Long Run Macroeconomics

Prof. Giacomo Rondina
University of California, San Diego
Spring, 2023

Lecture 3
(note: this lecture will be recorded)

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For questions: jcizeski@ucsd.edu (Lab Manager)

Econ 110A - Housekeeping

- Thank you for your reflection notes!

- Reduced office hours today: 5:30 pm to 6 pm
- Extended office hours Thursday: 5:30 pm to 7 pm

- Discussion tomorrow (Wed) is at 6 pm in CSB 001

Plan for Lecture 3

- measuring the value created in the economy
  - GDP: Production, Income, and Expenditure Approach
  - GDP: The role of Prices
  - Limits of GDP

Recap from Lecture 2

GDP: Market value of the final goods and services produced in an economy over a certain period of time.

How can we measure GDP?

Production = Income = Expenditure

Production: value added produced

Income: remuneration to factors of production

Expenditure: end-use of value added produced

Example: the economy of Truckopia

In Truckopia there are only two companies: *SteelCo* and *TruckCo. SteelCo*: extracts ore, turns it into steel. *TruckCo* buys steel from SteelCo, turns it into trucks, sells trucks.

Eco. Acc. SteelCo		Eco. Acc. TruckCo	
Wages	70	Wages	250
Cost of Inputs	0	Cost of Inputs	100
Profits	30	Profits	150
Sales	100	Sales	500

GDP by Value Added (= Sales – Cost of Inputs):

($100 - $0) + ($500 - $100) = $500

GDP by Income (= Wages + Profits):

($70 + $30) + ($250 + $150) = $500

Example: the economy of Truckopia

Expenditure	
Consumers	280
Government	150
Investment	100
Exports	50
Imports	80

The Expenditure Approach

$$GDP = C + I + G + X - IM$$

C: Private Consumption Expenditure
I: Private Investment Expenditure
G: Government Expenditure
X: Exports (Foreign Expenditure in Domestic Goods/Services)
IM: Imports (Domestic Expenditure in Foreign Goods/Services)

U.S GDP: Value Added, Income, Expenditure

NIPA tables: https://apps.bea.gov/national/pdf/SNTables.pdf

U.S. GDP: Income

Income = Wages and Benefits to Employees
+ Taxes (less subsidies) on Businesses
+ Profits
+ Depreciation of Fixed Capital

- Wages: remuneration to labor as factor of production
- Taxes: remuneration to government as factor of production
- Profits: remuneration to owners/managers as factor of production
- Depreciation of Fixed Capital: remuneration to capital as factor of production

Question 2 (5 pts)

The economic accounts of United Airlines, a U.S. airline company, shows that in 2019 the company paid $5,000,000 in wages and benefits to employees, made $1,000,000 in profits (net operating surplus), and paid $200,000 in taxes (net of subsidies) to the Government. Is this enough information to compute United's contribution to the U.S. GDP for 2019? If so, what is such contribution? If not enough information, what is missing? Please explain.

U.S. GDP: by Income

Line		2017	2018
1	**Gross domestic income**	**19,628.6**	**20,556.5**
2	**Compensation of employees, paid**	**10,420.6**	**10,869.5**
3	Wages and salaries	8,467.2	8,848.5
4	To persons	8,447.5	8,828.5
5	To the rest of the world	19.7	20.0
6	Supplements to wages and salaries	1,953.4	2,021.0
7	**Taxes on production and imports**	**1,347.2**	**1,428.9**
8	**Less: Subsidies[1]**	**61.3**	**66.3**
9	**Net operating surplus**	**4,805.9**	**5,050.5**
10	Private enterprises	4,810.9	5,063.0
11	Net interest and miscellaneous payments, domestic industries	768.1	786.5
12	Business current transfer payments (net)	161.2	159.5
13	Proprietors' income with inventory valuation and capital consumption adjustments	1,500.9	1,578.8
14	Rental income of persons with capital consumption adjustment	730.2	759.9
15	Corporate profits with inventory valuation and capital consumption adjustments, domestic industries	1,650.4	1,778.4
16	Taxes on corporate income	350.7	231.3
17	Profits after tax with inventory valuation and capital consumption adjustments	1,299.7	1,547.1
18	Net dividends	1,014.2	525.6
19	Undistributed corporate profits with inventory valuation and capital consumption adjustments	285.5	1,021.5
20	Current surplus of government enterprises[1]	-4.9	-12.6
21	**Consumption of fixed capital**	**3,116.2**	**3,273.9**
22	Private	2,574.6	2,712.6
23	Government	541.5	561.3
	Addendum:	**---**	**---**
24	Statistical discrepancy	-143.2	-62.4

Plan for Lecture 3

- measuring the value created in the economy
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Nominal and Real GDP

