Equity Premiums around the World

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We update our global estimates of the historical equity risk premium that were first presented in *The Millennium Book: A Century of Investment Returns* (Dimson, Marsh, and Staunton 2000) and in *Triumph of the Optimists: 101 Years of Global Investment Returns* (Dimson, Marsh, and Staunton 2002). More detailed analysis is published in our annual volumes, the *Credit Suisse Global Investment Returns Yearbook* and the *Credit Suisse Global Investment Returns Sourcebook* (Dimson, Marsh, and Staunton 2011a and 2011b).

We provide estimates for 19 countries, including two North American markets (the United States and Canada), eight markets from what is now the euro currency area (Belgium, Finland, France, Germany, Ireland, Italy, the Netherlands, and Spain), five other European markets (Denmark, Norway, Sweden, Switzerland, and the United Kingdom), three Asia-Pacific markets (Japan, Australia, and New Zealand), and one African market (South Africa).

The Dimson–Marsh–Staunton (DMS) database, which is distributed by Morningstar, also includes six U.S. dollar–denominated regional indices (Dimson, Marsh, and Staunton 2011c). The indices are a 19-country World equity index, an 18-country World ex-U.S. equity index, a 13-country European equity index, and three corresponding government bond indices for the World, World ex-U.S., and Europe. For the equity indices, each country is weighted by market capitalization (or by GDP for the years before capitalizations were available). The bond indices are GDP weighted throughout.

Our dataset includes equities, long government bonds, bills, inflation, exchange rates, and GDP. More details about the data, the sources, and the index construction methods are presented in Dimson, Marsh, and Staunton (2008, 2011b).

Long-Run Global Returns

Investment returns can be extremely volatile. The 2000s were a period of disappointment for most equity investors, and few would extrapolate future returns from this recent experience. Including the 1990s adds a period of stock market exuberance that is also not indicative of expectations. To understand risk and return, long periods of history need to be examined. That is why we ensure that all our return series embrace 111 years of financial market history, from the start of 1900 to the end of 2010.

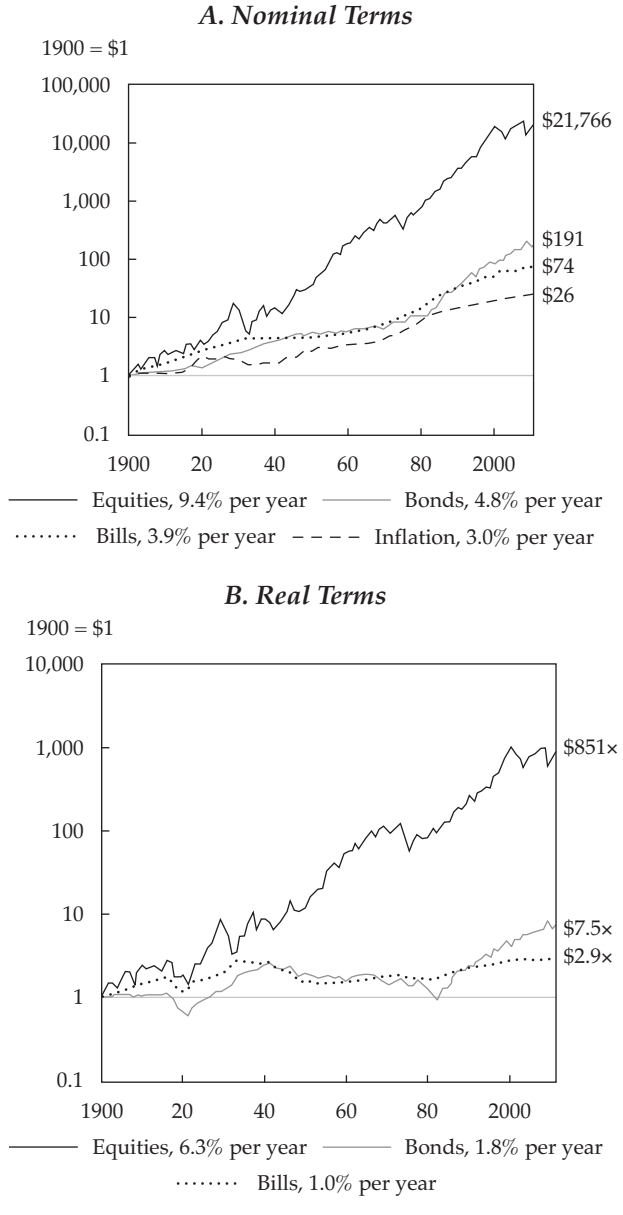
Panel A in **Figure 1** shows the cumulative total returns in nominal terms for U.S. equities, bonds, bills, and inflation for 1900–2010. Equities performed best, with an initial investment of $1 growing to $21,766 by year-end 2010. Long bonds and bills had lower returns, although they beat inflation. Their respective levels at the end of 2010 were $191 and $74, with the inflation index ending at $26. The legend shows the annualized returns were 9.4 percent for equities, 4.8 percent for bonds, and 3.9 percent for bills; inflation was 3.0 percent per year.

Because U.S. prices rose 26-fold over this period, it is helpful to compare returns in real terms. Panel B of Figure 1 shows the real returns on U.S. equities, bonds, and bills. Over the 111 years, an initial investment of $1 in equities, with dividends reinvested, would have grown in purchasing power by 851 times. The corresponding multiples for bonds and bills are 7.5 and 2.9 times the initial investment, respectively. As the legend shows, these terminal wealth figures correspond to annualized real returns of 6.3 percent for equities, 1.8 percent for bonds, and 1.0 percent for bills.

The United States is by far the world's best-documented capital market. Prior to the assembly of the DMS database, long-run evidence was invariably taken from U.S. markets and typically treated as being applicable universally. Few economies, if any, can rival the long-term growth of the United States, which makes it dangerous to generalize from U.S. historical returns. That is why we have put effort into documenting global investment returns.

