GLOBAL EVIDENCE ON THE EQUITY RISK PREMIUM

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One of the most important contemporary issues in corporate finance is the magnitude of the equity risk premium. The risk premium is the incremental return that shareholders require from holding risky equities rather than risk-free securities. The risk premium drives future equity returns and is the key determinant of the cost of capital.

Today, investors have more cause than ever to ask what returns they can expect from equities, and what the future risk-reward tradeoff is likely to be. Companies also need to answer this question in order to understand what returns their shareholders require from projects of differing risk. Regulators, too, need to know the cost of capital in order to set 'fair' rates of return for regulated industries.

This paper sheds light on this important issue by addressing two key questions: What has the size of the equity risk premium been historically? And what can we expect for the future? To answer these questions, we need to look at long periods of capital market history, and extend our horizons beyond just the United States. In this paper, we therefore present evidence for sixteen different countries over the 102-year period from 1900–2001.

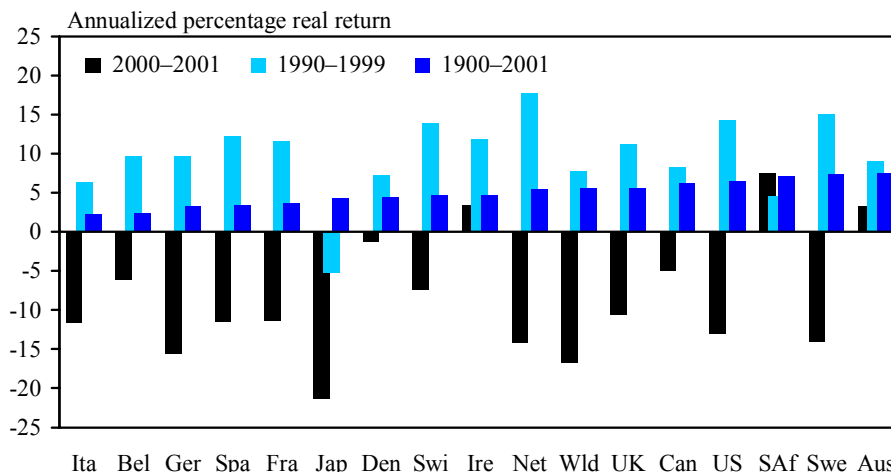## The need for a long-run perspective

The need for a long-run perspective, and the dangers of focusing just on recent stock market history, are easily demonstrated. Over the last decade of the twentieth century, US equity investors more than trebled their initial stake. In real terms, they achieved a total return (capital gain plus reinvested dividends) of 14.2 percent per annum. During the last five years of the 1990s, US equities achieved high returns in every year, varying from a low of twenty-one percent in 1996 to a high of thirty-six percent in 1995. Many investors became convinced that high corporate growth rates could be extrapolated into the indefinite future. With steady growth rates, equity risk appeared lower. Simultaneously, there appeared to be a decline in the premium sought by investors to compensate for exposure to equity market risk. This drove stock prices onward and upward. Surveys suggested that, in consequence, many investors expected long-run stock market returns to continue at double-digit percentage rates of return.

Then the technology bubble burst. Growth projections had been unrealistic. High growth expectations were seen to be associated with high risk. Investors demanded a larger reward for equity market risk exposure. Stock prices fell in 2000 and then again in 2001, with no respite yet in 2002. With markets having fallen, investors started to project lower returns for the future.

FIGURE 1

SHORT-TERM
AND LONG-RUN
REAL RETURNS
ON EQUITIES
AROUND THE
WORLD*

* The country names listed in abbreviated form along the horizontal axis are (from left to right) Italy, Belgium, Germany, Spain, France, Japan, Denmark, Switzerland, Ireland, The Netherlands, the world (the weighted average of the sixteen individual countries), The United Kingdom, Canada, The United States, South Africa, Sweden, and Australia.

Yet it is dangerous to overreact to recent stock market performance. It would be wrong for investors to conclude that just because equities have delivered a low return since New Year 2000 that there has been either a substantial fall, or indeed rise, in the long-term expected equity premium.

Figure 1 shows how US equity returns compared with those in fifteen other countries and the world index. The black bars show annualized equity returns over 2000–01. In most countries, equities suffered negative returns, underperforming bonds everywhere except Ireland, and falling short of bill returns everywhere except Australia, Ireland, and South Africa. Estimating the expected risk premium from the performance of equities relative to bills or bonds over this period would clearly be nonsense. Investors cannot have required or expected a negative return for assuming risk. Instead, this was simply a very disappointing period for equities.

But while the opening years of the twenty-first century (fortunately) do not provide a basis for generalising about future returns, looking back at the previous decade only confuses the picture. Indeed, it would be equally misleading to estimate future risk premia from data for 1990–99. The light blue bars in Figure 1 show that over this period, equity returns (except in Japan and South Africa) were high. The 1990s was a golden age for stocks, and golden ages, by definition, recur infrequently.

To understand the risk premium—which is the principal objective of this paper—we need to examine periods that are much longer than one or two years, or even a decade. This is because stock markets are volatile, with much variation in year-to-year returns. In order to make inferences we thus need long time series that incorporate the bad times as well as the good. The dark blue bars in Figure 1 provide an insight into the perspective that longer periods of history can bring. These show real equity returns over the 102-year period from 1900–2001. Clearly, these 102-year returns are much less favourable than the returns during the 1990s, but equally, they contrast sharply with the disappointing returns over 2000–01.

Investors' judgements should thus be informed by the full extent of financial market history, and by looking not just at the United States, but at other countries as well.

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Limitations of prior estimates of the risk premium

To be fair, financial economists do tend to measure the equity premium over quite long periods. Standard practice, however, draws heavily on the United States, with most textbooks citing only the US experience. By far the most widely cited US source prior to the end of the technology bubble was Ibbotson Associates[1], whose equity premium history starts in 1926. They estimated an annualized return on equities of 11.3 percent, and a risk-free return of 3.8 percent. This implied a geometric premium relative to bills of 7.3 percent (i.e., 1.113/1.038 = 1.073). References to other countries are few and far between, but a few textbooks also cite UK evidence. Before the publication of the research that underpins this paper, the most widely cited sources for the United Kingdom were the studies published by Barclays Capital and CSFB[2], which both started in 1919, and who published equity and risk-free returns of 12.2 and 5.5 percent, implying an annualized risk premium relative to bills of 6.4 percent.

In citing these estimates, financial economists are generally making the implicit assumption that provided the data are of sufficient quality, then the historical risk premium, measured over many decades, will provide an unbiased estimate of the future premium. Yet the twentieth century proved to be a period of remarkable growth in the US economy, and it seems probable that the outcome exceeded the expectations held in 1926 by US investors. Similar arguments apply to the United Kingdom, and the likely expectations of UK investors in 1919, but additionally, the UK evidence turned out to be based on a retrospectively constructed index whose composition, up to 1955, was tainted by survivor bias and narrow coverage.

