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Credit Suisse Global  
Investment Returns  
Yearbook 2013

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To contact the authors or to order printed copies of the Yearbook or of the accompanying Sourcebook, see page 66.







## Introduction

It is now over five years since the beginning of the global financial crisis and there is a sense that, following interruptions from the Eurozone crisis and, more recently, the fiscal cliff debate in the USA, the world economy is finally moving towards a meaningful recovery. In this context, the *Credit Suisse Global Investment Returns Yearbook 2013* examines how stocks and bonds might perform in a world that is witnessing a resurgence in investor risk appetite and might soon see a rise in inflation expectations.

The 2013 *Yearbook* now contains data spanning 113 years of history across 25 countries. The *Credit Suisse Global Investment Returns Sourcebook 2013* further extends the scale of this resource with detailed tables, graphs, listings, sources and references for every country. With their analysis of this rich dataset, Elroy Dimson, Paul Marsh and Mike Staunton from the London Business School provide important research that helps guide investors as to what they might expect from market behavior in coming years.

To start with, the report examines the post-crisis investment landscape, highlighting historically low yields on sovereign bonds, with real yields in many countries now negative. At the same time and notwithstanding the recent rally in equities, developed market returns since 2000 remain low enough for many commentators to continue asking whether the cult of equity is dead. Against this backdrop, the authors ask what rates of return investors should now expect from equities, bonds and cash. In brief, they hold that investors' expectations of asset returns may be too optimistic.

Then, continuing the theme of investing in a post-crisis environment, they examine mean reversion in equity and bond prices. This second chapter of the 2013 *Yearbook* examines the evidence for mean reversion in detail, and whether investors can exploit it. In fact, it shows that the evidence on mean reversion is weak and that market timing strategies based on mean reversion may even give lower, not higher, returns.

Finally, with the improving business cycle in mind, Andrew Garthwaite and his team analyze whether inflation is good for equities. Drawing on the *Yearbook* dataset, they assess what type of inflation we may see in the future, and what equity sectors, industries and regions offer the best inflation exposure.

We are proud to be associated with the work of Elroy Dimson, Paul Marsh, and Mike Staunton, whose book *Triumph of the Optimists* (Princeton University Press, 2002) has had a major influence on investment analysis. The *Yearbook* is one of a series of publications from the Credit Suisse Research Institute, which links the internal resources of our extensive research teams with world-class external research.

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# The low-return world

The financial crisis has created a new investment landscape. Yields on sovereign bonds in safe-haven countries have fallen to historic lows. This has prolonged the bull market in bonds, but prospective real yields in many countries are now negative, or very low. Meanwhile, since 2000, equity returns in developed markets have been disappointing, leading many to ask if the cult of equity is dead. In this article, we assess what rates of return investors should now expect from equities, bonds, and cash. We also examine the stresses and challenges of this new, low-return world.

Elroy Dimson, Paul Marsh, and Mike Staunton, London Business School

The baby boomers now retiring grew up in a high-returns world. So did their children. But everyone now faces a world of low real interest rates. Baby boomers may find it hard to adjust. However, McKinsey (2012) predicts they will control 70% of retail investor assets by 2017. So our sympathy should go to their grandchildren, who cannot expect the high returns their grandparents enjoyed.

Figure 1 on the following page shows the real returns from investing in equities and bonds since 1950 and since 1980. From 1950 to date, the annualized real return on world equities was 6.8%; from 1980, it was 6.4%. The corresponding world bond returns were 3.7% and 6.4%, respectively. Even cash gave a high annualized real return, averaging 2.7% since 1980 across the countries in our database.

Bond returns were especially high. Over the 33 years since 1980, a period that exceeds the working lifetime of most of today's investment professionals, world bonds (just) beat world equities. Past performance conditions our thinking and aspirations. Investors grew used to high returns.

Equity investors were brought down to earth over the first 13 years of the 21st century, when the annualized real return on the world equity

index was just 0.1%. But real bond returns stayed high at 6.1% per year. Bond returns were high, however, because interest rates fell sharply.

In most developed countries, yields are now very low. The 2011 *Yearbook* pointed out that UK rates were the lowest since records began in 1694. In 2012, bond yields in many countries, including the USA, UK, Germany, Japan and Switzerland, hit all-time lows. Meanwhile short-term nominal interest rates and even some two-year bond yields actually turned negative in some countries, as investors had to pay for the privilege of safely depositing cash.

We have transitioned to a world of low real interest rates. Does this mean that equity returns are also likely to be lower? In this article, we examine what returns investors can now expect from bonds, cash, and equities. We also look at the stresses and challenges of living in a lower-returns world.

## Prospective bond returns

To extrapolate the high bond returns of the last 30 years into the future would be fantasy. The long bull market that started in 1982 was driven by

unusual and unrepeatable factors. Figure 2 shows how much US and UK bond yields have declined since the 1970s and 1980s.

Fortunately, we do not need to extrapolate from the past. For default-free government bonds, there is a simpler and better predictor of investment performance: their yield to redemption. At the end of 2012, 20-year government bonds were yielding 2.5% in the USA, 2.7% in the UK, 2.0% in Germany, and 1.0% in Switzerland.

These nominal yields are low, but what really matters to investors is future purchasing power, and hence the real yield. Figure 3 shows the real yields on inflation-protected bonds since 2000. Some countries (e.g. Switzerland) do not issue such bonds, while others (e.g. Japan and Germany) began issuance after 2000. As not all countries issue longer maturities, the chart shows 10-year bonds or the closest equivalent.

Figure 3 highlights the sharp fall in real yields since 2000, typically over 4%. Of the countries shown, by end-2012, only France had a positive real yield (just 0.07%). Italy (not shown) had a real yield of 2.8%, but the premium enjoyed by Italian and (to a far lesser extent) French bonds reflects default and convertibility (i.e. euro breakup) risk.

Even 20-year bonds, where they existed, had low real yields; zero in the USA, 0.1% in Canada, -0.1% in the UK, 0.6% in France and 3.4% in Italy. Abstracting for default and convertibility risk, investors, even over a 20-year holding period, will earn real returns of close to zero. For taxpayers, after-tax returns will be firmly negative.

**Prospective cash returns**

Real bond yields are low, but real cash returns are even lower. Treasury bill yields are currently close to zero in most developed markets, and real rates are (mostly) even lower. Over 2012, the real return on Treasury bills was -1.7% (USA), -2.7% (UK), and -2.0% (Germany and France); it was (just) positive at 0.4% in Switzerland and 0.3% in Japan, but only because both experienced mild deflation.

For asset allocation decisions, we need to know not only today's cash return, but also the expected return on a rolling investment in cash over our future investment horizon. We can seek guidance here from the bond market and the yield curve. Figure 4 shows the yield curves on government bonds for the USA and UK for maturities up to 30 years, both today and 13 years ago at the start of 2000. Short-term rates have fallen by around 6%. The shape of the curve has also changed. In 2000, it was fairly flat for the USA and downward sloping for the UK. At end-2012, it was sharply upward sloping in both countries. Evidently, the market does not expect short-term interest rates to stay indefinitely at current levels.

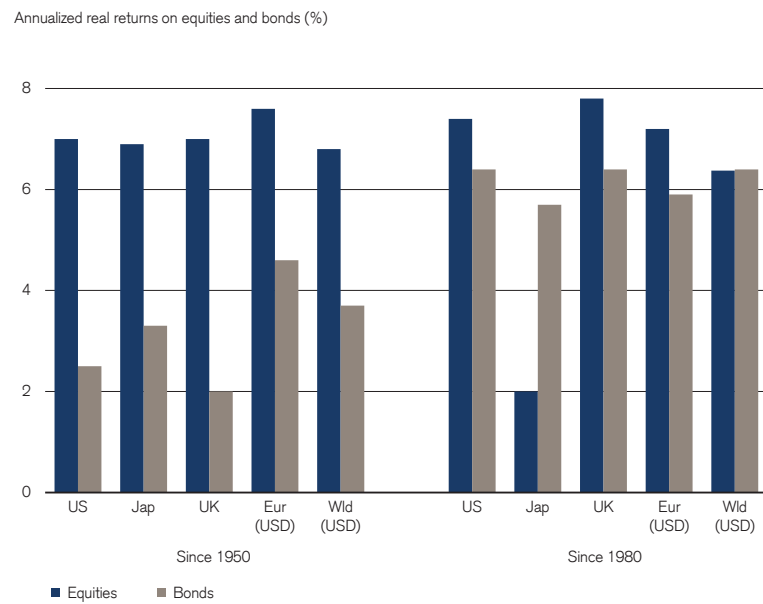
Redemption yields are a complex average of shorter and longer-term interest rates. The underlying year-by-year discount rates that investors implicitly use to price bonds are called spot rates. They can be estimated from either bond prices or strip prices. When yield curves slope upward, yields understate spot rates, as can be seen in Figure 4, which also plots the forward interest rates implied by the spot rates. These represent today's interest rates for a series of one-year loans applicable to successive future years.

If investors were risk neutral, the average of these forward rates would provide a market con-

**Figure 1**

**The high-returns world**

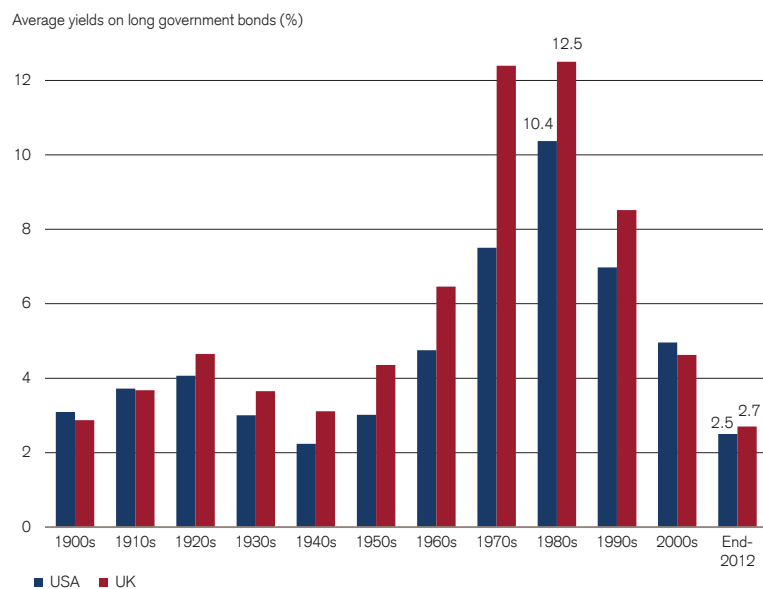
Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *Triumph of the Optimists*; authors' updates



**Figure 2**

**Yields on US and UK long sovereign bonds, 1900–2012**

Source: Elroy Dimson, Paul Marsh, and Mike Staunton



sensus estimate of the future return on cash. In reality, however, they are likely to provide an upwardly biased estimate. This is because they are estimated from bond prices, and bonds provide a maturity premium to compensate investors for the volatility of long-bond returns, for inflation and real interest rate risk, and to reflect transient factors like liability-driven demand and flights to quality.

We measure the maturity premium as the difference between the returns on long bonds and Treasury bills, where the bond returns are from a strategy of always investing in bonds of a given maturity. If the desired maturity is 20 years, for example, this can be approximated by repeatedly (1) buying a 20.5-year bond, (2) selling it (now a 19.5-year bond) a year later, and (3) buying another 20.5-year bond. The bond indices in this Yearbook follow this type of strategy.

Over the last 113 years, the bond maturity premium was positive in every country for which we have a continuous history, i.e. bonds beat bills/cash everywhere. The average premium was 1.1% per year, while the annualized premium on the world index (in USD) was 0.8%. Over the first half of the 20th century, the average annualized premium was 0.8%. Since then, it has been 1.5%, elevated by the high and unsustainable bond returns since 1980.

For major markets with a low risk of default, we therefore estimate an annualized forward-looking 20-year maturity premium of around 0.8%, in line with the long-run premium on the world bond index. We noted above that bonds of this maturity now have an expected real return of close to zero. Since the maturity premium is the amount by which bonds are expected to beat cash, this implies that the annualized return expected from cash over this same horizon is around -0.8%. The real return from a rolling investment in bills is thus likely to be firmly negative, even before tax.

### Are bond markets currently distorted?

The return estimates above rely heavily on current bond prices and yields. But can these market signals be trusted in today's financially repressed environment? Today's low yields partly reflect the quest for safe havens, are heavily influenced by central bank policies, and may be affected by regulatory pressure on pension-fund and insurance-company asset allocations. They may also be impacted by demographic factors, such as dissaving by retiring baby boomers, but the evidence here is, at best, weak (see Poterba, 2001) Should we be concerned that today's long bond yields may be artificially low?

This question is hard to resolve conclusively, but two points are relevant. First, many alleged "distortions" are likely to be permanent. Regulatory pressures on insurers and pension funds are unlikely to diminish; pension funds are maturing and should lean towards higher bond weightings; baby-boomer retirement is ongoing; and, with a stock market that could easily see an increase in volatility (see the

discussion below), the safe-haven demand for bonds could even increase.

Second, these factors are all common knowledge. While the impact of quantitative easing (QE) and other unconventional monetary policies may be hard to measure, the policies themselves are disclosed and transparent. It would be curious, therefore, if the market prices of bonds of different maturities failed to incorporate expectations of the impact of these factors. We should therefore expect bond market prices and yields to provide a reasonable guide to prospective returns.

Figure 3

### Real yields: The race to zero and beyond

Source: Thomson Reuters Datastream



Figure 4

### Term structure of interest rates in the USA and UK

Source: US Department of The Treasury, US Federal Reserve, Bank of England, UK Debt Management Office



### Expected equity returns will also be lower

The interest on cash/Treasury bills represents the return on a (near) risk-free asset. The expected return on equities needs to be higher than this as risk-averse investors require some compensation for their higher risk. If equity returns are equal to the risk free rate plus a risk premium, it follows that, other things equal, a low real interest rate world is also a lower-return world for equities.

From 1981 until the financial crisis in 2008, real interest rates were high, averaging 2.2% in the USA, 3.9% in the UK, and 3.3% across all Yearbook countries. Rates were much lower before this, from 1900 to 1980, when the average annual rate was 0.7% for the USA, 0.4% for the UK, and -0.6% when averaged across all countries, including those impacted by episodes of high inflation. Viewed through this prism, it is the high real rates from 1981 to 2008 that are the anomaly. However, today's real rates have fallen even below the 1900–80 average, implying a corresponding lowering of expected real equity returns.

To investigate whether history bears out this relationship between lower real equity returns and lower real interest rates, we examine, in Figure 5, the full range of 20 countries for which we have a complete 113-year investment history. We compare the real interest rate in a particular year with the real return from an investment in equities and bonds over the subsequent five years. There are 108 (overlapping) 5-year periods, so that we have 2,160 (108 x 20) observations. These are ranked from lowest to highest real interest rates and allocated to bands, with the 5% lowest and highest at the extremes and 15% bands in between.

The line plot in Figure 5 shows the boundaries between bands. The bars are the average real returns on bonds and equities, including reinvested income, over the subsequent five years within each band. For example, the first pair of bars shows that, during years in which a country experienced a real interest rate below -11%, the average annualized real return over the next five years was -1.2% for equities and -6.8% for bonds.

The first three bands comprise 35% of all observations, and relate to real interest rates below 0.1%, so that negative real interest rates were experienced in around one-third of all country-years. Thus, although today's nominal short-term interest rates are at record lows, real rates are not. Historically, however, the bulk of the low real rates occurred in inflationary periods, in contrast to today's low-inflation environment.

As one would expect, there is a clear relationship between the current real interest rate and subsequent real returns for both equities and bonds. Regression analysis of real interest rates on real equity and bond returns confirms this, yielding highly significant coefficients.

### The historical equity risk premium

While expected bond returns are revealed in market prices, prospective equity returns have to be inferred, since income is not guaranteed and future capital gains are unknown. By definition, the expected equity return is the expected risk-free rate plus the required equity risk premium, where the latter is the key unknown. Although we cannot observe today's required premium, we can look at the premium investors enjoyed in the past.

Figure 5

### Real asset returns versus real interest rates, 1900–2012

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database

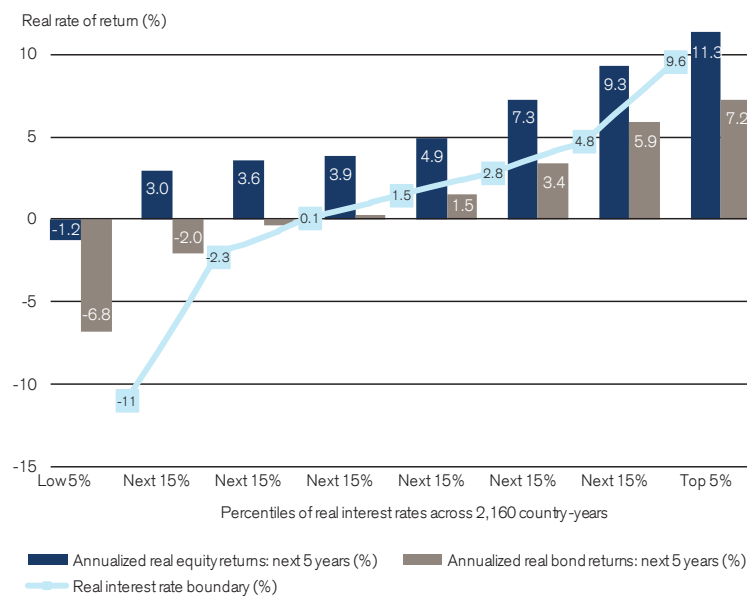
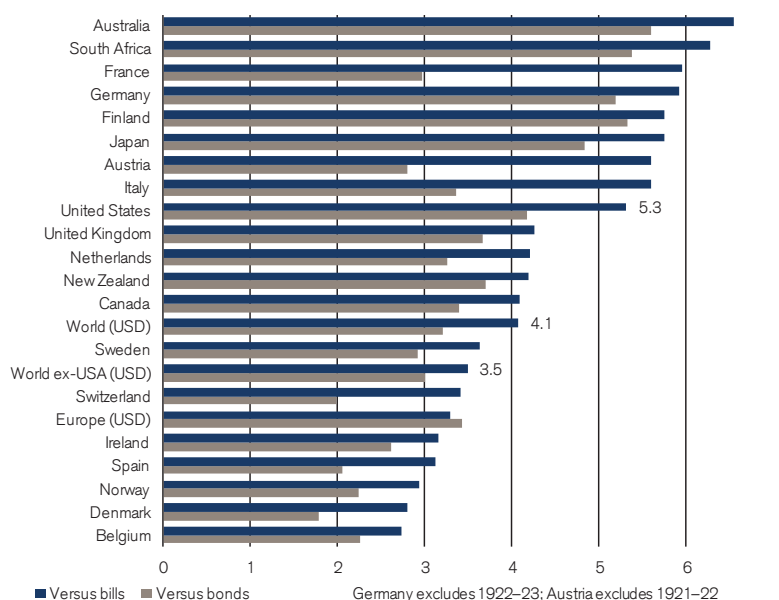


Figure 6

### Annualized historical equity risk premia (%), 1900–2012

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Triumph of the Optimists; authors' updates







century, the UK was overtaken by the USA, which remained the dominant market throughout, save for a brief 3-year period in the late 1980s, when Japan became the world's largest equity market. At its peak, Japan accounted for 45% of the total market capitalization of our 22 countries. Then the Japanese bubble burst and, by the end of 2012, Japan's proportion had fallen to just 8%, while the USA still accounted for 51%.

Our second enhancement is to address survivorship bias. At our base date of 1900, stock exchanges existed in 33 of today's nations. Until this year, our database contained 19 countries, accounting for some 87% of world market capitalization at end-1899. But, despite this extensive coverage, it is still possible that we are overstating worldwide equity returns by omitting countries that performed poorly or failed to survive.

The two largest missing markets were Austria-Hungary and Russia, which, at end-1899, accounted for 5% and 6% of world market capitalization, respectively (see Figure 1 of the country profiles on page 37). The best-known cases of markets that failed to survive were Russia and China. We have now added these countries to our database. With Austria, we now have 20 countries with continuous histories from 1900 to the present day. Russia and China have discontinuous histories, but we are still able to fully include them in our revised world index.

Figure 8 shows the capital gains (in USD) on the St. Petersburg and New York Stock Exchanges from 1865 onward. At first glance, Russian equities appear greatly superior – until one notes the timescale and end-point, namely 1917. The St. Petersburg Exchange was closed during World War I from July 1914 (the gray dashed line represents the closure period). It then briefly re-opened in early 1917, when stocks rallied by 20%. But then came the Russian Revolution, and all tsarist era equities became valueless. A similar fate awaited the Shanghai Stock Exchange in 1949. When it became clear that the communists had won the civil war, stocks rallied in the hope that the chaos was over, but this was a misjudgment.

The expropriation of Russian assets after 1917 and Chinese assets after 1949 could be seen as wealth redistribution, rather than wealth loss. But investors at the time would not have warmed to this view. Shareholders in firms with substantial overseas assets may have salvaged some equity value, e.g. Chinese stocks with assets in Hong Kong and Formosa/Taiwan. Similarly, Russian and Chinese bonds held overseas continued to be traded in London, Paris and New York long after 1917 and 1949. While no interest was paid, the Russian and Chinese governments eventually – in the 1980s and 1990s – paid compensation to some countries, but overseas bondholders still suffered a 99% loss of present value.

When incorporating these countries into our world index, we assume that shareholders and domestic bondholders in Russia and China suffered total losses in 1917 and 1949, respectively. We then re-include these countries in the index when their markets re-opened in the early 1990s.

Figure 7 shows this graphically. The black shaded area for Russia shows that it starts 1900 with a little over 6% of the total equity capitalization of our 22 countries. It disappears in 1917, and then reappears – as a much smaller percentage of capitalization in the early 1990s. Figure 7

Figure 8

Russian and US equities: Capital gains (USD), 1865 to 1917

Source: International Centre for Finance at Yale

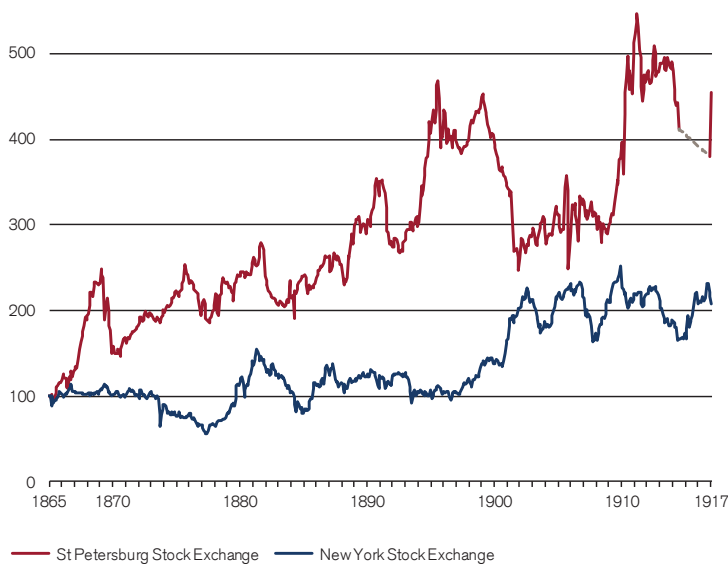
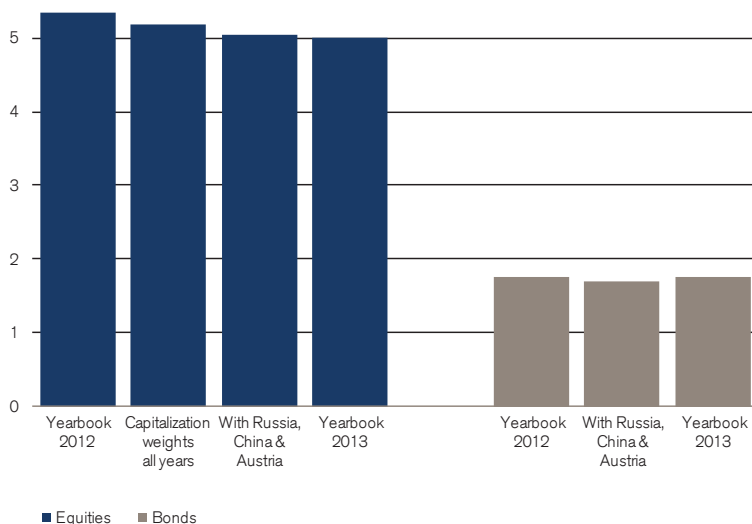


Figure 9

Impact of weighting and survivorship on world index

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database

Estimated annualized real returns on world index, 1900 to Yearbook date (%)



also shows Austria separately, as this was also a large market in 1900. The orange area for Austria starts at just over 5% of the total, but falls to just 1% with the breakup of the Habsburg Empire in 1918. China is not shown separately in Figure 7 as it was a very small market in 1900.

