

Lecture 6

GDP: Measuring Output and Income



- Alternative Measures

Real World Approximations

- September 18th, 2019

CONSIDER THE FOLLOWING HEADLINE AND EXCERPTS FROM 1 YEAR AGO:

GDP report proves Trump is turning the economy around

By [Jonathon Trugman](#)/ New York Post/ July 28, 2018

- “Friday’s [powerful gross domestic product report](#) adds to the evidence that President Trump and his economic team have turned the world’s largest economy from a stale and stagnant one to an empowering and uplifting machine.”
- “The second quarter’s GDP rise of 4.1 percent is the strongest non-zero percent interest rate, quantitative easing free number we’ve had in over a decade.”
- As an opinion-based columnist who practices his trade in the real economic world, **I believe** that the **GDP** is the single **most important provider of individual liberty and economic freedom in America**.
- This is the primary reason I have always found it so desirable to have **bona fide business brains** in the White House as opposed to the traditional politicians who inhabit Washington.
- **Team Trump** — now headed by the president, Larry Kudlow, Kevin Hassett and several others — **is delivering truly remarkable legitimate GDP growth**.

Can we evaluate these claims?

Let's define **GDP** and review its recent performance

- **Product**: all final goods and services produced
 - (cars are included // steel is excluded)
- **Domestic**: produced on U.S. soil
 - (Honda made in US, **Yes** // Ford made in Peru, **No**)
- **Gross**: Investment Goods are included, without attention to wear and tear
 - Includes computer purchases, but ignores company junking old computers

Key Words

- **Nominal GDP:** GDP measured in current dollars
- **Money Value:** Roughly, Price X Output
- **Final Output:**
 - Goods & Services purchased by final or ultimate users
 - Ignores Purchases of intermediate goods to avoid double-counting

Inflation: Overall Price Level Changes:
Subtracted to Calculate Constant dollar GDP

- The overall price level is a comprehensive basket of goods and services.
- The inflation rate is the speed with which the overall price level is changing.
- **Inflation:** subtracted to calculate **real GDP**.
 - Nominal GDP rises by 4.2%
 - Overall prices rise by 2%
 - Roughly speaking, real GDP rose by 2.2%

A STYLIZED ECONOMY: ONE UNIT OF OUTPUT

		FINISHED PRODUCT	TOTAL INCOME				
	VALUE ADDED:	SELLING PRICE:	PAYMENTS:	=	WAGES +	RENTS +	INTEREST + PROFITS
ALPHA LUMBER COMPANY	\$10	\$10	\$10		\$8	\$1	0\$ \$1

A stylized economy: one unit of final output

		FINISHED PRODUCT	TOTAL INCOME				
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ALPHA LUMBER COMPANY	\$10	\$10	\$10		\$8	\$1	0\$ \$1
BETA FURNITURE FACTORY	\$60	\$70	\$60		\$55		\$5

A stylized economy: one unit of final output

		FINISHED PRODUCT	TOTAL INCOME				
	VALUE ADDED:	SELLING PRICE:	PAYMENTS: =	WAGES +	RENTS +	INTEREST +	PROFITS
ALPHA LUMBER COMPANY	\$10	\$10	\$10	\$8	\$1	0\$	\$1
BETA FURNITURE FACTORY	\$60	\$70	\$60	\$55			\$5
GAMMA RETAILER	\$30	\$100	\$30	\$20	\$2	\$3	\$5
TOTALS	\$100		\$100				

GDP: Statistical Approximations

- The Bureau of Economic Analysis (BEA) provides both **annual** and **quarterly** estimates.
- Last month, BEA estimated **2019 real GDP** to be **\$18.638 trillion**.
- Thus in calendar year 2019, the **value of all final goods and services produced**, in **constant prices**, equaled \$18.638 trillion.

BEA: Quarterly Annualized Estimates

- one month after the conclusion of a quarter, BEA provides an estimate for quarterly GDP.
- Quarterly estimates are provided as **annualized** figures.
- They are also adjusted for recurring seasonal patterns—they are “**seasonally adjusted**”.

A THREE MONTH FLOW ANNUALIZED TO A YEAR

2019:Q2, GDP = \$19.023 trillion

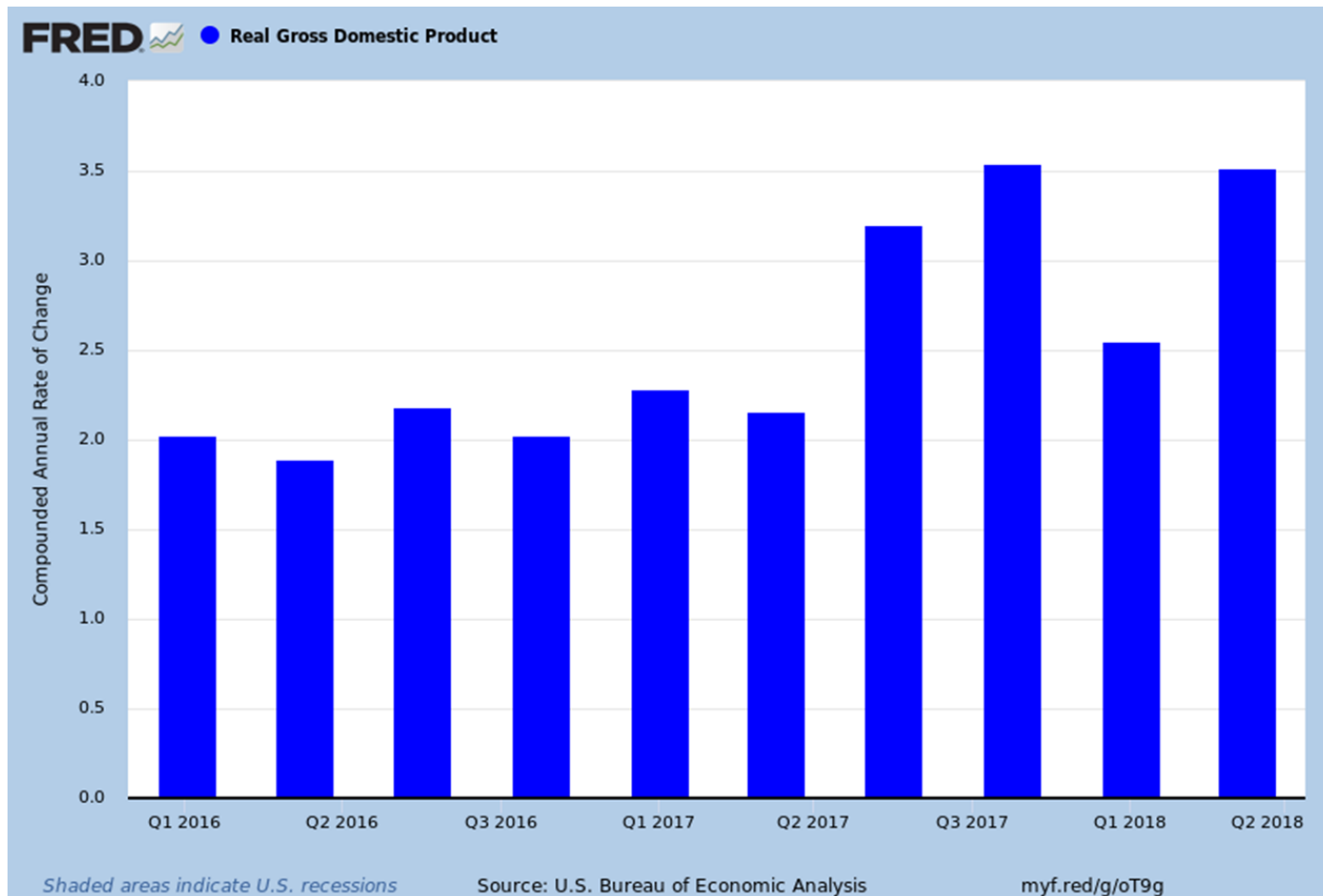
- In the second quarter of 2019, the value of all final goods and services, in constant dollars, accumulated at a **seasonally adjusted** \$19.023 trillion **annualized rate**.
- BEA collects 3 months of data, and multiplies by 4.