In recent years, both practitioners and researchers have grown increasingly uneasy about these widely cited estimates, largely because they seem high. Apart from biases in index construction, the finger of suspicion has pointed mainly at success and survivorship bias. One influential study by Jorion and Goetzmann[3], for example, asserted, "the high equity premium obtained for US (and, by implication, UK) equities appears to be the exception rather than the rule" (parenthesis added). Recently, Zvi Bodie[4] argued that high US and UK premia are likely to be anomalous, and underlined the need for comparative international evidence. He pointed out that long-run studies are always of US or UK premia: "There were 36 active stock markets in 1900, so why do we only look at two? I can tell you—because many of the others don't have a 100-year history, for a variety of reasons." This paper helps fill this gap in our knowledge by providing a 102-year back-history of risk premia for sixteen of these markets.

NEW EVIDENCE

The new evidence on long-run risk premia presented in this paper is derived from a unique new database of long-run international returns. This comprises annual returns on stocks, bonds, bills, inflation, and currencies for sixteen countries from 1900–2001. The countries include the two main North American markets, namely, the United States and Canada, the United Kingdom, seven markets from what is now the Euro currency area, three other

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1. See Ibbotson Associates, 2000, *Stocks, Bonds, Bills and Inflation Yearbook*, Chicago, Ibbotson Associates

2. Barclays Capital, 1999, *Equity-Gilt Study*, London: Barclays Capital; and Credit Suisse First Boston, 1999, *The CSFB Equity-Gilt Study*, London: Credit Suisse First Boston.

3. Jorion, P. and W. Goetzmann, "Global Stock Markets in the Twentieth Century", *Journal of Finance*, Vol. 54, 1999, pp. 953-80.

4. Bodie, Z, "Longer time horizon 'does not reduce risk'" *Financial Times*, 26 January 2002.

European markets, two Asia-Pacific markets, and one African market. Together, these countries made up 95 percent of the free float market capitalization of all world equities at start-2002, and we estimate that they comprised over 90 percent by value at the start of our period in 1900.

To compile this database, we assembled the best quality indices and returns data available for each national market from previous studies and other sources[5]. Where possible, we used data from peer-reviewed academic papers, although some studies were previously unpublished. To span the full period from 1900 onward, we typically linked more than one index series. For our own home market, the UK, we constructed our own indices, since hitherto there was no satisfactory record of long run returns. For the period since 1955, we used the London Business School Share Price Database to construct an index covering the entire UK equity market[6]. From 1900–55, we constructed an index of the performance of the largest 100 companies by a process of painstaking financial archaeology, collecting data from archives in the City of London. We also used archive data to construct indices for several other countries (e.g., Canada, Ireland, South Africa) for periods for which no data was previously available.

Unlike most previous long-term studies of global markets, all our investment returns include reinvested gross income as well as capital gains. Many early equity indices measure just capital gains, ignoring dividends, thereby introducing serious downward bias. Similarly, many early bond indices record just yields, ignoring price movements. Our database is thus more comprehensive and accurate than previous research, spans a longer period, and the common start-date of 1900 aids international comparisons. We can now set the US risk premia data alongside comparable 102-year risk premia series for fifteen other countries, and make international comparisons that help set the US experience in perspective.

Table 1 shows the historical equity risk premia for the sixteen countries over the 102-year period 1900–2001. We also display equity premia for the world, based on our world equity index. The latter comprises a sixteen-country, common-currency (here taken as US dollars) equity index in which each country is weighted by its start-year market capitalization or (in earlier years) its GDP[7]. The left-hand half of Table 1 shows equity premia measured relative to the return on treasury bills (or the nearest equivalent short-term instrument); the right-hand half shows premia calculated relative to the return on long-term government bonds. Since the world index is computed here from the perspective of a US (dollar) investor, the world equity risk premium relative to bills is calculated relative to the US risk free (i.e., treasury bill) rate. The world equity premium relative to bonds is calculated relative to a GDP-weighted, sixteen-country, common-currency (here taken as US dollars) world bond index.

In each half of the table we show three measures. These are, first, the geometric mean risk premium, namely, the annualized premium over the entire 102 years; second, the arithmetic mean of the 102 one-year premia; and third, the standard deviation of the 102 one-year premia. While the United States and the United Kingdom have indeed performed well, compared to other markets there is no indication that they are hugely out of line.

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5. Details of our data sources for all sixteen countries together with full citations are provided in Dimson, E, P R Marsh, and M Staunton, *Triumph of the Optimists: 101 Years of Global Investment Returns*, Princeton University Press, 2002.

6. Dimson, E and P R Marsh, "UK Financial Market Returns 1955-2000", *Journal of Business*, Vol. 74, pp. 1–31.

7. We use market capitalization weights from 1968 onward and GDP (gross domestic product) weights before then due to the lack of reliable comprehensive data on country capitalizations prior to that date.

| | Equity risk premia (percent per year) | | | | | |
| | Relative to bills | | | Relative to bonds | | |
Country	Geo-metric mean	Arith-metic mean	SD	Geo-metric mean	Arith-metic mean	SD
Australia	7.0	8.5	17.2	6.3	7.9	18.8
Belgium	2.7	5.0	23.5	2.8	4.7	20.7
Canada	4.4	5.7	16.7	4.2	5.7	17.9
Denmark	1.6	3.2	19.4	1.8	3.1	16.9
France	7.1	9.5	23.9	4.6	6.7	21.7
Germany*	4.6	10.0	35.3	6.3	9.6	28.5
Ireland	3.4	5.3	20.5	3.1	4.5	17.3
Italy	6.6	10.6	32.5	4.6	8.0	30.1
Japan	6.4	9.6	27.9	5.9	10.0	33.2
The Netherlands	4.8	6.8	22.3	4.4	6.4	21.5
South Africa	6.1	8.2	22.4	5.4	7.1	19.6
Spain	3.1	5.2	21.4	2.2	4.1	20.2
Sweden	5.3	7.4	21.9	4.9	7.1	22.1
Switzerland*	4.0	5.8	19.6	2.4	3.9	18.0
United Kingdom	4.5	6.2	19.9	4.2	5.5	16.7
United States	5.6	7.5	19.7	4.8	6.7	20.0
World	4.6	5.9	16.5	4.3	5.4	14.6

TABLE 1
EQUITY RISK PREMIA AROUND THE WORLD 1900–2001

Germany excludes 1922-23. Switzerland commences in 1911.
Source: Dimson, Marsh, and Staunton, Triumph of the Optimists, Princeton University Press, 2002.

Over the entire 102-year period, the annualized equity risk premium, relative to bills, was 5.6 percent for the United States and 4.5 percent for the United Kingdom. Averaged across all sixteen countries, the risk premium relative to bills was 4.8 percent, while the risk premium on the world equity index was 4.6 percent. Relative to long bonds, the story is similar. The annualized US equity risk premium relative to bonds was 4.8 percent, and the corresponding figure for the United Kingdom was 4.2 percent. Across all sixteen countries, the risk premium relative to bonds averaged 4.3 percent, while for the world index it was also 4.3 percent.