The Role of Prices: Comparing GDP Across Time

$$GDP_t = \sum_i P_t^i \times Q_t^i$$

$i = \text{food, rent, cars, haircuts, clothes,...}$

$t = 1950, 1951, ..., 2021, 2022$

The Role of Prices: Comparing GDP Across Time

$$GDP_t = \sum_i P_t^i \times Q_t^i$$

$i = \text{food, rent, cars, haircuts, clothes,...}$

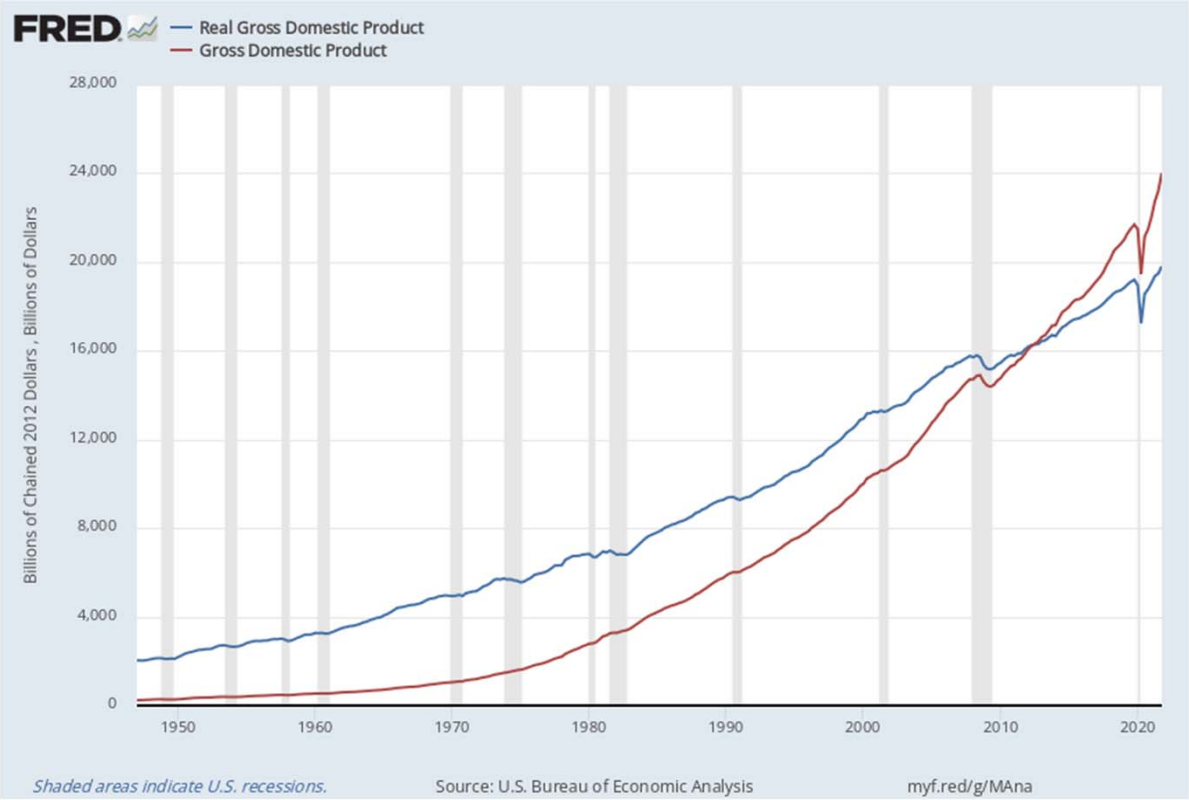
$t = 1950, 1951, ..., 2021, 2022$

$$RGDP_t = \sum_i P_X^i \times Q_t^i$$

- Initial Price method (Laspeyres): P_X^i are earliest date prices
- Final Price method (Paasche): P_X^i are latest date prices
- Chained-Weighted method: P_X^i are "weighted" averages across dates

Note: see recorded video "Lecture 3 Addendum" for examples on the three methods

Nominal and Real GDP



$$GDP_{1998} = \sum_i P^i_{1998} \times Q^i_{1998}$$
$$= \$\ 9{,}325B$$

$$GDP_{2019} = \sum_i P^i_{2019} \times Q^i_{2019}$$
$$= \$\ 21{,}729B$$

$$RGDP_{1998} = \sum_i P^i_{C2012} \times Q^i_{1998}$$
$$= \$\ 11{,}832B$$

$$RGDP_{2019} = \sum_i P^i_{C2012} \times Q^i_{2019}$$
$$= \$\ 19{,}221B$$

The Role of Prices: Comparing GDP Across Countries

$$\$\ GDP_t^{US} = \sum_i \$P_t^{i,US} \times Q_t^{i,US}$$

$$¥\ GDP_t^{CH} = \sum_i ¥P_t^{i,CH} \times Q_t^{i,CH}$$

Nominal GDP in the U.S. in 2017 = 19,754 Billion Dollars
Nominal GDP in China in 2017 = 82,712 Billion Yuan

Which of the two economies had a larger Real GDP in 2017?

