

10

Business-Cycle Properties

Tools: Basic statistics: standard deviation, correlation.

Key Words: Volatility; procyclical and countercyclical.

Big Ideas:

- Economies do not grow smoothly or regularly. We refer to the fluctuations in economic activity as business cycles.
- Growth rates of expenditure components move up and down with GDP over the business cycle, but they move by different amounts. Spending on investment and consumer durables moves more than output; we say it is more volatile. Spending on services and nondurable goods is less volatile than output. Labor and capital markets move with the cycle as well.

Over the last two centuries, [US real GDP](#) has grown at an average rate between 3 and 3.5 percent a year, but this growth has been anything but smooth. Annual growth rates over the last fifty years have ranged from −2 percent or less (in 1975, 1982, and 2008) to 8 percent (in 1966 and 1984). These short-term “fluctuations” or “business cycles” (we’ll use the terms interchangeably) are the subject of intense interest by businesses and play an important role in their decisions to hire, produce, and invest. And it’s not just the US; although we will use US data, other countries exhibit similar volatility. Emerging markets, including the US in the 19th century, differ primarily in having greater volatility. The bottom line: Fluctuations in economic growth are a fact of life.

Our mission is to outline some of the basic features of these fluctuations, which point to ways of dealing with the inevitable risk and uncertainty they bring to our lives.

10.1 Cycles and volatility

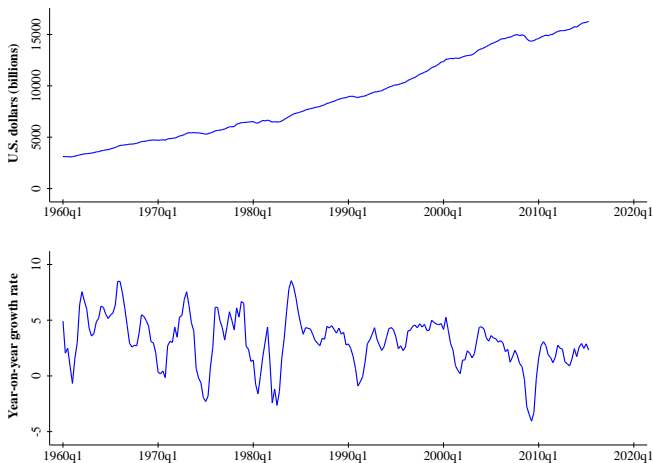
Arthur Burns and Wesley Mitchell, two of the pioneers of business-cycle research, noted:

business cycles are a type of fluctuation found in the aggregate economic activity of nations. ... A cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions and revivals which merge into the expansion phases of the next cycle; this sequence of changes is recurrent but not periodic; in duration business cycles vary from more than one year to ten or twelve years.

(From: *Measuring business cycles*, NBER, 1946.)

You can get a sense of these economy-wide fluctuations from Figure 10.1, where we plot real GDP and its year-on-year growth rate — the rate of growth of quarterly GDP over the same quarter a year earlier. As someone once said: The variance is so large that you hardly notice the mean. The figure also suggests that volatility was lower between 1985 and 2007. People used to refer to this as the “great moderation,” but that seems less appropriate now.

Figure 10.1: Level and fluctuations of US [real GDP](#).



The [National Bureau of Economic Research](#), which dates business cycles in the US, defines a recession as “a significant decline in economic activity spread across the economy, lasting more than a few months, normally visible in real GDP, real income, employment, industrial production, and wholesale-retail sales.” Using subjective methods, they identify dates of peaks and troughs. Less formally, many people use the rule of thumb that a recession consists of two consecutive quarters in which GDP has fallen. The year-on-year growth rates in the figure don’t coincide exactly with this definition, but you can see the eight official NBER recessions since 1960 as sharp downward spikes in GDP growth.

10.2 Expenditure components

Burns and Mitchell refer to fluctuations in “many economic activities.” Among these activities are the expenditure components of GDP. Are their fluctuations similar to those of GDP? On the whole, the components, particularly consumption and investment, move up and down together, but the magnitudes differ enormously. [Consumption](#) currently accounts for nearly 70 percent of US GDP; as you might expect, its fluctuations are similar (see Figure 10.2). The correlation of year-on-year growth rates in consumption (total) and GDP is 0.84.