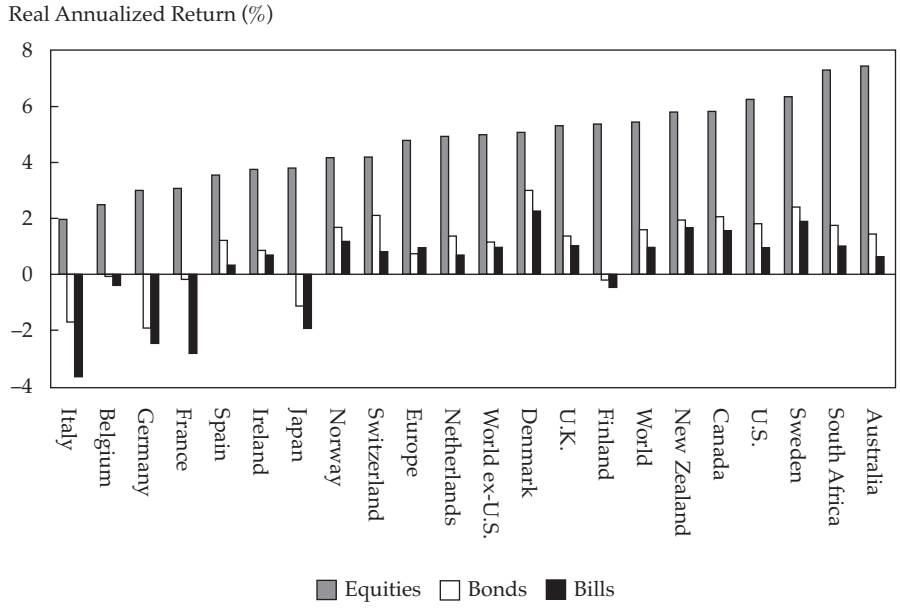
Figure 2 shows annualized real equity, bond, and bill returns for 19 countries as well as the World, the World ex-U.S., and Europe indices. The countries and regions are ranked in ascending order of equity market performance. The real equity return was positive in every location, typically 3–6 percent per year. Equities were the best-performing asset class within every market. Furthermore, bonds performed better than bills in all the countries. This pattern of equities outperforming bonds, and of bonds outperforming bills, is precisely what we would expect because equities are riskier than bonds, whereas bonds are riskier than cash.

Figure 1. Cumulative Returns on U.S. Equities, Bonds, Bills, and Inflation, 1900–2010



Source: Based on Dimson, Marsh, and Staunton (2002) and as updated in Dimson, Marsh, and Staunton (2011b).

Figure 2. Real Annualized Returns on Equities vs. Bonds and Bills Internationally, 1900–2010



Source: Based on Dimson, Marsh, and Staunton (2002) and as updated in Dimson, Marsh, and Staunton (2011b).

Figure 2 also shows that although most countries' bonds had a positive real return, six countries experienced negative returns. With the exception of Finland, the latter were also among the worst equity performers. Mostly, their poor performance dates back to the first half of the 20th century, when these countries suffered most from the ravages of war and civil strife as well as periods of high inflation or hyperinflation associated with the wars and their aftermath.

The chart confirms that the United States performed well, ranking fourth for equity performance (real 6.3 percent per year) and sixth for bonds (real 1.8 percent per year). This result confirms the conjectures that U.S. returns would be high because the U.S. economy has been such an obvious success story and that it is unwise for investors to base their future projections solely on U.S. evidence. Figure 2 helps set this debate in context, however, by showing that although U.S. stocks did well, the United States was not the top performer nor were its returns especially high relative to the world averages. The real return on U.S. equities of 6.3 percent is more than a percentage point higher than the real U.S. dollar–denominated return of 5.0 percent on the World ex-U.S. index. A

common factor among the best-performing equity markets over the past 111 years is that they tended to be rich in resources and/or to be New World countries.

Table 1 provides statistics on real equity returns from 1900 to 2010. The geometric mean shows the 111-year annualized returns achieved by investors, and these are the figures that are plotted in Figure 2. The arithmetic mean shows the average of the 111 annual returns for each country or region. The arithmetic mean of a sequence of different returns is always larger than the geometric mean, and the more volatile the sequence of returns, the greater the gap between the arithmetic and geometric means. This fact is evident in the fifth column of Table 1, which shows the standard deviation of each equity market's annual returns.

The U.S. equity standard deviation of 20.3 percent places it at the lower end of the risk spectrum, ranking sixth after Canada (17.2 percent), Australia (18.2 percent), New Zealand (19.7 percent), Switzerland (19.8 percent), and the United Kingdom (20.0 percent). The World index has a standard deviation of just 17.7 percent, showing the risk reduction obtained from international diversification. The most volatile markets during this period are Germany (32.2 percent), Finland (30.3 percent), Japan (29.8 percent), and Italy (29.0 percent), which are the countries that were most affected by the world wars and inflation; Finland's case also reflects its heavy concentration in a single stock (Nokia) during recent periods. Additionally, Table 1 shows that, as one would expect, the countries with the highest standard deviations experienced the greatest range of returns—that is, the lowest minimum returns and the highest maximum returns.

Bear markets underline the risk of equities. Even in a less volatile market, such as the United States, losses can be huge. Table 1 shows that the worst calendar year for U.S. equities was 1931, with a real return of −38 percent. However, from peak to trough, U.S. equities fell by 79 percent in real terms during the 1929–31 Wall Street crash. The worst period for U.K. equities was the 1973–74 bear market, with stocks falling 71 percent in real terms and by 57 percent in a single year. More recently, 2008 had the dubious distinction of being the worst year on record for eight countries, the World index, the World ex-U.S., and Europe. The table shows that in several other countries, even more extreme returns have occurred, on both the downside and the upside.