The Role of Prices: Comparing GDP Across Countries

Step 1: express everything in the same currency

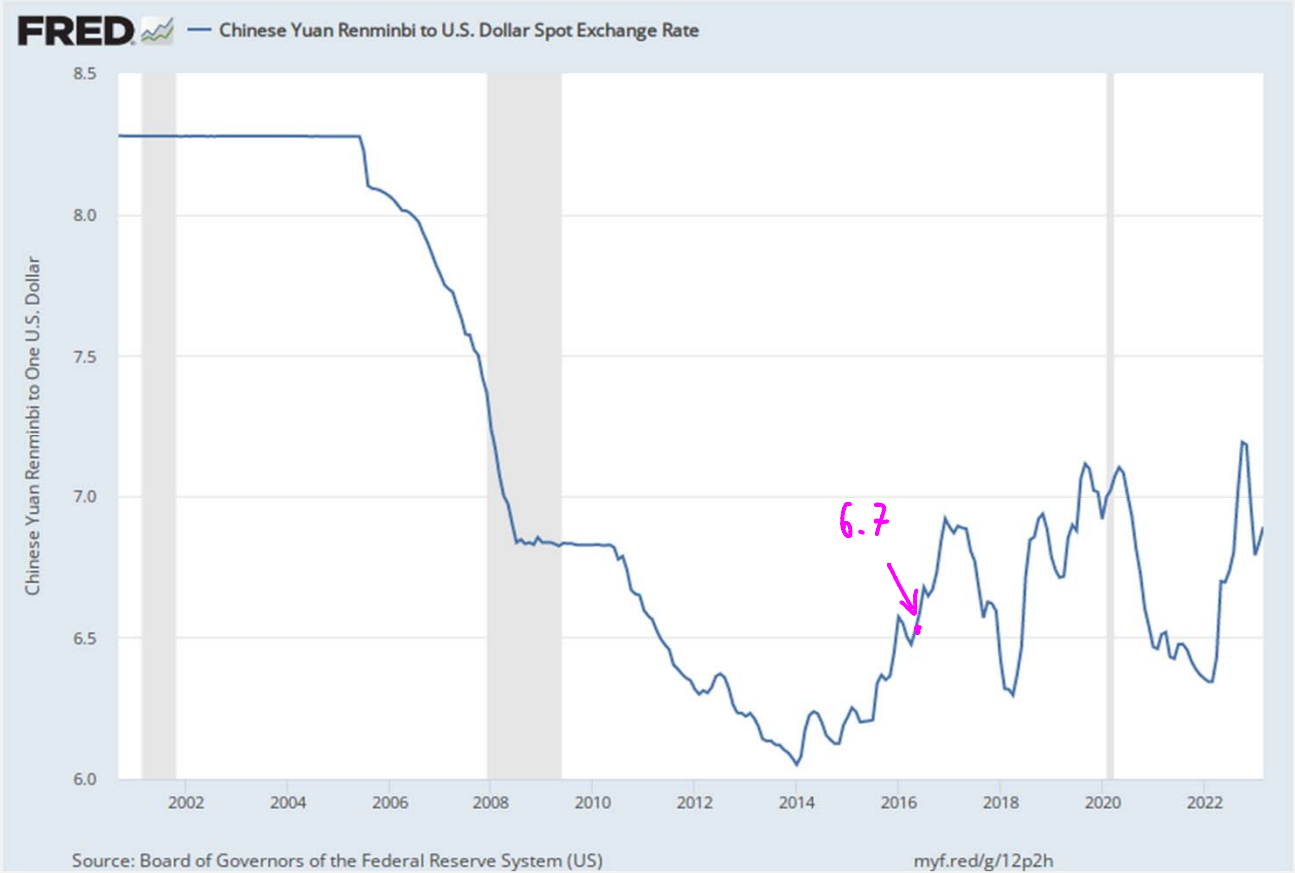
Ex Rate: E_t: $1\$ = ¥6.7$ $\quad 1¥ = \frac{1}{6.7}\$$

$$\$GDP^{CH}_{2017} = ¥82,712 \times \$\frac{1}{6.7} = \$12,345\ B$$

Step 2: express everything in the same prices

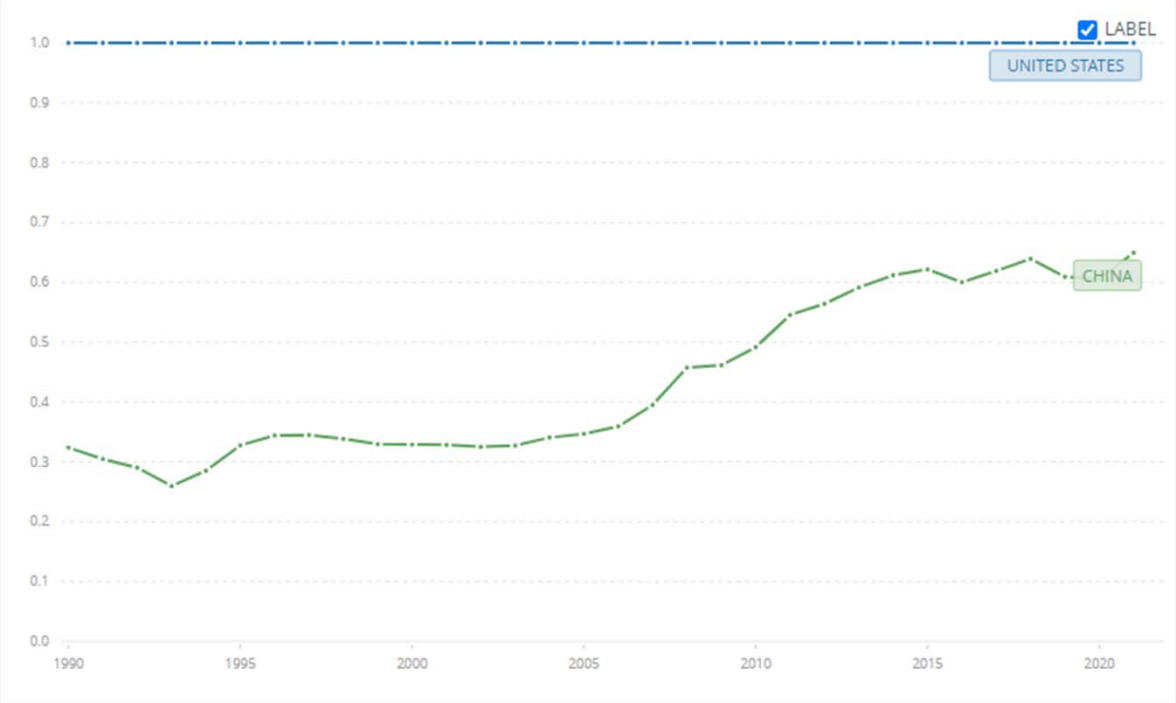
$$\$GDP^{CH}_{2017} \times \frac{P^{US}_{2017}}{P^{CH}_{2017}} = \$12,345 \times \frac{1}{0.6} = \$20,575\ B$$

