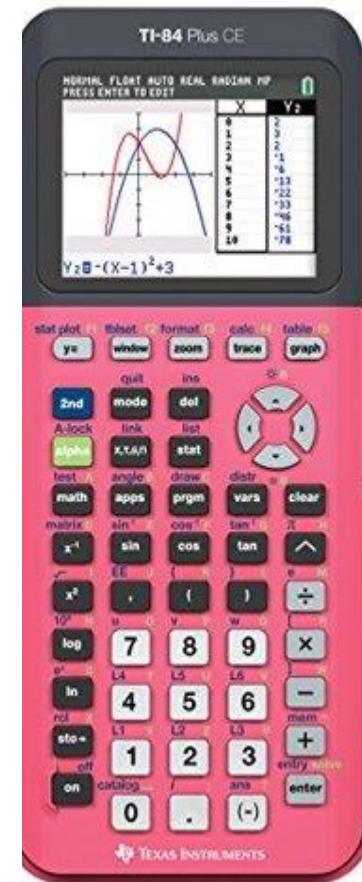


Deflation During the Great Depression: Prices Fell by 37%, And Bankruptcies Soared



	1972	2017	2017
Model	SR 10	Ti84	Ti84 +CE
Price	\$150	\$14	\$150

http://www.vintagecalculators.com/html/hand-held_calculators.html



Information Technology Investments: Prices Continue to Plunge, in the Post-War Thus 'REAL' technology investment continues to climb

	DISPOSABLE PERSONAL INCOME (Y_{pd}) (\$BILLIONS)	U.S.A. POPULATION (Pop) (MILLIONS)	PER CAPITA Y_{pd} (Y_{pd}/Pop) (\$)	PRICE FOR ONE SLIDE RULE (\$)	PRICE FOR ONE ELECTRONIC CALCULATOR (\$)	slide rule cost as % of Y_{pd}	ELECTRONIC CALCULATOR cost as % of Y_{pd}
YEAR							
1965	500	195	2,564	10	500	0.4%	20%
1972	850	2011	4,227	15	150	0.4%	4%
1977	1,435	220	6,523	20	50	0.3%	1%
2017	14,796	326	45,390	N.A.	14	N.A.	0.03%

How Do We Calculate the Inflation Rate? Lets Evaluate the Consumer Price Index (the CPI)

To calculate the CPI in a given year, we need:

- A **FIXED** *basket of goods and services*
- The cost to purchase the basket of goods and services in a *base year*
- The prices in the current year

The CPI in the current year is the cost to purchase the **FIXED** basket of goods this year, divided by the cost in the base year. By convention, we adjust the index level so that the CPI in the base year is 100.

An American Dreaming

She is In Paris

		BASE	YEAR:	1982
		QUANTITY	PRICE	EXPENDITURE
TEETH	CLEANING	2	\$35	\$70
CHEESE	WEDGES	20	\$7	\$140
RED	WINE	10	\$25	\$250
WHITE	WINE	10	\$25	\$250
	TOTAL			\$710

What Are the Price Levels in 2015?

Multiply Times 1982 Expenditure levels

			YEAR:	2015
		QUANTITY	PRICE	EXPENDITURE
TEETH	CLEANING	2	\$70	\$140
CHEESE	WEDGES	20	\$14	\$280
RED	WINE	10	\$125	\$1,250
WHITE	WINE	10	\$50	\$500
	TOTAL			\$2,170

Do the same using
price levels for 2016.

			YEAR:	2016
		QUANTITY	PRICE	EXPENDITURE
TEETH	CLEANING	2	\$74	\$148
CHEESE	WEDGES	20	\$16	\$320
RED	WINE	10	\$127	\$1,270
WHITE	WINE	10	\$51	\$510
	TOTAL			\$2,248

Reminder!!! We ASSUMED fixed purchase weights!

Quantities bought are fixed.

Spending increases only reflect price changes.