Common-Currency Returns

So far, we have reported the real returns to a domestic equity investor based on local purchasing power in that investor's home country. For example, during 1900–2010, the annualized real return to a U.S. investor buying U.S. equities was 6.27 percent, whereas for a British investor buying U.K. equities, it was 5.33 percent. When considering cross-border investment, however, it is also

Table 1. Real (Inflation-Adjusted) Equity Returns around the World, 1900–2010

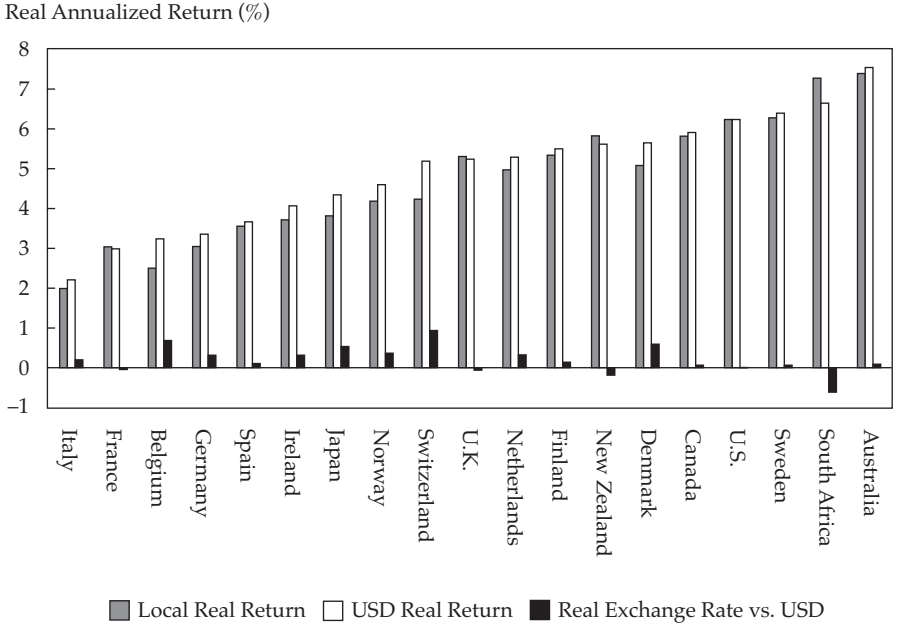
Country/Region	Geometric Mean (%)	Arithmetic Mean (%)	Standard Error (%)	Standard Deviation (%)	Minimum Return (%)	Year of Minimum	Maximum Return (%)	Year of Maximum
Australia	7.4	9.1	1.7	18.2	−42.5	2008	51.5	1983
Belgium	2.5	5.1	2.2	23.6	−57.1	2008	109.5	1940
Canada	5.9	7.3	1.6	17.2	−33.8	2008	55.2	1933
Denmark	5.1	6.9	2.0	20.9	−49.2	2008	107.8	1983
Finland	5.4	9.3	2.9	30.3	−60.8	1918	161.7	1999
France	3.1	5.7	2.2	23.5	−42.7	2008	66.1	1954
Germany	3.1	8.1	3.1	32.2	−90.8	1948	154.6	1949
Ireland	3.8	6.4	2.2	23.2	−65.4	2008	68.4	1977
Italy	2.0	6.1	2.8	29.0	−72.9	1945	120.7	1946
Japan	3.8	8.5	2.8	29.8	−85.5	1946	121.1	1952
Netherlands	5.0	7.1	2.1	21.8	−50.4	2008	101.6	1940
New Zealand	5.8	7.6	1.9	19.7	−54.7	1987	105.3	1983
Norway	4.2	7.2	2.6	27.4	−53.6	2008	166.9	1979
South Africa	7.3	9.5	2.1	22.6	−52.2	1920	102.9	1933
Spain	3.6	5.8	2.1	22.3	−43.3	1977	99.4	1986
Sweden	6.3	8.7	2.2	22.9	−43.6	1918	89.8	1905
Switzerland	4.2	6.1	1.9	19.8	−37.8	1974	59.4	1922
United Kingdom	5.3	7.2	1.9	20.0	−57.1	1974	96.7	1975
United States	6.3	8.3	1.9	20.3	−37.6	1931	56.3	1933
Europe	4.8	6.9	2.0	21.5	−46.6	2008	76.0	1933
World ex-U.S.	5.0	7.0	1.9	20.4	−43.3	2008	79.3	1933
World	5.5	7.0	1.7	17.7	−40.4	2008	69.9	1933

Source: Based on Dimson, Marsh, and Staunton (2002) and as updated in Dimson, Marsh, and Staunton (2011b).

necessary to account for exchange rate movements—for example, a U.S. investor buying U.K. equities or a U.K. investor buying U.S. equities. Each investor now has two exposures, one to foreign equities and the other to foreign currency, and each return needs to be converted into each investor's reference currency.

Rather than just comparing domestic returns, we translate all countries' local returns into a common currency. **Figure 3** shows the results of translating from the local currency to U.S. dollars. These dollar returns are expressed as real returns, adjusted for U.S. inflation. The gray bars show the annualized real domestic currency returns from 1900 to 2010, as presented earlier. The white bars are the common-currency returns, in real U.S. dollars, from the perspective of a U.S. investor. The black bars are the difference between the annualized real local-currency return and the annualized real dollar return. The black bars equate to the annualized inflation-adjusted exchange rate movement over the same period. The gap between the two return measures is less than 1 percent per annum for every country, indicating that purchasing power parity (PPP) held reasonably closely over the very long run (see Taylor 2002).

Figure 3. Real Annualized Equity Returns in Local Currency and U.S. Dollars, 1900–2010



Source: Based on Dimson, Marsh, and Staunton (2002) and as updated in Dimson, Marsh, and Staunton (2011b).

