

U.S. STOCK MARKET RETURNS DURING RECESSIONS



A STUDY OF 31 RECESSIONS
OVER 150 YEARS: 1889 TO 2022



RUSSELL INVESTMENTS RESEARCH

EMBRACE THE POSS/BLE®

Contents

| | |
|------------------------|---|
| Background | 2 |
| Analysis | 5 |
| Market timing accuracy | 7 |
| Appendix | 8 |

U.S. stock market returns during recessions

Adam Field, FSA, EA, Senior Consulting Analyst

Evgenia Gvozdeva, Ph.D., Managing Director, Research and Development

Eric Thaut, CFA, Lead Quantitative Research Analyst

In the 154 years spanning 1869 to 2022, U.S. stocks returned an average of 9.1% per annum. During this period, there were 31 recessions totaling 520 months (43.3 years), with a cumulative draw down of -76.6%, -3.3% annualized. During 15 of the 31 recessions, U.S. equity returns were negative with a cumulative return of -96.9% over 261 months (21.8 years), -14.8% annualized. During 16 of the 31 recessions, U.S. equity returns were positive with a cumulative return of 654.1% over 259 months (21.6 years), 9.8% annualized.

U.S. stock market peaks and troughs are often independent of the beginning and ending of recessions with peaks occurring as early as 22 months before the start of a recession. On average, the U.S. stock market peaks five months before the start of a recession, returning just 1.3% on average in five-months period. The market tends to recover quickly, returning on average 24.7% in the 12 months following the end of a recession.

It is difficult to time recessions. Beating a buy-and-hold return (9.1% for the U.S stock market, over the 154 years) would require forecasting accuracy above 70%. This assumes moving 100% of one's stock holdings in and out of cash.

Most investors wouldn't trade all of their stock holdings in order to protect against down markets but could reduce bottom rebalancing bands instead – in effect partitioning the portfolio into a buy-and-hold portion and a trading portion. This strategy also requires 70% forecasting accuracy in order for the trading portion to beat a long term buy-and-hold result.

This paper considers two passively managed asset classes: U.S. stocks and Treasury bills (T-bills). Well diversified, actively managed portfolios may deliver significantly different returns than those described herein.

Background

Many investment strategists are forecasting that the U.S. economy could experience a recession in the next year or two.

Monthly economic data was provided by the National Bureau of Economic Research (NBER) which has rated every month since 1850 as either an expanding or a contracting economy.

The NBER 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, industrial production and wholesale-retail sales.”

This is a broader version than the older, more mechanistic NBER definition of a recession, which qualified “two consecutive quarters of decline in real GDP” as a recession.

 Many investment strategists are forecasting that the U.S. economy could experience a recession in the next year or two.

NBER's Business Cycle Dating Committee makes the determination of the start and the end of recessions and economic expansions. The start and end date of each recession and expansion is shown in [Exhibit 8](#) in the Appendix.

As noted in the Appendix, monthly U.S. stock market returns have been gathered from several sources, including Robert Shiller for monthly returns dating back to 1871 and G. William Schwert for the years 1869 and 1970. Returns starting in 1926 are readily available from many sources.

By analyzing the starting and ending months and years of each economic expansion and recession and the respective monthly U.S. stock market returns, **one of the main goals of this paper is to determine if stock market peaks and troughs coincide with peaks and troughs in the economy, as defined by the NBER.**

Other studies analyze peak to trough returns for the stock market "in the vicinity of recessions." We provide a similar analysis by computing returns starting five months before the recession (i.e., the market peak) to the end of the recession.

In the 1848 months (154 years) from January 1, 1869 to December 31, 2022, there have been 33 periods of expansion, which total 1328 months (110.7 years), and 31 recessions totaling 520 months (43.3 years). **NOTE: Since a depression is a severe recession, the Great Depression is included in all the recession averages and analysis; to be correct, there were 30 recessions and one depression in the 150-year period. Throughout the paper we refer to this as "31 recessions".**

The average recession lasted 17 months (one year, five months) and the average economic expansion (between the recessions) has been three years, seven months. However, since the end of WWII, the average recession has been 10 months and the average expansion 5 years, 4 months.

As shown in [Exhibit 1](#), the U.S. stock market had an annualized return of 9.1% over the total 154-year period, including the impact of both strong and weak economies. The U.S. stock market returned an average of 14.4% per annum during the expansionary periods and an average of -3.3% per annum during the recessions.