			QUANTITY:	
		1982	2015	2016
TEETH	CLEANING	2	2	2
CHEESE	WEDGES	20	20	20
RED	WINE	10	10	10
WHITE	WINE	10	10	10

Calculating the **CPI** **Index Level**, for a given year

- $$\text{CPI} = \frac{\textit{expenditure in current year}}{\textit{expenditure in base year}} \times 100$$
- 2015 Level: $(\$2,170/\$710) \times 100 = 306$
- 2016 Level: $(\$2,248/\$710) \times 100 = 317$

Calculating the inflation rate in 2016

- CPI in 2015 = 306
- CPI in 2016 = 317
- CPI measured inflation rate in 2016:
 $((317/306)-1) \times 100 = 3.6\%$
OR
 $((317-306)/306) \times 100 = 3.6\%$

CPI is a Fixed Basket. One Problem? Substitution Bias:
 (Do you think **Red Wine** would remain as popular as **White wine**?)

					NEW PRICE
		PRICE IN	PRICE IN	PERCENTAGE	AS MULTIPLE
		1982	2015	CHANGE	OF OLD PRICE
TEETH	CLEANING	\$35	\$70	100%	2 TIMES
CHEESE	WEDGES	\$7	\$14	100%	2 TIMES
RED	WINE	\$25	\$125	400%	5 TIMES
WHITE	WINE	\$25	\$50	100%	2 TIMES

The Weights That Were Used for the August 2019 CPI Report:

ALL ITEMS	100%		
FOOD	13%	SERVICES EX-ENERGY	60%
FOOD AT HOME	7%	OWNERS' EQUIVALENT RENT	24%
FOOD AWAY FROM HOME	6%		
ENERGY	7%	CORE SERVICES	37%
GASOLINE	4%	RENT OF PRIMARY RESIDENCE	8%
ELECTRICITY	2.6%	MEDICAL CARE SERVICES	7%
		TRANSPORTATION SERVICES	6%
EX-FOOD AND ENERGY	80%	EDUCATION SERVICES	6%
HOUSEHOLD FURNISHINGS	3%	RECREATION SERVICES	4%
APPAREL	3%		
VEHICLES	4%		
MEDICAL GOODS	2%		
RECREATIONAL GOODS	2%		
BOOZE AND TOBACCO	2%		

We Can Organize these items into useful sub-categories:

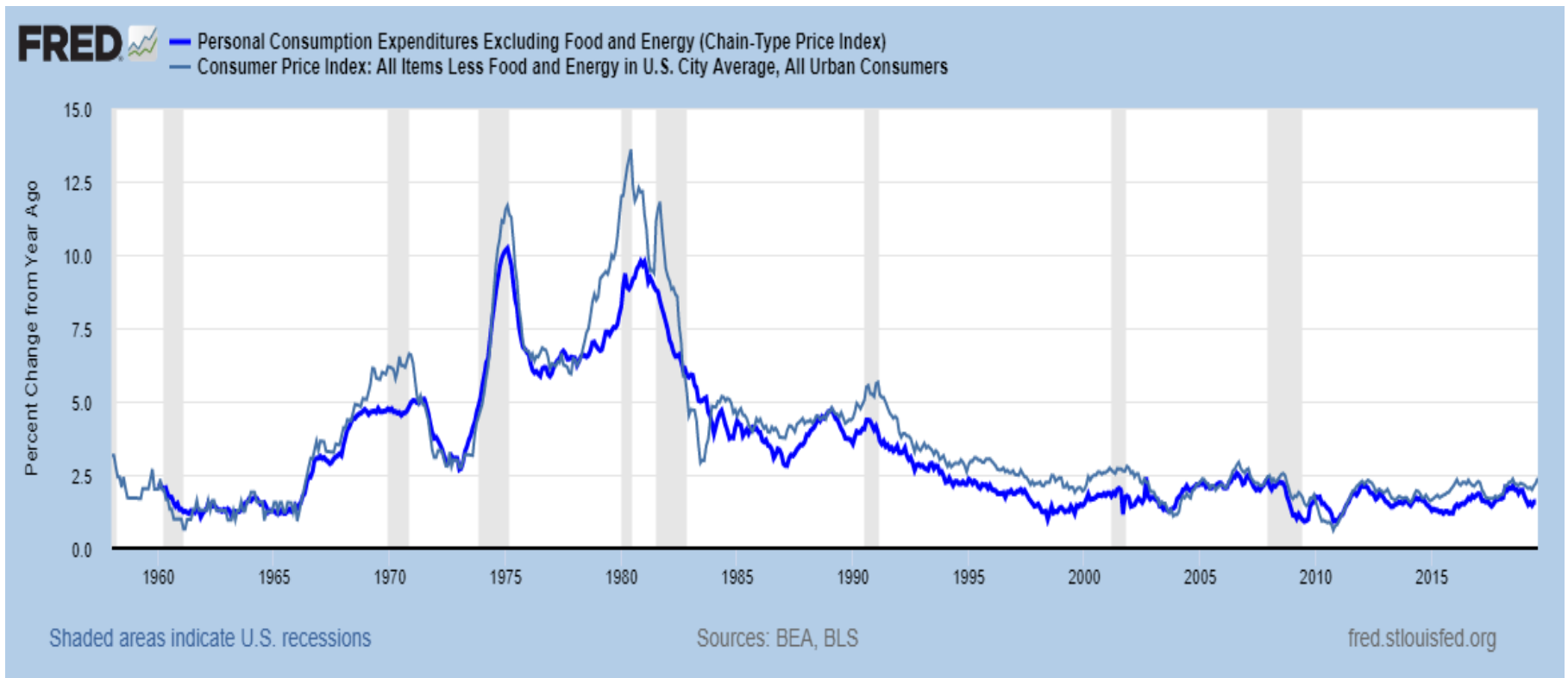
	ALL ITEMS	100%
	FOOD	13%
	ENERGY	7%
	CORE (EX-FOOD AND ENERGY)	80%
	GOODS EX-FOOD AND ENERGY	20%
	CORE SERVICES	36%
	OWNER'S EQUIVALENT RENT	24%