Yuan to U.S. Dollar Exchange Rate



https://fred.stlouisfed.org/series/DEXCHUS#0

Price Level Ratio GDP Conversion Factor (World Bank)



https://data.worldbank.org/indicator/PA.NUS.PPPC.RF?locations=US-CN

The Role of Prices: Comparing GDP Across Countries

$$GDP^{CH}_{t,P^{US}} = GDP^{CH}_t \times E_t \times \frac{P^{US}_t}{P^{CH}_t}$$

E_t : Exchange Rate (Dollars per Yuan)

$\frac{P^{US}_t}{P^{CH}_t}$: Price Level Ratio GDP Conversion Factor (World Bank Data)

Plan for Lecture 3

- measuring the value created in the economy
  - GDP: Production, Income, and Expenditure Approach ✓
  - GDP: The role of Prices ✓
  - Limits of GDP

The Limits of GDP

1. Gross and Net National Product

2. The Stock Market and GDP

3. Should we really care about GDP?

Gross and Net Domestic Product

Idea: existing value of capital is accumulated past investment (already accounted for in the past). The value of the capital that depreciates to produce current output should not be accounted as new **net value** being generated.

Gross: it includes fixed capital depreciation

Net: it excludes fixed capital depreciation

Line	U.S. GDP: by Income	2017	2018
1	**Gross domestic income**	**19,628.6**	**20,556.5**
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The focus is usually on "Gross" Domestic Product because, in practice, it is difficult to measure loss of value of existing capital!

Current preferred method is based on amortization for taxation purposes, which has little to do with economic value.

Issues with GDP

1. Gross and Net National Product
2. Stock Market and GDP
3. Should we really care about GDP?

Stock Market and GDP

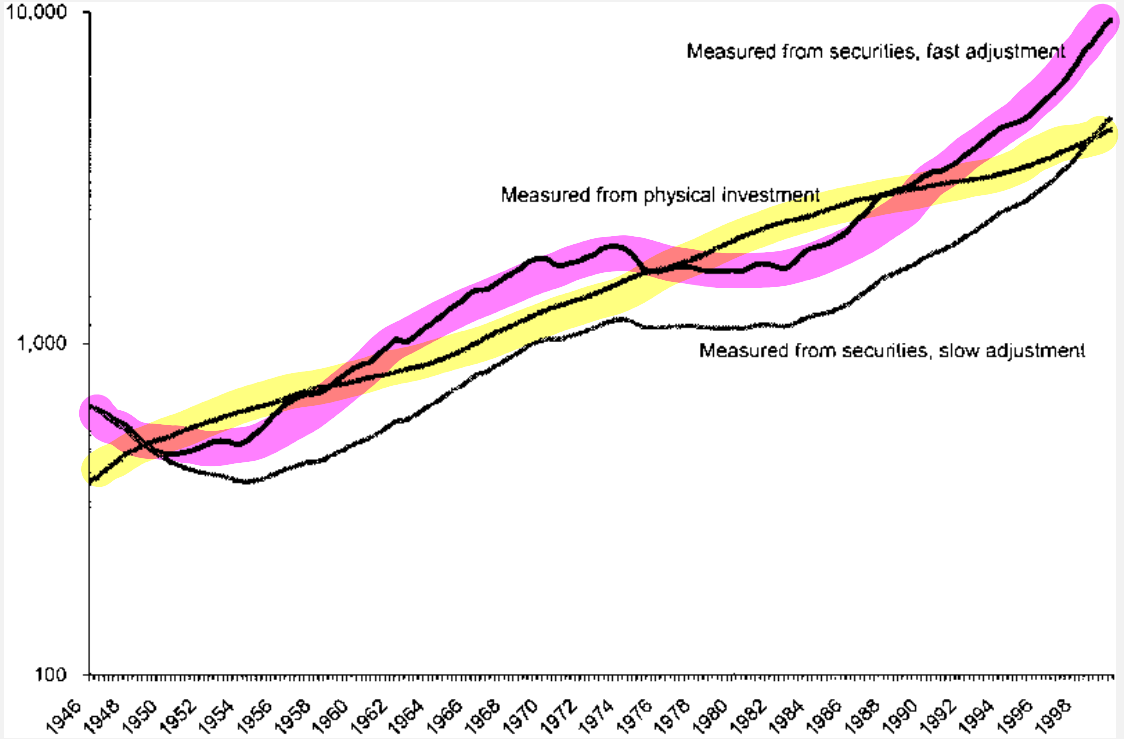
Suppose you purchased 100 Tesla stocks on Jan 1 2021 at $600 per share for a total of $60,000, and you sold the same 100 Tesla stocks on Dec 31 2021 at $1200 per share, for a total of $120,000. What is your capital gain, and should it be included in the 2021 GDP?

Stock Market and GDP

Should Capital Gains be accounted for in GDP?

