Soochow University International Programs

2021 SCUIP Winter Session I
ECON202

Lecture 2: Measuring a Nation' Income

ECON202: Macroeconomics
Soochow University

The Role of Data

- To see whether there is a problem, you first need data.

The Role of Data (Cont'd)

- In macroeconomics, data are crucial:

(i) Data help policy makers see what problems, if any, need to be addressed.

(ii) Data help macroeconomists identify the theories that make correct predictions and the theories that make incorrect predictions.

(iii) Data often reveal interesting puzzles that macroeconomic theories need to solve.

Total Income

- We need to measure the health of an economy.
- When judging whether an economy is doing well or poorly, it is natural to look at the total income that everyone in the economy is earning.

Total Income (Cont'd)

- We can temporarily enjoy a high standard of living even if total income is low.
- How? By borrowing from others.
- But we cannot keep borrowing forever.
- At some point we will have to repay – with interest – what we had borrowed.
- At that point, we will have to repay out of our income.
- This is why a country's standard of living depends heavily on its own total income.

Gross Domestic Product (GDP)

- Gross Domestic Product (GDP) is one measure of a country's total income.
  -- There are other measures of total income, but GDP is the most popular measure.

Gross Domestic Product (Cont'd)

- GDP is the total market value of all final goods and services produced within a country in a given period of time.
- GDP is also the total expenditure on all final goods and services produced within a country in a given period of time.
- It is also the total income earned from all productive activity in the domestic economy.

“Final” Goods and Services

- Final goods are those goods sold to their final users.

- Final goods are those goods that do not disappear in the process of the production of some other for-sale good.
  -- Goods that disappear in the process of the production of some other for-sale good are called intermediate goods.

“Final” Goods and Services (Cont’d)

- A pencil is a final good because, once produced, it is ready for use by its final users.

- The wood, the graphite, and other materials that disappeared in the pencil are NOT final goods.
  -- Their market value is counted when the market value of the pencil is counted.
  -- So, counting them separately in GDP would be counting them twice.

Nominal and Real GDP

- How can we measure a country's productive activity so that the numbers can be compared across time?

GDP: Nominal and Real

- GDP comes in two flavours:
  -- Nominal GDP (also called GDP at current prices), and
  -- Real GDP (also called GDP at constant prices)

- So when you see or hear a discussion of GDP, be sure to ask, “Nominal or Real?”

Gross Domestic Product, Nominal

- Nominal GDP is the total market value of all final goods and services produced within a country in a given period of time.

-- The market value is calculated using current prices, the prices that prevailed when the production took place.

-- For example, the nominal GDP of the United States in 2020 was $20,932.8 billion, according to the U.S. Department of Commerce.

-- Given a mid-year population of 330,157,000 (est.) the per capita nominal GDP was $63,402.

Gross Domestic Product, Real

- Real GDP is the total market value of all final goods and services produced within a country in a given period of time.

-- The market value is calculated using constant prices, which are the prices that prevailed in a benchmark year called the base year.

-- For example, the real GDP of the United States in 2020 was $18,422.6 billion in 2012 dollars, according to the U.S. Department of Commerce.

-- Given a mid-year population of 330,157,000 (est.) the per capita real GDP was $55,799 in 2012 dollars.

Nominal and Real GDP

	Apples		Oranges	
	Price ($)	Quantity	Price ($)	Quantity
2015	50	10	20	50
2016	100	20	30	100
2017	150	20	50	200

	Nominal GDP	$
2015	($50 × 10) + ($20 × 50) =	1500
2016	($100 × 20) + ($30 × 100) =	5000
2017	($150 × 20) + ($50 × 200) =	13000

	Real GDP (Base year 2015)	2015 $
2015	($50 × 10) + ($20 × 50) =	1500
2016	($50 × 20) + ($20 × 100) =	3000
2017	($50 × 20) + ($20 × 200) =	5000