How does BEA calculate Quarterly GDP Growth Rates?

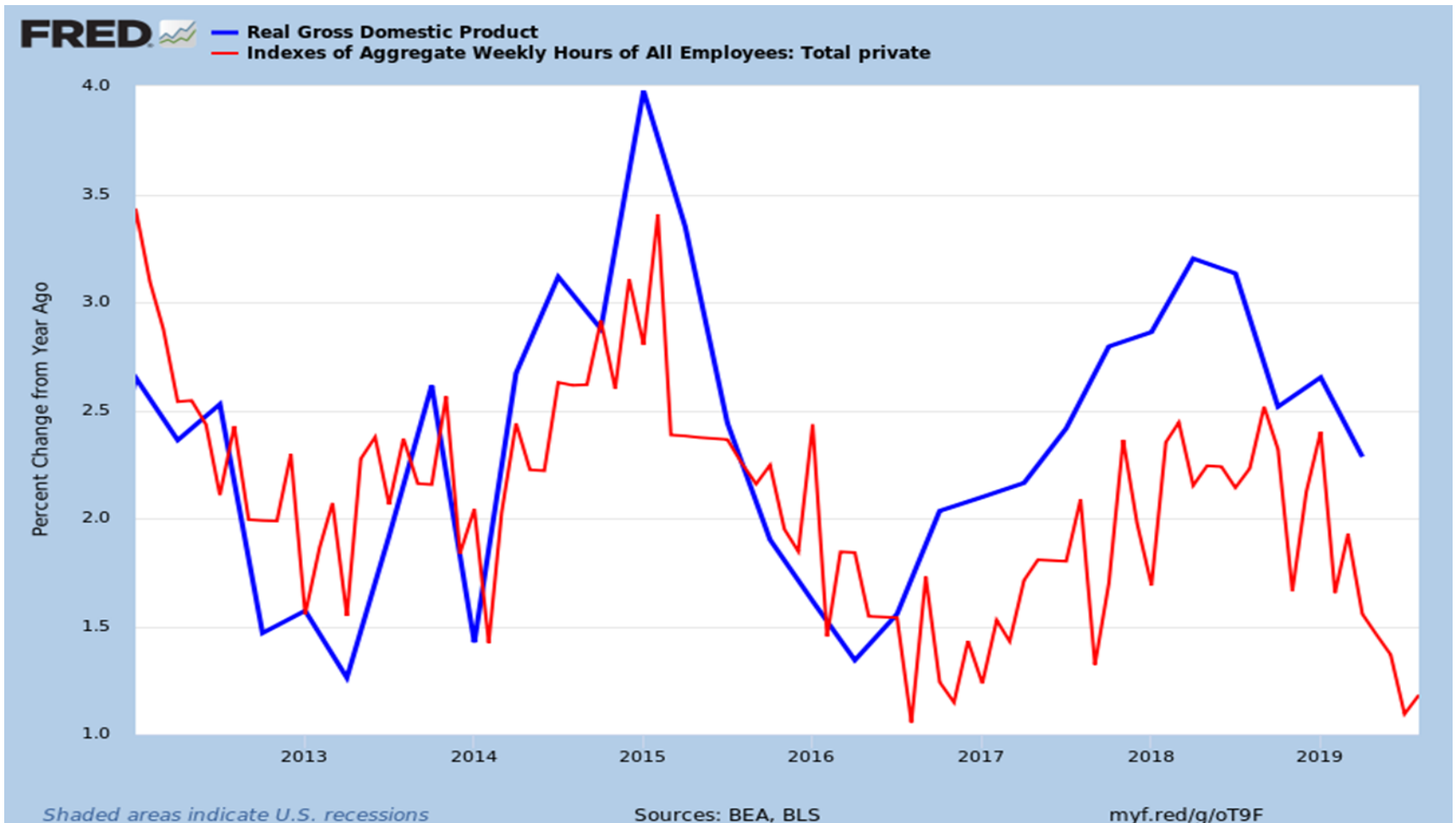
- BEA: **the annual growth rate** would occur if the **quarterly percent change** was replicated for a **full year**.
- In formulaic terms:
 - $((Q4/Q3)^4 - 1) \times 100$
- For 2018:Q2: $((18,598/18,438)^4 - 1) \times 100 = 3.5\%$
- For 2019:Q2: $((19,023/18,927)^4 - 1) \times 100 = 2.0\%$

If Real GDP growth, is the **most important provider of individual liberty and economic freedom***, after benchmark revisions, 2018:Q2 doesn't look quite so **LIBERATING**: its 3.5%, not 4.2%. Nonetheless, through 2018:Q2, the Trump tax cuts do coincide with faster growth:

**I am quoting the N.Y. Post article, slide 3, and being ironical.*



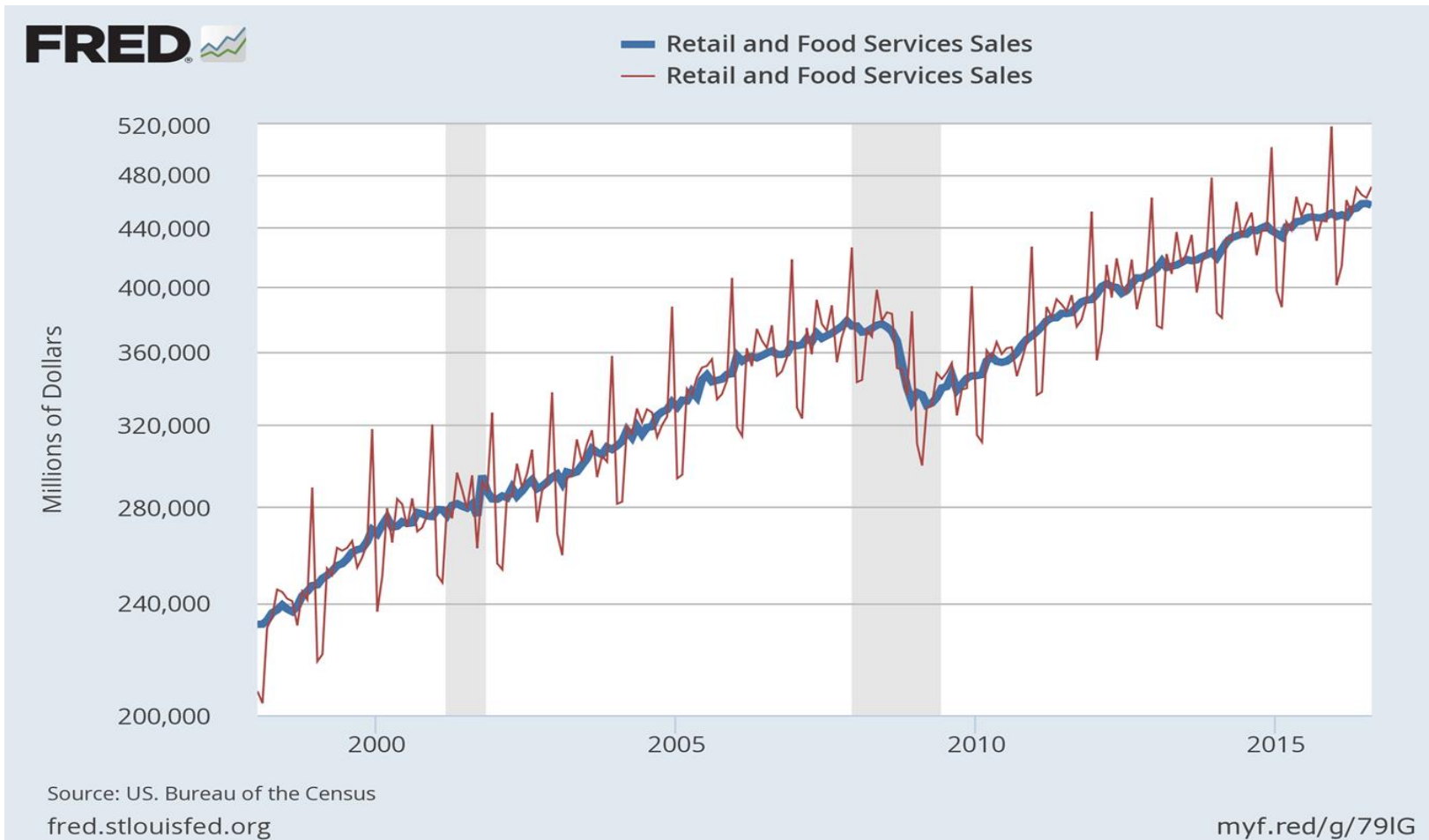
Indeed, **a year later** and the **acceleration** seems to have **evaporated**:



