TWO

Describing Business Cycles

INTRODUCTION

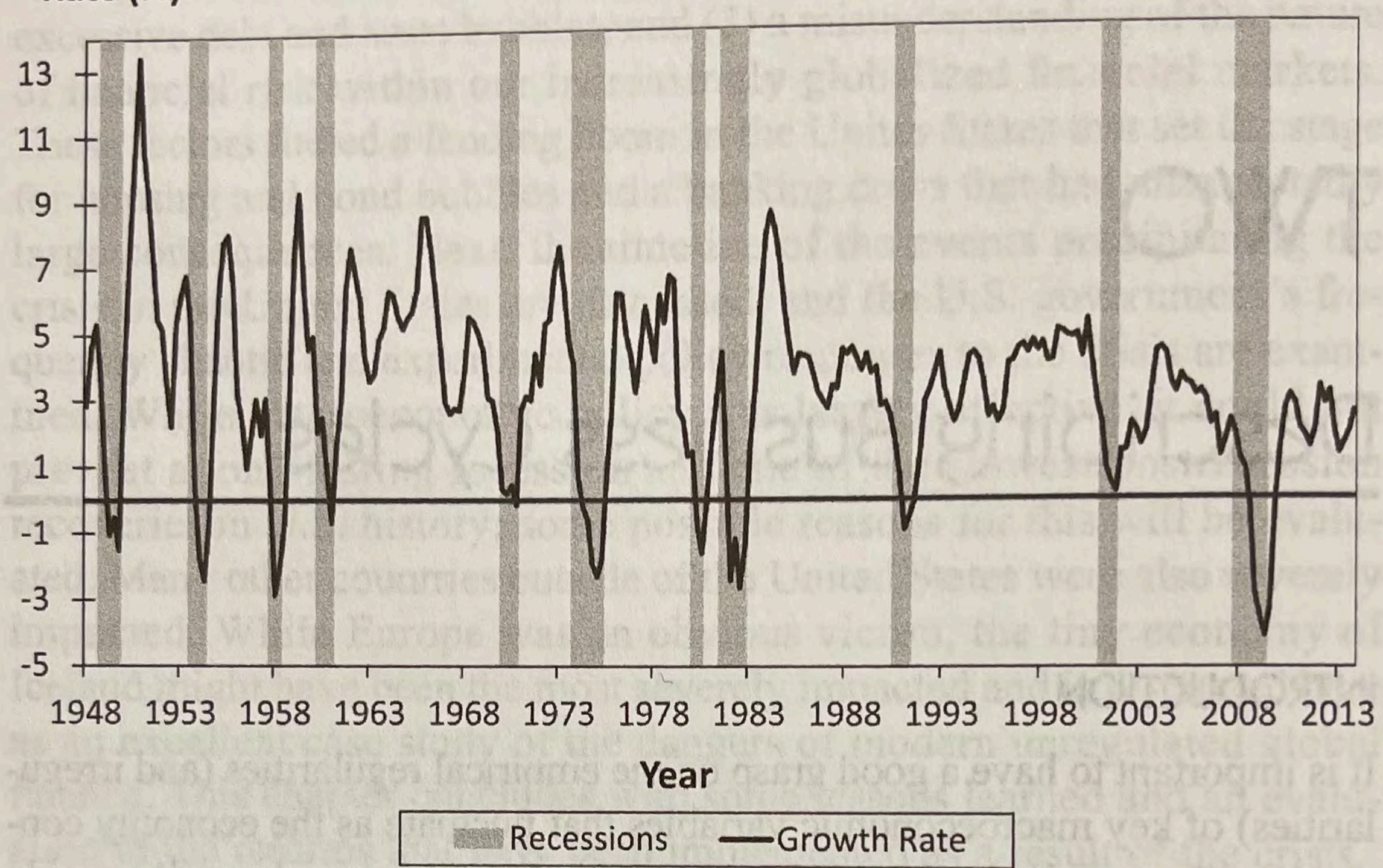
It is important to have a good grasp on the empirical regularities (and irregularities) of key macroeconomic variables that fluctuate as the economy contracts and expands. Understanding the data of business cycles will provide some basic empirical facts that we can then use to evaluate the competing 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

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, $Y_t - \overline{Y}_t$.