- Standard view: stock price reflects expected future profits, so capital gains are changes in expected future profits; future profits are not part of future GDP, so capital gains should not count for current GDP
- Alternative view: capital gains may reflect the production of *intangible capital* (business organization, customers loyalty/brand) inside a firm; in that case they should be included in current GDP

Stock Market and GDP



Estimates of U.S. Capital Stock

The Stock Market and Capital Accumulation

By Robert E. Hall*

American Economic Review, 2001

Our deduction is that the main portion of the computer-related intangible assets comes from the new business processes, new organizational structure, and new market strategies, which each complement the computer technology ... [C]omputer use is complementary to new workplace organizations which include more decentralized decision making, more self-managing teams, and broader job responsibilities for line workers.

Issues with GDP

1. Gross and Net National Product
2. Stock Prices and GDP
3. Should we really care about GDP?

Should we really care about GDP?

"Our Gross National Product, now, is over $800 billion dollars a year, but that Gross National Product - if we judge the United States of America by that - that Gross National Product counts air pollution and cigarette advertising, and ambulances to clear our highways of carnage.

It counts special locks for our doors and the jails for the people who break them. It counts the destruction of the redwood and the loss of our natural wonder in chaotic sprawl.

Yet the gross national 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. "

Bob Kennedy, 1968.

Accounting for Natural Capital Depreciation

Idea: depreciation of natural resources to produce value in the economy should be accounted as use of *natural capital*

"Green" Net Domestic Product =

Net Domestic Product – Depreciation of Natural Capital

Major problem: market prices of natural capital usually do not exist, or, if they do, they usually do not reflect externalities of use of natural capital (see Geoffrey Heal, "Endangered Economies," 2017)

Accounting for Natural Capital Depreciation

SteelCo: extracts ore, turns it into steel.

Reduction in total stock of ore in the ground is depreciation of natural capital!

Eco. Acc. SteelCo		Eco. Acc. TruckCo	
Wages	70	Wages	250
Cost of Inputs	0	Cost of Inputs	100
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"Green" Net Domestic Product = ?

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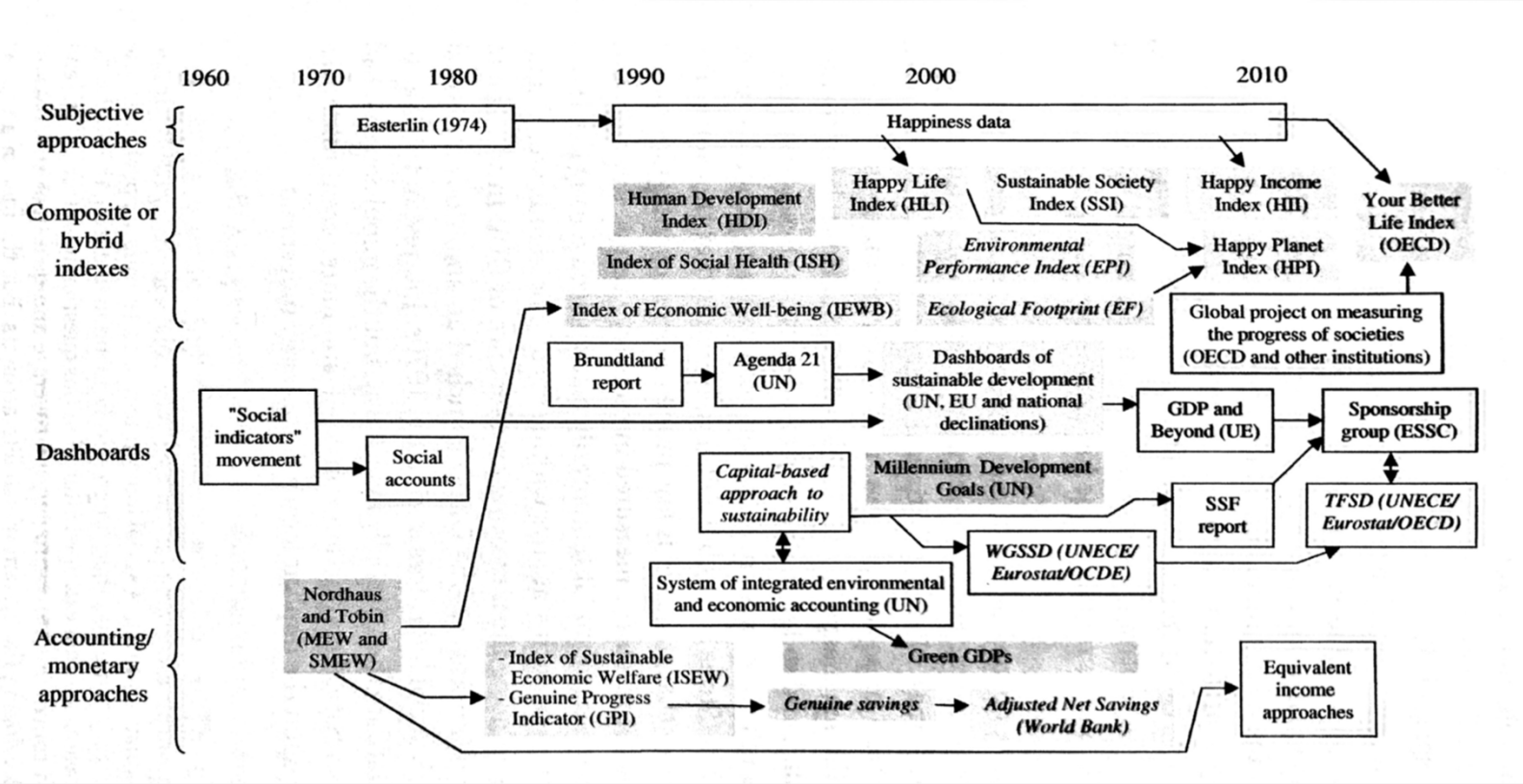
Gross Domestic Product and Welfare/Happiness