In Figure 3, countries are ranked in ascending order based on the white bars, which show the annualized real dollar returns to a U.S. investor. Because PPP tends to hold, equity markets have a similar ranking whether they are ranked by domestic real returns or by their real dollar returns. Note that although the magnitude of the returns varies according to the choice of common currency, the rankings of the countries are the same regardless of which reference currency is used.

Worldwide Premium

Investment in equities has proven rewarding over the long run, but as we noted in Table 1, it has been accompanied by significant variability of returns. Investors do not like volatility—at least on the downside—and will be prepared to invest in riskier assets only if there is some compensation for this risk (for more on this subject, see Dimson, Marsh, and Staunton 2004). The reward for equity risk that investors have achieved in the past can be measured by comparing the return on equities with the return from risk-free investments, such as Treasury bills. The difference between equity and bill returns is known as the "equity risk premium." For long-term government bonds, the difference between bond and bill returns is referred to as the "maturity premium." Although our focus in this article is on the equity risk premium, we provide up-to-date evidence on the maturity premium in Dimson, Marsh, and Staunton (2011b).

We measure the historical equity risk premium by taking the geometric difference between the equity return and the risk-free return. The formula is

$$(1 + \text{Equity rate of return}) / (1 + \text{Risk-free return}) - 1.$$

For example, if we were evaluating stocks with a one-year return of 21 percent relative to T-bills yielding 10 percent, the realized equity risk premium would be 10 percent because (1 + 21/100) / (1 + 10/100) is equal to 1 + 10/100 and deducting 1 gives a premium of 10/100, which is 10 percent. This measure of the risk premium is based on a ratio, and it thus has no numeraire. It is hence unaffected by whether returns are computed in dollars or pounds or euros or by whether returns are expressed in nominal or real terms.

Our preferred benchmark for the risk-free return is Treasury bills (i.e., very short-term, default-free, fixed-income government securities, or going back in history, the closest available equivalent in the years before T-bills became available). Many people, however, also measure the equity premium relative to long bonds, so we report both measures, even though bonds are clearly far from risk free in real terms. Detailed statistics on the equity risk premium relative to bills and bonds are given in **Table 2** and **Table 3**.

Table 2. Worldwide Equity Risk Premiums Relative to Bills, 1900–2010

Country/Region	Geometric Mean (%)	Arithmetic Mean (%)	Standard Error (%)	Standard Deviation (%)	Minimum Return (%)	Year of Minimum	Maximum Return (%)	Year of Maximum
Australia	6.7	8.3	1.7	17.6	−44.4	2008	49.2	1983
Belgium	2.9	5.5	2.3	24.7	−58.1	2008	130.4	1940
Canada	4.2	5.6	1.6	17.2	−34.7	2008	49.1	1933
Denmark	2.8	4.6	1.9	20.5	−50.6	2008	95.3	1983
Finland	5.9	9.5	2.9	30.2	−53.6	2008	159.2	1999
France	6.0	8.7	2.3	24.5	−44.8	2008	85.7	1941
Germany[a]	5.9	9.8	3.0	31.8	−45.3	2008	131.4	1949
Ireland	3.0	5.3	2.0	21.5	−66.7	2008	72.0	1977
Italy	5.8	9.8	3.0	32.0	−49.1	2008	150.3	1946
Japan	5.9	9.0	2.6	27.7	−48.3	1920	108.6	1952
Netherlands	4.2	6.5	2.2	22.8	−51.9	2008	126.7	1940
New Zealand	4.1	5.7	1.7	18.3	−58.3	1987	97.3	1983
Norway	3.0	5.9	2.5	26.5	−55.1	2008	157.1	1979
South Africa	6.2	8.3	2.1	22.1	−33.9	1920	106.2	1933
Spain	3.2	5.4	2.1	21.9	−39.9	2008	98.1	1986
Sweden	4.3	6.6	2.1	22.1	−41.3	2008	84.6	1905
Switzerland	3.4	5.1	1.8	18.9	−37.0	1974	54.8	1985
United Kingdom	4.3	6.0	1.9	19.9	−54.6	1974	121.8	1975
United States	5.3	7.2	1.9	19.8	−44.1	1931	56.6	1933
Europe	3.8	5.8	2.0	21.0	−47.4	2008	76.3	1933
World ex-U.S.	4.0	5.9	1.9	19.9	−44.2	2008	79.6	1933
World	4.5	5.9	1.6	17.1	−41.3	2008	70.3	1933

[a]All statistics for Germany are based on 109 years, excluding the hyperinflationary years of 1922–1923.

Source: Based on Dimson, Marsh, and Staunton (2002) and as updated in Dimson, Marsh, and Staunton (2011b).