Figure 9 shows the impact of the changes we have made to the world index. The leftmost bar shows that, based on the 19 countries in the 2012 *Yearbook* and the weightings we used then, the annualized real return on the world index from 1900 to 2011 was 5.35%. The second bar shows that moving to capitalization weights for all years lowered our estimate by 0.17% per year. Adding in Austria, which had disappointing equity returns, plus Russia and China, which experienced total losses, lowered the annualized return by a further 0.14% per year. The 2013 *Yearbook* now records an annualized real return of 5.01% on the world equity index, after adding in data for 2012, plus several enhancements to earlier equity series (see the 2013 *Sourcebook*).

The right-hand set of bars in Figure 9 shows the impact of adding Russia, China and Austria to the world bond index. The index weightings are unchanged and we continue to use GDP weights. This is partly because we have been unable to find comprehensive data on bond market sizes for all countries, but also because GDP-weighted indexes have advantages. For example, they do not give excessive weight to the most heavily indebted countries with the highest credit risk.

Last year's 2012 *Yearbook* reported an annualized real return on the world bond index of 1.75%. Figure 9 shows that with the inclusion of Austria, plus Russia and China, where we assume domestic bond investors lost everything in 1917 and 1949, the annualized return falls by 0.05% to 1.70%.

At first sight, this seems a remarkably small reduction. Closer scrutiny shows that the losses on Russian bonds in 1917 and Chinese bonds in 1949 reduced the annualized return on the world bond index by 0.10% and 0.12%, respectively. However, in other years, bond returns for these countries were slightly higher than for the remaining countries in the index, so the net impact over 113 years was very modest. After 2012 updates plus revised bond series for several countries, the 2013 *Yearbook* now records an annualized real return on the world bond index of 1.75%, unchanged from 2012.

Neither the move to capitalization weightings for the world equity index, nor our measures to remove survivorship and success bias have had a major impact. While these are both important methodological improvements, they result in only a small decline in the annualized world equity premium, which we now estimate to be 4.1%.

## Was the premium higher than expected?

Many people argue that the historical equity premium is a reasonable guide to the future. When investors buy stocks, the purchase price reflects an implicit risk premium. Over the long run, investors should expect good luck to balance out bad. If so, the average premium they receive should be close to the premium they required and impounded into prices at purchase. But, even over periods as long as 113 years, this may not be true. If investors enjoyed more than their share of good luck, the historical premium will overstate what we can expect in future.

As an alternative to assuming that today's risk premium equals the historical premium, several studies have sought instead to use historical data to infer what investors were expecting in the past. These studies all reach similar conclusions, but the best known is by the distinguished researchers Eugene Fama and Kenneth French (2002), who analyzed US data from 1872 to 1999. They concluded that, up to 1949, realized equity returns were in line with prior expectations.

From 1950 to 1999, however, they concluded that investors had, *ex ante*, priced in a required equity premium of around 3½%, but actually enjoyed a realized premium of over 8%. They argued that the difference was due to unexpected capital gains, partly as a result of a decline in discount rates. They concluded that expected future stock returns would be low, relative to the last 50 years.

What might explain the windfall gains apparently enjoyed by investors in the second half of the twentieth century? The first half of the century had not been kind to investors. There had been two world wars, the Wall Street Crash and the Great Depression. Yet the second half of the twentieth century turned out to be far better than might have been expected in 1950. There was no third world war, the Cold War ended, productivity and efficiency accelerated, technology progressed, and governance became stockholder-driven.

Our own research (2008), *The Worldwide Equity Premium: A Smaller Puzzle*, follows a similar approach to Fama and French, but uses data for multiple countries. We split the historical premium into components that correspond to investors' *ex ante* expectations and those that are attributable to non-repeatable luck. We show that equity returns can be decomposed into the annualized mean dividend yield, plus the annualized growth rate of real dividends, plus the annualized expansion over time of the price/dividend ratio.

This analysis is updated to the end of 2012 in the accompanying *Sourcebook*. We show that, historically, for the world equity index, the annualized mean dividend yield has been 4.1%, while real dividends grew by 0.5% per year and the annualized expansion in the price/dividend multiple was 0.4%. Like Fama and French, we interpret



the multiple expansion to be the result of a fall in the equity premium.

What might have caused the equity premium to fall since 1900 so that stocks became more highly valued? A plausible explanation is that this gradual re-rating reflects the reduced investment risk faced by investors. In 1900, most investors held a limited number of domestic stocks from a few industries – railroads then dominated. As the century evolved, new industries emerged, as did vehicles such as mutual funds, which provided cheap diversification. Liquidity, governance and risk management improved, and institutions and wealthy individuals invested globally. As equity risk became more diversifiable, the required risk premium is likely to have fallen. We judge there to be limited scope for further such gains, and do not expect this re-pricing element of returns to persist.

Between 1900 and 2012, the real dividend growth of the median country was close to zero, but the capitalization-weighted mean growth rate was 0.5%, supported by business and political conditions that improved on many dimensions during the second half of the 20th century. We are unaware of any indication that, in 1900, investors foresaw that equities would be re-rated or that dividends would grow faster than inflation (and even faster than GDP). These elements of “good luck” underpin realized returns that exceed equity investors’ ex ante expectations.

After adjusting for non-repeatable factors that have favored equities in the past, we infer that investors expect an equity premium (relative to bills) of around 3%–3½% on a geometric basis and, by implication, an arithmetic mean premium for the world index of approximately 4½%–5%. Since we cannot know today’s consensus expectation for the equity premium, these historically based ranges should be regarded only as a guide to current expectations.

### Do current risks justify a higher premium?

The equity premium can be viewed as an expected reward per unit of risk. It should not, therefore, be constant over time, but instead should vary with risk levels and investors’ risk aversion. Today, risks abound relating to the Eurozone, world growth, and political and geopolitical concerns. Many argue that this high level of uncertainty should command a high risk premium.

It is hard to find either historical or current market support for this view. First, the empirical evidence over 113 years indicates that, when markets are turbulent, volatility tends to revert rapidly to the mean, so that we should expect any period of extreme volatility to be relatively brief, elevating the expected equity premium only over the short run. Second, at the time of writing, volatility is in any case below the long-run average. As the 2013 Sourcebook shows, the VIX index, which measures the annualized volatility of S&P options, stood at 18.0% at the end of 2012, which is below its 27-year average of 20.9%.

In the Sourcebook, we identify 11 major spikes in the VIX, each associated with an economic or political crisis. For each crisis, Figure 10 shows the time taken in trading days for the VIX to revert from its peak volatility back to its (then) long-run mean. The longest reversion time was during the credit crunch/Lehman crisis, when it took 232 trading days (11 months). The average time was 106 trading days, or just under five months. Figure 10 also shows the “half-life,” or the time taken to revert half the way back to the mean. The average half-life was just 11 days.

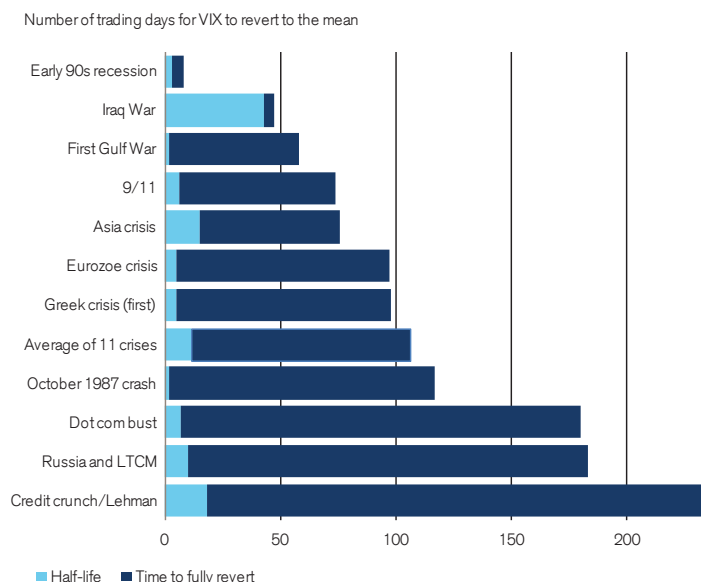
In addition to varying with the level of risk in the markets, the equity premium will also vary over time with investors’ risk aversion. After sharp market declines, equity investors are poorer and more risk averse. At such times, markets are also typically more volatile and highly leveraged. Investors should therefore demand a higher risk premium (which will drive markets even lower) in order to ensure that stocks are then priced to give a higher future expected return.

In Chapter 2, we examine whether the evidence supports this view. We conclude that it does, albeit less strongly than many have argued. But, if risk aversion is accentuated by market declines, it is hard to argue that it should currently be high. Over 2012, the world equity index gave a return of 16%, while, over the last four years, the

Figure 10

### Time taken for VIX volatility to revert from peak to the mean

Source: Chicago Board of Exchange and Elroy Dimson, Paul Marsh, and Mike Staunton



world index has risen by 65%. Current levels of risk or risk aversion do not therefore justify an equity premium above the long-term estimate of 3%–3½% (relative to bills). Those who argue to the contrary may well have forgotten that equity markets almost always face a wall of uncertainty. We do not live in uniquely uncertain times.

### Likely returns in a low-return world

We have seen that an investor with a 20–30 year horizon faces close to zero real returns on inflation-protected government bonds. Some countries offer higher yields, but only because of default and/or convertibility risk. The expected real return on conventional long bonds is expected to be a little higher, so the annualized real return on a rolling investment in cash is likely to be negative by as much as ½% over, say, 20 years, and close to zero over 30 years. Adding an equity premium of 3%–3½% to these negative/low real expected cash returns gives an expected real equity return in the region of 3%–3½% over 20–30 years. We are indeed living in a low-return world.

Figure 11 highlights the contrast with the past. The two sets of bars on the left are taken from Figure 1 and represent historical annualized real returns since 1950 and 1980 – the high-returns world. The bars on the right represent our estimates of the expected real returns on equities and bonds over the next generation. The bond returns are based on current yields, while the equity returns are based on expected cash returns plus an annualized equity premium that averages 3½%, but which varies with the systematic risk of each country/region.

### Many return projections are unrealistic

In 2012, the top concern of institutional investors was the low-return environment (Pyramis, 2012). Yet many investors seem to be in denial, hoping markets will soon revert to “normal.” Target returns are too high, and many asset managers still state that their long-run performance objective is to beat inflation by 6%, 7%, or even 8%. Such aims are unrealistic in today’s low-return world.

Pension plans are also too optimistic, especially in the USA. While the average expected return on plan assets at S&P 500 companies has fallen from 9.1% a decade ago, it still stands at 7.6%. Meanwhile, the proportion of equities held has fallen to 48%. Given low current fixed income yields, plan sponsors need equity returns of some 12½% nominal or 10% real to meet such targets. US public pension plans have even higher projections. Remarkably, Pyramis found that 71% of plan sponsors expected to achieve their targets.

In other countries, Towers Watson (2012) reports that projected pension returns are lower: 6.4% (Canada), 6.1% (UK), 5.0% (Asia), 5.0% (Netherlands), 4.6% (Germany), 3.6% (Switzerland), and 2.3% (Japan). But, with the exception

of Japan, these figures still seem optimistic. For Canada and the UK, the implied real equity return is greatly above the level we deem plausible. For Germany, Japan, the Netherlands and Switzerland, although the projections are lower, so is the proportion of equities held, making even these lower aspirations a stretch.

In many countries, regulators set guidelines for the claims that financial product manufacturers and distributors can make about what constitutes a plausible expected return. In the UK, for example, the Financial Services Authority (FSA) currently stipulates projections of 5%, 7%, and 9% before costs for a notional product two-thirds invested in equities, and one third in fixed income. After analysis of *Yearbook* data and other evidence, the FSA has reduced the assumed returns that can be used from 2014 onward to 2%, 5%, and 7%. The middle, or most likely, rate of 5% is closer to what we would regard as realistic, though it is noteworthy that the “pessimistic” projection is still for positive returns.

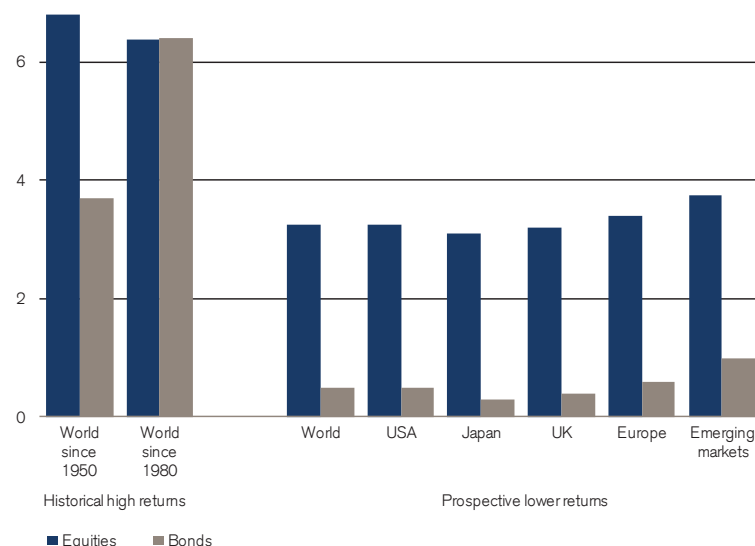
Meanwhile, however, Britain has introduced automatic enrolment rules for private pensions for most employees. Interestingly, the UK’s Department for Work and Pensions (DWP) calculates the prospective wealth of tomorrow’s pensioners using an assumed return that exceeds the most optimistic projection that the FSA now permits. Other cases of wishful thinking include child trust funds in the UK and the “privatization” reforms suggested for the US social security system. To assume that savers can confidently expect large wealth increases from investing over the long term in the stock market – in essence, that the investment conditions of the 1990s will return – is delusional.

Figure 11

### Likely returns in a low-return world

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database

Annualized real returns on equities and bonds (%)



## A low return world is a stressful world

Today's low-return world is imposing stresses on investors. Pension plans are especially hard hit. Defined benefit (DB) plan deficits are escalating, primarily reflecting the impact of low yields on the value of their liabilities. Meanwhile, lower prospective real returns inhibit their ability to recover.

The world's largest pensions market is the USA, which is five times larger than Japan, the runner-up. Milliman (2012) estimates that for the USA, the 100 largest DB corporate pension plans were underfunded by USD 0.5 trillion at the end of October 2012, with assets covering just 73% of liabilities. As recently as 2007, these plans were, in aggregate, overfunded. The deficit for the 100 largest public pension plans was even higher at USD 1.2 trillion, with a funding ratio of just 68%.

Pension plan deficits have emerged around the world. Sponsors have responded by lobbying for "relief." In the USA, this has been provided by legislation that allows plan sponsors to set the discount rate for liabilities with reference to a 25-year historical average of interest rates, rather than using current yields. The UK is considering similar measures. By overstating assumed interest rates, reported liabilities are underestimated. True liabilities are unaffected, so that this amounts to tampering with the barometer when the weather looks bad.

The deficits of funded pension plans pale into insignificance against unfunded pension liabilities, which have ballooned as interest rates fell after the financial crisis. In the USA, the 75-year unfunded social security liability is USD 8.6 trillion, while the infinite horizon liability is USD 20.5 trillion. In the UK, unfunded public sector pension liabilities (all DB schemes) are at least GBP 1 trillion, while unfunded state pension liabilities total at least GBP 4.3 trillion. The increased liabilities from the lower interest rates can be met only by raising taxes (e.g. US payroll tax or UK National Insurance), by increasing the pension age, or by cutting benefits. These are harsh choices.

Meanwhile, defined contribution (DC) pension schemes demand large contributions. Consider, for example, a 25-year old entering a DC scheme with a view to retiring at 65 on half salary. Assume that salary, contributions, and the ultimate pension are all inflation-linked. If the after-costs real investment return is 4%, this individual will need to contribute 10% of salary. While this might have been a plausible assumption five years ago, a more realistic assumption is that the after-costs real return will now be 1%–2%. This requires a contribution rate of 16%–20%.

Similar arguments apply to all forms of savings targeted at future spending goals, which imposes pressures on asset managers. If the fee for a retail savings or personal pension product is 1%, then it may be eating up as much as half the gross real return. Eventually, this has to translate into demands for asset managers to cut fees.

The low-return environment also challenges endowments, charities, foundations, and other funds with a very long investment horizon, which means they must manage their expenditures to live within their means. Consuming too much implies spending on this generation of beneficiaries at the expense of the next. These institutions must assess the level of spending that can be sustained over the long term without destroying the fund's real value. A common rule is to restrict spending to 4% of (say) 3-year average assets. A similar 4% rule is often advocated for retirement spending.

To maintain the real value of a perpetual endowment, the withdrawal or spending rate should not exceed the expected real return on the assets. We have estimated that over the next 20–30 years, global investors, paying low levels of withholding tax and management fees, can expect to earn an annualized real return of no more than 3½% on an all-equity fund and 2% on a fund split equally between equities and government bonds. These figures sit uneasily with a 4% rule. Endowments face the dilemma that they will be unable to maintain real value unless they drastically curtail grant-making, ramp up fundraising, convert from perpetual to finite life, or take on significant risk.

In this stressful environment, investors are naturally concerned with whether low returns will persist for a long time, and for how long these low returns might be bearable.

## How long can low returns be tolerated?

For how long can we expect returns to be low? The current market consensus, portrayed in the yield curve (see Figure 4), is that nominal interest rates will remain very low for the next few years before rising steadily, but not to the levels seen in 2000 or even pre-financial crisis. It could take another 6–8 years for short-term real interest rates to turn positive, and markets are not expecting a return to the high levels experienced since 1980 (2.7% averaged across countries). Instead, markets suggest a drift in the direction of the long-run average of 0.9% for the USA and UK.

For how long are low returns bearable? For investors, we fear that the answer is "as long as it takes." While a low-return world imposes stresses on investors and savers in an over-leveraged world recovering from a deep financial crisis, it provides essential relief for borrowers. The danger here is that if this continues too long, it creates "zombies" – businesses kept alive by low interest rates and a reluctance to write off bad loans. This can suppress creative destruction and rebuilding, and can prolong the downturn.



## Conclusion

The low-return environment is a major concern for investors. Low interest rates and bond yields have been clear for all to see for some time now. However, it may have been less obvious that low rates imply low prospective returns on all assets, including equities. We have shown that there is a strong association between low real interest rates and low subsequent equity returns. We estimate that the prospective real return on world equities has fallen to around 3%–3½% per annum.

While we have now been living with low rates for several years, many investors still seem in denial, hoping for a rapid return to “normal” conditions. But investors should be careful what they wish for. Most asset classes have benefitted greatly over the last few years from the fall in real yields. This process is symmetric. A rapid return to higher real interest rates would almost certainly be accompanied by a fall in the value of most asset classes, albeit to varying degrees.

The high equity returns of the second half of the 20th century were not normal; nor were the high bond returns of the last 30 years; and nor was the high real interest rate since 1980. While these periods may have conditioned our expectations, they were exceptional. The long-run averages documented in this [Yearbook](#) provide a more realistic guide to the future.

The projections we have made for asset returns over the next 20–30 years are simply our own best estimates. They will almost certainly be wrong, but we cannot predict in which direction. There will also be large year-to-year variations in return. They should also be viewed strictly as long-run forecasts, and they are not incompatible with short-term optimism or pessimism about particular asset classes.

As long-term forecasts for the next 20–30 years, we nevertheless believe our estimates are realistic. This is in stark contrast to some of the projections currently being made by many asset managers, retail financial product providers, pension funds, endowments, regulators and governments. Overly optimistic estimates of future returns are dangerous, not only because they mislead, but also because they can mask the need for remedial action.



# Mean reversion

In today's low-return world, investors are reluctant to lock in to negative real returns. There are many ways to increase expected returns, including holding more equities, but they all involve higher risk. But, in the case of equities, it is often argued that risk declines when the investment horizon is long. The reason given for this is that equity returns revert to the mean. Such mean reversion would not only reduce risk, but could also provide market-timing signals that allow investors to boost returns. This article examines the evidence for mean reversion, and whether investors can exploit it.

**Elroy Dimson, Paul Marsh, and Mike Staunton**, London Business School

As we highlight in the previous chapter, in today's financially repressive conditions, investors are seeking higher returns. In fixed income, one option is to move along the yield curve, but this involves maturity risk. Another strategy is to look beyond safe-haven sovereign bonds, at distressed sovereigns, emerging markets, and corporate and high yield bonds, but this involves credit risk. Or, as in the next chapter, investors can look at real assets, but again these are risky investments.

Where there are risks, there are often rewards. We saw in the last chapter that the equity premium is large. A simple way of enhancing expected returns is thus to increase equity weightings. In the short term, the risks are commensurately large. But there is a seductive argument that says equity risk falls the longer the investment horizon – a supposed corollary to the advice that investors should take a long-term view.

This belief that time helps conquer risk is based on the view that equity returns are mean reverting. To the extent that periods of poor performance tend to be followed by bounce-backs, and strong performance presages reversals, then short-term volatility will overstate longer-term risk.

This is an important issue. It lies at the heart of the debate about the appropriate equity weightings for long-term investors such as pension funds, insurance companies, endowments, family offices, and sovereign wealth funds. Furthermore, if markets do mean revert, this may imply market timing and tactical asset allocation opportunities.

This article examines the evidence. We start by showing why markets can seem to mean revert, even if they do not, drawing parallels with the "Gambler's Fallacy." We see whether valuation ratios reveal periods in which equities are unusually cheap or expensive, and how these signals should be interpreted, given the two main theories as to why stock returns may be predictable.

We then use *Yearbook* data to examine the extent to which valuation ratios can predict future returns over different horizons. This enables us to extend US-based research into a global context over the very long term. While there is some indication of stock market predictability, the signals are not consistent or reliable. Disconcertingly, there is likely to be a stronger case for investing in equities at the very time when investors are most keen to find a safer home for their wealth.



### Tempting but misleading trendlines

Figure 1 shows that the real return on US equities over the last 113 years was 6.3% including dividends, or 2.0% in terms of capital appreciation, excluding dividends. The 4.2% annualized difference between these two is attributable to the impact of reinvested dividends.

In line with common practice, we have fitted trendlines. The straight lines in Figure 1 portray the annualized long-term trends for US equities of a 6.3% annualized return and a 2.0% annualized capital gain. On any date when equities plot below the trendline, subsequent performance is destined to be above the long-term average and above the accumulated (1900–date) record. We refer to these as dates when equities appear, in hindsight, to be “cheap.” Similarly, when US equities plot above the long-term trend, and appear in hindsight to be “expensive,” subsequent performance is destined to be lower than the long-term average and lower than the accumulated (1900–date) record. Typically, people focus on the capital gains index when discussing when stocks look “cheap” or “expensive.”

Conditional on knowing the trend rate of return, “forecasts” based on whether stocks are deemed “cheap” or “expensive” will be completely accurate. By construction, equity prices will at a future date revert to the long-term mean. While we do not know the speed of mean reversion, we know it must happen by the end-date of the long-term return series. However, as an investment system, this approach is inoperable as it requires the investor to be prescient about the eventual performance of the stock market. The temptation to fit such trendlines seems irresistible. Unfortunately, they mislead, rather than inform.

### The Gambler’s Fallacy

Those who base investment decisions on this type of mean-reversion may be falling victim to the “Gambler’s Fallacy.” The roulette player, seeing a run of black, may believe that the next color is more likely to be red. Compared to the proportion of reds in the recent past (namely zero) it is obvious that the proportion of reds will rise, and there will in this sense be reversion to the mean. But some players may reckon that, since the long-run proportion of reds should be 50%, one can anticipate that a run of blacks will be followed by disproportionately more reds in order to restore the record to 50:50. The Gambler’s Fallacy is the belief that, if deviations from expected behavior are observed in repeated independent trials of some random process, subsequent deviations are more likely to be in the opposite direction.

After a run of superior stock market returns, is subsequent performance likely to be inferior? In a trivial sense, equity returns inevitably exhibit mean reversion. That is, after exceptional performance, one must expect future returns to be more restrained – just as, after a run of blacks, the next outcome is as likely to be red or black. Exley, Mehta and Smith (2004) express this trivial definition of mean reversion as follows: asset prices are mean-reverting if asset prices tend to fall (rise) after hitting a maximum (minimum). Using this definition, many analysts convince themselves that stock markets obviously mean revert. For example, the stock market was “clearly overvalued” in the summer of 1987 and late 1999, and was “clearly undervalued” at the end of 1974.

