Chapter 2
National Income Accounts

This foundation chapter begins with definitions of key macrovariables and policy instruments essential to macroeconomic policy analysis.

The conventional definition of macroeconomics is the analysis of economy-wide, aggregated variables such as national output, interest rates, employment, wages, inflation, and exchange rates. These are defined as **endogenous** variables, determined by and "within" the macroeconomy. These variables cannot be directly influenced or changed by degree but are a product of the interaction of domestic and global demand and supply pressures.

For example, policy makers cannot simply have a meeting, vote to increase growth from 2 to 3%, and expect national output to conveniently comply. National output is an endogenously determined variable, and the final change is, instead, a result of simultaneous interactions of consumer and investor expectations, domestic and foreign disturbances (shocks), and, of course, macroeconomic policies.

The macroeconomic policies that influence the endogenous variables are deliberately implemented and directly controlled by policy makers. These policies are considered to be **exogenous**, or determined independently "outside" the model.

The three exogenous policy instruments available to implement macroeconomic policy are changes in tax rates (t), changes in the growth of government spending (G), and changes in the growth of the money supply (M). The first two policy instruments constitute fiscal policy implemented by the government. Changes in the growth of the money supply and, to some extent, in national interest rates are determined and conducted by the nation's central bank, and constitute monetary policy.[1]

In addition to macroeconomic policies, exogenous variables also include "shocks" that unexpectedly slam into the economy. The endogenous macroeconomic variables such as national output, inflation, and employment are influenced, and at times traumatized, by exogenous shocks such as the oil

[1] The exact mechanism by which money growth is changed will be covered in detail in Chapter 11.

F.K. Langdana, *Macroeconomic Policy*, DOI 10.1007/978-0-387-77666-8_2,

Table 2.1

Fiscal policy	Monetary policy	Shocks
Changes in tax rates (t) and Changes in government spending (G)	Changes in money supply (M) and in short-term interest rates	Wars, Weather, Oil Shocks,
(Government controlled)	(Controlled by the nation's central bank)	Terrorism, for example

shocks of 1973 and 1979, which resulted in the Great Stagflation in the US, the events of 9/11, and Hurricane Katrina in the United States.[2]

Table 2.1 summarizes the exogenous variables, namely, fiscal and monetary policy instruments, and shocks. The interplay between these variables and factors such as consumer and investor confidence and expectations then determines the host of endogenous macroeconomic variables that we encounter on almost a daily basis in the news.

The following endogenous variables will be represented interchangeably:

National output growth = GDP = Y; inflation rate = P; employment rate = n; and interest rates = i.

In addition to the conventional discussion and analysis of macrovariables, one major feature of this book will be the explicit incorporation of the role of **expectations** in formulating and analyzing macroeconomic policy. A key feature introduced below and presented in forthcoming chapters is the concept of "paradigm shifts" where an entire macroeconomic model (paradigm) undergoes a fundamental and unexpectedly drastic change in a relatively short time period.[3]

2.1 Paradigm Shifts: An Introduction

This concept explains how macroeconomic models that may have performed wonderfully in certain periods may suddenly fail within the space of just a few years. It also illustrates how models that are tremendously successful in one economy may be frustrating disasters in another. This book will make the case that paradigm shifts were largely responsible for several major macroeconomic crises. The US in the Great Depression of the 1930s and the stagflation of the 1970s, the macroeconomic problems experienced by Japan since the early

[2] The Great Stagflation is discussed in the context of the "second paradigm shift" in Chapter 10. The US macroeconomic responses following 9/11 and the subprime crisis are also included and analyzed in later chapters.

[3] A "model" is simply a well-articulated, theoretical macroeconomic framework. Typically, a model includes descriptions (equations) of the goods, money, foreign exchange, and labor markets. These markets can be represented and analyzed graphically or mathematically. The major focus of this volume will be on graphical analysis emphasizing the real-world policy aspects of macroeconomics.

1990s, Western Europe since 2008, and the US following the "subprime crisis" of 2007–08, will be among the cases to be discussed in this context in later chapters.

A special feature of this book will be in-depth discussions of the implications and policy prescriptions of each individual paradigm and the linking of these paradigm shifts to the expectations and actions of forward-looking consumers, producers, and investors.

Building a Bridge: An Early Intuitive Example Why is macroeconomic policy making such an imprecise science? With all this computing power at our disposal and with even more accurate and sophisticated data-gathering systems in place, why can't a conventional engineering optimization problem design optimal fiscal and monetary policies that will ensure continuous recovery?

