

Equity Premia Around the World

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19 July 2011 (Revised: 7 October 2011)

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Abstract:

We update our global evidence on the long-term realized equity risk premium, relative to both bills and bonds, in 19 different countries. Our study now runs from 1900 to the start of 2011. While there is considerable variation across countries, the realized equity risk premium was substantial everywhere. For our 19-country World index, over the entire 111 years, geometric mean real returns were an annualized 5.5%; the equity premium relative to Treasury bills was an annualized 4.5%; and the equity premium relative to long-term government bonds was an annualized 3.8%. The expected equity premium is lower, around 3% to 3½% on an annualized basis.

Equity Premia Around the World

Introduction

This paper updates our global estimates of the historical equity risk premium, first presented in *The Millennium Book* and in *Triumph of the Optimists*; see Dimson, Marsh, and Staunton (2000, 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*; see Dimson, Marsh, and Staunton (2011a, 2011b).

Our estimates cover 19 countries. They comprise two North American markets (the USA 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 UK), three Asia-Pacific markets (Japan, Australia, and New Zealand), and one African market (South Africa).

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

Our dataset includes equities, long government bonds, bills, inflation, exchange rates, and GDP. More details on the data, its sources, and on index construction methods are presented in Dimson, Marsh, and Staunton (2007, 2011c).

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 from this recent experience. If we include the 1990s, we add in a period of stock market exuberance that is also not indicative of expectations. To understand risk and return, we need to examine long periods of history. 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.

Figure 1 shows, in the left-hand panel, the cumulative total return from U.S. stocks, bonds, bills, and inflation over 1900–2010. Equities performed best, with an initial investment of \$1 growing to \$21,766 in

nominal terms by year-end 2010. Long bonds and Treasury bills gave lower returns, although they handsomely beat inflation. Their respective index levels at the end of 2010 are \$191 and \$74, with the inflation index ending at \$26. The legend shows the annualized returns. Equities returned 9.4% per year, versus 4.8% on bonds, 3.9% on bills, and inflation of 3.0% per year.

[Figure 1 about here]

Since U.S. prices rose 26-fold over this period, it is more helpful to compare returns in real terms. The right-hand panel 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% on equities, 1.8% on bonds, and 1.0% on bills.

The United States is by far the world's best documented capital market. Prior to assembly of the DMS database, long-run evidence was almost invariably taken from U.S. markets, and was typically treated as being applicable universally. Few economies, if any, can rival the long-term growth of the U.S., and this makes it dangerous to generalize from that country's historical returns. That is why we have put effort into documenting global investment returns. Altogether, we have annual returns on stocks, bonds, bills, inflation, and currencies for 19 countries over 111 years.

Figure 2 shows annualized real equity, bond, and bill returns for the 19 countries plus the World index ("Wld"), the World ex-USA ("WxU"), and Europe ("Eur"). The countries and regions are ranked in ascending order of equity market performance. The real equity return was positive in every location, typically 3% to 6% per year. Equities were the best performing asset class within every market. Furthermore, bonds beat bills everywhere. This overall pattern of equities beating bonds, and of bonds outperforming bills, is precisely as we would expect, since equities are riskier than bonds, while bonds are riskier than cash.

[Figure 2 about here]

Figure 2 shows that, while in most countries bonds gave 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, and these were the countries that suffered most from the ravages of war and civil strife, and from periods of high inflation or hyperinflation, typically associated with wars and their aftermath.

The chart confirms that the U.S. performed well, ranking fourth for equity performance (real 6.3% per year) and sixth for bonds (real 1.8% per year). This confirms our conjecture that U.S. returns would be high since 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. However, Figure 2 helps set this debate in context by showing that while U.S. stocks did well, the U.S. 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% is more than a percentage point higher than the real U.S. dollar-denominated return of 5.0% on the World ex-USA index. A common factor among the best performing equity markets over the last 111 years is that they tended to be resource-rich and/or New World countries.

Table 1 provides statistics on real equity returns from 1900 to 2010. The geometric means in the second column show the 111-year annualized returns achieved by investors, and these are the figures that are plotted in Figure 2. The arithmetic means in the third column show 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 is the gap between the arithmetic and geometric means. This fact is evident in the fifth column of Table 2, which shows the standard deviation of each equity market's annual returns.