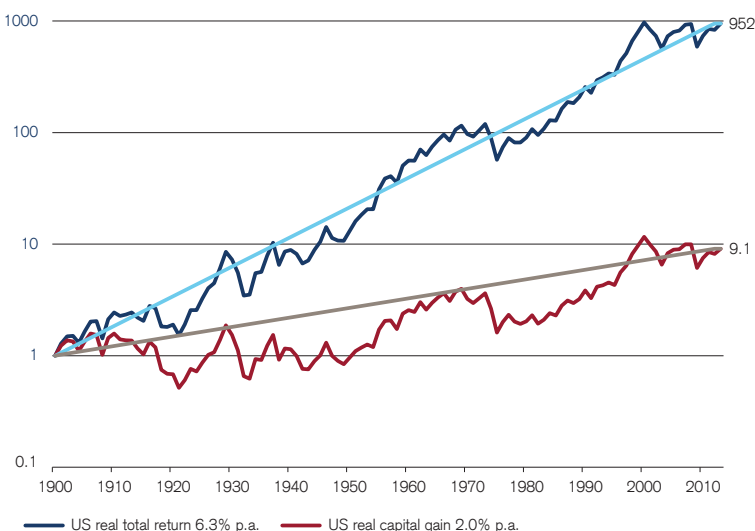
Siegel (2008), a well-known proponent of mean reversion, explains that such a series is one for which “returns can be very unstable in the short run but very stable in the long run.” However, trends in equity returns are unpredictable, and the parameters of the distribution – the long-term mean return and the precision with which it can be calculated – are challenging to estimate. Bou-doukh, Richardson, and Whitelaw (2006), Diris (2011) and Pastor and Stambaugh (2012), among others, contend that parameter uncertainty increases over longer horizons. This body of theory and evidence indicates that it is unlikely that

Figure 1

### Real returns and capital appreciation, US equities, 1900–2012

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *Triumph of the Optimists*; authors’ updates

US real total return and capital gains indexes: start-1900 = 1



long-horizon equity performance can be estimated with more confidence than over short horizons.

The search for predictability has led to an increasingly complex and statistically sophisticated body of research. There are several careful, detailed surveys of this research, including the papers by Kojien and Van Nieuwerburgh (2011) and Rapach and Zhou (2013). The latter includes references to 200 academic papers on predicting stock market returns. Interestingly, however, most of these are based on the experience of a single country (usually the United States) and, where the evidence is international, it typically spans a rather brief interval. We rectify this by drawing on the long-term and globally diverse *Yearbook* database.

### Using valuation ratios to predict reversion

Tests for mean reversion typically focus on measures of fundamental value. The most widely cited approach is Shiller's cyclically adjusted price-earnings ratio, defined as the ratio of the current real index level to the average of the preceding ten years' real earnings. We refer to the Shiller PE estimated over ten years as  $PE_{10}$ . A similar measure can be constructed based on income, the cyclically adjusted price-dividend ratio or  $PD_{10}$ , the ratio of the current real index level to the average of the preceding ten years' real dividends.

Figure 2 presents monthly data for these two series for the USA. The series move together closely, and a similar high degree of association is apparent when we look at annual data. Notably, the earnings-based and dividend-based series are highly correlated, despite the fact that, in recent years, some cash flows reached investors through buybacks rather than dividends.

The USA is the only country with a very long-run earnings series. But such series can anyway be problematic. Even in the comparatively stable markets of the USA and UK, the last century witnessed cyclical variation in the proportion of loss-making companies (which are almost invariably omitted from PE multiples). There was also an evolution in accounting standards and major step changes in the definition of reported earnings, so that early earnings data are not truly comparable with more recent data. Additionally, when comparing different countries' equity markets, there has been cross-sectional variation in inflationary and economic conditions, and in reporting practices.

Consequently, not only is the cyclically adjusted price-dividend ratio  $PD_{10}$  a substitute for the cyclically adjusted price-earnings ratio  $PE_{10}$  in the USA, but the dividend-based series is likely to be a superior metric for making very long-run and cross-country comparisons. Earnings, after all, can be manipulated, and include accruals, whereas dividends are factual and represent hard cash flows. There is also substantial evidence that companies set their dividend policies to be consistent with their (private) forecasts of future, sustainable earnings.

We can therefore make a virtue out of a necessity (the lack of earnings data), and conduct our long-run, cross-country analysis into mean reversion and market predictability using the  $PD_{10}$  ratio for all *Yearbook* countries.

### Why returns may be predictable

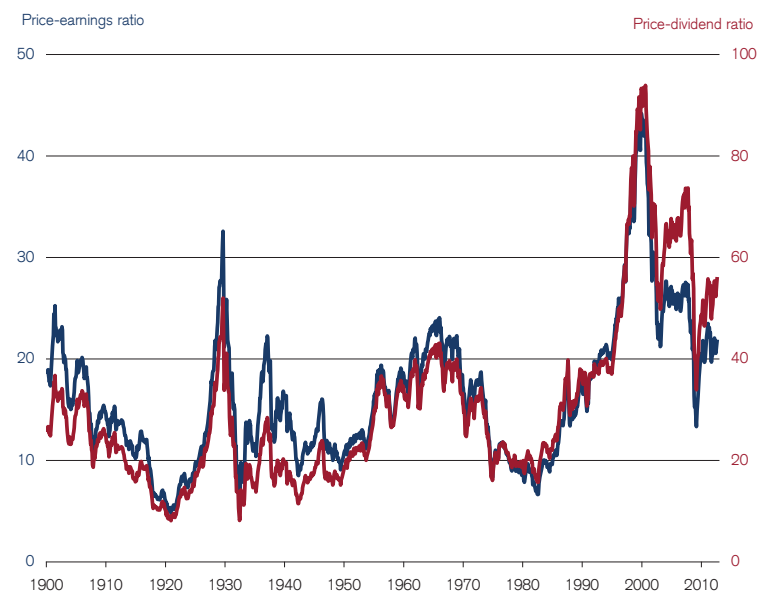
Stock market performance may be genuinely predictable, or the predictability may be an illusion. Illusions usually arise because a long-term trend has been identified with hindsight. As noted above, this guarantees a tendency towards mean reversion and a spurious impression of predictability. Goyal and Welch (2003, 2008) highlight how hard it is to extrapolate from the past to generate a prediction that is valid out-of-sample, and we have written about this before (Dimson, Marsh, and Staunton, 2004ab). It is a serious concern.

But there are two reasons why stock market performance could be genuinely predictable. First, prices may be incorrect because investors have overreacted to good or bad news. This can give rise to speculative bubbles in stock prices (either positive or negative). Because of their slow reaction to information, investors' decisions reflect past returns and can be characterized by herding. The herding pushes prices higher (or lower) and this can create a feedback loop. Thus, prices may deviate from fundamental value for a long time.

Figure 2

### Monthly values of Shiller price-earnings ratio and corresponding price-dividend ratio for the USA, 1900–2012

Source: Elroy Dimson, Paul Marsh, and Mike Staunton using data from Professor Shiller's website



**Figure 3****Scatter plot of real equity returns vs. prior cyclically adjusted dividend yield in the USA, 1900–2012**

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database plus Shiller dividends 1890–99. Note that over 2009–12, the number of years spanned by the returns window shortens to 4, 3, 2 and then 1.

**Figure 4****Scatter plot of real equity returns vs. prior cyclically adjusted dividend yield in the UK, 1900–2012**

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database and Grossman (2002) dividends 1890–99. Note that over 2009–12, the number of years spanned by the returns window shortens to 4, 3, 2 and then 1.



When stocks are overvalued, the subsequent return can be expected to be lower than in normal times; when stocks are undervalued, the subsequent return can be expected to be higher. The eventual return to normalcy offers profit opportunities to astute investors who are not subject to these behavioral biases. This literature is represented by De Bondt and Thaler (1985) and Shiller (2000), and reviewed in Barberis and Thaler's (2003) survey. The weakness of this view is the assumption that investors do not learn about their behavioral biases, and that there are not enough smart, fundamental investors around to prevent this mispricing from persisting.

The second reason why stock markets may be predictable is that there are time-varying risk premia. On this view, investors respond rationally to stock market booms and busts. At times of business confidence, buoyant economic conditions and investor tolerance for risk, markets will be elevated and this will give rise to the lower expected return required by investors when times are good. At times of economic and financial trauma, markets will be depressed and this will underpin a superior reward to investors willing to hold risky assets.

Fama and French (1989) explain that, in a rational and efficient financial market, changes in business conditions should give rise to time-varying risk premia. High returns should rationally tend to follow periods when valuation ratios are low, while low returns should tend to follow high valuation ratios. Berk (1995) stresses that higher expected returns are virtually synonymous with lower current prices. We have provided confirmation of this tendency in previous editions of the *Yearbook*, most recently in Dimson, Marsh, and Staunton (2011b, 2012).

As Cochrane (2011) notes, the debate over long-term return predictability remains unresolved. Moreover, the two potential explanations outlined above are not necessarily mutually exclusive. But if there is some degree of stock market predictability on an out-of-sample basis, then expected returns must vary over time. And if they do vary, then this is of considerable importance to investors.

**Using Yearbook data as a return predictor**

In Figures 3 and 4, we look at using the DMS dividend-price ratio or dividend yield (the reciprocal of the price-dividend ratio) to predict subsequent stock market performance. In each chart, we plot the cyclically adjusted dividend-price ratio,  $DP_{10}$ , on the horizontal axis and the annualized real return over the following five years on the vertical axis. Figures 3 and 4 present the data for the USA and UK, respectively. Note that, because the observations overlap, the consistency of the relationship in these scatter plots is likely to be overstated.

For both countries, there appears to be a tendency towards mean reversion. Buying the equity market at a high dividend yield, i.e. a low price-dividend ratio, has on average been rewarded with



superior real returns, as equity prices have reverted towards the mean.

Figures 5 and 6 reveal the pattern of mean reversion. They show the average inflation-adjusted performance from buying when price-dividend ( $PD_{10}$ ) ratios were tiny (<14), low (14–21), moderate (21–28), high (28–35), or huge (>35). Performance is plotted over one year (dark blue), then two-, five- and finally ten years (light blue). In these charts, the bars comprise two parts, which are added together. The lower part is the capital gain or loss, and the upper part is the additional impact of dividend income. The total height of each bar shows the total return, including reinvested dividends, while the lower part represents the capital appreciation, which may, of course, be negative.

In the USA, the average real return was in all cases positive, and the average capital appreciation was mostly positive. For the UK, in the three left-hand clusters in the chart, average real returns were all positive and average capital gains were nearly all positive. In the right-hand cluster, real returns were all negative, and real capital gains were all substantially negative.

Buying at a low valuation ratio was on average followed by a substantial real return, while buying at a demanding valuation ratio was followed by a disappointingly low (or, in the UK, negative) real return as prices reverted towards the mean. For both countries, there seems to be superior performance from initiating equity exposure when stocks appear cheap relative to fundamentals and closing it out when stocks look expensive.

But, for this to be useful to investors, we need to know if it is just a chance outcome in two particular markets, or whether it generalizes across countries and is consistent and long-lived. We also need to be sure this is not just another “trendline illusion.” The pattern we have documented may result simply from being able to define the index level as “cheap” or “expensive” with reference to the entire history of US and UK returns. In practice, of course, we could not possibly have known this full history in advance.

### Investment horizon

The mean reversion patterns shown visually in Figures 3 and 4 focus on returns over five years. This may be rather a long period, given that investors have to decide when to act and for how long to remain invested. For example, they may need to decide whether the market is near a buying signal rather than in the middle of a bear market. We therefore examine how sensitive our results are to the length of the return measurement interval. The tool we use is regression analysis. We estimate the following relationship:

$$\text{Annualized real return starting at date } t = a + b (\text{Valuation ratio at date } t) + \text{Error term,}$$

where the annualized return is measured over the shorter intervals of one and two years, as well as the five years we have examined so far. In addition, we also look at a 10-year investment horizon.

We see from Figures 3 and 4 that the relation between 5-year real returns and  $DP_{10}$  is mildly positive. Equivalently, if we express the valuation ratio as a reciprocal – as a price-dividend ratio rather than as a dividend-price ratio – we see that the relation between returns and  $PD_{10}$  is mildly negative. We would expect this pattern to be apparent in a regression context, too.

Figure 5

### Real returns after various levels of the cyclically adjusted price-dividend ratio in the USA, 1900–2012

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database. Over periods starting in 2011, 2008 or 2003 respectively, the number of years spanned by the investment horizon shrinks from 2 to 1, 5 to 1 or 10 to 1.

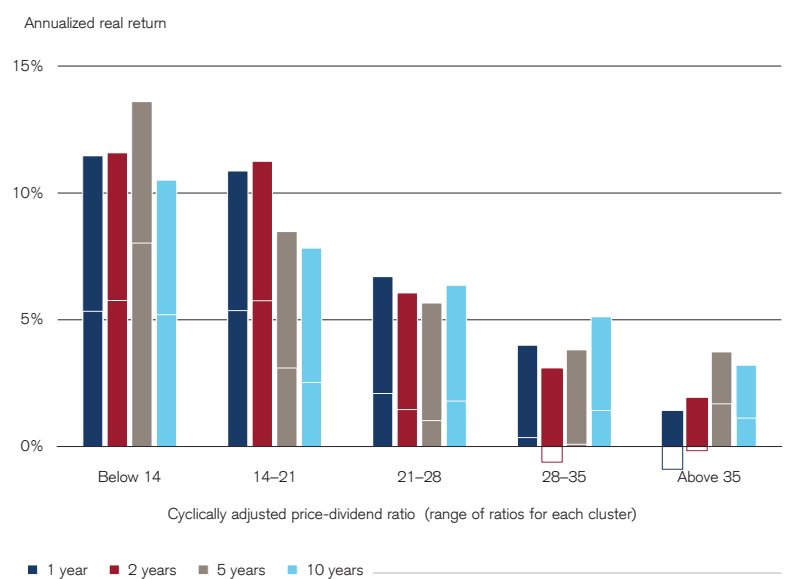
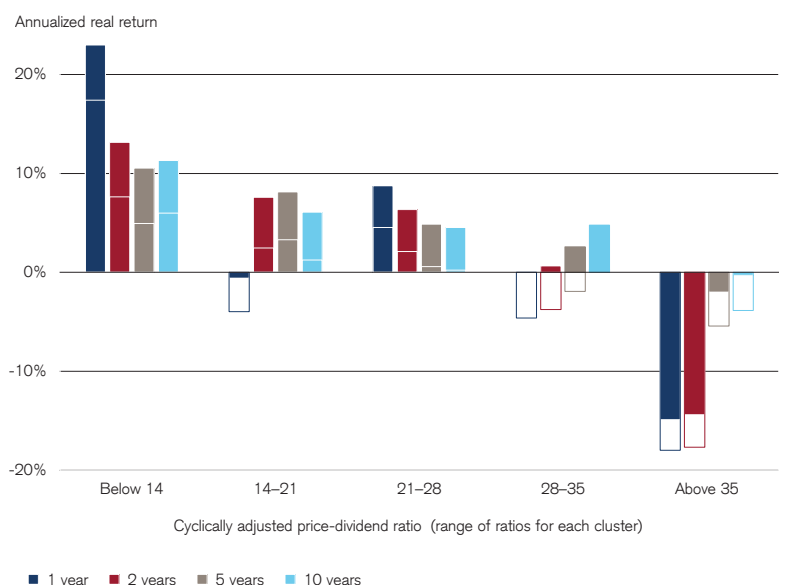


Figure 6

### Real returns after various levels of the cyclically adjusted price-dividend ratio in the UK, 1900–2012

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database. Over periods starting in 2011, 2008 or 2003 respectively, the number of years spanned by the investment horizon shrinks from 2 to 1, 5 to 1 or 10 to 1.



In addition to the time frame over which returns are measured, another question is whether the switch of valuation ratio to one based on dividends, rather than earnings, makes a difference. We take the opportunity to run our regression model using both dividends and earnings for the USA, a country for which both forms of valuation ratio are available.

We therefore consider three valuation ratios. They are Shiller's US earnings yield  $EP_{10}$  (reciprocal of  $PE_{10}$ ), the corresponding US dividend yield  $DP_{10}$  (reciprocal of  $PD_{10}$ ), and the UK dividend yield. All are cyclically adjusted over ten years.

**Regression analysis**

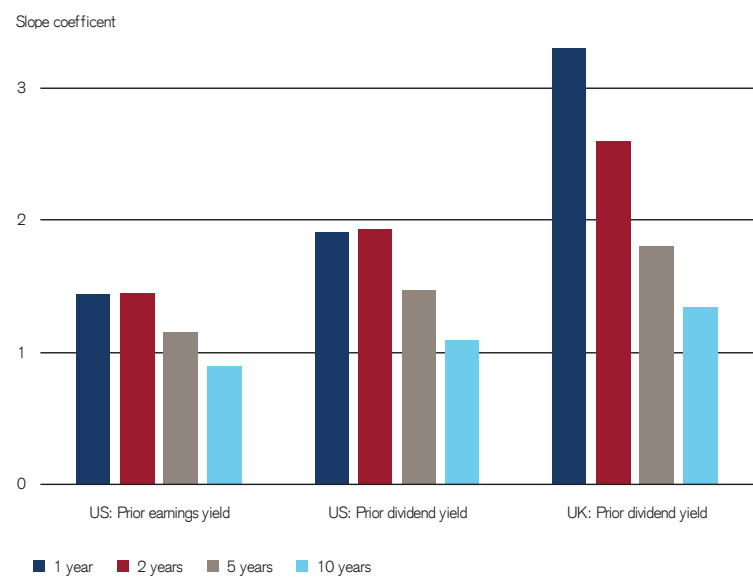
Figure 7 presents the slope coefficients,  $b$ , from the regressions described above. We confirm the positive relationship for the dividend-based and earnings-based valuation ratios over all investment horizons. To illustrate the economic meaning of the coefficients, consider the middle cluster, based on dividends and estimated for the USA. The coefficient for the 1-year return is approximately 2. Therefore, a 1% higher dividend yield is on average associated with an additional 2% return over the following year.

Note that intervals during which valuation ratios are higher will often be quite different historical episodes compared to those when valuation ratios are lower. It is clear from Figure 2 that our valuation criteria,  $DP_{10}$  and  $EP_{10}$ , which are smoothed over ten years, tend to evolve gradually over time. It follows that the resulting measures of value are "sticky" and – except during rare instances of crashes or frenzies – do not fluctuate a great deal from one year to the next.

The regressions with multi-year horizons have overlapping observations. Recognizing this, we assess statistical significance using Newey-West t-statistics. For a 1-year investment horizon, the three t-statistics fall in the range 2.0–2.3; for 2 years, 2.2–2.6; for 5 years, 3.0–3.7; and for ten years, 3.8–5.0. In brief, the coefficients depicted in Figure 7 are statistically significant.

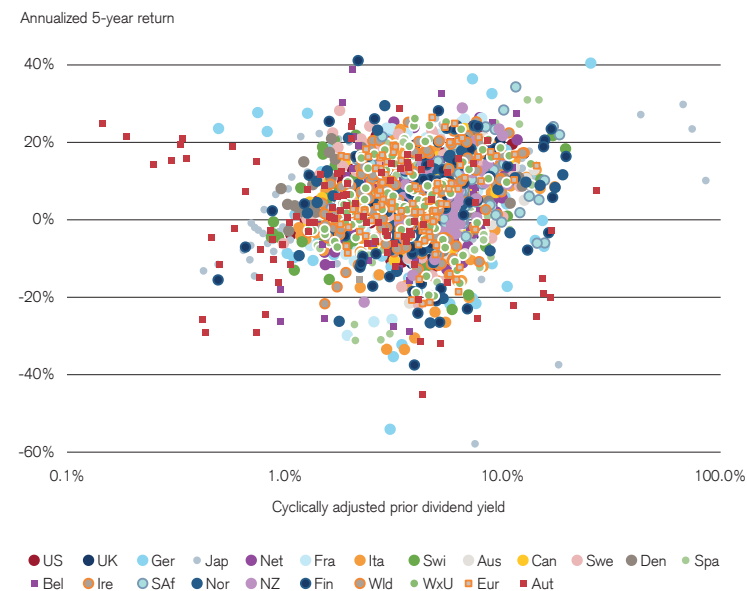
**Figure 7**  
**Regressions of real returns on cyclically adjusted valuation ratios for the USA and UK, 1900–2012**

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database plus Grossman (2002) dividends 1890–99; Shiller website for earnings (all years) and dividends 1890–99.



**Figure 8**  
**Real returns vs. prior valuation ratio, all markets, 1909–2012**

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database. See endnote for country abbreviations.



**Extreme events**

The US and UK stock markets have experienced a few instances of dramatic reversals. In the USA, there was a real capital loss of -67% (1929–32) followed by a gain of +50% (1933). More recently, there was a real capital loss of -39% (2008) followed by a gain of +23% (2009). Similarly, in the UK, there was a real capital loss of -36% (1920) that was followed by a gain of +75% (1921–22). And perhaps most dramatically, there was Britain's real capital loss of -74% (1973–74) that was followed by a gain of +86% (1975).

We therefore check whether the mean reversion we observe in Figure 7 arises because of just a very few brief historical episodes that may never recur. Because our measure of fundamental value is averaged over ten years, a market collapse makes equities appear cheaper relative to fundamental value. A speedy market recovery gives rise to profits when there is reversion to the mean. Because the reversal in these extreme cases took only a year or so, and because the t-statistics are straightforward to interpret with an investment horizon of one time period, we focus on the 1-

year horizon. We ask whether the apparent evidence of mean reversion might be a reflection of a couple of once-in-a-half-century reversals.

What happens if we omit these two dramatic reversals in each of the USA and UK, when equities collapsed and then recovered? The positive coefficients for 1-year returns switch to being smaller and non-significant; the regression coefficient against the US earnings yield falls from 1.46 (2.34) to 0.99 (1.66); the coefficient on the US dividend yield falls from 1.98 (2.04) to 1.46 (1.53); and the coefficient on UK dividend yield falls from 3.31 (2.95) to 1.95 (1.69). The blue numbers in brackets are t-values. There is a comparable switch for annualized returns measured over other intervals.

To a considerable extent, the in-sample pattern of mean reversion in each of these markets is thus attributable to just a couple of events per market that occurred over the span of 113 years. Moreover, collapses in these two markets were followed by a recovery, and a relatively speedy one at that. Investors in some other countries were not so fortunate (think of China, Austria, or perhaps Belgium). Evidently, the pattern of mean reversal that we have uncovered is fragile. Even on an in-sample basis, it depends critically on a few outlying events. We therefore study global markets to see the pattern around the world and then look at whether the apparent predictability of the market is confirmed on an out-of-sample basis.

### Country-specific or worldwide?

Figure 8 plots the 5-year real returns on each of the 20 national markets and three transnational regions with a complete history in the DMS database. To compute their cyclically adjusted dividend yields, we use data over 1900–09 to estimate the first dividend yield, so the first 5-year return covers 1910–14. The last four intervals are shorter, namely 2009–12, 2010–12, 2011–12 and 2012, respectively. With 23 markets and 103 return intervals, we have 2,369 valuation ratios and subsequent returns.

The correlation between the returns and prior cyclically adjusted dividend yields is obviously low, and the dividend yield explains a small proportion of realized returns. A regression of these pooled observations on the explanatory variable has an adjusted R-squared of 3.9% on an in-sample basis.

Figure 9 shows the results of regressions that resemble Figure 7, but are now undertaken for all Yearbook countries and regions based on a 5-year horizon and using the dividend based ( $DP_{10}$ ) valuation ratio. The bars show the slope coefficients while the t-statistics are shown as a line plot. We have already seen (from the gray bars in Figure 7) that the US and UK regression coefficients were similar at around 1.7. Three countries had higher coefficients, implying that a high initial

dividend yield was on average better rewarded than in the USA and UK. But most countries had lower coefficients. The World ex-USA has a coefficient of around 0.9, which is virtually half that for the USA and UK.

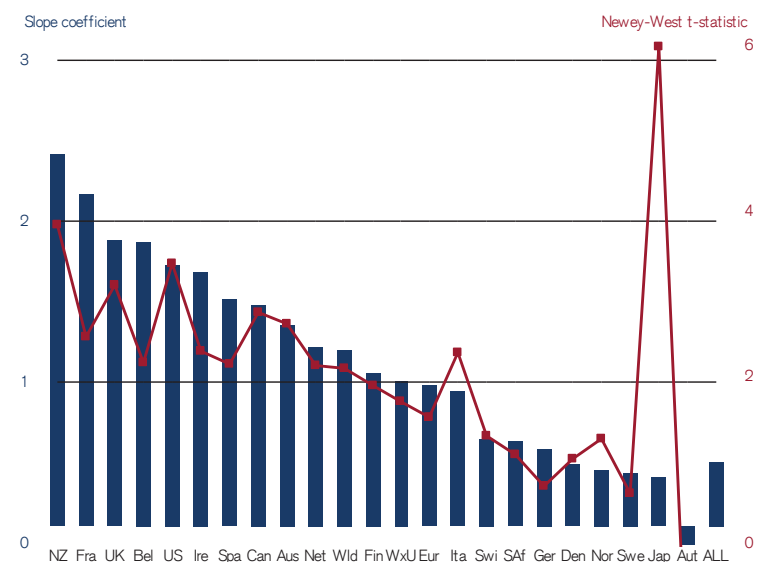
A pooled regression of every national and regional market has a coefficient of only 0.4 (see the bar labeled “ALL”). Thus, across markets and time, an extra 1% on the dividend yield is associated with a rise in the expected return of just 0.4%. The fact that this is low relative to the other bars strongly indicates that the results for individual markets, however modest, are overstated by being estimated, and hence optimized, in-sample.

