CHAPTER 2 Measuring the Macroeconomy

CHAPTER OVERVIEW

By and large, this is a conventional "What is gross domestic product (GDP)?" chapter. Jones runs through the production, expenditure, and income approaches, and emphasizes that the labor share in the United States is roughly constant (well worth emphasizing, since it helps justify the Cobb-Douglas production function that plays a major role later).

There's a particularly clear discussion of how to compare GDP numbers across countries; even if you don't plan on covering international topics in your course, this is probably worth discussing, since cross-country GDP comparisons are so central to the economic growth chapters (and many students have an intuition that prices differ across countries).

Interest rates and the unemployment rate are deferred to later chapters, so you can focus your energies on an intellectual triumph that we economists usually take for granted: the definition of GDP.

2.1 Introduction

Chad starts off by emphasizing just how hard it is to measure "an economy." What should we include? What should we leave out? How can we add up things that are wildly dissimilar—automobile production and grocery store employment and resales of homes and on and on—into one number that tells us what is happening?

Simon Kuznets found a reasonable way to do this, and was awarded the 1971 Nobel Prize in economics largely for creating the definition of GDP that we use today. Economists and citizens take GDP for granted—but it really is one of the great intellectual contributions to economics. What did we ever do without it? Bad macro policy: that's what we did without it. Throughout this chapter, you may want to look for ways to emphasize how many *bad* ways there are to count economic activity—this lets students know that you're not just belaboring the obvious. In addition, you may want to emphasize that the system of national accounts constitutes a set of accounting identities—statements that are true by definition. These definitions are important in framing questions and finding answers. For example, if we define "spending" as $C+I+G+NX$, then we will ask how C, I, G, and NX changed to cause spending to change. In contrast, if we define "spending" as the money supply times velocity ($M \times V$), then we will ask how the money supply and velocity changed to cause spending to change. Definitions are an essential part of economic theory. The national accounts provide ample definitions for asking questions.

A useful analogy comes from medicine. How can you tell whether a human being is healthy? Doctors have settled on a few key variables for summing up human health: body temperature, blood pressure, heart rate, and breathing rate. The first two of the vital signs, in particular, could be measured in a number of ways—so doctors had to settle on the one best way to measure body temperature and blood pressure. Over the centuries, many different "vital signs" were put forward as being the key to measuring health, but only these four passed the test. Even today, many doctors push to include a fifth or sixth vital sign—oxygen levels in the blood, pupil size, emotional distress, pain—but the profession as a whole resists these efforts.

So too with GDP: we're always tinkering with ways to improve the GDP measure. We remind students of its limitations: we look at other numbers as well, but we keep coming back to GDP because it seems to be one of the vital signs of the nation's economic health. GDP is also the most complicated vital sign to explain—not unlike blood pressure in that regard—so we spend a whole chapter explaining it.

2.2 Measuring the State of the Economy

Let's start with Chad's phrasing of the definition of GDP: "Gross domestic product is defined as the **market value** of the **final** goods and **services produced** in an economy over a certain period." The words of this definition that can be emphasized are "market value," "final," "produced," and "services."

By emphasizing "market value," we stress that GDP is valued in some currency, such as dollars, and that unalike quantities of goods cannot be added up to measure the nation's output.

By highlighting "final" I emphasize that one key to accurately measuring GDP is to **avoid** *double counting*. I like to use examples in which common sense conflicts with Kuznets' GDP measure, as in the sample lecture below.

By highlighting "produced" I emphasize that GDP doesn't include sales of used items (such as homes and cars), and doesn't include purely financial transactions (such as buying stocks or moving money between bank accounts). Moreover, GDP is a flow. A flow represents an economic variable that is measured through time, for example how much income was earned or spent last week. In contrast, economic variables measured at a point in time are called stocks. These variables are found in our balance sheets (our statements of assets, liabilities, and net worth). How much money you hold is a question about an economic stock.

