Stock Price Perspective on Coronavirus Crash

March 20, 2020; Version 1.0

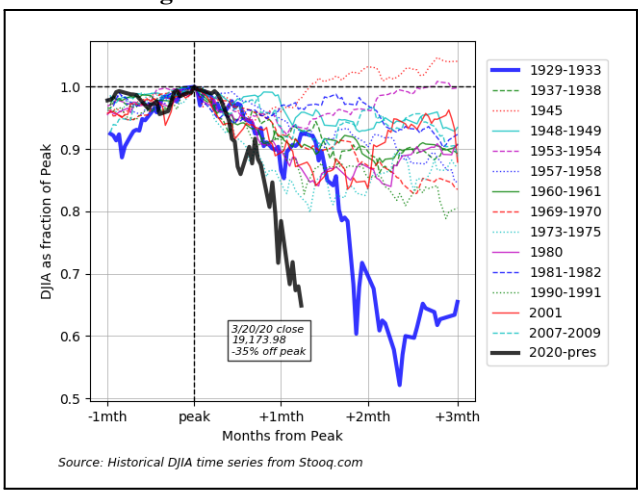
Richard W. Evans*

Evans Bio: Richard Evans is Associate Director and Senior Lecturer of the University of Chicago M.A. Program in Computational Social Science and Director of the Open Source Economics Laboratory (OSE Lab). Rick is also President of Open Research Group, Inc. (OpenRG). Rick is a core maintainer of the OG-USA open source macroeconomic model for dynamic tax analysis. His research focuses on macroeconomics, fiscal policy, and computational modeling.

Abstract: *This Quantitative Note provides evidence that the initial economic effects of the coronavirus pandemic in the United States are worse than any of the last 15 recessions, including the Great Depression. Specifically, average stock prices as measured by the Dow Jones Industrial Average (DJIA) have fallen faster in the last 37 days than in any previous five-week period at the beginning of a recession in the last 100 years. The current 35% decline of the DJIA compares with a decline of roughly 10% over the same period at the outset of the Great Depression. The hope is that this current shock will not last as long as the worst recessions of the past and will not depress stock prices as deeply.*

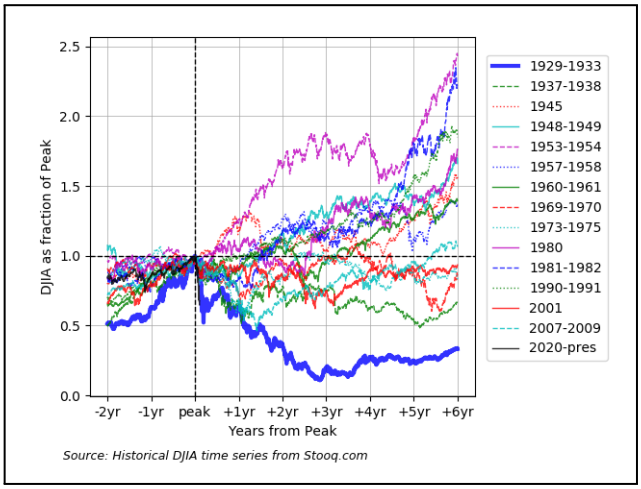
The U.S. and rest of the globe are almost certainly at the beginning of a global recession resulting from the spread of the coronavirus (COVID-19) pandemic. In addition to the various online destinations for coronavirus infection and mortality rates, stock market indices provide real-time updates about peoples beliefs about the economic future and the economic effects of the pandemic. In this *Quantitative Note*, I provide evidence that the initial economic effects of the coronavirus pandemic in the United States are worse than any of the last 15 recessions, including the Great Depression. Specifically, average stock prices as measured by the Dow Jones Industrial Average have fallen faster in the last 37 days (since the February 12) than in any previous five-week period at the beginning of a recession in the last 100 years (see Figure 1).