- Ultimate objective in economics is Welfare

$$\text{e.g.: } U(C_1) + \beta U(C_2)$$

- Inappropriate use of GDP to approximate Welfare is the issue

Beyond GDP



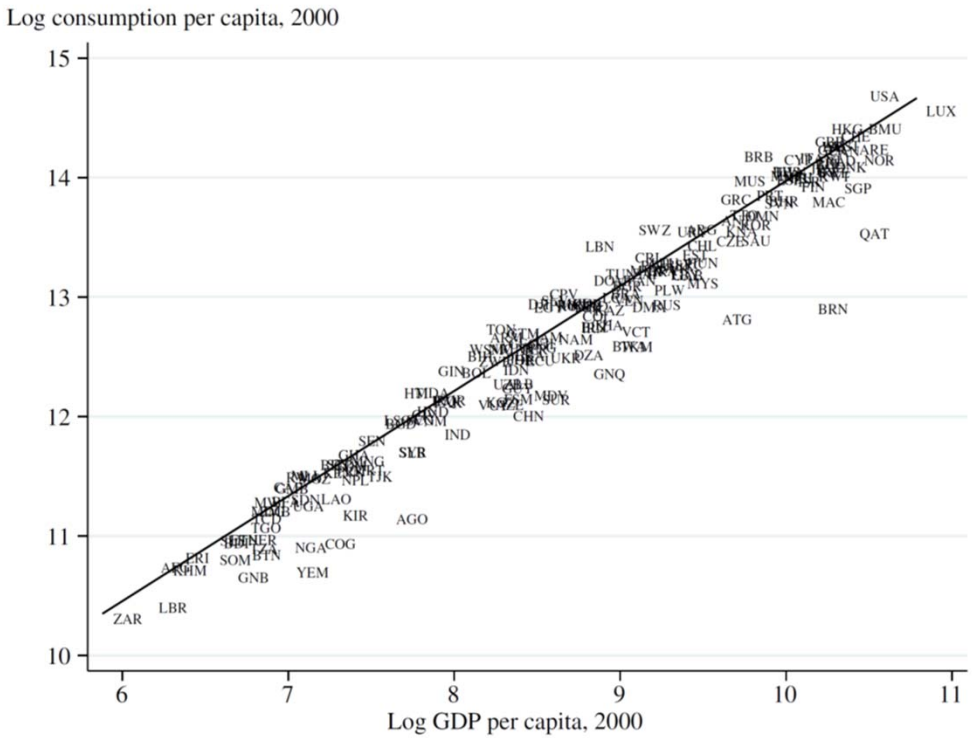
Fleurbaey and Blanchet, *Beyond GDP*, 2013

Beyond GDP: Welfare

What really matters to people's life is Total Welfare. How do we measure that?

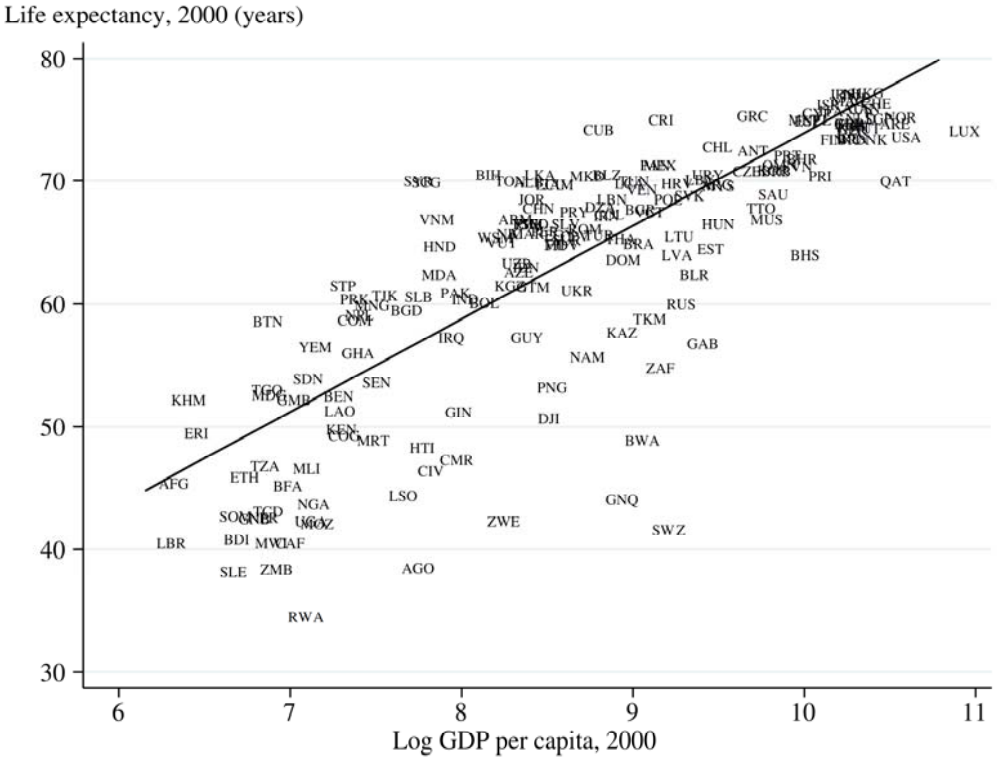
1. Income per Capita (GDP per Capita)
2. Consumption
3. Life Expectancy
4. Inequality