Price Trends of CPI Sub-sectors.

Goods Inflation Has Been Weak:

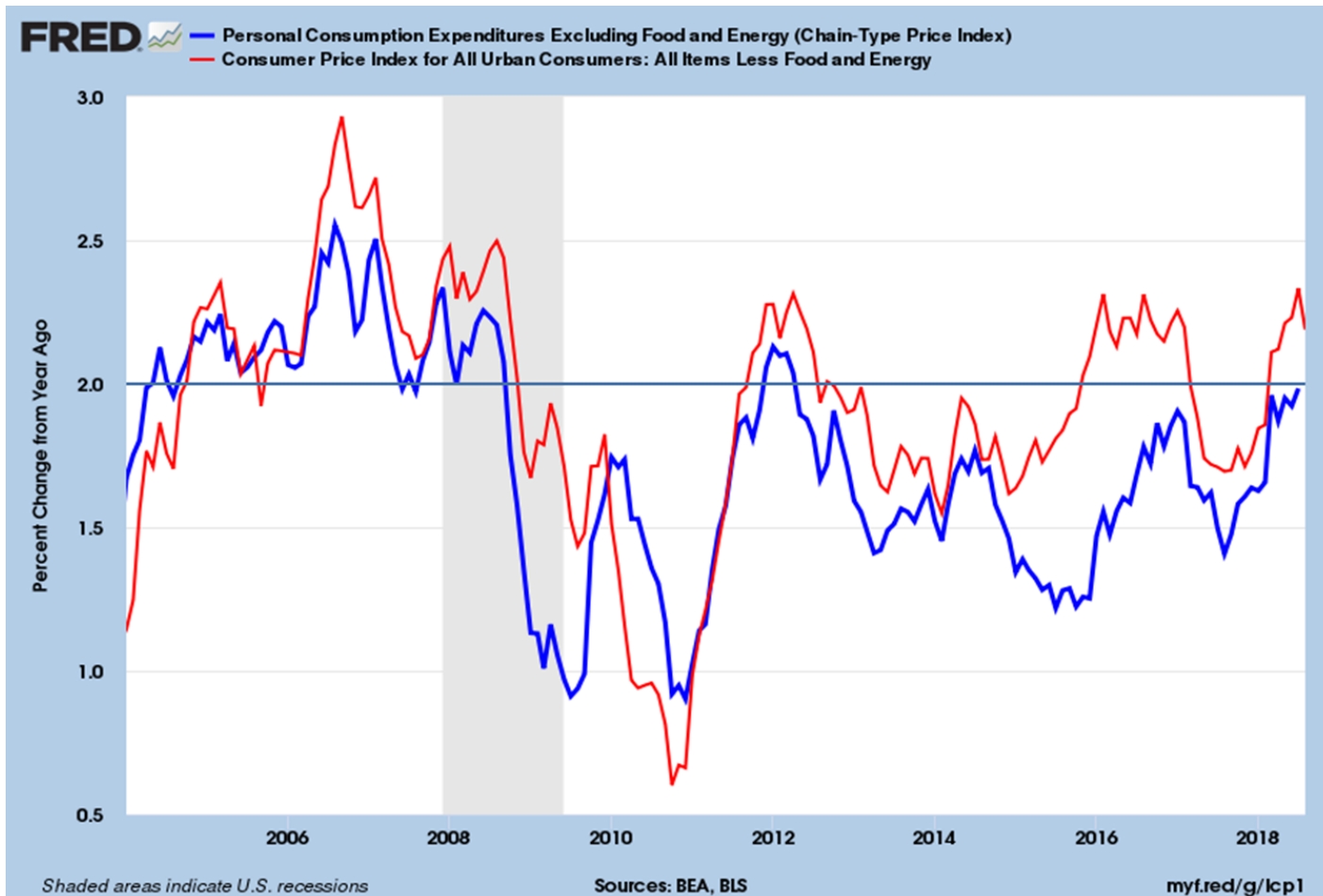
U.S. INFLATION SNAPSHOT:	1995 to 2005	YEAR-ON-YEAR		
	ANNUALIZED	% CHANGE		
TOTAL	2.5%	1.7%		
CORE (EX-FOOD AND ENERGY)	2.2%	2.4%		
FOOD	2.5%	1.7%		
ENERGY	5.7%	-4.4%		
GOODS EX-FOOD AND ENERGY	0.0%	0.8%		
SERVICES EX-ENERGY SERVICES	3.1%	2.9%		
OWNERS' EQUIVALENT RENT	3.0%	3.3%		
CORE SERVICES				