Table 3. Worldwide Equity Risk Premiums Relative to Bonds, 1900–2010

Country/Region	Geometric Mean (%)	Arithmetic Mean (%)	Standard Error (%)	Standard Deviation (%)	Minimum Return (%)	Year of Minimum	Maximum Return (%)	Year of Maximum
Australia	5.9	7.8	1.9	19.8	−52.9	2008	66.3	1980
Belgium	2.6	4.9	2.0	21.4	−60.3	2008	84.4	1940
Canada	3.7	5.3	1.7	18.2	−40.7	2008	48.6	1950
Denmark	2.0	3.4	1.6	17.2	−54.3	2008	74.9	1972
Finland	5.6	9.2	2.9	30.3	−56.3	2008	173.1	1999
France	3.2	5.6	2.2	22.9	−50.3	2008	84.3	1946
Germany[a]	5.4	8.8	2.7	28.4	−50.8	2008	116.6	1949
Ireland	2.9	4.9	1.9	19.8	−66.6	2008	83.2	1972
Italy	3.7	7.2	2.8	29.6	−49.4	2008	152.2	1946
Japan	5.0	9.1	3.1	32.8	−45.2	2008	193.0	1948
Netherlands	3.5	5.8	2.1	22.2	−55.6	2008	107.6	1940
New Zealand	3.8	5.4	1.7	18.1	−59.7	1987	72.7	1983
Norway	2.5	5.5	2.7	28.0	−57.8	2008	192.1	1979
South Africa	5.5	7.2	1.9	19.6	−34.3	2008	70.9	1979
Spain	2.3	4.3	2.0	20.8	−42.7	2008	69.1	1986
Sweden	3.8	6.1	2.1	22.3	−48.1	2008	87.5	1905
Switzerland	2.1	3.6	1.7	17.6	−40.6	2008	52.2	1985
United Kingdom	3.9	5.2	1.6	17.0	−38.4	2008	80.8	1975
United States	4.4	6.4	1.9	20.5	−50.1	2008	57.2	1933
Europe	3.9	5.2	1.6	16.6	−47.6	2008	67.9	1923
World ex-U.S.	3.8	5.0	1.5	15.5	−47.1	2008	51.7	1923
World	3.8	5.0	1.5	15.5	−47.9	2008	38.3	1954

[a]All statistics for Germany are based on 109 years, excluding the hyperinflationary years of 1922–1923.

Source: Based on Dimson, Marsh, and Staunton (2002) and as updated in Dimson, Marsh, and Staunton (2011b).

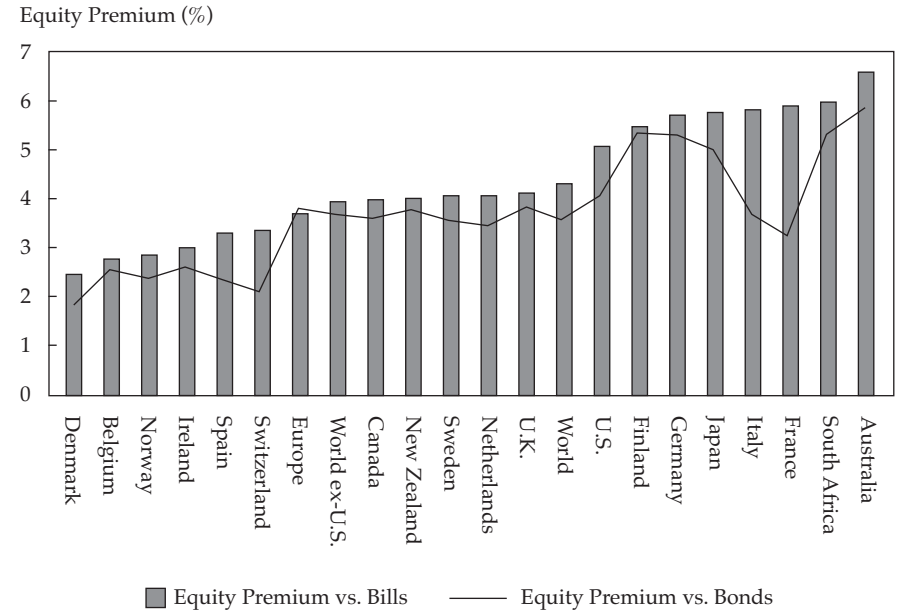
The estimates in Table 2 and Table 3 are lower than frequently quoted historical averages, such as the Ibbotson Yearbook (2011) figures for the United States and the earlier Barclays Capital (1999) studies for the United Kingdom. The differences arise from a bias (subsequently corrected) in the construction of the U.K. index used in Barclays' studies and, for both countries, our use of a long time frame (1900–2010) that incorporates the earlier part of the 20th century as well as the opening years of the 21st century, utilizing data described in Dimson, Marsh, and Staunton (2008). Our global focus also results in lower risk premiums than previously assumed. Prior views have been heavily influenced by the experience of the United States, whereas the view expressed here reflects an average of 19 countries, of which the United States is only one and in which the U.S. risk premium is somewhat higher than average.

The annualized equity premiums for the 19 countries and the World indices are summarized in **Figure 4**, in which countries are ranked according to the equity premium measured relative to bills, displayed as bars. The line plot presents each country's corresponding risk premium, measured relative to bonds. Over the entire 111 years, the annualized (geometric) equity risk premium, relative to bills, is 5.3 percent for the United States and 4.3 percent for the United Kingdom. Averaged across all 19 countries, the risk premium relative to bills is 4.6 percent, whereas the risk premium on the World equity index is 4.5 percent. Relative to long-term government bonds, the story is similar. The annualized U.S. equity risk premium relative to bonds is 4.4 percent and the corresponding figure for the United Kingdom is 3.9 percent. Across all 19 markets, the risk premium relative to bonds averages 3.8 percent; for the World index, it is also 3.8 percent.

Survivorship Bias

For the World index, our estimate of the annualized historical equity premium relative to bills is 4.5 percent. This estimate is based on the 19 countries in the DMS database, all of which survived from 1900 to 2011. These 19 countries accounted for an estimated 89 percent of the world equity market in 1900. The remaining 11 percent came from markets that existed in 1900 but for which we have been unable to obtain data. Some of these omitted markets failed to survive, and in cases like Russia in 1917 and China in 1949, investors lost all of their money. To quantify the maximum possible impact of omitted markets on the magnitude of the historical equity risk premium, we make an extreme assumption. We assume that all omitted markets became valueless and that this outcome occurred for every omitted country in a single disastrous year, rather than building up gradually. We then ask what risk premium investors would have earned if in 1900, they had purchased a holding in the entire World

Figure 4. Worldwide Annualized Equity Risk Premium Relative to Bills and Bonds, 1900–2010



Note: Statistics for Germany are based on 109 years, excluding the hyperinflationary years of 1922–1923.
Source: Based on Dimson, Marsh, and Staunton (2002) and as updated in Dimson, Marsh, and Staunton (2011b).

market, including countries omitted from the DMS database, and held this portfolio for 111 years. At the start of the period, their portfolio would have comprised an 89 percent holding in the DMS World index and an 11 percent holding in countries that we have assumed were all destined to become valueless.