However, these average returns disguise the fact that there are periods of negative U.S. stock returns during some of the expansions as well as periods of positive U.S. stock returns during some recessions.

There were 15 recessions with negative U.S. stock returns and 16 recessions with positive stock returns.

Negative recessions

The Great Depression from August 1929 through March 1933, a duration of 43 months, had a total U.S. stock return of -73.6%. (Returns during recession are shown unannualized in column 4 of [Exhibit 9](#).)


The next worst recession was the GFC, which spanned December 2007 through June of 2009, a duration of 18 months, with total U.S. stock return of -34.8%.

The third worst was May 1937 through June 1938, a duration of 13 months, with a total U.S. stock return of -32.6%.

The 12 additional negative recessions had U.S. stock returns ranging from -18.1% (for January 1920 through July 1921) to -3.9% (for March 2001 through November 2001). COVID-19 recession was the sixth worst recession.

This is a total of 261 months (21.8 years) of recessions with negative stock market returns. Putting them end to end would result in a drawdown of -96.9%.

Most returns in this paper are quoted on an annualized basis, so the -96.9% loss over 21.8 years equates to -14.8% per annum, which is shown in [Exhibit 1](#).



One of the main goals of this paper is to determine if stock market peaks and troughs coincide with peaks and troughs in the economy, as defined by the NBER.

Positive recessions

The 16 recessions with positive U.S. stock market returns ranged from a 13-month recession, which spanned October 1926 to November 1927 (with a total U.S. stock market return of 38.1%) to a 24-month recession, which spanned January 1910 to January 1912 (with a return of 0.02%). (Returns can be seen in column 4 of [Exhibit 9](#).)

The recessions with positive stock returns total 259 months (21.6 years). Putting the positive recessions end to end would result in a total return of 654.1%. Annualized, this is 9.8% per annum over 21.6 years, as shown in [Exhibit 1](#).

Combining the 15 negative recessions with the 16 positive recessions equates to a total return of -76.6% over 520 months or -3.3% per annum over 43.3 years, as shown in [Exhibit 1](#).

Putting the positive recessions end to end would result in a total return of 654.1%. Annualized, this is 9.8% per annum over 21.6 years.

Exhibit 1: U.S. stock returns during economic expansions and recessions

Expansions

| | # OF YEARS | AVERAGE RETURN |
|----------------|------------|----------------|
| Positive Years | 73.7 | 41.1% |
| Negative Years | 37.0 | -24.7% |
| Subtotal | 110.7 | 14.4% |

Recessions

| | # OF YEARS | AVERAGE RETURN |
|---------------------|------------|----------------|
| Positive Recessions | 21.6 | 9.8% |
| Negative Recessions | 21.8 | -14.8% |
| Subtotal | 43.3 | -3.3% |

| | | |
|--------------|------------|-------------|
| TOTAL | 154 | 9.1% |
|--------------|------------|-------------|

Analysis

154 years 1869-2022

This study analyzes 154 years of U.S. stock, bond and T-bill returns from January 1, 1869 to December 31, 2022.

As shown in [Exhibit 2](#), stocks returned 9.1% in nominal terms and 7.1% in real terms per annum during the 154-year period. Equities achieved a risk premium of 4.9% over 90-day T-bills. Inflation, at 2.0%, is relatively low over the 154 years.

U.S. stock returns were positive in 113 years, with an annualized cumulative return of 18.5%. U.S. stock returns were negative in 41 years, averaging -13.0%. Inflation, at 2.3% during positive years, was almost double the 1.2% inflation in negative years due to disinflationary periods when markets suffered. Stocks were more volatile in up markets, with a 12.1% standard deviation (SD), than in down markets, with a 10.3% SD.

U.S. stock returns were positive in 113 years, with an annualized cumulative return of 18.5%.