These questions hit at, perhaps, the core of macroeconomic policy design. Prescribing macropolicy is, unfortunately, not an optimization problem like those encountered in engineering. (Having acquired an engineering undergraduate degree, this author remembers agonizing over similar issues in graduate school in macroeconomics). The answer lies in the aspect of macroeconomics that results in paradigm shifts. The following simple example will provide intuition at this early stage. (A more detailed analysis will be presented while studying the JoAnna Grey/Lucas model in Chapter 10.)

A bridge has to be designed to cross a river in Year 1. The design specifications are {A, B, C}, where A is the width and depth of the river, B is the load and cycles/second to be experienced by the bridge, and C is the nature of the bedrock, geology, etc. With these specifications, the engineer produces the optimal design, X, which is the blueprint for the bridge.

Now, in Year 5, if another bridge is to be built in a different part of the country, and if, coincidentally, the specifications {A, B, C} are to remain exactly the same, the civil engineer can indeed dust-off blueprint {X} and submit it again. It will work.

However, this procedure would be practically impossible in the world of macroeconomic policy. If a set of "optimal" fiscal and monetary policies {Z} were designed and implemented to improve an economy laboring under the specifications {J, K, L}, where J is high inflation, K is high unemployment, and L is low output growth, they may indeed work in Year 1. But, say, in Year 5, if the economy is facing the same problem specified by {J, K, L}, it is more than likely that the set of macroeconomic policies {Z} which were successful in Year 1 would fail or even be counterproductive in Year 5.

The reason is that engineering policy {X} is set against a time-invariant backdrop of nature. Isaac Newton's three laws of motion will always be valid in Year 1 as well as in Year 5. Macroeconomic policy, on the other hand, is set against a backdrop of individuals who have expectations which are constantly changing and which are, in turn, functions of the results of past fiscal and monetary policies.

In our example here, individuals remember the effects of macropolicy {Z} in Year 1. They remember what happened to interest rates, employment, exchange rates, etc., soon after {Z} was enacted. So in year 5, when they realize that policies {Z} are about to be implemented again, this time they indulge in hedging behavior. They anticipate the effects of {Z} based on their past experience, and they take action to minimize any and all adverse effects of {Z}. Thus, the cumulative actions of these individuals may end up minimizing or totally negating policy {Z} in Year 5. In this case, a paradigm shift is said to have occurred. Policy {Z} which may have been a huge success in Year 1 may now be rendered totally ineffectual in Year 5.

Some examples of such paradigm shifts are presented in Table 2.2.

Until the early 1930s, the US economy was well-represented by the classical model. Macroeconomic policies dictated by the model and its underlying assumptions of wage and price changes fit the economy well. However, the macroeconomic trauma of the Great Depression of 1929–33 ushered in a shift to the Keynesian paradigm (named after the British economist, John Maynard Keynes) that reigned supreme from the late 1930s and was generally considered to be a globally effective model. The shift from the classical to the Keynesian model is now labeled Paradigm Shift 1. Macroeconomic policies dictated by the Keynesian model—activist fiscal and monetary policies—enabled economists to fine-tune macrovariables such as inflation and output growth with respectable precision.

This macroeconomic Camelot, however, collapsed in spectacular fashion in the oil-shock decade of the 1970s. The Great Stagflation of the 1970s in the US (characterized by double-digit inflation and unemployment) ushered in yet another paradigm shift to the supply-side model, now described as Paradigm Shift 2.

This paradigm, with its theoretical underpinnings in the "rational expectations" models, has policy implications and assumptions that are fundamentally different from its Keynesian predecessor. Here, the roles of government spending and

Table 2.2

Till early 1930s	Late 1930s to late 1970s	Late 1970s to present
Classical model	Keynesian model	**Developed economies** Supply-side (rational expectationist) leading to the New Economy since the mid-1990s **Or** New Keynesian **Emerging economies** New Keynesian

monetary policy in influencing employment and output are minimal at best. The emphasis is on deregulation, tax cuts, and "less government" in general. Adherents of this model, the supply-siders, have claimed responsibility for the US macroeconomic performance of the 1980s till 2001. In fact, as discussed in Chapter 10, the internet-assisted and technology-driven "new economy" has been linked to the deregulatory backdrop of the 1980s.

