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U.S. Capital Markets Performance
by Asset Class 1926–2021

2022

SBBI® Yearbook

STOCKS, BONDS, BILLS, AND INFLATION®

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The Historical Equity Risk Premium

NOTE: *In this section the general concepts of the equity risk premium are discussed. For a detailed discussion of the concepts of the equity risk premium, the strengths and weaknesses of the various models available for estimating the equity risk premium, and multiple choices of U.S. equity risk premia developed using multiple models, see the Resources Library of the Cost of Capital Navigator's U.S. Cost of Capital Module at* kroll.com/costofcapitalnavigator.

The expected equity risk premium (ERP) can be defined as the additional return an investor expects to receive to compensate for the additional risk associated with investing in equities as opposed to investing in riskless assets.

Unfortunately, the expected equity risk premium is unobservable in the market and therefore must be estimated. Typically, this estimation is arrived at through the use of historical data. The historical equity risk premium can be calculated by subtracting the long-term average of the income return on the riskless asset (Treasuries) from the long-term average stock market return (measured over the same period as that of the riskless asset).

In using a historical measure of the equity risk premium, one assumes that what has happened in the past is representative of what might be expected in the future. In other words, the assumption one makes when using historical data to measure the expected equity risk premium is that the relationship between the returns of the risky asset (equities) and the riskless asset (Treasuries) is stable.

The Stock Market Benchmark

The stock market benchmark chosen should be a broad index that reflects the behavior of the market as a whole. Commonly used indexes include the S&P 500 and the Russell 3000. Although the Dow Jones Industrial Average is a popular index, it would be inappropriate for calculating the equity risk premium because it is too narrow.

We use the total return of our large-cap stock index (currently represented by the S&P 500) as our market benchmark when calculating the equity risk premium. The S&P 500 was selected as the market benchmark because it is representative of a large sample of companies across a large number of industries. The S&P 500 is also one of the most widely accepted market benchmarks and is a good measure of the equity market as a whole.

Exhibit 10.8 illustrates the equity risk premium calculated using the S&P 500 and the income return on three government bonds of different horizons.

Exhibit 10.8: Equity Risk Premium Calculated Using the S&P 500 and the Income Return on Three Government Bonds of Different Horizons (%)
1926–2021

	Long-horizon	Intermediate-horizon	Short-horizon
S&P 500	7.46	8.04	9.03

The equity risk premium is calculated by subtracting the arithmetic mean of the government bond income return from the arithmetic mean of the stock market total return. Exhibit 10.9 demonstrates this calculation for the long-horizon equity risk premium, the intermediate-horizon equity risk premium, and the short-horizon equity risk premium.

Exhibit 10.9: Calculation of the Long-Horizon Equity Risk Premium, the Intermediate-Horizon Equity Risk Premium, and the Short-Horizon Equity Risk Premium (%)
1926–2021

	Arithmetic Annual Mean			
	S&P 500 (the "Market")	Risk-free Rate		Equity Risk Premium
S&P 500	12.33	4.87	=	7.46
Intermediate-horizon	12.33	4.29	=	8.04
Short-horizon	12.33	3.30	=	9.03

The Market Benchmark and Firm Size

Although not restricted to the 500 largest companies, the S&P 500 is considered a large-cap index. The returns of the S&P 500 are market-cap-weighted. The larger companies in the index therefore receive the majority of the weight. If using a large-cap index to calculate the equity risk premium, an adjustment is usually needed to account for the different risk and return characteristics of small stocks. This was discussed in Chapter 7 on the size premium.

The Risk-Free Asset

The equity risk premium can be calculated for a variety of time horizons when given the choice of risk-free asset to be used in the calculation. The long-horizon, intermediate-horizon, and short-horizon equity risk premia calculated in Exhibit 10.8 and Exhibit 10.9 use the income return from (i) a 20-year Treasury bond, (ii) a 5-year Treasury bond, and (iii) a 30-day Treasury bill, respectively.[215]

20-Year vs. 30-Year Treasuries

The U.S. Treasury periodically changes the maturities that it issues. For example, in April 1986 the U.S. Treasury stopped issuing 20-year Treasuries, and from October 2001 through January 2006 the U.S. Treasury did not issue 30-year bonds (it resumed issuing 30-year Treasury bonds in February 2006), making the 10-year bond the longest-term Treasury security issued over the October 2001–January 2006 period. Most recently, on January 16, 2020 the U.S. Department of the Treasury announced it plans to issue a 20-year nominal coupon bond in the first half of calendar year 2020, the first time a 20-year maturity will be offered since March 1986.[216,217]

Our methodology for estimating the long-horizon equity risk premium makes use of the income return on a 20-year Treasury bond. While a 30-year bond is theoretically more correct when dealing with the long-term nature of business valuation,[218] 30-year Treasury securities have an issuance history that is on-again-off-again. Ibbotson Associates creates a series of returns using bonds on the market with approximately 20 years to maturity because Treasury bonds of this maturity are available over a long history, while Treasury bonds of 30-years are not.

