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A Market Crash is Coming?!

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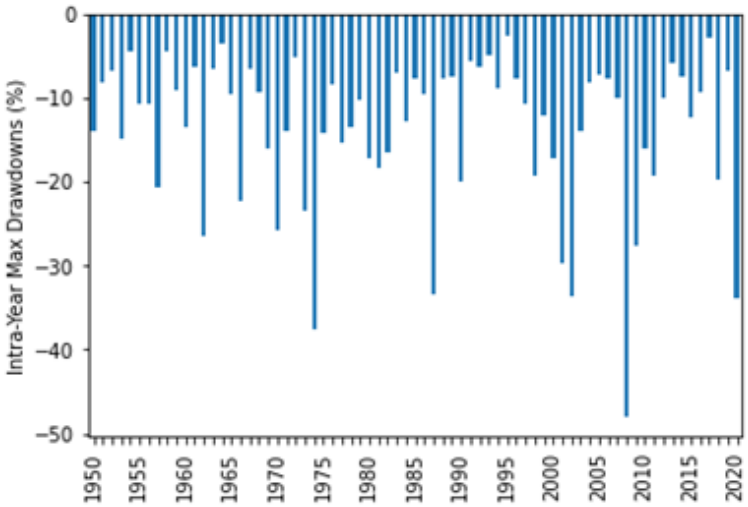
...At least, we were told so recently by a 'market sage'. The explanations include lofty stock market valuations, the end of 'easy money' and something about the Weimar Republic. Perhaps his title was just meant to be click bait (which we shamelessly borrowed), but it undoubtedly hits a nerve among investors. Fortunately, in a data-rich era, we can explore how and when crashes happen.

A History of Drawdowns

It is well-known that even in good years, the S&P 500 index can experience sizeable intra-year peak-to-trough drawdowns. Since 1950, the average and median intra-year maximum drawdown ("IMDD") are approximately 13% and 10%, respectively. The two smallest IMDDs, of less than 3% each, occurred in 1995 and 2017. And, the largest were in 2008, 1974, 2020, and 2001 (all greater than 30%), coinciding with recessions in those years. So, we know that if you can forecast recessions, you can forecast large drawdowns. How about other factors such as valuation or sentiment; can they predict drawdowns? Let us find out.

Display 1: S&P 500 Experiences 10% Median Drawdowns Annually



Source: Daily data, 1/3/1950 to 12/31/2020, Yahoo Finance, Federal Reserve Bank of St. Louis

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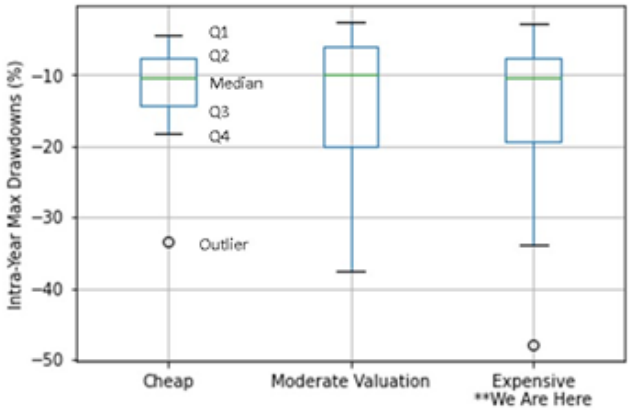
Crash Prediction with Valuations

Most investors accept that high valuations may result in low expected returns. One notion is that high valuations tend to mean-revert and, in doing so, may cause crashes. Recent examples such as the Tech Bubble appear to reaffirm that view. But how often and imminently does this happen?

To investigate, we take a look at IMDDs in low, moderate and high valuation years as proxied by the Shiller Cyclically-adjusted P/E Ratio (CAPE). For example, if the average CAPE in 2012 is in the top third of historical values, we record the subsequent year's drawdown (2013 in this case) in the 'Expensive' category. We repeat this for every year from 1950 to 2020 and analyze the distribution of drawdowns; do bigger drawdowns coincide with more expensive markets?