Exhibit 2. Market returns and rates over 154 years

| | NOMINAL STOCK RETURNS | STOCK SD | 90 DAY T-BILL RETURNS | RISK PREMIUM | SHARPE RATIO | 10-YEAR TREASURY YIELD | INFLATION | REAL STOCK RETURN |
|--------------------|-----------------------|----------|-----------------------|--------------|--------------|------------------------|-----------|-------------------|
| 154 years | 9.1% | 18.1% | 4.2% | 4.9% | 0.35 | 4.6% | 2.0% | 7.1% |
| 113 positive years | 18.5% | 12.1% | 4.1% | 14.4% | 1.24 | 4.6% | 2.3% | 16.2% |
| 41 negative years | -13.0% | 10.3% | 4.7% | -17.7% | -1.66 | 4.7% | 1.2% | -14.2% |

Recessions

During the 154-year period we examined, there were 31 recessions (30 recessions and one depression), which totaled 43.3 years of declining economic conditions. The 31 recessions ranged in length from two months (February 2020 through April 2020) to five years, five months (October 1873 through March 1879) and averaged one year and five months in duration. The average time between recessions was three years and seven months of economic expansion. (See [Exhibit 8](#) in the Appendix.)

During the 43.3 recession years, U.S. stocks had a nominal annualized return of -3.3% and a real return of -1.2%. Volatility in positive recessions (12.2%) was much less than the volatility in negative recessions (22.0%). (See [Exhibit 3](#).)

Even though half of the recessionary periods (21.6 years) have had positive U.S. stock market returns of 9.8%, this is much less than the 18.5% U.S. stock market return for the 113 positive years out of the total 154 years. (See [Exhibits 2 and 3](#).)

Similarly, the average negative stock return in the 15 losing recessions, -14.8%, is lower than the average negative stock return for the 41 negative years (-13.0%).

U.S. stock returns were negative in 41 years, averaging -13.0%.

Exhibit 3. Market returns and rates during recessions

| | NOMINAL STOCK RETURNS | STOCK SD | 90 DAY T-BILL RETURNS | RISK PREMIUM | SHARPE RATIO | 10-YEAR TREASURY YIELD | INFLATION | REAL STOCK RETURN |
|--------------------|-----------------------|----------|-----------------------|--------------|--------------|------------------------|-----------|-------------------|
| Total (43.3 years) | -3.3% | 18.1% | 5.1% | -8.4% | -0.37 | 4.5% | -2.1% | -1.2% |
| Pos (21.6 years) | 9.8% | 12.2% | 5.5% | 4.3% | 0.39 | 5.0% | -1.7% | 11.5% |
| Neg (21.8 years) | -14.8% | 22.0% | 4.6% | -19.4% | -0.82 | 4.1% | -2.4% | -12.3% |

U.S. stock market returns before, during and after recessions

The stock market often anticipates recessions – but how soon before a recession? In one instance the market peaked 22 months before the start of the recession. Our analysis shows that the market peaks on average five months before a recession, returning just 1.3% in this five month period.

The 1.3% average contains returns that range from -16.1% for the five months before the May 1907 through June 1908 recession to 20.0% for the six months before the Great Depression, which started in August of 1929. (See [Exhibit 9](#) in the Appendix.)

During the one year, five month average duration of a recession, the average stock market return was -3.3% per annum.

In the 12 months following each recession, the market returns 24.7% on average. The returns vary from 80.5% in the 12 months following the Great Depression to -18.2% for the 12 months after the 2001 recession.

Putting the three time periods together – five months before a recession; one year, five months during a recession; and one year following a recession (for a total of 2.8 years average) – results in an annualized return of 7.6%.

A U.S. stock return of 7.6% per annum over 2.8 years (before, during and after a recession) exceeds Russell Investments' Capital Market Assumptions for US Stocks over this time period. Buy-and-hold would be a better strategy than trying to time a recession.

Impact of recessions on pension plan funded status

This estimation assumes a duration of 12 years for the typical pension plan and uses changes in the 10-year Treasury as a proxy for discount rate changes. On average, over all 31 recessionary periods, changes in funded status are about -1%. (See [Exhibit 10](#) in Appendix.)

However, there are some outliers worth mentioning as shown in the [Exhibit 4](#). In the 2007-2009, 1937-1938, 2020, and 1981-1982 recessions, a typical pension plan lost ~18% on average in funded status, but for very different reasons. For example:

- In 1981-1982, the U.S. stock market had a positive 15.3% return, but rates fell 373 bps.
- In 2007-2009, markets lost 34.8% but rates were nearly constant at -38 bps.