Figure 1. First three months of Dow Jones Industrial Average over last 15 recessions



Market prices of publicly traded assets—like stocks, derivatives, corporate bonds, and government bonds—summarize the information of millions of market participants, their beliefs about the future, willingness to buy, and willingness to sell. One might buy shares of a corporate stock to be able to have a vote in decisions of the corporation, have claim on any dividends the corporation pays, or because they think the value of that stock will increase. One might buy a government bond because they think the interest rate on that bond will remain steady over some period of time due to the stability and solvency of the government. In all cases, the price of

Figure 2. First six years of Dow Jones Industrial Average over last 15 recessions



Quantitative Notes is published by Open Research Group, Inc. (OpenRG), a public benefit corporation. For more *QN*s or to arrange meetings with an expert, please contact experts@openrg.com.

an asset reflects the beliefs of the buyers and sellers about the future value the asset represents.

Looking at the time series of a single corporate stock conveys information about both broad trends in expectations about the value of the corporation as well as minute-by-minute effects that can be related to the rest of the economy. But stock indices group a sample of stocks together that are representative of some aspect of the economy. The relationship between stock indices and the real economy is imprecise, but the S&P 500 stock price index has been econometrically shown to be a leading indicator of the real economy since the 1960s.[1]. The three most widely followed indices of the U.S. stock market are the Dow Jones Industrial Average (DJIA), S&P 500 Index, and NASDAQ Composite Index.

- Dow Jones Industrial average (DJIA): A weighted average of 30 large-capitalization corporate stock prices listed in the United States. The weighting is simply the sum of the price of a share of each stock, adjusted for stock splits prices at the time they joined the index. Launched in 1896.
- S&P 500 Index: A weighted average of 500 large-capitalization corporate stock prices listed in the United States. This index of 500 companies is much broader than the 30 stocks in the DJIA. Launched in 1957.
- NASDAQ Composite Index: A weighted average of the corporate stock prices listed on the Nasdaq stock exchange. The corporations represented by these stocks are heavily weighted toward the technology sector. Launched in 1971.

Because only the Dow Jones Industrial average has existed over the time period from before the Great Depression 1929 to the present, I compare changes in only the DJIA across recessions. However, the same patterns emerge using existing data for the S&P 500 Index and NASDAQ Composite Index.

Figure 2 takes the time series of the Dow Jones Industrial Average and slices it into 15 series of 8 years each, one for each of the recessions from the Great Depression (August 1929 to March 1933) to the present (March 2020).[2] I take the maximum stock price at the beginning of each recession and display the path of the DJIA as a percent of that maximum price (a normalized peak plot). In this way, we can compare how average stock prices move throughout a recession as measured by the DJIA as a percent of its peak at the beginning of the recession.

Figure 2 shows us how severe the Great Depression was in terms of persistent declines in average stock prices. The DJIA index value fell nearly 50% in the first two months (see bold blue line in Figure 1) and bottomed out at a loss of nearly 90% of its value after three years. What is not shown in Figure 2 is that it took 35 years for the DJIA to return to its peak value at the beginning of the recession of 381.17 on September 3, 1929.[3]

Using this sample of the last 15 U.S. recessions, Figure 2 shows that all recessions are characterized by a decline in stock prices. In 60% of recessions, the DJIA stock prices return or surpass their peak at the beginning of the recession within three years (9 out of 15 recessions). But a significant 40% of recessions induce a dip in stock prices that takes longer than three years to recover (6 out of 15 recessions). The question is how deep and prolonged will be this crash in U.S. stock prices induced by the coronavirus pandemic.

Because we are only 37 days into the current decline in U.S. stock prices as measured by the DJIA that began on February 12, 2020, it is hard to use Figure 2 to compare today's decline to those of past recessions. Figure 1 is a magnification of Figure 2 and shows the first three months of each of the last 15 recessions, with the Great Depression highlighted in thick blue and the current recession highlighted in thick black. It is striking how much more quickly prices are dropping in today's downturn versus stock prices in the Great Depression, the next most severe recession. The DJIA closed today, March 20, 2020, at a price of 19,173.98. That is a decline of 35% from the peak price 37 days ago of 29,551.42 on February 12, 2020.

