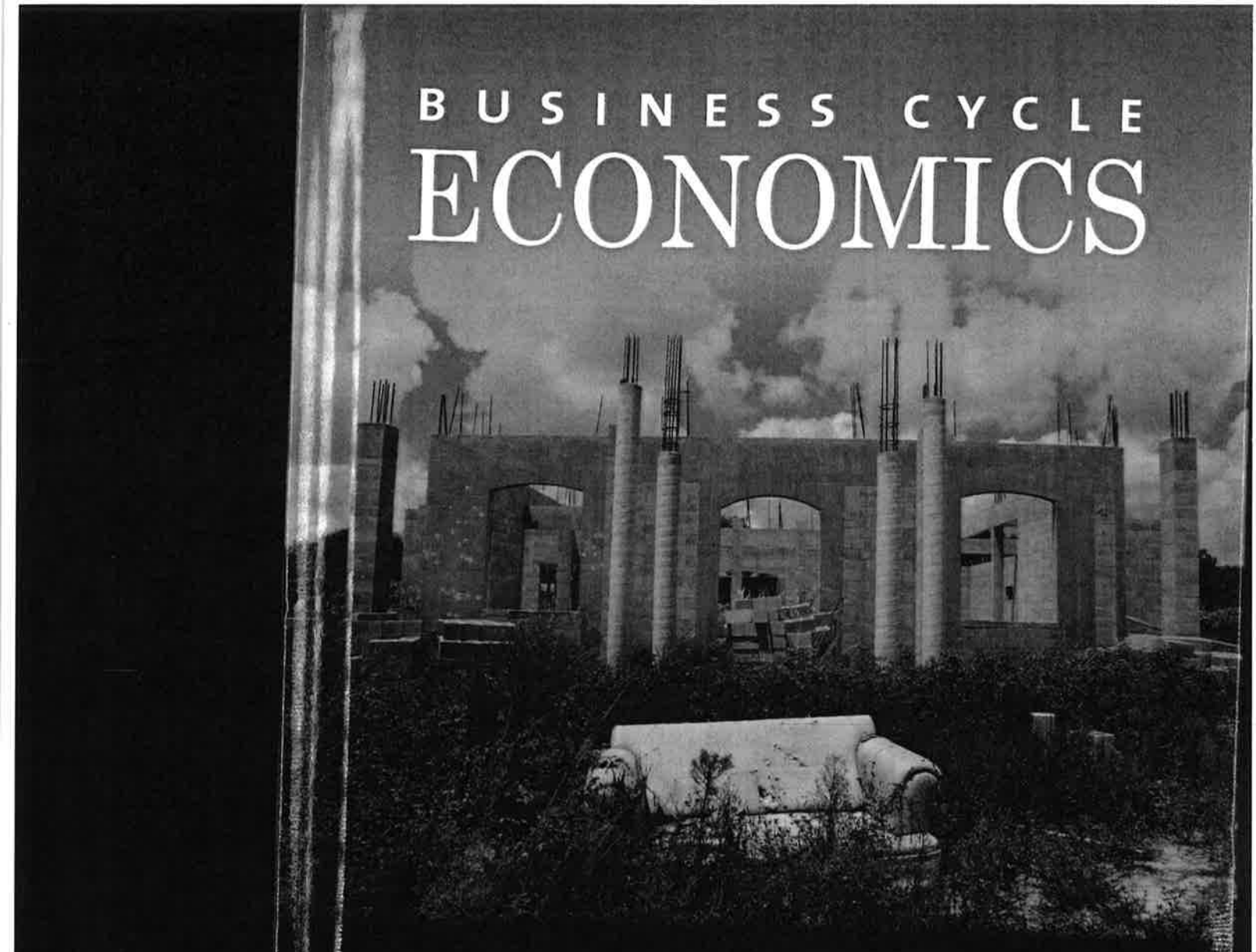
# BUSINESS CYCLE ECONOMICS



## UNDERSTANDING RECESSIONS AND DEPRESSIONS FROM BOOM TO BUST

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# ONE

# Why Study Business Cycles?

## INTRODUCTION

Consistent with the popular conception of economics as the "dismal science," economists secretly long for recessions and depressions. Not in any real or concrete sense, for as a general rule economists are not sadists and do not enjoy seeing people suffer through the kinds of hardships experienced by countries that are going through an economic crisis. However, when it comes to the state of economic knowledge, nothing improves economists' understanding of how markets and macroeconomies work more than an economic downturn. The most obvious analogy is to an auto mechanic who learns his craft not by working on cars that are running well but by getting under the hood of autos that have broken down. Much the same can be said of economists. Recessions and depressions are essentially the only substitute that macroeconomists have for an experiment; when markets break down so completely, the underpinnings of what is actually driving the operations of fully functioning economies become more readily apparent. Economic contractions are an opportunity for economists to pop open the hood and take a look inside the engine of modern economic systems.

The best example of the learning opportunities afforded by economic crises is the Great Depression, an unprecedented economic downturn of such a massive scale that it turned the whole discipline of economics on its ear. The Great Depression played a crucial role in the development of macroeconomics as a separate field of study from microeconomics, and also in the development of Keynesian economics, the most fundamental

change in the way that economists think about the world since 1776 when Adam Smith published *The Wealth of Nations*. Keynesian economics in turn spawned some of the most radical developments in public policy since the Industrial Revolution and provided the theoretical foundation for the modern welfare state. It also provided the impetus for conservative critiques of the expanded role of government, from Friedrich Hayek to Milton Friedman. Of course, the global financial crisis that occurred in 2008 led many to wonder whether we were going to suffer through a second Great Depression and also whether time-tested policies to combat business cycles need to be rethought.

This book will provide in-depth analyses of the following three questions:

1. Why are economies subject to periods of negative output growth (recessions)?
2. How do you explain severe economic contractions (depressions)?
3. What government policies can be used to moderate and prevent business cycles, or is government policy the cause of, not the solution to, business cycles?

As mentioned above, many of the key developments in macroeconomic theory both before and after Keynes have centered on these questions. The big problem, unfortunately, is that after more than 200 years of debate there is still no general agreement about what causes recessions and depressions. There continue to be multiple competing models of business cycles used among economists. In fact, there is often a disconnect between the models used by academics and those used by private-sector economists. This debate over the root causes of business cycles continues to be a key question in the development of macroeconomic thought. The goal of this book is not to put an end to this debate by providing a definitive answer on why business cycles exist, because there is no single answer at this point and business cycles are complex enough that there never will be. Rather, this book aims to understand all of the competing theories and factors in the debate so that the reader understands the full context in which these debates take place.

For an example of how disagreements persist in macroeconomics, consider the United States' recession of 1990–1991. Some economists have argued that it was caused by an aggregate demand downturn resulting from a reduction in consumer confidence during the Gulf War or by a decrease in the money supply by the Federal Reserve. Others have argued

that it was caused by a decrease in aggregate supply brought about by an increase in the price of oil during the war or the delayed effects of tax increases and new government regulations adopted in the late 1980s. To this day, there is no single cause that is generally agreed upon among economists.

Another example of the discord among economists is evident in their handling of the East Asian crisis from 1997 to 1999, at that time the most significant international economic crisis since the Great Depression. Economists did not forecast the East Asian crisis. Most disturbingly, there was no agreement at the time among economists about which policies should be adopted to best deal with the crisis. In fact, the crisis occurred in countries that were previously thought to be model economies that were fundamentally sound.

Then, of course, there is the 2008 global financial crisis. Not only did most economists fail to see it coming, but many refused to believe their eyes as it happened. Once again, economists as a group had no clear and unified set of policies to deal with the downturn, although, in the end, influential policy makers who were well-versed in business cycle theory did piece together solutions (in a somewhat less than timely manner) that did contribute to the recovery. Clearly, there is still much work to be done before economists can come to any sort of consensus about the causes of recessions and depressions and provide clear prescriptions for how to deal with them once they begin.

Given the obvious difficulties inherent in this topic, in the past many people have asked: Why study business cycles if, in the long run, they all average out? This is a question that is only asked by someone who has not lived through a major economic contraction—very few of us today. Business cycles are extremely costly to a society, not just in terms of lost income but in terms of disrupted lives—higher suicide and homicide rates, higher poverty levels, and higher divorce rates amongst other measures of well-being—that have economic, social, and personal consequences that persist for a very long time. During the global financial crisis, the most vulnerable groups in American society—minorities, the poor, the less educated—were disproportionally impacted, worsening economic inequality. Economic uncertainty caused birth rates in the United States to drop to historic lows. Jobs lost during recessions led to a deterioration of labor skills that has had long-lasting effects on productivity and unemployment. Whole communities, from new suburbs in Florida to the entire city of Detroit, were devastated and, in some cases, have disappeared. Keynes's (1923) response to the question posed at the beginning of this paragraph is one of the classic retorts in all of economics. "Now 'in the

long run' this is probably true. . . . But this long run is a misleading guide to current affairs. In the long run we are all dead. Economists set themselves too easy, too useless a task if in tempestuous seasons they can only tell us that when the storm is long past the ocean is flat again."

## OUTLINE OF THE BOOK

This book is divided into five sections.

*Part I: The Facts of Business Cycles.* Chapter 2 describes business cycle data both quantitatively and qualitatively. This chapter provides a summary discussion of the duration and depth of business cycles, both in the United States and internationally, with a focus on seven basic facts about business cycles. In addition, the behavior of the components of gross domestic product (GDP) over the business cycle is also described, including a discussion of how economists separate the cyclical components of data from trend. Finally, this chapter summarizes the cyclical behavior of other important macroeconomic time series variables, including whether each variable is a reliably leading, coincident, or lagging indicator of turning points in a business cycle.