Figure 9 could invite the conclusion that there are many markets for which the relation between real return and the prior valuation ratio is significant, both statistically and economically. Significance levels may, of course, have been distorted by the more extreme, and probably non-repeatable, vagaries of history. An example is Japan, which experienced long intervals with a high dividend yield and long periods with a low yield. While the slope coefficient is small in economic terms (note the bar for Japan) it is statistically significant (see the line plot). But the bigger issue is whether any of these patterns could have been discerned without a model that incorporates 113 years of data, and which is optimized for each country and for the investment future that these countries were destined to provide to investors – and which could not have been known in advance.

Figure 9

### Regressions of 5-year real returns on valuation ratios for all Yearbook markets, 1909–2012

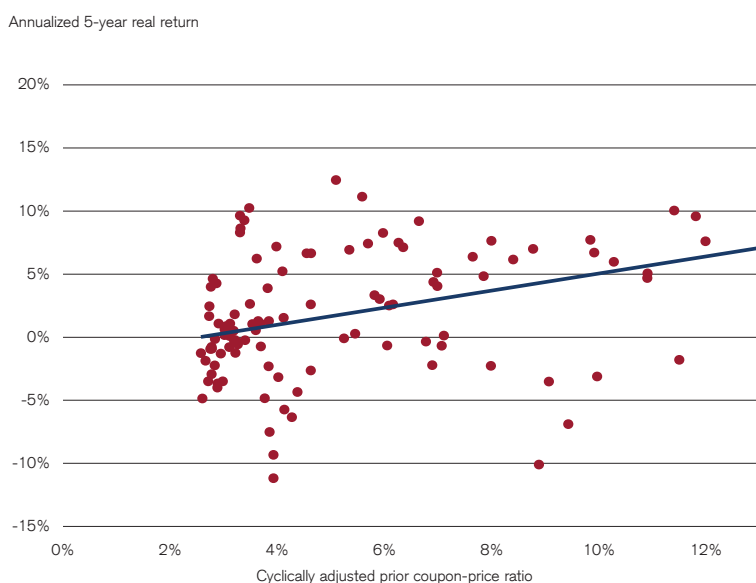
Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database. See endnote for country abbreviations.





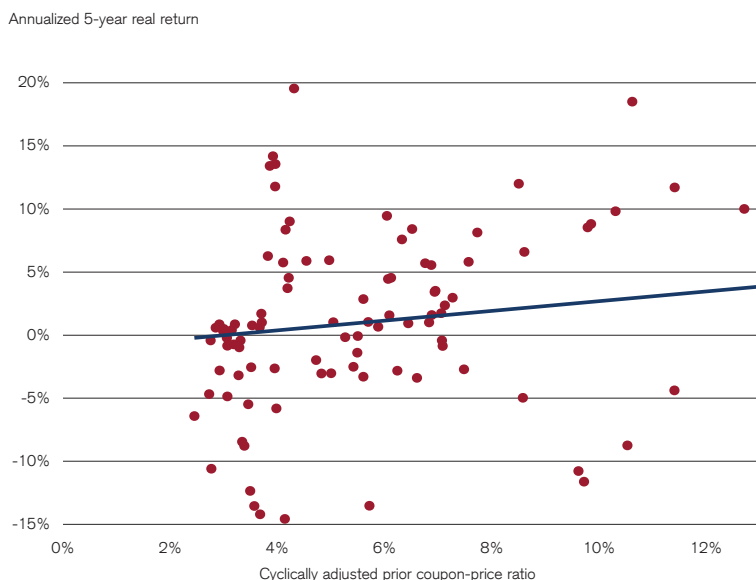
**Figure 10**  
**Scatter plot of real bond returns vs. prior cyclically adjusted bond yield in the USA, 1900–2012**

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database and hand-collected data for 1890–99. Note that over 2009–12, the number of years spanned by the returns window shortens to 4, 3, 2 and then 1.



**Figure 11**  
**Scatter plot of real bond returns vs. prior cyclically adjusted bond yield in the UK, 1900–2012**

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database and hand-collected data for 1890–99. Note that over 2009–12, the number of years spanned by the returns window shortens to 4, 3, 2 and then 1.



**Cyclical adjustment**

Our dividend yield and earnings yield estimates are cyclically adjusted by averaging over an interval of ten years. The length of this interval is controversial in some quarters. Some detractors say that the 10-year interval is arbitrary; others that it has been chosen retrospectively because this interval has been found to generate apparent trading opportunities when tested on the US back-history.

Many, however, defend the 10-year smoothing period. Asness (2012, footnote 1) cites the detractors writing, e.g. in *The New York Times* in 2012, and the supporters writing, e.g. in *The Economist* in 2011. In analysis not reported here, we examine how sensitive our results are to the choice of a 10-year period for smoothing valuation ratios. Like Asness, we find it makes remarkably little difference whether valuation ratios are smoothed over eight, ten or 12 years.

**Equities only, or bonds as well?**

Is this evidence of mean reversion specific to equities, or does it apply also to bonds? We replicate Figures 3 and 4 for US and UK government bonds. Instead of looking at the ratio of real equity income (smoothed over ten years) to the real equity index level, we look at the bond counterpart. That is, we look at the ratio of real bond income (smoothed over ten years) to the real bond index level. We call this the cyclically adjusted coupon-price ratio,  $CP_{10}$ .

In these charts, we plot the coupon-price ratio,  $CP_{10}$ , on the horizontal axis and the annualized real return over the following five years on the vertical axis. Figures 10 and 11 present our analysis for the USA and UK, respectively. The relationships are statistically significant (t-statistics for the USA and UK of 5.9 and 3.5, respectively; R-squared for the USA and UK of 10% and 24%, respectively).

As in the case of equities, there appears to be a tendency towards mean reversion. Buying the bond market at a high coupon-to-price ratio, or at a low price-coupon ratio, has on average been rewarded with superior real returns, as government bond prices have reverted towards the mean. For bonds, like equities, there is historical evidence of mean reversion. The question remains whether such patterns can not only be discerned in past data, but whether they can be exploited profitably over an interval that follows the research period.

**Using mean reversion in practice**

The key question, then, is whether mean reversion is identifiable only with hindsight, or whether it is apparent and profitably exploitable on an ongoing basis. To examine this we follow an approach used, among others, by Goyal and Welch (2003, 2008) and ourselves (Dimson,

Marsh, and Staunton, 2004a). This involves repeating the procedure used for Figure 9, but now assuming the investor is not prescient. We therefore estimate our model using only data that would have been available at the time of each annual investment decision.

For each country and region, we adopt the following procedure. First, we estimate a model using data up to 1919 to generate a forecast for 1920–24. Next, we estimate a model using data up to 1920 to generate a forecast for 1921–25. We repeat this year by year until the most recent model uses all available data up to 2007 to generate a forecast for 2008–12. We now have forecasts for 1920–24, 1921–25, 1922–26, and so on, to the most recent five years. We also have realized returns for each of these periods.

We then run a regression of realized returns on forecast returns. If the forecasts are very good, the regression coefficient should be positive and highly significant. If the forecasts have no informational content, the regression coefficient should be zero, and non-significant. If the forecasts have little predictive value, then by chance alone some countries will have a positive coefficient, while others will have a negative coefficient. But, on average, the coefficient should be around zero.

Figure 12 shows the results. It reveals that the apparent significance of some in-sample results in Figure 9 is not maintained out of sample. For investors who do not have perfect foresight and who do not know the parameters of the model for the long-distant future, there is no consistent relationship between forecasts and outcomes. Moreover, for cases where there is a marginally significant relationship, roughly as many countries are significantly negative as are significantly positive.

We have experimented with alternative investment horizons and intervals for out-of-sample testing. The backward-looking regressions reveal how assets behaved in the past. Sadly, however, in line with other research including Dimson, Marsh, and Staunton (2004a), we learn far less from valuation ratios about how to make profits in the future than about how we might have profited in the past.

### Returns from trading on mean reversion

As we noted earlier, changes in business conditions should give rise to time-varying rewards. At times when investors are poorer – typically, times when asset prices have fallen and valuation ratios look “cheap” – their aversion to risk is likely to be greater. These times are also more likely to accompany periods of increased market volatility. In an efficient market, expected returns should be higher when asset prices are low relative to fundamentals.

Two years ago, in Dimson, Marsh, and Staunton (2011ab), we examined the performance of an equity market rotation strategy and a bond market rotation strategy. The equity strategy in-

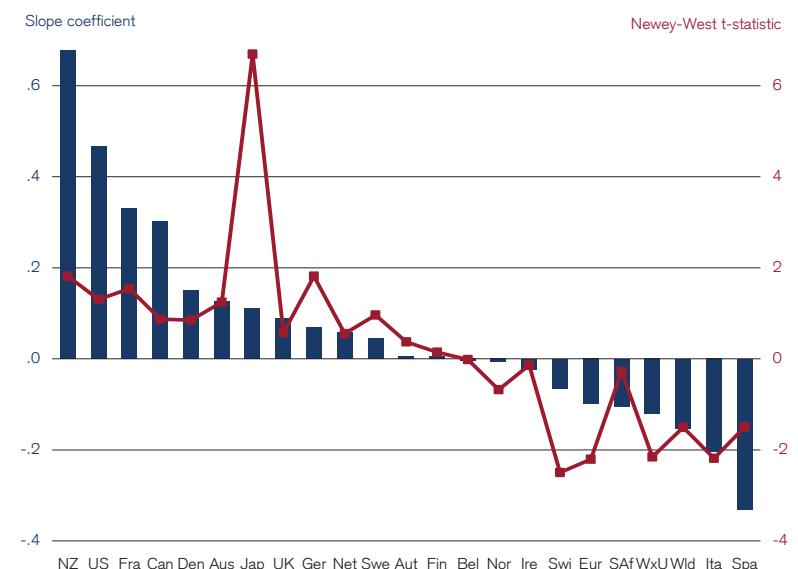
involved selecting equity markets according to how low the national equity index had fallen relative to dividends. The bond strategy involved selecting bond markets based on how much inflation had eroded real bond returns. The details are in “Fear of falling” and “The quest for yield,” both published in the 2011 *Yearbook*, and available on request from the publishers.

In each case, the strategies involved buying into markets that had performed poorly and avoiding those that had done well. This is a means of benefiting from mean reversion, and we showed that such country-rotation strategies generate superior returns on an out-of-sample basis. However, they can involve investing in markets at the very time that they are most unappealing, moving from country to country to search out the markets that had experienced the greatest trauma.

Figure 12

### Regressions of real returns on forecasts, 1920–2012

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database. See endnote for country abbreviations.



Most investors do not wish to be so active; nor do they usually have an appetite for investing into financial market disaster zones. More usually, investors have a policy portfolio or strategic benchmark, which may focus on a particular country or region, or even the world. The dilemma for such stock market investors is how to determine when to be invested in equities, and when to go liquid (similar considerations apply to bond investors). We use the forecasts provided by our mean reversion model to investigate the difficulties of exploiting mean-reversion patterns with a national market.

Figure 13 reports the results from using the forecasts depicted in Figure 12 for deciding whether to deviate from equities. In red, we plot the performance from the start of every period invested in the equities for a particular country, regardless of the forecast. In blue, we show the result from selling out of that country's equities when real returns are forecast to be negative (the proceeds are held in Treasury bills).

In every country, a retreat from equities reduces the investor's return through foregone exposure to the equity premium. If the forecasts have predictive value, the investor will miss periods when the equity premium is negative. However, for every country, the net impact is to miss out on worthwhile stock market returns. The differences can be small if the signal to avoid equities occurs rarely. They can be large if the signal is to avoid equities most of the time and if, despite the forecast, equities then perform well.

In all markets, our out-of-sample forecasting model fails to achieve the returns available from remaining in equities all the time. With a better forecasting model, there might be more predictions of negative real returns from the stock market, and more time spent "out of the market." Unfortunately, that could only too easily attenuate the performance of this strategy by a bigger margin.

**Concluding observations**

Are there profits to be made from mean reversion that can be expected to materialize within a reasonable time frame? In a mean-reverting series, the standard deviation of average annual returns declines faster than the inverse of the holding period, implying that periods of lower returns are systematically followed by compensating periods of higher returns. Although stocks can never become "safe" over the long run, mean reversion in equity markets could lead to lower risk over longer horizons, and hence superior reward-to-risk ratios. Mean reversion could also provide market-timing signals that enhance returns.

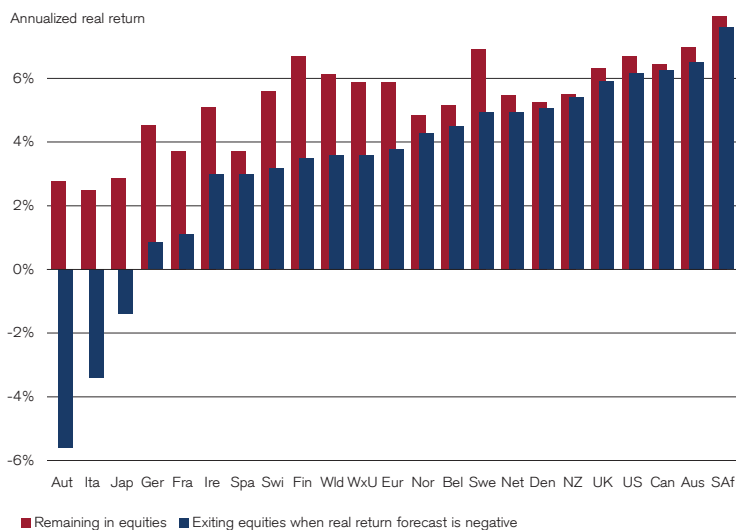
With mean reversion, when valuation levels become stretched, prices will tend to switch back towards their earlier magnitude. This may take a long time. Since we do not know whether prices have hit their peak or trough, investors may have to be patient for a protracted period until historical norms resume. Worse still, in some cases those norms may never recur. Prices may look cheap compared to recent years, and simultaneously expensive versus their long-run average. Or they may look cheap in one country, and expensive in another. We cannot know in advance what valuation level is going to prevail at some point in the (possibly very distant) future.

Having examined the long-term historical evidence for return predictability, we conclude that much of the popular evidence for mean reversion is attributable to optical illusions that employ perfect hindsight. We have used the Yearbook's 20-

**Figure 13**

**Real returns: Portfolios based on mean reversion, 1900–2012**

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, DMS database. See endnote for country abbreviations.





country, 113-year dataset to analyze the evidence on return predictability in the absence of any look-ahead bias. We find that, without the benefit of foresight, the evidence on mean reversion is weak. Market-timing strategies based on mean reversion may even give lower, not higher, returns.

Nevertheless, if investors are willing to accept some increase in risk, there are signals that can be used to identify when the market offers a larger or smaller reward. Indeed, we presented evidence in prior *Yearbooks* that there is some predictability of stock market performance. However, there is insufficient predictability to make equity investing safe over any horizon.

To exploit stock market predictability, investors should take advantage of opportunities when returns are expected to be higher, and hence should buy when prices are low relative to fundamentals. In historical terms, that means buying enthusiastically during the October 1987 crash, during the Lehman crisis, and during other major setbacks; and selling outperforming assets during the 1990s bull market. Following a contra-cyclical investment strategy, at the very time that investors are behaving pro-cyclically, is uncomfortable. It is clear that the potential profits from mean reversion are in general modest, and that they demand a disciplined approach to investment strategy.

The difficulty of deciding when to be in and out of an asset class highlights the importance of following a controlled approach to investing and disinvesting. For many classes of investor – including individuals, pension plan sponsors, and foundations and endowments – the aim is to save over a number of years, to grow the resulting assets, and eventually to withdraw funds over an interval that is expected to be long.

For such investors, it is helpful to adopt a framework that offsets the temptation to follow the herd. It can be useful to follow a dollar-cost averaging approach, whereby regular investments are made into a portfolio, so that at least some assets are bought at the bottom (and relatively fewer at the top). At the same time, a spending rule, which smoothes the amount taken out of the fund, can ensure that portfolio withdrawals do not give rise to excessive disposals at the bottom of the market. Dollar-cost averaging, together with a sustainable spending rule, can help investors achieve their objectives.

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#### Abbreviations:

In the charts, the countries and regions are abbreviated as follows: *Aus* Australia, *Aut* Austria, *Bel* Belgium, *Can* Canada, *Den* Denmark, *Eur* Europe (based on 15 countries), *Fin* Finland, *Fra* France, *Ger* Germany, *Ire* Ireland, *Ita* Italy, *Jap* Japan, *Net* The Netherlands, *Nor* Norway, *NZ* New Zealand, *SAf* South Africa, *Spa* Spain, *Swe* Sweden, *Swi* Switzerland, *UK* The United Kingdom, *US* The United States, *Wld* World (based on 22 countries), *WxU* World ex-United States (based on 21 countries).







# Is inflation good for equities?

In this chapter, we draw upon the discussion about low returns in a “low-return world” and the 2011 Yearbook, in which we focused on inflation and asset returns to examine the prospect that a rise in inflation, or at very least a rise in inflation expectations, could have for investment strategy. The 2011 Yearbook drew on observations of different types of inflation to show that, when inflation is rising at a modest level, equities tend to perform well and bonds much less so. In the aftermath of the credit crisis, the critical distinction we make is – what type of inflation will we witness in coming years?

**Andrew Garthwaite and Global Equity Strategy Team**, Credit Suisse Investment Banking

The chapter on “low returns” makes it clear that there is a strong association between low real interest rates and low equity returns. However, we show that in the context of modest inflation with rising inflation expectations, there is scope for equity multiples to re-rate higher. As the global business cycle begins to move toward a firmer recovery, this is important for investment strategy and could well drive a reversal in fund flows from bonds into equities.

## Should we worry about inflation?

Since 2009, nascent recoveries in the global business cycle have been cut short. With the Eurozone crisis in remission and the US fiscal cliff debate partly behind us, 2013 offers the prospect of a more firm and durable economic recovery globally. Should this occur, it may also lead to concerns that, in the context of quantitative easing by a number of central banks, inflation will rise and significantly affect asset prices.

Our view is that inflation is a good thing if it is “demand pull” inflation, i.e. companies have pricing power and thus selling prices are rising more than input prices (commodities or wages). On the

other hand, inflation is bad if it is “cost-push” inflation, when companies face higher commodity prices or wage costs rise, which in turn squeezes margins as they are unable to pass them on.

In a sense, inflation is like eating – too little or too much can be problematic. We find that, historically, moving from deflation to mild inflation leads to a re-rating of equities, while moving from moderate inflation to high inflation leads to a de-rating of equities. The tipping point between the two outcomes, on the basis of US data back to 1871, has been inflation of around 3%–4%.

Perhaps the most critical issue is the response of real yields to higher inflation. If high inflation comes as a shock and there is no financial repression (i.e. there is no deliberate effort on the part of governments or central banks to push down real bond yields), then real bond yields are likely to rise dramatically, something which has historically been very negative for financial assets.

If, however, higher inflation is part of a deliberate policy of financial repression, then rising inflation expectations actually lead to lower real bond yields, which should in turn re-rate financial assets. We continue to believe that real bond yields need to fall to minus 1.5% to minus 2% to both



stabilize government debt to GDP and unemployment. This time around, therefore, higher inflation and inflation expectations are part of this process.

**What is inflation?**

We believe that the best proxy of underlying inflationary pressure is prevailing wage growth, as roughly two thirds of corporate costs are from the labor market. Thus the key determinant of inflation is the direction of wage growth or, more precisely, unit labor costs. Higher wages also enable corporates to partly pass on these higher costs due to the concomitant improvement in consumers' disposable income.

At present, there is little evidence of inflationary pressure based on the current growth in rates in US wage costs or average earnings growth, with both of these measures at the bottom end of their historical ranges. According to the Congressional Budget Office (CBO), the NAIRU is around 5.5%–6% and, for demographic reasons, the rate of growth in the labor force will accelerate as growth recovers (this keeps the unemployment rate higher than it otherwise would be) and thus GDP growth of 3.5% for at least more than a year is required before wage growth starts to rise.

There also still appears to be significant external dis-inflationary forces: improvements in industrial automation (robot density in emerging markets is just 5% of developed markets), growth of the internet (5.8% of retail sales in the USA and growing at a 23% CAGR, which pushes down retailers' margins), and less supply-constrained commodity markets (with the capex to depreciation ratio for both oil and mining companies being over 3x).

The "wrong" sort of inflation is commodity-led inflation. This is inflationary in the short term as headline prices rise (food and energy equate to a third of emerging market CPIs). If higher commodity prices are not associated with a rise in wage growth, then clearly the purchasing power of the consumer falls and that in turn ends up being dis-inflationary. So commodity-led inflation is only sustainable if wages are able to rise by a similar amount.

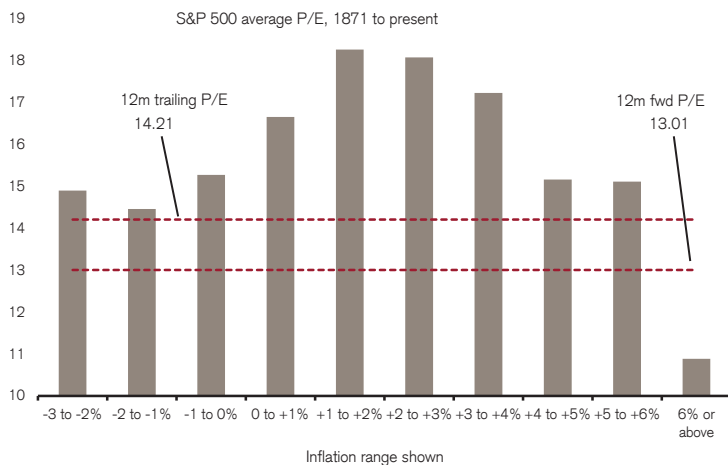
**Market inflation expectations can rise even when headline inflation is well controlled**

We believe one of the key developments in 2012 was that, in spite of headline inflation falling, inflation expectations actually rose.

The critical issue is that markets are (correctly in our view) starting to price in the probability of a policy error. If there is "too much" quantitative easing (QE) over the next few years, then on a 5–10 year view, inflation could spike upward. We believe that central bankers are much more likely to end up being too dovish than too hawkish, given the experience of the Great Recession, and thus eventually tighten policy too late rather than too early!

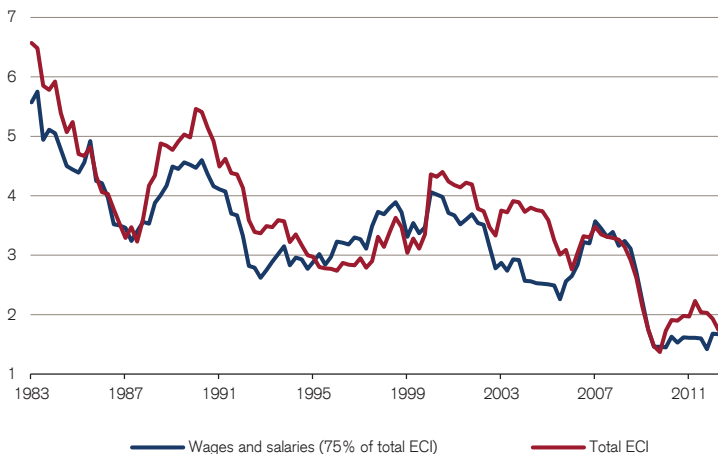
**Figure 1**  
Equities do not tend to de-rate significantly until inflation expectations rise above 4%

Source: Dimson-Marsh-Staunton data, Credit Suisse research



**Figure 2**  
Growth in the wage component of the Employment Cost Index is close to a 30-year low...

Source: Thomson Reuters, Credit Suisse research



## Implications for asset classes

We have found that, historically, equities tend to have a binomial distribution between P/E and inflation. As inflation falls below 2%, equities tend to de-rate. This is because, as we move to deflation, pricing power becomes much harder to come by (and often periods of deflation, particularly the 1930s, have been periods of very poor GDP growth).

Historically, when inflation rises above 4%, equities also start to de-rate (see Figure 1). This is for two principal reasons: first, the rise in inflation leads to a rise in real bond yields (see below) and, second, the rise in inflation is often associated with economies overheating, which leads to a rise in short-term interest rates. This rise in short rates not only tends to raise the discount rate for equities, but, if an economy overheats, there has to be a period of below-trend growth (thus earnings fall while the discount rate rises).