The results are shown in Display 2 – the box-and-whisker plots shows the quartiles and outliers of the drawdown distributions. Surprisingly, the median drawdowns across categories appear fairly impervious to valuation levels, i.e., we are most likely to see a 10% drawdown in any given year regardless of starting valuation. So, the commonly held wisdom linking valuations and crashes do not really hold for the S&P 500 over a one-year period. However, and to its defense, the range of drawdowns are smaller when valuations are 'Cheap', and thus the average drawdown is lower. Perhaps there is some truth, but just a little.

Display 2: Shiller CAPE is Not a Good Predictor of Future Intra-Year Drawdowns



Source: 1/3/1950 to 12/31/2020, Yahoo Finance, Federal Reserve Bank of St. Louis, Damodaran at NYU for monthly CAPE data
Notes: Monthly CAPE data is averaged over a calendar year and compared against max intra-year drawdowns for the subsequent calendar year. CAPE Ratio for the categories are as follows: Cheap <= 16.1, 16.1 < Moderate <= 21.7. Expensive > 21.7. Each valuation category comprises 23-24 data points.

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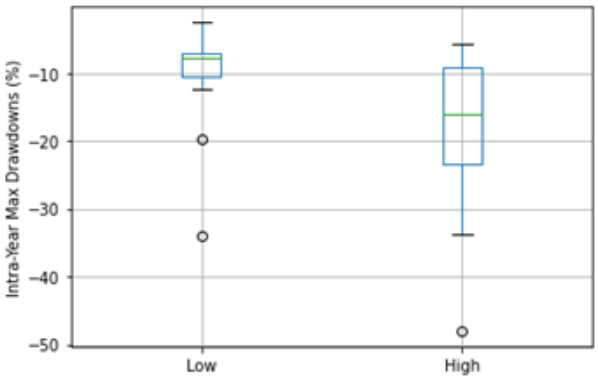
Consumer Sentiment and VIX

How about other factors such as sentiment? One would think that when consumers are over-exuberant, we should see a bigger tendency for markets to crash and revert back to more normal levels. We do not show the results here, but using the University of Michigan Consumer Sentiment Index, we do not see evidence of this either.

There is, however, one predictive factor that is more promising than others, which is the VIX Index (Display 3). Here, we segment our data into two halves due to data availability - the VIX Index only began in 1990, meaning we have much less history than the CAPE. Our results indicate that we are more likely to see bigger IMDDs when the VIX is already high over the prior year. This implies that market crashes usually take time to build, which makes sense as the market volatility levels tend to stay high or low over some period of time. But there are exceptions. The two outliers are of 2020 and 2018, when the market experienced sudden drops because of the global pandemic and anxieties around growth.

Display 3: VIX is a Better Indicator of Future Intra-Year Drawdowns



Source: 1/3/1990 to 12/31/2020, Yahoo Finance, Federal Reserve Bank of St. Louis, Damodaran at NYU for CAPE data
Notes: Daily VIX data is averaged over a calendar year and compared against max intra-year drawdowns for the subsequent calendar year. VIX levels for the categories are as follows: Low <= 17.1, High > 17.1. Each VIX category comprises 15 data points

Next-Twelve Months IMDD May Be Closer to 10%

The result of our findings is that market crashes usually happen when certain conditions exists – when we are in a low growth and high volatility environment. Again, high valuations and sentiment in and of themselves do not seem to correlate strongly with drawdown sizes.

With respect to the current environment, despite equity markets trading at historically lofty levels, we now know it does not portend an immediate crash. We think the maximum drawdown over the next year should be more commensurate with those in 'Low' VIX category: likely around -10% and very unlikely to be worse than -20%. As investors, there will come a time for us to worry more, but we should enjoy this for now.

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The S&P 500 is a market-capitalization weighted index that includes the 500 most widely held companies chosen with respect to market size, liquidity, and industry. The University of Michigan Consumer Sentiment Index is a consumer confidence index published monthly by the University of Michigan. The index is normalized to have a value of 100 in December 1966. Each month at least 500 telephone interviews are conducted of a contiguous United States sample. Created by the Chicago Board Options Exchange (CBOE), the Volatility Index, or VIX, is a real-time market index that represents the market's expectation of 30-day forward-looking volatility. Derived from the price inputs of the S&P 500 index options, it provides a measure of market risk and investors' sentiments. It is not possible to invest directly in an index.

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