*Part II: Macroeconomic Theories of Business Cycles.* The evolution of thought on the nature of business cycles also traces the evolution of a large part of modern macroeconomic theory. In order to comprehend macroeconomics as it is practiced today and where it is headed in the future, it is crucial to understand the theoretical ground already covered and the economic events that precipitated changes in the way that we view macroeconomic fluctuations.

Part II presents seven primary models: the classical model (Chapter 3), the Keynesian model (Chapter 4), Austrian economics (Chapter 5), the monetarist model (Chapter 6), the rational expectations model (Chapter 7), the real business cycle model (Chapter 8), and new Keynesian models (Chapter 9). For each of these models, the relevant chapter discusses (1) the historical context in which the model was developed, (2) the basic theory behind the model, which includes a description of how the model explains business cycles, (3) a discussion of the policy implications of the model, and (4) a look at whether existing empirical research supports the model's principle implications. Each of these models is discussed in a rigorous but nontechnical narrative with an emphasis on making the discussion accessible to the general reader or undergraduate student.

To briefly preview our discussions from this section: the study of modern business cycles began in the 1930s with Keynesian economics,

# TWO

# Describing Business Cycles

## INTRODUCTION

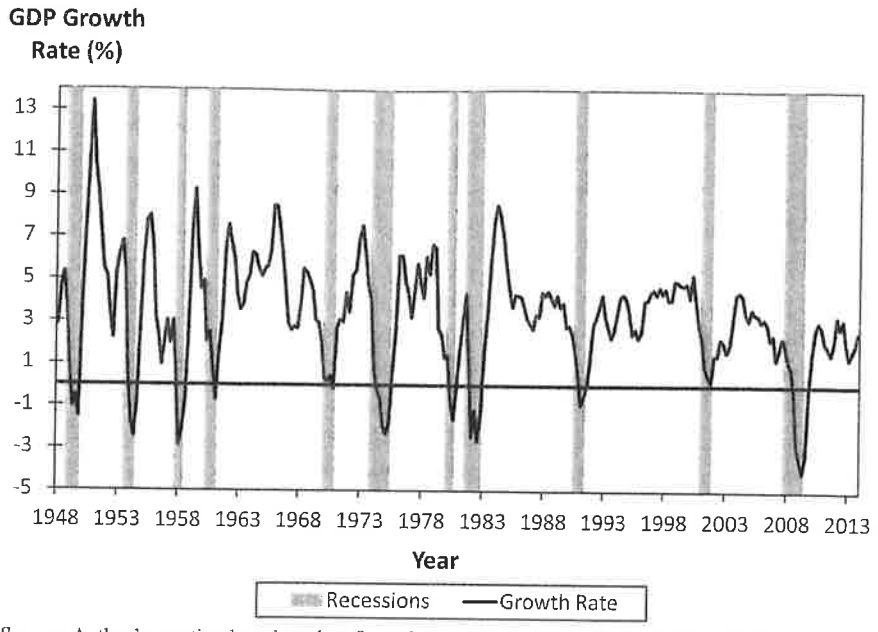
It is important to have a good grasp on the empirical regularities (and irregularities) of key macroeconomic variables that fluctuate as the economy contracts and expands. Understanding the data of business cycles will provide some basic empirical facts that we can then use to evaluate the competing theories that have attempted to provide explanations to the three primary questions posed in this book: (1) Why are economies subject to periods of negative output growth (recessions)? (2) How do you explain severe economic contractions (depressions)? (3) What government policies can be used to moderate and prevent business cycles, or is government policy the cause of, not the solution to, business cycles?

The first purpose of this chapter is to describe the quantitative aspects of business cycles, meaning the depth and duration of both individual and average economic contractions and expansions. The second purpose of this chapter is to describe the qualitative aspects of business cycles, meaning how different macroeconomic variables move in relation to each other during contractions and expansions. While the focus in this discussion is primarily on the United States, international business cycle data will also be examined.

## BASIC DEFINITIONS

Economists from the Business Cycle Dating Committee of the National Bureau of Economic Research (NBER), the preeminent economic research organization in the United States, date the beginning and end of

**Figure 2.1 Real GDP growth in the United States, recessions noted.**




*Source:* Author's creation based on data from the Bureau of Economic Analysis available at https://www.bea.gov/national/xls/gdplev.xls, and the National Bureau of Economic Research available at http://www.nber.org/cycles.html.

economic contractions and expansions in the United States. To do this, the NBER needs a working definition of what constitutes a recession and an expansion. The NBER defines a *recession* as when "a significant decline in economic activity spreads across the economy and can last from a few months to more than a year." The *peak of an expansion* is the point in time at which the level of GDP reaches its maximum before it starts to decline. Thus, the peak of an expansion dates the beginning of a recession. Likewise, the *trough of a recession* is the point in time at which GDP falls to its lowest level before it begins to rise again, meaning that a trough dates the beginning of an expansion. Figure 2.1 graphs real GDP growth rates in the United States between 1948 and 2013, where the shaded areas denote the period of time during which the economy was in recession (i.e., the period between the peak and the trough of the business cycle).

Table 2.1 provides a complete list of business cycles (measured from peak to peak) in the United States since dating began in 1854. Looking at recent business cycle episodes, there have been 11 postwar recessions in the United States. The last recession was associated with the global

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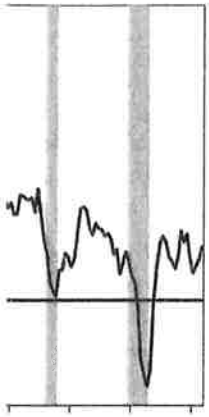

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**Table 2.1 Timing and depth of U.S. business cycles.**

| | | Duration (in months) of | | | |
|---|---|---|---|---|---|
| Trough | Peak | Contraction | Expansion | Cycle (trough to trough) | Decline in GDP (peak to trough) |
| | 12/1854 | — | — | — | — |
| 06/1857 | 12/1858 | 18 | 30 | 48 | — |
| 10/1860 | 06/1861 | 8 | 22 | 30 | — |
| 04/1865 | 12/1867 | 32 | 46 | 78 | — |
| 06/1869 | 12/1870 | 18 | 18 | 36 | — |
| 10/1873 | 03/1879 | 65 | 34 | 99 | — |
| 03/1882 | 05/1885 | 38 | 36 | 74 | — |
| 03/1887 | 04/1888 | 13 | 22 | 35 | — |
| 07/1890 | 05/1891 | 10 | 27 | 37 | — |
| 01/1893 | 06/1894 | 17 | 20 | 37 | — |
| 12/1895 | 06/1897 | 18 | 18 | 36 | — |
| 06/1899 | 12/1900 | 18 | 24 | 42 | — |
| 09/1902 | 08/1904 | 23 | 21 | 44 | — |
| 05/1907 | 06/1908 | 13 | 33 | 46 | — |
| 01/1910 | 01/1912 | 24 | 19 | 43 | — |
| 01/1913 | 12/1914 | 23 | 12 | 35 | — |
| 08/1918 | 03/1919 | 7 | 44 | 51 | — |
| 01/1920 | 07/1921 | 18 | 10 | 28 | — |
| 05/1923 | 07/1924 | 14 | 22 | 36 | — |
| 10/1926 | 11/1927 | 13 | 27 | 40 | — |
| 08/1929 | 03/1933 | 43 | 21 | 64 | −26.7% |
| 05/1937 | 06/1938 | 13 | 50 | 63 | −18.2% |
| 02/1945 | 10/1945 | 8 | 80 | 88 | −12.7% |
| 11/1948 | 10/1949 | 11 | 37 | 48 | −1.7% |
| 07/1953 | 05/1954 | 10 | 45 | 55 | −2.6% |
| 08/1957 | 04/1958 | 8 | 39 | 47 | −3.7% |
| 04/1960 | 02/1961 | 10 | 24 | 34 | −1.6% |
| 12/1969 | 11/1970 | 11 | 106 | 117 | −0.6% |
| 11/1973 | 03/1975 | 16 | 36 | 52 | −3.2% |
| 01/1980 | 07/1980 | 6 | 58 | 64 | −2.2% |
| 07/1981 | 11/1982 | 16 | 12 | 28 | −2.7% |
| 07/1990 | 03/1991 | 8 | 92 | 100 | −1.4% |
| 03/2001 | 11/2001 | 8 | 120 | 128 | −0.3% |
| 12/2007 | 6/2009 | 18 | 73 | 91 | −5.1% |

(*continued*)

**Table 2.1 (continued)**

| Trough | Peak | Duration (in months) of: Contraction | Expansion | Cycle (trough to trough) | Decline in GDP (peak to trough) |
|---|---|---|---|---|---|
| **Averages** | | | | | |
| 1854–2001 (32 cycles) | | 17 | 38 | 55 | |
| 1854–1919 (16 cycles) | | 22 | 27 | 48 | |
| 1919–1945 (6 cycles) | | 18 | 35 | 53 | –19.2% |
| 1945–2009 (11 cycles) | | 11 | 58 | 69 | –2.3% |

*Source:* Adapted from National Bureau of Economic Research available at http://www.nber.org/cycles.html and the Bureau of Economic Analysis available at https://www.bea.gov/national/xls/gdplev.xls.

financial crisis, lasting from December 2007 until June 2009. Before this, the previous recession began in March 2001 and ended in November of that same year, making it one of the shortest recessions in American history. Preceding the 2001 recession, the United States experienced the longest expansion in its history. This expansion lasted more than 10 years, from March 1991 to April 2001.