The annualized equity risk premia are plotted in Figure 2. In this figure, countries are ranked by the equity premium relative to bonds, displayed as bars. The line-plot presents each country's risk premium relative to bills. It can be seen that the United States does indeed have a historical risk premium that is above the world average, but it is by no means the country with the largest recorded premium. The equity premium for the United Kingdom is closer to the worldwide average. While US and UK equities have performed well, both countries are towards the middle of the distribution of worldwide equity premia. Commentators have suggested that survivor bias may have given rise to equity premia for the United States and the United Kingdom that are unrepresentative. While legitimate, these concerns are somewhat overstated. Investors may not have been materially misled by a focus on the US and UK experiences. Rather, the critical factors are the period over which the risk premium is estimated, together with the quality of the index series.

FIGURE 2

WORLDWIDE
ANNUALIZED
EQUITY
RISK PREMIA
1900–2001
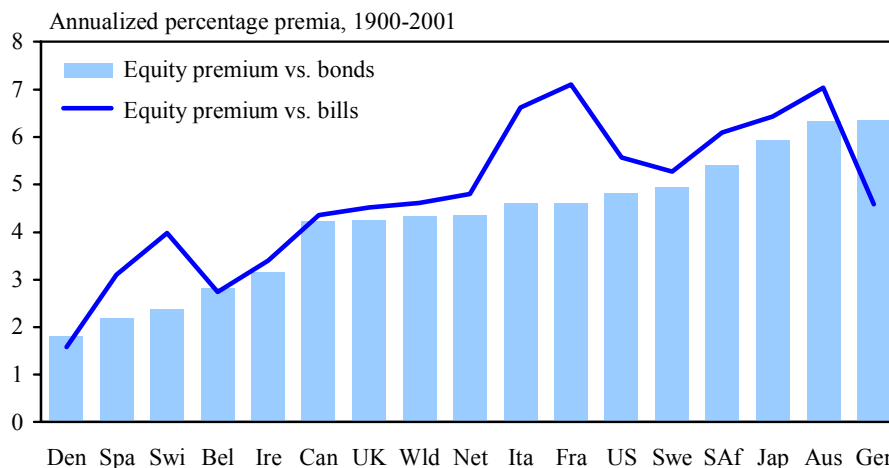
Annualized percentage premia, 1900-2001

Germany excludes 1922-23. Switzerland commences in 1911.
Source: Dimson, Marsh, and Staunton, Triumph of the Optimists, Princeton University Press, 2002.

Avoiding bias

There are noteworthy differences between the premia reported in this paper and those put forward, prior to publication of our research, by Ibbotson Associates in the United States, and by Barclays Capital and CSFB in the United Kingdom. Indeed, the premia estimated in this paper are around 1½ percent lower than those reported in these earlier studies. The differences arise from previous biases in index construction for the United Kingdom and, for both countries, from the choice of time frame, which in our case extends back to 1900[8]. We thus include the pre-1926 period for the United States (and pre-1919 for the United Kingdom) when returns were lower, partly due to events in the period leading up to, and including, World War I. Moreover, as noted above, prior perceptions about the risk premium have been dominated by the widely cited US estimates. Yet Table 1 and Figure 2 show that the premia for two-thirds of the other countries in our sample were lower than for the United States[9].
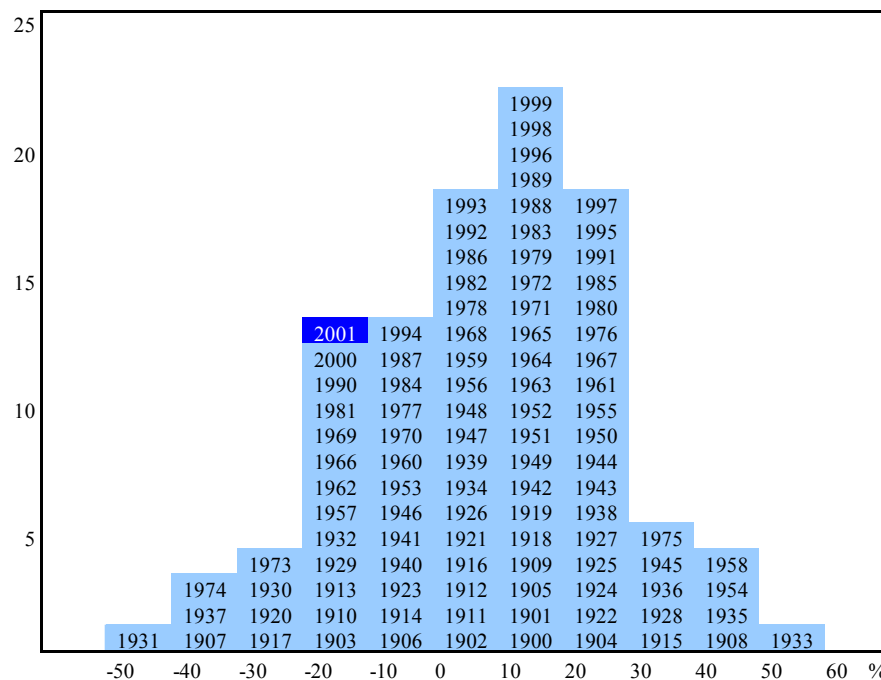
It is thus clear that the 102-year historical estimates of equity premia reported here are lower than was previously thought and other studies suggest. Even then, however, the historical record may overstate expectations. First, even if we have been successful in avoiding survivor bias within each index, we still focus on markets that survived, omitting countries such as Poland, Russia or China whose compound rate of return was –100 percent. Although these markets were relatively small in 1900[10], their omission probably leads to an overestimate of the

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Histogram of US equity risk premium relative to bills, 1900–2001 (vertical axis: frequency 0–25; horizontal axis: percent from −50 to 60):

−50%	−40%	−30%	−20%	−10%	0%	10%	20%	30%	40%	50%
						1999				
						1998				
						1996				
						1989				
				1993		1988	1997			
				1992		1983	1995			
				1986		1979	1991			
				1982		1972	1985			
				1978		1971	1980			
			2001	1994	1968	1965	1976			
			2000	1987	1959	1964	1967			
			1990	1984	1956	1963	1961			
			1981	1977	1948	1952	1955			
			1969	1970	1947	1951	1950			
			1966	1960	1939	1949	1944			
			1962	1953	1934	1942	1943			
			1957	1946	1926	1919	1938			
			1932	1941	1921	1918	1927	1975		
		1973	1929	1940	1916	1909	1925	1945	1958	
	1974	1930	1913	1923	1912	1905	1924	1936	1954	
	1937	1920	1910	1914	1911	1901	1922	1928	1935	
1931	1907	1917	1903	1906	1902	1900	1904	1915	1908	1933

Source: Dimson, Marsh and Staunton, Triumph of the Optimists, Princeton University Press, 2002

worldwide risk premium.[11] Second, our premia are estimated relative to bills and bonds, which in a number of countries gave markedly negative real returns. Since these "risk-free" returns likely fell below investors' expectations, the corresponding equity premia are probably overstated.[12]

Although there is room for debate, we do not consider market survivorship to be the most important source of bias when inferring expected premia from the historical record. There are cogent arguments for suggesting that investors expected a lower premium than they actually received. However, this is more to do with a failure to fully anticipate improvements in business and investment conditions during the second half of the last century, an issue that we will return to below.