Given these extreme assumptions, we demonstrate (see Dimson, Marsh, and Staunton 2008) that survivorship bias could, at most, give rise to an overstatement of the geometric mean risk premium on the World equity index by about one-tenth of a percentage point. If omitted markets did not all become valueless—and we know that very many did not—the magnitude of survivorship bias would be smaller still. Although debate continues about the precise impact of the bias because some, but not all, of these equity markets experienced a total loss of value, the net impact on the worldwide geometric mean equity premium is no more than 0.1 percent. The effect on the arithmetic mean is similar. The intuition involves the disappearance of 11 percent of the value of the market over 111 years, which represents a loss of value averaging 0.1 percent per year. We conclude that survivorship bias in world stock market returns is negligible.

Decomposing the Equity Risk Premium

Many people argue that the historical equity premium is a reasonable guide to what to expect in the future. Their reasoning is that over the long run, investors should expect good luck to balance out bad luck. If this view is correct, then the average premium investors receive should be close to the premium they required and "priced in" before the event. But even over a period as long as 111 years, this expectation may fail to be the case. It is possible that investors have enjoyed more than their share of good luck, making the past too good to last. If so, the historical premium would reflect "the triumph of the optimists" and would overstate expectations.

As an alternative approach, we seek to infer what investors may have been expecting, on average, in the past. To understand investors' expectations, we separate the historical equity premium into elements that correspond to investor expectations and elements of non-repeatable good or bad luck. In our article "The Worldwide Equity Premium: A Smaller Puzzle" (Dimson, Marsh, and Staunton 2008), we show that the equity premium can be decomposed into five components: the annualized mean dividend yield, plus the annualized growth rate of real dividends, plus the annualized expansion over time of the price/dividend ratio, plus the annualized change in the real exchange rate, minus the real risk-free rate.

Of these components, the dividend yield has been the dominant factor historically. At first sight, this may seem surprising because on a daily basis, investors' interest tends to focus mainly on the capital gains element of returns, such as stock price fluctuations and market movements. Indeed, over a single year, equities are so volatile that most of an investor's performance is attributable to capital gains or losses. Dividend income adds a relatively modest amount to each year's gain or loss. But although year-to-year performance is driven by capital appreciation, long-run returns are heavily influenced by reinvested dividends.

The difference in terminal wealth that results from reinvested dividend income is very large. As Figure 1 shows, the total real return from investing $1 in U.S. equities at the start of 1900—and reinvesting all dividend income—is an annualized 6.3 percent, such that by the start of 2011, the initial investment would have grown in purchasing power by 851 times. If dividends had not been reinvested, the initial $1 investment would have grown in purchasing power by just 8.5 times, equivalent to a real capital gain of 1.9 percent per year over the 111 years. A portfolio of U.S. equities with dividends reinvested would have grown to 100 times the value it would have attained if dividends had been spent. The longer the investment horizon, the more important dividend income becomes. For the seriously long-term investor, the value of a portfolio corresponds closely to the present value of dividends.

Components of the Equity Premium

To quantify the components of the equity premium, we examine the decomposition for all 19 countries and the World index over 1900–2010. The results are presented in **Table 4**, and we examine each component in turn. The second column of the table shows the annualized dividend yield for each market, reinforcing the point that the dividend yield has been the dominant factor historically. Across all 19 countries, the mean yield was 4.5 percent, although it was as large as 5.8 percent (South Africa) and as low as 3.5 percent (Switzerland). The annualized dividend yield for the United States (4.2 percent)

Table 4. Decomposition of the Historical Equity Risk Premium, 1900–2010

Country/Region	Geometric Mean Dividend Yield	*plus* Real Dividend Growth Rate	*plus* Expansion in the P/D Ratio	*plus* Change in Real Exchange Rate	*minus* U.S. Real Interest Rate	*equals* Equity Premium for U.S. Investors
Australia	5.76	1.10	0.48	0.10	0.96	6.53
Belgium	3.72	−1.48	0.36	0.70	0.96	2.28
Canada	4.39	0.84	0.56	0.09	0.96	4.94
Denmark	4.58	−1.13	1.64	0.57	0.96	4.69
Finland	4.76	0.49	0.09	0.15	0.96	4.53
France	3.81	−0.90	0.18	−0.04	0.96	2.05
Germany	3.66	−1.16	0.58	0.31	0.96	2.40
Ireland	4.57	−0.94	0.16	0.31	0.96	3.09
Italy	4.06	−1.52	−0.47	0.20	0.96	1.24
Japan	5.22	−2.39	1.08	0.54	0.96	3.39
Netherlands	4.94	−0.51	0.55	0.35	0.96	4.34
New Zealand	5.38	1.26	−0.84	−0.21	0.96	4.60
Norway	4.00	−0.13	0.33	0.38	0.96	3.62
South Africa	5.82	0.95	0.46	−0.61	0.96	5.65
Spain	4.18	−0.60	0.01	0.12	0.96	2.71
Sweden	4.02	1.77	0.43	0.09	0.96	5.41
Switzerland	3.48	0.46	0.28	0.94	0.96	4.22
United Kingdom	4.63	0.46	0.20	−0.06	0.96	4.27
United States	4.24	1.37	0.56	0.00	0.96	5.26
Average	4.49	−0.11	0.35	0.21	0.96	3.96
Standard dev.	0.69	1.18	0.51	0.35	0.00	1.39
World (USD)	4.11	0.83	0.48	0.00	0.96	4.49

Notes: Premiums are relative to bills. Summations and subtractions are geometric.