The NBER's definition of what constitutes a recession has been criticized along a number of lines. One problem with this definition is that a lag exists between getting data and making decisions. Output must be falling for at least "a few months" before the NBER will declare a recession. In practice, the economy has typically been in a recession for at least six months before it has been officially recognized as one by the NBER. For example, the recession that began in the United States in December 2007 was actually not recognized as such by the NBER until December 2008, a full year after it began. This recognition lag might delay a policy response until it is too late to be effective.

Another criticism of this definition is that it ignores *growth recessions*, or periods of positive but below-average growth. The problem here is that a period of growth that is below *trend*, or the long-run average GDP growth rate, is generally regarded as a recession by the public but not technically considered a recession by economists. For example, economists timed the end of the global financial crisis as occurring in June 2009, but the vast majority of the public considered the United States to be in recession until well into 2012 because real GDP growth, while positive, was weaker than trend.

Despite these criticisms, these definitions of recessions, peaks, and troughs are the ones that economists have chosen to work with. Lags in getting and interpreting data are impossible to avoid given the difficulties

in collecting economic data. Defining a growth recession is more difficult than defining a recession using the NBER's definition. This is because the definition of a growth recession relies on measuring growth relative to its trend, and measuring trend output growth is imprecise if the trend is not constant over time (as we will discuss in more detail in a moment). As a result, the NBER's definitions of recessions, expansions, troughs, and peaks will be the working definitions used throughout this book.

There is no formal definition of a depression, although an old joke is that a recession is when your neighbor loses their job, a depression is when you lose yours. An informal definition is an economic contraction in which output falls by more than 10 percent. During the era for which we have reliable economic data, the only depression that has occurred in the United States was the Great Depression of the 1930s.

A few additional definitions are extremely useful in characterizing the qualitative relationships between macroeconomic variables over the business cycle. Economists are always looking for macroeconomic variables that can help predict the peaks and troughs of business cycles. A *leading indicator* is a variable that peaks (troughs) before GDP peaks (troughs). For obvious reasons, economists closely watch leading indicators when trying to forecast business cycles. A *lagging indicator* is a variable that peaks (troughs) after GDP peaks (troughs). A *coincident indicator* is one that peaks or troughs at the same time as GDP.

One final set of definitions is extremely useful. A variable is referred to as *procyclical* if its deviations from trend have a positive correlation with deviations in GDP trend; in other words, when GDP is below trend, a procyclical variable is also below trend and vice versa. Some obvious examples of variables that are procyclical are consumption, investment, and employment. A variable is *countercyclical* if deviations in the variable from its trend are negatively correlated with deviations of GDP from trend. Unemployment is an obvious example of a variable that is consistently countercyclical and rises above its trend when GDP falls below its trend. An *acyclical* variable is one that has no consistent correlation with changes in GDP from trend.

## DETRENDING: SEPARATING CYCLE FROM TREND

Identifying short-run cyclical movements in macroeconomic variables is problematic because most macroeconomic data is subject to changes along a trend over time. For example, real per-capita GDP growth in the United States has averaged slightly less than 2 percent a year over the last 150 years. As a result, we cannot attribute all changes in GDP to the business cycle. In essence, economists measure short-run behavior as a

residual: It is the movements in the actual data that are not related to trend behavior. To calculate the cyclical component of macroeconomic data, the movements consistent with trend behavior must be subtracted out of the data we collect. Doing this is referred to as *detrending* the data. Using detrended data is crucial when trying to identify cyclical behavior, for example when determining whether a variable is procyclical or countercyclical, as discussed above.

Identifying the trend behavior within macroeconomic variables is the first and most important step in detrending and deriving cyclical economic data. Two simple methods of detrending data are commonly used in macroeconomics:

*(1) Assuming that trend is constant.* By assuming that a variable has a constant trend, we are not assuming that the trend is necessarily linear. For example, consider the following example where the trend in GDP follows an exponential process:

$$\overline{Y}_t = a(1 + \overline{g})^t \tag{2.1}$$

where $\overline{Y}_t$ is the trend level of GDP at time $t$, $\overline{g}$ is the constant growth rate of GDP, and $a$ is a constant. While trend GDP is growing at a constant rate, notice that the level of trend GDP is growing exponentially over time. Note that while the level of trend GDP is not linear, taking the natural log of trend GDP in this equation is linear. As a result, economists will often refer to the specification in equation (2.1) as being "linear in logs." Equation (2.1) is generally consistent with GDP's actual behavior, as illustrated in Figure 2.2.

After calculating the average periodic growth rate for GDP over time ($\overline{g}$) (which in the United States is equal to .036632, or approximately 3.67 percent), we can then use equation (2.1) to estimate trend GDP, or $\overline{Y}_t$. The cyclical component of GDP is then determined by calculating the difference between actual GDP and trend GDP, that is, $Y_t - \overline{Y}_t$.

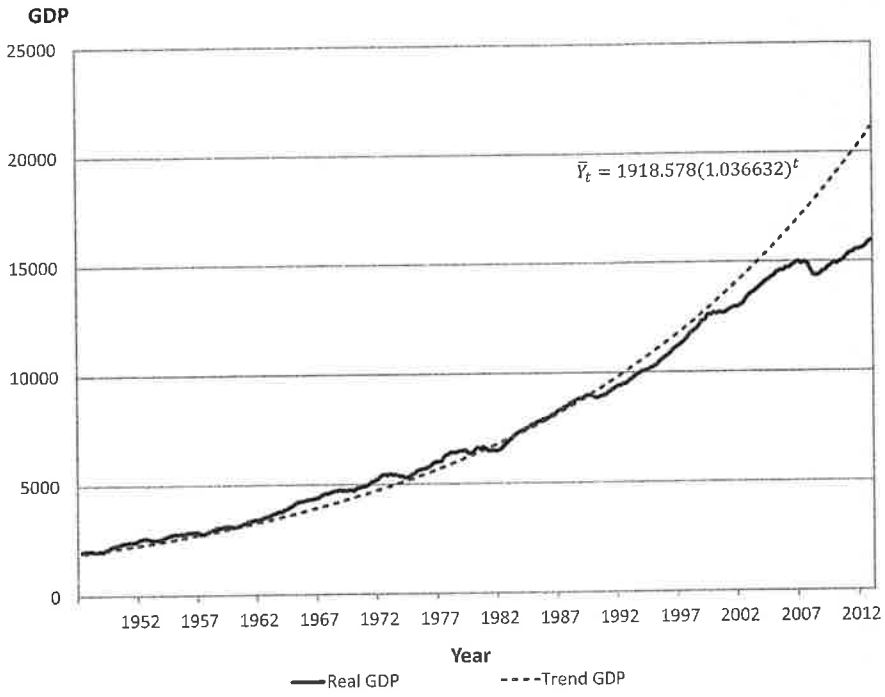
(2) *Assuming that trend follows a moving average.* By assuming a moving average trend, trend is not necessarily restricted to being constant but can vary over time. When using moving averages, economists typically assume that they are centered around the period in question. For example, the centered five-year moving average trend of GDP in 2012 would be calculated as

$$\overline{Y}_{12} = \frac{(Y_{10} + Y_{11} + Y_{12} + Y_{13} + Y_{14})}{5} \tag{2.2}$$

There are two problems with using moving average trends. First, when using a centered moving average you cannot calculate trend for the most recent data because you are missing future observations. For example, you cannot calculate GDP trend in 2014 using the method in equation (2.2) until 2016 because you will not have the data available. Typically, economists will estimate these missing observations for future years, often by using a constant growth rate derived from previous years.

The second problem with using moving averages is that they are sensitive to the number of periods over which the moving average is calculated. Trend measured by a 5-year moving average will be much more variable than trend measured by a 10-year moving average. This will, in turn, make the cyclical movements in GDP less variable for a 5-year moving average. This is a crucial problem because there is often no clear choice for how long moving average calculations should be. One standard assumption when dealing with GDP data is to use a 30-quarter moving average when

**Figure 2.2 Real GDP against an exponential trend.**



calculating trend GDP because, as can be seen in Table 2.1, 30 quarters is the average length of a business cycle (measured from trough to trough).

It is important to note that putting macroeconomic data measured over time into percentage changes is not a method of detrending the data. Transforming GDP into percentage changes involves subtracting this period's observation from last period's observation, known as *first-differencing* the data, then dividing by the previous value; that is,

$$\%\Delta Y_t = \frac{(Y_t - Y_{t-1})}{Y_{t-1}} \tag{2.3}$$

Note that when using this method, the percentage change in GDP will not fluctuate around zero; it will fluctuate around the positive trend growth rate of GDP, as in Figure 2.1. As a result, transforming the data into growth rates is a method of making a variable *stationary*, meaning that it will fluctuate around a steady trend. When used by itself, however, it is not a method of detrending data. To calculate the detrended growth rate, one would have to take the current growth rate of GDP and subtract out the trend growth rate of GDP calculated via one of the two methods (constant trend or moving average) discussed above.

## SEVEN BASIC BUSINESS CYCLE FACTS

What general properties and relationships can be gathered from studying business cycle data? Seven basic facts are crucial to understanding the fundamental properties of business cycles in the United States and internationally.