Exhibit 4: Funded status change during recessions (changes in funded status, five worst periods)

| RECESSION PERIOD | FUNDED STATUS CHANGE* | STOCK RETURN | DISCOUNT RATE CHANGE** |
|----------------------------|-----------------------|--------------|------------------------|
| Depression 1929-1930 | -39.3% | -73.6% | -0.12% |
| Recession 2007-2009 | -21.7% | -34.8% | -0.38% |
| Recession 1937-1938 | -19.3% | -32.6% | -0.16% |
| Recession 2020 | -16.7% | -15.4% | -0.84% |
| Recession 1981-1982 | -14.7% | 15.3% | -3.73% |
| Average over 31 recessions | -0.9% | -3.3% | -0.34% |

*Assumes a duration of 12 years for the typical pension plan liabilities with a 60/40 stock/bond mix on the asset side

**Changes in 10-year Treasury yield used as proxy for discount rate changes

U.S. stock market returns correlated to GDP changes

The correlation between U.S. stock market returns and GDP changes over the 31 recessions is 0.30. This positive correlation is almost entirely driven by the 2020 recession where GDP dropped 17.8% on an annualized basis and the market lost 63.4% on an annualized basis. Excluding this period, the correlation is near zero. (See data in [Exhibit 11](#) in the Appendix.)

“ A U.S. Stock return of 7.6% per annum over 2.8 years (before, during and after a recession) exceeds Russell Investments Capital Market Assumptions for US Stocks over this time period. Buy-and-hold would be a better strategy than trying to time a recession.

Market timing accuracy

An investor may forecast that stocks will go up in the next investment period and then one of two things will happen:

1. Stocks go up
2. Stocks go down

Or an investor may forecast that stocks will go down in the next investment period and then one of two things will happen:

1. Stocks go up
2. Stocks go down

To estimate the timing accuracy needed to match a buy-and-hold return over a historical period, it is assumed that assets are invested in cash during losing periods for stocks. The possible outcomes for stocks and cash over the 15 negative recessions are summarized in [Exhibit 5](#). Note that these 15 recessions with negative U.S. stock returns amount to 261 months (21.8 years).

Exhibit 5: Performance summary

Market timing: 15 negative recessions

| | OTHER | NEGATIVE RECESSION |
|-----------------------|--------|--------------------|
| Number of Years | 132.2 | 21.8 |
| Frequency | 85.84% | 14.16% |
| Stock Returns | 13.60% | -14.80% |
| T-Bill Returns (cash) | 4.20% | 4.60% |

Timing accuracy is computed from these statistics using the timing accuracy formula as shown in [Exhibit 7](#) in the Appendix. In order to equal the buy-and-hold return of 9.1%, an investor would have to successfully predict 70% of the market turns, as shown in [Exhibit 6](#).

Exhibit 6: Timing accuracy

| TIMING ACCURACY | RETURN |
|-----------------|---------------------|
| 100% | 12.33% |
| 70% | 9.1% (Buy and Hold) |
| 0% | 1.51% |

Market timing by lowering re-balancing bands

In protecting against down markets, most investors would not trade 100% of their stock holdings but might instead adjust their re-balancing bands downward.

Consider an investor who lowers her downside rebalancing band from 10% to 20% of a 100% equity position. Eighty percent (80%) of the stocks will be held constant and 20% are available for timing. This 20% is the trading portfolio. This means that 80% of the equity portfolio would earn the buy-and-hold return of 9.1% over 154 years.

To exceed the buy-and-hold rate for the entire equity holding, the investor would have to achieve greater than 70% timing accuracy for the 20% trading portfolio.

“ To exceed the buy-and-hold rate for the entire equity holding, the investor would have to achieve greater than 70% timing accuracy for the 20% trading portfolio.

Appendix

Data sources (154 years, 31 recessions)

eVestments: annual S&P500 returns post 1970

U.S. Bureau of Economic Analysis, "Prototype Economic Statistics for Puerto Rico, 2012-2017," 2017.
(<https://www.bea.gov/data/gdp/gross-domestic-product>)

Gordon, Robert J., 1986. The American Business Cycle: Continuity and Change (<https://www.nber.org/books/gord86-1>)

Officer, Lawrence H., "What Was the Interest Rate Then?" Measuring Worth, 2019 (<http://www.measuringworth.com/interestrates/>)

Maddison Project Database (MPD), 2020

Shiller, Robert, "Online Data Robert Shiller," 2018 (<http://www.econ.yale.edu/~shiller/data.htm>)