At some point the rise in inflation means that equities do worse than bonds (after all, equities are long-duration assets); typically, we find this occurs when inflation is above 8%. The key issue for us is that, historically, the more the inflation rate rises, the more uncertainty there is about future inflation (as proxied by inflation volatility) and thus the higher the real bond yield becomes.

This used to particularly be the case when central banks were not independent (for example, the Bank of England was only made independent in 1997). So, historically, if inflation rose, there was considerable uncertainty about the willingness of central banks (or rather politicians, prior to central bank independence) to bring down inflation and, as a result, the real bond yield would tend to rise.

In our view, a high real bond yield is bad for equities. Not only does it push up the discount rate, but it also impedes the financing of government deficits. If the real bond yield rises by 2%, then with government debt to GDP at 100%, this adds 2% of GDP a year to the government's cost of debt servicing. The less sustainable the government funding arithmetic appears to markets, the more the real bond yield will rise.

## Impact of the credit crisis

Today, we believe that any rise in inflation will not be associated with a rise in the real bond yield. This is the key difference. We believe that central banks will seek to keep nominal rates from rising through further asset purchases and that rising inflation will be associated with a fall in the real bond yield. This is because of the need for financial repression. We believe, in the long run, governments will have to stabilize government debt to GDP and unemployment.

Figure 3

### ...as is average hourly earnings growth in the private non-farm sector

Source: Thomson Reuters, Credit Suisse research

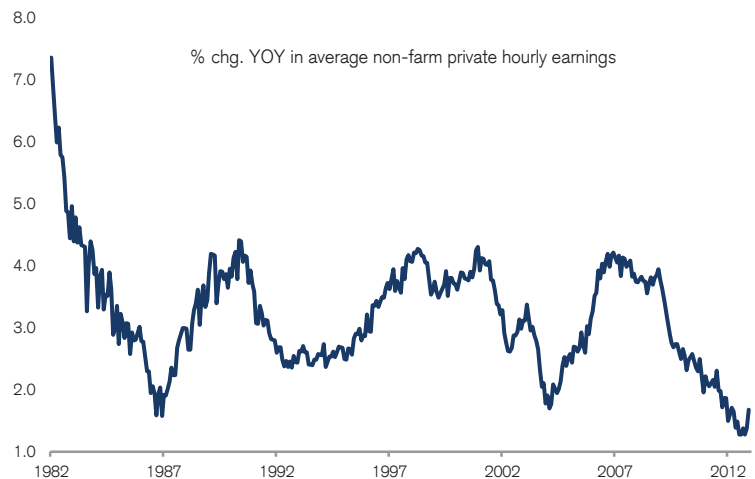


Figure 4

### In 2012, US inflation expectations and headline inflation move in opposite directions...

Source: Thomson Reuters, Credit Suisse research



Figure 5

...with the same occurring in the UK

Source: Thomson Reuters, Credit Suisse research

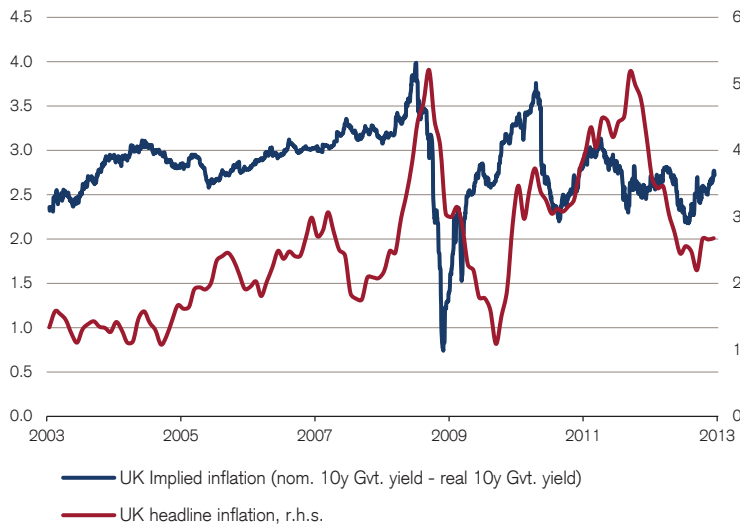
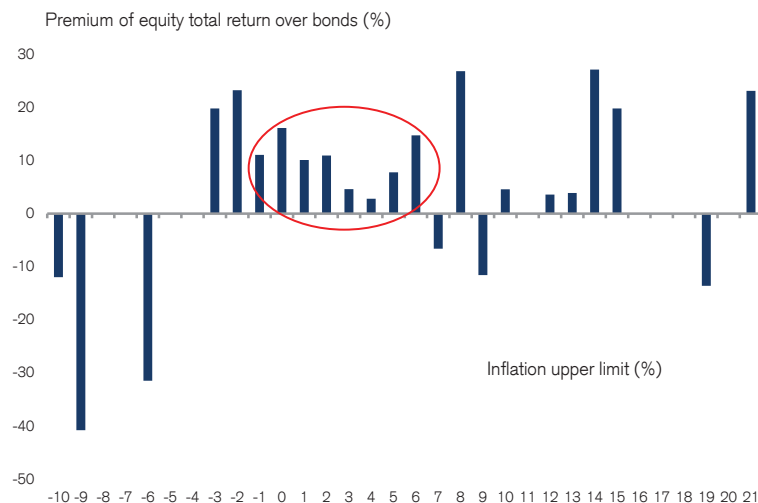


Figure 6

At inflation rates in excess of 8%, equity outperformance is much less consistent than at more moderate inflation rates

Source: Dimson-Marsh-Staunton data, Credit Suisse research



Very simply, we believe that the biggest problem globally is that there is USD 8 trillion of excess leverage in the developed world and around USD 13 trillion more government debt than in 2008.

There are only four ways to reduce debt: improve the underlying growth rate, default, tighten fiscal policy or lower real rates. We estimate that 1% off real rates reduce the amount by which fiscal policy needs to be tightened by 1% (to stabilize government debt to GDP) and boost GDP growth by around 0.5%.

Thus, based on our models, in order to stabilize both government debt to GDP and unemployment, the USA needs to have real rates of minus 1.6%. When we run the same analysis for the UK and Japan, the required real rate is even lower.

Thus a rise in inflation expectations could be associated with a decline in the real bond yield. It is this that re-rates equities. Over the past five years, the prospective earnings multiple for the S&P 500 has been closely correlated with inflation expectations. Indeed, the single most important driver of valuations has been inflation expectations.

Central case

Our central case is firstly that inflation expectations rise (as markets price in the risk of a policy mistake), but that this will not be associated with a rise in headline inflation and, secondly, that real bond yields fall as inflation expectations rise (but nominal bond yields rise slightly as the rise in inflation expectations more than offsets the fall in real yields).

In this environment, we believe that the best hedges on inflation in the developed world are:

- (1) **Cheap real asset investments:** according to the OECD, US, Germany and Japanese real estate are among the cheapest globally. UK commercial real estate also looks attractive, with a record gap between the underlying property yield in the UK (from the Investment Property Databank) and the index-linked gilt yield.
- (2) **Companies with inflation-linked pricing formulae:** these de facto become cheap inflation hedges.
- (3) **Growth:** The more the real bond yield falls, the more investors should buy long duration assets as these should benefit more from a lower discount rate.
- (4) **Gold:** Gold stocks have underperformed the gold price significantly in 2012 and, the more real bond yields fall, the more gold should rise.

### Conclusion if inflation rises sharply

If investors really fear inflation will rise and that bond yields will rise more than inflation (i.e. real bond yields rise), then they should buy short-duration stocks (i.e. high dividend yield) with negative working capital (i.e. they are paid before they pay their creditors). This typically favors food, retailing and telecoms.

### What about commodity stocks as an inflation hedge?

There is a loose positive correlation between inflation and the relative performance of commodity stocks. The fit is clearly worse in absolute terms. This is of course a “chicken and egg” situation. Rising oil prices cause inflation and oil stocks to rise. We would warn that to some extent when we look at the integrated oil companies (IOCs), they have only outperformed when there has been a large upward spike in the oil price.

If there is only a modest rise in the oil price, then IOCs tend to underperform because they are defensive (the IOCs outperform 78% of the time the market falls or 88% of the time credit spreads rise). Hence, ironically, they do well when the equity market falls significantly (such as in 2008), even if the oil price falls at the same time. The other concern is that, in general, quoted IOCs tend to be the higher cost producers globally and are also vulnerable to changes in government policies, particularly windfall taxes.

From a global strategy perspective, we feel that commodity stocks are now a worse hedge on rising inflation, given the sharp increase in capital spending, which has been extreme relative to both history and other sectors. A sharp increase in capex tends to be bad for prices as it increases costs and is ultimately negative for free cash flow generation.

Figure 7

### Rising inflation tends to be associated with higher inflation volatility

Source: Shiller data, Credit Suisse research

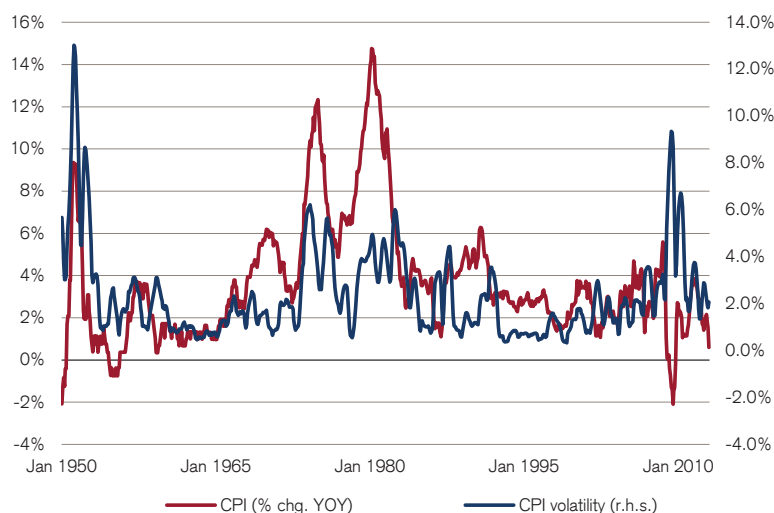
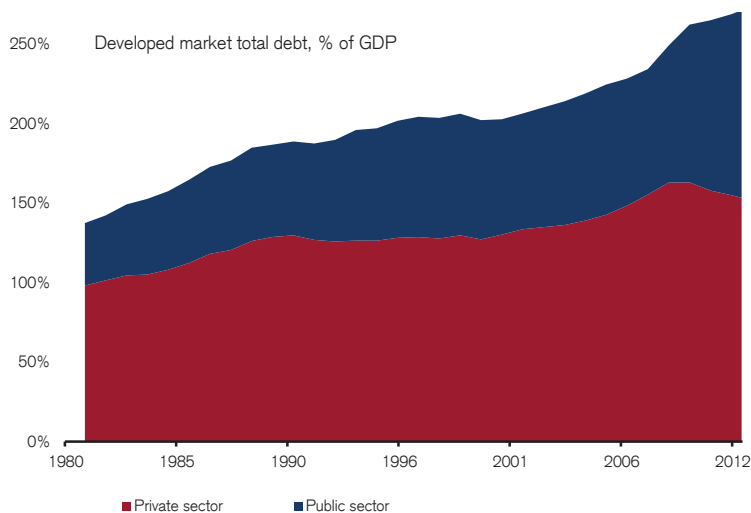


Figure 8

### Since 2008, government debt to GDP has increased by around 30 percentage points

Source: Thomson Reuters, Credit Suisse research









All markets

# Country profiles

The coverage of the Credit Suisse Global Investment Returns Yearbook has expanded to 22 countries and three regions, all with index series that start in 1900. The three new countries are Austria (with a complete 113-year record), Russia, and China, which have a gap in their financial market histories from the start of their communist régimes until securities trading recommenced. There is a 22-country world region, a 21-country world ex-US region, and a 15-country European region. For each region, there are stock and bond indexes, measured in USD and weighted by equity market capitalization and GDP, respectively

Figure 1 shows the relative market capitalizations of world equity markets at our base date of end-1899. Figure 2 shows how they had changed by end-2012. Markets that are not included in the Yearbook dataset are colored black. As these pie charts show, the Yearbook covered 98% of the world equity market in 1900 and over 87% by end-2012.

In the country pages that follow, there are three charts for each country or region with an unbroken history. The upper chart reports the cumulative real value of an initial investment in equities, long-term government bonds, and Treasury bills, with income reinvested for the last 113 years. The middle chart reports the annualized real returns on equities, bonds, and bills over this century, the last 50 years, and since 1900. The bottom chart reports the annualized premia achieved by equities relative to bonds and bills, by bonds relative to bills, and by the real exchange rate relative to the US dollar for the latter two periods.

Countries are listed alphabetically, starting on the next page, and followed by three regional groupings. Extensive additional information is available in the Credit Suisse Global Investment Returns Sourcebook 2013. This 200-page reference book, which is available through London Business School, also contains bibliographic information on the data sources for each country. The underlying annual returns data are redistributed by Morningstar Inc.

## The Yearbook's global coverage

The Yearbook contains annual returns on stocks, bonds, bills, inflation, and currencies for 22 countries from 1900 to 2012. The countries comprise two North American nations (Canada and the USA), nine Eurozone states (Austria, Belgium, Finland, France, Germany, Ireland, Italy, the Netherlands and Spain), six European markets that are outside the euro area (Denmark, Norway, Russia, Sweden, Switzerland, and the UK), four Asia-Pacific countries (Australia, China, Japan and New Zealand), and one African market (South Africa). These countries covered 98% of the global stock market in 1900, and over 87% of its market capitalization by the start of 2013.

Figure 1  
Relative sizes of world stock markets, end-1899

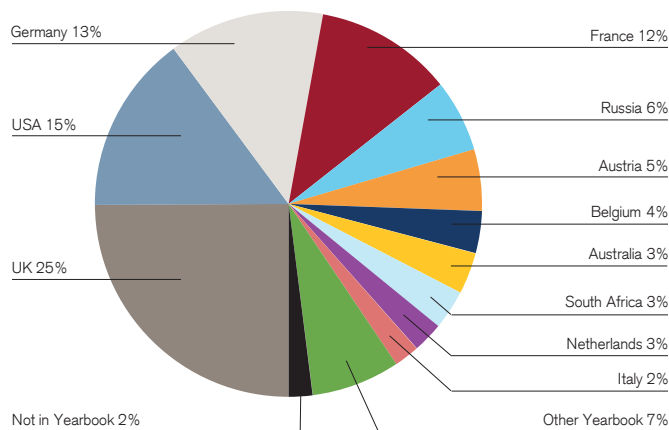
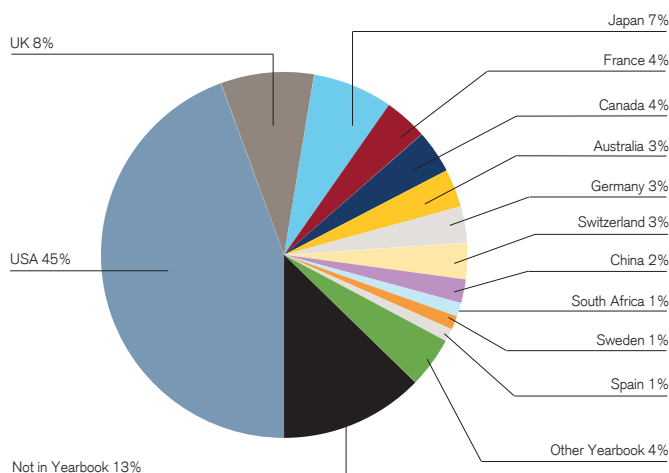


Figure 2  
Relative sizes of world stock markets, end-2012



Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.

## Data sources

1. Dimson, E., P. R. Marsh and M. Staunton, 2002, *Triumph of the Optimists*, NJ: Princeton University Press
2. Dimson, E., P. R. Marsh and M. Staunton, 2007, *The worldwide equity premium: a smaller puzzle*, R Mehra (Ed.) *The Handbook of the Equity Risk Premium*, Amsterdam: Elsevier
3. Dimson, E., P. R. Marsh and M. Staunton, 2013, *Credit Suisse Global Investment Returns Sourcebook 2013*, Zurich: Credit Suisse Research Institute
4. Dimson, E., P. R. Marsh and M. Staunton, 2013, *The Dimson-Marsh-Staunton (DMS) Global Investment Returns Database*, Morningstar Inc.

Selected data sources for each country are listed in the country profiles below. Detailed attributions, references, and acknowledgements are in the Sourcebook (reference 3).





Australia

# The lucky country

Australia is often described as “The Lucky Country” with reference to its natural resources, prosperity, weather, and distance from problems elsewhere in the world. But maybe Australians make their own luck. In 2012, the Heritage Foundation ranked Australia as the Yearbook country with the highest economic freedom. Also in 2012, the Charities Aid Foundation study of World Giving ranked Australia as the most generous out of 146 countries in the world. Whether it is down to luck, economic management or a generous spirit, Australia has been one of the two best-performing equity markets over the 113 years since 1900, with a real return of 7.3% per year.

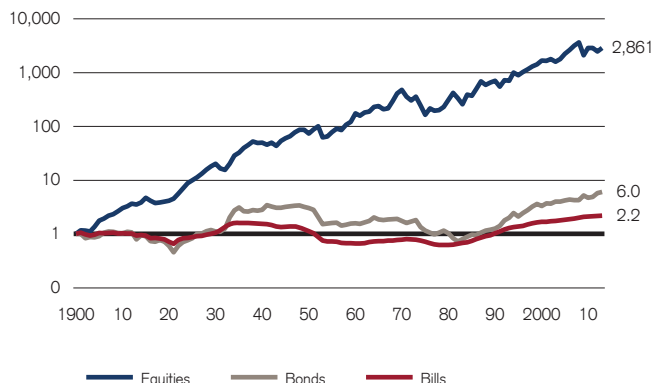
The Australian Securities Exchange (ASX) has its origins in six separate exchanges, established as early as 1861 in Melbourne and 1871 in Sydney, well before the federation of the Australian colonies to form the Commonwealth of Australia in 1901. The ASX ranks among the world’s top ten stock exchanges by value and turnover. Half the index is represented by banks (31%) and mining (18%), while the largest stocks at the start of 2013 are BHP Billiton, Commonwealth Bank of Australia, and Westpac Banking Corporation.

Australia also has a significant government and corporate bond market, and is home to the largest financial futures and options exchange in the Asia-Pacific region. Sydney is a major global financial center.

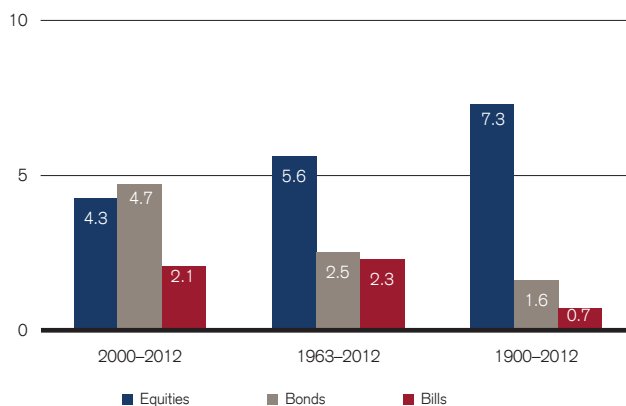
## Capital market returns for Australia

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 2861 as compared to 6.0 for bonds and 2.2 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 7.3%, bonds 1.6%, and bills 0.7% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 6.6%. For additional explanations of these figures, see page 35.

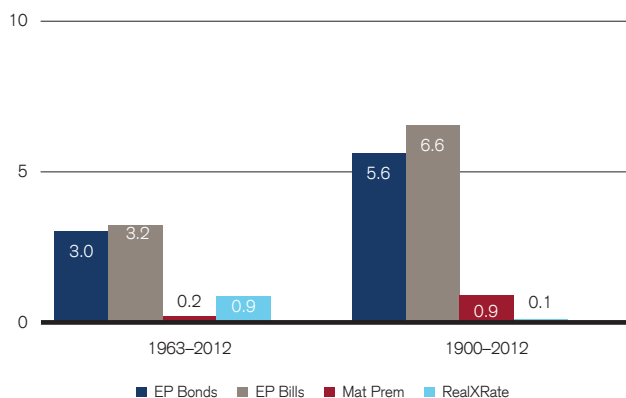
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



**Figure 3**  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



**Austria**

# Lost empire

The Austrian Empire was reformed in the 19th century into Austria-Hungary, which, by 1900, was the second-largest country in Europe. It comprised modern-day Austria, Bosnia-Herzegovina, Croatia, Czech Republic, Hungary, Slovakia, Slovenia; large parts of Romania and Serbia; and small parts of Italy, Montenegro, Poland, and Ukraine. At the end of WWI and the break-up of the Habsburg Empire, the first Austrian republic was established.

Although Austria did not pay reparations after WWI, the country suffered hyperinflation during 1921–22 similar to that of Germany. In 1938, there was a union with Germany, and Austria ceased to exist as an independent country until after WWII. In 1955, Austria became an independent sovereign state, becoming a member of the European Union in 1995, and a member of the Eurozone in 1999. Today, Austria is prosperous, enjoying the highest per capita GDP out of all countries in the EU.

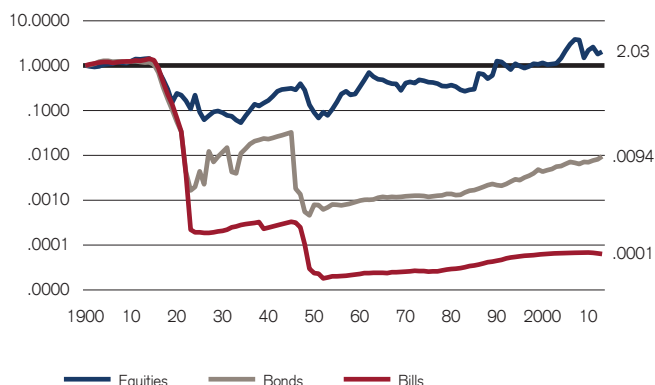
Bonds were traded on the Wiener Börse from 1771 and shares from 1818 onward. Trading was interrupted by the world wars and, after the stock exchange reopened in 1948, share trading was sluggish – there was not a single IPO in the 1960s or 1970s. From the mid-1980s, building on Austria's gateway to Eastern Europe, the Exchange's activity expanded. Still, over the last 113 years, real stock market returns (0.6% per year) have been lower for Austria than for any other country with records from 1900 to date.

At the start of 2013, the largest Austrian company is Erste Group Bank (23% of the market), followed by DMV, Voestalpine, Andritz, and Immofinanz.

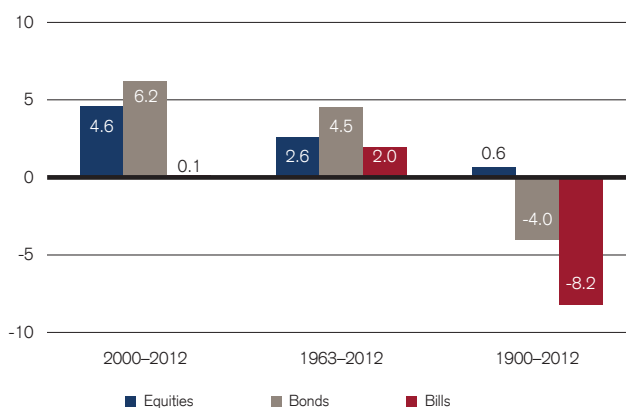
## Capital market returns for Austria

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 2.0 as compared to 0.009 for bonds and 0.00006 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 0.6%, bonds –4.0%, and bills –8.2% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 5.6%. The premia in Figure 3 omit 1921–22. For additional explanations of these figures, see page 35.

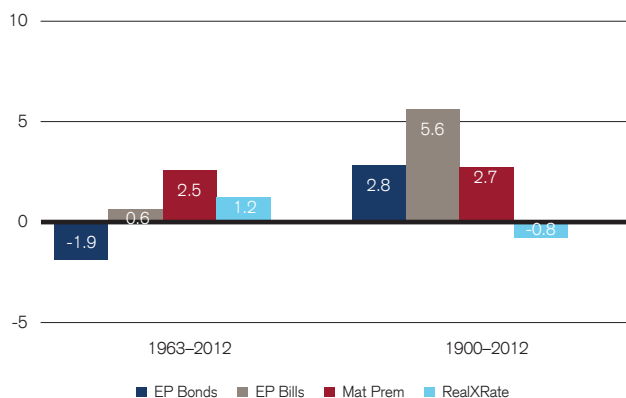
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



**Figure 3**  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.





**Belgium**

# At the heart of Europe

Belgium lies at the crossroads of Europe’s economic backbone and its key transport and trade corridors, and is the headquarters of the European Union. In 2012, Belgium was ranked the most global of the 208 nations that are scored in the KOF Index of Globalization.