1. *Business cycles are not cyclical.* The term *business cycle* is really a misnomer because it implies that recessions and expansions follow a regular, predictable pattern. They do not. In fact, business cycles vary considerably in size and duration over time. Refer to Table 2.1. The shortest recession in United States history was in 1980–1981 (though it was a very sharp recession) and lasted only 6 months. It was followed by the shortest expansion, which lasted only 12 months. The longest modern recession lasted 43 months between 1933 and 1937, while the longest expansion ended in 2001 and lasted 121 months, or more than 10 years. In between these shortest and longest recessions and expansions there is a wide variety of business cycle lengths. Clearly, the length of the previous

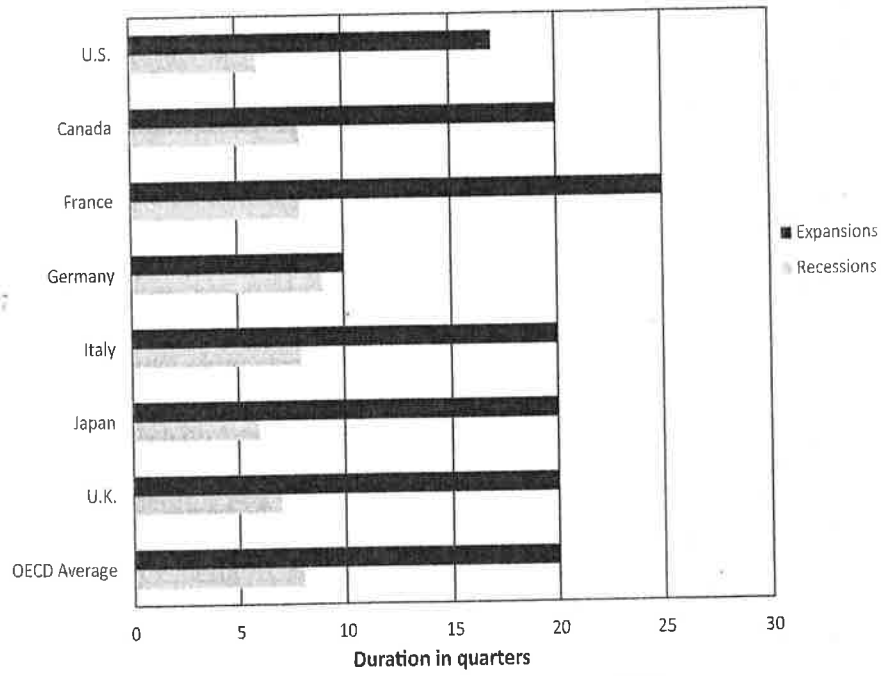
business cycle is not a reliable indicator of the length of the next business cycle.

In addition, the size of the decline in GDP associated with postwar business cycles has also varied greatly, from a fall of nearly 27 percent during the Great Depression to a fall of only 0.3 percent during the 2001 recession.

2. *Business cycles are not symmetrical.* In the United States, expansions average 39 months in length while recessions average only 18 months. Thus, expansions are about twice as long as recessions on average. However, output changes tend to be much bigger during recessions than they are during expansions.

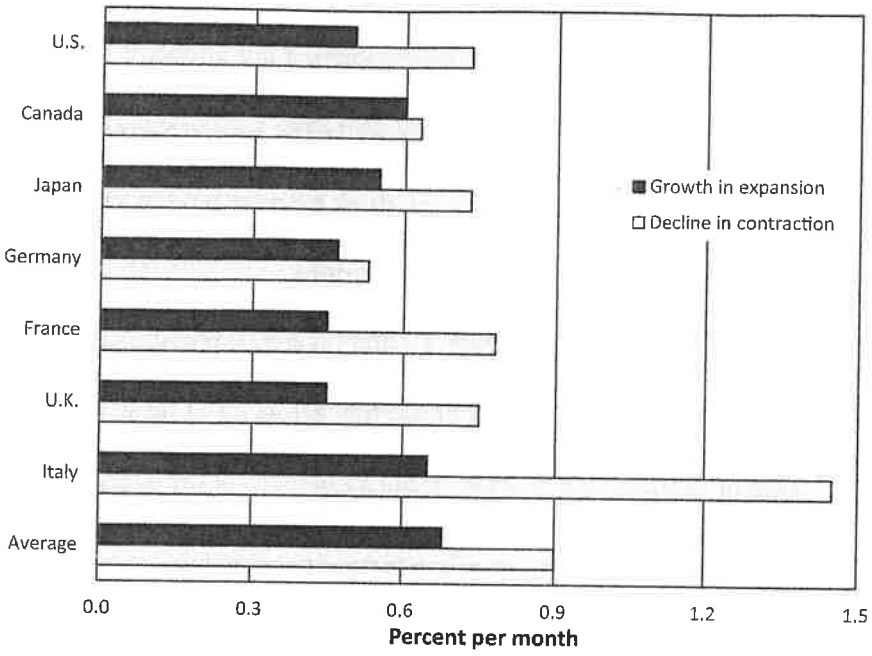
These same asymmetries between recessions and expansions hold internationally as well. Figure 2.3 and Figure 2.4 provide some summary data of business cycles across a small subset of developed countries. Looking at Figure 2.3, notice that across all of these countries expansions last considerably longer than recessions. There is a great deal of similarity across these countries in terms of the length of their

**Figure 2.3 Average duration of expansions and recessions.**




*Source:* Author's creation based on data available in Chauvet and Yu (2006).

**Figure 2.4 Monthly percentage changes in industrial production during business cycles.**




*Source:* Author's creation based on data available in Artis et al. (1997).

recessions, but slightly more variation in terms of the length of expansions. Figure 2.4 presents percentage increases and decreases in industrial production across countries. Recessions tend to be characterized by larger changes in output than expansions. Thus, as a general rule across countries, recessions tend to be shorter but with sharper changes in GDP, while expansions tend to be longer but with more gradual changes in GDP.

3. *Business cycles have changed over time.* Newer and better historical data has given economists a clearer picture of historical business cycles in the United States, and this better data suggests that postwar recessions have moderated, particularly in regards to their length. A quick glance at the data averages reported at the bottom of Table 2.1 suggests that recessions are about half the length they were in the prewar period, while expansions have gotten significantly longer. This means that recessions have been less frequent than they were in previous eras, although this result has been largely driven by two long expansions in the 1980s and 1990s. In addition, the

declines in output associated with postwar recessions appear to have been smaller. The moderation of business cycles, and an examination of its causes, will be discussed in more detail in Chapter 14 on postwar business cycles in the United States.

4. *The Great Depression and the World War II expansion dominate all other recessions and expansions.* GDP fell by nearly 27 percent in 1929–1933, while unemployment rose to a peak of 25 percent in 1933. The fluctuations of the 1930s and 1940s dwarf the next largest recession, the global financial crisis of 2008, in which GDP declined by 5.1 percent and unemployment rose to 10 percent. Likewise, the expansion that began in 1938 and continued throughout World War II was unparalleled, with GDP rising by 64 percent between 1941 and 1944. The explanation for this large expansion obviously had a lot to do with the huge increases in government purchases and the massive mobilization of resources that took place during the war. The explanation for the Great Depression is less apparent. Obviously, something unprecedented happened during the late 1920s and 1930s that must be explained in order to have a plausible theory of what causes recessions and depressions. The Great Depression will be discussed throughout this book and will be most closely examined in Chapter 13.
5. *The components of GDP exhibit behaviors much different than GDP itself.* The components of GDP are consumption, investment, government purchases, and net exports. Investment, durable consumption, and net exports are highly volatile and change more than output over the business cycle, while nondurable consumption and government purchases are more stable and change less than output over the business cycle.

   Table 2.2 presents the components of GDP and their contribution to both average GDP growth and to changes in GDP during recessions. Consumption includes both nondurables (like food and clothing), durables (like appliances and automobiles), and services. Both nondurables and services contribute less to falls in GDP than they do to the level of GDP, meaning that they are considerably more stable than GDP as a whole and, in fact, are only mildly procyclical. Durables, however, are significantly more volatile than GDP as a whole, strongly procyclical, and a coincident indicator of peaks and troughs in GDP.

   Investment as a whole is consistently procyclical, a leading indicator of changes in GDP, and about 3.5 times more volatile

**Table 2.2 Behavior of the components of GDP.**

| Component of GDP | (%) Average share in GDP | (%) Average share of fall in GDP during recessions |
|---|---|---|
| Consumption | | |
| Durables | 8.9 | 14.6 |
| Nondurables | 20.6 | 9.7 |
| Services | 35.2 | 10.9 |
| Investment | | |
| New residential | 4.7 | 10.5 |
| Fixed nonresidential | 10.7 | 21 |
| Changes in inventories | 0.6 | 44.8 |
| Net exports | −1 | −12.7 |
| Government purchases | 20.2 | 1.3 |

*Source:* Author's creation based on data from the Bureau of Economic Analysis available at https://www.bea.gov/itable/index.cfm.

than GDP. Investment includes new residential construction, fixed nonresidential investment (investments made by firms), and changes in inventories. Looking at Table 2.2, we see that each of the components of investment is considerably more volatile than its share of GDP, together accounting for more than 75 percent of the changes in GDP during recessions. Especially important are inventories, which account for less than 1 percent of GDP but more than 40 percent of the changes in GDP during recessions. Inventories are also a leading indicator of business cycle turning points. Investment clearly plays a crucial role in initiating and propagating business cycles. As a result, investment has also played an integral part in many of the theories of business cycle behavior.

Government purchases include government acquisitions of goods and services but ignore transfer payment programs such as social security and welfare. Government purchases are mildly countercyclical in the United States and not very volatile.