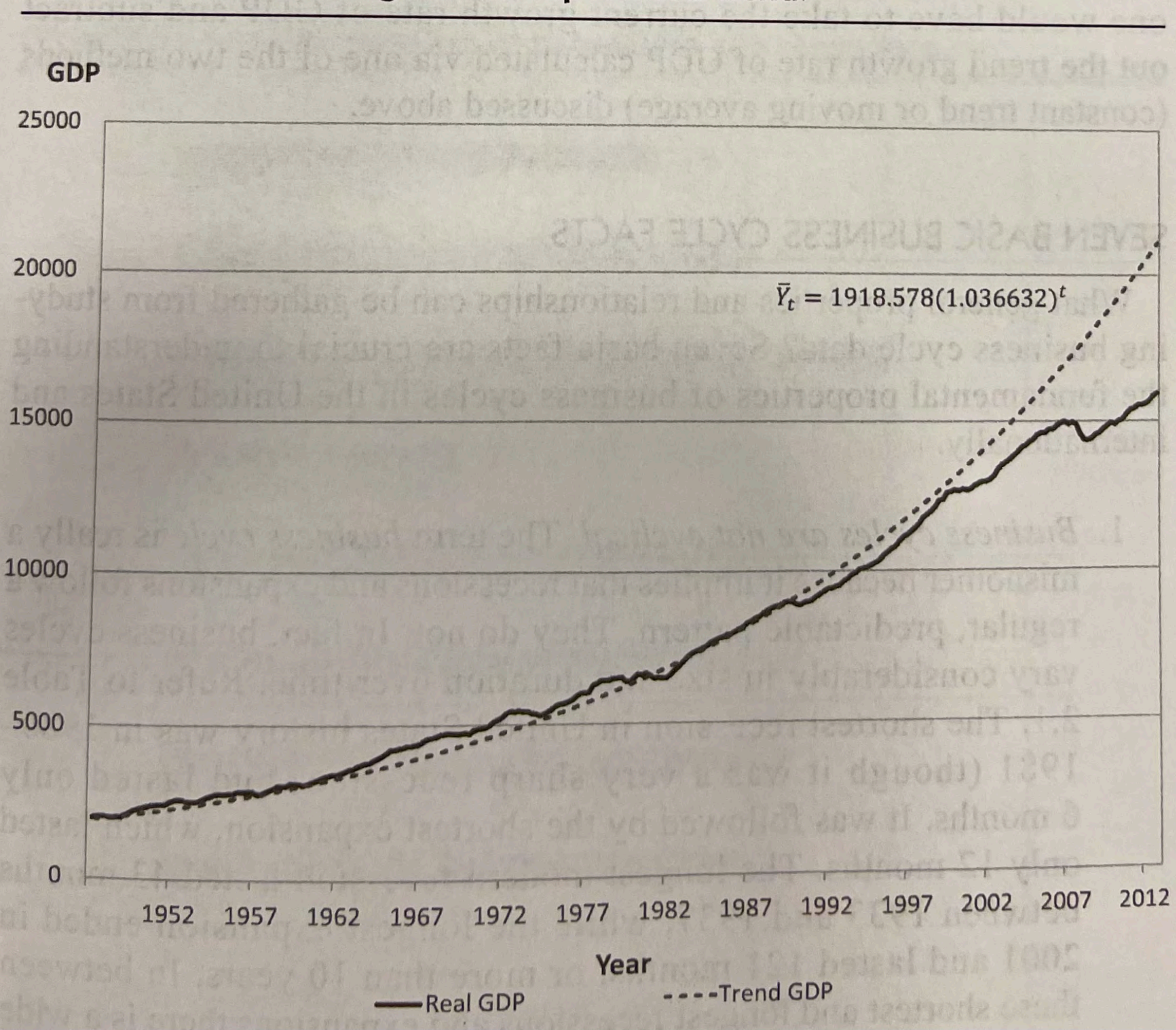
(2) *Assuming that trend follows a moving average.* By assuming a moving average trend, trend is not necessarily restricted to being constant but can vary over time. When using moving averages, economists typically assume that they are centered around the period in question. For example, the centered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

