Part I

Introduction

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Macroeconomics and the Real World

1.1 The Problems of Macroeconomics

Perhaps the most direct way to understand what *macroeconomics* is about is to sample the typical problems that it addresses.

Nothing focuses the mind on the economy more readily than an economic crisis. And when most of us think about an economic crisis, it is the macroeconomic aspects of the economy that spring to mind. The U.S. economy entered a recession in December 2007. Between then and the beginning of the recovery in June 2009, gross domestic product (GDP) fell by 3.7 percent – the largest fall during a recession since the Great Depression of the 1930s. To put that in perspective, GDP per head fell by $2,981 – that is, if the GDP had been evenly distributed across every person in the United States, each would have lost nearly $3,000 per year or nearly $4,500 over the eighteen-month recession (i.e., a family of four would have lost $18,000).

Of course, GDP is not evenly distributed and neither are the losses from a recession – many people are affected, but none suffer more than those who lose their jobs. Over this same period, 7,311,000 Americans lost their jobs – a fall of more than 5 percent of total employment. Looked at another way, the unemployment rate – the percentage of people who want to work but are not working – rose over this period by 4.4 percentage points to 9.4 percent. Nearly, one person in ten was out of work. Nor did the pain stop with the end of the recession. Employment continued to fall and the unemployment rate continued to rise for several more months. It is not for nothing that the recession of 2007–2009 is already widely known as the "Great Recession." The first central concern of macroeconomics is to understand **MACROECONOMIC FLUCTUATIONS** – that is, to understand why such calamitous situations arise and, possibly, to provide an intellectual foundation for doing something about them.

One should not conclude that macroeconomics is a gloomy field, concerned only with the malfunctioning economy. For a quarter of a century

before the onset of the recession in 2007, the U.S. economy experienced growth punctuated by two mild recessions – one at the beginning of the 1990s and one at the beginning of the new millennium. Over the period from the end of the last big recession in November 1982 to the onset of the Great Recession of 2007, real GDP more than doubled; and, while population increased by 30 percent, total employment increased by more than 50 percent. People became richer. GDP per head rose by 75 percent or by nearly $19,000 per year or nearly $76,000 for a family of four (again on the unrealistic assumption that the gains were spread evenly). Over the course of U.S. history, the forward steps of rising GDP and rising employment have, in the end, overwhelmed the backward steps of recession. The second central concern of macroeconomics is to understand long-term **ECONOMIC GROWTH** – that is, to understand why such happy situations arise and, possibly, to provide guidance on how to foster them in the future.

1.2 What Is Macroeconomics?

1.2.1 Macroeconomics Defined

Macroeconomics is sometimes defined as the study of the relationships among aggregate quantities (or **aggregates**) such as GDP, employment, unemployment, inflation, interest rates, exchange rates, and the balance of trade. In contrast, *microeconomics* is sometimes defined as the study of the behavior of individual economic actors – individual people, households, and firms.

An alternative to this definition defines **MACROECONOMICS** as *the study of the economy taken as a whole*; whereas **MICROECONOMICS** is *the study of a part of the economy (particular people, households, firms, markets, and so forth), taking the remainder as given*.

The two definitions of macroeconomics are by no means identical, and the second definition is better. For example, the study of the market for personal computers is typically regarded as microeconomics, although it may use aggregated data – for example, the total sales of personal computers rather than the sales of a particular model by a particular manufacturer. Similarly, typical macroeconomic problems may be addressed – at least in theory – without aggregates. However, in most cases, the only practical way to study the economy as a whole is to use aggregates, so the two definitions will typically pull in the same direction.