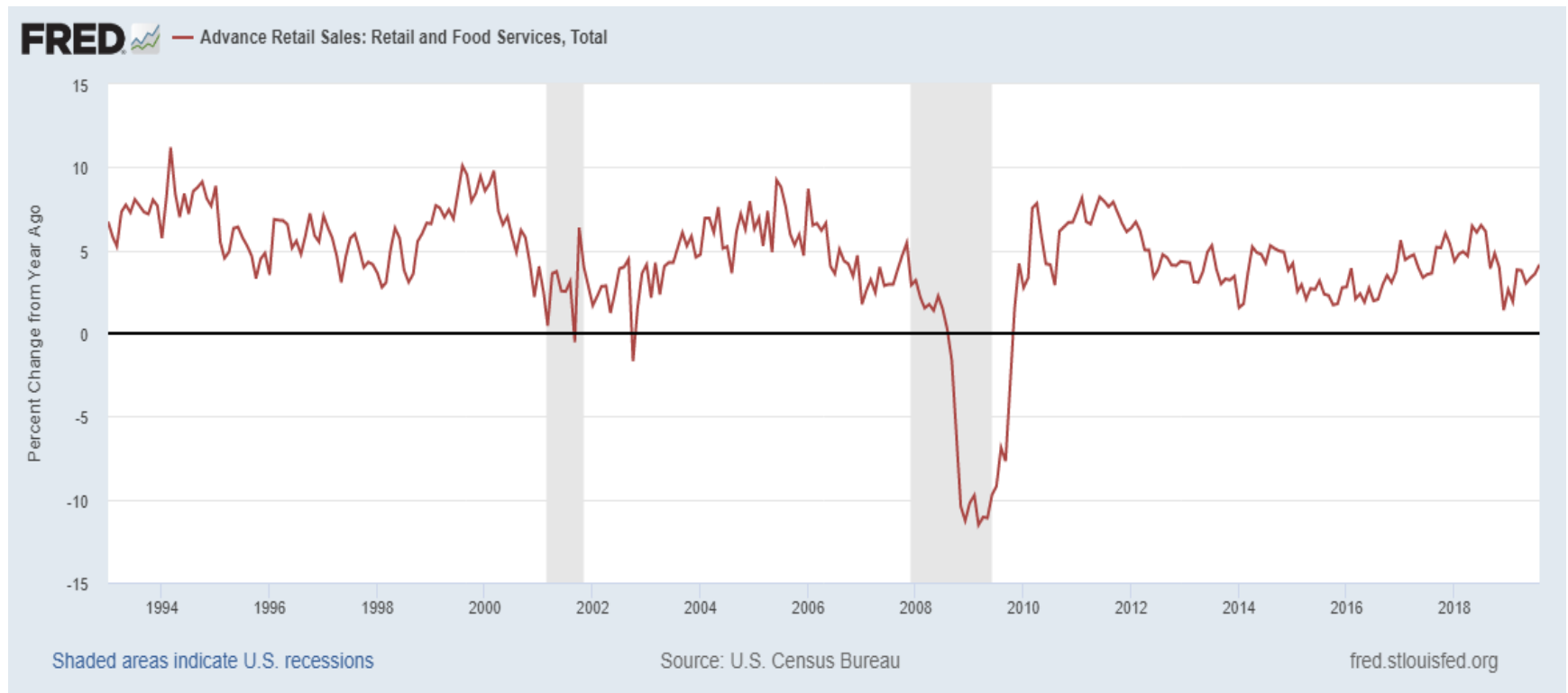
Seasonal Adjustment Powerfully Alters Data

		RETAIL	SALES			
				NOT		
	SEASONALLY		SEASONAL	SEASONALLY		NSA
	ADJUSTED	MONTH-OVER	FACTOR	ADJUSTED		year-over
	millions\$	MONTH		millions\$		year
Dec-11	394.3		1.129	445.2		
Jan-12	397.1	0.7	0.918	364.5	-18.1	
Dec-12	414.6		1.14	472.6		6.2
Jan-13	415.1	0.1	0.922	382.7	-19.0	5.0

Seasonal Adjustment: Separating **signal** from **noise**!



One Way to Garner Signal from NSA Data? Compare **Comparable** Months or Quarters (create year-over-year charts)



S. A. data can deliver useful
sequential period **comparisons**

<u>U.S.</u>	<u>REAL</u>	<u>GDP</u>
	billions	annualized
	of dollars:	growth rate
2007:Q4	\$14,996	
2008:Q1	\$14,895	-2.7%
2008:Q2	\$14,969	2.0%
2008:Q3	\$14,895	-2.0%
2008:Q4	\$14,575	-8.3%

European Statistics: A Different Kettle of Fish

GERMANY		REAL	GDP	
	2006:Q1	1.1%	2007:Q1	0.6%
	2006:Q2	1.5%	2007:Q2	0.6%
	2006:Q3	1.0%	2007:Q3	0.8%
	2006:Q4	1.3%	2007:Q4	0.4%
4Q Average		1.2%		0.6%
Q4/Q4		4.9%		2.4%

Real GDP Growth, YOY versus 4th Qtr./ 4th Qtr.

	REAL	GDP
	billions of	YOY
	chained	percent
YEAR	2009 \$	change
2006	14615	
2007	14877	1.8
2008	14833	-0.3
2009	14418	-2.8

Raw Data/Quarterly Growth rates

4th over 4th quarter growth

	REAL	GDP	
		Q/Q	4th Q/4th Q
	billions	annualized	percent
	of \$	growth	change
		rate	
2007:Q4	14996		1.9
2008:Q1	14895	-2.7	
2008:Q2	14969	2.0	
2008:Q3	14895	-2.0	
2008:Q4	14575	-8.3	-2.8
2009:Q1	14372	-5.4	
2009:Q2	14357	-0.4	
2009:Q3	14403	1.3	
2009:Q4	14540	3.9	-0.2

How Do We Link Output and Income?