Finally, net exports are the difference between exports and imports. Net exports are actually a negative share of GDP because the United States has consistently run trade deficits since the mid-1980s. Net exports are slightly countercyclical, meaning that net exports tend to rise during recessions and offset some of the falls in output. This is in part because exchange rates tend to fall during

a recession, decreasing the price of exports and increasing the price of imports. However, net exports, while volatile, are not a reliable indicator of peaks and troughs in GDP.

6. *Business cycles are associated with big changes in the labor market.* Unemployment is strongly countercyclical, and changes in employment are much larger during recessions than the changes in other inputs into production. Over the long run, increases in the capital stock account for roughly one-third of trend per capita GDP growth while increases in productivity account for the other two-thirds. Changes in employment account for little of the increases in trend per capita GDP (this makes sense if employment and the population grow at roughly the same rate, which they do). However, during business cycles (times when output is growing at a rate different than trend), the story is exactly the opposite. The capital stock changes very little over business cycles because it is largely fixed in the short run, meaning it contributes little to changes in output over the business cycle. Changes in employment, on the other hand, account for two-thirds of the cyclical changes in per capita GDP while changes in productivity account for one-third of cyclical changes. In other words, during recessions and expansions, changes in employment appear to be driving a very large share of the changes in output. This seems to suggest that any plausible theory of business cycles has to give a prominent role to the cyclical behavior of the labor market.
7. *Business cycles are larger and more frequent in poorer countries than richer countries.* The variability of output in poor countries is more than twice what it is in rich countries. According to Uribe (2013), this higher volatility is driven by the fact that consumption and net exports are more volatile in poor countries, but also by the fact that in poor countries government purchases are acyclical. In rich countries, however, government spending is countercyclical because of its use in stabilization policy. The ability to increase government spending during downturns is an option that many poorer countries do not have because they have limited access to debt markets.

Table 2.3 presents business cycle data for 12 countries in the Organization for Economic Co-operation and Development (OECD), which are developed countries, and 12 Latin American countries, which are poorer and emerging-market economies. While the length of recessions between the two groups are similar, notice that

| Average share of fall DP during recessions |
|---|
| 14.6 |
| 9.7 |
| 10.9 |
| 10.5 |
| 21 |
| 44.8 |
| −12.7 |
| 1.3 |

alysis available at https://

construction, fixed
firms), and changes
each of the compo-
le than its share of
ent of the changes
nt are inventories,
t more than 40 per-
ventories are also a
oints. Investment
pagating business
an integral part in

quisitions of goods
ams such as social
mildly countercy-

ween exports and
re of GDP because
cits since the mid-
, meaning that net
t some of the falls
tend to fall during

**Table 2.3 Business cycles in Latin America and OECD countries.**

| | Duration of contraction | Duration of expansion | (%) Decline in GDP |
|---|---|---|---|
| Latin America | 3.5 quarters | 16 quarters | −6.2 |
| OECD | 3.6 quarters | 23.8 quarters | −2.2 |

*Source:* Author's creation based on data available in Calderón and Fuentes (2010).

expansions are roughly eight quarters longer in rich countries. This implies that recessions occur less frequently in rich countries. In addition, as mentioned before, the sizes of the contractions in GDP associated with recessions are nearly three times larger in Latin America than in OECD countries. Overall, these facts indicate that a much more volatile macroeconomic environment exists in poorer countries relative to richer countries.

## THE CYCLICAL BEHAVIOR OF OTHER IMPORTANT MACROECONOMIC VARIABLES

As mentioned earlier, economists are always looking for clues to help them forecast the future and to help them evaluate competing models of business cycle behavior. A few of the most closely followed macroeconomic variables are briefly described here. The cyclical behaviors of these variables are summarized in Table 2.4.

### Labor Market Variables

A worker is classified as being unemployed in the United States if he or she is currently without work and has been actively looking for work during the previous four weeks. Total unemployment is strongly countercyclical and is a lagging indicator of both peaks and troughs. Total unemployment lags peaks in output because when the economy first slows down, some workers are still finding jobs (even as new layoffs may be increasing) so that unemployment lags peaks. When the economy begins to improve, the last inputs to be re-added by firms are more workers, so unemployment also lags troughs. The lagging nature of unemployment has been particularly pronounced after the last two recessions in the United States, hence the widely recognized phenomena of a "jobless recovery."

Economists also closely follow two other variables related to unemployment. The first is the duration of unemployment, or the average

**Table 2.4 Cyclical behaviors of key macroeconomic variables.**

| Variable | Direction | Timing |
|---|---|---|
| Expenditures | | |
| Consumption | Procyclical | Coincident |
| Investment | Procyclical | Leading |
| Government purchases | Countercyclical in rich countries; acyclical in poor ones | – |
| Net exports | Countercyclical | Lagging |
| Labor market variables | | |
| Total unemployment | Countercyclical | Lagging |
| Duration of unemployment | Countercyclical | Lagging |
| Initial unemployment claims | Countercyclical | Leading |
| Real wages | Inconsistent | Inconsistent |
| Money supply and inflation | | |
| Money (M1) supply | Procyclical | Leading |
| GDP deflator inflation | Procyclical | Lagging |
| Consumer Price Index (CPI) inflation | Procyclical | Coincident |
| Financial variables | | |
| Short-term interest rates | Procyclical | Lagging |
| Long-term interest rates | Procyclical | Lagging |
| Stock prices | Procyclical | Leading |
| Corporate profits | Procyclical | Leading |
| Capacity and productivity | | |
| Capacity utilization | Procyclical | Leads peak, lags troughs |
| Productivity | Procyclical | Leading |
| Expectations | | |
| Consumer Confidence Index | Procyclical | Leading |

period of unemployment for those who are currently unemployed. This is countercyclical and a lagging indicator of peaks and troughs. The second is initial unemployment claims, which are the number of new claims for unemployment insurance. Initial unemployment claims are more sensitive to changes in the business cycle than total unemployment. Unlike total unemployment, which lags peaks and troughs because of lags in the hiring process, initial unemployment claims are a leading indicator because firms anticipate changes in economic conditions and increase layoffs before production falls and decrease layoffs before conditions improve.

Real wages do not behave consistently over business cycles, although changes in the real wage do consistently lag behind peaks and troughs in GDP. During the recessions of the 1970s, real wages were procyclical. During the Great Depression, real wages were countercyclical. If measured over the entire length of United States data that is available, however, real wages are mildly procyclical. Real wages also fail to consistently lag or lead business cycle turning points.

As mentioned in fact (6) earlier in this chapter, the volatility of unemployment indicates that the labor market plays a critical role in business cycles. As a result, the behavior of real wages is an integral component of many of the theories that will be examined in this book. Differences in how each of these models views the labor market provide a useful criterion by which to compare and contrast alternate explanations of business cycles. This puzzle regarding the inconsistent behavior of real wages is one that will be referred to repeatedly throughout our discussions.

## Money Supply and Inflation

M1 is the most commonly used definition of the money supply, which includes currency and checkable deposits. M1 is strongly procyclical and a leading indicator of peaks and troughs in the business cycle. Federal Reserve policy largely, but not completely, determines the level of M1. The critical issue is this: Do changes in the money supply lead to changes in output, or do changes in output cause the money supply to change in ways that the Fed cannot control? These questions will be an important topic for later discussion.

There are two commonly used measures of inflation. The GDP deflator measures changes in the price of all goods produced within U.S. borders and included in GDP. Inflation as measured by the GDP deflator is weakly procyclical, only falling during 6 of the 11 postwar recessions. It lags peaks and troughs primarily because it includes investment goods and government purchases, the prices of which are slow to respond to changes in economic conditions.

The consumer price index (CPI) measures changes in the prices of consumer goods. Like the GDP deflator, it is only mildly procyclical, falling during 7 of the 11 postwar recessions. Unlike the GDP deflator, changes in the CPI are roughly coincident with business cycle turning points because consumer prices are more sensitive to changes in prevalent market conditions.

It is important to note that while both measures of inflation have been mildly procyclical on average, they have exhibited periods of

countercyclical behavior as well. The variability of the cyclical behavior of inflation is a puzzle that economists need to explain.

### Financial Variables

Both short-term and long-term interest rates are procyclical. However, there are a myriad of interest rates that can be tracked, and some are more reliable predictors of business cycles than others. One of the most reliable is the three-month Treasury Bill rate, which has fallen during 10 of the 11 postwar recessions. Even though many long-term interest rates are less reliable indicators of business cycles than short-term rates, they probably have a more direct effect on investment decisions and economic activity. In general, short-term and long-term interest rates are lagging indicators of business cycle turning points because inflation is a key determinant of the level of interest rates, which tends to lag business cycle fluctuations.

Stock prices are one of the most visible and closely followed macroeconomic series. Stock prices are procyclical and a leading economic indicator of peaks and troughs. The same holds true for corporate profits. The problem with using the stock market to predict business cycles is that stock prices are much more volatile than GDP. Stock prices cannot be relied on exclusively when forecasting because of the high probability of false signals.

### Capacity and Productivity

Capacity utilization is the employment rate of capital. For obvious reasons, capacity utilization is procyclical. Its downturns tend to lead peaks because firms typically purchase large amounts of capital during expansions, and this capital typically comes online before a downturn, reducing capacity utilization. On the other hand, capacity utilization lags troughs because firms first reduce inventories and delay new investment projects for as long as possible during downturns.

Increasing productivity, which is measured as output per worker hour, is the primary way that economies improve the standards of living of their citizens over the long run. However, in the short run, the relationship between GDP and productivity is much less clear. Productivity is procyclical, falling during 10 of the 11 postwar recessions, and it is a leading indicator of peaks and troughs in the business cycle. However, the reasons why this holds remain unclear. Do new technologies drive expansions and technological inefficiencies drive recessions? Or could it simply be that firms ask their employees and their capital to work harder during

expansions because firms are pushing their capacity constraints, and then allow their workers and capital some slack during recessions because these same constraints are less pressing?