The distinction between the study of the economy as a whole and the study of its individual parts, taking the rest of the economy as given, is an important one. Consider an analogy. A citizen of New Orleans might want to take the most efficient route to Baton Rouge. Normally, he would simply drive

Interstate Highway 10. In making that calculation, he assumes that other people will go about their own business in their ordinary ways. On the other hand, if there were a hurricane, and everyone tried to leave New Orleans by this route, the traffic jam would be enormous. The calculation that assumed that other people would act in their ordinary way would be misleading. And indeed, the problem arises mainly because many people act on that misleading calculation. The people who miscalculate in this way are guilty of a **FALLACY OF COMPOSITION** – *the assumption that what holds for a part must hold for the whole as well.*

Fallacies of composition also occur in economics. For example, when I say that I hold $2,935 worth of Google stock, what I mean is that the current price quoted on the stock exchange times the number of shares that I own equals $2,935. Because my few shares are only a tiny part of the outstanding Google shares, it is not unreasonable to think that I will be able to sell my shares for the going price without driving that price down. However, if the entire market decided that it was time to sell Google shares, their price would collapse. What is true of the individual is not necessarily true of the market as a whole.

The most famous fallacy of composition in economics was identified by the English economist John Maynard Keynes (1883–1946) and is discussed in Chapter 13: an individual can increase her wealth by saving, but the attempt of every individual simultaneously to increase savings will add nothing to the wealth of the economy as a whole. Individuals attempt to save more by reducing their consumption, which reduces the demand for goods, reducing the production needed to meet the lower demand, reducing the employment of workers needed in production, and, therefore, reducing their incomes and the amount of funds available for saving. Workers save at a higher rate relative to income, but that rate is multiplied by a smaller income. And, in the end, because their efforts to save lowers income, the amount that is successfully saved for the economy as a whole is just the amount needed to fund new investment, which did not change. (Of course, this is all conditional on no other sources of demand filling the void.) One goal of macroeconomics is to provide an analysis of the economy that does not commit fallacies of composition.

1.2.2 The Origins of Macroeconomics

Economics is an ancient field. Aristotle wrote on economic topics in the third century B.C. The origins of economics belong in equal measure to philosophy; the practical experiences of merchants, manufacturers, and government; and the law. What we now regard as macroeconomic problems are among the oldest in economics. For example, the relationship between the

stock of money and the price level was addressed as early as the sixteenth century. The problem of the balance of trade concerned governments at least from the Renaissance and was widely discussed among economic commentators. Modern economics is usually dated to Adam Smith's *Wealth of Nations* (1776). Lacking a clear distinction, microeconomic and macroeconomic issues are run together in the *Wealth of Nations* and in the work of subsequent economists before the twentieth century.

Before the nineteenth century, economists had frequently addressed the problems of money, prices, trade, and the sources of economic growth. With the Industrial Revolution, business cycles – the difficult-to-understand alternation of good and bad times – became a central focus of economics. By the 1920s, economists had begun to reconceptualize business cycles as requiring a different sort of analysis from that appropriate to the behavior of consumers and firms. The Great Depression accelerated this reconceptualization.

Most famously, John Maynard Keynes's *General Theory of Employment Interest and Money* (1936) is widely credited with providing the foundations of modern macroeconomics. Whereas Keynes explicitly drew the distinction between the theory of the individual economic actor and the theory of the output and employment as a whole, it was not Keynes but the Norwegian economist Ragnar Frisch (1895–1973), winner of the first Nobel Prize in Economic Science in 1969, who in 1933 first coined the terms *microeconomics* and *macroeconomics*. Perhaps, more importantly, Frisch and the Dutch economist Jan Tinbergen (1903–1994), who shared the Nobel Prize with Frisch, set the stage for the way in which modern macroeconomics analyzes the economy. Tinbergen was originally trained as a physicist. And both Frisch and Tinbergen advocated the use of formal models as tools of data analysis to illuminate the workings of the macroeconomy. Frisch was the father of modern econometrics, whereas Tinbergen was the first to provide a complete macroeconometric model of the U.S. economy. These developments were possible only because, at about the same time, other economists, notably the Russian-American Simon Kuznets (1901–1985; winner of the Nobel Prize in 1971), the English Richard Stone (1913–1991; winner of the Nobel Prize in 1984), and the Australian Colin Clark (1905–1989), developed the modern system of national accounts that provides the basic data for macroeconomic analysis (see Chapters 2–4).

1.2.3 Positive versus Normative Macroeconomics

The Great Depression was a deep psychic wound to many who lived through it. Modern macroeconomics was born out of the desire to do something about it. Both Frisch and Tinbergen saw macroeconomic modeling as a

tool for central planning. Keynes was not a central planner, but he also saw macroeconomics as a tool for government intervention to counteract recessions. He is often vilified by modern opponents of such intervention for having provided the intellectual justification for them.

