

Business Cycles and Their Properties

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Over the last two centuries, US real GDP has grown at an average rate between 3 and 3.5% a year, but this growth has been anything but smooth: annual growth rates over the last fifty years have ranged from -2% or less (in 1975, 1982, and 2008) to 8% (in 1966 and 1985). 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 economies 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.

Cycles and volatility

Arthur Burns and Wesley Mitchell, 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 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.

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

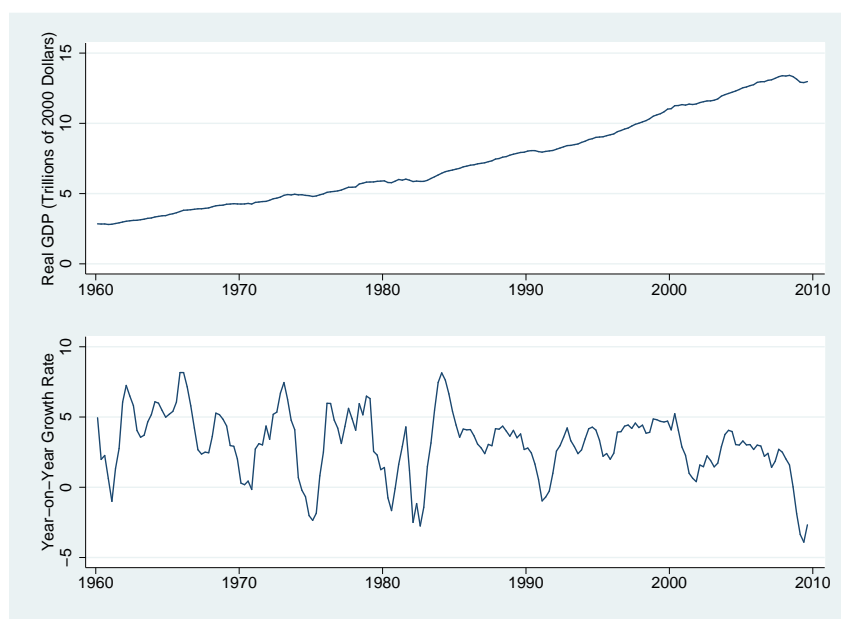


Figure 1: Level and Fluctuations of US Real GDP.

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.

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 about 70% of US GDP; as you might expect, its fluctuations are similar. The correlation of year-on-year growth rates in consumption (total) and GDP is 0.84; see Table 1. Its major components — services, nondurable goods, and durable goods — also vary with GDP, but their correlations and (esp) 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. You can see this clearly in Figure 2. The dark line in each panel is GDP, the other line a component of consumption. It’s apparent that consumption of durables is far more

	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

Table 1: Properties of Growth Rates. Numbers refer to year-on-year growth rates computed from quarterly US data.

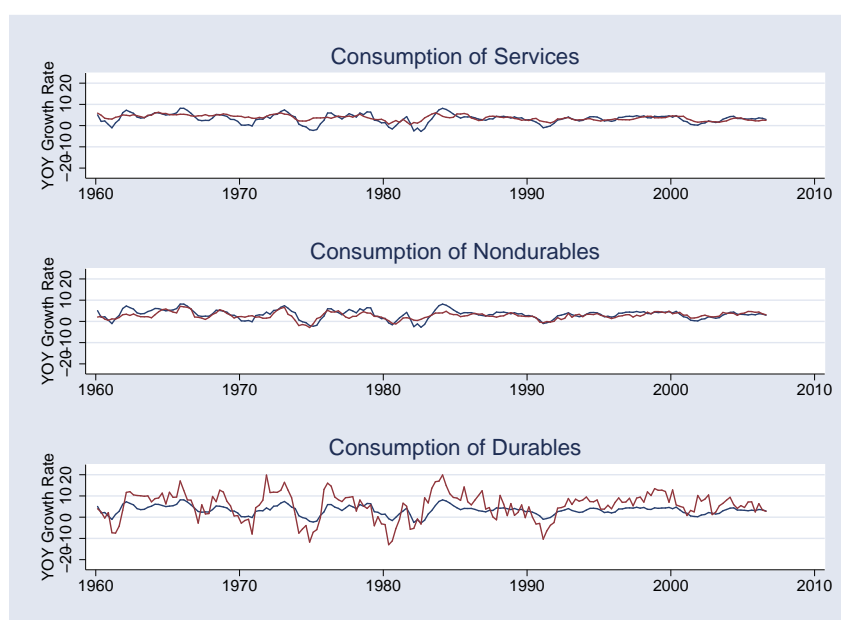


Figure 2: Fluctuations in Consumption and GDP. The solid (blue) line is real GDP, the other (red) line a component of consumption.