By highlighting "services" I emphasize that a large part of economic activity in the United States isn't about making things—it's about providing valuable services. If we leave out the ambiguous "housing services" part of GDP, the remaining service items—transportation, medical care, tourism, and "other"—add up to about $3.5 trillion, about one-fourth of our $13 trillion U.S. economy. Consumer services represent the largest category of consumer spending in the United States, about two-thirds of total consumer spending. In short, consumer services are almost half (around 47 percent) of GDP.

PRODUCTION = EXPENDITURE = INCOME

A clear example about Homer and Marge running a farm makes the point that if you measure correctly, there are three equivalent ways to measure GDP. You can remind students that this is the same "circular flow" idea they saw back in Principles: you can take the economy's pulse when products flow to final users, when revenue flows to firms, or when income flows to the firm's workers, owners, and lenders.

It may be worth emphasizing that Chad's "profits" are what Principles texts often call "accounting profits." They're different from "economic profits," which don't come into play at all when measuring GDP (recall that the difference between accounting and economic profits is the opportunity cost of the entrepreneur's time and the investor's capital). It's worth remembering that GDP is by and large an accounting measure, using accounting intuition.

Students are often confused by the rhetoric of macroeconomists. A case in point arises here. Macroeconomists often use the terms "real income," "output," and "GDP" interchangeably. Since the value of output, as realized through sales, is distributed in the form of various incomes, output, GDP, and income are identical.

THE EXPENDITURE APPROACH TO GDP

Here we run through *C*, *I*, *G*, and *NX* just as in Principles. Fortunately, Chad places less emphasis on the minutiae of the four categories and instead focuses on how these shares have changed over time—and by emphasizing time series, he gives the students stylized facts for macroeconomic theory to explain.

In one case he begins a theoretical explanation immediately. He draws attention to the rise in the U.S. consumption share, noting that it could reflect the fact that it's been easier for average consumers to borrow in recent decades. Alternatively, the rise in today's consumption share could reflect an expected rise in future income.

A few points that might be worth noting:

- It's always worth emphasizing the difference between government purchases (measured in GDP) and government spending (which is what the media cares about, and what matters for many fiscal policy questions, but is not a formal category of GDP). As Chad notes, Social Security, Medicare, and interest on the debt are not included in *G*. They are transfer payments, and in practice most Social Security and all Medicare payments are used to purchase *C*, consumer goods and services.
- It's worth noting that composition of spending is sensitive to where the economy is during the business cycle. During the current downturn in the economy, we see investment's share of GDP falling, as consumption and government purchases' shares are increasing.

It's also worth emphasizing what *NX* really does: it makes sure we count everything exactly once. For example, *C* contains all *purchases* of consumer goods within the United States, not all *production* of consumer goods within the United States. So some of the *C* in GDP is really produced in Germany or China or Canada—and if our final measure of GDP is really going to measure U.S. *production*, we have to subtract that to make sure it doesn't show up in our final number.

So when an American buys a $400 Chinese TV from the local appliance store, it shows up twice on the right-hand side of the national income identity: as +$400 in *C*, and again as –$200 in *NX*. That's how we make sure that the portion of the TVs produced abroad doesn't show up in U.S. gross *domestic* product.

The surprise is that *C*, *I*, *G*, and *NX* all reflect *purchases* by different groups, but they are defined in such a way that they sum up to U.S. *production*.

THE INCOME APPROACH TO GDP

This section gives just enough information for students to learn that the labor share is fairly stable across time within the United States. The only point I might emphasize is that the two forms of business income (net operating surplus and depreciation) are actually one item: income going to owners of capital, which we might call "gross operating surplus of business." The "depreciation" item is imputed (that is, scientifically made up) based on assumptions about the decay of the U.S. capital stock.

And just why is there an item called "indirect business taxes," if so many other forms of taxes—income and payroll taxes, in particular—don't show up here? The easy answer is probably the right one: it's because the creators of the national accounts are following accounting methods. In accounting terms, the answer to "Who pays a sales-type tax?" is empirically ambiguous: in the typical case, the customer "pays" the tax, since it's added onto the bill, but in reality, the business owner sends the proceeds on to the government. By lumping these ambiguous taxes together, we reduce the ambiguity of the other income categories.