[Table 1 about here]

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

Bear markets underline the risk of equities. Even in a less volatile market such as the U.S., losses can be huge. Table 1 shows that the worst calendar year for U.S. equities was 1931 with a real return of -38%. However, from peak to trough, U.S. equities fell by 79% in real terms in the 1929-1931 Wall Street Crash period. The worst period for U.K. equities was the 1973-74 bear market, with stocks falling 71% in real terms, and by 57% in a single year, 1974. More recently, 2008 had the dubious distinction of being the worst year on record for eight countries, for the World index, the World ex-USA, and Europe. The table shows that, in several other countries, even more extreme returns have occurred, both on 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, over the period 1900–2010, the annualized real return to an American buying U.S. equities was 6.27%, while for a British investor buying U.K. equities it was 5.33%. However, when considering cross-border investment, we also need to account for exchange rate movements, for example, an American buying UK equities or a British investor buying US equities. Each investor now has two exposures, one to foreign equities and the other to foreign currency, and we need to convert each return into the investor's reference currency.

Rather than just comparing domestic returns, we therefore translate all countries' local returns into a common currency. Figure 3 shows the results from translating out of local currency and into the U.S. dollar. These dollar returns are all expressed as real returns, adjusted for U.S. inflation. The blue bars show the annualized real domestic currency returns from 1900 to 2010, as presented earlier. The gray bars are the common-currency returns, in real U.S. dollars, from the perspective of an American investor. The small red bars, close to the horizontal axis, are the difference between the annualized real local-currency return and the annualized real dollar return. The red bars equate to the annualized inflation-adjusted exchange rate movement over the same period. As Taylor (2002) points out, purchasing power parity (PPP) holds reasonably closely over the very long run. Consequently, the gap between the two return measures is for every country under 1% per annum.

[Figure 3 about here]

In Figure 3, countries are ranked in ascending order of the gray bars, which show the annualized real dollar returns to a U.S. investor. Because PPP tends to hold, we obtain a similar ranking of equity markets whether we rank them 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 whichever reference currency is used.

The worldwide premium

Investment in equities has proved 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; see Dimson, Marsh, and Staunton (2004). We can measure the reward for risk that they have achieved in the past by comparing the return on risky assets, such as equities, with the return from risk-free investments, such as Treasury bills. In the case of stocks, 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. While our focus in this paper 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 $1 + \text{Equity rate of return}$, divided by $1 + \text{Risk-free return}$, minus 1. For example, if we were evaluating stocks with a one-year return of 21% relative to Treasury bills yielding 10%, the realized equity risk premium would be 10%. (This is because $1 + \frac{21}{100}$ divided by $1 + \frac{10}{100}$ is equal to $1 + \frac{10}{100}$; and deducting 1 gives a premium of $\frac{10}{100}$, namely 10%.) This measure of the risk premium is based on a ratio, and it therefore has no numeraire. It is hence unaffected by whether we compute returns in dollars or pounds or euros, or 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. However, many people 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 premium relative to bills and bonds are given in Tables 2 and 3.

[Table 2 about here]

[Table 3 about here]

The estimates in Tables 2 and 3 are lower than frequently quoted historical averages such as the Ibbotson Yearbook figures for the U.S., and the earlier Barclays Capital studies for the U.K. The differences arise from a bias (subsequently corrected) in the construction of the U.K. index used in the Barclays studies and, for both countries, 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. Our global focus also results in rather lower risk premiums than hitherto assumed. Prior views have been heavily influenced by the experience of the United States, while the view expressed here reflects an average of 19 countries, of which the U.S. is only one, and the U.S. risk premium is somewhat higher than average.

The annualized equity premiums for our 19 countries and the World indexes are summarized in Figure 4, where countries are ranked by 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, was 5.3% for the U.S. and 4.3% for the United Kingdom. Averaged across all 19 countries, the risk premium relative to bills was 4.6%, while the risk premium on the World equity index was 4.5%. Relative to long government bonds, the story is similar. The annualized U.S. equity risk premium relative to bonds was 4.4% and the corresponding figure for the United Kingdom was 3.9%. Across all 19 markets the risk premium relative to bonds averaged 3.8%, while for the World index, it was also 3.8%.