Source: Based on Dimson, Marsh, and Staunton (2008) and as updated in Dimson, Marsh, and Staunton (2011b).

was close to the cross-sectional average. For the World index, the annualized dividend yield was 4.1 percent, which is 3.1 percent higher than the real risk-free return from Treasury bills (see the penultimate column).

The real dividend growth rates in the third column of Table 4 reveal that in most markets, real dividend growth was lower than it was in the United States. In more than half of the countries, real dividends declined, and only four countries enjoyed real dividend growth of more than 1 percent per year. The equal-weighted average rate of real dividend growth across the 19 countries was slightly negative, although the World index's real dividend growth rate was 0.83 percent, bolstered by its heavy U.S. weighting. Dividends, and probably earnings, barely outpaced inflation. Over sufficiently long intervals, higher equity returns are generally associated with higher profits, which, in turn, generate larger dividends; comparing real equity returns (Table 1) with real dividend growth rates (Table 4) reveals a strong correlation (0.82) between the two.

The fourth column shows the expansion in the price-to-dividend ratio (P/D). Superior stock market performance and the magnitude of the historical equity risk premium are sometimes attributed to the expansion of valuation ratios, but the importance of this can be overstated. Table 4 shows that over the last 111 years, the P/D rose (dividend yields have fallen) in all but two countries, whereas the P/D of the World index grew by 0.48 percent per year. There are two possible explanations for this long-term decline in dividend yields: It may represent a repricing of equities (a downward shift in the capitalization rate or an upward shift in growth expectations), or the average payout ratio may have declined. In *Triumph of the Optimists* (Dimson, Marsh, and Staunton 2002), we note that equities enjoyed a rerating over this period but that in some countries, especially the United States, there were well-known changes in the cash distribution policies of corporations that made it necessary to take into account the impact of repurchases as well as cash dividends. The long-term multiple expansion of 0.48 percent per year is modest, however, given the improved opportunities for stock market diversification that took place over this period.

The fifth column shows the long-term change in the real (inflation-adjusted) exchange rate. As noted earlier, to examine the equity premium from the perspective of a global investor located in a specific home country, such as the United States, the real, local-currency returns need to be converted to real, common-currency returns. The annualized change in the 19 countries' real exchange rates averages only 0.21 percent per year, so this effect is small. As noted earlier, every country's real exchange rate change was within the range of ±1 percent.

The penultimate column is the historical real U.S. risk-free interest rate, and the final column computes the historical annualized equity premium for all the markets from the perspective of a U.S. investor. The realized equity premium relative to bills was, on average, 4.0 percent, with a cross-sectional standard deviation of 1.4 percent. For the U.S. dollar–denominated World index, the realized equity premium relative to bills was 4.5 percent (see the final entry in the bottom row of Table 4).

Investor Expectations

Over the long term, purchasing power parity has been a good indicator of long-run exchange rate changes (for more information, see Taylor 2002 and Dimson, Marsh, and Staunton 2011b, p. 19). The contribution to equity returns of real exchange rate changes is, therefore, an unanticipated windfall. It implies an upward bias of 0.21 percent in the cross-sectional average of the country equity premiums (there is no bias for the World index because it is denominated in the reference currency). Furthermore, as noted by Grinold, Kroner, and Siegel in their paper in this book, valuation ratios cannot be expected to expand indefinitely. Consequently, the contribution to equity returns of repricing is also likely to have been unanticipated; it implies an upward bias of 0.35 percent in the cross-sectional average of the country equity premiums and of 0.48 percent for the World index. Together, these two adjustments cause the equity premium to decline from 4.0 percent to 3.4 percent for the average country and from 4.5 percent to 4.0 percent for the World index.

In the sample of 19 countries, the average country had a long-term real dividend growth rate of slightly less than zero. In the World index, dividends outpaced inflation by an annual 0.8 percent, bolstered by the heavy weighting of the United States, where real dividends grew by 1.4 percent. But the 111-year annualized growth rate conceals a game of two halves. The 20th century opened with much promise, and only a pessimist would have believed that the next half-century would involve widespread civil and international wars, the Wall Street crash, the Great Depression, episodes of hyperinflation, the spread of communism, and the start of the Cold War. During 1900–1949, the annualized real return on the World equity index was 3.4 percent. By 1950, only a rampant optimist would have dreamed that during the following half-century, the annualized real return would be 9 percent. Yet, the second half of the 20th century was a period when many events turned out better than expected: There was no third world war, the Cuban missile crisis was defused, the Berlin Wall fell, the Cold War ended, productivity and efficiency accelerated, technology progressed, economic development spread from a few industrial countries to most of the world, and governance became stockholder driven.

The 9 percent annualized real return on world equities during 1950–1999 almost certainly exceeded expectations and more than compensated for the poor first half of the 20th century.

The question now is, What real dividend growth can be projected for the future? Pessimists may favor a figure of much less than the 0.8 percent historical average on the grounds that the "good luck" after 1950 more than outweighed the "bad luck" before 1950. Optimists may foresee indefinite real growth of 2 percent or more. Ilmanen (2011, p. 58) argues for a forward-looking approach. The yield on the World index as of year-end 2010 was 2.5 percent, well below the long-run historical average. If we assume future real dividend growth of 2 percent from this lower starting point, then the prospective premium on the World index declines to 3–3.5 percent, depending on the assumption made about the expected future real risk-free rate. The corresponding arithmetic mean risk premium would be around 4.5–5 percent, as we explained in Dimson, Marsh, and Staunton (2008). Our estimate of the expected long-run equity risk premium is less than the historical premium and much less than the premium in the second half of the 20th century. Many investment books still cite figures as high as 7 percent for the geometric mean and 9 percent for the arithmetic mean, but investors who rely on such numbers are likely to be disappointed.