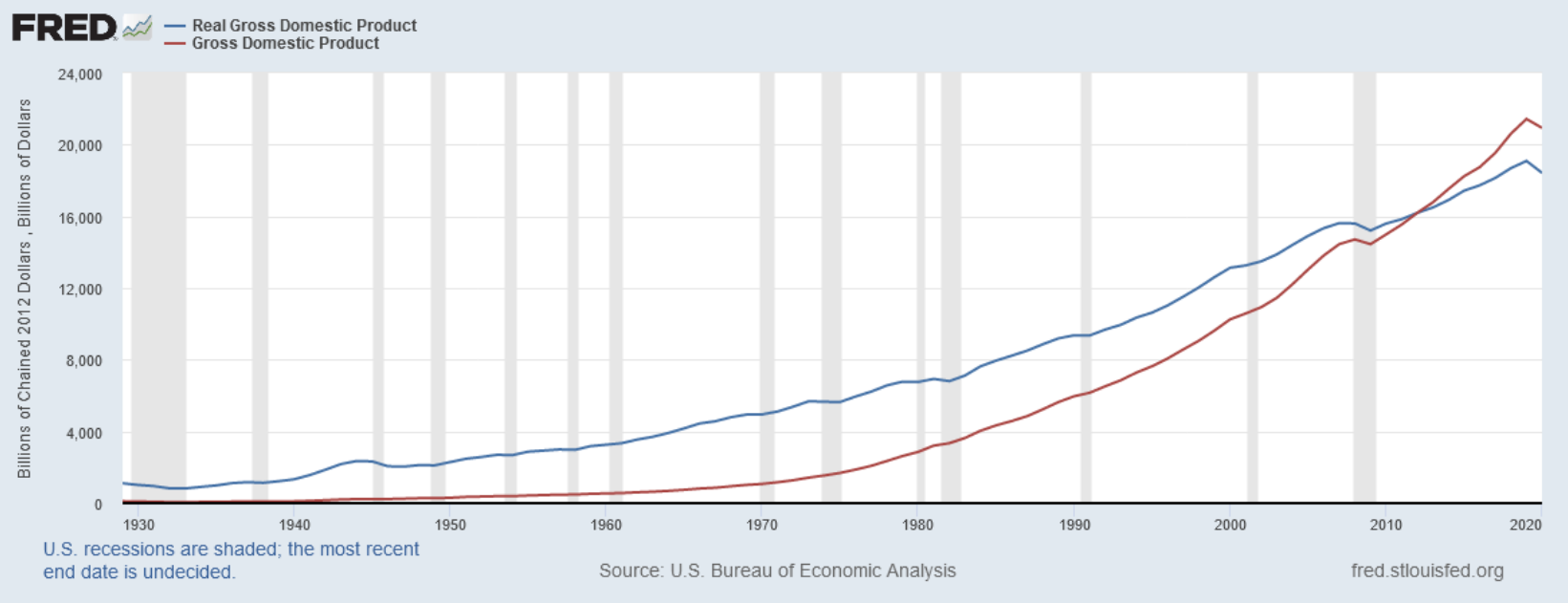
Note that the base year's nominal and real GDP *must* be the same.

Nominal and Real GDP (Cont'd)