We will see, however, that in the US, Paradigm Shift 2 is by no means incontrovertible. As discussed in the preceding chapter, since the early 1980s, both the Keynesian and the supply-sider models have been competing for the center stage of macroeconomic policy dominance. Both models claim distinguished and experienced economists and policy makers as adherents. And both seem to be able to "explain" the behavior of key macroeconomic variables reasonably well.[4] It is this two-model coexistence in the US since the early 1980s that has resulted in the conflicting policy analyses, policies, and interpretations discussed in Chapter 1. This duality of models exists only in developed economies such as the US, Western Europe, and Japan. Emerging economies are well described by individual and incontrovertible macromodels to be discussed in detail in later chapters.

Each model will be chronologically discussed in the following chapters, beginning with the classical model, followed by the Keynesian and supply-side models, and finally ending with the New Economy. For the US economy at present, the reader will have to decide which model—New Keynesian or supply-sider—is most applicable, based on the information and analyses presented in the following chapters. Unlike other texts, which may steer readers towards one of the two models for the US, this book will not impose the author's choice of the "true" US macroeconomic model. While a strong case could be made to indicate that the US has indeed been required to adopt a conventional Keynesian paradigm in the years following 9/11, a consensus for a single model is still conspicuously absent at present. Given that even the governors of the Federal Reserve are themselves strongly split, it would be pedagogically inappropriate to unequivocally claim one or the other as the dominant macromodel for the US.

2.2 Some Fundamental Definitions

The total value of a country's output is the gross domestic product, or GDP. In the US, this statistic is measured by the Commerce Department. It is defined as the total market value of all final goods and services produced within a given time period by factors of production located domestically.

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[4] The discussion of the time-series generated Identification Problem in Chapter 10 explains how two very different models with drastically different policy prescriptions can legitimately co-exist and explain macroeconomic behavior equally well.

This seemingly innocuous definition has several interesting aspects. Only final goods and services are included with their final prices inclusive of all taxes. Intermediate goods are not included to avoid the problem of double-counting. For example, an electronic component that is part of a laptop screen is counted in the price of the final laptop. Including it separately at some earlier stage of the production process would simply double-count the component.

Only goods produced (and services rendered) in the current period are included. Unsold inventory is also included with the emphasis on current production, and not necessarily on market clearance. The sale of a used car, or the resale value of a home, for example, would not be a current GDP statistic as these items have already been included in the year in which they were initially produced.

The goods produced and services rendered must be within the current period, and the output must be produced by factors of production (labor, capital, or land), located within the country, hence, gross "domestic" product. This includes output produced (and profits earned) by foreigners and foreign companies in the domestic country, but does not include output produced by domestic citizens abroad. Profits earned by domestic companies abroad are, similarly, not included.

The less widely used gross national product (GNP) statistic measures the output produced by a country's factors of production (domestic workers), regardless of where the production takes place. The following simple example helps differentiate the GDP and GNP statistics. A Japanese company making light trucks in the US would have all its output included in US GDP. However, only the wages of the American workers employed in the truck factory would be included in US GNP.

In late 1999, the Bureau of Economic Analysis significantly revised the measurement of GDP. (i) Business software purchases were included in a component of GDP (specifically in the Equipment and Software component of non-residential fixed investment), (ii) government employees' pensions were reclassified as personal savings, and (iii) a new measure of banking output was designed to measure banking productivity gains more accurately. All these revisions may have boosted the annual growth rate of real GDP by as much as 0.4% annually in the expansion of the late 1990s.

While GDP is one of the most frequently encountered and tracked statistics, it is far from being a perfect measure. By itself, per capita GDP—total GDP divided by the population—says very little about the overall level of pollution, quality of health care, education, government services, financial, and legal institutions, etc.[5] In addition, the average per capita GDP ignores the vast

[5] For example, the boost in GDP obtained by harvesting every tree in the vast forests of the Pacific Northwest in the US would certainly be dwarfed by the ecological disaster that would follow. In fact, historically, economies experiencing phenomenal GDP growth have often also experienced accompanying increases in pollution; Dickensian England is an oft-cited example.

asymmetry in income distribution experienced in countries where most of the national wealth is concentrated in only a few individuals. In short, the link from per capita GDP to "quality of life" is often tenuous.

Even if per capita GDP were to increase over time, a large portion of this increase could be due to inflation and not to real increases in output. The next logical step, therefore, is to measure national inflation and to determine the "real" or inflation-adjusted output.

2.2.1 Inflation

Inflation is defined as the percentage rate of change of a price index. Two important and frequently encountered price indexes that allow us to measure inflation are the GDP deflator and the Consumer Price Index (CPI). The following examples will best describe these two frequently encountered indexes.