Time-Varying Risk Premiums

The equity premium should be higher at times when the equity market is riskier and/or when investors are more risk averse. Yet, when markets are very volatile, extensive empirical evidence indicates that volatility tends to revert quite rapidly to the mean (for more information, see Dimson, Marsh, and Staunton 2011b, p. 34). We can, therefore, expect the period of extreme volatility to be short-lived, elevating the expected equity premium only over the relatively short run. But the premium may also vary with changes in investors' risk aversion. The latter will naturally vary among individuals and institutions and will be linked to life cycles as well as wealth levels.

The links between wealth levels and risk aversion suggest that there will be periods when risk aversion will be more or less than its long-run average. Particularly after sharp market declines, investors in aggregate will be poorer and more risk averse. At such times, markets are also typically more volatile and highly leveraged. Investors will thus demand a higher risk premium, which will drive markets even lower. Stocks are then priced to give a higher future expected return. So on average, achieved returns should be higher after market declines. The reverse logic applies following bull markets; when investors are richer, then risk aversion and, hence, the equity premium are expected to be lower.

Therefore, equity markets might be expected to exhibit mean reversion, with higher returns typically following market declines and lower returns, on average, following market rises. If there is appreciable mean reversion, then a market-timing strategy based on, for example, buying stocks after large price drops (or when market dividend yields are high or price-to-earnings ratios are low) and selling stocks after significant market rises should generate higher absolute returns. This rational economic explanation for mean reversion is based on time-varying equity premiums and discount rates. The more widely held view among investment practitioners, however, is that equity markets exhibit mean reversion for behavioral reasons—namely, that markets overreact. It is believed that in down markets, fear and over-pessimism drive prices too low, whereas in up markets, irrational exuberance and over-optimism cause markets to rise too high. In both cases, there will eventually be a correction so that equity markets mean revert.

A key difference between the rational economic view and the behavioral view is that if the former is correct, investors simply expect to earn a fair reward at all times for the risks involved. Thus, although market-timing strategies might seem to increase returns *ex post*, these higher *ex post* returns may simply reflect a realization of the higher *ex ante* returns required to compensate investors for additional risk. Put another way, the good news is that short-term expected returns are likely to be higher after market declines. The bad news is that volatility and risk aversion are correspondingly higher, and larger returns are needed to compensate for this increase. Loading up on equities at these risky times may take courage, but if subsequent returns prove to be higher, this outcome is a reward for risk, not for timing skill.

The problem with both the rational economic and behavioral views is that the evidence for mean reversion is weak. Mean reversion would imply that the equity premium is to some extent predictable, that risk over the long run is less than short-run volatility suggests, and that investors with a long horizon should favor equities compared with short-horizon investors. Yet, despite extensive research, this debate is far from settled. In a special issue of the *Review of Financial Studies*, leading scholars expressed opposing views, with Cochrane (2008) and Campbell and Thompson (2008) arguing for predictability, whereas Welch and Goyal (2008, p. 1455) find that "these models would not have helped an investor with access only to available information to profitably time the market." Cochrane's (2011) recent Presidential Address demonstrates the persistence of this controversy.

As we pointed out in our article (Dimson, Marsh, and Staunton 2004), and as articulated more formally by Pástor and Stambaugh (Forthcoming), mean reversion (if it exists) does not make equities safer in the long run. The reason

is that there are three additional components of long-term risk that pull in the opposite direction. For example, an investor does not know what the average stock market return is going to be in the future, nor what the equity premium is today, nor what the other parameters of the return process are. These issues leave the investor with substantial estimation risk, and all three components of uncertainty get bigger as the investment horizon lengthens. As a result, Pástor and Stambaugh conclude that on a forward-looking basis, stocks are more risky over the long run. Diris (2011) elaborates on this view and points out that although stocks can be safer over long investment horizons, provided markets are fairly stable, they are riskier when held for the long term over periods that suffer from financial crises or other turmoil.

In summary, although some experts say that knowledge of current and recent market conditions can improve market timing, others conclude that investors cannot do better than to forecast that the future equity premium will resemble the (long-term) past. Moreover, although a lot of money could be earned if investors managed to invest at the bottom of the market, sadly the bottom can be identified only in hindsight. There are, of course, good reasons to expect the equity premium to vary over time. Market volatility clearly fluctuates, and investors' risk aversion also varies over time. But although sharply lower (or higher) stock prices may have an impact on immediate returns, the effect on long-term performance will be diluted. Moreover, volatility does not usually stay at abnormally high levels for long, and investor sentiment is also mean reverting. For practical purposes, therefore, and consistent with our discussion here, we conclude that when forecasting the long-run equity premium, it is hard to improve on evidence that reflects the longest worldwide history that is available at the time the forecast is being made.

Conclusion

Our approach is based on analyzing a comprehensive database of annual asset class returns from the beginning of 1900 to the end of 2010 and estimating realized returns and equity premiums for 19 national markets and three regions. Our estimates, including those for the United States and the United Kingdom, are lower than some frequently quoted historical averages. Yet, we find that the equity premium is positive and substantial in all markets and that survivorship bias has had only a very small effect on the estimate of the premium for the World index.

The historical equity premiums, presented here as annualized (i.e., geometric mean) estimates, are equal to investors' *ex ante* expectations plus the effect of luck. The worldwide historical premium was larger than investors are likely to have anticipated because of such factors as unforeseen exchange rate

gains and unanticipated expansion in valuation multiples. In addition, past returns were also enhanced during the second half of the 20th century by business conditions that improved in many dimensions. We infer that investors expect a long-run equity premium (relative to bills) of around 3–3.5 percent on a geometric mean basis and, by implication, an arithmetic mean premium for the World index of approximately 4.5–5 percent. From a long-term historical and global perspective, the equity premium is smaller than was once thought. The equity premium survives as a puzzle, however, and we have no doubt that it will continue to intrigue finance scholars in the foreseeable future.

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