VARIATION IN RISK PREMIA OVER TIME

The historical equity premia shown in Figure 2 are the geometric means of 102 separate one-year premia that vary a great deal. In Figure 3 we show the year-by-year premia on US equities relative to bills. The lowest excess return was –45 percent in 1931, when equities returned –44 percent and treasury bills 1.1 percent; the highest was 57 percent in 1933, when equities gave 57.6 percent and bills 0.3 percent. Figure 3 shows that, for the United States,

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11. We say omitting non-surviving markets "probably" gives rise to overestimated risk premia because of the possibility that some defaulting countries have returns of –100 percent on bonds, while equities retain some residual value. For such countries, the ex post equity premium would be positive.

12. We again say low risk-free rates probably give rise to overstated risk premia because equity returns would presumably have been higher if economic conditions had not given rise to markedly negative real fixed-income returns. If economic conditions had been better, it is possible that the equity premium would then have been larger.

FIGURE 4

FIGURE 4

ROLLING AND
ANNUAL TEN-
YEAR US PREMIA
RELATIVE TO
BILLS, 1900–2001
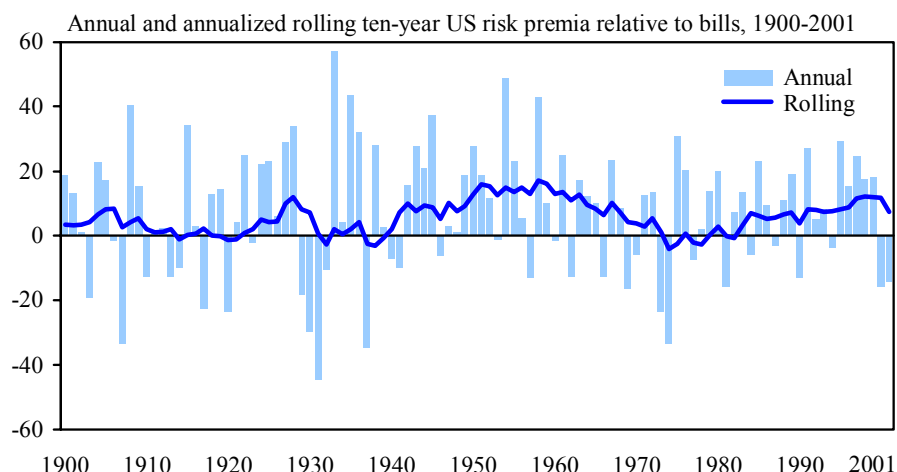
Annual and annualized rolling ten-year US risk premia relative to bills, 1900-2001

Source: Dimson, Marsh and Staunton, Triumph of the Optimists, Princeton University Press, 2002

the distribution of annual excess returns is roughly symmetrical with a mean of 7.5 percent and a standard deviation of 19.7 percent. On average, therefore, US investors received a positive, and quite large, reward for exposure to equity market risk.

Because the range of excess returns encountered on a year-to-year basis is very broad, it can be misleading to label them "risk premia." As already noted, investors cannot have expected, let alone required, a negative risk premium from investing in equities, otherwise they would simply have avoided them. All the negative and many of the very low premia plotted in the histogram must therefore reflect nasty surprises. Equally, investors could not have required premia as high as 57 percent in 1933. Such numbers are implausible as a required reward for risk, and the high realizations must therefore reflect pleasant surprises. To avoid confusion, many writers choose not to refer to annual excess returns as "risk premia". They simply clarify that excess returns are ex post returns in excess of the risk free interest rate.

As we noted above, because one-year excess returns are so variable, we need to examine much longer periods, in the hope that good and bad luck might then cancel out. A common choice of time frame is a decade. In Figure 4, we show the US equity risk premium, measured over a sequence of rolling ten-year periods, superimposed on the annual returns since 1900.

Even over ten-year periods, the historical risk premium was sometimes negative, most recently in the 1970s and early 1980s. Again, since investors cannot have required a negative reward for risk, these must reflect unpleasant surprises. Figure 4 also reveals several cases of double-digit ten-year premia. These must have been pleasant surprises, as they are too high to reflect prior expectations. Clearly, a decade is still too short a period for good and bad luck to cancel out, and for drawing inferences about investors' expectations. Over a decade, like a single year, all we are plotting is the excess return that was realised over a period in the past.

Imprecise estimates

Prior to our research, studies for countries other than the United States and United Kingdom used the longest stock return series available, typically covering an interval of up to half a

century. Sadly, even such a long research period does not yield an answer that is invariant to the choice of period. Taking the United Kingdom as an illustration, the arithmetic mean annual excess return for the first half of the twentieth century was only 3.1 percent, as compared to 9.2 percent from 1950 to date.

Even with a full century of data, market fluctuations have an impact. All we can state with confidence is what the excess return was in the past. This is why some writers restrict the term "risk premium" to denote the expected reward from equity investment. To avoid confusion, we make it clear when we are looking to the future by referring to the expected or "prospective" risk premium. When we measure the excess return over a period in the past we generally refer to this as the "historical" risk premium.

With 102 years of data, the potential inaccuracy in historical risk premia is high. The standard error measures this inaccuracy. It is approximately equal to one-tenth of the annual standard deviation of returns reported in Table 1. The standard error for the United States is 1.9 percent, and the range runs from 1.7 percent (Australia and Canada) to 3.5 percent (Germany). This means that while the US arithmetic mean premium (relative to bills) has a best estimate of 7.5 percent, we can be only two-thirds confident that the true mean lies within one standard error of this, namely within the range 7.5 ± 1.9 percent, or 5.6 to 9.4 percent. Similarly, there is a nineteen-out-of-twenty probability that the true mean lies within two standard errors, namely 7.5 ± 3.8 percent, or 3.7 to 11.3 percent. These high standard errors are why the longest possible series of stock market data should in general be used for estimating risk premia.

FROM THE PAST TO THE FUTURE

To estimate the equity risk premium to use in discounting future cash flows, we need the expected future risk premium, i.e., the arithmetic mean of the possible premia that may occur. Suppose the returns that may happen in the future are drawn from the same distribution as those that occurred in the past. If so, the expected risk premium is the arithmetic mean (or simple average) of the one-year historical premia. Whenever there is some variability in annual premia, the arithmetic mean will always exceed the geometric mean (or annualized) risk premium.[13]

In Figure 5, the full height of the bars shows the historical arithmetic mean premium relative to bills for each country. The US equity premium is 7.5 percent, while the world equity risk premium is 5.9 percent. The arithmetic mean premia are noticeably higher than the geometric mean premia shown by the light blue portion of each bar. They are at their largest (in both absolute terms and relative to the geometric mean) for the countries that experienced the greatest volatility of returns over the last century (see Table 1).