Schwert, G. William, "Indexes of United States Stock Prices from 1802-1987", Journal of Business 63 (1990); 399-426

Williamson, Samuel H., "The Annual Consumer Price Index for the United States, 1774-Present," MeasuringWorth, 2019
(<http://www.measuringworth.com/uscpil/>)

Exhibit 7: Computing timing accuracy

$$R' = A1 \times F(S+) \times R'(S+) + (1 - A1) \times F(S+) \times R'TB(S+) \\ + A2 \times F(S-) \times R'TB(S-) + (1 - A2) \times F(S-) \times R'(S-)$$

Where:

| | | |
|------------|---|--------------------------------------|
| R' | = | Total return |
| $A1$ | = | Timing accuracy in up markets |
| $F(S+)$ | = | Frequency of up markets |
| $R'(S+)$ | = | Stock returns in up markets |
| $R'TB(S+)$ | = | T-bill returns in up stock markets |
| $A2$ | = | Timing accuracy in down markets |
| $F(S-)$ | = | Frequency of down markets |
| $R'TB(S-)$ | = | T-bill returns in down stock markets |
| $R'(S-)$ | = | Stock returns in down markets |

Primes on returns denote continuous compounding.

Source: William F Sharpe, "Likely Gains from Market Timing", FAJ, March-April 1975, p 60.

Exhibit 8: Recession dates, duration

| START | END | DURATION | ANN. STOCK MARKET RETURNS | ANN. T-BILL RETURNS | INFLATION | TIME TO NEXT RECESSION |
|-----------------------|---------------|-------------------|---------------------------|---------------------|-----------|------------------------|
| June 1869 | December 1870 | 1 year, 6 months | 2.7% | 8.1% | -4.1% | 2 years, 10 months |
| October 1973 | March 1979 | 5 years, 5 months | 4.4% | 5.4% | -7.0% | 3 years |
| March 1882 | May 1885 | 3 years, 2 months | -3.0% | 5.3% | -7.3% | 1 year, 10 months |
| March 1887 | April 1888 | 1 year, 1 month | -5.2% | 5.5% | 1.1% | 2 years, 3 months |
| July 1890 | May 1891 | 10 months | -8.7% | 6.7% | 4.5% | 1 year, 7 months |
| January 1893 | June 1894 | 1 year, 5 months | -12.0% | 6.8% | -12.2% | 1 year, 6 months |
| December 1895 | June 1897 | 1 year, 6 months | 3.6% | 6.2% | -4.8% | 2 years |
| June 1899 | December 1900 | 1 year, 6 months | 12.9% | 5.6% | 4.4% | 1 year, 9 months |
| September 1902 | August 1904 | 1 year, 11 months | -7.1% | 5.8% | 0.0% | 2 years, 9 months |
| May 1907 | June 1908 | 1 year, 1 month | 0.6% | 5.9% | -4.8% | 1 year, 7 months |
| January 1910 | January 1912 | 2 years | 0.1% | 5.2% | -3.9% | 1 year |
| January 1913 | December 1914 | 1 year, 11 months | -6.4% | 5.8% | 1.6% | 3 years, 8 months |
| August 1918 | March 1919 | 7 months | 21.0% | 5.7% | 11.4% | 9 months |
| January 1920 | July 1921 | 1 year, 6 months | -12.5% | 7.2% | -5.6% | 1 year, 10 months |
| May 1923 | July 1924 | 1 year, 2 months | 10.2% | 4.5% | 1.0% | 2 years, 3 months |
| October 1926 | November 1927 | 1 year, 1 month | 34.7% | 4.1% | -1.6% | 1 year, 9 months |
| August 1929 | March 1933 | 3 years, 7 months | -31.1% | 2.3% | -8.5% | 4 years, 2 months |
| May 1937 | June 1938 | 1 year, 1 month | -30.5% | 0.2% | -1.9% | 6 years, 8 months |
| February 1945 | October 1945 | 8 months | 34.5% | 0.4% | 2.5% | 3 years, 1 month |
| November 1948 | October 1949 | 11 months | 11.5% | 1.1% | -2.3% | 3 years, 9 months |
| July 1953 | May 1954 | 10 months | 29.5% | 1.3% | 0.4% | 3 years, 3 months |
| August 1957 | April 1958 | 8 months | -7.4% | 2.5% | 3.2% | 2 years |
| April 1960 | February 1961 | 10 months | 18.0% | 2.5% | 1.2% | 8 years, 10 months |
| December 1969 | November 1970 | 11 months | -4.5% | 6.7% | 5.5% | 3 years |
| November 1973 | March 1975 | 1 year, 4 months | -9.9% | 7.7% | 10.9% | 4 years, 10 months |
| January 1980 | July 1980 | 6 months | 23.0% | 11.4% | 13.0% | 1 year |
| July 1981 | November 1982 | 1 year, 4 months | 11.3% | 12.2% | 5.2% | 7 years, 8 months |
| July 1990 | March 1991 | 8 months | 9.0% | 6.9% | 5.3% | 10 years |
| March 2001 | November 2001 | 8 months | -5.8% | 3.1% | 1.0% | 6 years, 1 month |
| December 2007 | June 2009 | 1 year, 6 months | -24.8% | 1.0% | 1.8% | 10 years, 8 months |
| February 2020 | April 2020 | 2 months | -63.4% | 0.2% | -5.2% | N/A |
| Across all Recessions | | 16.8 months | -3.3% | 5.1% | -2.1% | 3 years, 7 months |