Income Return

Another point to keep in mind when calculating the equity risk premium is that the income return on the appropriate-horizon Treasury security, rather than the total return, is used in the calculation.

The total return comprises three return components: the income return, the capital appreciation return, and the reinvestment return. The income return is defined as the portion of the total return that results from a periodic cash flow or, in this case, the bond coupon payment. The capital appreciation return results from the price change of a bond over a specific period. Bond prices generally change in reaction to unexpected

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215 For U.S. Treasury Bills, the income return and total return are the same.

216 To learn more, visit the U.S. Department of the Treasury website at: https://home.treasury.gov/news/press-releases/sm878.

217 See Kate Davidson, "Treasury to Issue New 20-Year Bond in First Half of 2020", *The Wall Street Journal*, January 16, 2020 at: https://www.wsj.com/articles/treasury-to-issue-new-20-year-bond-in-first-half-of-2020-11579217450.

218 An equity risk premium is an input in developing cost of capital estimates (i.e., "expected return", "required return", or "discount rate") for use in a discounted cash flow model. **Note:** The four Kroll (formerly Duff & Phelps) "Valuation Handbooks" have been transitioned from print to an online delivery platform, the "Cost of Capital Navigator". The Cost of Capital Navigator is an interactive, web-based platform that guides finance and investment professionals through the process of estimating cost of capital, globally. The Cost of Capital Navigator includes four modules: (i) the U.S. Cost of Capital Module, (ii) the U.S. Industry Benchmarking Module, (iii) the International Cost of Capital Module, and (iv) the International Industry Benchmarking Module. To learn more, visit kroll.com/costofcapitalnavigator.

fluctuations in yields. Reinvestment return is the return on a given month's investment income when reinvested into the same asset class in the subsequent months of the year. The income return is thus used in the estimation of the equity risk premium because it represents the truly riskless portion of the return.

Arithmetic vs. Geometric Mean

The equity risk premium data presented in this book are arithmetic average risk premiums as opposed to geometric average risk premiums. The arithmetic average equity risk premium can be demonstrated to be most appropriate when discounting future cash flows. For use as the expected equity risk premium in either the CAPM or the building-block approach, the arithmetic mean or the simple difference of the arithmetic means of stock market returns and riskless rates is the relevant number.

This is because both the CAPM and the building-block approach are additive models, in which the cost of capital is the sum of its parts. The geometric average is more appropriate for reporting past performance because it represents the compound average return.

Appropriate Historical Period

The equity risk premium can be estimated using any historical time period. For the U.S., market data exist at least as far back as the late 1800s. Therefore, it is possible to estimate the equity risk premium using data that covers roughly the past 125 years.

Our equity risk premium covers 1926 to the present. The original data source for the time series comprising the equity risk premium is the Center for Research in Security Prices. CRSP chose to begin its analysis of market returns with 1926 for two main reasons. CRSP determined that 1926 was approximately when quality financial data became available. They also made a conscious effort to include the period of extreme market volatility from the late 1920s and early 1930s; 1926 was chosen because it includes one full business cycle of data before the market crash of 1929.

Implicit in using history to forecast the future is the assumption that investors' expectations for future outcomes conform to past results. This method assumes that the price of taking on risk changes only slowly, if at all, over time. This "future equals the past" assumption is most applicable to a random time-series variable. A time-series variable is random if its value in one period is independent of its value in other periods.

Choosing an Appropriate Historical Period

The estimate of the equity risk premium depends on the length of the data series studied. A proper estimate of the equity risk premium requires a data series long enough to give a reliable average without being unduly influenced by very good and very poor short-term returns. When calculated using a long data series, the historical equity risk premium is relatively stable. Furthermore, because an average of the realized

equity risk premium is quite volatile when calculated using a short history, using a long series makes it less likely that the analyst can justify any number he or she wants. The magnitude of how shorter periods can affect the result will be explored later in this chapter.

Some analysts estimate the expected equity risk premium using a shorter, more recent period on the basis that recent events are more likely to be repeated in the near future; furthermore, they believe that the 1920s, 1930s, and 1940s contain too many unusual events. This view is suspect because all periods contain unusual events. Some of the most unusual events of the last 100 years took place quite recently, including the inflation of the late 1970s and early 1980s, the October 1987 stock market crash, the collapse of the high-yield bond market, the major contraction and consolidation of the thrift industry, the collapse of the Soviet Union, the development of the European Economic Community, the attacks of Sept. 11, 2001, the global financial crisis of 2008–2009, and most recently, the market crash in the first quarter of 2020 that was precipitated by the spread of the COVID-19 virus.