THE PRODUCTION APPROACH TO GDP

Once again, this gives you another chance to emphasize the importance of counting everything exactly once. In the production method, you have only two choices:

1. Either only measure *final goods and services*, or
2. Only measure the *value added at each stage of production* as a good moves from firm to firm to final purchaser.

Why bother with (2)? For an economist (or businessperson) trying to figure out which industries are most productive, it is useful to know which industries add the most value to their inputs. In Chad's example, you could use the value-added method to answer the question, "Where does most of a car's value come from—the raw materials or the assembly of those materials?" In the diamond jewelry industry, the answer might be quite different (if the "raw" material is cut diamonds).

I often emphasize that when measuring the size of a local economy, common sense and economic sense are likely to conflict. Common sense says, "Measure the size of the local economy by adding up the sales of all the local businesses." But that would include massive double counting—just think of all the products that are sold from one local business to the next before they reach their final user (farm products are a good example, as is anything locally made and then sold in a local store).

Economic sense says something different: "Measure the size of the local economy by summing up the *value added* by each local business." To do that, you need to know the cost of each company's outputs and inputs, and then just sum all the values of the outputs while subtracting the sum of all the values of the inputs.

WHAT IS INCLUDED IN GDP AND WHAT IS NOT?

Of course, we have to explain the limitations of GDP—Chad's discussion differs from many by pointing to recent research showing that health matters more than is measured in GDP, while environmental degradation likely matters very little. In addition, you might emphasize the importance of leisure as a good that is excluded from GDP.

In this third edition of the textbook, Chad provides a case study in which a nation's welfare is linked to consumption (government and personal) per person, life expectancy, leisure, and consumption inequality. The resulting measure of welfare is contrasted to relative per capita GDP. When comparing the welfare measures across countries two important results emerge. First, relative to the United States, in developed countries like those of Northern Europe welfare rises in comparison to per capita GDP because of: (1) more government consumption, (2) more leisure, (3) higher life expectancy, and (4) less consumption inequality. Second, in poorer countries relative welfare decreases in comparison to relative per capita GDP for the opposite reasons. Chad's case study complements and provides results similar to the United Nations Development Programme's Human Development Index (available at http://hdr.undp.org/en/statistics/hdi).

2.3 Measuring Changes Over Time

Now we get to the distinction between nominal and real GDP. In Section 2.3.1, Jones runs through a simple apples-and-computers example, yielding what you really need to cover: Nominal GDP and Real GDP.

In Sections 2.3.2, 2.3.3, and 2.3.5, he runs through the various types of price indexes—Laspeyres, Paasche, and chain-weighted. If you want to avoid these price-index details, that's easy: just cover 2.3.1 to teach the old standby of "Real GDP in Year X Prices." Then use the basic equation at the beginning of 2.3.1 (nominal GDP = real GDP × price level) to back out the price level.

From there, proceed directly to 2.3.4 and to the definition of inflation, which is probably what you care about anyway. Chain weighting doesn't ever come up again aside from a parenthetical reference between equations 2.3 and 2.4.

Chad's coverage of the three types of price indexes is quite clear and brief, so if you do want to cover it, it shouldn't take more than half an hour in class.

2.4 Comparing Economic Performance across Countries

Students often have a strong intuition that prices vary across countries, and since cross-country GDP comparisons will play a major role in the next four chapters, it may be worthwhile to spend a little time on this section. There is one particular point that I would expand on a bit with most students, and that is the meaning of the final equation in this section:

$$\text{real Chinese GDP in U.S. prices} = (\text{U.S. price level}/\text{Chinese price level}) \times \text{Chinese nominal GDP}$$

The easiest way to make sense of this equation is to first convert Chinese nominal GDP from yuan into dollars. Students can then see, given the exchange rate, how much those many trillion yuan are worth in dollars. Then you can point out that goods cost less in China than in the United States, and therefore those dollars purchase more goods than they would have purchased in the United States. If those dollars purchase more goods, real GDP in China is increased. This real Chinese GDP in U.S. dollars can then simply be found by dividing China's nominal dollar GDP by the ratio of the Chinese price level to the U.S. price level (multiplying nominal dollar GDP by the ratio of the U.S. price level to the Chinese price level).