Belgium’s strategic location has been a mixed blessing, making it a major battleground in two world wars. The ravages of war and attendant high inflation rates are an important contributory factor to its poor long-run investment returns – Belgium has been one of the three worst-performing equity markets and the seventh worst-performing bond market out of all those with a complete history.

The Brussels Stock Exchange was established in 1801 under French Napoleonic rule. Brussels rapidly grew into a major financial center, specializing during the early 20th century in tramways and urban transport.

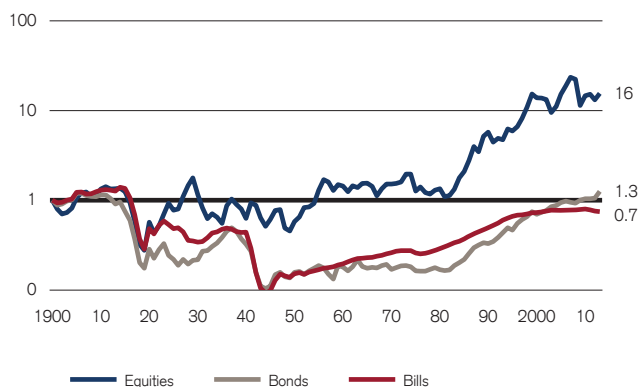
Its importance has gradually declined, and Euronext Brussels suffered badly during the banking crisis. Three large banks made up a majority of its market capitalization at the start of 2008, but the banking sector now represents only 5% of the index. By the start of 2013, most of the index (54%) was invested in just one company, Anheuser-Busch InBev, the leading global brewer and one of the world’s top five consumer products companies.

In 2013, we made enhancements to our Belgian data series, drawing on work by Annaert, Buelens, and Deloof (2012), whom we acknowledge in the Credit Suisse Global Investment Returns Sourcebook 2013.

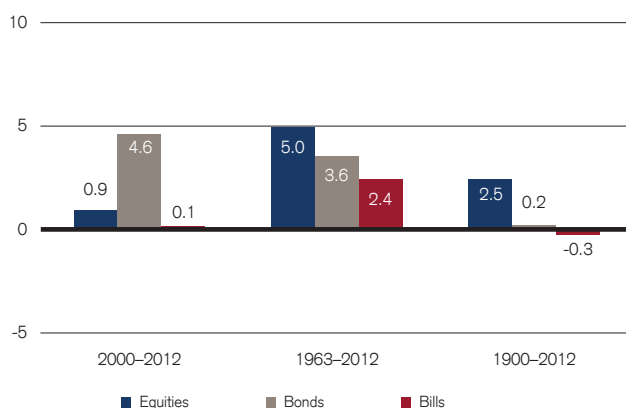
**Capital market returns for Belgium**

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 15.5 as compared to 1.3 for bonds and 0.7 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 2.5%, bonds 0.2%, and bills -0.3% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 2.7%. For additional explanations of these figures, see page 35.

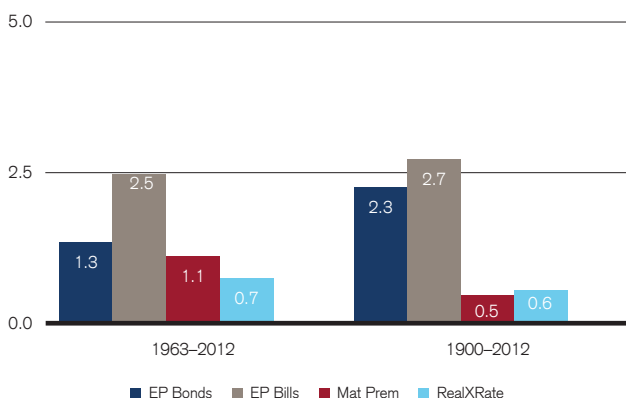
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



**Figure 3**  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



Canada

# Resourceful country

Canada is the world's second-largest country by land mass (after Russia), and its economy is the tenth-largest. As a brand, it is rated number two out of all the countries monitored in the 2013 Country Brand Index. It is blessed with natural resources, having the world's second-largest oil reserves, while its mines are leading producers of nickel, gold, diamonds, uranium and lead. It is also a major exporter of soft commodities, especially grains and wheat, as well as lumber, pulp and paper.

The Canadian equity market dates back to the opening of the Toronto Stock Exchange in 1861 and is the world's fifth-largest, accounting for 4.0% of world capitalization. Canada's bond market also ranks among the world's top ten.

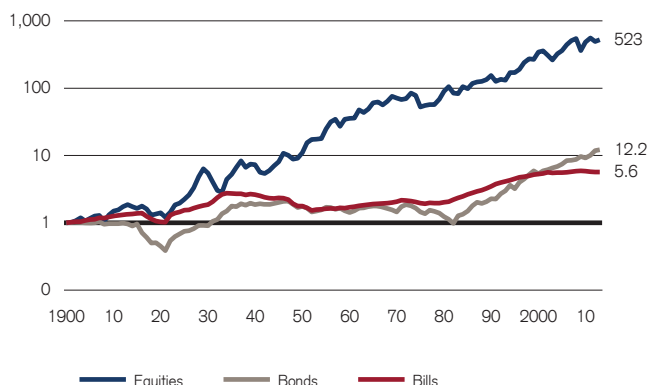
Given Canada's natural endowment, it is no surprise that oil and gas has a 24% weighting, with a further 11% in mining stocks. Banks comprise 27% of the Canadian market. The largest stocks are currently Royal Bank of Canada, Toronto-Dominion Bank, Bank of Nova Scotia, and Suncor Energy.

Canadian equities have performed well over the long run, with a real return of 5.7% per year. The real return on bonds has been 2.2% per year. These figures are close to those for the United States.

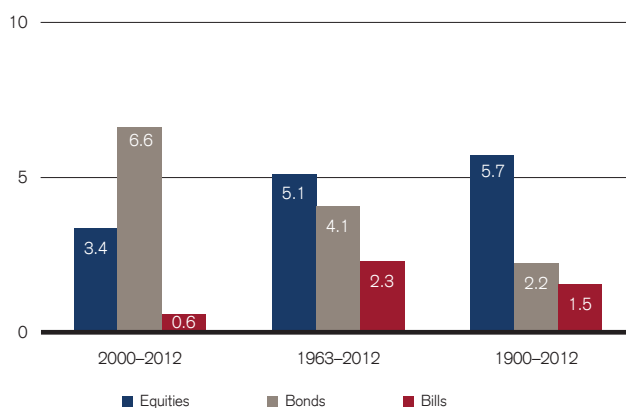
## Capital market returns for Canada

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 522.6 as compared to 12.2 for bonds and 5.6 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 5.7%, bonds 2.2%, and bills 1.5% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 4.1%. For additional explanations of these figures, see page 35.

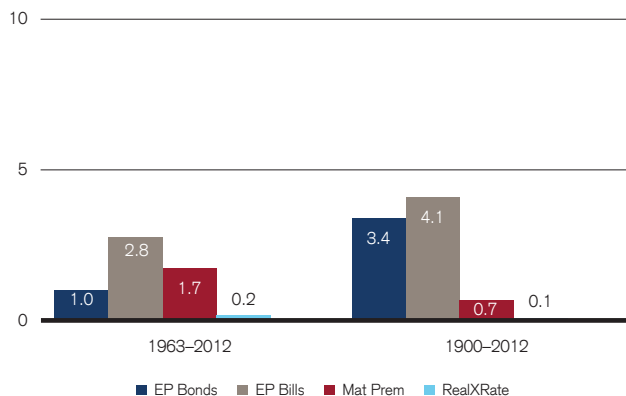
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



**Figure 3**  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



China

# Emerging powerhouse

The world's most heavily populated country, China has over 1.3 billion inhabitants. After the Qing Dynasty, it became the Republic of China (ROC) in 1911. The ROC nationalists lost control of the mainland at the end of the 1946–49 civil war, after which their jurisdiction was limited to Taiwan and a few islands.

After the communist victory in 1949, privately owned assets were expropriated and government debt was repudiated, and the People's Republic of China (PRC) has been a single-party state. We therefore distinguish between three periods. First, the Qing period and the ROC. Second, the PRC until economic reforms were introduced. Third, the modern period following the second stage of China's economic reforms of the late 1980s and early 1990s.

Though a tiny proportion of assets held outside the mainland may have retained value, and some UK bondholders received a small settlement in 1987 for outstanding claims, we assume the communist takeover generated total losses for domestic investors. After 1940, we hold the nominal value of assets constant until 1949. This gives rise to a collapse in real values during the early 1940s. Chinese returns from 1900 are incorporated into the world and world ex-US indexes.

China's economic growth since the reforms has been rapid, and it is now seen as an engine for the global economy. Intriguingly, China's fast GDP growth has not been accompanied by superior investment returns. Nearly half (45%) of the Chinese stock market's free-float capitalization is represented by financials, mainly banks and insurers. The largest company is China Mobile (11% of the index), followed by China Construction Bank, the Industrial and Commercial Bank of China, and CNOOC.

### Capital market returns for China

In addition to performance from 1900 to the 1940s, Figure 1 shows that, over 1993–2012, the real value of equities, with income reinvested, grew by a factor of 0.6 as compared to 1.5 for bonds and 1.1 for bills. Figure 2 displays the 1993–2012 real index levels as annualized returns, with equities giving –2.5%, bonds 1.9%, and bills 0.4%. Figure 3 expresses the annualized long-term real returns as premia. Since 1993, the annualized equity premium relative to bills has been –2.9%. For additional explanations of these figures, see page 35.

Figure 1 Cumulative real returns from 1900 to 2012

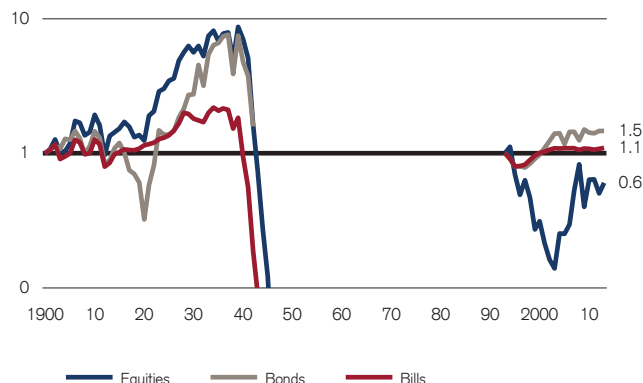


Figure 2 Annualized real returns on major asset classes (%)

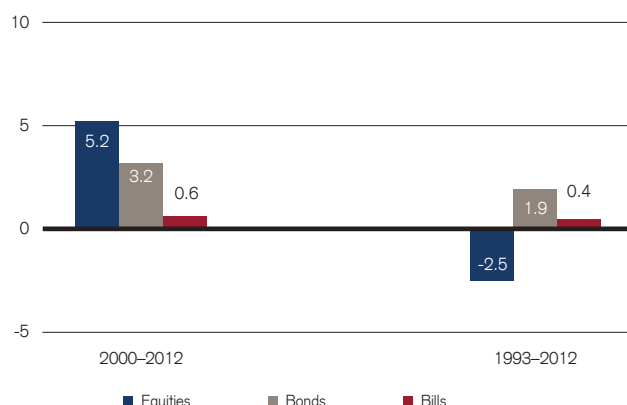
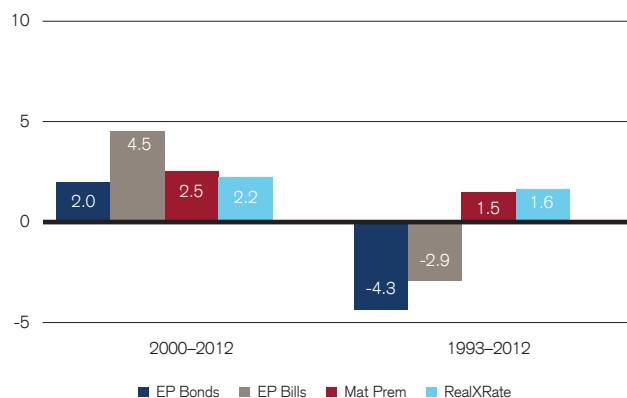


Figure 3 Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



## Denmark

# Happiest nation

The United Nations World Happiness Report, published in 2012 by Columbia University's Earth Institute, ranked Denmark the happiest nation on earth, ahead of Finland, Norway and the Netherlands. The Global Peace Index for 2012 rates the country as the second most peaceful in the world (jointly with New Zealand). And, according to Transparency International, Denmark also ranked joint top with Finland and New Zealand as the least corrupt country in the world in 2012.

Whatever the source of Danish happiness and tranquility, it does not appear to spring from outstanding equity returns. Since 1900, Danish equities have given an annualized real return of 5.0%, which is close to the performance of the world equity index.

In contrast, Danish bonds gave an annualized real return of 3.2%, the highest among the *Yearbook* countries. This is because our Danish bond returns, unlike those for other *Yearbook* countries, include an element of credit risk. The returns are taken from a study by Claus Parum, who felt it was more appropriate to use mortgage bonds, rather than more thinly traded government bonds.

The Copenhagen Stock Exchange was formally established in 1808, but traces its roots back to the late 17th century. The Danish equity market is relatively small. It has a high weighting in healthcare (60%) and industrials (18%). One half (49%) of the Danish equity market is represented by one company, Novo-Nordisk. Other large companies include Danske Bank and AP Møller-Mærsk.

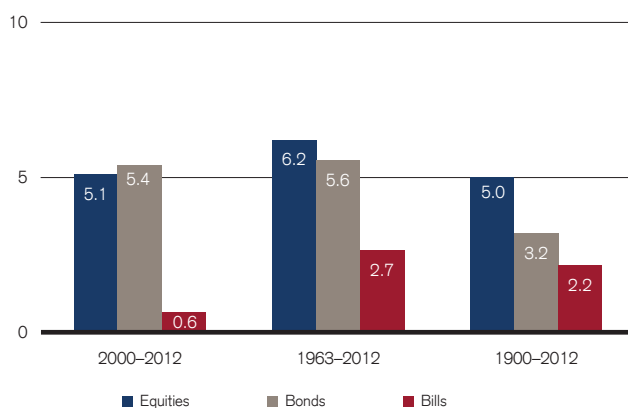
## Capital market returns for Denmark

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 251.0 as compared to 34.4 for bonds and 11.2 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 5.0%, bonds 3.2%, and bills 2.2% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 2.8%. For additional explanations of these figures, see page 35.

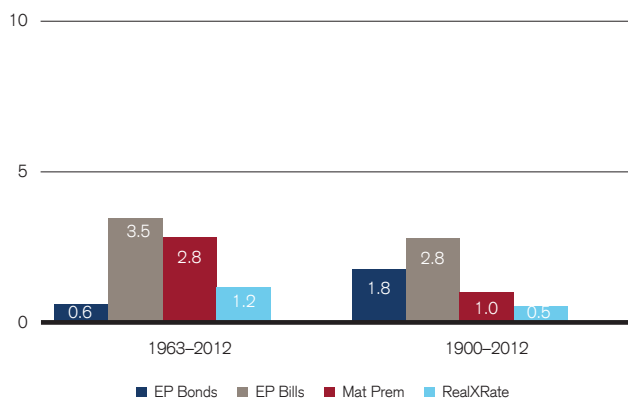
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



**Figure 3**  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *Credit Suisse Global Investment Returns Sourcebook 2013*.





**Finland**

# East meets West

With its proximity to the Baltic and Russia, Finland is a meeting place for Eastern and Western European cultures. This country of snow, swamps and forests – one of Europe’s most sparsely populated nations – was part of the Kingdom of Sweden until sovereignty transferred in 1809 to the Russian Empire. In 1917, Finland became an independent country.

In 2012, the Fund for Peace ranked Finland as the most stable country, while The Economist Intelligence Unit ranked the Finnish educational system as the world’s best. According to Transparency International, Finland ranked joint top with Denmark and New Zealand as the least corrupt country in 2012. A member of the European Union since 1995, Finland is the only Nordic state in the Eurozone. The Finns have transformed their country from a farm and forest-based community to a diversified industrial economy. Per capita income is among the highest in Western Europe.

Finland excels in high-tech exports. It is home to Nokia, the world’s largest manufacturer of mobile telephones until 2012, and the second-largest today. Forestry, an important export earner, provides a secondary occupation for the rural population.

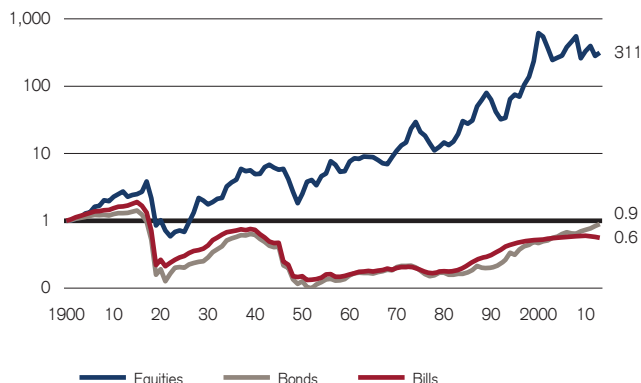
Finnish securities were initially traded over-the-counter or overseas, and trading began at the Helsinki Stock Exchange in 1912. Since 2003, the Helsinki exchange has been part of the OMX family of Nordic markets. At its peak, Nokia represented 72% of the value-weighted HEX All Shares Index, and Finland was a particularly concentrated stock market. Today, the largest Finnish companies are currently Sampo (20% of the market), Nokia (16% of the market), and Kone (14%).

In 2013, we made enhancements to our Finnish equity series, drawing on work by Nyberg and Vaihekoski (2012), whom we acknowledge in the [Credit Suisse Global Investment Returns Sourcebook 2013](#).

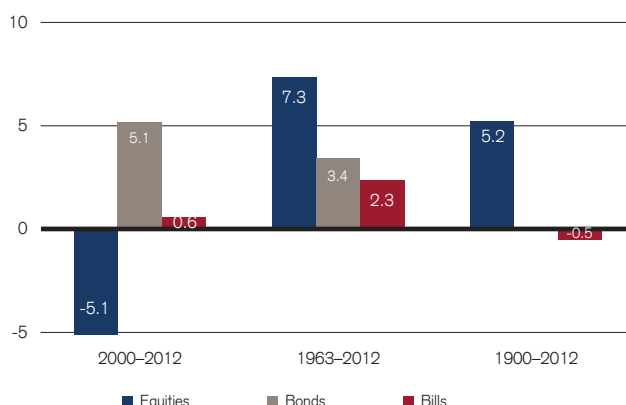
## Capital market returns for Finland

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 311.0 as compared to 0.9 for bonds and 0.6 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 5.2%, bonds -0.1%, and bills -0.5% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 5.8%. For additional explanations of these figures, see page 35.

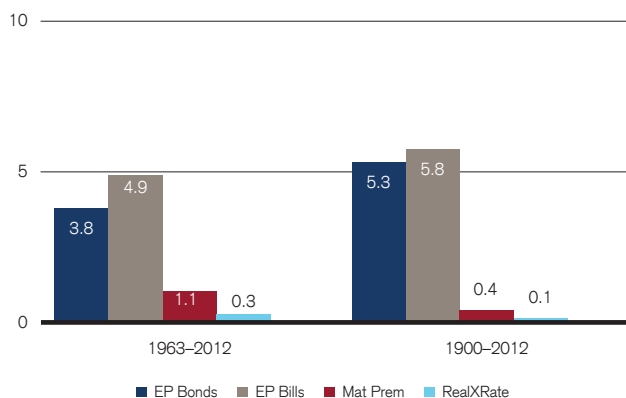
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



**Figure 3**  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, [Credit Suisse Global Investment Returns Sourcebook 2013](#).



France

# European center

Paris and London competed vigorously as financial centers in the 19th century. After the Franco-Prussian War in 1870, London achieved domination. But Paris remained important, especially, to its later disadvantage, in loans to Russia and the Mediterranean region, including the Ottoman Empire. As Kindelberger, the economic historian put it, "London was a world financial center; Paris was a European financial center."

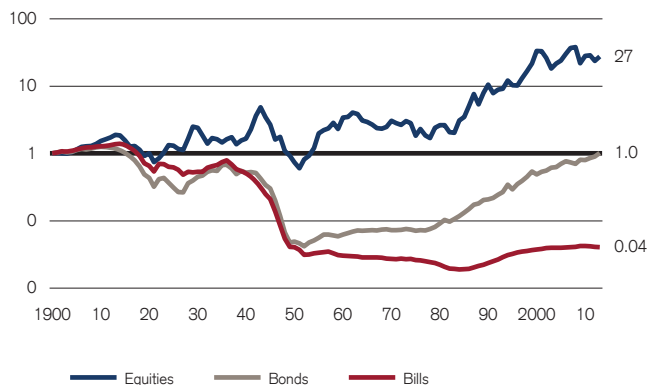
Paris has continued to be an important financial center, while France has remained at the center of Europe, being a founder member of the European Union and the euro. France is Europe's second-largest economy. It has the largest equity market in Continental Europe, ranked fourth in the world, and one of the largest bond markets in the world. At the start of 2013, France's largest listed companies were Sanofi, Total, LVMH and BNP Paribas.

Long-run French asset returns have been disappointing. France ranks 17th out of the 20 Yearbook countries for equity performance, 15th for bonds and 18th for bills. Among the Yearbook countries, it had the fourth-highest inflation and, hence, the poor fixed income returns. However, the inflationary episodes and poor performance date back to the first half of the 20th century and are linked to the world wars. Since 1950, French equities have achieved mid-ranking returns.

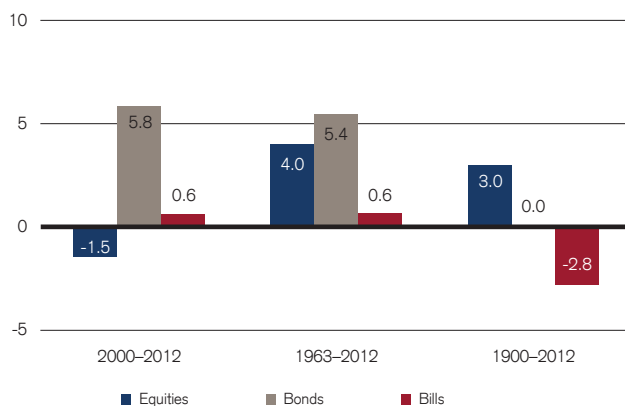
## Capital market returns for France

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 27.5 as compared to 1.0 for bonds and 0.04 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 3.0%, bonds 0.0%, and bills -2.8% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 5.9%. For additional explanations of these figures, see page 35.

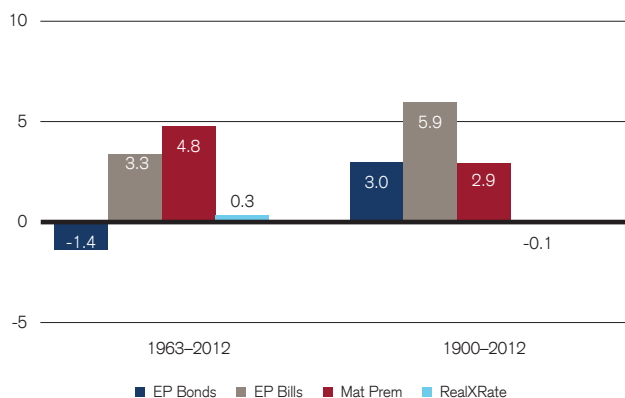
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



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Annualized equity, bond, and currency premia (%)



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Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



Germany

# Locomotive of Europe

German capital market history changed radically after World War II. In the first half of the 20th century, German equities lost two-thirds of their value in World War I. In the hyperinflation of 1922–23, inflation hit 209 billion percent, and holders of fixed income securities were wiped out. In World War II and its immediate aftermath, equities fell by 88% in real terms, while bonds fell by 91%.

There was then a remarkable transformation. In the early stages of its “economic miracle,” German equities rose by 4,094% in real terms from 1949 to 1959. Germany rapidly became known as the “locomotive of Europe.” Meanwhile, it built a reputation for fiscal and monetary prudence. From 1949 to date, it has enjoyed the world’s second-lowest inflation rate, its strongest currency (now the euro), and an especially strong bond market.

Today, Germany is Europe’s largest economy. Formerly the world’s top exporter, it has now been overtaken by China. Its stock market, which dates back to 1685, ranks seventh in the world by size, while its bond market is among the world’s largest.

The German stock market retains its bias towards manufacturing, with weightings of 22% in basic materials, 22% in consumer goods, and 16% in industrials. The largest stocks are Siemens, BASF, Bayer, SAP, and Allianz.

## Capital market returns for Germany

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 29.9 as compared to 0.1 for bonds and 0.1 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 3.1%, bonds –1.7%, and bills –2.4%. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 5.9%. Bond/bill returns and premia omit 1922–23. For additional explanations of these figures, see page 35.