[Figure 4 about here]

Survivorship bias

For the World index, our estimate of the annualized historical equity premium relative to bills is 4.5%. We have based this estimate on the 19 countries in the DMS database, all of which survived from 1900 to 2011. These 19 countries accounted for an estimated 89% of the world equity market in 1900. The remaining 11% 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 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 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% holding in the DMS World index and an 11% holding in countries that we have assumed were all destined to become valueless.

Given these extreme assumptions, Dimson, Marsh, and Staunton (2007) demonstrate that, at most, survivorship bias could 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 have been smaller still. While there is room for debate about the precise impact of the bias arising because some, but not all, equity markets experienced a total loss of value, the net impact on the worldwide geometric mean equity premium is no more than 0.1%. The impact on the arithmetic mean is similar. The intuition involves disappearance of 11% of the value of the market over 111 years, which represents a loss of value averaging 0.1% per year. We conclude that survivorship bias in World stock market returns is negligible.

Decomposing the equity risk premium

Is the historical equity premium a reasonable guide to what we can expect in the future? Many people argue that it is, on the grounds that, over the long run, we should expect good luck to balance out bad. If so, then the average premium investors received should be close to the premium they required and “priced in” before the event. But even over a period of as long as 111 years, we cannot be sure of this. It is possible that investors 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.

We therefore 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. Dimson, Marsh, and Staunton (2007) show that we can decompose the equity premium into five components. They are 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, since on a daily basis, investors' interest tends to focus largely on the capital gains element of returns, namely, 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 while year-to-year performance is driven by capital appreciation, long-run returns are heavily influenced by reinvested dividends.

The difference in terminal wealth arising 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%, 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% 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 is dividend income. 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 this 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%, though it was as large as 5.8% (South Africa) and as low as 3.5% (Switzerland). The annualized dividend yield for the U.S. (4.2%) was close to the cross-sectional average. For the World index, the annualized dividend yield was 4.1%, which is 3.1% higher than the real risk-free return from Treasury bills (see penultimate column).

[Table 4 about here]

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

The fourth column reports expansion in the price/dividend multiple. Superior stock market performance and the magnitude of the historical equity risk premium is 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, price/dividend ratios have risen (dividend yields have fallen) in all but two countries, while the price/dividend ratio of the World index grew by 0.48% 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*, we note that equities enjoyed a re-rating over this period, but that in some countries, especially the U.S., there were well-known changes in the cash distribution policies of corporations that make it necessary to take account of the impact of repurchases as well as cash dividends. The long-term multiple expansion of 0.48% per year is modest, however, given the improved opportunities for stock market diversification that took place over this period.

The fifth column reports the long-term change in the real (inflation-adjusted) exchange rate. As we noted earlier, if we wish to examine the equity premium from the perspective of a global investor located in a specific home country, such as the U.S., we need to convert from real, local-currency returns to real, common-currency returns. The annualized change in our 19 countries' real exchange rate averages only 0.21% per year and, as noted above, every country's real exchange rate change was within the range $\pm 1\%$. This is a small effect.

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

Investor expectations

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

In our sample of 19 countries, the average country had a long-term real dividend growth rate of just below zero. In the World index, dividends outpaced inflation by an annual 0.8%, bolstered by the heavy weighting of the U.S., where real dividends grew by 1.4%. But this 111-year annualized growth rate concealed 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%. By 1950, only a rampant optimist would have dreamt that over the following half-century, the annualized real return would be 9%. 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% 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.