It is even difficult for economists to predict the economic environment of the future. For example, if one were analyzing the stock market in 1987 before the crash, it would be statistically improbable to predict the impending short-term volatility without considering the stock market crash and market volatility of the 1929–1931 period.

Without an appreciation of the 1920s and 1930s, no one would believe that such events could happen. The 95-year period starting with 1926 represents what can happen: It includes high and low returns, volatile and quiet markets, war and peace, inflation and deflation, and prosperity and depression. Restricting attention to a shorter historical period underestimates the amount of change that could occur in a long future period. Finally, because historical event-types (not specific events) tend to repeat themselves, long-run capital market return studies can reveal a great deal about the future. Investors probably expect unusual events to occur from time to time, and their return expectations reflect this.

A Look at the Historical Results

It is interesting to look at the realized returns and realized equity risk premium in the context of the above discussion. Exhibit 10.10 shows the average stock market return and the average (arithmetic mean) realized long-horizon equity risk premium over various historical periods. The exhibit shows that using a longer historical period provides a more stable estimate of the equity risk premium. The reason is that any unique period will not be weighted heavily in an average covering a longer historical period. It better represents the probability of these unique events occurring over a long period of time.

Exhibit 10.10: Stock Market Return and Equity Risk Premium Over Time (%)

Length	Period Dates	Large-Cap Stocks Arithmetic Mean (%)	Long-horizon Equity Risk Premium (%)
96	1926–2021	12.33	7.46
90	1932–2021	12.97	8.00
80	1942–2021	13.34	8.09
70	1952–2021	12.67	7.00
60	1962–2021	11.79	5.72
50	1972–2021	12.59	6.31
40	1982–2021	13.62	7.79
30	1992–2021	12.11	7.60
20	2002–2021	11.09	7.56
15	2007–2021	12.24	9.19
10	2012–2021	17.15	14.66
5	2017–2021	19.21	16.95

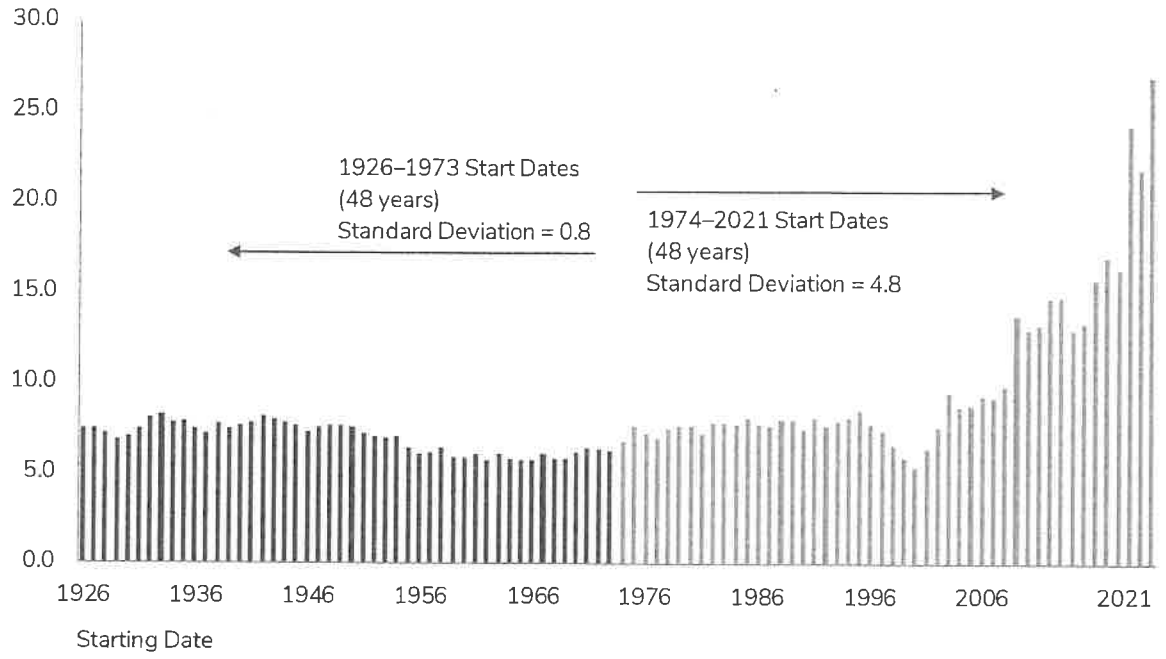
Exhibit 10.11 helps to clarify this point. Exhibit 10.11 shows the realized equity risk premium for a series of periods through 2021, starting with 1926. In other words, the first value on the left in the graph represents the average realized equity risk premium over the period 1926–2021. The second-most left value in the graph represents the average realized equity risk premium over the period 1927–2021, and so on, with the rightmost value representing the average for a single year, 2021.