- GDP = Gross Domestic Product
 - Domestic means 'on U.S. soil'
- Y = National Income:
 - Dollars Collected by U.S. Entities
 - U.S. Citizens
 - U.S. Corporations

National Output(**GDP**) and National Income(**Y**):
Different Organizing Principles

- Ikea makes Furniture in Florida: U.S. GDP
- Coke makes Soda in Brazil: Not in U.S.A.
- Mercedes makes Profits in US: Not in U.S. Y
- Apple makes profits in Germany: US Y

From GDP to GNP

- Gross National Product
 - ‘National’ replaces ‘Domestic’
- GDP based on location
- GNP based on ownership

From GNP to NNP

- Gross investment fails to account for the effect of wear and tear on the capital stock
- Formally, it ignores 'depreciation'
- $\text{GNP} - \text{depreciation} = \text{NNP}$
- $\text{NNP} = Y$ (in theory)
- Statistical Discrepancy: The BEA plug in

Car and Truck production: 2014 (A flow concept)

- 16.5 million vehicles produced
- Average sticker price \$30,300
- Nominal GDP for motor vehicles:
 - 16.5 million cars × \$30,300/car = \$500 billion

Motor Vehicle Fleet 2014

(A stock concept)

- U.S. Car and trucks: **200 million**
- Average Value for Used Car? **\$10,750**
(40% are over 10 years old)
- Value of the Fleet:
200 million cars X \$10,750/car = \$2.15 trillion

GDP: Motor Vehicles vs. The Fleet of U.S. Cars and Trucks

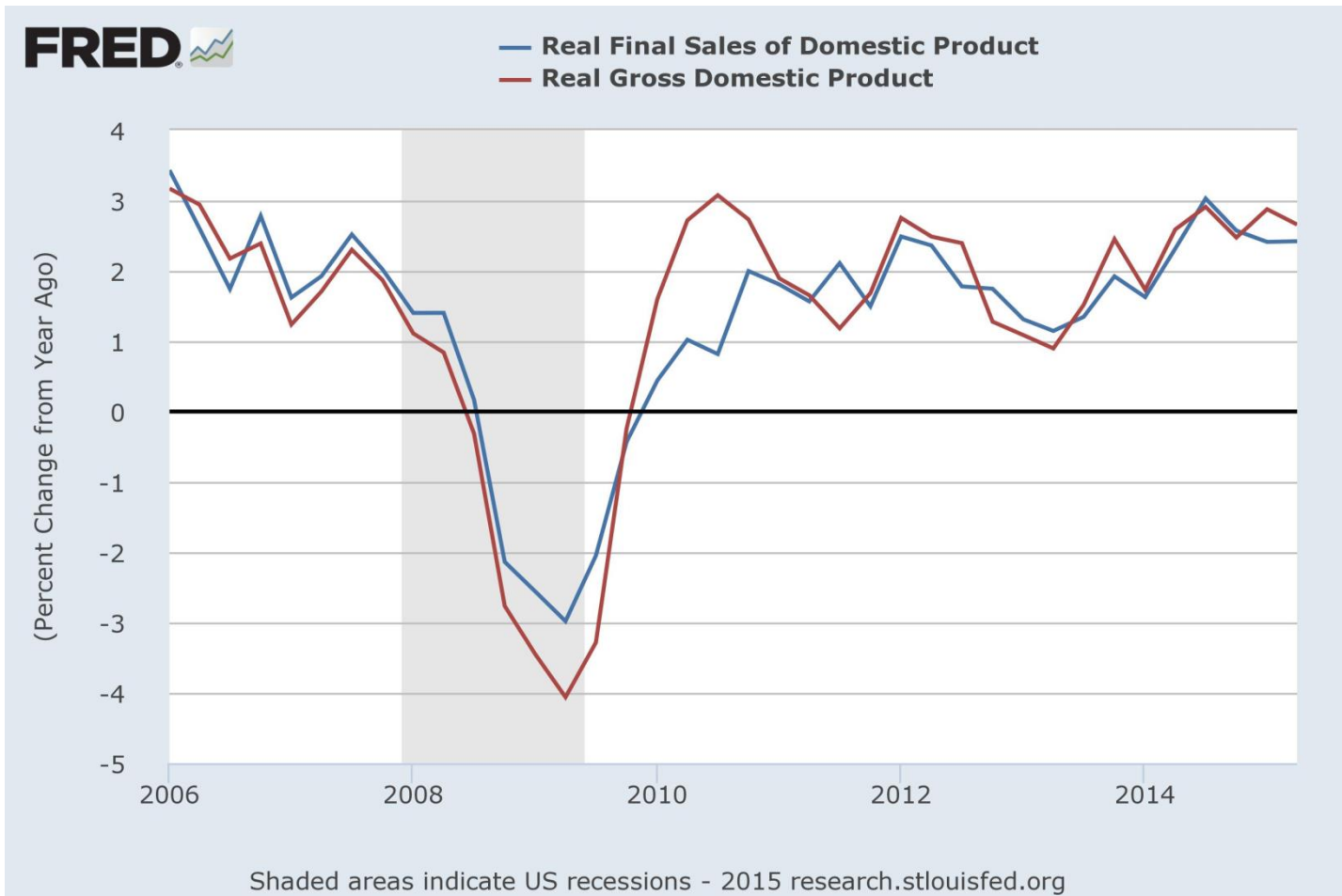
- **Flow:**
 - The value of vehicle production: \$ 500 billion in 2014
- **Stock:**
 - The value of the fleet: \$2.150 trillion in 2014

	YEAR:	2003	2007	2009	2014
				\$ billions	
GDP, MOTOR VEHICLES:		381	406	247	500
U.S. MOTOR VEHICLES, VALUE OF FLEET		1,635	1,740	1,610	2150
STOCK/FLOW RATIO		4.3	4.3	6.5	4.3