In looking to the future, let us assume for the moment that investors in each country expect the same annualized (geometric mean) risk premium as they have received in the past. The bar and line plots in Figure 5 can then be interpreted as forecasts of the prospective arithmetic risk premia under alternative assumptions about future volatility. If there were no volatility in future annual returns, the expected arithmetic risk premia would be equal to their (historical)

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13. For example, the arithmetic mean of two equally likely returns of +25 percent and −20 percent is (+25 − 20)/2 = 2½ percent, while their geometric mean is zero since (1 + 25/100) x (1 − 20/100) − 1 = 0.

FIGURE 5

ARITHMETIC
MEAN EQUITY
RISK PREMIA
RELATIVE TO
BILLS, 1900–2001
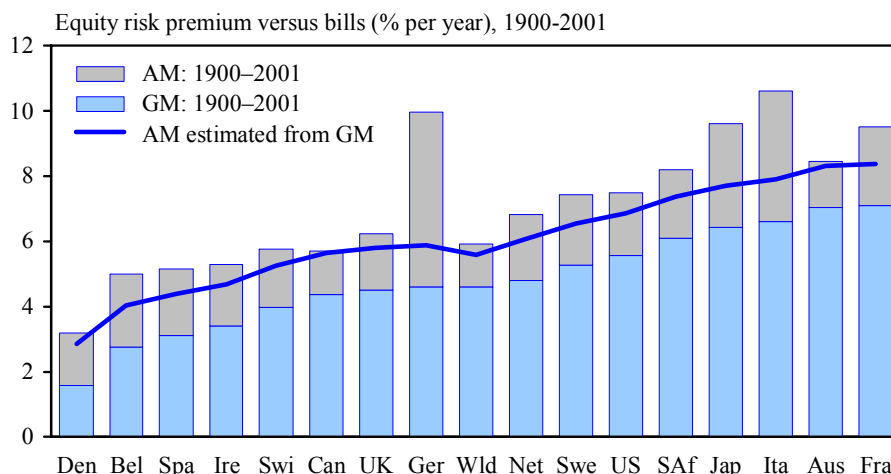
Equity risk premium versus bills (% per year), 1900-2001

Source: Dimson, Marsh and Staunton, Triumph of the Optimists, Princeton University Press, 2002

geometric mean premia shown by the height of the light blue portion of the bars in Figure 5. On the other hand, if future volatility were equal to the long-term historical volatility, the expected risk premia would be equal to the historical arithmetic mean risk premia, shown by the full height of the bars. However, the long-term historical standard deviation is a poor predictor of future volatility, especially since some sources of extreme volatility (such as hyperinflation) are unlikely to recur. We therefore need estimates of expected future risk premia that are conditional on current predictions for market volatility.

When returns are distributed lognormally, the geometric and arithmetic means are linked by the standard deviation (or volatility) of returns. We therefore estimate the expected future arithmetic mean premium for each country, replacing the historical difference between the arithmetic and geometric means with a difference based on contemporary risk estimates. For expositional simplicity, even though the volatility of one stock market is not in reality the same as another, we assume a current volatility level for all sixteen national markets of 16 percent, and for the world index of 14 percent. The resulting estimates of the arithmetic mean premia relative to bills are shown by the dark blue line-plot in Figure 5.

For those wishing to forecast future arithmetic mean risk premia by extrapolating from the long-run historical annualized premia, the premia illustrated by the line plot in Figure 5 are the ones to use. The historical equity risk premium, adjusted to current levels of market volatility, is estimated as 6.8 percent for the United States, and 5.6 percent for the world index.

THE EXPERTS' CONSENSUS

In refocusing on the expected future risk premium, however, we must do more than extrapolate from the past. The question of what equity premium we can expect has, for years, been a source of controversy. In late 1998 Ivo Welch studied the opinions of 226 financial economists who were asked to forecast the thirty-year arithmetic mean equity risk premium[14].

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14. Welch, I, "Views of Financial Economists on the Equity Premium and Other Issues," *Journal of Business*, Vol. 73, 2000, pp. 501-537.

FIGURE 6
FINANCIAL
ECONOMISTS'
RISK PREMIUM
FORECASTS
AND MARKET
HISTORY

Distribution of forecast arithmetic mean risk premia (percent)
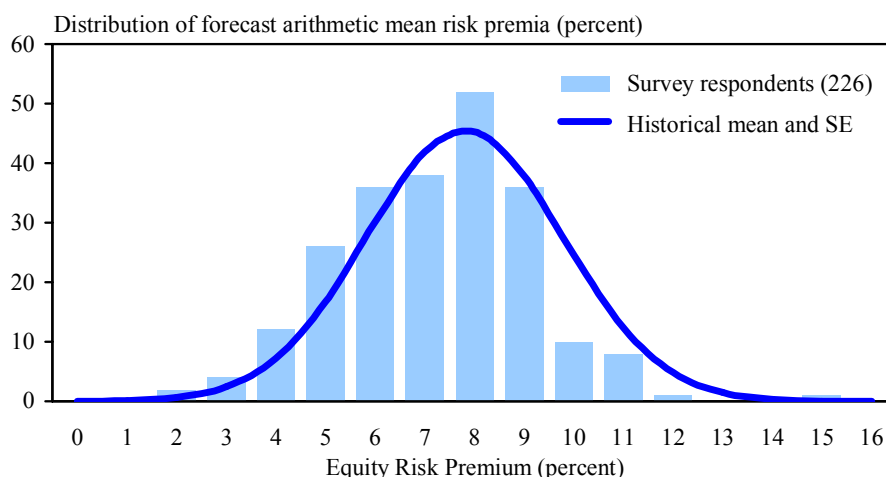
The bars in Figure 6 show the distribution of the responses. The mean forecast was 7.1 percent; the median was 7.0 percent, and the range ran from 1 to 15 percent.