The key takeaway here should be that if prices are "lower" in China than in the United States, then Chinese real GDP is higher than Chinese nominal GDP.

Compare actual, uncorrected, right-off-the-website U.S. prices (in dollars) for certain goods and services against actual, uncorrected, right-off-the-website Chinese prices (in yuan) for the same goods and services. Convert those yuan prices into dollars at the actual, uncorrected nominal dollar/yuan exchange rate, and you've got a commonsense measure of where prices are lower. Add in a big budget and dozens of well-meaning bureaucrats, and you've got the United Nations International Comparisons Program.

If goods and services cost less in China than in the United States (in fact they do, after you convert yuan into dollars), then that means the price level is lower in China than in the United States. So while China's nominal GDP may look relatively small at $5.8 trillion (when converted into dollars), when adjusting for relative prices, the Chinese real GDP is relatively large at $10.8 trillion.

Figuring out *why* the same goods and services are more or less expensive in some countries than in others is a task usually left to international economics, so I won't attempt even a quick explanation here. Chad closes this section (and for practical purposes, the chapter) by noting that the same goods and services are often cheaper in the poorest countries—haircuts are a classic example. Also, the *Economist*'s Big Mac Index is always worth a mention, since students can grasp that idea quickly.

So while on paper the world's wealthiest countries may appear 100 times richer than the world's poorest countries, the actual difference is closer to 30 times richer. That is still a massive difference that demands explanation—and that is the topic of the next few chapters.

2.5 Concluding thoughts

Just as a reminder, there are two popular topics that Chad (mercifully) leaves out of this chapter in order to get us away from the economic anatomy and toward the economic models that are our field's strength. These are the Consumer Price Index and how price indexes measure quality changes. Chad provides coverage of the former later on in Chapter 8, while this manual provides some coverage on quality changes when discussing that chapter.

You may want to mention these topics in class at some point, to let the students know you'll come back to them:

- The Consumer Price Index's "basket" method is different from the other price indexes covered in this chapter. (The CPI is used to index tax brackets and Social Security payments, so it has policy relevance.)
- It's difficult to measure changes in quality over time (key in a new-economy world). The Census Bureau's hedonic price indexes for computers and Alan Greenspan's speech on the falling real price of cataract surgery come to mind.

Finally, students might be interested to know that national accounts provide a wealth of useful definitions that can be used as a starting point for analyzing important questions such as what causes the national budget deficit, and what role the national budget deficit plays in affecting national savings and gross savings.

SAMPLE LECTURE: PRODUCTION, EXPENDITURE, AND INCOME IN A TRUCK ECONOMY

In this lecture, you can tie together all three GDP measurement methods in a simple economy with one output good. Since I find that most misunderstandings and most of the insights in national income accounting come from the production/value-added method, we'll use Chad's example of steel being used to make trucks. Let's consider the economy of Pickupia. The only two companies in Pickupia produce steel (SteelCo) and trucks (TruckCo).

SteelCo		TruckCo	
Wages	70	Wages	250
Sales Tax	0	Sales Tax	30
Cost of Inputs	0	Cost of Inputs	100
+ Profit	30	+ Profit	120
Total Steel Sales	100	Total Truck Sales	500

There are four different customers for TruckCo's trucks:

Pickupia's consumers buy $200 worth of trucks for personal use.
Pickupia's businesses buy $100 worth of trucks to haul products and workers.
Pickupia's government buys $150 worth of trucks to haul products and workers.
Foreign countries buy $50 worth of trucks for unknown reasons.

Pickupia's consumers also import $100 worth of other goods and services from foreign countries.

This is a complete description of the Pickupia economy. Now, let's work out the GDP measures based on the expenditure, income, and production methods.

Expenditure:

$$\text{GDP} = C + I + G + \text{total exports} - \text{total imports}$$

$$\text{GDP} = (200 \text{ on trucks} + 100 \text{ on imports}) + 100 + 150 + 50 - 100 \text{ on imports} = 500$$

There's no trick here—just a reminder that C includes **all** purchases by domestic consumers, regardless of whether those goods are made here or overseas.