Exhibit 9: U.S. stock market returns before/after recessions

| START | END | STOCK RETURN (5 MO. BEFORE RECESSION) | STOCK RETURN (DURING RECESSION) | STOCK RETURN | STOCK RETURN (1 YEAR AFTER RECESSION) | CUMULATIVE RETURNS |
|-------------------|---------------|---|---------------------------------------|--------------|---|-----------------------|
| June 1869 | December 1870 | 7.97% | 4.10% | 12.39% | 13.68% | 27.77% |
| October 1973 | March 1979 | -14.66% | 26.54% | 7.99% | 51.76% | 63.88% |
| March 1882 | May 1885 | -3.89% | -9.29% | -12.82% | 22.22% | 6.55% |
| March 1887 | April 1888 | 2.02% | -5.59% | -3.68% | 6.21% | 2.30% |
| July 1890 | May 1891 | 5.89% | -7.28% | -1.82% | 17.34% | 15.20% |
| January 1893 | June 1894 | 1.62% | -16.59% | -15.24% | 13.66% | -3.67% |
| December 1895 | June 1897 | -6.88% | 5.50% | -1.76% | 23.13% | 20.96% |
| June 1899 | December 1900 | 1.19% | 20.00% | 21.42% | 20.40% | 46.19% |
| September 1902 | August 1904 | 6.02% | -13.22% | -8.00% | 36.24% | 25.35% |
| May 1907 | June 1908 | -16.05% | 0.67% | -15.49% | 34.38% | 13.56% |
| January 1910 | January 1912 | 0.80% | 0.02% | 0.82% | 7.18% | 8.06% |
| January 1913 | December 1914 | -3.21% | -11.93% | -14.76% | 35.79% | 15.75% |
| August 1918 | March 1919 | 7.85% | 11.77% | 20.55% | 13.41% | 36.72% |
| January 1920 | July 1921 | 2.01% | -18.11% | -16.47% | 38.83% | 15.97% |
| May 1923 | July 1924 | 1.11% | 12.04% | 13.28% | 29.87% | 47.12% |
| October 1926 | November 1927 | 15.06% | 38.14% | 58.95% | 40.90% | 123.97% |
| August 1929 | March 1933 | 20.03% | -73.62% | -68.33% | 80.53% | -42.82% |
| May 1937 | June 1938 | -2.99% | -32.55% | -34.57% | 17.35% | -23.22% |
| February 1945 | October 1945 | 12.89% | 21.85% | 37.56% | -7.05% | 27.86% |
| November 1948 | October 1949 | -6.99% | 10.46% | 2.74% | 33.82% | 37.48% |
| July 1953 | May 1954 | -3.81% | 24.00% | 19.28% | 36.89% | 63.28% |
| August 1957 | April 1958 | 5.73% | -4.97% | 0.47% | 39.59% | 40.25% |
| April 1960 | February 1961 | -1.25% | 14.79% | 13.35% | 16.29% | 31.81% |
| December 1969 | November 1970 | -2.45% | -4.17% | -6.52% | 13.65% | 6.23% |
| November 1973 | March 1975 | -1.40% | -12.96% | -14.18% | 25.67% | 7.85% |
| January 1980 | July 1980 | 5.53% | 10.92% | 17.06% | 13.00% | 32.28% |
| July 1981 | November 1982 | 2.58% | 15.31% | 18.28% | 25.00% | 47.85% |
| July 1990 | March 1991 | 10.46% | 5.93% | 17.01% | 12.90% | 32.10% |
| March 2001 | November 2001 | -14.25% | -3.87% | -17.57% | -18.17% | -32.55% |
| December 2007 | June 2009 | -1.98% | -34.84% | -36.14% | 19.48% | -23.69% |
| February 2020 | April 2020 | 10.74% | -15.41% | -6.33% | 52.47% | 42.83% |
| Annualized | | | | | | 7.6% |