Table 10.1 shows us that consumption’s components — services, nondurable goods, and durable goods — also vary with GDP, but their correlations and (especially) volatilities differ somewhat. Consumption of nondurables and services is less volatile than GDP, in the sense that the standard deviation of its growth rate is smaller. Consumption of durables is far more volatile than consumption of nondurables and services. You might think of specific products and industries that reflect the same phenomenon. Why do you think cars and refrigerators are more volatile than haircuts and medical care?

[Investment](#) also moves up and down with output and is substantially more volatile (see Figure 10.2). As a rule of thumb, a one-percent increase in GDP is associated with about a three-percent increase in total investment. (We’re looking at the ratio of standard deviations here, and the high correlation of the two series.) Table 10.1 shows that the major components of investment — structures, equipment, and residential housing — are highly correlated with, and more volatile than, GDP.

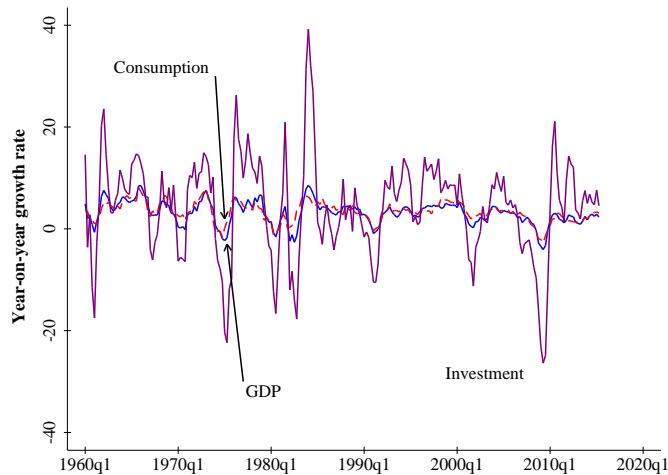
When we turn to business-cycle indicators, we’ll see that many of them are more detailed measures of some aspect of consumption or investment. Consumption is important because it accounts for most of GDP. Investment is important because it is highly responsive to changes in economic conditions.

Table 10.1: Properties of business cycles.

	Std Dev (%)	Corr w/ GDP
GDP	2.19	1.00
Consumption: total	1.75	0.84
Consumption: services	1.22	0.63
Consumption: nondurable	1.65	0.75
Consumption: durables	6.29	0.76
Investment: total	6.64	0.86
Investment: structures	7.85	0.46
Investment: equipment	7.35	0.81
Investment: housing	13.05	0.60
Employment	1.77	0.76
S&P 500 Index	14.98	0.36

Numbers refer to year-on-year growth rates computed from quarterly US data.

Figure 10.2: Fluctuations in consumption, investment, and GDP.



10.3 Labor and capital markets move with the cycle

Labor markets also move with the business cycle; indeed, it's the way in which business cycles make themselves known to us most directly. Figure 10.3 shows us how fluctuations in [employment](#) covary with GDP. Note that employment growth is generally less than GDP growth; the difference reflects an increase in output per worker — a good thing, to be sure! You

can see in the figure that the ups and downs in employment typically lag those in GDP by a little — a quarter or two. The current expansion is an extreme case, with GDP rebounding well before employment, but the general pattern is not unusual.

Figure 10.3: Fluctuations in employment and GDP.