### Expectations

The most popular measure of the public's expectations of future economic conditions is the Consumer Confidence Index, which is based on household survey data collected by the University of Michigan's Survey Research Center. The index is generated based on household responses to questions regarding (1) the family's economic prospects over the next 12 months; (2) the United States' economic prospects over the next 12 months; and (3) the United States' economic prospects over the next five years. This Consumer Confidence Index is strongly procyclical and a leading economic indicator. However, it is much more volatile than GDP, meaning the Consumer Confidence Index often provides false signals of business cycle turning points.

Expectations play a key role in many of the explanations of business cycles discussed later in the book because of their importance in influencing investment and consumption decisions. As a result, measures of consumer confidence are very closely watched by economic forecasters.

## CONCLUSIONS

The empirics of business cycles have not been completely covered in this chapter, but in reality, this is impossible to do. New theories often provide economists with new ideas about things to look for in their economic data. Albert Einstein makes this interaction between theory and empirics quite clear in the following quote: "It is quite wrong to try founding a theory on observable magnitudes alone. . . . It is the theory which decides what we can observe" (Heisenberg 1971).

The goal for economists interested in why business cycles occur and what can be done about them is straightforward: find a theory that fits the empirical facts of business cycles as they are understood. While this goal is clear, how to achieve this goal has not been. A number of different models have been developed over the past 250 years to explain the nature and causes of recessions and depressions. Many of these models generate predictions that are consistent with much (though never all) of this economic data. How do we evaluate these competing models? Is a model's ability to match economic data the only measure of its worth? Or do things like logical structure and consistency with microeconomic theory matter

just as much? These are just some of the many questions that will be dealt with when the macroeconomic theory of business cycles is reviewed in the next part of this book.

## SUGGESTED READING

*National Economic Trends*, *International Economic Trends*, and *Monetary Trends*: These publications are made available by the St. Louis Federal Reserve. They contain a wide variety of current macroeconomic data as well as economic analysis of the current state of the economy. They are available at http://research.stlouisfed.org/publications/.

# THREE

# Early Business Cycle Theories

## INTRODUCTION

Before the Great Depression, a number of economic theories existed that elucidated the thinking of early economists about the causes of economic fluctuations. In examining these theories in this chapter, we will take the first step in evaluating just how much progress has been made in our understanding of recessions and depressions. These early theories are simple, to the point that they are somewhat naïve about the way that macroeconomics works. They each focus on a single explanation of what causes business cycles. They also focus on microeconomic phenomena and fail to explain how markets can fail at the aggregate level. However, these simple models are interesting not only for what they cannot explain about business cycles but also because of the things they identify as the key factors that drive recessions and depressions. Many of these early models provided the original insights that were then more fully developed in future, more comprehensive business cycle models.

While many theories are introduced in this chapter, the classical model is the most important of these early theories and is the primary focus of discussion. The classical model attempts to explain macroeconomic business cycles using microeconomic principles. Its clear, simple insights into the causes of business cycles are still the basis of widely held beliefs among many modern economists. However, the classical model of business cycles has also been the focus of generations of critiques and a starting point from which most modern theories have deviated. As a result, the

classical model serves as a useful base model for comparing different modern models of business cycles.

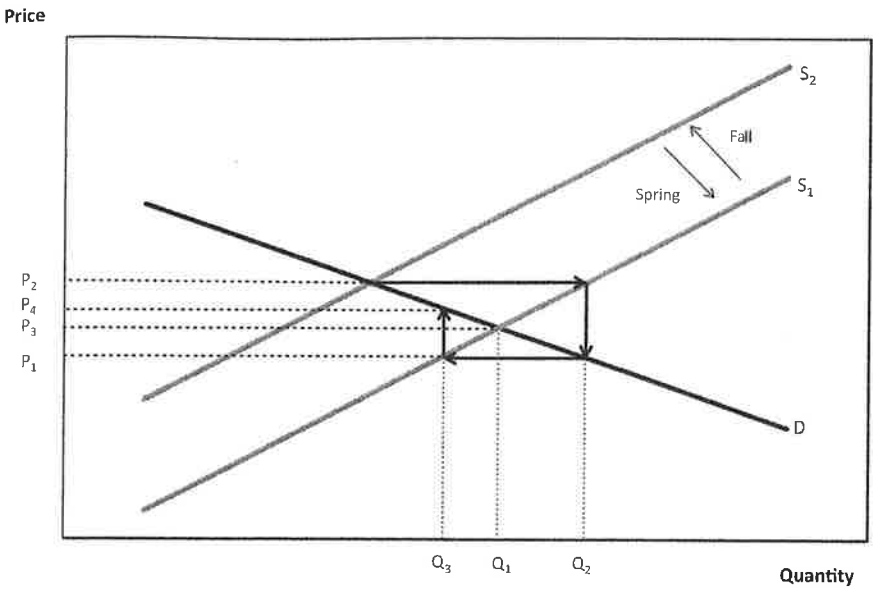
## EARLY AGRICULTURAL THEORIES

During times when agriculture was a much more important industry than it is today, economists focused on the cyclical nature of agricultural production to explain recessions and expansions. One of the earliest of these models is the sunspot theory developed by W. S. Jevons (1884). His theory proposed that low sunspot activity on the surface of the sun was bad for plant growth and agricultural output (which is questionable botany as well as questionable economics). As a result, Jevons believed that the cyclical behavior of economies closely followed the cyclical behavior of sunspot activity. Jevons presented historical evidence that business cycles lasted approximately 10.43 years from peak to peak, while sunspot cycles lasted 10.45 years. In his mind, this correlation proved his theory. However, new evidence was later presented that sunspot cycles in fact lasted 11 years. Jevons tried to salvage his theory by saying that because his theory was so well known by farmers, if farmers expected sunspot activity to change then they would change their behavior accordingly, breaking the link between actual sunspot activity and economic activity. While the sunspot theory is today discredited, Jevon's hypothesis that expectations can be self-fulfilling, meaning that falling expectations can lead to falling output without any real changes in the economy, anticipates later macroeconomic theories that focus on the importance of expectations and how these expectations might affect behavior.

Another influential agricultural theory was the cobweb theory, first presented by Ezekial (1938). This theory attempted to explain how shocks to supply and demand could lead to cyclical fluctuations in prices and output. There are two critical assumptions in the cobweb theory. First, goods are perishable so that farmers have to accept the current price and cannot store their output until the next period. Second, the amount farmers plant in the spring is based on what the price was last fall. This means that expectations are backward looking, not forward looking.

Figure 3.1 presents the results of a temporary negative supply shock, in which supply falls from $S_1$ to $S_2$ in the fall but returns to $S_1$ before the spring planting. In the spring, farmers make their planting decisions based on the higher price that existed in the previous fall, $P_2$, continuing until the upcoming fall. However, because supply has returned to its previous level, farmers find that they have planted too much based on their assumption

**Figure 3.1 Supply and demand in the cobweb theory after a temporary fall in supply.**




that the price would still be $P_2$, resulting in excess supply. In order to sell all of the crops that are available in the fall, $Q_2$, farmers must reduce their price to $P_3$ in order to clear the market. Next spring, farmers plant based on a price of $P_3$ and produce an amount equal to $Q_3$ to sell in the fall. Of course, now there is a shortage of crops because $P_3$ is below the equilibrium price. As a result, price rises to $P_4$ in order to clear the market. In the third spring, farmers plant based on the belief that the price will continue to be $P_4$, and the process continues. Notice that prices and quantities will eventually converge towards the equilibrium price and quantity, but this process takes a long period of time. In addition, this process is very costly because of the instability created as the market cycles between excess supply and excess demand.

The cobweb theory is not a useful explanation of the behavior of modern markets because of the two questionable assumptions on which it is based. First, most goods in modern economies, even agricultural goods, can be stored. If goods can be stored, producers do not necessarily have to accept the current price, which would smooth cyclical movements in prices and quantities. More importantly, producers are not nearly as

naïve as the cobweb theory assumes. Do individuals really form their expectations of the future based only on what has happened in the past? Or are they forward looking, attempting to anticipate future market conditions? If producers are forward looking, equilibrium will be restored much more quickly. Once again the cobweb theory underscores the important role of expectations in business cycles, which plays an important role in all modern macroeconomic theories.

Malthus (1798) developed one of the best-known, and most infamous, models of economic cycles. Malthus observed that in an agricultural society such as the one that existed in Great Britain during the late 1700s, capital was primarily land, and land in an island country is fixed in quantity. In addition, given that agricultural production techniques had largely remained the same over the previous century, Malthus assumed that technological knowledge would also be constant in the future. As a result, Malthus believed that as the population in Britain rose, diminishing returns would quickly set in as the capital-to-labor ratio fell. Over time this would lead to chronic underproduction, falling standards of living, and eventually mass poverty and starvation. However, starvation does have its benefits; namely, that the capital-to-labor ratio would rise, increasing per capita income. As income rose, standards of living and general health would improve. Healthy people have more babies, and the whole process would begin again.

Of course, the problem with Malthus's analysis is that capital and technology are not fixed. Malthus never understood that an industrial revolution was taking place at the time he was writing. As a result, he did not anticipate improvements in technology and the invention of new forms of capital that have taken place over the last 200 years. Through this omission, however, Malthus's model highlighted the importance of technological change (or the lack of it) not only in stabilizing economic growth but also in potentially driving business cycles. This later possibility is the basis of real business cycle models, which are discussed in Chapter 8.