Exhibit 10: Impact on a typical pension plan's liabilities & funded %

| START | END | Δ LIABILITIES | Δ SURPLUS | Δ FUNDED STATUS | Δ 10 YR. TREASURY BILL YIELD |
|-------------------|---------------|---------------|-----------|-----------------|------------------------------|
| June 1869 | December 1870 | -0.73% | 6.77% | 6.82% | 0.06% |
| October 1973 | March 1979 | 16.02% | 17.01% | 14.66% | -1.31% |
| March 1882 | May 1885 | 1.73% | -1.88% | -1.85% | -0.15% |
| March 1887 | April 1888 | -0.89% | -1.00% | -1.01% | 0.07% |
| July 1890 | May 1891 | -1.19% | -2.23% | -2.25% | 0.09% |
| January 1893 | June 1894 | 1.71% | -8.94% | -8.79% | -0.15% |
| December 1895 | June 1897 | 2.40% | 3.83% | 3.74% | -0.21% |
| June 1899 | December 1900 | 0.19% | 13.82% | 13.79% | -0.02% |
| September 1902 | August 1904 | -2.36% | -3.56% | -3.65% | 0.19% |
| May 1907 | June 1908 | -1.11% | 2.99% | 3.02% | 0.09% |
| January 1910 | January 1912 | -1.27% | 4.13% | 4.18% | 0.10% |
| January 1913 | December 1914 | 2.49% | -5.60% | -5.47% | -0.22% |
| August 1918 | March 1919 | -0.63% | 8.45% | 8.51% | 0.05% |
| January 1920 | July 1921 | 3.17% | -9.74% | -9.44% | -0.27% |
| May 1923 | July 1924 | 3.46% | 6.72% | 6.50% | -0.30% |
| October 1926 | November 1927 | 1.06% | 23.52% | 23.28% | -0.09% |
| August 1929 | March 1933 | 1.31% | -39.77% | -39.26% | -0.12% |
| May 1937 | June 1938 | 1.87% | -19.66% | -19.30% | -0.16% |
| February 1945 | October 1945 | 1.37% | 12.79% | 12.62% | -0.12% |
| November 1948 | October 1949 | 0.16% | 6.98% | 6.97% | -0.01% |
| July 1953 | May 1954 | 6.55% | 10.78% | 10.12% | -0.56% |
| August 1957 | April 1958 | 12.64% | -11.17% | -9.92% | -1.05% |
| April 1960 | February 1961 | 5.83% | 6.47% | 6.11% | -0.50% |
| December 1969 | November 1970 | 9.61% | -4.91% | -4.48% | -0.81% |
| November 1973 | March 1975 | -12.00% | 4.04% | 4.59% | 1.00% |
| January 1980 | July 1980 | 6.43% | 5.62% | 5.28% | -0.55% |
| July 1981 | November 1982 | 52.61% | -22.43% | -14.70% | -3.73% |
| July 1990 | March 1991 | 4.16% | 3.71% | 3.56% | -0.36% |
| March 2001 | November 2001 | 2.76% | -3.59% | -3.50% | -0.24% |
| December 2007 | June 2009 | 4.40% | -22.69% | -21.73% | -0.38% |
| February 2020 | April 2020 | 9.99% | -18.42% | -16.75% | -0.84% |
| Recession Average | | 4.2% | -1.2% | -0.9% | -0.34% |