Income:
total wages: 320
total sales tax (an "indirect tax"): 30
total profits: 150
total income = 320 + 30 + 150 (assuming no depreciation of capital) = 500
(This 64 percent wage share is close to the true U.S. value, which may be a surprise to many students who suspect that the vast majority of GDP is profits.)

Production:
Value Added by SteelCo: Somehow, they get their raw ore for free, so their value added is just:

$$\text{revenue} - \text{cost of inputs} = 100 - 0 = 100$$

Value Added by TruckCo:

$$\text{revenue} - \text{cost of inputs} = 500 - 100 = 400$$

$$\text{total domestic production} = \text{value added by all firms in the economy} = 100 + 400 = 500$$

Emphasize how different this answer is from "common sense." If I wanted a commonsense answer to how much is produced in this economy, I'd add up SteelCo's 100 in sales plus TruckCo's 500 in sales to get my answer: 600.

The commonsense answer—which is what you'd get if you just surveyed both businesses and added their answers—turns out to be completely wrong, because it double counts the steel. Making sure you count everything exactly once is the key to a good accounting system—and that's harder to do than you might think.

CASE STUDY: CAPITAL GAINS—WHY AREN'T THEY PART OF GDP?

If you buy a share of Microsoft stock for $100 and then sell it a year later for $150, common sense tells you that you've earned $50. The $50 increase is called a "capital gain." Similarly, if you bought a house for $100,000 and sell it two years later for $125,000, that $25,000 sure feels like income to you—it's money you can spend just as if you had received a $25,000 bonus at work.

But economists' measure of GDP doesn't include capital gains at all—so we have a case of "economists versus common sense." If we focus on the income approach to GDP, we include labor income, capital income, and a few adjustments. "Capital gains" sounds a lot like "capital income," so why aren't capital gains counted as part of capital income?

The short answer is that capital gains can't be part of capital income because capital gains (or losses) merely reflect a change in the *future* profitability of an asset. For example, a stock price might rise because people believe that their company will earn more profits in the future. And if those people are correct, those future profits will show up in *future* GDP.

Of course, stock prices rise and fall for many reasons, and in a course on asset pricing you can cover that topic. But the main point holds: a rise in the price of a home, a painting, or the collection of machines and workers we call "Microsoft" doesn't reflect any *current-year production*. And remember, GDP is all about *current-year production*.

Capital gains aren't part of the government's measure of "national income," but many capital gains are still taxed by the state and federal *income* tax.

CASE STUDY: ROBERT HALL AND *"INTANGIBLE CAPITAL"*

According to some economists—most prominently Robert Hall[1] of Stanford—the previous case study is completely

1. Robert E. Hall, "The Stock Market and Capital Accumulation," *American Economic Review*, vol. 9, no. 5, (December 2001), pp. 1185–1202.

wrong for an economically important reason. Hall shows that under some fairly strict assumptions (inter alia, that a company's stock price doesn't reflect either future monopoly profits or changes in the rate of time preference), then changes in the stock price *must* reflect changes in the size of the nation's total stock of capital. That would mean that an increase in a stock's price *must* reflect corporate investment, while stock price decreases *must* reflect decay of past corporate investment.

But clearly, stock prices change too often and by too large an amount to reflect changes in the *physical* amount of corporate capital—roughly measured by the *I* part of GDP—so Hall argues that many changes in stock price must reflect changes in the stock of the nation's "intangible capital."

Intangible capital might include a corporation's ability to create new ideas, its form of corporate organization, its ability to motivate employees to work hard, and many other things that a corporation can do *today* to help it to produce more output in the *future*. That, after all, is what investment goods do, right? What we call "investment goods" are just products we create today in order to reap a benefit down the road. Perhaps we can think of "intangible investment" as *services* we create today in order to reap a benefit in the future.

