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***What is a fair interest rate?***

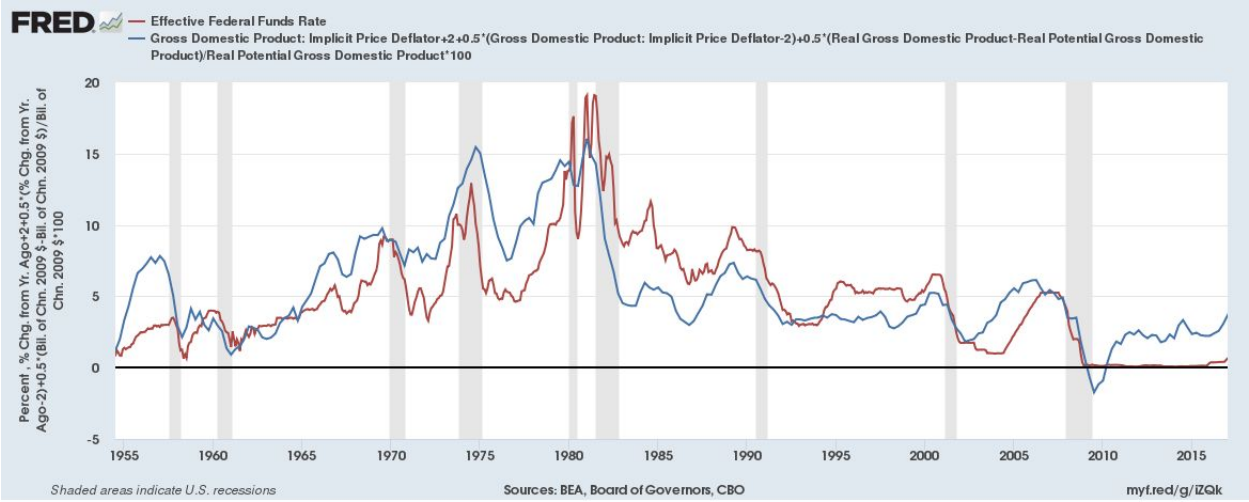
What is the most important variable in investing? The answer is simple: future interest rates. Interest rates drive all other investor behavior. For example, if interest rates are high, then home buyers are unwilling to pay as much for a house, because they will have large interest payments. Conversely, if interest rates are low, then home buyers are willing to pay more for a house, because they are not devoting as much cash flow to interest payments. The same rules apply to all financial assets. If interest rates are high, it pushes asset prices down, and if interest rates are low, then it pulls asset prices up. (For more details, see my previous article, "What is a baseball team, a bond, or a business worth?")

Current interest rates are computed from bond prices. These current interest rates fluctuate up and down based on several factors such as how investors are feeling, how the central bank (Federal Reserve) has decided to manipulate markets, etc. These dynamic fluctuations mean that current interest rates may or may not reflect reasonable interest rates, given a long-term view.

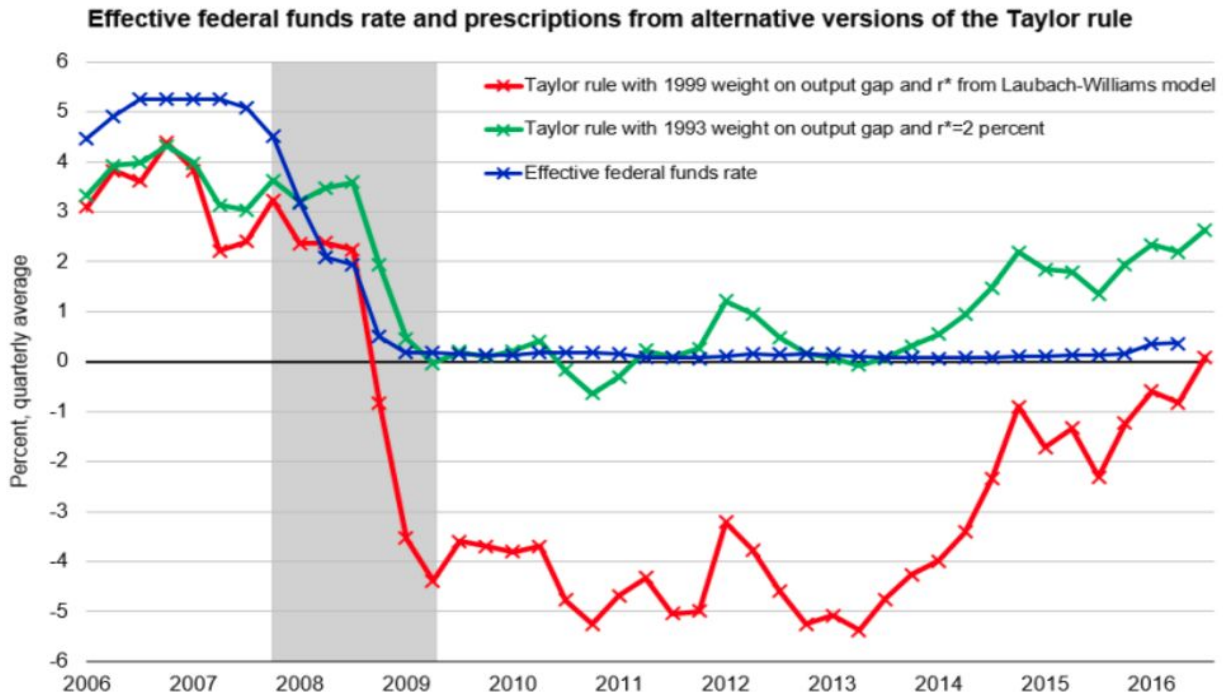
Since interest rates influence the prices of all other financial assets, it raises the question of: "What *should* interest rates be?" I think the most thoughtful answer to this question came from a 1993 paper by John Taylor of Stanford. Taylor looked at the interest-rate problem through the lens of Optimal Control Theory. While Optimal Control Theory sounds complex, it is conceptually very simple. As an example, take a self-driving car. If the car drifts too far to the left, it steers right. If the car drifts too far to the right, it steers left. Small, incremental steers to the left or right keep the car between the lines.