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 (new plant and equipment) also moves up and down with output, and is substantially more volatile. As a rule of thumb, a 1% increase in GDP is associated

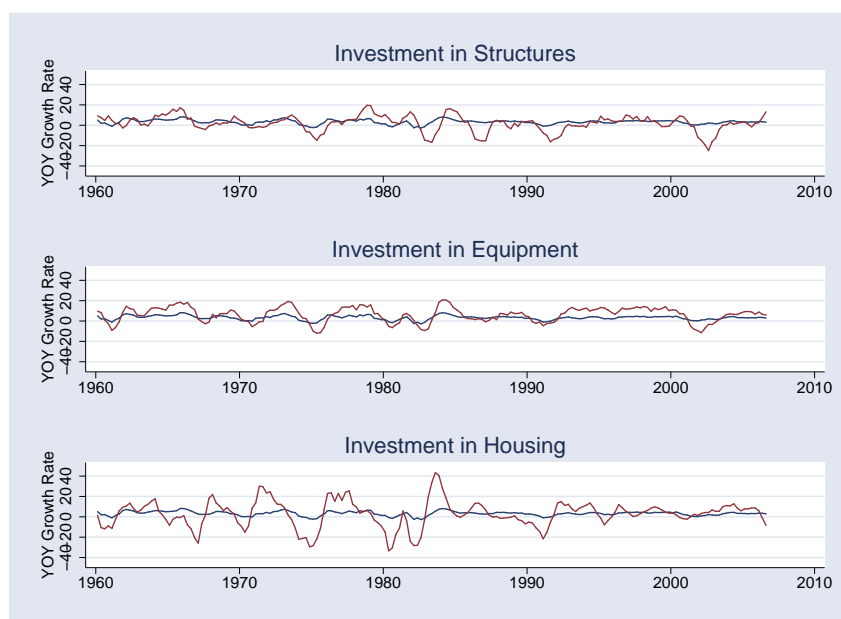


Figure 3: Fluctuations in Investment and GDP. The solid (blue) line is real GDP, the other (red) line a component of investment.

with about a 3% increase in total investment. (We’re looking at the ratio of standard deviations here, and the high correlation of the two series.) Table 1 and Figure 3 show that the major components — 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.

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 4 shows 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 employment rebounding well before employment, but the general pattern is not unusual.

Aggregate stock prices are extremely volatile, with a standard deviation about eight times larger than GDP. The correlation with GDP (0.36) suggests that good news

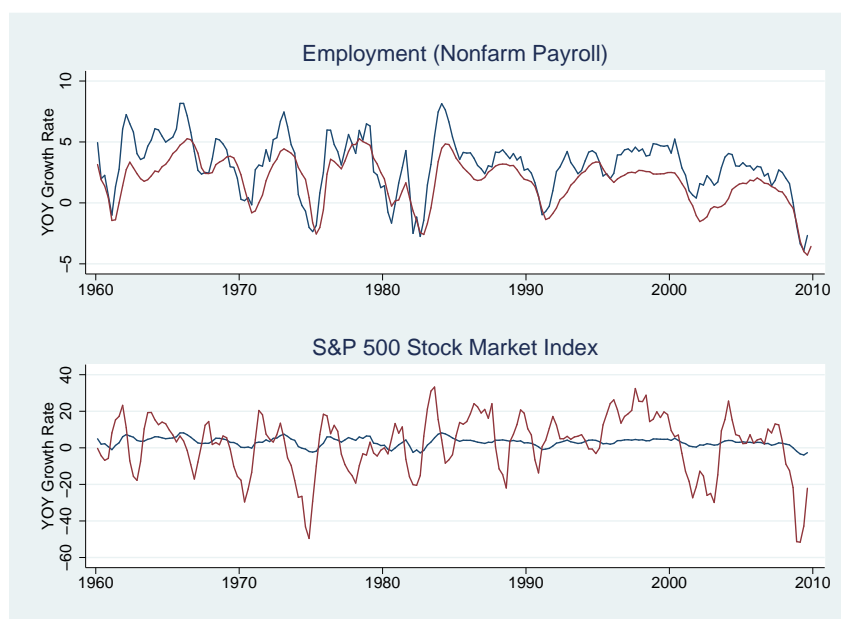


Figure 4: Fluctuations in Employment and Stock Prices. The solid (blue) line is real GDP, the other (red) line employment (top panel) or the S&P 500 Index (bottom).

about the economy is good news for stock prices. It's hard to see in the figure, but we'll see later that stock prices lead GDP: the correlation of stock prices with GDP two quarters later is above 0.5. We'll look at this more closely when we turn to indicators.

Labor market indicators and asset prices are both sources of useful indicators of economy activity. We'll see more of each in the following section.

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. Household spending on nondurable goods and services is less volatile than output.
3. Most variables are procyclical: they move up and down with GDP. Examples include consumption, investment, employment, and the stock market.