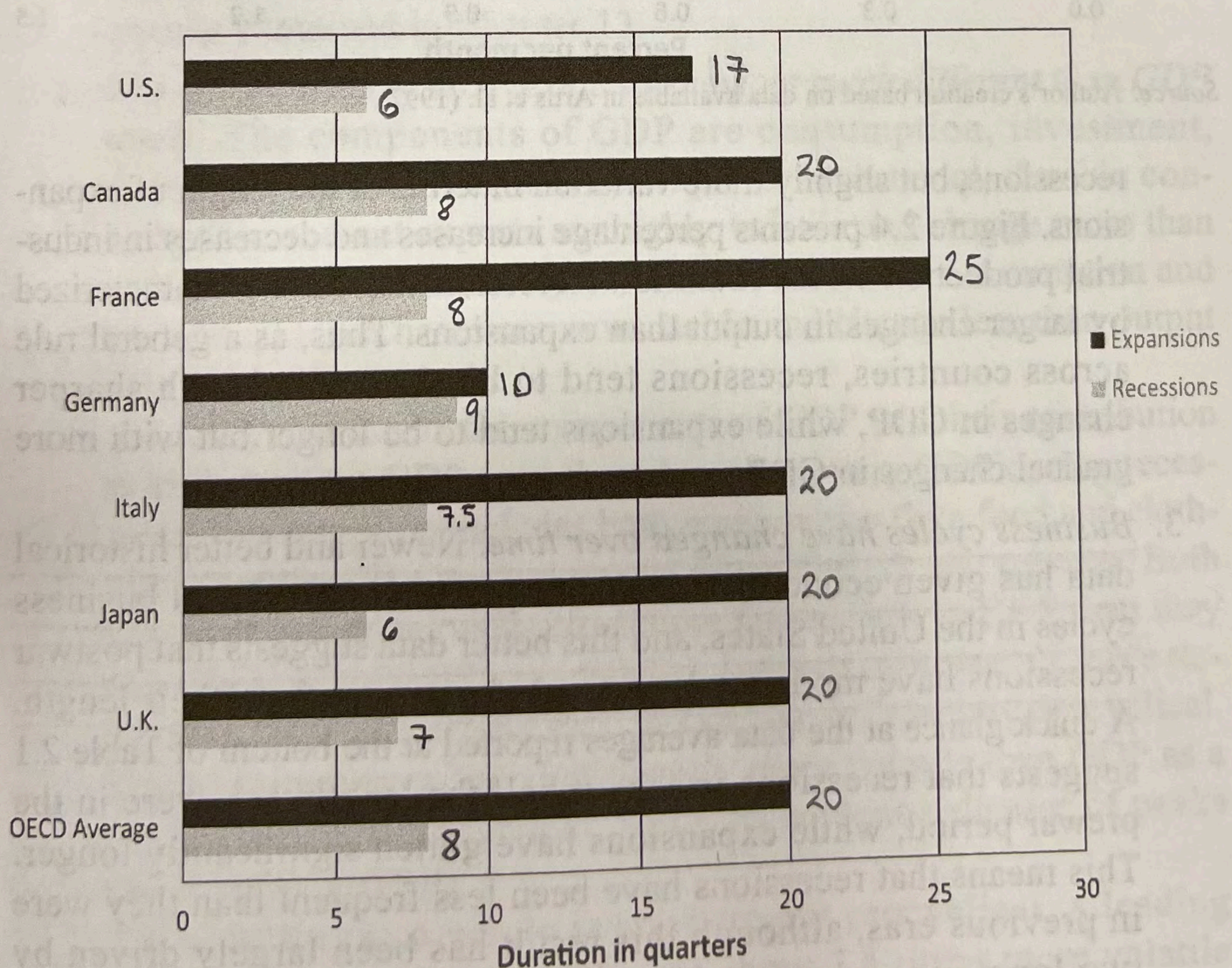
business cycle is not a reliable indicator of the length of the next business cycle.

In addition, the size of the decline in GDP associated with post-war 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.