So what real dividend growth can be projected for the future? Pessimists may favor a figure well below the 0.8% historical average on the grounds that the “good luck” post-1950 more than outweighed the “bad luck” pre-1950, while optimists may foresee indefinite real growth of 2% or more. Ilmanen (2011, page 58), argues for a forward-looking approach. The yield on the World index as of year-end 2010 was 2.5%, well below the long-run historical average. If we assume future real dividend growth of 2% from this lower starting point, then the prospective premium on the world index declines to 3%–3½%, depending on the assumption made about the likely future real risk-free rate. The corresponding arithmetic mean risk premium would be around 4½%–5%, as explained in Dimson, Marsh, and Staunton (2007). Our estimate of the expected long-run equity risk premium is below the historical premium, and well below the premium

in the second half of the 20th century. Many investment books still cite figures as high as 7% for the geometric mean and 9% 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, we know from extensive empirical evidence that volatility reverts quite rapidly to the mean; see Dimson, Marsh, and Staunton (2011b, page 34). We can 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 across individuals and institutions and will be linked to life cycles as well as wealth levels.

The linkage between wealth levels and risk aversion suggests that there will be periods when risk aversion will be above or below its long-run average. In particular, after sharp market falls, investors, in aggregate, will be poorer and more risk averse. At such times, markets are typically also more volatile and highly leveraged. Investors will thus demand a higher risk premium, driving markets even lower. Stocks are then priced to give a higher future expected return. So, on average, we should find that achieved returns are higher after market falls. The reverse logic applies following bull markets, when investors are richer, and when we would expect risk aversion, and hence the equity premium, to be lower.

We might therefore expect equity markets to exhibit mean reversion, with higher returns typically following market falls, and lower returns, on average, following market rises. If there is appreciable mean reversion, then a market timing strategy based on, say, buying stocks after large price falls (or when market dividend yields are high or price/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 premia and discount rates. However, the more widely held view among investment practitioners 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, while 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 and behavioral views is that, if the former is correct, investors simply expect to earn a fair reward for the risks involved at all times. Thus, although market timing strategies might seem to increase returns *ex post*, these higher *ex post* returns may simply reflect 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 falls. The bad

news is that volatility and risk aversion are correspondingly higher, and larger returns are needed to compensate for this. 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 at best weak. Mean reversion would imply that the equity premium is to some extent predictable, that risk over the long run is smaller than short-run volatility suggests, and that investors with a long horizon should favor equities compared to 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, while Welch and Goyal (2008) find that “these models would not have helped an investor with access only to available information to profitably time the market.”

As we pointed out in Dimson, Marsh, and Staunton (2004), and as articulated more formally by Pástor and Stambaugh (2011), mean reversion (if it exists) does not make equities safer in the long run. This is because 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. This leaves the investor with substantial estimation risk, and all three components of uncertainty get bigger as the investment horizon lengthens. As a result, on a forward-looking basis Pástor and Stambaugh (2011) conclude that stocks are more risky over the long run. Diris (2011) elaborates on this, and points out that while 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, while some experts say that knowledge of current and recent market conditions can improve market timing, others conclude that one cannot do better than to forecast that the future equity premium will resemble the (long-term) past. Moreover, while we would make a lot of money if we managed to invest at the bottom of the market, sadly, we can identify the bottom only with 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. However, these effects are likely to be modest. Sharply lower (or higher) stock prices may have an impact on immediate returns, but 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 above, 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