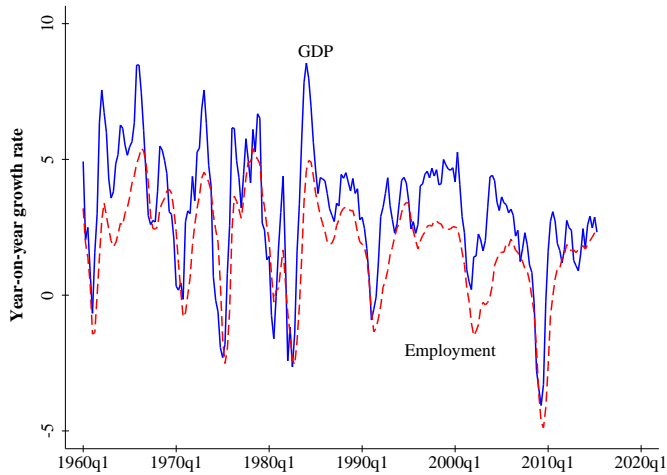
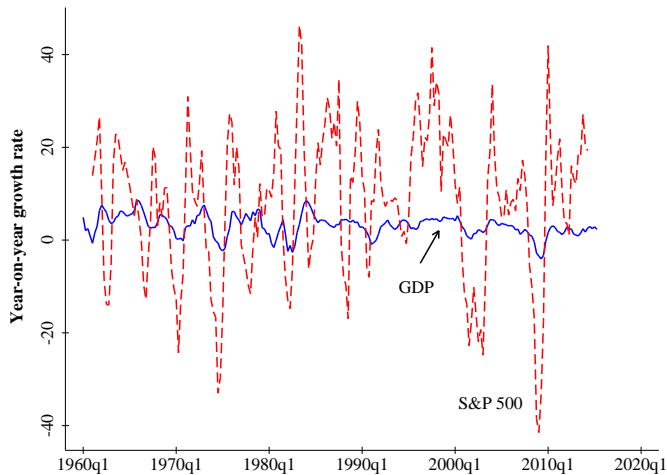


Figure 10.4: Fluctuations in asset prices and GDP.



Financial (capital) markets move with the business cycle, as well. Figure 10.4 plots the growth rate of real GDP against versus the yearly growth

rate of the [S&P 500 index](#). Notice that aggregate stock prices are extremely volatile, with a standard deviation about eight times larger than GDP. Moreover, aggregate stock prices and GDP are positively correlated (0.36). This suggests that good news about the economy is good news for stock prices. It's hard to see in Figure 10.4, but we'll see later that stock prices lead GDP; the correlation of stock prices with GDP two quarters later is above 0.5. Financial measures often lead economic activity. Another example is the yield curve (the difference between long-term and short-term interest rates), which tends to flatten or invert ahead of business downturns. We'll look at this more closely when we turn to indicators.

Labor markets and asset prices are both sources of useful indicators of economic activity. We'll see more of each shortly.

Executive summary

1. Economies do not grow smoothly; they exhibit lots of short-term volatility.
2. Spending on investment goods (by firms) and consumer durables (by households) are more volatile than output as a whole. Household spending on nondurable goods and services is less volatile than output.
3. Most variables are procyclical; that is, they move up and down with GDP. Examples include consumption, investment, employment, and the stock market.

Review questions

1. Statistics. What statistic would you use to show that two economic series move up and down together?

Answer. The correlation between them. Table 10.1, for example, includes the correlations of year-on-year growth rates of GDP and several expenditure components. The correlations in most cases are above 0.8, indicating they do indeed mostly move up and down together.

2. More statistics. What statistic would you use to show that one series is more “volatile” than another.

Answer. The standard deviation. In the same table, we saw that investment is more volatile than consumption in the sense that its standard deviation is about three times higher.

3. Do it yourself. Reproduce Figure 10.3 in FRED. The variables are real GDP (FRED code GDPC1) and nonfarm employment (PAYEMS).

If you're looking for more

These basic features of business cycles are covered in most macroeconomics textbooks. A reasonably good overview is Finn Kydland and Edward Prescott, “[Real facts and a monetary myth.](#)”

Data used in this chapter

Table 10.2: Data table.

Variable	Source
GDP	GDPC1
Consumption	PCECC96
Services	PCESVC96
Durables	PCDGCC96
Nondurables	PCNDGC96
Investment	GPDIC96
Nonresidential	PNFIC96
Equipment	NRIPDC96
Housing	PRFIC96
Employment	PAYEMS
S&P500	SP500
10yr Treasury yield	GS10
2yr Treasury yield	GS2
Federal funds rate	FEDFUNDS

To retrieve the data online, add the identifier from the source column to <http://research.stlouisfed.org/fred2/series/>. For example, to retrieve nonfarm employment, point your browser to <http://research.stlouisfed.org/fred2/series/PAYEMS>

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