In Hall's view, then, the rise in the stock market in the late 1990s reflected the market's guess that modern technology would enable firms to create much more output in the future with very few workers—something that sounds quite a bit like the "new economy" in a nutshell. Of course, since the NASDAQ (a tech-heavy stock market index) plummeted by 75 percent between 2000 and 2003, the big question is, Where did all of that intangible capital go? Did hundreds of billions in "intangible capital" somehow get destroyed?

There is a large literature on "intangible capital," also known as "organizational capital." In the future, economists may find a coherent, practical way to include these important forms of investment activity in the *I* part of GDP.

If Hall's view has merit, then accurately measured GDP should include *some* portion of capital gains income. If these improved measures are even half as volatile as the stock market, then GDP is much more volatile than we currently believe.

CASE STUDY: "ONE QUARTER OF GDP IS PERSUASION"

As we saw before, services are about one-quarter of U.S. GDP. That means that much economic activity isn't about making things, it's about interacting with other people. There are two other ways of slicing up GDP that might be of interest:

1. John Wallis and Nobel laureate Douglass North estimate that "transactions costs, that is, expenditures to negotiate and enforce contracts, rose from a quarter of national income in 1870 to over half of national income in 1970" (cited in McCloskey and Klamer, 1995).[2]

   Transaction costs include attorneys' fees, the cost of the legal system, most of the cost of running the nation's banking and financial systems, auditors, office workers who do accounts payable and receivable, locks on doors, security guards, and almost anything else that makes it possible for you to (1) keep your property, (2) feel enough trust to transfer your property to someone else, or (3) receive property from someone else. Transaction costs aren't just part of *G*: As the list above shows, there are a lot of private-sector purchases involved, so they show up in *C*, *I*, and *NX* as well. According to Wallis and North, about half of GDP gets spent just so that we can interact and exchange with each other.

2. McCloskey and Klamer go further: They estimate how much of GDP is just devoted to "sweet talk," to persuasion. Even when a person is providing information, much of the work isn't just about giving raw data, but about selling the audience on the data. "Why should I listen to you?" That's the question answered by persuasion. The importance of persuasion was noted by the father of economics himself. Adam Smith, in his *Lectures on Jurisprudence*, noted, "Everyone is practicing oratory on others thro the whole of his life" (cited in McCloskey and Klamer).

   Broadly, McCloskey and Klamer want to count up all human communication that isn't about providing either information (for example, telephone operators or college professors) or commands (such as much of the work of police officers and CEOs). They count up lawyers, actors, and members of the clergy; they count up three-quarters of the work done by salespeople, therapists, and job supervisors; and half the work done by police officers, technical writers, and nurses. Their rough estimate is the title of their paper: one-quarter of GDP is persuasion.

REVIEW QUESTIONS

1–4. These essentially summarize the entire chapter, so I will refrain from answering them.

2. Donald McCloskey and Arjo Klamer, "One-Quarter of GDP Is Persuasion," *American Economic Review*, vol. 85, no. 2, (May 1995), pp. 191–95.

John Joseph Wallis and Douglass North, "Measuring the Transaction Sector in the American Economy, 1870–1970," in S. L. Engerman and R. E. Gallman, eds., *Long-Term Factors in American Economic Growth* (Chicago: University of Chicago Press, 1986).

EXERCISES

1. This is a worked exercise. Please see the text for the solution.

2. **(a)** GDP rises by $2 million (final sale price of computers).
(b) GDP rises by the $6,000 commission (capital gains—an increase in the price of an asset like a home, car, or painting—are not part of GDP since the asset wasn't produced that year. They aren't part of national income, either).
(c) No impact. This is a government transfer payment, not a government purchase of a good or service. If the government hired the unemployed and paid them to dig ditches or program in C++, then their wages *would* count as a government purchase.
(d) No impact. *I* rises by $50 million, but *NX* falls by $50 million, so the two effects cancel out and have no impact on GDP.
(e) U.S. GDP rises by $50 million: *NX* rises by $50 million. (Incidentally, this has no impact on European GDP for the same reason as in part **(d)**).
(f) GDP rises by $25,000: *NX* falls by $100,000 but *C* rises by $125,000. The store added $25,000 of value to the U.S. economy, so it shows up in GDP.