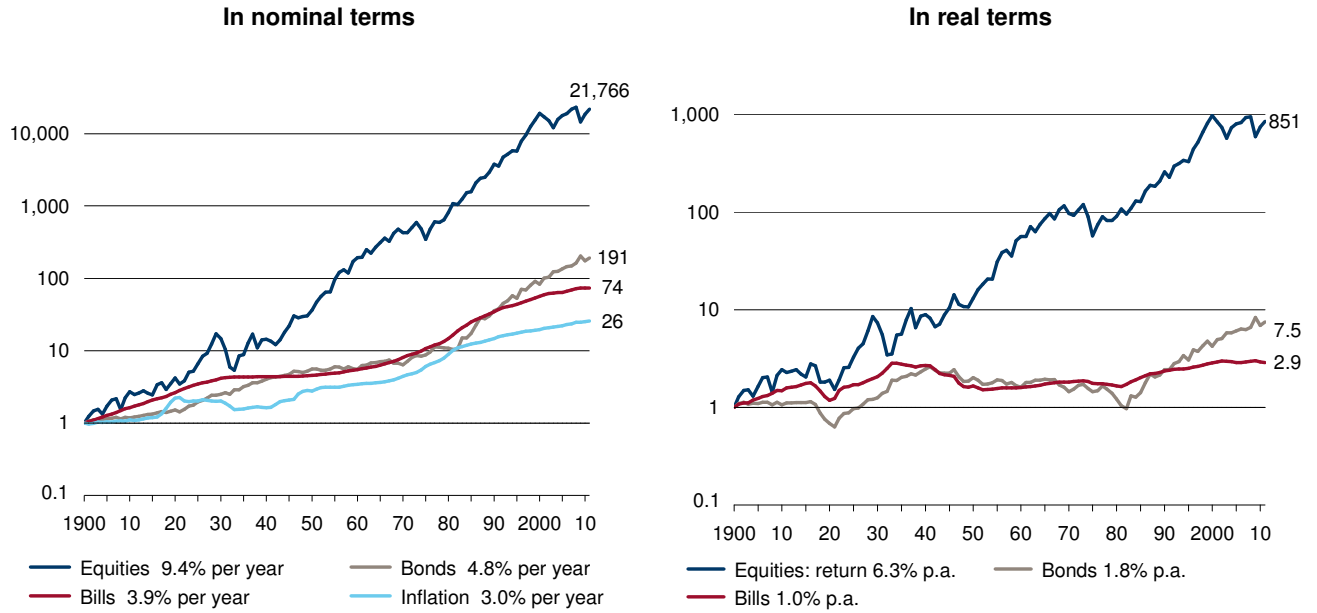
Our approach is based on analyzing a comprehensive database of annual asset-class returns, running from 1900 to the end of 2010, to estimate realized returns and equity premiums for 19 national markets and three regions. Our estimates, including those for the U.S. and U.K., are lower than some frequently quoted historical averages, yet we find that the equity premium is positive and substantial in all markets, and that survivor bias has had almost no 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 impact of luck. The worldwide historical premium was larger than investors are likely to have anticipated, on account of factors such 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 on many dimensions. We infer that investors expect a long-run equity premium (relative to bills) of around 3%–3½% on a geometric mean basis and, by implication, an arithmetic mean premium for the world index of approximately 4½%–5%. 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 for the foreseeable future.

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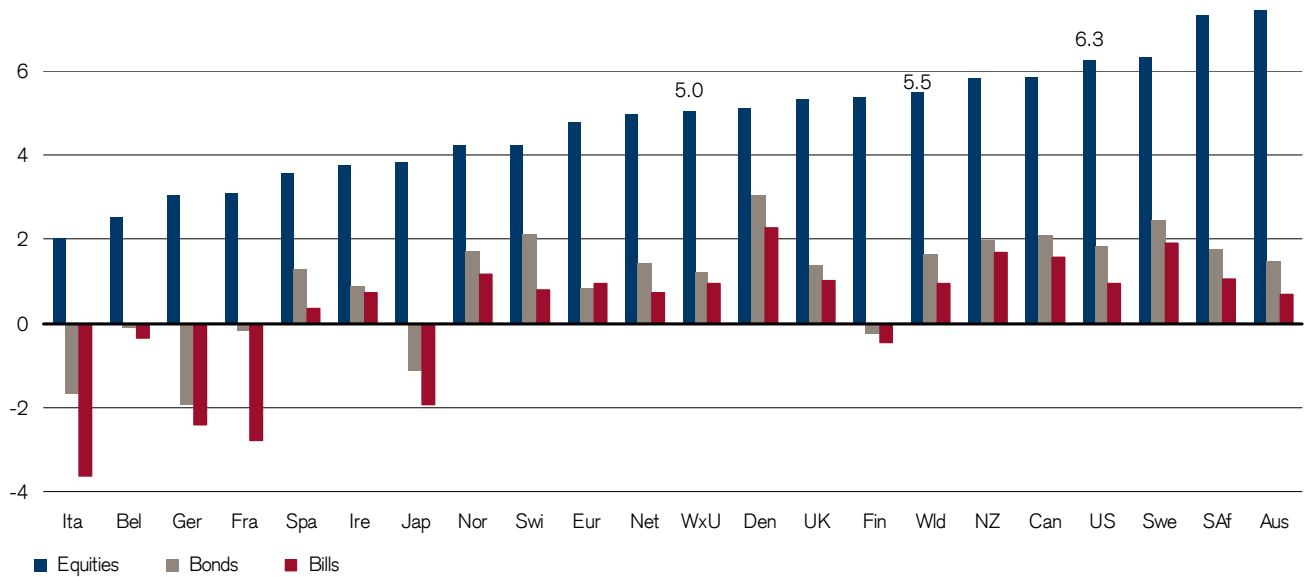
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Figure 1: Cumulative returns on US equities, bonds, bills and inflation, 1900–2010