Core inflation: Nearly Invisible versus the late 1970s

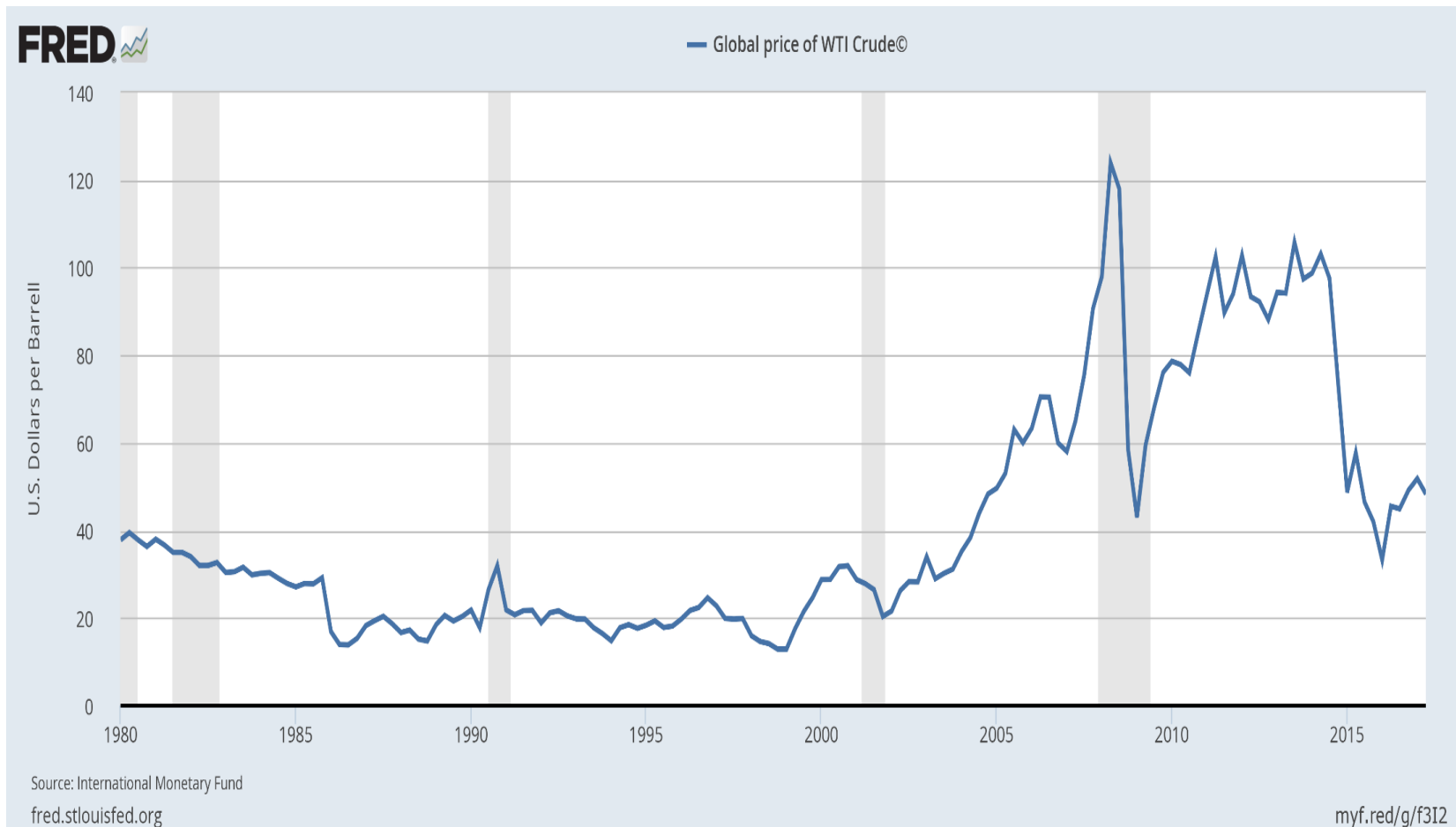