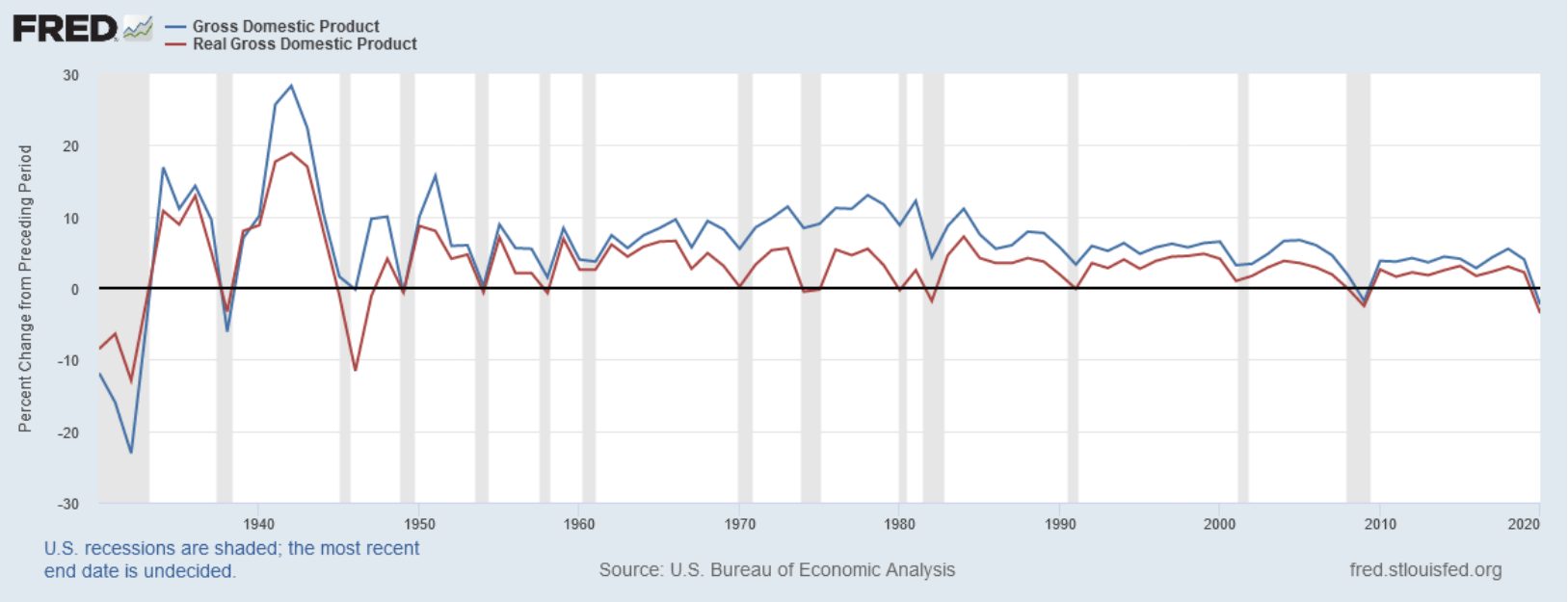
	Apples		Oranges		
	Price ($)	Quantity	Price ($)	Quantity	
2015	50	10	20	50	
2016	100	20	30	100	
2017	150	20	50	200	
	Nominal GDP			$	Growth Rate (%)
2015	($50 × 10) + ($20 × 50) =			1500	
2016	($100 × 20) + ($30 × 100) =			5000	100 × [(5000 – 1500)/ 1500] = 233
2017	($150 × 20) + ($50 × 200) =			13000	100 × [(13000 – 5000)/ 5000] = 160
	Real GDP (Base year 2015)			2015 $	
2015	($50 × 10) + ($20 × 50) =			1500	
2016	($50 × 20) + ($20 × 100) =			3000	100 × [(3000 – 1500)/ 1500] = 100
2017	($50 × 20) + ($20 × 200) =			5000	100 × [(5000 – 3000)/ 3000] = 67

$$\text{Growth Rate} = \frac{\text{New value} - \text{Old value}}{\text{Old value}} \times 100$$

U.S. Nominal and Real GDP, 1929-2020



Growth Rate of Nominal and Real GDP, USA



Components of GDP

- We need to pay attention not only to the total expenditure on all final goods and services made in a country (that is, GDP), we also need to watch where the expenditure is coming from.

- That way, when there is a recession, we will know which sector needs the most attention.

- GDP = Consumption spending (*C*) + Investment spending (*I*) + Government spending (*G*) + (Exports – Imports) (*NX*)

Components of GDP (Cont'd)

- Expenditure on "Made in USA" final goods and services can come from only these four sources:
  -- Households (consumption expenditure)
  -- Businesses (Investment expenditure)
  -- Government entities (government purchases)
  -- Foreigners (Exports)

- So, one might think …

- GDP = Consumption spending + Investment spending + Government spending + Exports

- But that would be incorrect!

Components of GDP (Cont'd)

- GDP = Consumption spending (*C*) + Investment spending (*I*) + Government spending (*G*) + (Exports – Imports) (*NX*)

- Question: Why do we subtract imports?

- Answer: GDP is the market value of all final "Made in USA" goods. But consumption, investment, and government purchases all include spending on foreign goods. Therefore, to make the two sides of the equation the same, we must take out all the imports.
  -- Exports – Imports is called Net Exports

Components of GDP (Cont'd)

- Consumption (*C*):

  -- The spending by households on goods and services, with the exception of purchases of new housing.

- Investment (*I*):

  -- The spending on capital equipment, inventories, and structures, including new housing.