## EARLY MONETARY THEORIES

Before the Great Depression, most economies in the world were on the gold standard. The gold standard was an international monetary system that required the amount of paper currency in circulation within each country to be backed by a fixed amount of gold. As a result, a country's gold holdings would place an upper limit on the quantity of money supplied within that country. One of the important implications of the gold standard was that the money supply of a country would fluctuate with its

trade balance. A country that was running a trade deficit would experience gold outflows, which would eventually necessitate lowering the money supply. On the other hand, a country that was running a trade surplus would see its gold holdings rise and its money supply increase.

Hawtrey (1913) hypothesized that fluctuations in the money supply caused by changes in the trade balance were the cause of business cycles. A country that was running a trade surplus would see its money supply increase. This increased the supply of credit within an economy, increasing investment and output. However, higher output would increase the demand for imports and reduce the trade balance. Eventually, the country would begin to run a trade deficit and see its money supply contract, and the whole cyclical process would take place again in reverse. Hawtrey's model of monetary business cycles is one in which business cycles are *endogenous*, or internally self-generating. Business cycles are not the result of external, or *exogenous*, shocks to the economy. Hawtrey's solution to preventing these cyclical fluctuations was simple: Abandon the gold standard for *fiat money*, or money that is not backed by a commodity so that its supply could be stabilized.

The obvious problem with Hawtrey's theory is that business cycles have not ended since modern economies have adopted fiat money. However, by being one of the first to propose that changes in the money supply and credit drive cyclical fluctuations, Hawtrey laid the groundwork for modern, more fully developed business cycle models in which monetary policy plays a critical role, such as the Keynesian model (Chapter 4), Austrian economics (Chapter 5), and particularly the monetarist model (Chapter 6).

## UNDERCONSUMPTION AND MARXIST THEORIES

Underconsumptionist economists such as Hobson (1922) worried that growth in the production of goods within an economy would outpace the growth rate of consumption. Without adequate aggregate demand to absorb these goods, the resulting chronic overproduction would threaten future economic prosperity and create business cycles.

Why would consumption growth be unable to keep pace with production growth? Hobson's underconsumption model focused on the fact that households save a larger share of their income as their income rises. As aggregate income in a country increases over time, the average propensity to consume (consumption divided by income) falls and the gap between aggregate income and total consumption increases. For a while, this gap can be filled with higher levels of investment. However, over time, this

increased investment will only aggravate the excess supply of goods and reduce the average propensity to consume even further. Increasingly large excess supplies of goods will eventually necessitate cuts in production and a decrease in aggregate income. This recession leads to a rise in the average propensity to consume, eventually causing the problem of excess supply to disappear—for a while. Ultimately, though, higher aggregate income will lead to a lower average propensity to consume, and the whole process will start all over again. Thus, like early monetary theories, business cycles are endogenous in underconsumption models and not initiated by external shocks.

Marxist theories of business cycles share many similarities with the underconsumptionist viewpoint. Marx theorized that excess capital accumulation over time would reduce the profitability of businesses, leading to periodic business failures and economic contractions. Other Marxists blamed the falling purchasing power of workers that results from the inequality inevitably created by capitalism. As the purchasing power of most of the population falls relative to the size of aggregate output, persistent and destabilizing excess supply will occur.

There were a number of policy solutions offered by the underconsumptionists aimed at preventing the average propensity to consume from falling over time. One was to redistribute income from the rich to the poor who have higher propensities to consume. Another was to increase the amount of government purchases within an economy, which would increase the average propensity to consume for the public and private sectors as a whole. These underconsumption theories were very influential in the development of Keynesian economics (Chapter 4), which also focuses on aggregate demand shortfalls as the primary cause of business cycles. The fiscal policy solutions proposed by underconsumptionists are developed more fully in the Keynesian model, leading to a more complete theory of the proper role of government in stabilizing business cycles.

## PROFIT MARGIN THEORIES

A *profit margin* is simply the price minus the average cost of the good. Mitchell (1927) argued that profit margins are strongly procyclical in imperfectly competitive markets because costs fall during expansions. This happens for a number of reasons. First, firms are able to reduce their inventories, reducing costs. Second, input cartels tend to fall apart during recessions, so the beginning of expansions should be characterized by lower input prices. Finally, larger output means that *economies of scale*

can be exploited. Economies of scale refer to conditions when the average cost of production falls as the quantity of the good produced rises. Economies of scale tend to exist in industries with large fixed costs because higher production allows these fixed costs to be spread out over more units, reducing average cost.

Procyclical movements in the profit margin feed expansions and magnify contractions. During good times, rising profit margins increase expected profits and encourage firms to undertake investment projects. However, these projects do not immediately increase the capital stock and capacity. In the meantime, as the economy approaches full capacity, costs begin to rise and profit margins begin to fall. Falling profit margins reduce expected profits and reduce a firm's likelihood of undertaking new investment projects, eventually turning an expansion into a contraction. Once again, expectations play an important role in this model, as they do in all modern business cycle theories. In addition, profit margin theories recognize that markets are not perfectly competitive and that imperfect competition plays an important role in explaining business cycles. This later becomes a crucial component of Keynesian (Chapter 4) and new Keynesian (Chapter 9) economics.

## EARLY INVESTMENT THEORIES

For as long as economists have known about fluctuations in aggregate economic activity, economists have also intuitively understood that investment is extremely volatile and an important source of economic instability. Investment volatility played an important, but secondary, role in many of the early theories already discussed. In other early theories, investment plays a more central role. Early investment theories of business cycles fall into roughly three categories. Some of these models, such as those of Hawtrey (discussed previously) and Wicksell (1936), focused on unstable fluctuations in the money supply, which creates changes in investment. In Wicksell's model, changes in the money supply push interest rates either above or below the level required for savings to equal investment. As a result, investment and output fluctuate with changes in the supply of money and bank credit.

A second category of early investment theories, also developed by Wicksell, focused on the overinvestment that results from the investment booms and busts that follow the development of new technologies. This theme is later re-examined in more detail by long-wave theories of business cycles, which are discussed in the next section.

Finally, other early investment theories focus on spending multipliers associated with investment, such as that of Clark (1917). Often referred to as accelerator models, these models center on the possibility that higher investment increases aggregate output, which in turn increases spending, which in turn leads to additional increases in investment and output. Thus, small initial changes in investment can lead to large changes in aggregate output. While these models do not explain why investment would initially change, they do explain why changes in investment could be multiplied into very large changes in output. The possibility of spending multipliers associated not only with investment but also with exogenous changes in consumption and government purchases were later to become crucial components of the Keynesian model.

## THE CLASSICAL MODEL

The cornerstone concepts of the classical model were laid out in the first book to treat economics as a distinct field of study, Adam Smith's (1776) *The Wealth of Nations*. The model was further refined by many of the founding fathers of economics such as David Ricardo, Jean-Baptiste Say, and John Stuart Mill. The classical model is the most fully developed and influential of the early business cycle theories.

## THE ASSUMPTIONS OF THE CLASSICAL MODEL

The classical model is founded upon three crucial assumptions.

1. *Perfect competition exists in all markets.* This means that all firms and consumers are price takers, wages and prices are perfectly flexible, perfect information exists about economic conditions, and markets always clear so that excess demand or excess supply cannot persist.
2. *Real values, not nominal values, are used when making decisions.* In other words, money illusion does not exist, and agents adjust all nominal variables by changes in the price level before they act.
3. *The economy is composed of representative agents, or individuals that all have the same preferences and act alike in every way.* When combined with the assumption of perfect competition, the assumption of representational agents means that macroeconomic behavior becomes a simple summation of average microeconomic behavior. In other words, the classical model does not make any real distinction between macroeconomic and microeconomic behavior.

## Output Determination and the Labor Market in the Classical Model

In the classical model, capital and labor are combined using a production function to produce aggregate output. Let $Y$ denote real aggregate output, $L$ denote total labor employed, and $K$ denote the total capital stock. The production function can then be written in the following form:

$$Y = F(L, K) \tag{3.1}$$

This production function is in *Cobb–Douglas* form. It is easy to show that this production function exhibits both *constant returns to scale*, meaning that doubling both capital and labor will double output. However, each individual input is also subject to *diminishing marginal returns*. Diminishing marginal returns refers to the property that if the quantity of one of the inputs in production is fixed, the additional units of output that are produced by increasing the other input will get smaller as the quantity of that input rises. In other words, the *marginal product of labor*, the change in output from a change in labor, falls as the quantity of labor rises. Diminishing marginal returns is one of the cornerstone concepts in economics because it implies that a firm's ability to increase output is limited unless it can increase all of the inputs to production.

Diminishing marginal returns play an important role in the classical labor market. The equilibrium real wage (denoted as $\frac{W}{P}$) in the classical model is determined by the supply and demand for labor. The demand for labor is determined by firms, who hire labor until the marginal benefit of an additional unit of labor, or the marginal product, is equal to the marginal cost of an additional unit of labor, or the real wage. Diminishing returns imply that the marginal product of labor falls as the quantity of labor rises. As a result, firms will only hire more workers (and accept a lower marginal product) at a lower real wage, meaning that the demand curve for labor must slope downward.

Regarding labor supply, changes in the real wage have two effects. The first is the substitution effect, in which a higher real wage induces more workers to enter the workforce or work longer hours. The second is the wealth effect, in which a higher real wage increases wealth and reduces the incentives to work. The classical model assumes that the substitution effect of an increase in the real wage is larger than the wealth effect so that a higher real wage increases labor supply and the labor supply curve is upward sloping.