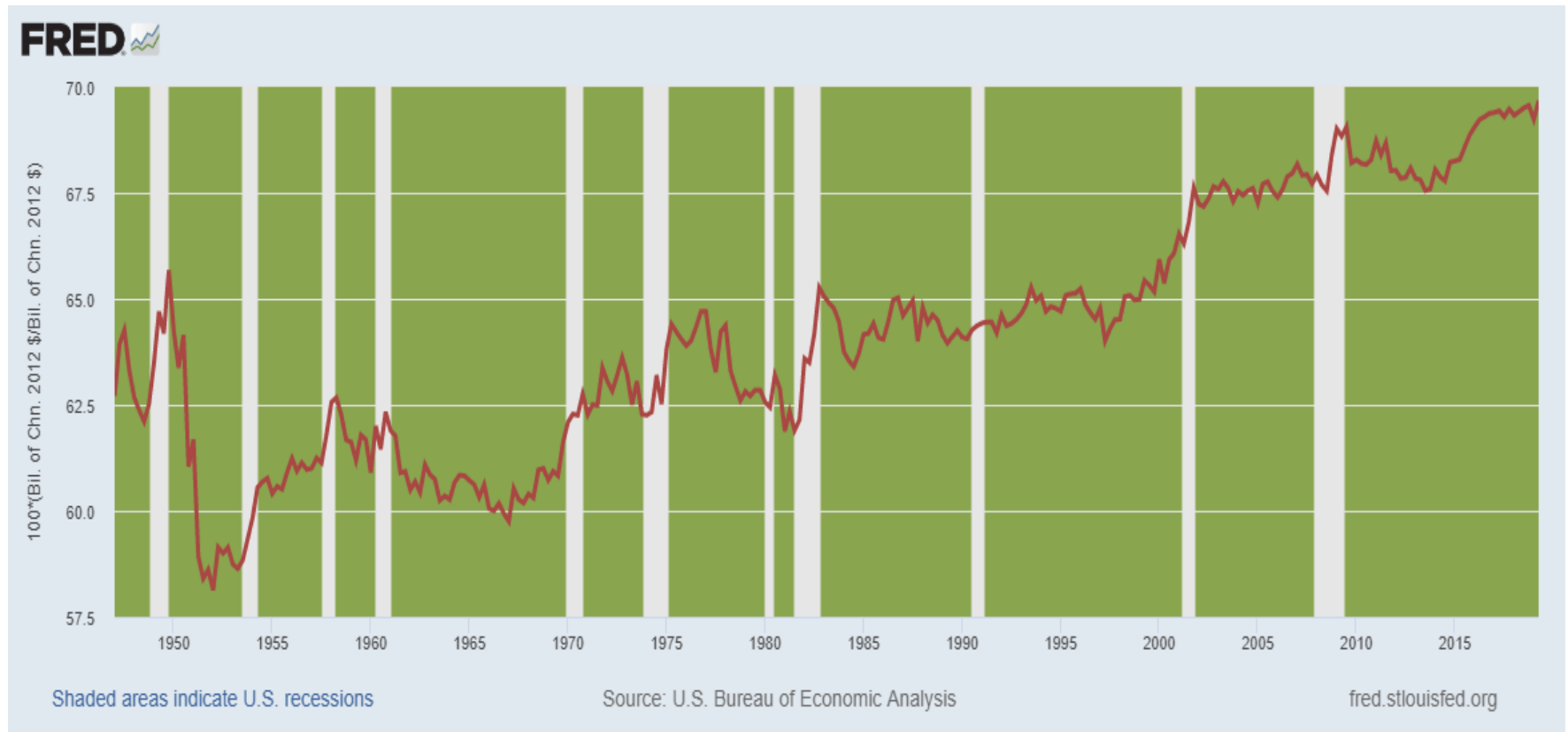
Alternative Aggregate Measures

- GDP includes inventory changes
- Economists like to know 'how much was sold'
- Lectures 8&9, Aggregate Expenditure Model, inventory swings drive output changes
- Final Sales = GDP minus **Inventory Investment**

In 2010, the jump for **GDP Growth** was not matched by **sales strength**



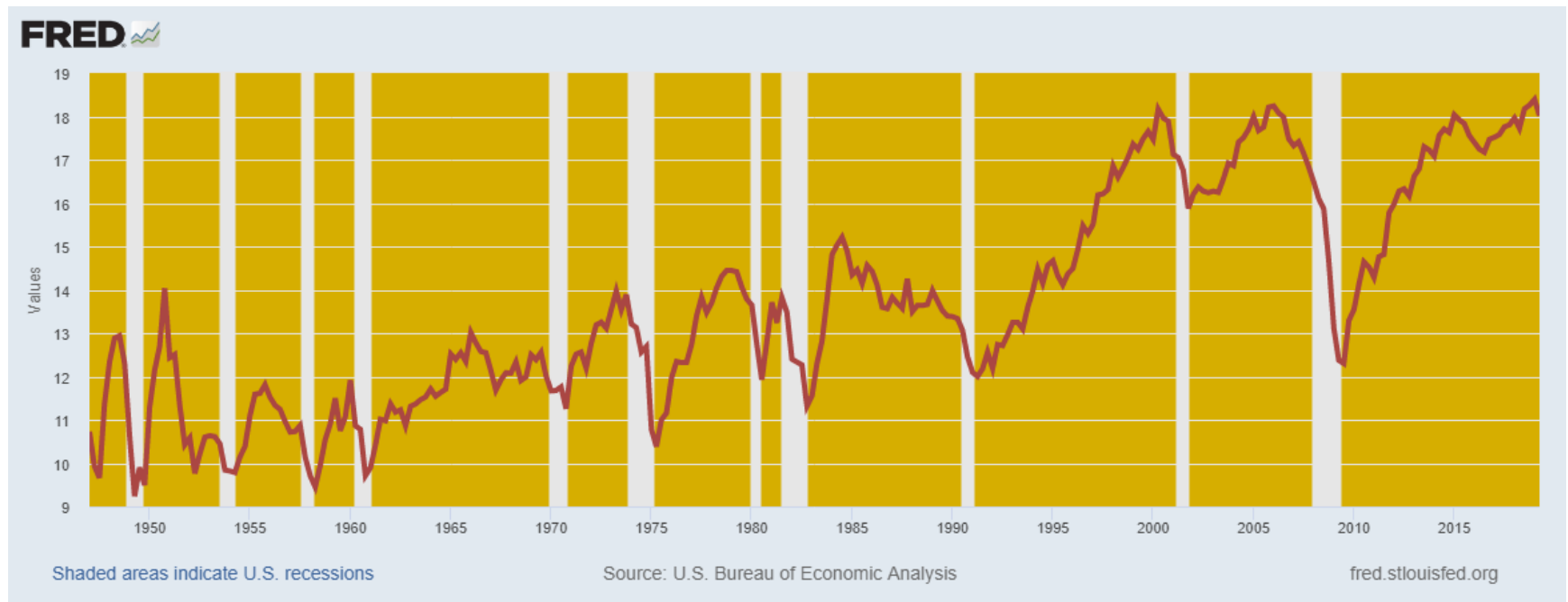
U.S. Real GDP Shares: Personal Consumption Expenditures



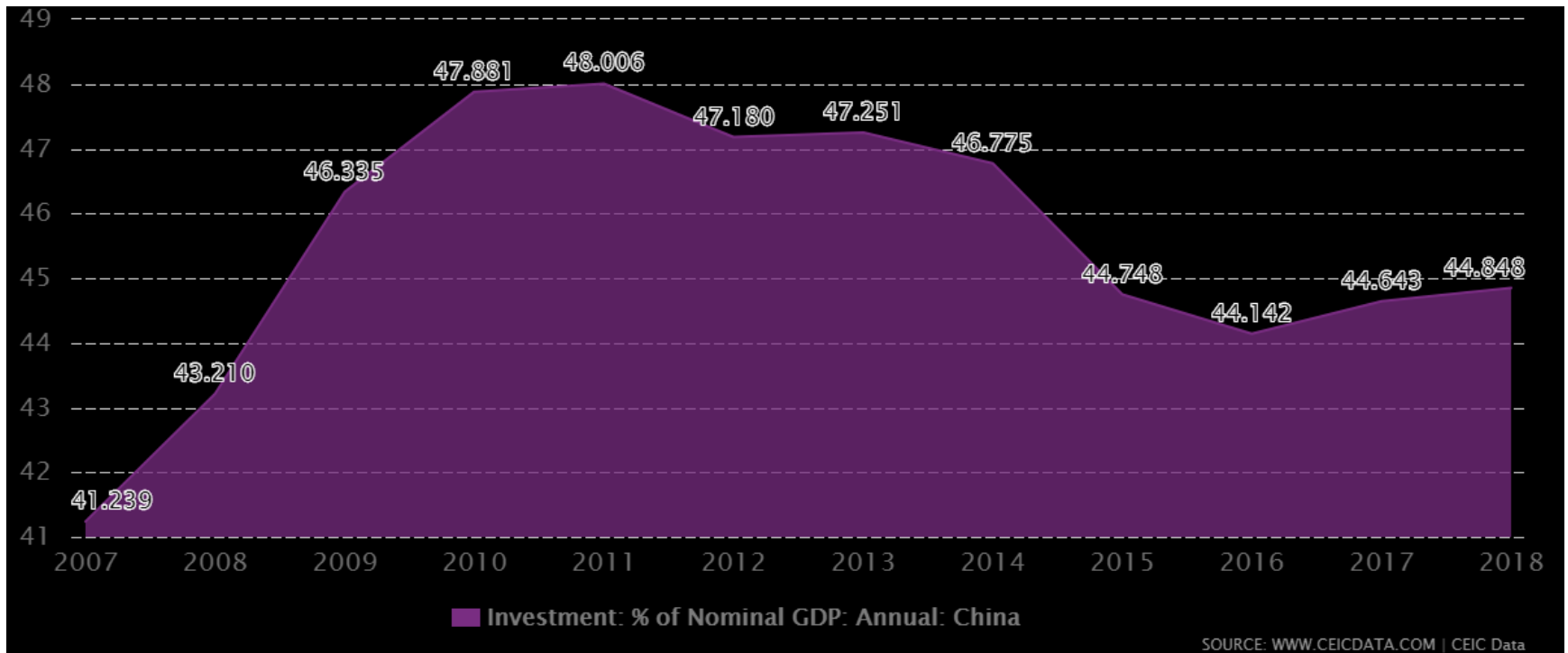
China GDP: Consumption was 50% in 1990, and now is 38%