Components of GDP (Cont'd)

- Government purchases (*G*):

  -- The spending on goods and services by local, state, and federal governments.

  -- Does NOT include transfer payments because they are not made in exchange for currently produced goods or services.

- Net exports (*NX*)

  -- Exports minus imports.

Table 1: GDP and Its Components

	Total (in billions of dollars)	Per Person (in dollars)	Percent of Total
Gross domestic product, *Y*	$15,676	$49,923	100%
Consumption, *C*	11,119	35,411	71
Investment, *I*	2,059	6,557	13
Government purchases, *G*	3,064	9,758	20
Net exports, *NX*	–567	–1,806	–4

Source: U.S. Department of Commerce. Parts may not sum to totals due to rounding.

This table shows total GDP for the U.S. economy in 2012 and the breakdown of GDP among its four components. When reading this table, recall the identity $Y = C + I + G + NX$.

Where to find US data?

- Bureau of Economic Analysis, U.S. Department of Commerce: http://bea.gov
- Federal Reserve Bank of St. Louis: http://research.stlouisfed.org/fred2/categories/18

International Comparisons

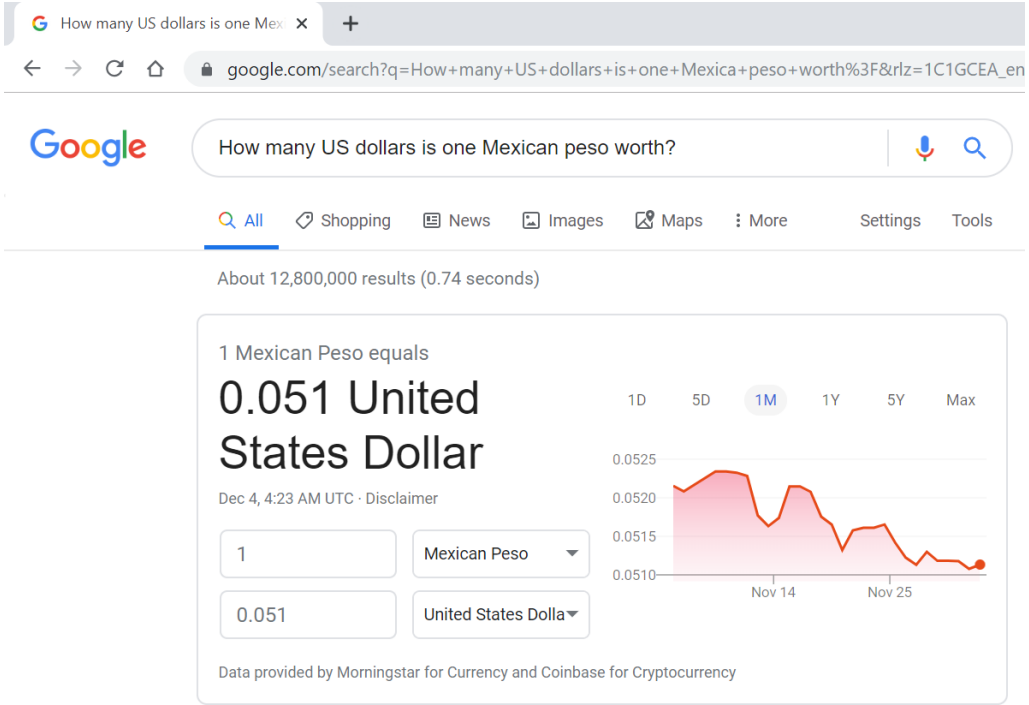
- When the GDP numbers for various countries' are compared, the same currency units must be used.

- There are *two* ways of converting from national currencies to a common currency, such as the US dollar.
  -- Use market exchange rates
  -- Use a common set of prices (PPP)

Market Exchange Rate Method

- Step 1: Look up Mexico' GDP in Mexico's currency, the peso
- Step 2: Look up how many US dollars one Mexican peso is worth
- Step 3: Multiply the numbers in Steps 1 and 2
  -- This gives you Mexico's GDP in US dollars
  -- If the GDPs of two countries are both expressed in US dollars, they can be compared head to head
- There is another way to calculate Mexico's GDP in US dollars …

Market Exchange Rate Method (Cont'd)



Purchasing Power Parity Method

- Step 1: Find out the quantities of all the final goods that were produced in Mexico during 2016.