2.2.2 GDP Deflator

The GDP deflator is a nation-wide generalized price index focusing on the change in prices of goods and services that constitute the GDP. This economy-wide index attempts to determine the percentage change in price for all the goods and services produced in an economy.

$$\text{GDP Deflator} = \text{Nominal GDP} \,/\, \text{Real GDP}$$

In the following simple example in Table 2.3, the inflation rate is measured from some benchmark or base year in the past (Year 1) to the current time period (Year 5).

In Year 1, country K produced 15 units of X at \$0.20 per unit, and 50 of Y at \$0.22 per unit. In Year 5, as shown below, it produced more of both goods, but the prices also increased. To calculate the real (physical) increase in the value of national output, our first task is to measure the rate of inflation and then to sift it out to compute the real inflation-adjusted increase in GDP.

Table 2.3

Base year (Year 1)	Current year (Year 5)	Real GDP current year (Year 5)
15 of X at \$0.20 = \$3.00	20 of X at \$0.30 = \$6.00	20 of X at \$0.20 = \$4.00
50 of Y at \$0.22 = \$11.00	60 of Y at \$0.25 = \$15.00	60 of Y at \$0.22 = \$13.20
Total = \$14.00	Total = \$21.00	Total = \$17.20
Nominal GDP in Year 1 (in Year 1 dollar)	Nominal GDP in Year 5 (in Year 5 dollars)	Real GDP in Year 5 is \$17.20 (using Year 1 prices)

The nominal GDP from the formula is computed by simply multiplying both quantities and prices of each individual good for the particular year in question. Hence, nominal GDPs for Year 1 and Year 5 are respectively \$14.00 and \$21.00, as presented in Table 2.3. However, computing a growth rate for GDP based on these numbers would certainly overstate the real increase in output. We need to subtract—deflate—the increase in nominal GDP due to inflation.

The next task, therefore, is the computation of the real GDP in the current year. As displayed in the third column, real GDP is computed by multiplying the quantities produced in the current period (Year 5) not with the current prices, but by our base year (benchmark) prices from Year 1. Real GDP is, therefore, a more modest \$17.20 in Year 5. This is the "real" increase in goods and services from Year 1 to Year 5.

The rate of growth of real GDP is defined as the **"growth rate"** of an economy. A decline in real GDP over two consecutive quarters constitutes a **recession;** this is the unofficial, yet widely accepted, definition of a recession.

Plugging the nominal and real GDP into the deflator formula, we obtain:

$$\text{GDP Deflator} = \frac{21.00}{17.20} = 1.22$$

This simple example indicates an inflation rate of 22% between years 1 and 5. Alternatively stated, the nominal GDP of year 5 has to be "deflated" by 22% to give us the real or inflation adjusted GDP.

In actual computations performed by the Commerce Department's BEA (Bureau of Economic Analysis) that calculates and releases GDP figures, all goods and services included in GDP, along with their respective prices, are included in calculating the deflator. This, however, is not a good measure of the inflation experienced by the typical consumer/worker/family because it includes goods—heavy-duty steam turbines, for example—that are not typical "household" consumption. For this reason, the Fed prefers to use the **personal consumption expenditures (PCE) index** to gauge inflation at the consumer level. The construction of the PCE is similar to that of the deflator, with the big difference being that it includes goods and services only from the consumption category of the GDP—in the next chapter, we will see how GDP is comprised of Consumption, Capital Investment, Government Spending, and Net Exports.

2.2.3 Consumer Price Index (CPI)

In marked contrast to the above index that includes all goods produced in the economy, the more familiar Consumer Price Index (CPI) tracks only the rate of change in price of a relatively fixed bundle of goods ("market basket") over time. This market basket is designed to represent the typical monthly consumption of a typically urban family of four, and is also referred to as CPI-u.

Initially constructed during World War 1 as a benchmark for adjusting shipbuilders wages paid by the US government, the index is computed monthly by the Bureau of Labor Statistics (BLS). On a monthly and bimonthly basis, the BLS collects price information of around 96,000 goods and services—everything from mouse pads to mangoes is included. Every month, the Department of Labor sends a team of observers to 23,000 stores in 87 cities to record the most current prices. These items are then placed into eight major expenditure categories to finally produce one price index, the CPI, computed as follows[6]:

$$\text{CPI} = \frac{\sum P_i q_0}{\sum P_0 q_0}$$

where P_i = current prices; q_0 = "fixed" market basket (consumption bundle); P_0 = base year prices

In the following Table 2.4, the first column represents the "fixed" market basket composed of 15 of X and 50 of Y. It is the change in price of this consumption bundle over time that will give us the CPI.