U.S. Real GDP Shares: Real Gross Private Domestic Investment Around 18% of GDP



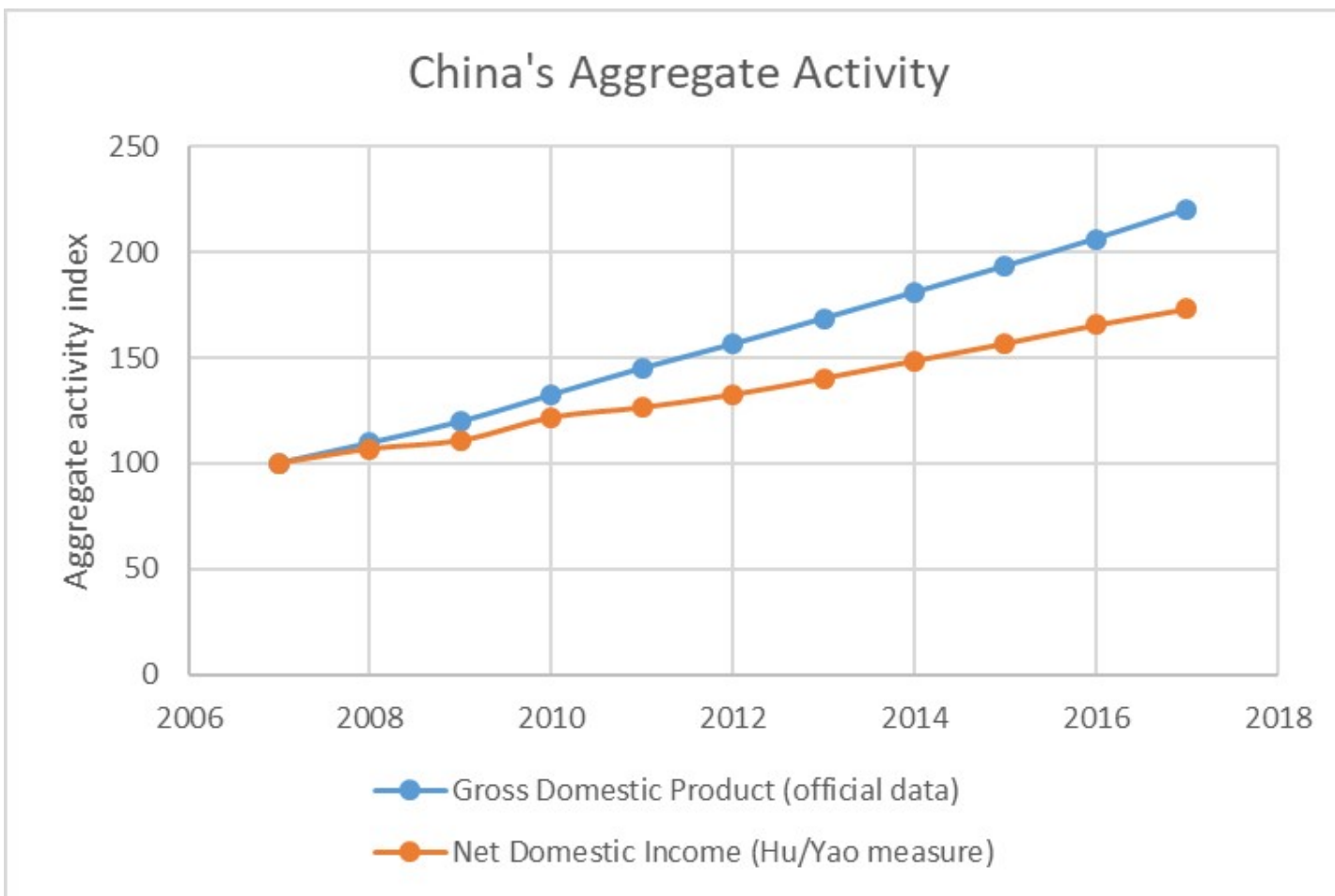
China Investment Share: 45% of GDP



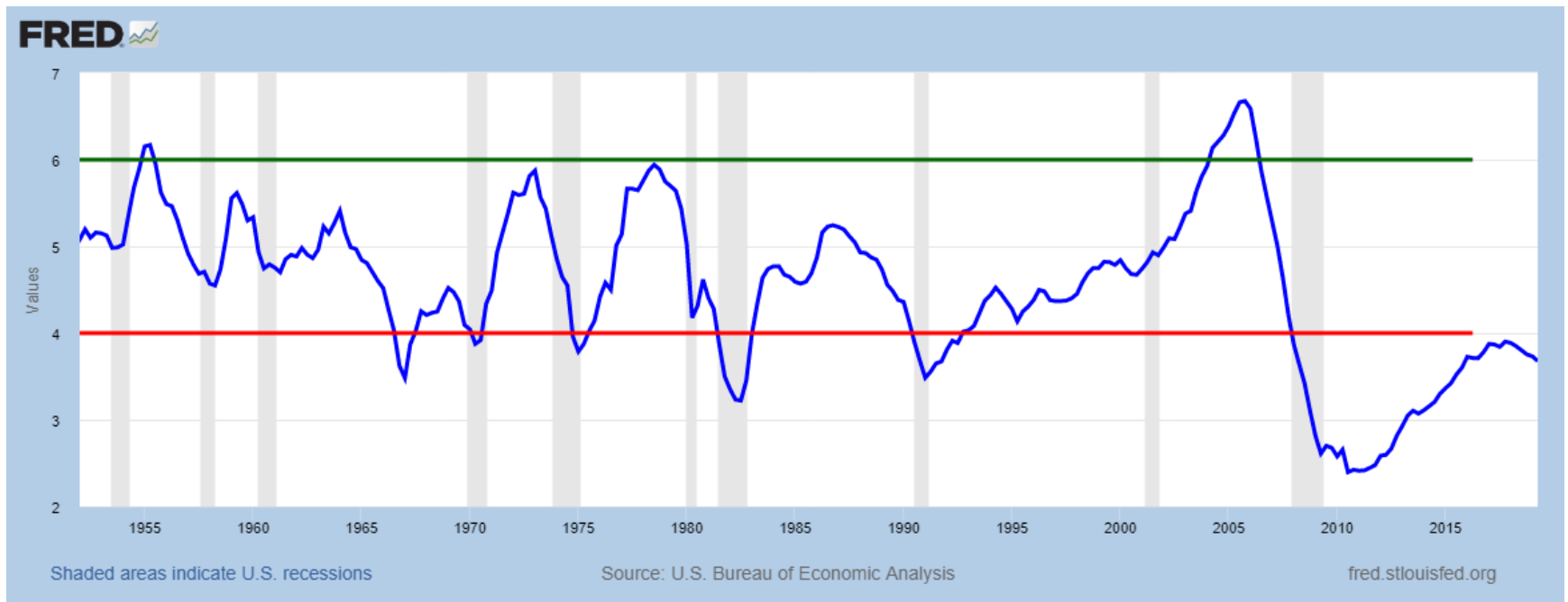
China's Slowdown: More There than Meets the Eye

