Macroeconomics | Activity 1, Lectures 1–2

Reading the Economy: Measurement as an Economic Choice

Worked solutions

· SJTU Summer School · Fatih Kansoy

Lesson of the day. A measurement choice is an economic choice. Which prices you hold fixed, which boundaries you draw, and whether you use exchange rates or common prices all change the number, and so change the story. Every phase returns to this one idea.

Phase 1 – Concept checks

ANSWERS

ConcepTest 1. **Answer.** (c). Building and selling a *new* flat is new production (it enters GDP as residential investment). (a) is a transfer, not payment for new output. (b) buying shares is a swap of assets, which economists call saving, not investment. (d) reselling an old car is not new production; only the dealer's service fee would count.

ConcepTest 2. **Answer.** (b), about 6%. The clean relationship is $g_{\text{nominal}} \approx g_{\text{prices}} + g_{\text{real}}$, so inflation $\approx 10\% - 4\% = 6\%$. It is an approximation, not an identity (the exact figure from $1+\pi = (1+g_{\text{nom}})/(1+g_{\text{real}})$ is about 5.8%). (a) overstates the precision; (c) misreads the algebra.

ConcepTest 3. **Answer.** (b), the Paasche index. With quantities fixed and all prices higher, valuing output at the *final* (higher) prices gives the largest real figure. Laspeyres uses the lower base-year prices, and chain weighting sits between the two.

ConcepTest 4. **Answer.** (a), richer. Poorer countries have lower price levels (mainly lower wages), so converting at the market exchange rate undervalues what they actually produce. Correcting to common prices (PPP) raises their measured real GDP. This is exactly the China case in Phase 3.

Phase 2 – The desk problem

FULL WORKING

(a) Nominal GDP. 2025 = \$2(300) + \$1000(4) = \$4,600; 2026 = \$3(330) + \$1000(5) = \$5,990. Nominal growth = (5990 − 4600)/4600 = **30.2**%.

(b) Real growth, two ways.

(i) **2025 prices (Laspeyres).** Real 2026 = \$2(330) + \$1000(5) = \$5,660. Growth = (5660 − 4600)/4600 = **23.0**%.

(ii) **2026 prices (Paasche).** Real 2025 = \$3(300) + \$1000(4) = \$4,900. 2026 growth = (5990 − 4900)/4900 = **22.2**%.

(iii) They differ because the two years have different relative prices, so the choice of price weights changes the answer. Here rice got dearer relative to laptops, and the two indexes weight rice's rising quantity differently.

(c) Chain weighting and inflation.

(i) Chain (Fisher) growth $\approx (23.0\% + 22.2\%)/2 = \mathbf{22.6}\%$. *The exact geometric average,* $\sqrt{1.230 \times 1.222} - 1$*, is also* 22.6%.

(ii) Inflation ≈ nominal − real = 30.2% − 22.6% = **7.6**%. Positive, and it should be: the rice price rose by half while the laptop price held, so the average price level went up.

(d) From output to living standards.

(i) Per-capita growth = 22.6% − 2% = **20.6**%.

(ii) Rule of 70 at 5% per person: 70/5 = **14** years to double living standards.

(iii) You watch **GDP per person**. Total GDP can rise simply because there are more people; living standards are about output *per head*.

The single economy gave four different growth numbers (nominal 30.2, Laspeyres 23.0, Paasche 22.2, chain 22.6) and one inflation rate. Same facts, different rulers.

Phase 3 – The case

WORKED ANSWERS

The numbers.

1. At the exchange rate, China = ¥95.1tn ÷ 6.91 = $13.8 trillion. As a share of the U.S. $20.6 trillion, that is 13.8/20.6 ≈ **67**%. China looks about a third smaller.

2. It misses that prices are lower in China, so the same real output is valued at low local prices and then converted down. The clearest example is a non-traded service like a *haircut*: identical service, far cheaper in yuan, so the exchange-rate method records it as less output.

3. Correct for prices: $13.8tn ÷ 0.684 = $20.1 trillion, about 20.1/20.6 ≈ **98**% of the United States. China jumps from "a third smaller" to "about the same size." On the IMF's PPP measure, China's *total* output in fact passed the United States in the mid-2010s, making it the world's largest economy by that ruler.

4. No. China has about **four times** the population, so the *same* total output spread over four times as many people means GDP per person is far lower, very roughly a quarter. "Largest economy" and "rich country" are different questions: total size versus output per head.

One country, two honest answers: a third smaller at exchange rates, the largest in the world at common prices. The measurement choice flips the ranking.

End of solutions. Sources: Jones, *Macroeconomics* 6e, Ch. 2; IMF World Economic Outlook (PPP). All figures verified.