In equilibrium, real wages adjust in the classical model so that the quantity demanded of labor equals the quantity supplied. Notice that only the

things that affect the quantity of labor, the quantity of capital, or the production function (i.e., things that shift the labor supply or labor demand curves) will affect the level of aggregate output. Thus, changes in output in the classical model must be driven by changes in these three factors, each of which influence the aggregate supply of goods produced within an economy.

*Factors that influence the quantity of labor.* Immigration and population growth are two obvious determinants of the quantity of labor supplied within an economy. Public policy is also an important influence on labor supply and labor demand because it can play a role in shaping individuals' incentives to work. For example, income taxes on workers reduce the supply of labor, while taxes on payrolls reduce the demand for labor. Likewise, government regulations that place costly restrictions or requirements on firms (such as health and safety requirements) can also reduce labor demand and the quantity of labor.

*Factors that influence the quantity of capital.* Anything that encourages firms to invest in capital will increase aggregate output, while anything that discourages investment will decrease aggregate output. Once again, tax policy and government regulations play an important role in shaping the incentives to invest. Public policy also plays a critical role in determining how much households save. Tax policies that favor consumption as opposed to saving (such as an income-based tax system instead of a consumption-based tax system) will reduce the total amount of savings and the quantity of funds that are available for investment, reducing the quantity of capital. Finally, the discovery of natural resources will increase aggregate output, while wars or natural disasters that destroy capital will obviously reduce aggregate output.

*Factors that influence technology.* New technologies change the production function a firm uses, allowing firms to produce more output using the same amount of capital and labor. In addition, new technologies provide firms with incentives to hire more labor and more capital. Anything that improves the incentives to produce and invest in new technologies will eventually increase output growth. For example, the provision of tax incentives and funding for research and development projects, the granting of patent protection, and the provision of educational opportunities are all examples of public policies that can encourage new innovation. However, negative shocks to technology are also possible. For example, during the Organization

of Petroleum Exporting Countries (OPEC) oil embargos of the 1970s, higher oil prices made oil-intensive equipment and many oil-intensive technologies too expensive to use, significantly reducing productivity and aggregate output.

## Aggregate Demand and Aggregate Supply in the Classical Model

The things that determine real output in the classical model—labor, capital, and technology—are all factors that affect aggregate supply. Nominal variables, such as the price level, have no effect on these inputs and play no role in determining the level of real output, $Y$. As a result, there is no relationship between the price level and aggregate output on the supply-side of the classical model, meaning that aggregate supply is a vertical line. The position of the aggregate supply curve is determined by a country's stock of labor, capital, and technology.

What about aggregate demand in the classical model? The classical theory of aggregate demand is based on the quantity theory of money demand originally developed by the philosopher David Hume in the mid-1700s. In the quantity theory, people hold money because money is needed in order to conduct transactions. This implies the following quantity theory equation:

$$MV = PY \tag{3.2}$$

$P$ denotes the aggregate price level, so that $PY$ is equal to nominal aggregate expenditure (or nominal aggregate output). $M$ denotes the money supply, and $V$ denotes the velocity of money, or the number of times a unit of money changes hands over a period of time. The intuition behind this equation is straightforward. If money is needed when conducting all trades, then in order for the level of nominal expenditure ($PY$) to increase either the supply of money ($M$) or the velocity of money ($V$) has to increase as well in order to support this higher volume of trade.

The quantity theory is not only a theory of money demand but also a theory of aggregate demand because it states that on the demand side of an economy a negative relationship exists between the price level and the level of real output. The intuition behind this downward sloping aggregate demand curve is as follows: Holding money and velocity constant, a higher price level reduces the real value of money holdings, which in turn reduces real spending and output.

When these aggregate demand and aggregate supply curves are considered together, two important implications of the classical model become evident. First, the role of aggregate demand in the classical model is only to determine the price level. Aggregate demand has no influence on real aggregate output. It is aggregate supply in the classical model that determines aggregate income and, as a result, aggregate expenditure within an economy. This classical principle that supply creates its own demand is often referred to as *Say's Law*.

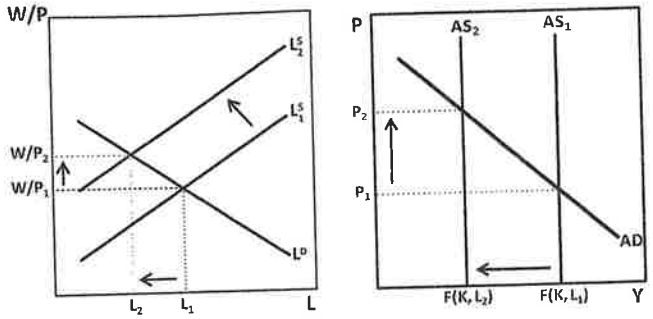
Second, given that aggregate demand only influences the price level, changes in the money supply, which shift the position of the aggregate demand curve, only affect the price level. The classical principle that changes in the money supply only affect nominal variables (the price level, nominal wages, nominal output) but not real variables (real output, unemployment, labor, capital, technology) is often referred to as *money neutrality*. Thus, changes in the money supply cannot influence the things that really matters in the classical model. The strength of the quantity theory of aggregate demand is that it provides a simple and accurate explanation for the close correlation that exists between average money growth and average inflation across all countries over long periods of time. Sustained money growth, and nothing else, drives sustained inflation.

## Business Cycles in the Classical Model

Business cycles do not exist in the classical model, at least not in the traditional sense of temporary deviations of output from a long-term trend. All changes in output in the classical model are permanent and are caused by changes in aggregate supply. As a result, when output falls because of a decrease in aggregate supply, it will not return to its previous level unless something else changes to increase aggregate supply.

So what drives changes in aggregate supply, particularly decreases in aggregate supply that cause economic contractions? Classical economists focused on one primary culprit—government policy, particularly tax policy and government regulation. For example, consider the imposition of a tax on labor income, such as the payroll tax adopted in the United States. Figure 3.2 graphs the effects of this tax, which reduces the labor supply curve, reduces the quantity of labor and increases the real wage. It also shifts the aggregate supply curve to the left, decreasing aggregate output. As another example, Figure 3.3 graphs the effects of a tax on savings (or investment). This tax reduces the capital stock, which lowers the marginal product of labor and shifts the labor demand curve downward. Because of

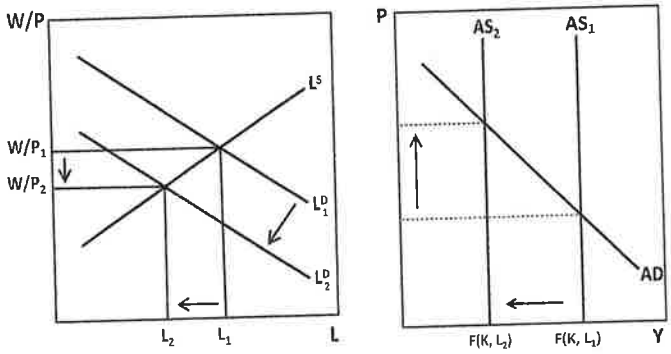
**Figure 3.2 Impact of a tax on labor income on the labor market and aggregate demand and supply.**




these falls in labor and capital, aggregate supply shifts to the left and aggregate output decreases.

Markets are perfectly competitive in the classical model, and if left alone they will work efficiently and maximize output and welfare. As a result, the role of government in the classical model is essentially a negative one. Anything the government does outside of the basic responsibilities of protecting property rights, providing for national defense, breaking up monopolies, and providing public education will lower efficiency and output. There is no positive role for the government to actively stabilize or manage an economy at the macroeconomic level. Even monetary policy in the classical model is irrelevant to real activity, and its

**Figure 3.3 Impact of a tax on savings (or investment) on the labor market and aggregate demand and supply.**



excessive use will only lead to inflation. Hence, the governing philosophy advocated by the proponents of the classical model is one of *laissez faire*, or "hands off." This governing philosophy dominated economic policy debates in the United States and much of Europe during most of the late 1700s and 1800s.

The classical model has framed the debate on business cycles for most of the last 230 years because of its simple and intuitive explanation of the way that the economic world works. Throughout most of its history, however, even when it was the dominant business cycle theory, the classical model has come under heavy criticism for a number of reasons. First, the irrelevance of aggregate demand is troubling to many economists. Is it true that things such as monetary policy or exogenous changes in consumption have no direct effect on real output? Second, the assumption of perfect competition has also been questioned. Are prices and wages really perfectly flexible? Do firms and households really have perfect information about existing conditions in the economy? Another important implication of perfect competition is that financial systems play essentially no role in propagating business cycles; financial systems simply rise and fall in response to changes in the general economy. Finally, the assertion that recessions are driven by falls in aggregate supply seem implausible to many, especially following the events of the Great Depression. It became increasingly difficult to argue during the 1930s that Say's Law was plausible when excess supplies of goods existed throughout the world and unemployment in the United States stood at 25 percent.

## CONCLUSIONS

The Great Depression completely changed the study of macroeconomics in general and business cycles in particular. The Great Depression focused the attention of economists on both the costs of output fluctuations and on the inadequacies of their existing theories. However, the more modern business cycle theories that were developed subsequently, such as the Keynesian model that is discussed in the next chapter, looked to these earlier models as a starting point of inquiry. By identifying many of the critical components of business cycles—such as changes in technology, expectations, investment volatility, spending multipliers, the money supply, public policy, the incentives to work and invest, and imperfect competition—these early theories laid the foundation on which much of modern macroeconomic theory has been built.