Core Inflation: 2002 to 2019

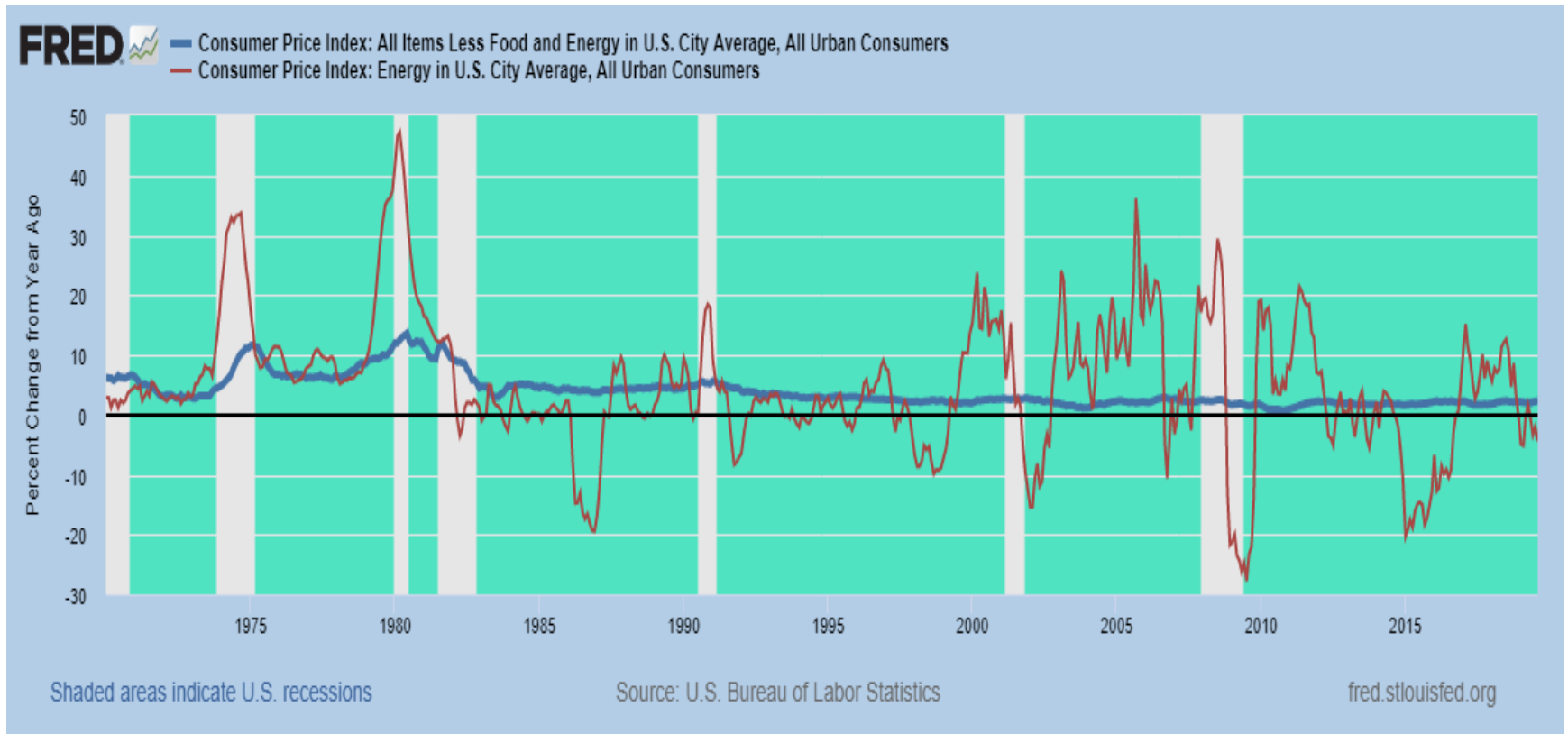
Oscillating Between 1% and 3%