Figure 1 Cumulative real returns from 1900 to 2012

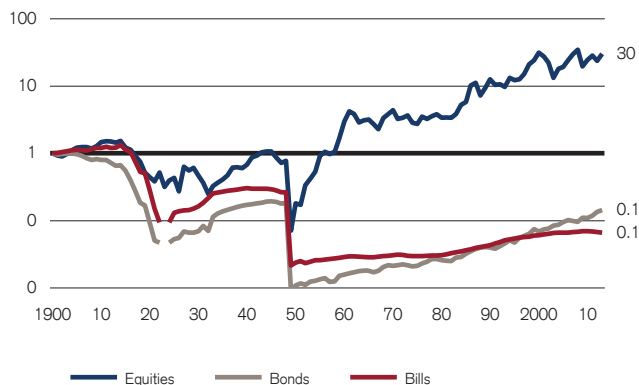


Figure 2 Annualized real returns on major asset classes (%)

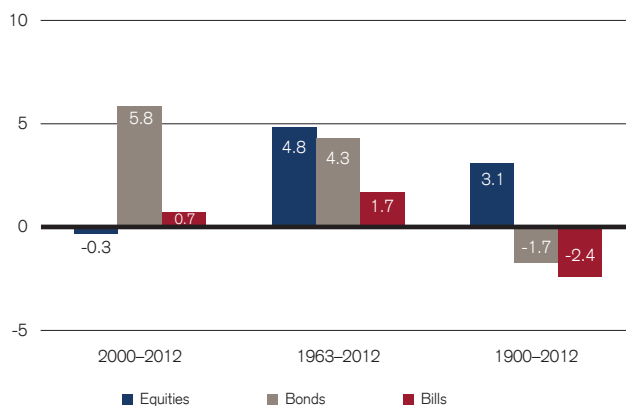
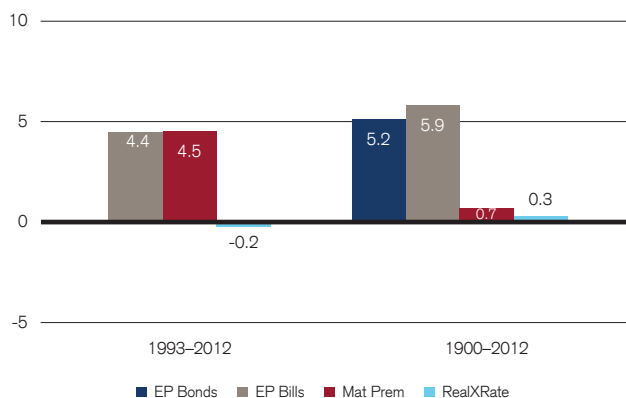


Figure 3 Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



Ireland

# Born free

Ireland was born as an independent country in 1922 as the Irish Free State, released from 700 years of Norman and later British control. By the 1990s and early 2000s, Ireland experienced great economic success and became known as the Celtic Tiger. The financial crisis changed that, and the country still faces hardship. Just as the Born Free Foundation aims to free tigers from being held captive, Ireland now needs to be saved from being a captive of the economic system.

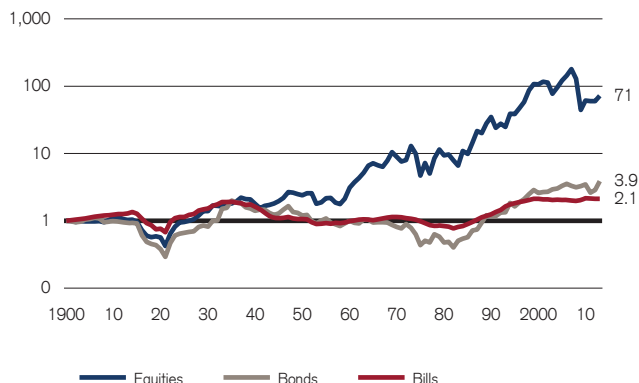
By 2007, Ireland had become the world's fifth-richest country in terms of GDP per capita, the second-richest in the EU, and was experiencing net immigration. Over the period 1987–2006, Ireland had the second-highest real equity return of any Yearbook country. The country is one of the smallest Yearbook markets and, sadly, it has shrunk since 2006. Too much of the boom was based on real estate, financials and leverage, and Irish stocks are now worth only a third of their value at the end of 2006. At that date, the Irish market had a 57% weighting in financials, but, by the beginning of 2013, they were no longer represented. The captive tiger now has a smaller bite.

Stock exchanges had existed from 1793 in Dublin and Cork. To monitor Irish stocks from 1900, we constructed an index for Ireland based on stocks traded on these two exchanges. In the period following independence, economic growth and stock market performance were weak, and during the 1950s the country experienced large-scale emigration. Ireland joined the European Union in 1973 and, from 1987, the economy improved. It switched its currency from the punt to the euro in 2002, and all investment returns reflect the start-2002 currency conversion factor.

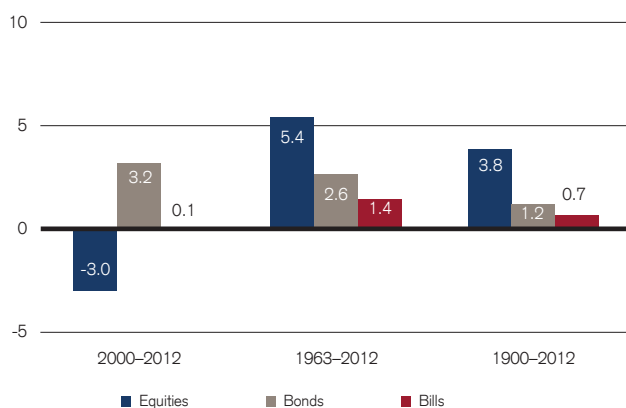
## Capital market returns for Ireland

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 71.3 as compared to 3.9 for bonds and 2.1 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 3.8%, bonds 1.2%, and bills 0.7% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 3.2%. For additional explanations of these figures, see page 35.

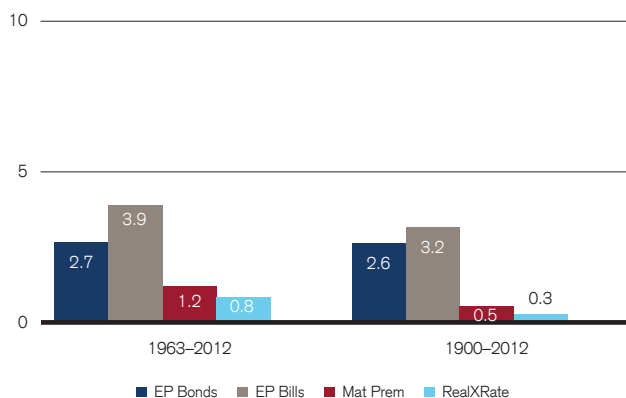
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



**Figure 3**  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.





Italy

# Banking innovators

While banking can trace its roots back to Biblical times, Italy can claim a key role in the early development of modern banking. North Italian bankers, including the Medici, dominated lending and trade financing throughout Europe in the Middle Ages. These bankers were known as Lombards, a name that was then synonymous with Italians. Reflecting its international heritage, Italy was ranked in 2012 by the KOF Index as the most politically globalized country in the world.

Italy retains a large banking sector to this day, with financials still accounting for 30% of the Italian equity market. Oil and gas accounts for a further 27%, and the largest stocks traded on the Milan Stock Exchange are Eni, Enel, and Generali.

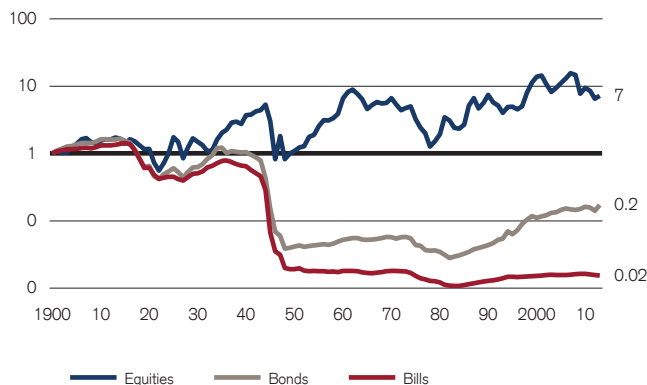
Sadly, Italy has experienced some of the poorest asset returns of any Yearbook country. Since 1900, the annualized real return from equities has been 1.8%, which is one of the two lowest returns out of the Yearbook countries. After Germany and Austria, which experienced especially severe hyperinflations, Italy has experienced the poorest real bond and real bill returns of any Yearbook country, the highest inflation rate, and the weakest currency.

Today, Italy's stock market is just in the world's largest 20, but its highly developed bond market is the world's third-largest. Italians are now focused on the implications of the Eurozone debt crisis.

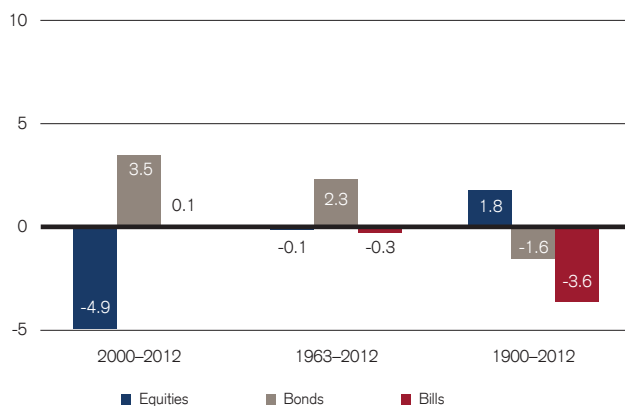
## Capital market returns for Italy

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 7.1 as compared to 0.2 for bonds and 0.02 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 1.8%, bonds -1.6%, and bills -3.6% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 5.6%. For additional explanations of these figures, see page 35.

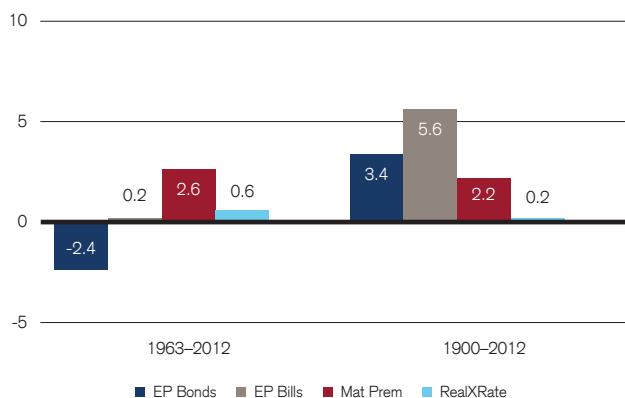
**Figure 1**  
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Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



Japan

# Birthplace of futures

Japan has a long heritage in financial markets. Trading in rice futures had been initiated around 1730 in Osaka, which created its stock exchange in 1878. Osaka was to become the leading derivatives exchange in Japan (and the world's largest futures market in 1990 and 1991), while the Tokyo Stock Exchange, also founded in 1878, was to become the leading market for spot trading.

From 1900 to 1939, Japan was the world's second-best equity performer. But World War II was disastrous and Japanese stocks lost 96% of their real value. From 1949 to 1959, Japan's "economic miracle" began and equities gave a real return of 1,565%. With one or two setbacks, equities kept rising for another 30 years.

By the start of the 1990s, the Japanese equity market was the largest in the world, with a 41% weighting in the world index versus 30% for the USA. Real estate values were also riding high and it was asserted that the grounds of the Imperial palace in Tokyo were worth more than the entire State of California.

Then the bubble burst. From 1990 to the start of 2009, Japan was the worst-performing stock market. At the start of 2013 its capital value is still only one-third of its value at the beginning of the 1990s. Its weighting in the world index fell from 41% to 8%. Meanwhile, Japan suffered a prolonged period of stagnation, banking crises and deflation. Hopefully, this will not form the blueprint for other countries facing a financial crisis.

Despite the fallout after the asset bubble burst, Japan remains a major economic power. It has the world's third-largest equity market as well as its second-biggest bond market. It is a world leader in technology, automobiles, electronics, machinery and robotics, and this is reflected in the composition of its equity market.

## Capital market returns for Japan

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 64.6 as compared to 0.3 for bonds and 0.1 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 3.8%, bonds -1.0%, and bills -1.9% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 5.7%. For additional explanations of these figures, see page 35.

Figure 1 Cumulative real returns from 1900 to 2012

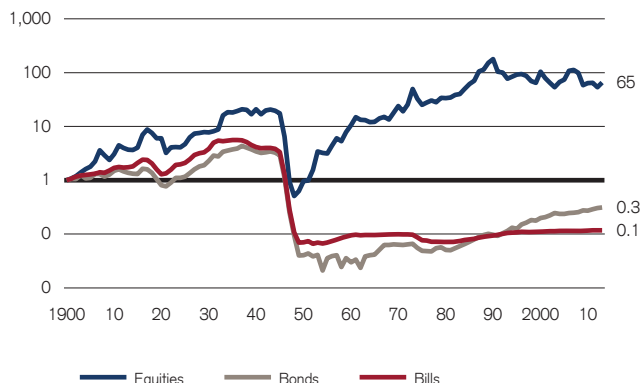


Figure 2 Annualized real returns on major asset classes (%)

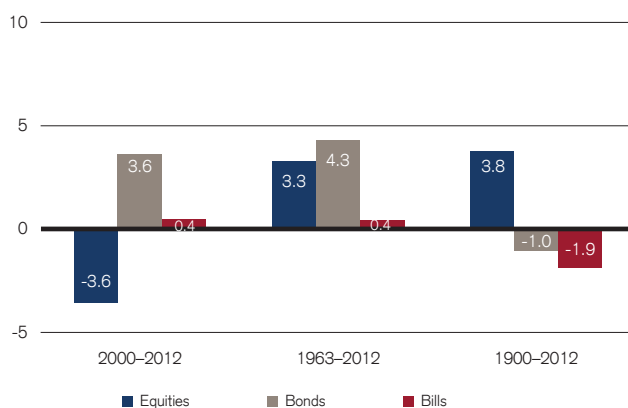
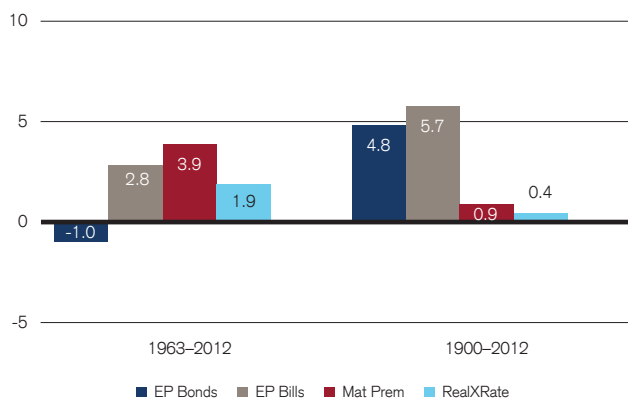


Figure 3 Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



Netherlands

# Exchange pioneer

Although some forms of stock trading occurred in Roman times, organized trading did not take place until transferable securities appeared in the 17th century. The Amsterdam market, which started in 1611, was the world's main center of stock trading in the 17th and 18th centuries. A book written in 1688 by a Spaniard living in Amsterdam (appropriately entitled *Confusion de Confusiones*) describes the amazingly diverse tactics used by investors. Even though only one stock was traded – the Dutch East India Company – they had bulls, bears, panics, bubbles and other features of modern exchanges.

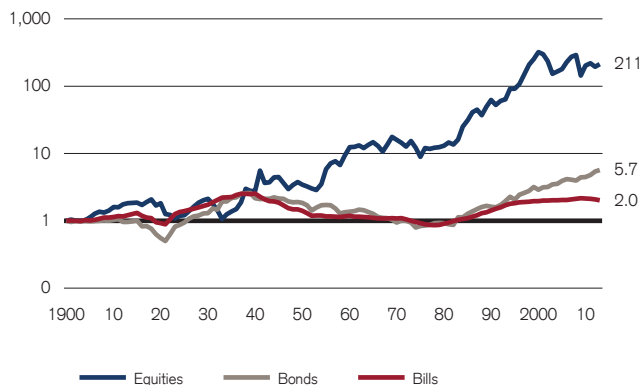
The Amsterdam Exchange continues to prosper today as part of Euronext. Over the years, Dutch equities have generated a mid-ranking real return of 4.9% per year. The Netherlands has traditionally been a low inflation country and, since 1900, has enjoyed the lowest inflation rate among the EU countries and the second-lowest (after Switzerland) from among all the countries covered in the *Yearbook*.

The Netherlands has a prosperous open economy. The largest energy company in the world, Royal Dutch Shell, now has its primary listing in London and a secondary listing in Amsterdam. But the Amsterdam Exchange still hosts more than its share of major multinationals, including Unilever, ArcelorMittal, ING Group, and Koninklijke Philips.

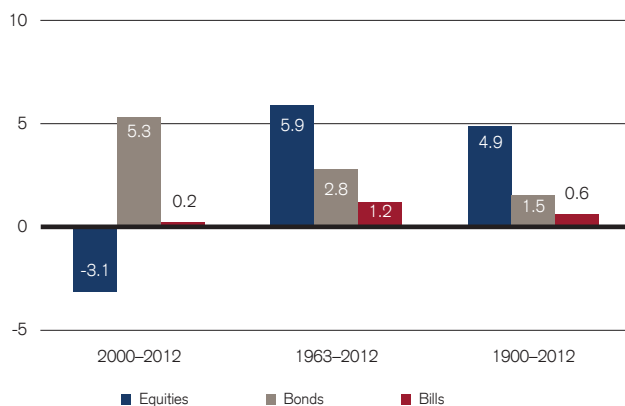
## Capital market returns for the Netherlands

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 211.3 as compared to 5.7 for bonds and 2.0 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 4.9%, bonds 1.5%, and bills 0.6% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 4.2%. For additional explanations of these figures, see page 35.

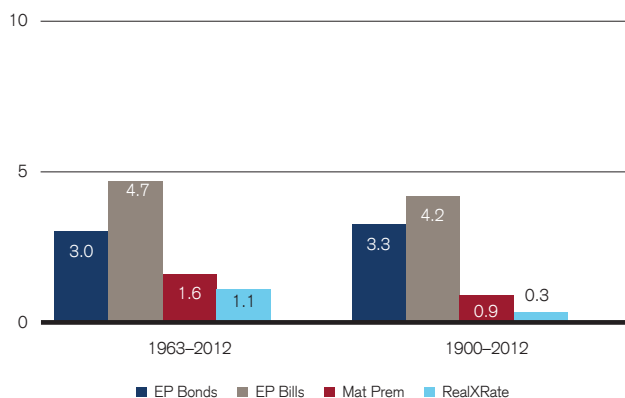
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



**Figure 3**  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *Credit Suisse Global Investment Returns Sourcebook 2013*.



New Zealand

# Purity and integrity

For a decade, New Zealand has been promoting itself to the world as “100% pure” and Forbes calls this marketing drive one of the world's top ten travel campaigns. But the country also prides itself on honesty, openness, good governance and freedom to run businesses. According to Transparency International, New Zealand ranked joint top with Denmark and Finland as the least corrupt country in the world in 2012. The Wall Street Journal ranks New Zealand as the best in the world for business freedom. The Global Peace Index for 2012 rates the country as the second most peaceful in the world (with Denmark).

The British colony of New Zealand became an independent dominion in 1907. Traditionally, New Zealand's economy was built upon on a few primary products, notably wool, meat and dairy products. It was dependent on concessionary access to British markets until UK accession to the European Union.

Over the last two decades, New Zealand has evolved into a more industrialized, free market economy. It competes globally as an export-led nation through efficient ports, airline services and submarine fiber-optic communications.

The New Zealand Exchange traces its roots to the Gold Rush of the 1870s. In 1974, the regional stock markets merged to form the New Zealand Stock Exchange. In 2003, the Exchange demutualized and officially became the New Zealand Exchange Limited. The largest firms traded on the exchange are Fletcher Building (25% of the index) and Telecom Corporation of New Zealand (19%).

## Capital market returns for New Zealand

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 669.0 as compared to 11.1 for bonds and 6.4 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 5.9%, bonds 2.2%, and bills 1.7% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 4.2%. For additional explanations of these figures, see page 35.

Figure 1 Cumulative real returns from 1900 to 2012

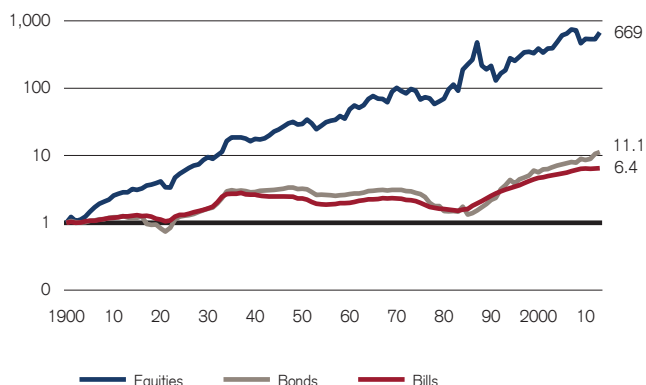


Figure 2 Annualized real returns on major asset classes (%)

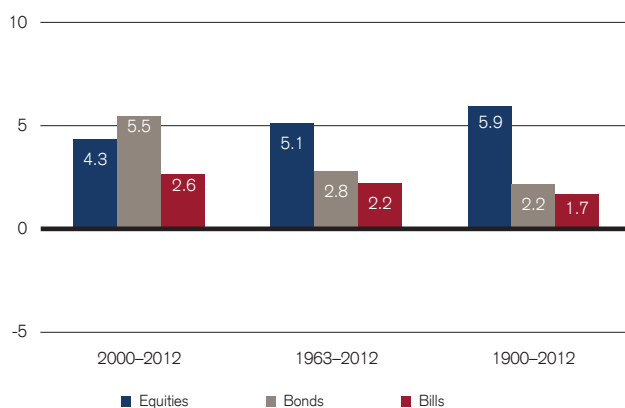
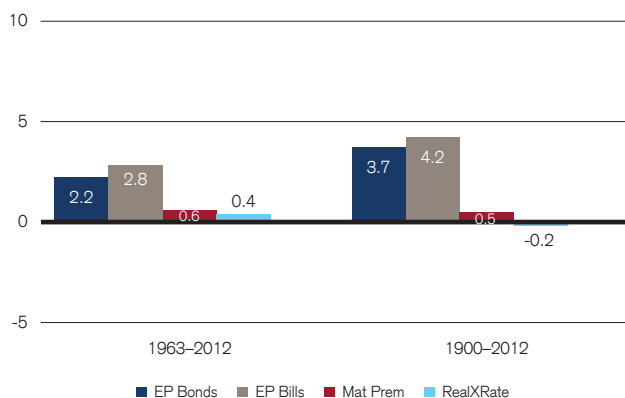


Figure 3 Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.





Norway

# Nordic oil kingdom

Norway is a very small country (ranked 115th by population and 61st by land area) surrounded by large natural resources. It is the only country that is self sufficient in electricity production (through hydro power) and it is one of the world's largest exporters of oil. Norway is the second-largest exporter of fish.

The population of 4.9 million enjoys the largest GDP per capita in the world, beaten only by a few city states. Norwegians live under a constitutional monarchy outside the eurozone. Prices are high: *The Economist's* Big Mac Index shows that, in 2013, a burger in Norway is more expensive than any other country apart from Venezuela. The United Nations, through its Human Development Index, ranks Norway the best country in the world for life expectancy, education and standard of living.

The Oslo Stock Exchange was founded as Christiania Bors in 1819 for auctioning ships, commodities and currencies. Later, this extended to trading in stocks and shares. The exchange now forms part of the OMX grouping of Scandinavian exchanges.

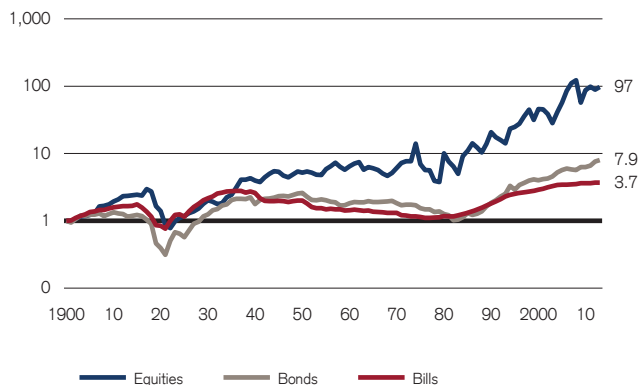
In the 1990s, the Government established its petroleum fund to invest the surplus wealth from oil revenues. This has grown to become the largest fund in Europe and the second largest in the world, with a market value of some 0.6 trillion. The fund invests predominantly in equities and, on average, it owns more than 1% of every listed company in the world.

The largest Oslo Stock Exchange stocks are Statoil, Telenor, and DnB NOR.