Like most economists, Frisch, Tinbergen, and Keynes nonetheless understood the key distinction between the *positive* (how things are in fact) and the *normative* (how we want them to be). The goals of the policymaker are normative. What the policymaker can do to achieve those goals is positive. Two economists could agree on facts about how the economy works and its present condition – that is, they could agree on a positive account of the economy – and still disagree about what should be done. Some hope to use policy to guide the economy to better outcomes. Others wish to leave the economy to its own devices – which is itself a kind of policy. Either way, the goal of this book is to develop a sound positive account of how the economy works. Such an account provides vital information to inform policy, whichever direction policymakers, politicians, and citizens wish to take it.

One difficulty with a simple dichotomy between the normative and the positive – between policy and the way that policy actions work out in the economy – is that the government does not stand outside the economy, pushing a button here and pulling a lever there to guide it along. The government is part of the economy. It commands substantial economic resources, and it provides important services, as well as key elements of the institutional setting in which economic activity takes place. As a result, although a positive account of the economy does not endorse any particular policy, it must nevertheless take account of policies, what they aim to achieve, and how successful they are in their own terms in order to understand how the economy behaves in fact.

1.3 Doing Macroeconomics

1.3.1 Macroeconomics as a Science

Social Sciences versus Natural Sciences

Economics is a social science. The issue raised in the last section that positive economics must account for the normative goals and actions of policymakers is part of a general difference between social and natural sciences. Most natural sciences (with the partial exception of some aspects of biological sciences) deal with inert matter. Unlike human beings, molecules and planets and electricity do not hold beliefs, aim at goals, possess intentions, or make decisions. A reasonable hypothesis is that, at some level, we can find relatively simple rules describing the behavior of inert matter based on reasonably straightforward factual observations. It is hard to imagine social

behavior being captured in the same way. Exactly how would a physicist account for something as basic as deciding to go to the store to buy a gallon of milk and the actions that follow it?

This is not to say that social life is inscrutable. Although a physicist using the tools of physics would find your trip to the store beyond the powers of his science, the same physicist as a human being may well be able to predict with considerable accuracy your route, means of movement (car or foot), the time it takes, and so forth simply by understanding your goals and the constraints that you face (for example, that it is too far to walk in a reasonable time). Nor need he know in detail what is inside your head. It will often suffice to understand what is typical about people. Of course, you might surprise him by having atypical characteristics or goals – prediction in social sciences is rarely certain or precise. We should be careful not to make too much of that. The relevant comparison is not with the precision that a natural science can achieve with respect to the motion of a planet or the measurement of a molecule. Rather we must ask whether the methods of the natural sciences or the methods of the social sciences, which take account of people's goals and constraints, give greater certainty or precision when applied to the behavior of human beings. On that front, the social sciences win hands down.

Rational Behavior

The distinction between positive and normative economics is sometimes described in the catchphrase "you can't derive *ought* from *is*." Scientific explanation in economics turns this prohibition on its head: in economics we frequently derive *is* from *ought*. Microeconomic explanations are typically of the form: "Given her preferences and the prices of fruit and what she has to spend, Louise would be more satisfied buying grapefruit than bananas (that is, Louise *ought* to buy grapefruit); therefore, Louise *does* buy grapefruit." This is the essence of the sometimes misunderstood economic premise: *people behave rationally*. Here "rationally" means only that people are assumed to adapt their actions efficiently to their own desires, whatever those desires are. It says nothing about the nature of the desires. And again, such explanations may turn out to be wrong in particular cases. But most economic explanations are not interested in particular cases anyway, but in what people do on average in markets or economies. Again, if we can appeal to what is typical – of people's desires and their behavior – then the insight that people typically try to fulfill their desires efficiently is helpful in understanding what happens in the economy.