- Step 2: Find out the prices of those goods in the United States – NOT Mexico – in 2016.

- Step 3: Calculate Mexico's GDP in US dollars, by:

-- Step 3a: multiplying the quantities in Step 1 by the corresponding prices in Step 2 and

-- Step 3b: then adding the results obtained in Step 3a

Let's Compare GDP!

Gross domestic product 2016, PPP

Ranking	*Economy*	(millions of international dollars)
1	China	21,417,150
2	United States	18,569,100
3	India	8,702,900
4	Japan	5,266,444
5	Germany	4,028,362
6	Russian Federation	3,397,368
7	Brazil	3,141,333
8	Indonesia	3,032,090
9	United Kingdom	2,796,732
10	France	2,773,932
11	Italy	2,312,559
12	Mexico	2,278,072
13	Turkey	1,927,693
14	Korea, Rep.	1,832,073
15	Saudi Arabia	1,756,793
16	Spain	1,686,373
17	Canada	1,597,517
18	Iran, Islamic Rep.	*1,352,814*
19	Thailand	1,164,928
20	Australia	1,128,908
21	Nigeria	1,091,228
22	Egypt, Arab Rep.	1,065,179
23	Poland	1,055,354
24	Pakistan	1,014,181
25	Argentina	874,071
26	Netherlands	866,204
27	Malaysia	863,287
28	Philippines	806,539
29	South Africa	739,419
30	Colombia	688,817

Gross domestic product 2016

Ranking	*Economy*	*(millions of US dollars)*
1	United States	18,569,100
2	China	11,199,145
3	Japan	4,939,384
4	Germany	3,466,757
5	United Kingdom	2,618,886
6	France	2,465,454
7	India	2,263,523
8	Italy	1,849,970
9	Brazil	1,796,187
10	Canada	1,529,760
11	Korea, Rep.	1,411,246
12	Russian Federation	1,283,162
13	Spain	1,232,088
14	Australia	1,204,616
15	Mexico	1,045,998
16	Indonesia	932,259
17	Turkey	857,749
18	Netherlands	770,845
19	Switzerland	659,827
20	Saudi Arabia	646,438
21	Argentina	545,866
22	Sweden	511,000
23	Poland	469,509
24	Belgium	466,366
25	Thailand	406,840
26	Nigeria	405,083
27	Iran, Islamic Rep.	*393,436*
28	Austria	386,428
29	Norway	370,557
30	United Arab Emirates	348,743

Is GDP a good measure of economic well-being?

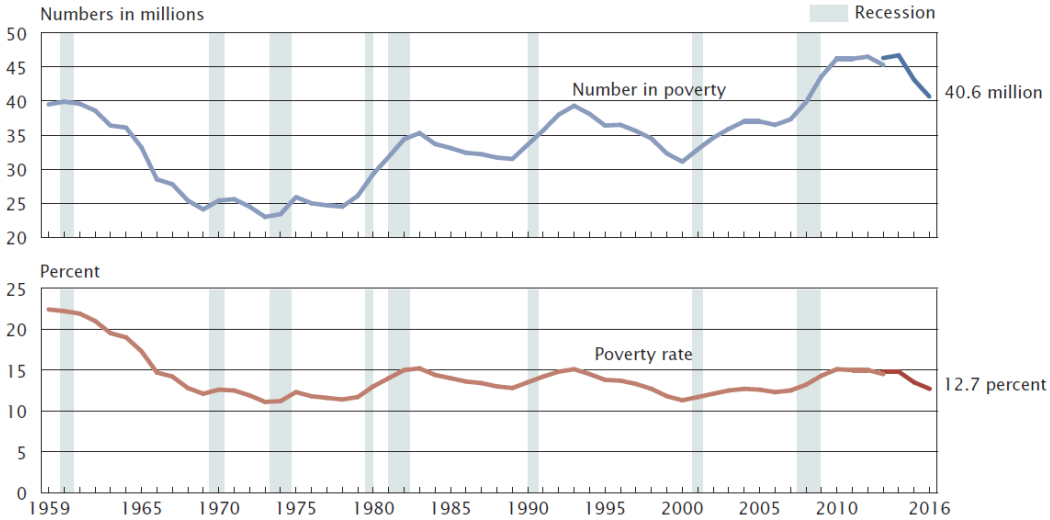
- No, but it is the best one-number measure we have.