Beyond GDP: Consumption



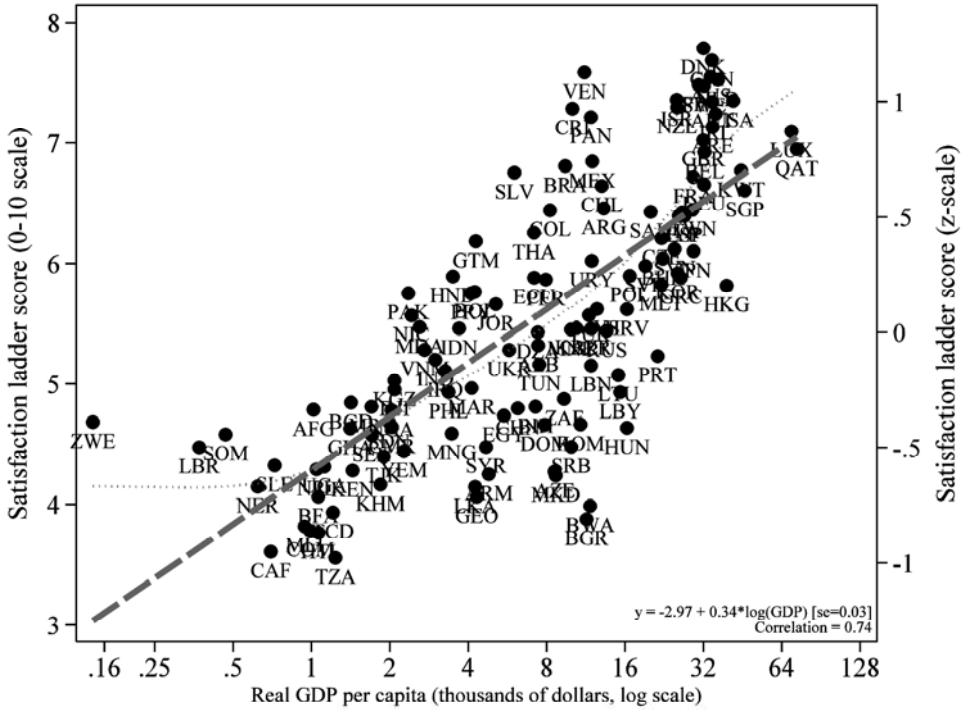
Reproduced from Ch. 1 of Daron Acemoglu, “Introduction to Modern Economic Growth,” 2014

Beyond GDP: Life Expectancy



Reproduced from Ch. 1 of Daron Acemoglu, “Introduction to Modern Economic Growth,” 2014

Beyond GDP: Life Satisfaction



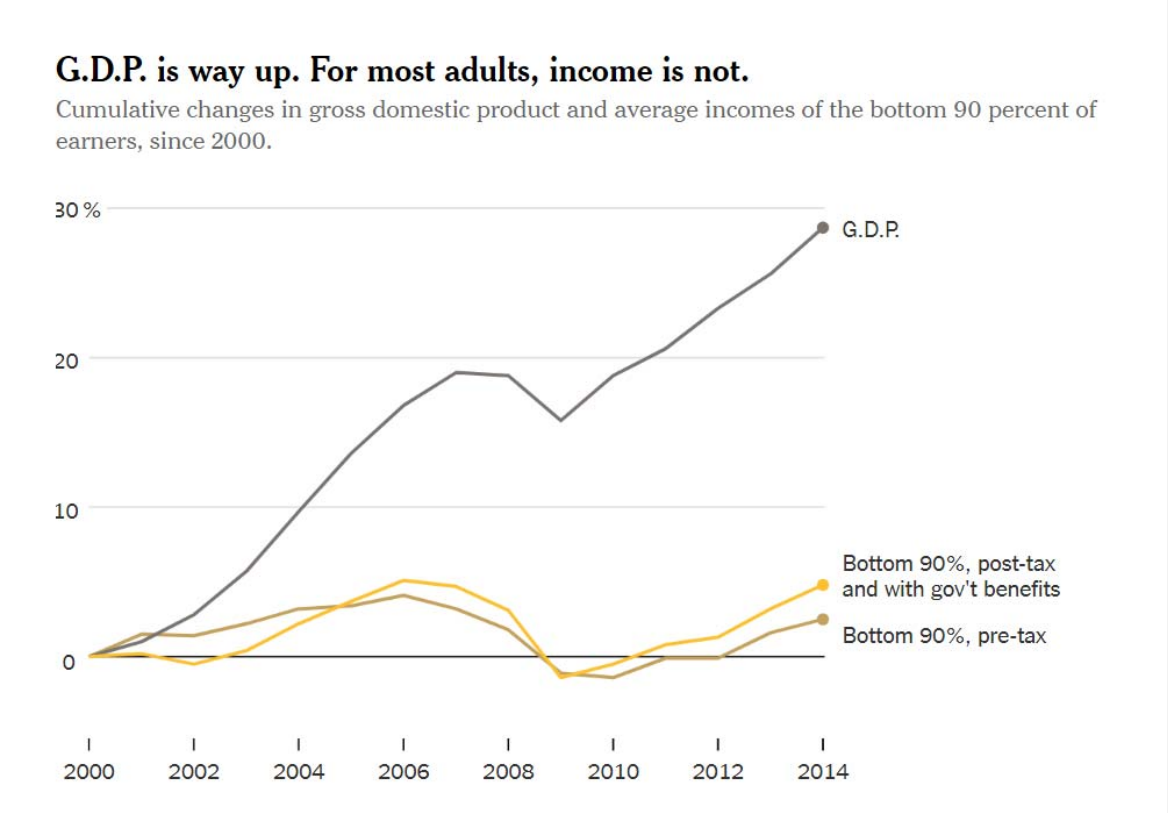
Notes: Each data point shows the average level of well-being and real GDP per capita in that country. Dashed lines are fitted from an OLS regression; dotted lines are fitted from loess regressions. The units on the regression coefficients refer to the normalized scale. Real GDP per capita is at purchasing power parity in constant 2000 international dollars. Sample includes 122 developed and developing countries.