Concentrating on the left side of Exhibit 10.11, one notices that the realized equity risk premium when measured over *longer* periods is relatively stable and has a standard deviation of 0.8.

Alternatively, the realized equity premia on the right side of Exhibit 10.11 are measured over *shorter* periods are less stable and have a standard deviation of 4.8.[219]

[219] If the unusually large realized equity risk premia measured over the years 2019–2021 (24.3), 2020–2021 (21.9) and the single year 2021 (27.0) are excluded (the rightmost two bars in Exhibit 10.11), the standard deviation of the realized equity risk premia measured with starting dates 1973–2018 drops to 3.0. This is still more than three times the standard deviation of the realized equity risk premia measured with starting dates 1926–1972 (the left side of Exhibit 10.11) of 0.8.

Exhibit 10.11: Average Long-Horizon Equity Risk Premium Calculated Using Variable Start Dates (1926–2021), and Fixed End Date (2021) (%)



Some practitioners argue for a shorter historical period, such as 30 years, as a basis for the equity risk premium estimation. The logic for the use of a shorter period is that historical events and economic scenarios present before this time are unlikely to be repeated. However, the impact of adding one additional year of data to a historical average is *lessened* the *greater* the initial period of measurement. As is demonstrated in Exhibit 10.11, shorter-term averages can be affected considerably by one or more unique observations, while longer-term averages tend to produce more stable results.

A dramatic example of this is the third rightmost point in Exhibit 10.11, which is the "average" ERP as measured over a single year (2019). In 2019 large-cap stocks (represented by the S&P 500) produced a total return of 31.49% and the income return of long-term government bonds was 2.55%, implying an "average" ERP of 28.94% (31.49% - 2.55%). Using an estimate of the ERP developed over such a short time horizon is logical only to the extent that one believes that stocks will outperform the risk-free instrument by nearly 29% per year, in perpetuity.

Having said that, the effect of "adding one additional year" when using historical data to estimate the ERP can still lead to counterintuitive conclusions, even when the average is taken over *longer* periods. A very recent example of a result that was "counterintuitive" occurred in the December 2008–2009 Financial

Crisis. The historical ERP at the end of 2007 (as calculated over the time period 1926–2007) was 7.1%. A year later at the end of 2008, at the height of the financial crisis and risks were likely at an all time *high*, the historical ERP (as calculated over the time period 1926–2008) *declined* to 6.5%, implying that risks were actually *lower* than they were a year earlier.

What happened? In 2008 the S&P 500 declined nearly 37%, an unusually large decline for a single year. This single period's unusually large decline caused the average annual return of the S&P 500 to fall from 12.26% (as calculated over the 1926–2007 time period) to 11.67% (as calculated over the 1926–2008 time period), a decrease of 0.59%. The historical ERP is calculated as the average annual equity return minus the average annual risk-free rate, so a decline in the average equity return causes a 1 for 1 decline in the ERP, all other things held the same. Such large moves in a single year can produce a "tail wagging the dog" effect.

The Supply-Side Model

This section is based on the work by Roger G. Ibbotson and Peng Chen, who combined the first and second approaches to arrive at their forecast of the equity risk premium.[220] By proposing a new supply-side methodology, the Ibbotson-Chen study challenges current arguments that future returns on stocks over bonds will be negative or close to zero. The results affirm the relationship between the stock market and the overall economy.

Long-term expected equity returns can be forecasted by the use of supply-side models. The supply of stock market returns is generated by the productivity of the corporations in the real economy. Investors should not expect a much higher or lower return than that produced by the companies in the real economy. Thus, over the long run, equity returns should be close to the long-run supply estimate.

Earnings, dividends, and capital gains are supplied by corporate productivity. Exhibit 10.12 illustrates that earnings and dividends have historically grown in tandem with the overall economy (GDP per capita). However, GDP per capita did not outpace the stock market. This is primarily because the 3-year average P/E ratio increased 2.7 times during the same period. So, assuming that the economy will continue to grow, all three should continue to grow as well.

[220] Ibbotson, R.G., & Chen, P. 2003. "Long-Run Stock Returns: Participating in the Real Economy". *Financial Analysts Journal*, Vol. 59, No. 1, P. 88.