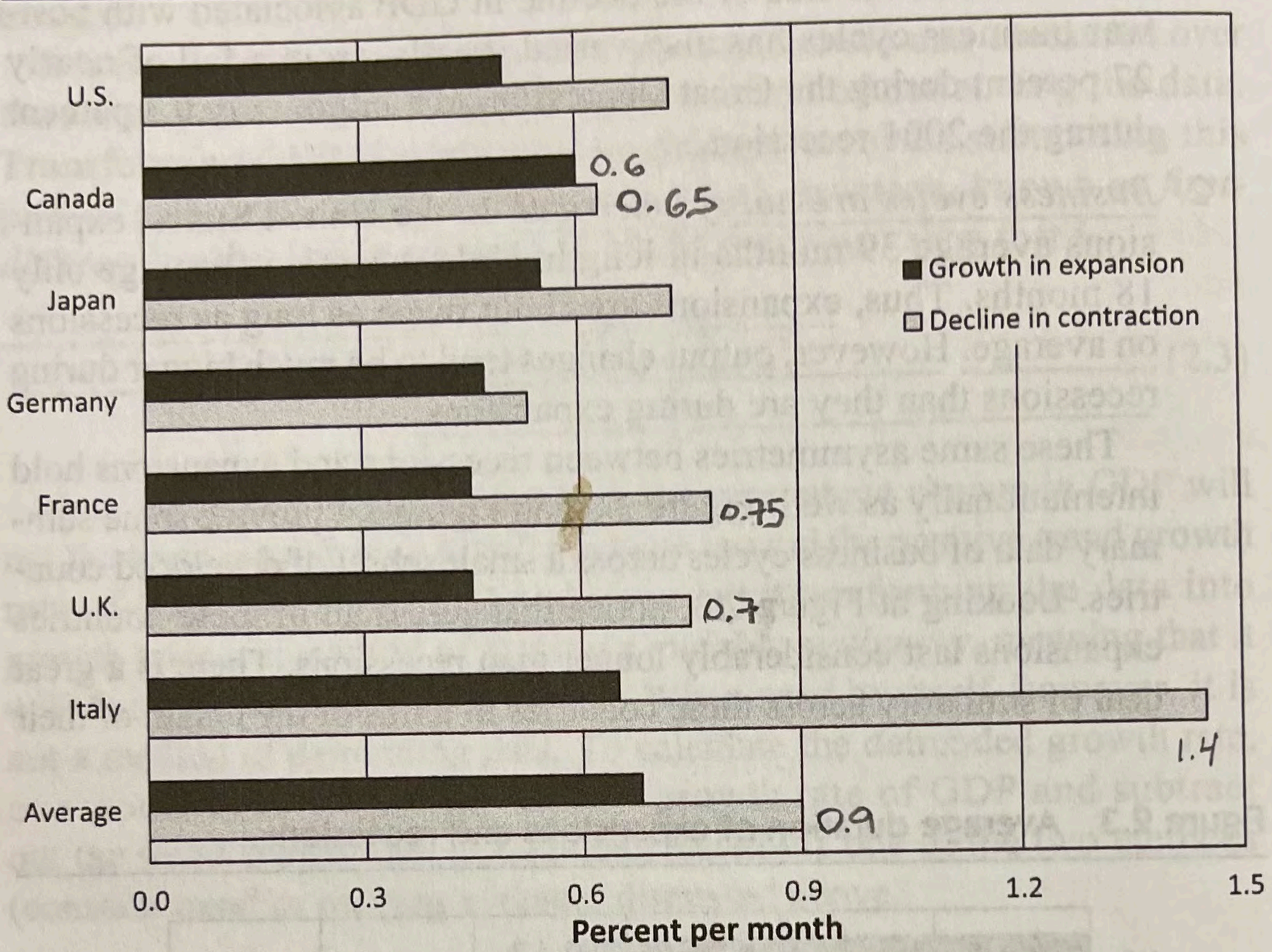
These same asymmetries between recessions and expansions hold internationally as well. Figure 2.3 and Figure 2.4 provide some summary data of business cycles across a small subset of developed countries. Looking at Figure 2.3, notice that across all of these countries expansions last considerably longer 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

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/.