While the bars in Figure 6 show the distribution of survey responses, the curved line represents the normal distribution based on the mean over approximately a century and the associated standard error for the US equity risk premium. The spread in both distributions indicates that the uncertainty across financial experts about the risk premium is as large as the uncertainty that arises from statistical analysis of historical returns.
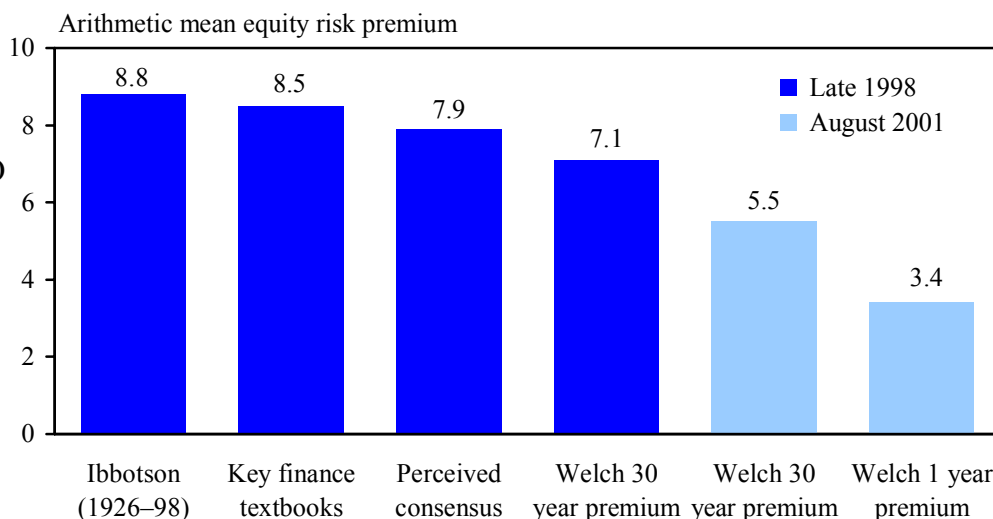
Most respondents to the Welch survey would have regarded the Ibbotson Associates yearbook as the definitive study of the historical US risk premium. The first bar of Figure 7 shows that the 1926-98 arithmetic risk premium computed from Ibbotson data was 8.8 percent per year. The second bar shows that the key finance textbooks were on average suggesting a premium of 8.5 percent, a little below the Ibbotson figure. The textbook authors may have based their views on earlier, slightly lower, Ibbotson estimates, or else they were shading the Ibbotson estimates downward. The Welch survey mean is in turn lower than the textbook figure, but since respondents claimed to lower their forecasts when the equity market rises, this difference may be attributed to the market's strong performance in the 1990s. Interestingly, the third and fourth bars of Figure 7 show that the survey respondents also perceived the profession's consensus to be higher than it really was. That is, they thought the mean was around 0.8 percent higher than the 7.1 percent average revealed in the survey.

These survey and textbook figures represent what was being taught at the end of the 1990s in the world's leading business schools and economics departments in the United States and around the world. As such, these estimates were also widely used by investors, finance professionals, corporate executives, regulators, lawyers and consultants. Their influence extended from the classroom to the dealing room, to the boardroom, and to the courtroom.

New opinions

Whether Welch's survey mean of 7.1 percent was appropriate is another matter. A large number of respondents were calibrating their forecasts relative to the longest-run historical benchmark available from Ibbotson, and then shading the historical number downward based on subjective factors, including their judgement of the impact of strong market performance in the late 1990s. By 2001, longer-term estimates of the US arithmetic mean equity premium

11

Arithmetic mean equity risk premium

■	Late 1998
■	August 2001

Ibbotson (1926–98): 8.8
Key finance textbooks: 8.5
Perceived consensus: 7.9
Welch 30 year premium: 7.1
Welch 30 year premium: 5.5
Welch 1 year premium: 3.4

were gaining publicity. Including pre-1926 data, and extending the period through the start of the new millennium, the 1900-2000 mean premium was 1.1 percent lower than the Ibbotson estimate on the left-hand side of Figure 7. At the same time, survey respondents who sought to predict a premium below the consensus might have been encouraged by publication of the survey to further reduce their estimates.

In August 2001, Welch updated his earlier survey, receiving responses from 510 finance and economics professors[15]. He found that respondents to the follow-up questionnaire had revised downward their estimates of the long-term arithmetic mean risk premium by an average of 1.6 percent. Over a thirty-year horizon they now estimated an equity premium averaging 5.5 percent, and over a one-year horizon, an equity premium averaging 3.4 percent (see Figure 7). The mean premia were the same for those who had previously participated in the earlier survey and those who were taking part for the first time. Although respondents to the earlier survey had indicated that, on average, a bear market would raise their equity premium forecast, Welch (2001) reports that "This is in contrast with the observed findings: it appears as if the recent bear market correlates with lower equity premium forecasts, not higher equity premium forecasts".

Predictions of the long-term equity premium should not be so sensitive to short-term stock market fluctuations, especially in the direction and magnitude revealed by Welch's follow-up survey in 2001. While it is possible that one-year required rates of return fluctuate markedly, it is unlikely that thirty-year expectations can be so volatile. The changing consensus may, however, reflect the new approaches to estimating the premium and /or new facts about long-term stock market performance, such as evidence that other countries have typically had historical premia that were lower than the United States.

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15. Welch, I, "The Equity Premium Consensus Forecast Revisited," Working paper, Yale School of Management, September 2001.

FIGURE 8

PREMIA
RELATIVE TO
BILLS, FIRST
50 YEARS
VERSUS THE
NEXT 52 YEARS
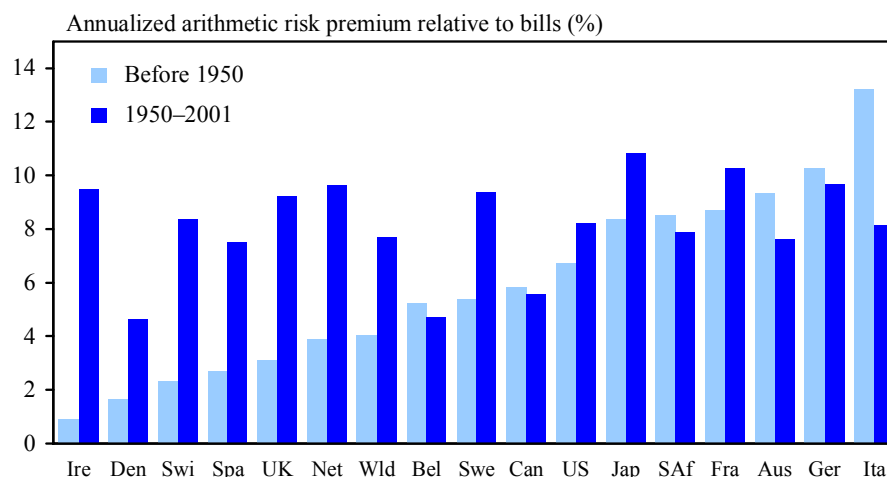
Annualized arithmetic risk premium relative to bills (%)