3. Real GDP in 2020 in 2018 prices: 5,950; 19 percent growth between 2019 and 2020.
Real GDP in 2018 in 2010 prices: 6,500.
Real GDP in chained prices, benchmarked to 2020: 6,483. (*Note*: output of apples and computers didn't change between 2018 and 2019, so the average of the Paasche and Laspeyres zero growth rates is still zero.)

4.

	2016	2017	Percent change 2016–2017
Quantity of oranges	100	105	5
Quantity of boomerangs	20	22	10
Price of oranges (dollars)	1	1.10	10
Price of boomerangs (dollars)	3	3.10	3.33
Nominal GDP	160	183.7	14.8
Real GDP in '16 prices	160	171	6.9
Real GDP in '17 prices	172	183.7	6.8
Real GDP in chained prices, benchmarked to 2017	171.9	183.7	6.85

Here GDP growth only shows a tiny difference between the various methods.

5. We'll use Chad's shortcut from Section 2.3.4:

$$\text{growth in nominal GDP} = \text{growth in price level (a.k.a. inflation)} + \text{growth in real GDP}$$

This isn't exact, as Chad notes, but it's good enough for our purposes. This implies:

$$\text{growth in nominal GDP} - \text{growth in real GDP} = \text{inflation rate}$$

All we need to do is add in our three definitions of "growth in real GDP," and we'll have our three answers:

Paasche: 14.8 percent – 6.9 percent = 7.9 percent
Laspeyres: 14.8 percent – 6.8 percent = 8 percent
Chained: 14.8 percent – 6.85 percent = 7.95 percent

6. **(a)** Without taking relative price differences into account, India's economy is 11.9 percent of the size of the U.S. economy (78.9 trillion/45.7) / 14.5 trillion).

(b) Taking relative price differences into account, India's economy is 32.3 percent, or about one-third, the size of the U.S. economy (11.9 percent/0.368).

(c) The numbers are different because many consumer goods—food, haircuts, medical visits—are very cheap in India when you are measuring in U.S. dollars. This is usually true in poor countries. As we'll see in Chapter 14, when we look at *The Economist*'s "Big Mac Index" of exchange rates, the same McDonald's hamburger is much cheaper in poor countries than in rich countries when you compare prices in U.S. dollars. Wages, rents, and taxes cost less in poor countries, which makes it cheaper to produce a hamburger or a haircut or even a doctor's visit.

That means that while India is a very poor country, the Indian economy is not one-tenth the size of the U.S. economy. It is closer to one-third.

7. **(a)** 37.7 percent
(b) 30.3 percent
(c) The numbers are different because many goods are more expensive in Japan than in the United States.

8. **(a)** If fewer people have homes, then the average person must be worse off when it comes to homeownership—after all, now people have to share homes or live in less desirable places. People will be working to rebuild things that they already had before. This is a loss, not a benefit. It is likely that if there hadn't been an earthquake, most of the people rebuilding these lost homes would have been able to build something *new* and valuable, rather than rebuilding something *old* and valuable.

(b) Measured GDP will likely rise—people will want to work hard and quickly to rebuild homes, or they will pay a high price to have other workers rebuild their homes. These wages for workers and purchases of materials (which are mostly wages for other workers, probably) all show up in GDP.

This question illustrates a famous parable in economics, the "fallacy of the broken window."[3] If a person breaks a shop window, the shop owner has to pay to repair that window. If we only look at the direct effect, we will only notice that the person who broke the window has "created new jobs" in the windowmaking industry. That's true, but what we don't see is that if the window hadn't been broken, the shop owner would have bought a new suit later that week. Now, he doesn't get the suit since he has to replace his window. So he would've "created new jobs" in the suitmaking industry, but now he won't get that *new* and valuable suit. Instead, he'll spend his scarce dollars replacing something *old* and valuable.

So our earthquake is like the broken window: workers who could have created something new instead have to replace something. It would have been better for citizens if the earthquake had not happened.

3. Henry Hazlitt, *Economics in One Lesson*, Chapters 1 and 2.