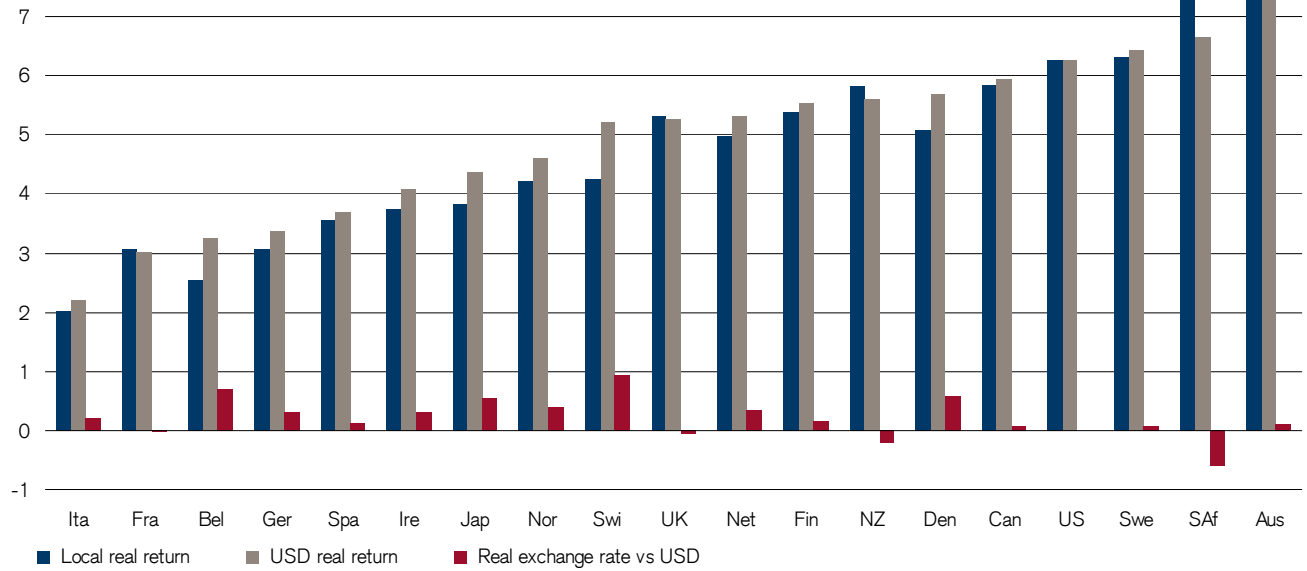
Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *Triumph of the Optimists*, Princeton University Press, 2002, and subsequent research

Figure 2: Real annualized returns (%) on equities versus bonds and bills internationally, 1900–2010