The question of how macroeconomics is related to microeconomics has been debated for decades. For our purposes, it is sufficient to say that whatever happens in aggregate must be connected to the behavior of individual people. We do have to guard against fallacies of composition. Yet, as we shall

see in subsequent chapters, we may frequently get some insight into the relationships of aggregate macroeconomic data from a careful analysis of how individuals should behave optimally. Such insights are never decisive. We must always check to see whether, and to what degree, the macroeconomic data reflect them.

Observation versus Controlled Experiments

One of the reasons that some physical sciences are more certain and precise than social sciences is that they are better able to run controlled experiments. Controlled experiments help to isolate causes and typically create situations that are much simpler to analyze than uncontrolled experiments or nonexperimental observation would allow. The difference is not perfectly sharp. Although experimental economics is now a recognized field, it mostly involves observing people in stylized market transactions or games. It provides genuine insight, for example, into how auctions work. But we cannot necessarily generalize from the experiment to real-world economic behavior. Similarly, not all natural sciences are experimental: astronomy, meteorology, and geology, for example, are no more – and perhaps less – susceptible to experiment than is economics.

Experiments of a type that would be most revealing are frequently not possible in economics. It is too hard, or we simply do not know how, to manipulate different aspects of the economy in the right way to achieve the right sort of controls. Experiments would also raise ethical problems. We can hardly test the effects of unemployment on inflation rates by intentionally creating mass unemployment just to see what happens. One of the great benefits of controlled experiments is that they simplify. They permit us to observe a situation in which everything other than the relationship of interest has been excluded. The economy is too complex to do such experiments on any large scale. We must instead simply observe the economy and try to infer its mechanisms through other means.

Another feature of experiments is that they can be repeated. Our confidence in what they show may be increased when scientists in other laboratories get the same results. In an earlier era, some scientific fields were called "natural history." The ecologist or wildlife biologist was a natural historian who might observe forests or seas or animals or plants in their natural environments. The geologist might drill, dig, measure, and map to try to determine the geological history of the earth. In all these cases, there is only a single history. The naturalist does not have the luxury of starting over and rerunning history to see if it works out the same. In this respect, economics is more like natural history than it is like physics or chemistry. Just as a wildlife biologist can observe different populations of, say, elephants in different areas, an economist might observe the economies of different

countries. But neither the biologist nor the economist can observe the *same* population or the *same* economy with the *same* initial conditions. There may be similarities and general lessons to be drawn, but history moves on.

1.3.2 Models and Maps

Models as Maps

One approach to understanding phenomena that are both complex and hard to manipulate in their natural state is to construct models. Models are meant to represent known or conjectured relationships in a form that may allow us to experiment on the model, even when we cannot experiment on the thing that is modeled. These days models are often virtual, existing only on a computer. Originally, however, models were nearly always physical. Aeronautical engineers, starting with the Wright brothers, used models of airplanes in wind tunnels to discover how real airplanes will perform in flight. Civil engineers used models of river systems to learn about the hydrology of actual rivers.

Reasoning with models is analogical. We hope that when the analogies are close in some known respects, they will be close in some unknown respects. We may imagine that the more detailed the model, the more likely it is to be informative. That rarely turns out to be correct. Wind-tunnel models need to get the shape of the airplane correct. Yet it may be unnecessary – and even misleading – to try to mimic the internal structure. In what respects, and to what degree, a model needs to mimic the real thing depends in part on our purposes, in part on how the world is, and in part on the properties of the model itself that may not be related at all to what we are trying to model.

Maps are an example of a particular kind of model in which we can see that detailed copying of the world may be counterproductive. A "perfect" map on a one-to-one scale would be perfectly useless. Even a map on a much higher scale would be hard to use if it were cluttered with details that we do not need. A subway map (think of the iconic London Tube map) needs to show accurately which stations are connected by which subway lines. If the distances between the stations are even roughly proportional, it is a plus. But it would be utterly confusing and would defeat the purpose if it showed every building at the street level above the subway. The beauty of the map is that it accurately displays the information that is relevant to getting the rider on the right line and off at the right station.

Different maps might be employed in closely related activities. We may, for instance, want a subway map *and* a plan of the layout of a particular station. Different maps serve different purposes. It is not inaccuracy but different goals that allow one map to represent the subway station as a mere