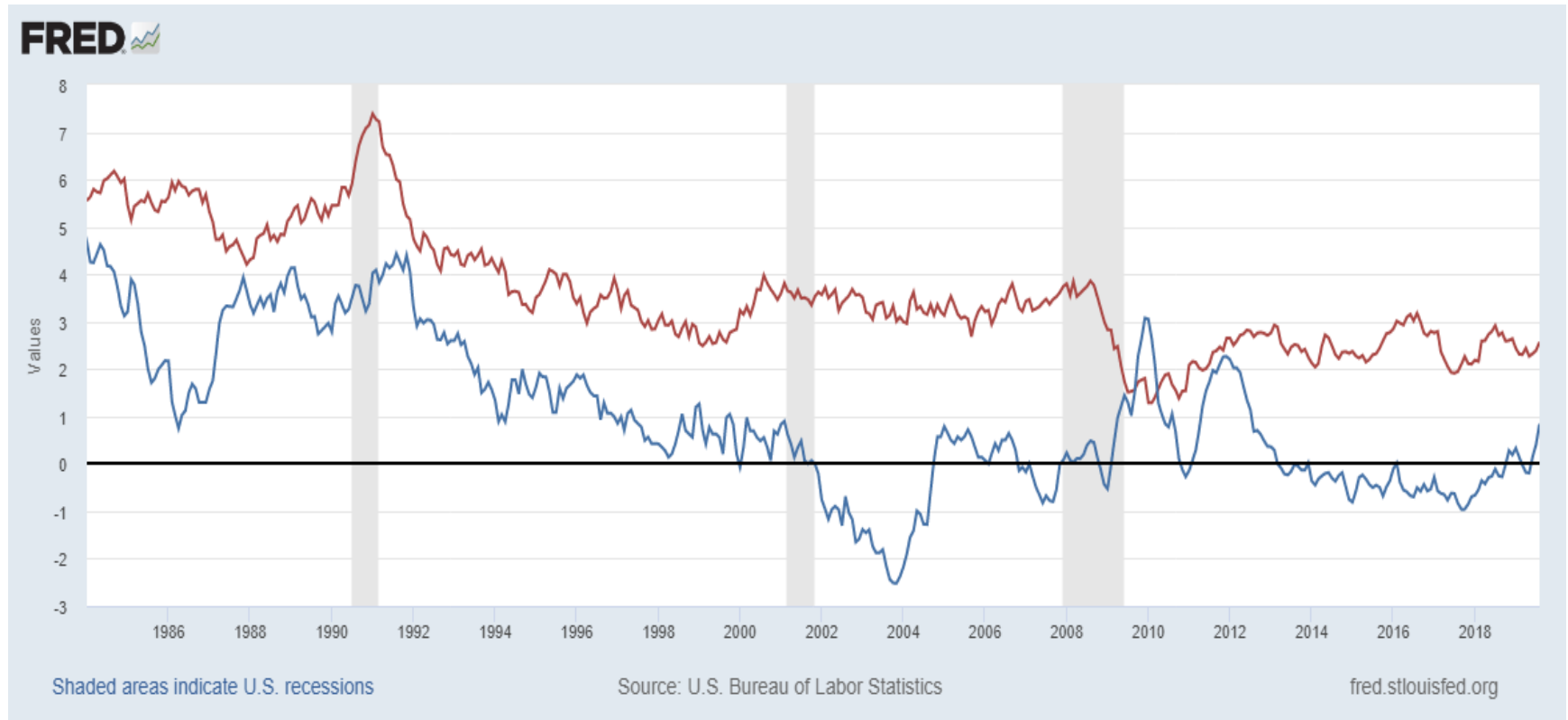
Oil prices drive CPI Energy: they are extremely volatile