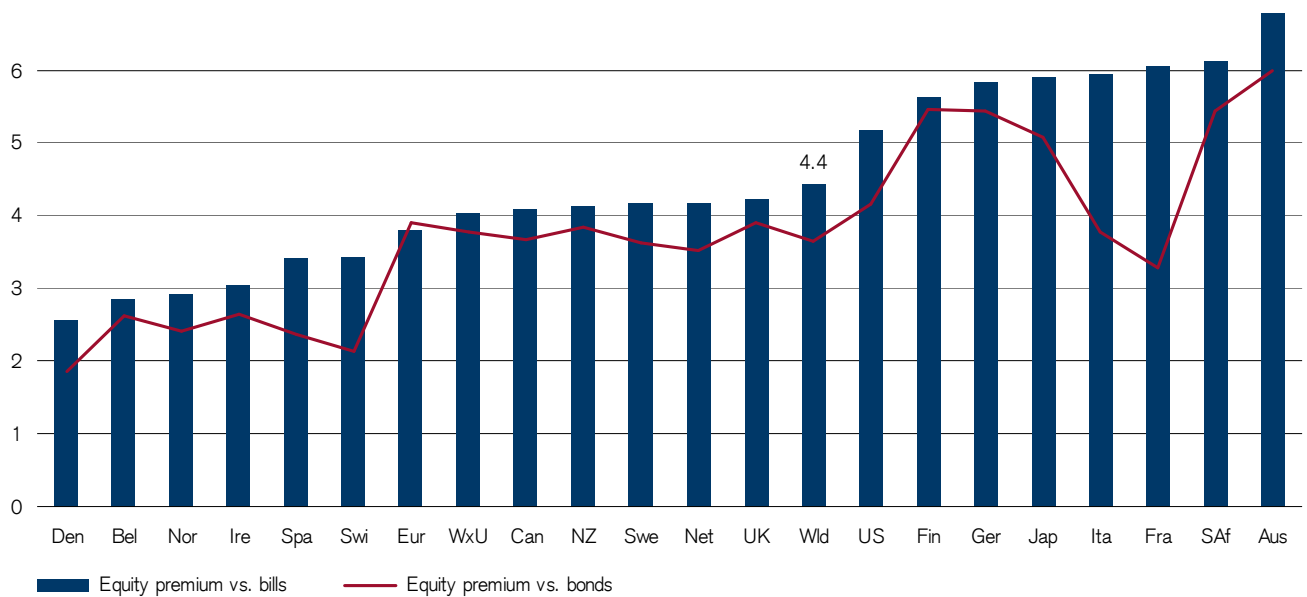
Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *Triumph of the Optimists*, Princeton University Press, 2002, and subsequent research

Figure 3: Real annualized equity returns (%) in local currency and US dollars, 1900–2010



Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *Triumph of the Optimists*, Princeton University Press, 2002, and subsequent research.

Figure 4: Worldwide annualized equity risk premium (%) relative to bills and bonds, 1900–2010



Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *Triumph of the Optimists*, Princeton University Press, 2002, and subsequent research. Premiums for Germany are based on 109 years, excluding hyperinflationary 1922–23.

Table 1: Real (inflation-adjusted) equity returns around the world, 1900–2010

Country	Geometric mean%	Arithmetic mean%	Standard error%	Standard dev.%	Minimum return%	Min year	Maximum return%	Max year
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
The 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-US	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: Elroy Dimson, Paul Marsh, and Mike Staunton, *Triumph of the Optimists*, Princeton University Press, 2002, and subsequent research.

Table2: Worldwide equity risk premiums relative to bills, 1900–2010

Country	Geometric mean%	Arithmetic mean%	Standard error%	Standard dev.%	Minimum return%	Min year	Maximum return%	Max year
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*	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
The 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-USA	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

*All statistics for Germany are based on 109 years, excluding hyperinflationary 1922–23. Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *Triumph of the Optimists*, Princeton University Press, 2002, and subsequent research.

Table 3: Worldwide risk premiums relative to bonds, 1900–2010

Country	Geometric mean%	Arithmetic mean%	Standard error%	Standard dev.%	Minimum return%	Min year	Maximum return%	Max year
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*	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
The 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-USA	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

*All statistics for Germany are based on 109 years, excluding hyperinflationary 1922–23. Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *Triumph of the Optimists*, Princeton University Press, 2002, and subsequent research.

Table 4: Decomposition of the historical risk premium, 1900–2010 (% p.a.)

Country	Geometric mean dividend yield	plus* Real dividend growth rate	plus Expansion in the P/D ratio	plus Change in real exchange rate	minus US real interest rate	equals Equity premium for US 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
The 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 deviation	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

*Premiums are vs bills. Summations and subtractions are geometric. Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *The Worldwide Equity Premium: A Smaller Puzzle*, in R. Mehra (Ed.), *Handbook of the Equity Risk Premium*, Elsevier, 2007.