The denominator in the formula is simply the nominal value of the market basket in Year 1 dollars. The numerator is the price of the "fixed" Year 1 basket in Year 5 (current year) dollars. This is computed in the column on the extreme right.

Hence, the CPI is:

$$\text{CPI} = \frac{17}{14} = 1.21$$

This indicates 21% inflation in the fixed market basket from Years 1 to 5, in this simplified example. Since the CPI measures the cost incurred by a typical family in buying a representative market basket, it is also known as the **cost-of-living** index.

The rigidity in the composition of the "fixed" market basket has always been known to cause the CPI to overstate the actual inflation rate. In fact, the 1996 Boskin Commission found this amount of overstatement to be as much as 1.1%.[7]

This overstatement is actually a very significant issue. In addition to measuring inflation, the CPI also measures the change in the cost of living for the urban

Table 2.4

Base year (Year 1)	Current year (Year 5)	To get $\sum P_i q_0$
15 of X at \$0.20 = \$3.00	20 of X at \$0.30 = \$6.00	15 of X at \$0.30 = \$4.50
50 of Y at \$0.22 = \$11.00	60 of Y at \$0.25 = \$15.00	50 of Y at \$0.25 = \$12.50
$\sum P_0 q_0$ = \$14.00	Total = \$21.00	$\sum P_i q_0$ = \$17.00

[6] The eight categories along with their general expenditure proportions are housing (43%), food and beverages (15%), transportation (17%), medical care (7%), entertainment (6%), education and communication (6%), apparel and upkeep (4%), and other (about 2%).

[7] Named after Stanford University Professor, Michael Boskin, chairman of the committee. While it was clear for some time that the CPI was overstating actual inflation, the Boskin commission systematically estimated this value.

population of the US, which accounts for approximately 81% of the total population. It forms the basis for annual benefits adjustments to recipients of social security benefits and food stamps, funding for school lunches and other programs, workers whose long-term wage contracts are determined by collective bargaining, and non-government sectors that use the CPI as a benchmark for future wage changes. Income tax brackets, interest on inflation-indexed bonds (I-bonds), and exemptions and deductions computed by the IRS are also distorted by overstated inflation.

The overstatement can be primarily attributed to four factors:

(i) Substitution Bias

The CPI does not capture the fact that when the price of a particular good increases, consumers quickly shift to a substitute good whose price may not have increased by as much.

(ii) New Product Bias

This occurs when new goods and services are introduced into an economy but not yet incorporated into the fixed weights of the market basket. Air conditioners in the 1950s, and mobile phones and laptops in the 1990s, for example, were included years after their introduction. These new products typically experience sharp drops in price within the first few years of introduction, with this initial price decline not being captured by the CPI. In sectors such as consumer electronics and entertainment, avionics, medical technology, and nanoscience (just to name a few), the rate of introduction of new products and services renders even a one-year-old market baskets obsolete.

(iii) Quality Bias

It is increasingly difficult, especially in technologically advanced economies, to separate simple changes in price from changes in quality. New video equipment and new medical technology, for example, may be significantly more expensive in the current year, but may easily outperform the corresponding items that constitute a market basket from some earlier base year. The BLS does indeed attempt to make adjustments for increases in quality. Inflation in the auto sector from 1967 to the present would have been far higher if this had not been done. Since 1992, the US has also been making quality adjustments for hardware in the information technology (IT) sector. Nevertheless, quality bias, which is linked to the new product bias, remains a challenge for the BLS.

(iv) Outlet Substitution

More and more consumers, both in the US as well abroad, are shopping in outlet malls. Furthermore, sophisticated supply chain management has resulted in generations of discount stores such as Walmart that can sell significantly below standard retail prices. If these stores are not fully represented in the CPI, an upward bias may result in the final inflation figure.

To remedy the bias problem, from 1998 the BLS has switched from updating the weights and composition of the market basket from every 10 years to every two years. This shorter period should provide a more timely and flexible measure of consumer spending patterns that, in turn,

should give us a more accurate measure of inflation. Mobile phones and auto leases were included in a new category in 1998, labeled "education and communication", and personal computers were given a greater role.

This more frequent revision of the composition of the market basket will, hopefully, ensure that the consumption bundle is more in line with current consumption patterns, thereby resulting in a more accurate measure of inflation.

2.2.4 Which Measure Does the Fed Use?

Given the recent emphasis on the goal of price stability both in the US as well as in the Eurozone, central banks—despite the popularity of the CPI—have de-emphasized the consumer price index because of its biases in overstating the true underlying rate of inflation, and have, instead, focused more on the PCE.