Exhibit 11: Changes in GDP vs. U.S. stock market returns

| START | END | Δ ANNUALIZED 2022 GDP | GDP RANK | ANNUAL STOCK MARKET RETURNS |
|--|---------------|--------------------------|----------|--------------------------------|
| June 1869 | December 1870 | 1.09% | 4 | 2.7% |
| October 1873 | March 1879 | 5.00% | 1 | 4.4% |
| March 1882 | May 1885 | 0.96% | 5 | -3.0% |
| March 1887 | April 1888 | -2.94% | 20 | -5.2% |
| July 1890 | May 1891 | -0.06% | 10 | -8.7% |
| January 1893 | June 1894 | -8.04% | 24 | -12.0% |
| December 1895 | June 1897 | 0.94% | 7 | 3.6% |
| June 1899 | December 1900 | 3.07% | 2 | 12.9% |
| September 1902 | August 1904 | 0.94% | 6 | -7.1% |
| May 1907 | June 1908 | -10.85% | 27 | 0.6% |
| January 1910 | January 1912 | 2.14% | 3 | 0.1% |
| January 1913 | December 1914 | -4.62% | 23 | -6.4% |
| August 1918 | March 1919 | -15.46% | 30 | 21.0% |
| January 1920 | July 1921 | -9.01% | 26 | -12.5% |
| May 1923 | July 1924 | -1.37% | 14 | 10.2% |
| October 1926 | November 1927 | -2.04% | 16 | 34.7% |
| August 1929 | March 1933 | -11.75% | 28 | -31.1% |
| May 1937 | June 1938 | -8.60% | 25 | -30.5% |
| February 1945 | October 1945 | -14.15% | 29 | 34.5% |
| November 1948 | October 1949 | -1.02% | 12 | 11.5% |
| July 1953 | May 1954 | -2.73% | 19 | 29.5% |
| August 1957 | April 1958 | -4.58% | 22 | -7.4% |
| April 1960 | February 1961 | -0.85% | 11 | 18.0% |
| December 1969 | November 1970 | 0.21% | 9 | -4.5% |
| November 1973 | March 1975 | -2.13% | 17 | -9.9% |
| January 1980 | July 1980 | -3.75% | 21 | 23.0% |
| July 1981 | November 1982 | -1.32% | 13 | 11.3% |
| July 1990 | March 1991 | -1.99% | 15 | 9.0% |
| March 2001 | November 2001 | 0.61% | 8 | -5.8% |
| December 2007 | June 2009 | -2.58% | 18 | -24.8% |
| February 2020 | April 2020 | -17.79% | 31 | -63.40% |
| Correlation r GDP and Total S&P 500 returns 0.30 | | | | |

QUESTIONS?

Call Russell Investments at **800-426-8506**
or visit [russellinvestments.com](https://www.russellinvestments.com)



ABOUT RUSSELL INVESTMENTS

Russell Investments is a leading global investment solutions partner providing a wide range of investment capabilities to institutional investors, financial intermediaries, and individual investors around the world. Since 1936, Russell Investments has been building a legacy of continuous innovation to deliver exceptional value to clients, working every day to improve people's financial security. Headquartered in Seattle, Washington, Russell Investments has offices worldwide, including New York, London, Sydney, Tokyo, and Shanghai.

IMPORTANT INFORMATION

Nothing contained in this material is intended to constitute legal, tax, securities, or investment advice, nor an opinion regarding the appropriateness of any investment, nor a solicitation of any type. The general information contained in this publication should not be acted upon without obtaining specific legal, tax, and investment advice from a licensed professional.

Russell Investments' ownership is composed of a majority stake held by funds managed by TA Associates, with a significant minority stake held by funds managed by Reverence Capital Partners. Certain of Russell Investments' employees and Hamilton Lane Advisors, LLC also hold minority, non-controlling, ownership stakes.

Frank Russell Company is the owner of the Russell trademarks contained in this material and all trademark rights related to the Russell trademarks, which the members of the Russell Investments group of companies are permitted to use under license from Frank Russell Company. The members of the Russell Investments group of companies are not affiliated in any manner with Frank Russell Company or any entity operating under the "FTSE RUSSELL" brand.

Copyright © 2023. Russell Investments Group, LLC. All rights reserved. This material is proprietary and may not be reproduced, transferred, or distributed in any form without prior written permission from Russell Investments. It is delivered on an "as is" basis without warranty.

First used: November 2019. Revised: April 2023

AI-29725-04-26

EMBRACE THE POSS/BLE®