Exercises on Chapter 1

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Exercise 1. GDP Detective: Who moved the GDP?

You're a forensic accountant in the Agency for Macroeconomic Mysteries. For each short vignette below, state how the event is recorded in GDP using:

(i) the **income** method,

(ii) the **production** method,

(iii) the **expenditure** method.

(a) A car firm imports parts from Japan for $1 and stores them in its warehouse for future production.

(b) The firm imports parts for $1, uses half to produce a car and sells the car to Andy for $2; the other half of parts goes to inventory.

(c) The army is mobilized. Government pays $10,000 in soldier wages. An ammunition factory sells $5,000 of ammo to the government (made with $2,000 of imported steel and $1,000 in domestic wages).

(d) A shipyard builds a cruise ship. Costs: wages $200,000, interest to domestic lenders $100,000, imported inputs $300,000. The ship is sold for $1,000,000 to a cruise company. In the same year the cruise company earns operating revenue $50,000 and pays wages $20,000.

Exercise 2. Time-Travel GDP: The case of Goods A and B

You're asked to explain to a policymaker how GDP evolved when prices and quantities swing wildly. Use the table below for the U.S. and answer the questions.

	p_A	q_A	p_B	q_B
2017	4	5	3	3
2018	1	10	4	2

(a) Compute nominal GDP in 2017.

(b) Compute nominal GDP in 2018.

(c) Compute real GDP in 2018 using 2017 prices (fixed-2017). How much did GDP grow from 2017 to 2018 under this measure?

(d) Compute real GDP in 2017 using 2018 prices (fixed-2018). How much did GDP grow between 2017 and 2018 under this measure? Explain intuitively why this number differs from part (c).

(e) Compute GDP growth between 2017 and 2018 using the *chain-weighted* method (briefly explain steps and give the final growth rate).

Now consider **Thailand** (2017) with:

p_A	q_A	p_B	q_B
30	1	10	2

(f) What was nominal GDP in Thailand in 2017 (in baht)?

(g) If the exchange rate was 25 baht per US dollar in 2017, what is Thailand's 2017 GDP in US dollars at market exchange rates?

Exercise 3. Chained GDP: Fruitopia's fruity dilemma

The country of *Fructus* produces Apples, Bananas and Cherries. Below are annual quantities and prices. Use this dataset to practise chained GDP calculations and interpretation.

(a) Compute a real GDP series at year-2000 prices using base year prices and using the chained method

(b) Plot both series and comment on any differences.

(c) What was the average growth rate according to each method?

Exercise 4. Inequality and Risk Aversion: Country A vs. Country B

We compare two countries, each with 100 residents. Individuals are labeled $j = 1, 2, \ldots, 100$ in order of increasing consumption.

- Country A: $c_A(j) = 100 + 8j$

- Country B: $c_B(j) = 200 + 4j$

(a) Plot the consumption patterns of each country. Horizontal axis: individual j, vertical axis: $c_A(j)$ or $c_B(j)$.

(b) Compute per capita consumption in each country.

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Year	Apples		Bananas		Cherries	
	Quantity	Price	Quantity	Price	Quantity	Price
2000	100	40	50	30	200	20
2001	103	39	47	35	206	20
2002	107	39	47	38	213	19
2003	109	39	45	38	215	18
2004	112	40	46	41	224	18
2005	112	39	46	39	227	17
2006	114	40	47	36	237	16
2007	115	40	46	42	249	16
2008	119	40	43	44	255	16
2009	118	42	40	46	262	15
2010	116	43	41	44	268	15
2011	118	42	40	50	280	15
2012	117	42	41	50	289	15
2013	119	43	40	53	290	14
2014	120	44	40	56	297	13
2015	125	45	41	59	308	13
2016	128	45	38	66	320	13
2017	129	46	38	61	330	13
2018	131	47	37	64	344	13
2019	136	47	37	61	353	13
2020	143	47	34	61	361	12

Note: You can download this table as an Excel spreadsheet from Kurlat's course page.

(c) Suppose the utility function in both countries is

$$u(c) = \frac{c^{1-\sigma}}{1 - \sigma}.$$

Compute expected utility in both countries with $\sigma = 2$. Which country looks better? Recompute expected utility with $\sigma = 3$. Explain intuitively what this tells us about the role of risk aversion and inequality.

(d) For $\sigma = 1.5$, individuals prefer living in Country A to living in Country B. If everyone in Country A were to consume 5% less, would they still prefer Country A, or would they prefer Country B?