There is a lot that is missing in GDP

- Where to begin!
- Inequality, work done in home, volunteer work, illegal work, leisure, environment, disasters, …

Trends in US Poverty Rate

Figure 4.
Number in Poverty and Poverty Rate: 1959 to 2016

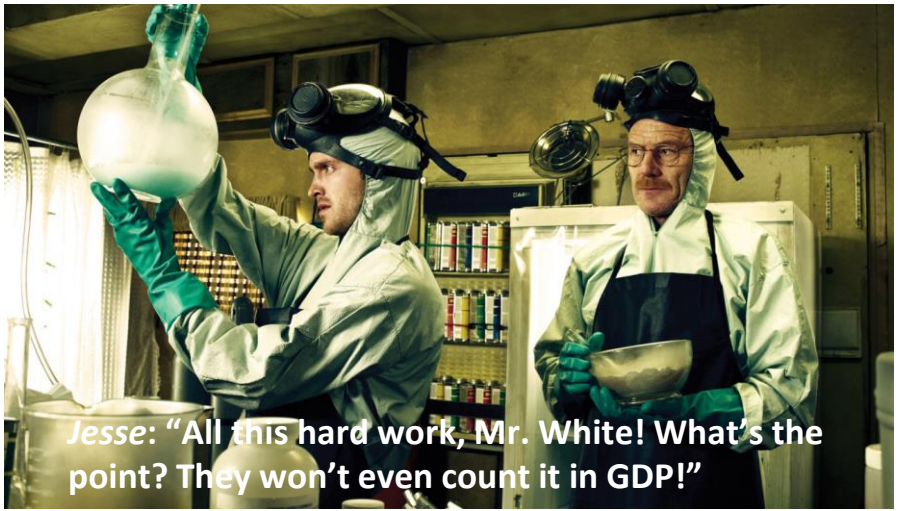


Note: The data for 2013 and beyond reflect the implementation of the redesigned income questions. The data points are placed at the midpoints of the respective years. For information on recessions, see Appendix A. For information on confidentiality protection, sampling error, nonsampling error, and definitions, see <www2.census.gov/programs-surveys/cps/techdocs/cpsmar17.pdf>.

Source: U.S. Census Bureau, Current Population Survey, 1960 to 2017 Annual Social and Economic Supplements.

Leisure Reduces GDP

GDP Does Not Count Illegal Work



GDP Does Not Count Work at Home

GDP Does Not Count Volunteer Work

GDP Ignores Environmental Damage

GDP Ignores Consumer Surplus

- Free digital technology
  -- Free Apps, Google, Google maps, Wikipedia, YouTube
- Freely available education
  -- Khan Academy, Coursera
- None of this adds to GDP
- Users would be willing to pay but don’t. They get consumer surplus.

Disaster May Raise GDP

GDP and Economic Well-being

- GDP is the best single measure of the economic well-being of a society.
- GDP per person tells us the income and expenditure of the average person in the economy.

GDP and the Quality of Life

Country	Real GDP per Person	Life Expectancy	Average Years of Schooling	Satisfied with Water Quality (% of population)
United States	$43,017	79 years	12 years	90
Germany	35,854	80	12	95
Japan	32,295	83	12	88
Russia	14, 561	69	10	53
Mexico	13,245	77	9	68
Brazil	10,162	74	7	83
China	7,746	74	8	73
Indonesia	3,716	69	6	87
India	3,468	65	4	63
Pakistan	2,550	65	5	55
Nigeria	2,069	52	5	47
Bangladesh	1,529	69	5	70

Source: *Human Development Report 2011*, United Nations. Real GDP is for 2011, expressed in 2005 dollars. Average years of schooling is among adults 25 years and older.

The table shows GDP per person and three other measures of the quality of life for twelve major countries.

Robert Kennedy on GDP

- [Gross domestic Product] does not allow for the health of our children, the quality of their education, or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials. It measures neither our courage, nor our wisdom, nor our devotion to our country. It measures everything, in short, except that which makes life worthwhile, and it can tell us everything about America except why we are proud that we are American.

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