JHU CFE Post: 12/16/2018

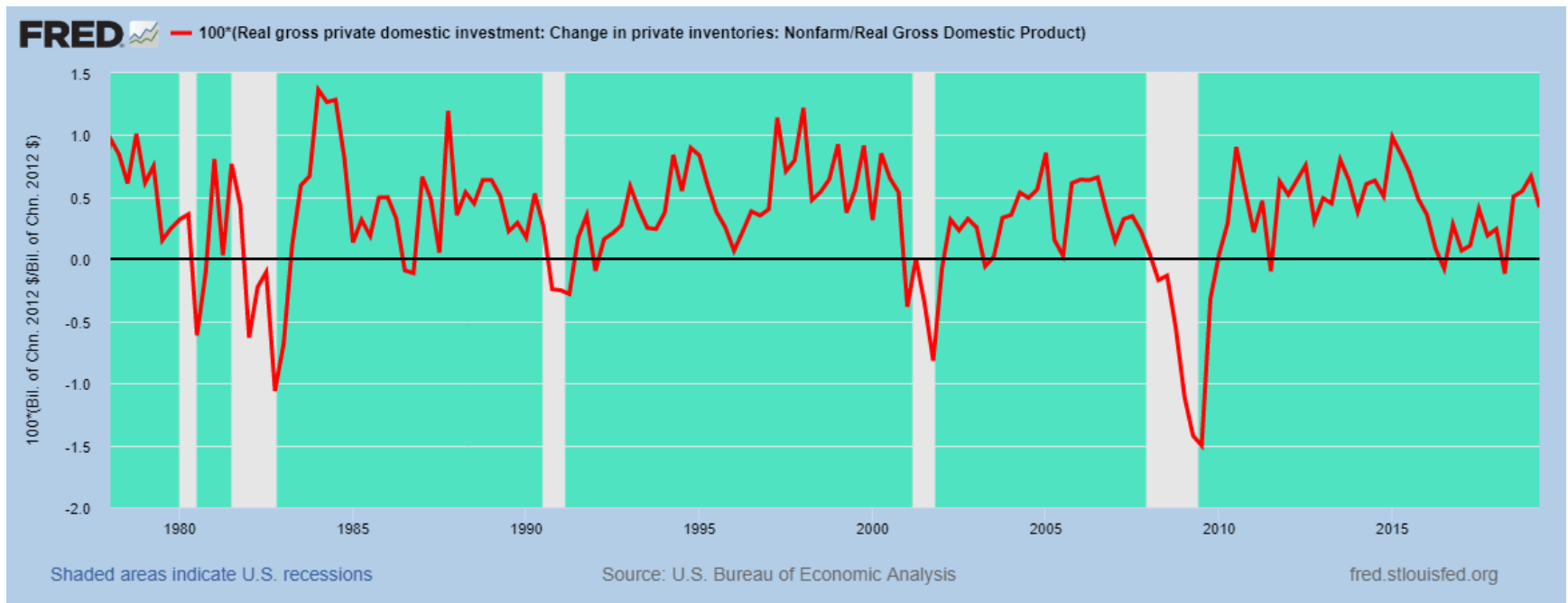
Bob Barbera and Yingyao Hu.