Contrast CPI Energy, YOY with Core CPI, YOY



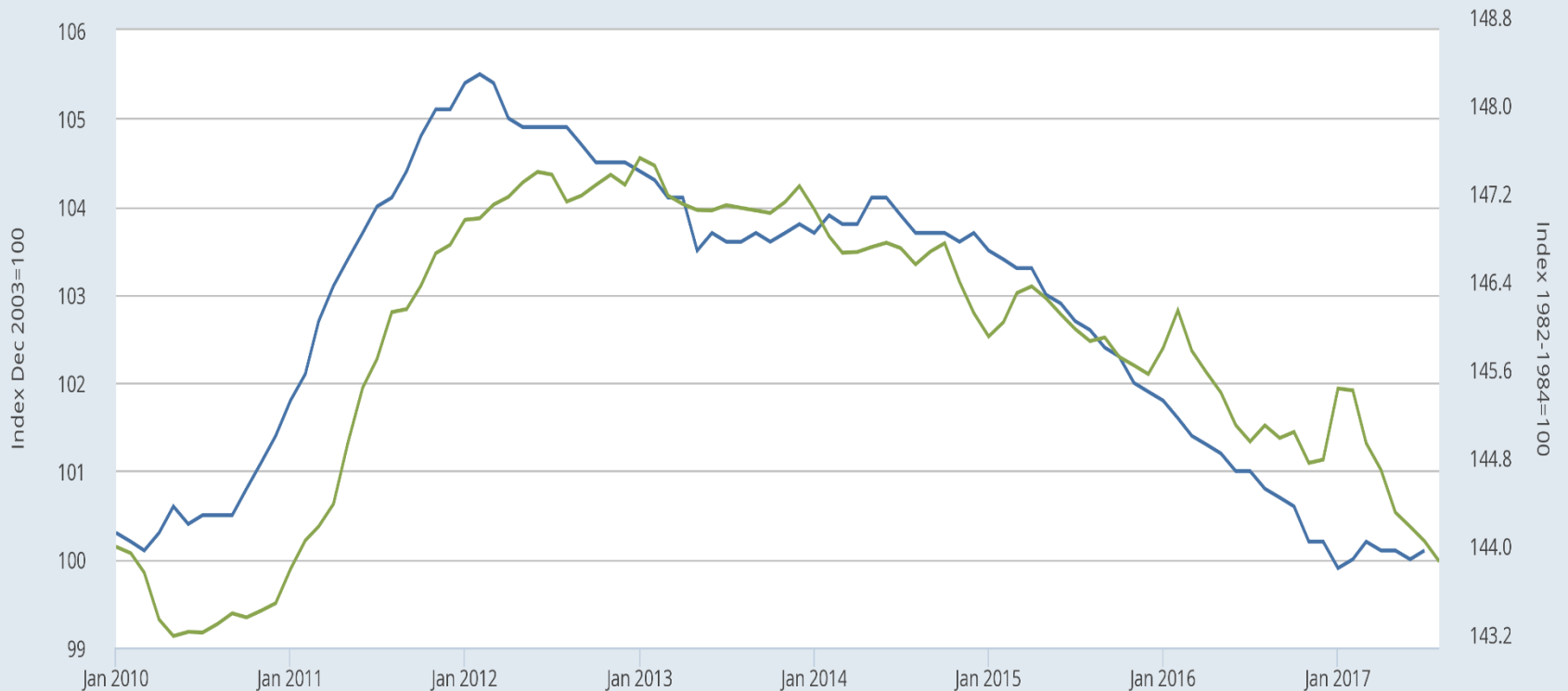
Core Goods (Blue), 20%, Affected by China Core Services (Red), 36%, U.S. Dynamics