Sacks, Stevenson, Wolfers, "The New Stylized Facts about Income and Subjective Well-Being," 2012

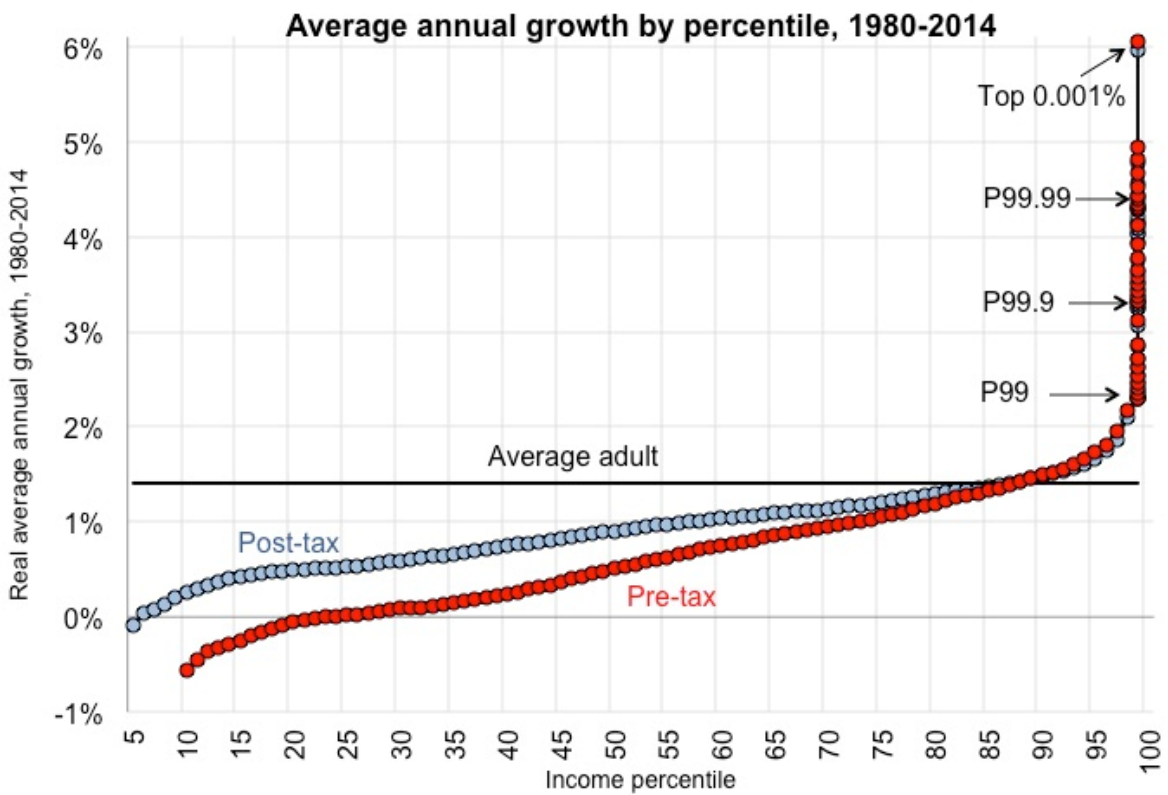
Beyond GDP: Inequality

Beyond GDP: Top 10%, Bottom 90%

"We're Measuring the Economy All Wrong", NYT, Sept 2018



Beyond GDP: Growth by Income Percentiles



"Distributional National Accounts" Piketty, Saez, Zucman, 2018

Summing up on GDP

- GDP sophisticated accounting measure of value created by the economy
- National Accounts offer rich perspective on economy (value added, income, expenditure)
- GDP has limits, use of GDP as measure of welfare is inappropriate

Summing up on GDP

"The valuable capacity of the human mind to simplify a complex situation in a compact characterization becomes dangerous when not controlled in terms of definitely stated criteria.

With quantitative measurements especially, the definiteness of the results suggests, often misleadingly, a precision and simplicity in the outlines of the object measured.

Measurements of national income are subject to this type of illusion and resulting abuse, especially since they deal with matters that are the center of conflict of opposing social groups where the effectiveness of an argument is often contingent upon oversimplification.

Simon Kuznets, 1934.