In fact, in 2000, the Fed announced a switch to the PCE for three reasons:

(i) The PCE is a chain-type index. With advances in sectors such technology, health care, and communications, it was found that many goods produced in the current period (Year 5) were not even in existence in Year 1. Or, alternatively, the base year counterparts of goods in Year 5 (computers, mobile phones, etc.) were simply not in the same league in terms of productivity and performance.

To remedy this problem, the BEA adopted a chain index for calculating real GDP with the base year now just one year behind the current year. In our simple example, the average of the prices of Year 4 and Year 5 would be used for computing the real GDP in Year 5, instead of the Year 1 prices, as done earlier. Presumably, Year 4 would have more of the items produced in Year 5, and these items would be closer in quality and performance to current items than those produced in Year 1. For the following year (6), a moving average of prices of years 5 and 6 would be computed as "base year" prices, and so on. Hence, real GDP is now often presented in chained dollars, and the PCE is essentially the rectified equivalent of the GDP Deflator.

(ii) The PCE is a broader measure of inflation, as it includes more goods and services than the CPI.

(iii) Past values of the PCE can be recalibrated as more sophisticated methods of measuring prices and capturing new data become available.

In 2004, the Fed announced that it would track a sub-category of the PCE called the **core PCE**. The core rate of inflation is simply the inflation measured by the PCE minus price increases (changes) in food and fuel. This is done to sift away the exogenous (external) factors causing inflation and to allow policy makers to focus on the component of inflation caused by domestic endogenous influences such as excess consumer and investor demand. After all, as we will discuss later in Chapter 5, the endogenous inflation (caused by internal demand pressures) is really the only inflation that central banks can counter with appropriate monetary policy.

We now turn to discussion questions followed by simulated "media articles" in which concepts covered in this chapter will be presented in the form in which macroeconomic information is usually encountered in our professional and personal lives.

2.3 Discussion Questions

The following Q&A section highlights some additional aspects of these inflation indexes.

(1) *Since both the CPI and the chained-type price index (deflator) measure inflation, why do we often see a "spike" in one and not the other?*

The deflator includes all goods and services that constitute GDP, but the CPI does not. However, the CPI includes imports, which are not included in the deflator. Typically when oil prices surge, for example, a spike in the CPI is observed while the deflator seems to be unaffected, at least during the particular period. Additionally, the two indexes are not always synchronized; the CPI is measured monthly, whereas the deflator is available only quarterly.

(2) *Is one index superior to the other? Which index must one use?*

The CPI suffers from substitution bias, while the Personal Consumption Expenditure (PCE) index does not. While this bias has caused the US Federal Reserve to switch from the CPI to the PCE index as its primary gauge for measuring inflation and prescribing policy, the CPI still remains very much alive in that it determines adjustments to social security benefits, pension payments, etc. Furthermore, recent improvements to the CPI's market basket are designed to continuously reduce substitution and outlet biases and to align the CPI more closely with the deflator (PCE).

Generally, very rarely do policy makers examine just one index—CPI or PCE—in isolation. An array of more specialized indexes are also consulted, such as the PPI (producer price index), and the forward-looking CRB (Commodities Research Bureau) index. Other examples include the precious metals index, employment cost index, and the feed-and-seed index. Smaller economies such as Singapore, where foreign trade constitutes a significantly larger proportion of domestic GDP compared to that for the US, would have a greater role for exchange rate influences that affect the price of vital imports such as fuel and food.

(3) *The PPI is another eagerly awaited number. Is it similar to the CPI?*

The PPI is indeed calculated in similar fashion. It measures the wholesale prices of approximately 3,500 items and was, in fact, formerly known as the wholesale price index. However, its implications are quite different from those of the CPI and the chained-price deflator. The PPI includes many raw materials and semi-finished goods in the early stage of the supply chain. Therefore, movements in the PPI serve as leading indicators of future price movements at the retail level captured "later" by the CPI and the deflator. This often results in the PPI being one of the more eagerly awaited statistics

when expectations of resurgent inflation are high. Another noteworthy index of future inflation is the monthly FIBER (Foundation for International Business and Economic Research). This index focuses on expected labor and raw materials shortages in the near future.