The price of **imported products from China**: A growing influence on **U.S. core goods prices**.

FRED 

— Import Price Index: China - All commodities (left)
— Consumer Price Index for All Urban Consumers: Commodities less food and energy commodities (right)



Source: U.S. Bureau of Labor Statistics
fred.stlouisfed.org

myf.red/g/f3Jl

We use inflation measures to allow us to calculate real GDP

- Nominal GDP rises by 4.25% in 2016
- Overall prices rise by 2.05% in 2016
- Roughly speaking, real GDP rose by 2.20% in 2016
- Make sure you can calculate nominal and real GDP, from gains in output and prices (p250-252)

**Let's calculate nominal GDP for the 4 years presented
(Nominal GDP = Sum of (P × Q))**

NOMINAL GDP			
2012			
	price/item	Quantity	expenditures
movies	\$8	1,000	\$8,000
apples	\$20	500	\$10,000
motor cycles	\$30	200	\$6,000
GDP ≡ sum of spending			\$24,000
2015			
	price/item	Quantity	expenditures
movies	\$9	1216	\$10,940
apples	\$20	608	\$12,155
motor cycles	\$32	243	\$7,779
GDP ≡ sum of spending			\$30,874
2016			
	price/item	Quantity	expenditures
movies	\$10	1240	\$12,398
apples	\$30	620	\$18,597
motor cycles	\$34	248	\$8,431
GDP ≡ sum of spending			\$39,426
2017			
	price/item	Quantity	expenditures
movies	\$11	1302	\$14,320
apples	\$23	651	\$14,971
motor cycles	\$35	260	\$9,113
GDP ≡ sum of spending			\$38,403

Nominal GDP Growth (Annualized rate)

2016 vs 2015: $(\$39,426/\$30,874) - 1 = 27.7\%$

2017 vs 2016: $(\$38,403/\$39,426) - 1 = -2.6\%$

2016 vs 2012: $((\$38,403/\$24,000)^{1/4}) - 1 = 12.5\%$

Now we calculate Real GDP

(We use 2012 Prices)

	REAL GDP		
	2012		
	price/item	Quantity	expenditures
movies	\$8	1,000	\$8,000
apples	\$20	500	\$10,000
motor cycles	\$30	200	\$6,000
GDP \equiv sum of spending			\$24,000
	2015		
	price/item	Quantity	expenditures
movies	\$8	1216	\$9,724
apples	\$20	608	\$12,155
motor cycles	\$30	243	\$7,293
GDP \equiv sum of spending			\$29,172
	2016		
	price/item	Quantity	expenditures
movies	\$8	1240	\$9,919
apples	\$20	620	\$12,398
motor cycles	\$30	248	\$7,439
GDP \equiv sum of spending			\$29,756
	2017		
	price/item	Quantity	expenditures
movies	\$8	1302	\$10,414
apples	\$20	651	\$13,018
motor cycles	\$30	260	\$7,811
GDP \equiv sum of spending			\$31,243

Real GDP Growth (Annualized rate)

2016 vs 2015: $(\$29,756/\$29,172) - 1 = 2\%$

2017 vs 2016: $(\$31,243/\$29,756) - 1 = 5\%$