Nominal Residential Investment as a share of Nominal GDP



U.S. Real Inventory investment as a share of real GDP

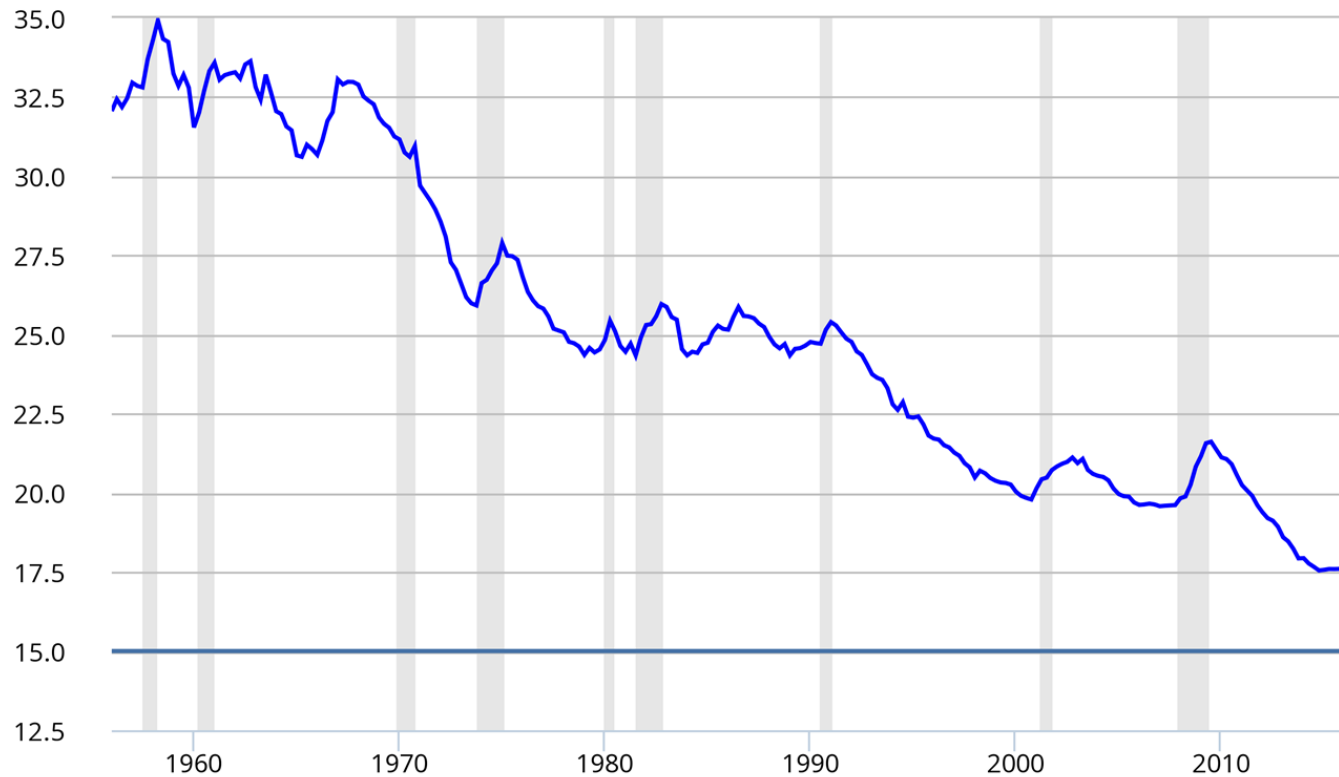


What Investment Does Not Include

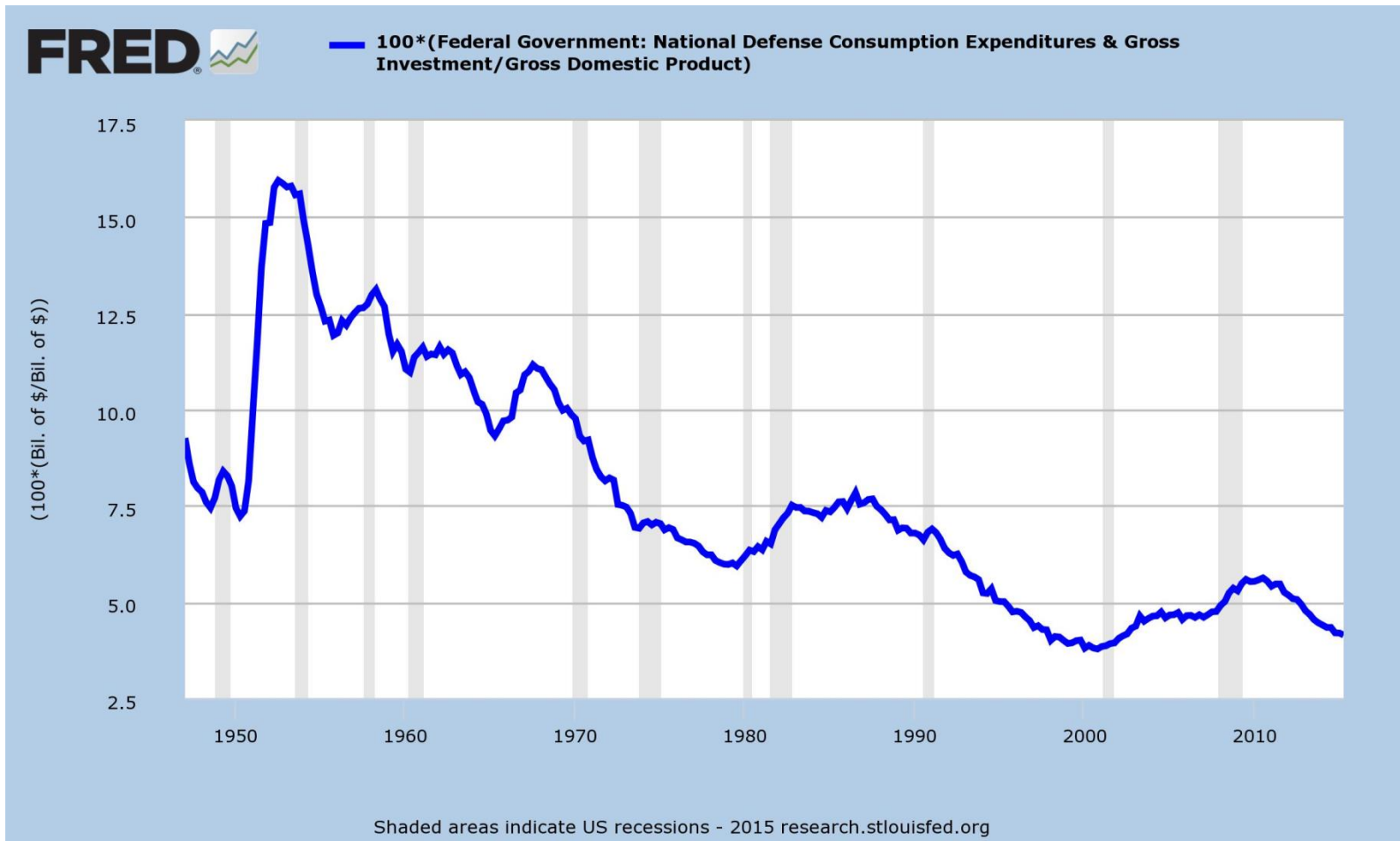
- Does **not** include financial investments
Buying a stock or bond does not produce a flow of new product.
- Does **not** include purchases or sales of existing or used houses

U.S. **Real** Government Expenditures as a share of U.S. **Real** GDP

FRED 



U.S. Defense spending as a share of GDP: Slated to Jump!

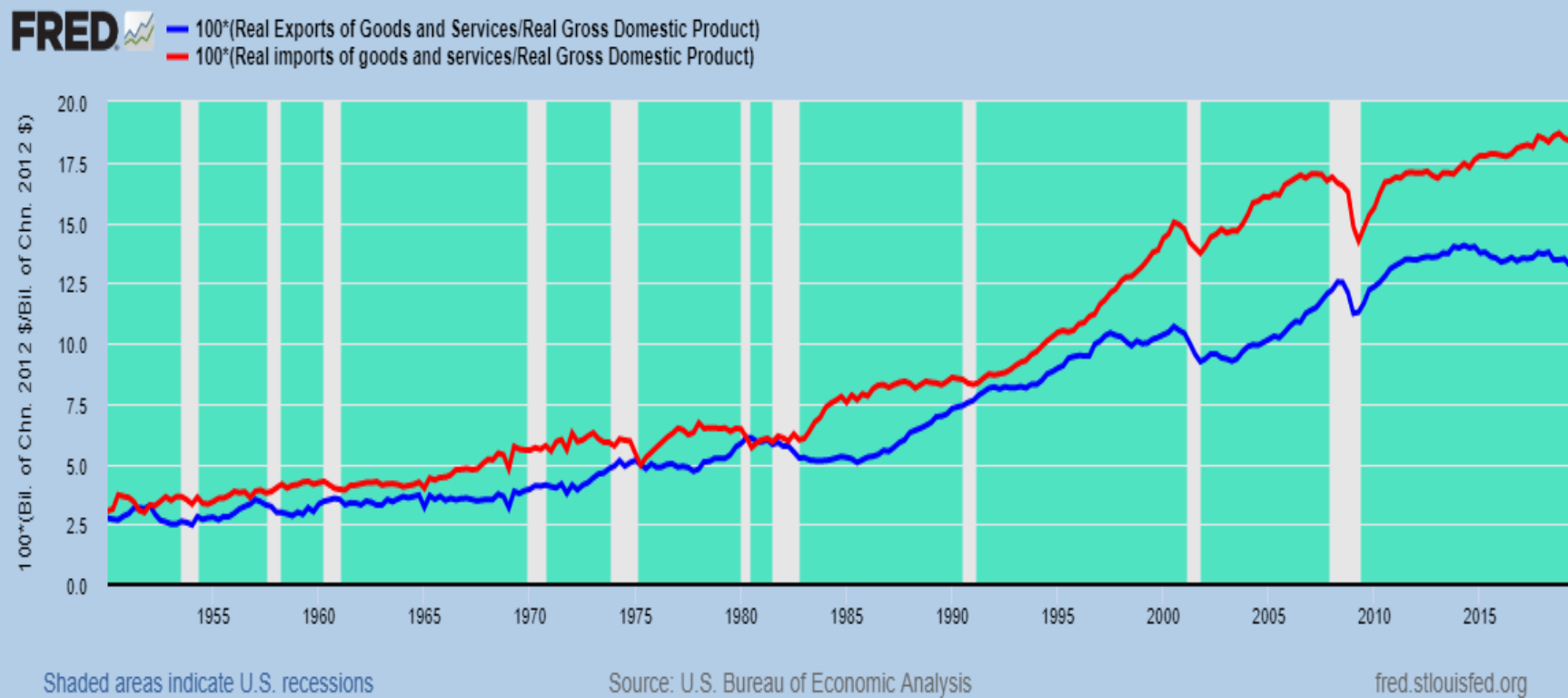


GDP: Government Spending

What it does not Include

- Does **not** include transfer payments
 - Federal spending on nuclear submarines counts.
 - Local government spending on road construction counts
 - Federal money sent to retirees, for social security, does not count
 - Federal money sent to medicare recipients does not count.
 - Interest on the debt does not count

Real Exports and Real Imports as a share of Real GDP



Profits: from 6% to 10% (left)
Wages: from 50% to 43% (right)