Taylor's model applies the same reasoning to the economy. Instead of steering a car with a wheel, the central bank steers the economy with interest rates. If the economy is growing too quickly or if current productivity is unsustainable, then the central bank should raise interest rates to reign things in. On the other hand, if the economy is weak or if productivity is languishing, then the central bank should lower interest rates to stimulate activity. By manipulating interest rates, the central bank can attempt to steer the economy and keep it between the lines.

Subsequent research has built upon Taylor's work. These papers primarily (1) tweak constants so that interest rate adjustments are more or less aggressive and (2) switch which factors are used to steer the economy (e.g. unemployment rate instead of productivity). While these modifications produce slightly different numbers, the results are typically quite similar to Taylor's original model.




The chart above shows one version of a Taylor Rule, computed with Federal Reserve data. The red line is the actual market interest rate, and the blue line is the Taylor Rule target interest rate. From this chart, we can make two interesting observations. First, during the 1970s, the Taylor Rule suggested that rates needed to be higher than they actually were in order to control inflation. However, it was not until the 1980s that the Federal Reserve raised rates enough to finally moderate inflation. Second, from 2000-2008, the Taylor Rule once again suggested that interest rates needed to be higher than they actually were. If the Federal Reserve had raised interest rates, it might have softened or avoided the housing bubble entirely.




Note: Output gap is the percentage point difference between real GDP and the Congressional Budget Office's estimate of potential. Inflation measured by 4-quarter percent change in price index for personal consumption expenditures excluding food and energy (core PCE). Rules use first released estimates of GDP, core PCE inflation, and Laubach-Williams model estimates of r*. Output gaps are constructed using CBO's most recent estimate of potential real GDP available at the time of the release. 2016:Q3 values based on nowcasts described on Taylor Rule Utility webpage.

Sources: U.S. Bureau of Economic Analysis, Congressional Budget Office, Federal Reserve Bank of San Francisco, and Federal Reserve Bank of Atlanta calculations.

The chart above focuses on the last decade, and like the previous chart, it is extremely interesting. Fallout from the Great Recession left the US with weak growth and a very poor employment market. Many Taylor-variant models suggested that the Federal Reserve should impose negative interest rates in order to force the economy forward. Some models suggested negative rates for a year or two, while other models suggested that we should have had negative rates all the way until 2016. While Europe ventured into negative interest rates, the US did not. It is possible that the sluggish economic growth and weak inflation we experienced over the last decade resulted simply from limiting interest rates to zero, rather than letting interest rates go negative as some Taylor models suggested.

Currently, the economy is beginning to heat up, unemployment is extremely low, and inflation is beginning to appear. The various Taylor-like models now say that the economy is either between the lines or possibly is getting overheated. As a result, almost all models prescribe interest rates of 4% or possibly more.

Most people would be stunned to see interest rates quickly rise to 4%. Yet if the Federal Reserve continues to run interest rates significantly below 4%, it may negatively impact the economy. As I said before, future interest rates are the most important variable in investing. Right now, a gap exists between what interest rates ***should*** be -- according to Taylor -- and what they ***are***. As mindful investors, we should be aware of the unintended outcomes that may result from this discrepancy.

Cordially,

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