(4) *Should central banks strive for zero inflation?*

Given the fact that—revisions to the market basket notwithstanding—most G7 economies' CPIs tend to overstate the actual cost of living, a zero percent inflation target as measured by the CPI may conceivably correspond to a negative inflation rate in reality![8] These economies would experience deflation with across-the-board average decreases in prices of real estate, stocks, manufacturing, wages, etc., reminiscent of the agony experienced by Japan in the 1990s and into the 2000s. In later chapters, we will examine how some central banks aim, instead, for stable inflation rates of 1–2%, rather than potentially deflationary absolute values such as "zero inflation".

Unfortunately, though, when banks adopt targets of, say, 2% (corresponding to actual inflation of, perhaps, 0.5%), unions and others often tend to misinterpret this as a sign that the central bank is prepared to tolerate a little inflation. They may then push for 2% wage increases, thereby actually contributing to actual future increases in inflation!

(5) *Finally, since measured inflation tends to overstate the actual cost of living in most economies, does this imply that there is some globally standardized index of measuring inflation?*

While the technique of computing the price indexes in different countries is similar, the market baskets are, unfortunately, not. For example, unlike the other G7 countries, the UK's retail-price index includes interest payments on home loans. The former Soviet Union did not include many costs of services. Economies like Singapore, that have relatively large trade sectors, have proportionally greater emphasis on traded, exchange-rate sensitive goods such as water, fuel, and food, in addition to re-exports, compared to the US.[9] And Japan's CPI excludes many popular goods such as mobile phones and personal computers. Attempts at convergence are, however, gradually being made—China, for example, switched from using a retail price index to a more standardized consumer price index in 2000.

Article 2.2 provides more details pertaining to the choice of deflators in the US, France, and Germany which adjust for quality improvements, particularly in the information technology (IT) sector.

In the following simulated articles, please comment on/define/explain the underlined phrases/sentences with reference to material from this chapter.

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[8] The G7 economies are Canada, France, Germany, Italy, Japan, the UK, and the US. With Russia included, we have the G8.

[9] Singapore's trade sector (imports plus exports and including re-exports) as a percentage of its GDP is often in 160–180% range, while the US typically has a trade/GDP ratio of 22–25%.

ARTICLE 2.1 CHOOSE YOUR INFLATION TARGET

Fred Burdekin, The New York Ledger[10]

Last week's comments regarding the "right" level of inflation by the Chief Economist of the National Chapter of Certified Accountants have sparked what seems to be a national debate. Even talk-show hosts are in on the act, espousing their personal views on the subject! This newspaper decided to randomly interview some Americans from different walks of life, to get a perspective on what they are thinking on Main Street, USA.

"Why don't they just **(a)** aim for zero inflation? Seems straight-forward! Why argue over whether it (target inflation) should be 1% or 2%? Hey, zero is best!" was Sam Trivenni's comment, as he emerged from his police car in Houston, Texas. Sam is a police veteran of 17 years, and assists wife Judy when he can in her pet grooming business.

Mary Etawills of Wills Travels Agency in Blacksburg, Virginia, disagrees. "I'm no rocket scientist, but it seems like some inflation would be good. We want the prices of houses and other assets to go up, don't we?"

The inflation debate affects individuals of all age groups. Edna Winterbauer, resident of Memories Retirement Home in Fayetteville, Arkansas, is concerned. **(b)** "The only increase I ever get in my social security check is cost-of-living. Will zero inflation mean no increases for us retired people? No, I don't like it!"

Mohit Sharma, an IT consultant in San Francisco, takes time out from his latte break at Starbird's to talk to us. He feels that "the indexes are quite confusing. I noticed that **(c)** often the CPI rises sharply, but the other major indicators do not. Just have one index and try not to confuse the public." His co-worker, Shifra Bergstrum, added, "I don't even think that the indexes are accurate. I mean, **(d)** I remember when inflation was 'low' according to the indexes, but it was impossible to afford a house in the Northeast or here on the West Coast? It just doesn't make sense!"

In Colorado, digital spectro- scope manufacturer John Zalinsky, who imports electronic components from Asia, went on to say that, "the strong dollar makes my costs of basic electronic components imported from Southeast Asia much lower, and **(e)** hence, my final product, many steps down the supply chain, is cheaper. This has to decrease inflation. Is this figured in the inflation measurement?" Lots of opinions. Lots of ideas. The debate rages.

All "articles" have been created by the author and, as discussed in Chapter 1, are designed to mimic actual reporting of macroeconomic events by the news media. The objective, as discussed earlier, is to allow managers and executives to relate concepts discussed in the chapter to macroeconomic news and analyses presented by the media on a daily basis. The names ascribed to the newspapers and magazines, and to the individuals "quoted" in the articles as well as listed as "authors" are purely fictional. Any resemblance to any existing publication or persons is coincidental. This endnote applies to all "articles" in all chapters of this book.