In comparison, the DJIA during the Great Depression was only down 7.4% at the same point 37 days out from its peak, although it had been as low as 13.4% down after 30 days. It is clear that the global shock of the coronavirus pandemic has induced the most severe initial decline in stock prices in at least the last 100 years.

1. Summary

It is clear that stock prices have declined more quickly in response to the coronavirus pandemic than in any of the previous recessions of the last 100 years. The hope is that this shock will not last as long as previous recessions and will not depress stock prices as deeply. The global pandemic has induced uncertainty about how long the contagious spread will last and how severe will be the effects on the infected. And the resulting social distancing has frozen many layers of economic interactions that can hopefully be quickly restarted as soon as new infections subside. These uncertainties will be an obstacle to stock market recovery until we see decreases in infections, social distancing measures are removed, and workers, teachers, and students return to their day jobs.

[1] See Zarnowitz (1992)

[2] The National Bureau of Economic Research (NBER) Business Cycle Dating Committee is the official arbiter of when a recession starts and when it ends in the United States. See NBER's U.S. Business Cycle Expansions and Contractions page at https://www.nber.org/cycles.html.

[3] The DJIA closed at 382.74 on November 23, 1954, the first time it closed above 381 since the peak value 381.17 on September 3, 1929, at the beginning of the Great Depression.

Modeling Notes

The time series for the Dow Jones Industrial Average (DJIA) from May 26, 1896 to March 20, 2020 are daily closing prices and were downloaded from Stooq.com using the pandas-datareader library for the Python programming language. The data series (djia_close_2020-03-20.txt) and Python code (DJIA_NormPeakPlot.py) for producing Figures 1 and 2 are available in the public GitHub repository https://github.com/OpenSourceEcon/Plots in the DJIA_NormPeakPlot folder.

Modeling Assumptions

The S&P 500 Index has been shown to be a leading indicator of the real economy since the 1960's (see Zarnowitz, 1992). In most cases, the stock index moves before real macroeconomic variables like GDP move. In the case of the DJIA and the NBER-specified recessions, 10 out of the last 15 recessions had a peak stock price within two months of the beginning recession month. Only 5 out of 15 recession had a DJIA stock price peak more than two months from the beginning month of the recession. Table 1 shows the beginning and ending months of each of the past 15 recessions and the peak stock price date at the beginning of those recessions.

Table 1. Peak DJIA day versus beginning recession month

Beginning[a] recession month	Ending recession month	Peak DJIA date
1929 Aug	1933 Mar	1929-09-03
1937 May	1938 Jun	1937-03-10
1945 Feb	1945 Oct	1945-03-06
1948 Nov	1949 Oct	1948-06-15
1953 Jul	1954 May	1953-08-13
1957 Aug	1958 Apr	1957-07-12
1960 Apr	1961 Feb	1960-01-05
1969 Dec	1970 Nov	1969-05-14
1973 Nov	1975 Mar	1973-10-26
1980 Jan	1980 Jul	1980-02-13
1981 Jul	1982 Nov	1981-04-27
1990 Jul	1991 Mar	1990-07-16
2001 Mar	2001 Nov	2000-01-14
2007 Dec	2009 Jun	2007-10-09
2020 Mar[b]	present	2020-02-12

[a] Recession beginning and ending months are determined by the National Bureau of Economic Research (NBER) Business Cycle Dating Committee. See NBER's U.S. Business Cycle Expansions and Contractions page at https://www.nber.org/cycles.html.
[b] The current economic downturn has not yet been officially declared a recession, but it almost certainly will be.

References

Zarnowitz, Victor, "Composite Indexes of Leading, Coincident, and Lagging Indicators," in Victor Zarnowitz, ed., *Business Cycles: Theory, History, Indicators, and Forecasting*, University of Chicago Press, 1992, chapter 11, pp. pp. 316–356.