Germany excludes 1922-23. Switzerland commences in 1911.
Source: Dimson, Marsh and Staunton, Triumph of the Optimists, Princeton University Press, 2002
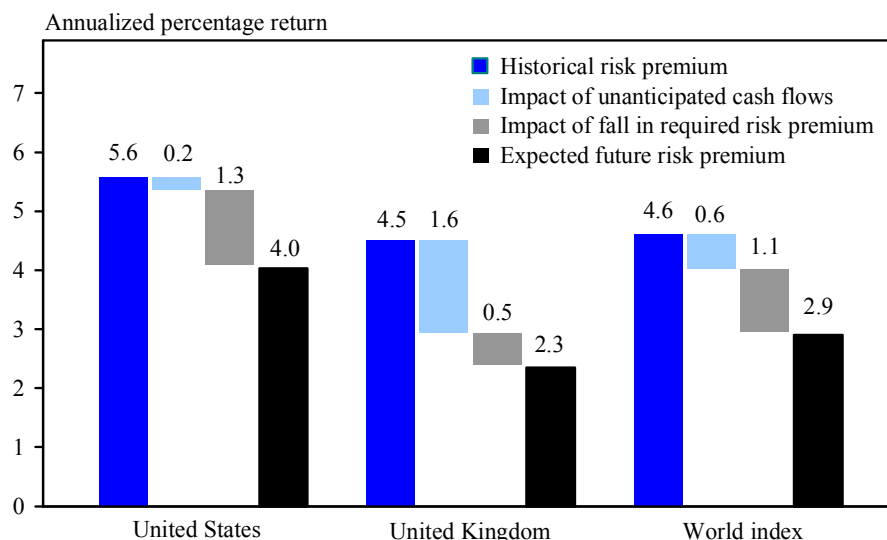
REVISITING HISTORY

The wide dispersion of estimates, together with the dramatic decline in the consensus premium between 1998 and 2001, reinforces the need to better understand the historical record. However, since history may have been kind to (or harsh on) stock market investors, there are coherent arguments for going beyond raw historical estimates. First, the whole idea of using the achieved risk premium to forecast the required risk premium depends on having a long enough period to iron out good and bad luck, yet as we noted earlier, even with 102 years of data our estimates are imprecise. Second, the expected equity risk premium could for good reasons vary over time. Third, we must take account of the fact that stock market outcomes are influenced by many factors, some of which (like removal of trade barriers) may be non-repeatable, which implies projections for the premium that deviate from the past.

A comparison between the first and second halves of our 102-year period makes the point. Over the first half of the twentieth century, the arithmetic average world equity risk premium relative to bills was 4.1 percent, whereas over the period 1950–2001, it was 7.7 percent. Figure 8 shows that most of the sixteen countries had lower mean premia in the first half-century, with Australia, Italy, Belgium, and South Africa being the exceptions. The sixteen-country (unweighted) mean of the arithmetic risk premia in the first half of the twentieth century was 6.0 percent, versus 8.2 percent in the next fifty-two years. The pattern for the equity premium relative to bonds (not shown in Figure 8) is similar: a pre-1950 mean of 5.5 percent as compared to 7.1 percent over the following fifty-two years.

The large risk premia achieved during the second half of the twentieth century are attributable to three factors. First, there was unprecedented growth in productivity and efficiency, accelerating technological change, and enhancements to the quality of management and corporate governance. As Europe, North America, and the Asia-Pacific region emerged from the turmoil of the Second World War, expectations for improvement were limited to what could be imagined. Reality almost certainly exceeded investors' expectations. Corporate cash flows grew faster than investors anticipated, and this higher growth is now known to the market and built into higher stock prices.

FIGURE 9

INFERRING
EXPECTATIONS
FROM THE
HISTORICAL
PREMIUM

Annualized percentage return

Legend:
- ■ Historical risk premium
- ■ Impact of unanticipated cash flows
- ■ Impact of fall in required risk premium
- ■ Expected future risk premium

United States: 5.6 0.2 1.3 4.0
United Kingdom: 4.5 1.6 0.5 2.3
World index: 4.6 0.6 1.1 2.9

Source: Dimson, Marsh and Staunton, Triumph of the Optimists, Princeton University Press, 2002

Second, stock prices have also risen because of a fall in the required rate of return due to diminished business and investment risk. Business risk diminished as the economic and political lessons of the twentieth century were learned, international trade flows increased, and the Cold War ended. Investment risk diminished over time as investors gained the benefits of diversification, both domestically (through a wider range of quoted securities and industries[16], and through intermediaries such as mutual funds) and internationally (with the disappearance of impediments to foreign investment). Diversification allows investors to lower their risk exposure without detriment to expected return. Finally, transaction and monitoring costs are also lower now than a century ago. Factors such as these, which led to a reduction in the required risk premium, have contributed further to the upward re-rating of stock prices.

To convert from a pure historical estimate of the risk premium into a forward-looking projection, we need to reverse-engineer the factors that drove up stock markets over the last 102 years. The simplest idea would be to infer the impact on returns of the historical changes in dividend yield. But we can go beyond this, as shown in Figure 9. The left-hand panel of Figure 9 relates to the US equity market, the centre panel to the UK market, and the right-hand panel to the world market. Within each panel, the first bar portrays the historical annualized risk premium of the equity market. This includes the contribution from unanticipated growth in cash flows and the gain from falls in the required risk premium. We therefore deduct the impact of these two factors. What remains in the right-hand bar of each panel is an estimate of the prospective risk premium demanded by investors as compensation for the risks of equity investment. We explain below how we quantify the deductions in the two centre bars of each panel, but the key qualitative point is that the prospective risk premium is lower than the raw historical risk premium.

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16. At the start of our research period in 1900, US domestic investors would have found it much harder than today to construct a well-diversified portfolio. At the start of 1900, there were just 123 stocks listed on the New York Stock Exchange, and a single industry, railroads, accounted for 63 percent of their total market value. See Chapter 2, Dimson, E, P R Marsh, and M Staunton, *Triumph of the Optimists: 101 Years of Global Investment Returns*, Princeton University Press, 2002.

Unanticipated growth

To apply this framework, we need some notion of when cash flows (proxied here by equity dividends) have exceeded or fallen short of expectations. A simple approach that is commonly used today for forecasting the long-run dividend growth rate is to extrapolate from previous long-term dividend growth. The long-term real dividend growth rate is then used to make a naive projection of future real growth. That is, we estimate the product of *1 + Year 1 annual growth* multiplied by *1 + Year 2 annual growth* and so on to year *n*. We then compute the *n*[th] root of this product, which is equal to *1 + Projected growth*. To summarize, we calculate the annualized real dividend growth rate to each year-end, over periods that start in 1900.

We assume that at every December 31st, investors compare the year's real dividend growth to the real growth rate that would have been projected as at January 1st of that year. The difference is defined as *1 + Annual dividend growth* divided by *1 + Projected growth*, minus *1*. This error in projecting dividend growth may be thought of as the unanticipated growth rate in dividends. The unanticipated changes in dividend growth are compounded together to produce an estimate of their annualized impact over the last century. This is clearly a rather ad hoc measure of unanticipated real dividend growth, but it suffices to illustrate the general idea. Defined this way, Figure 9 shows that the stock price impact of unanticipated dividend growth over the period from 1900 to 2001 is 0.2 percent per year for the United States, 1.6 percent per year in the United Kingdom, and 0.6 percent per year for the world equity market.