ARTICLE 2.2 INFORMATION TECHNOLOGY AND MACRO-DATA

David Mandelstamm, Frankfurt Business Policy Review

Comparing global growth figures has become even more of a challenge in recent years because of the different statistical methods employed by countries to account for changes in quality of output. One major component within this category is the **(a)** change in the quality of computers.

As the G7 economies have increased capital investment in information technology (IT) hardware, the magnitude of the potential statistical error in measuring **(b)** real GDP growth has increased proportionally.

"Measuring the real output of, say, crude oil or coal over time is relatively easy. With computing technology, however, the change in quality every year is so significant that it is really very hard to separate an increase in nominal output or spending between a change in price and a change in volume," remarked Prof. Eugenie Moulin of Tourainne Macroscience Labs, in Tours, France.

Given the massive increases in speed and memory in IT hardware, American statisticians have adopted techniques for adjusting for quality improvements in computers when computing GDP deflators. Within the eurozone, though, only France uses this adjustment technique; Germany does not.

"This adjustment for quality isn't just a matter for statisticians and macroeconomic purists", states Professor Moulin. "This makes a very significant difference."

From 1992 till the present, the **(c)** price deflator for IT equipment in the US has fallen by over 80%. In other words, nominal output in the IT hardware sector is deflated by 80% compared to the amount for 1992 to account for a bias in inflation measurement.

Since Germany does not adjust for this bias, the deflator for IT has shrunk by only 20%. The implication is that growth in the real IT investment in Germany is understated and so is its real GDP.

In fact, studies by the Macro Institute in Frankfurt (among others) find that if Germany's nominal capital investment in IT were to be deflated by the relatively smaller US GDP deflator, then German investment has grown by an average of 29% a year since 1992. This is in stark contrast to the 6% growth figure reported in official government (German) statistics!

(d) Japanese statistics in this area are, in fact, even more distorted. "The Asian economies along with the eurozone economies need to be aware of the measurement differences that exist between their countries and the US, before they design macroeconomic policy," states Lord Larry Duncan, a financial analyst an owner of WorldSoft, an IT consulting house based in London.

We find macroeconomic experts everywhere to be well aware of the measurement problems. "No wonder the French statistics (regarding capital investment in IT) look so good!" exclaims Victor Gulli, Senior Economist

at Rome's Modigliani Center. "We should all be using the US method which the French have adopted—it just makes sense!" He waves expansively towards his computer sitting beside a window with an amazing view of the Eternal City. "Look, I just bought this last year, and already my teenage son's laptop, which he bought last month, can do more. And he paid less!"

In fact, if American statistical methods were to be applied to the entire eurozone, then its **(e)** annual growth rate might be at least half a percentage point higher than it has been since the late 1990s.

Answers And Hints

Article 2.1 Choose Your Inflation Target

(a) Zero inflation may actually lead to deflation, since inflation is usually overstated. Deflation is usually symptomatic of an economy in collapse, with average prices of assets falling across the board. Mary Etawills in the following paragraph has the right hunch.
(b) This is not just an academic exercise. An inflation-indexed increase is often the only source of increase for those on fixed incomes—correcting the overstated inflation actually "hurts" these folks.
(c) The CPI includes imports, namely oil. The PCE does not. So when oil shocks slam into the economy, the CPI rises while the deflator remains dormant.
(d) This is average rate of inflation for the whole economy. In some cases, the overall rate of inflation may seem low but could mask high and rising inflation in certain specific sectors. Hence, the increased focus on the notion of speculative asset price (SAP) bubbles in sectors such as IT, the stock market, and in real estate. This will be discussed in Chapter 5.
(e) The PPI would be the relevant statistic here. Please refer to discussions pertaining to the "early-warning" potential of this inflation statistic.

Article 2.2 Information Technology and macro-data

(a) Which bias is being discussed here?
(b) Business purchases of software are now included in capital investments (I). Clearly, rapid increases in technology and related IT products have unleashed a host of complications in measuring accurate GDP statistics—biases abound.
(c) This is a special deflator for the IT sector, primarily hardware. If the deflator for the US has shrunk by 80% this means that nominal IT output in the current year has to be deflated now by only 20% compared to 1992. Why?
(d) Please give an example of these Japanese "distortions" from earlier in the chapter.
(e) As discussed, the annual growth rate of an economy is simply the per capita growth rate of real GDP.

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