Since 1900, there has also been a dramatic change in the valuation basis for equity markets. The price/dividend ratio (the reciprocal of the dividend yield) at the start of 1900 was twenty-three in both the United States and the United Kingdom, but by the start of 2002, the US ratio had risen to eighty-one and the UK ratio to thirty-nine. Undoubtedly, this change is in part a reflection of expected future growth in real dividends, so we could in principle decompose the impact of this valuation change into both an element that reflects changes in required rates of return, and an element that reflects enhanced growth expectations.

To keep things simple, we assume that the increase in the price/dividend ratio is attributable solely to a long-term fall in the required risk premium for equity investment. Given this assumption, Figure 9 shows that the stock price impact of the fall in the required risk premium since 1900 is 1.6 percent per year in the United States and 0.5 percent per year in the United Kingdom. This, together with the impact of unanticipated dividend growth, must be deducted from the historical risk premium.

To estimate the expected future risk premia, we must deduct the impact of both unanticipated cash flows and the fall in the required risk premium from our historical premia. The first of these adjustments can be thought of as the impact of good luck, while the second can be viewed as the effect of re-rating. Figure 9 shows quite large differences in the relative importance of these factors between the United States and the United Kingdom. In particular, for the US market, good luck appears to have had a smaller impact, and re-rating a larger influence. This arises partly from our using dividends as a proxy for unexpected cash flows and changes in the dividend price ratio as a proxy for re-rating. In the United States, the rapid growth of stock repurchases and the trend toward "disappearing dividends"[17] makes it harder

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17. See Fama, E. F. and K. R. French, "Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay", *Journal of Financial Economics*, Vol. 60, 2001, pp.3-43.

to disentangle these effects. The United States is the outlier among our sixteen countries[18], and in judging the relative contribution of unanticipated cash flows versus the impact of the fall in the required risk premium, the UK pattern may be more informative (see Figure 9).

The net effect of deducting the two adjustments from the historical risk premia is shown in the final bar of each of the three panels in Figure 9. These indicate an expected future geometric risk premium of 4.0 percent for the United States, 2.3 percent for the United Kingdom, and 2.9 percent for the world equity market. Our estimates for the United States are similar to those obtained recently by Fama and French using a related approach[19]. Also based on dividend yields and dividend growth estimates, Fama and French use the Gordon model to compute the US equity premium from 1872–1999. They find a premium of 3.8 percent before 1949, and a premium of 3.4 percent for the subsequent period. They argue that the difference between these estimates and the larger ex post risk premium based on historical realized returns is attributable to a reduction since 1949 in investors' required rate of return.

EXPECTED RISK PREMIA

If they are to be used as prospective risk premia, our annualized figures need to be converted into arithmetic means, as explained earlier. Using a projected standard deviation for US and UK equities of 16 percent, the prospective arithmetic risk premia for the United States is 5.3 percent, while the premium for the United Kingdom is 3.6 percent. Using a slightly lower standard deviation for the world index of 14 percent, the prospective arithmetic risk premium for the world index is 3.9 percent. Whichever country one focuses on, our forward-looking predictions for the equity risk premium are lower than the historically based projections reviewed earlier.

A literal interpretation of historical averages might suggest that France has a higher equity risk premium, while Denmark's is lower. While there are obviously differences in risk between markets, this is unlikely to account for cross-sectional differences in historical premia. Indeed, much of the cross-country variation in historical equity premia is attributable to country-specific historical events that will not recur. When making future projections, there is a strong case, particularly given the increasingly international nature of capital markets, for taking a global rather than a country-by-country approach to determining the prospective equity risk premium.

However, just as there must be some true differences across countries in their riskiness, there must also be variation over time in the levels of stock market risk. It is well known that stock market volatility wanders over time, and it is likely that the "price" of risk—namely the risk premium—also fluctuates over time. In the days following September 11, 2001 for example, financial market risk was high, and it is likely that the equity premium demanded by investors was also high. This depressed the market. If the terror had escalated further, the market may have collapsed; but Armageddon did not arrive and the market bounced back.

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18. Compared with the United States, stock repurchases have been far less prevalent in the other countries. In Europe, the United Kingdom has the highest level of buybacks, but even UK repurchases are small compared with the United States. See section 11.6 of Dimson, E, P R Marsh, and M Staunton, *Triumph of the Optimists: 101 Years of Global Investment Returns*, Princeton University Press, 2002.

19. Fama, E. F. and K. R. French, "The Equity Premium", *Journal of Finance*, Vol. 57, 2002, pp.637-59.

There were similar considerations a generation earlier during the Cuban missile crisis—another Armageddon that was averted. Clearly, at such times risk premia are above average. However, it is difficult to predict premia from the rolling ten-year averages depicted earlier in Figure 4. Indeed, it is difficult to infer expected premia from any analysis of historical excess returns. It may be better to use a "normal" equity premium most of the time, and to deviate from this prediction only when there are compelling economic reasons to suppose expected premia are unusually high or low.

CONCLUSION

The equity premium is the difference between the return on risky stocks and the return on safe bonds. The equity risk premium is central to corporate finance and investment. It is often described as the most important number in finance. Yet it is not clear how big the equity premium has been in the past, or how large it is today.

This paper has presented new evidence on the historical risk premium for sixteen countries over 102 years. Our estimates are lower than frequently quoted historical averages such as the Ibbotson Associates' figures for the United States and the earlier Barclays Capital and CSFB studies for the United Kingdom. The differences arise from previous bias in index construction for the United Kingdom, and, for both countries, from our choice of a longer time frame from 1900–2001, which incorporates the earlier part of the twentieth century, as well as the opening years of the new millennium. In addition, our global focus results in somewhat lower risk premia than hitherto assumed, since prior views have been heavily influenced by the experience of the United States, yet we find that the US risk premium has been somewhat higher than the average for the other fifteen countries.

The historical equity premium is often presented in the form of an annualized rate of return, which summarizes past performance in one number. For the future, what is required is the arithmetic mean of the distribution of equity premia, which is larger than the geometric mean. For markets that have been particularly volatile, the arithmetic mean of past equity premia may exceed the geometric mean premium by several percentage points.

In forecasting the future arithmetic mean premium, investors or companies who believe they can expect the same annualized risk premium as they have received in the past still need to adjust for the differences between historical market volatility and the volatility that we might anticipate today. More fundamentally, however, we have argued that past returns have been flattered by the impact of good luck and re-rating. Since the middle of the last century, equity cash flows almost certainly exceeded expectations, and the required rate of return doubtless fell as investment risk declined and the scope for diversification increased. Stock markets rose for reasons that are unlikely to be repeated. This means that when seeking forecasts for the future, historical risk premia should be adjusted downward for the impact of these factors.

We have illustrated one approach that can be used to make such adjustments. The result is a set of forward-looking, geometric mean risk premia for the United States, United Kingdom and for the world all falling within a range of around 2½ to 4 percent, and a corresponding set of arithmetic mean risk premia falling in a range of around 3½ to 5¼ percent. These estimates are not only far lower than the historical premia quoted in most textbooks, but they are also lower than those cited in surveys of finance academics.