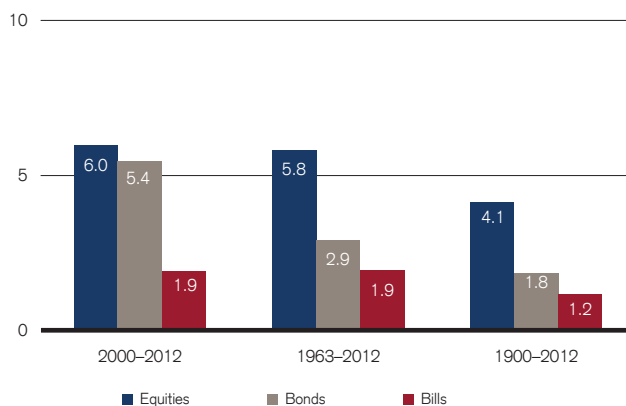
## Capital market returns for Norway

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 96.6 as compared to 7.9 for bonds and 3.7 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 4.1%, bonds 1.8%, and bills 1.2% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 2.9%. For additional explanations of these figures, see page 35.

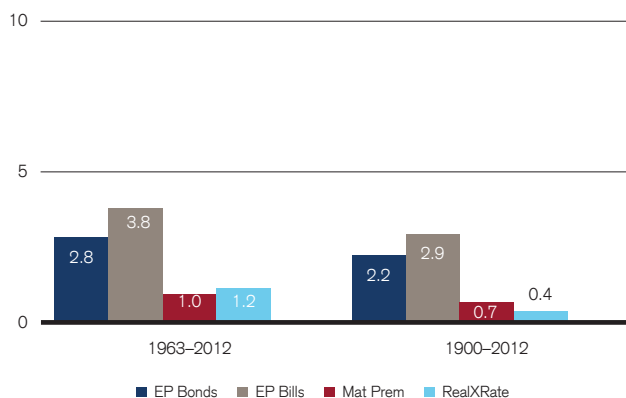
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



**Figure 3**  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *Credit Suisse Global Investment Returns Sourcebook 2013*.



## Russia

# Wealth of resources

Russia is the world's largest country, covering more than one-eighth of the Earth's inhabited land area, spanning nine time zones, and located in both Europe and Asia. Formerly, it even owned one-sixth of the USA. It is the world's leading oil producer, second-largest natural gas producer, and third-largest steel and aluminium exporter. It has the biggest reserves of natural gas and forestry and the second-biggest of coal.

After the 1917 revolution, Russia ceased to be a market economy. We therefore distinguish between three periods. First, the Russian Empire up to 1917. Second, the long interlude following Soviet expropriation of private assets and the repudiation of Russia's government debt. Third, the Russian Federation, following the dissolution of the Soviet Union in 1991.

Very limited compensation was eventually paid to British and French bondholders (in the 1980s and 1990s, respectively) but investors in aggregate still lost more than 99% in present value terms. The 1917 revolution is deemed to result in complete losses for domestic stock- and bondholders. Russian returns are incorporated into the world, world ex-US, and Europe indexes.

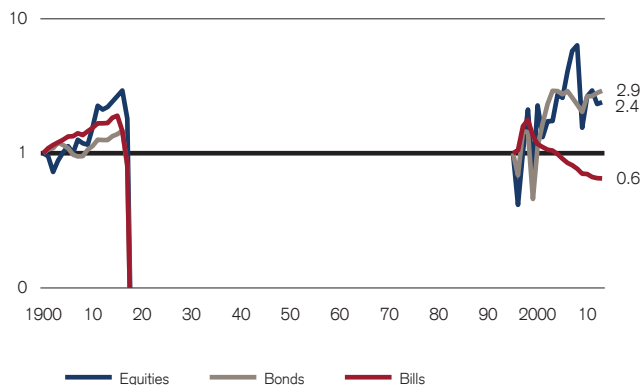
In 1998, Russia experienced a severe financial crisis, with government debt default, currency devaluation, hyperinflation, and an economic meltdown. However, there was a surprisingly swift recovery and in the decade after the 1998 crisis, the economy averaged 7% annual growth. In 2008–09 there was a major reaction to global setbacks and commodity price swings. Russian stock market performance has therefore been volatile.

By the beginning of 2013, over half (55%) of the Russian stock market comprised oil and gas companies, the largest being Gazprom and Lukoil. Adding in basic materials, resources represent two-thirds of market capitalization. The largest non-resource company is Sberbank.

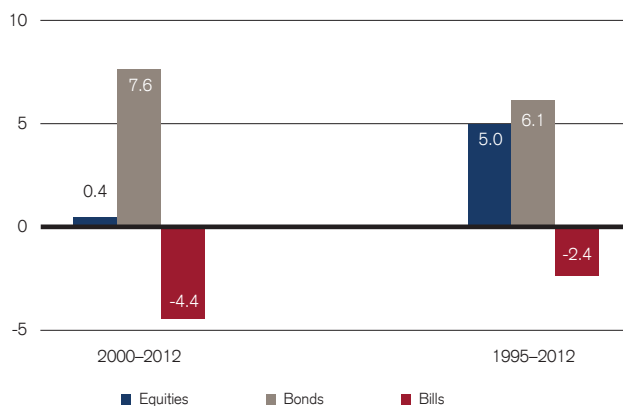
## Capital market returns for Russia

In addition to performance from 1900 to 1917, Figure 1 shows that over 1993–2012, the real value of equities, with income reinvested, grew by a factor of 2.4 as compared to 2.9 for bonds and 0.6 for bills. Figure 2 displays the 1995–2012 real index levels as annualized returns, with equities giving 5.0%, bonds 6.1%, and bills –2.4%. Figure 3 expresses the annualized long-term real returns as premia. Since 1995, the annualized equity risk premium relative to bills has been 7.5%. For additional explanations of these figures, see page 35.

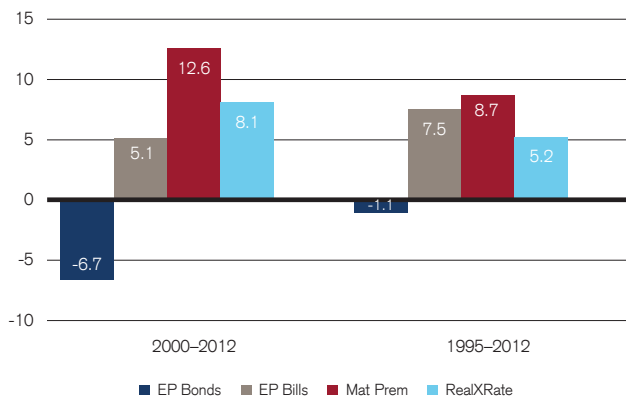
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



**Figure 3**  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



South Africa

# Golden opportunity

The discovery of diamonds at Kimberley in 1870 and the Witwatersrand gold rush of 1886 had a profound impact on South Africa’s subsequent history. Today, South Africa has 90% of the world’s platinum, 80% of its manganese, 75% of its chrome and 41% of its gold, as well as vital deposits of diamonds, vanadium, and coal.

The 1886 gold rush led to many mining and financing companies opening up and, to cater for their needs, the Johannesburg Stock Exchange (JSE) opened in 1887. Over the years since 1900, the South African equity market has been one of the world’s most successful, generating real equity returns of 7.3% per year, which is the highest return among the Yearbook countries.

Today, South Africa is the largest economy in Africa, with a sophisticated financial structure. Back in 1900, South Africa, together with several other Yearbook countries, would have been deemed an emerging market. According to index compilers, it has not yet emerged and today ranks as the fifth-largest emerging market.

Gold, once the keystone of South Africa’s economy, has declined in importance as the economy has diversified. Financials account for 25%, while basic minerals lag behind with only 16% of the JSE’s market capitalization. The largest JSE stocks are MTN, Naspers, Sasol, and Standard Bank.

### Capital market returns for South Africa

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 2925.5 as compared to 7.8 for bonds and 3.0 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 7.3%, bonds 1.8%, and bills 1.0%. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 6.3%. For additional explanations of these figures, see page 35.

Figure 1 Cumulative real returns from 1900 to 2012

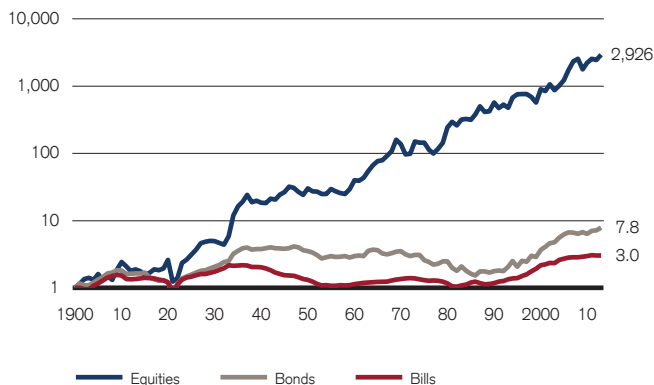


Figure 2 Annualized real returns on major asset classes (%)

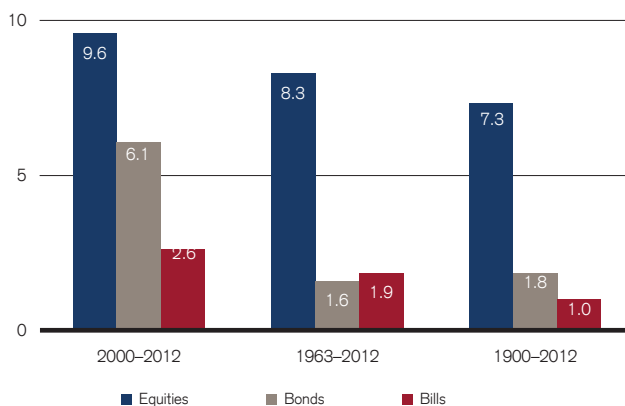
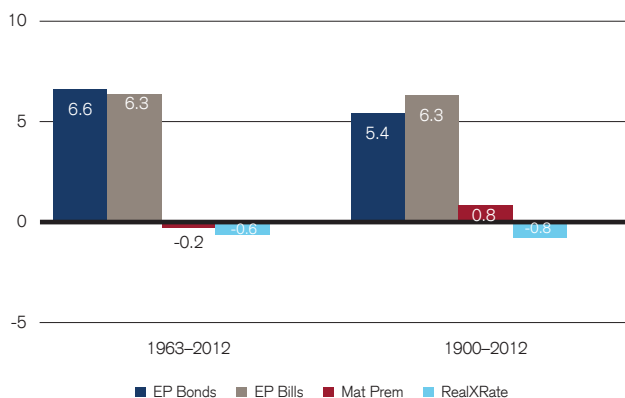


Figure 3 Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



Spain

# Key to Latin America

Spanish is the most widely spoken international language after English, and has the fourth-largest number of native speakers after Chinese, Hindi and English. Partly for this reason, Spain has a visibility and influence that extends way beyond its Southern European borders, and carries weight throughout Latin America.

While the 1960s and 1980s saw Spanish real equity returns enjoying a bull market and ranked second in the world, the 1930s and 1970s saw the very worst returns among our countries.

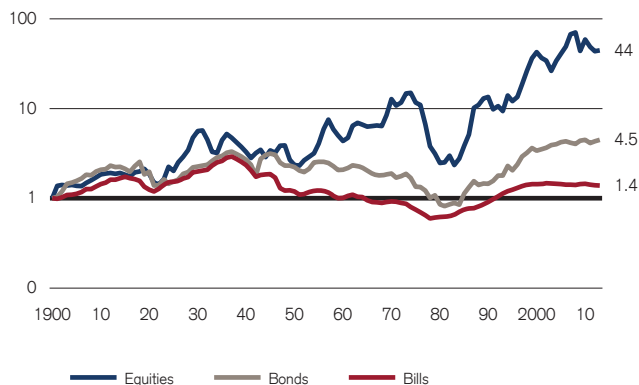
Though Spain stayed on the sidelines during the two world wars, Spanish stocks lost much of their real value over the period of the civil war during 1936–39, while the return to democracy in the 1970s coincided with the quadrupling of oil prices, heightened by Spain’s dependence on imports for 70% of its energy needs.

The Madrid Stock Exchange was founded in 1831 and is now the fourteenth-largest in the world, helped by strong economic growth since the 1980s. The major Spanish companies retain strong presences in Latin America combined with increasing strength in banking and infrastructure across Europe. The largest stocks are Banco Santander, Telefonica, BBVA, and Inditex.

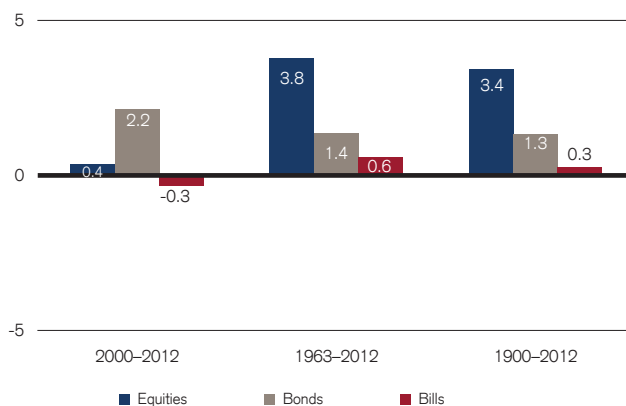
## Capital market returns for Spain

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 44.3 as compared to 4.5 for bonds and 1.4 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 3.4%, bonds 1.3%, and bills 0.3% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 3.1%. For additional explanations of these figures, see page 35.

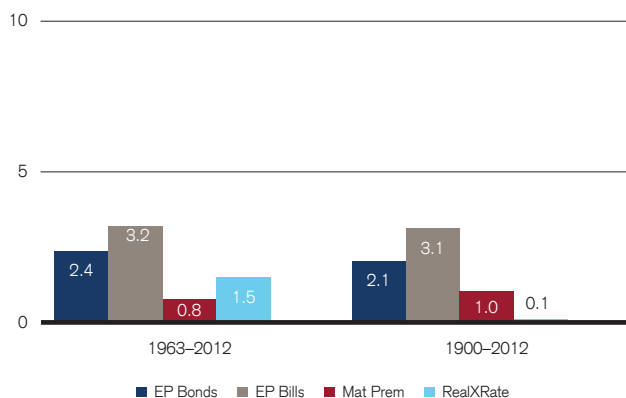
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



**Figure 3**  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.





Sweden

# Nobel prize returns

Alfred Nobel bequeathed 94% of his total assets to establish and endow the five Nobel Prizes (first awarded in 1901), instructing that the capital be invested in safe securities. Were Sweden to win a Nobel prize for its investment returns, it would be for its achievement as the only country to have real returns for equities, bonds and bills all ranked in the top six.

Real Swedish equity returns have been supported by a policy of neutrality through two world wars, and the benefits of resource wealth and the development of industrial holding companies in the 1980s. Overall, they have returned 5.6% per year. Details on our Swedish index data and sources are provided in the *Credit Suisse Global Investment Returns Sourcebook 2013*.

The Stockholm Stock Exchange was founded in 1863 and is the primary securities exchange of the Nordic countries. Since 1998, it has been part of the OMX grouping. The largest SSE stocks are Nordea Bank, Ericsson and Svenska Handelsbank.

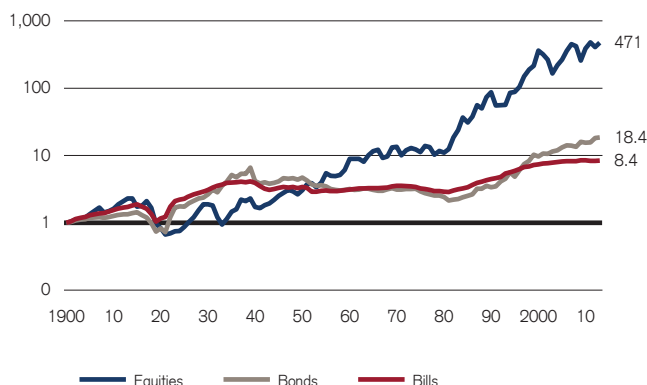
Despite the high rankings for real bond and bill returns, Nobel prize winners would rue the instruction to invest in safe securities as the real return on bonds was only 2.6% per year, and that on bills only 1.9% per year. With the capital invested in domestic equities, the winners would have maximized their fortunes as well as their fame.

In 2013, we made enhancements to our series for Swedish equities, drawing on work by Gerndt, Palm, and Waldenström (2012), whom we acknowledge in the *Credit Suisse Global Investment Returns Sourcebook 2013*.

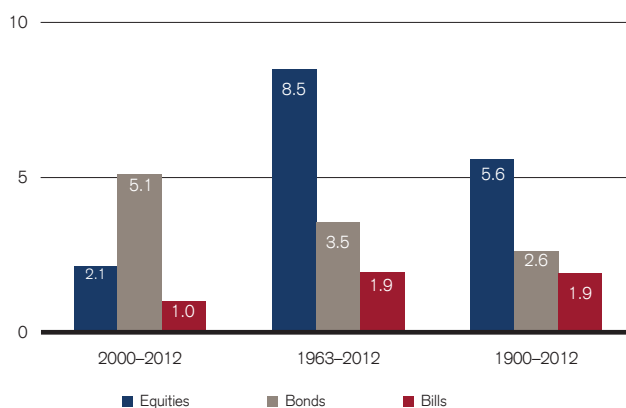
## Capital market returns for Sweden

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 470.8 as compared to 18.4 for bonds and 8.4 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 5.6%, bonds 2.6%, and bills 1.9% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 3.6%. For additional explanations of these figures, see page 35.

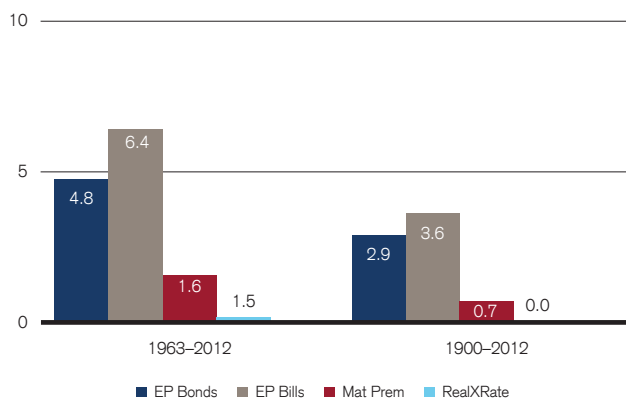
**Figure 1**  
Cumulative real returns from 1900 to 2012



**Figure 2**  
Annualized real returns on major asset classes (%)



**Figure 3**  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, *Credit Suisse Global Investment Returns Sourcebook 2013*.



Switzerland

# Traditional safe haven

For a small country with just 0.1% of the world's population and less than 0.01% of its land mass, Switzerland punches well above its weight financially and wins several gold medals in the global financial stakes. In the Global Competitiveness Report 2012–2013, Switzerland is top ranked in the world. It also moved up one place in 2013 to be ranked by Future Brand Index as the world's number one country brand.

The Swiss stock market traces its origins to exchanges in Geneva (1850), Zurich (1873), and Basel (1876). It is now the world's eighth-largest equity market, accounting for 3.2% of total world value.

Since 1900, Swiss equities have achieved an acceptable real return of 4.2%, while Switzerland has been one of the world's four best-performing government bond markets, with an annualized real return of 2.2%. Switzerland has also enjoyed the world's lowest inflation rate: just 2.3% per year since 1900. Meanwhile, the Swiss franc has been the world's strongest currency.

Switzerland is, of course, one of the world's most important banking centers, and private banking has been a major Swiss competence for over 300 years. Swiss neutrality, sound economic policy, low inflation and a strong currency have all bolstered the country's reputation as a safe haven. Today, close to 30% of all cross-border private assets invested worldwide are managed in Switzerland.

Switzerland's listed companies include world leaders such as Nestle, Novartis and Roche, which together comprise more than half of the equity market capitalization of Switzerland.

## Capital market returns for Switzerland

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 110.0 as compared to 11.9 for bonds and 2.5 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 4.2%, bonds 2.2%, and bills 0.8% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 3.4%. For additional explanations of these figures, see page 35.

Figure 1 Cumulative real returns from 1900 to 2012

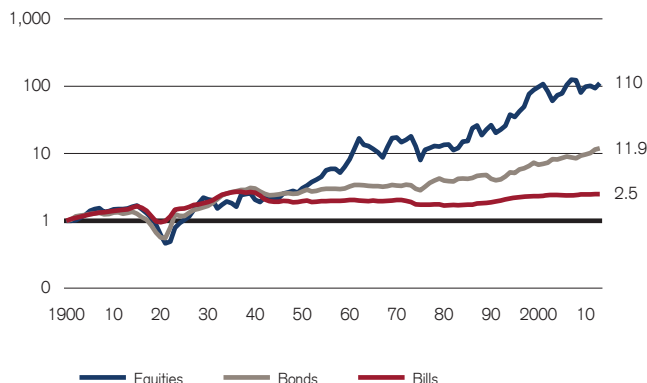


Figure 2 Annualized real returns on major asset classes (%)

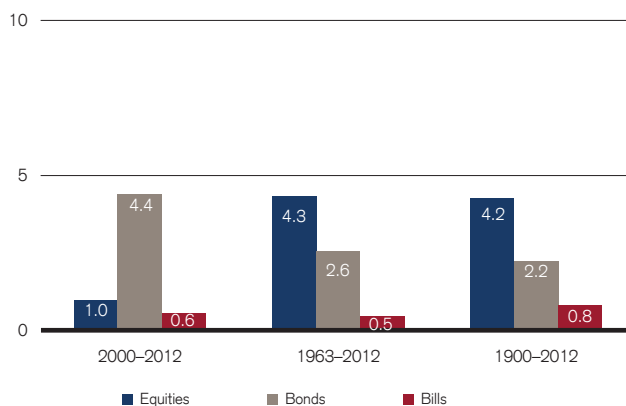
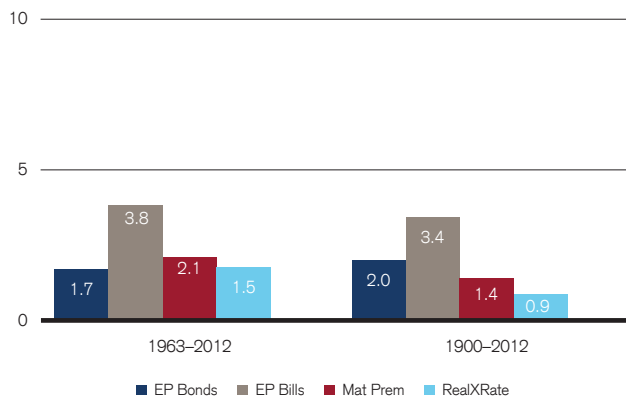


Figure 3 Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



United Kingdom

# Global center

Organized stock trading in the United Kingdom dates from 1698, and the London Stock Exchange was formally established in 1801. By 1900, the UK equity market was the largest in the world, and London was the world's leading financial center, specializing in global and cross-border finance.

Early in the 20th century, the US equity market overtook the UK and, nowadays, New York is a larger financial center than London. What continues to set London apart, and justifies its claim to be the world's leading international financial center, is the global, cross-border nature of much of its business.

Today, London is ranked as the top financial center in the Global Financial Centres Index, Worldwide Centres of Commerce Index, and Forbes' ranking of powerful cities. It is the world's banking center, with 550 international banks and 170 global securities firms having offices in London. The London foreign exchange market is the largest in the world, and London has the world's second-largest stock market, third-largest insurance market, and seventh-largest bond market.

London is the world's largest fund management center, managing almost half of Europe's institutional equity capital, and three-quarters of Europe's hedge fund assets. More than three-quarters of Eurobond deals are originated and executed in London. More than a third of the world's swap transactions and more than a quarter of global foreign exchange transactions take place in London, which is also a major center for commodities trading, shipping and many other services.

London is now the location at which Royal Dutch Shell is listed. Other major UK companies include HSBC, BP, Vodafone, and GlaxoSmithKline.

## Capital market returns for the United Kingdom

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 316.0 as compared to 5.5 for bonds and 2.9 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 5.2%, bonds 1.5%, and bills 0.9% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 4.3%. For additional explanations of these figures, see page 35.

Figure 1  
Cumulative real returns from 1900 to 2012

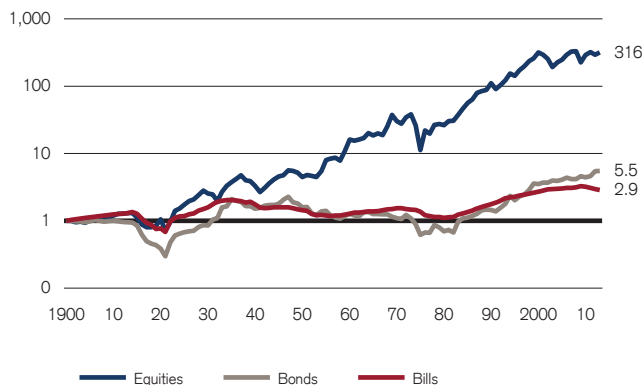


Figure 2  
Annualized real returns on major asset classes (%)

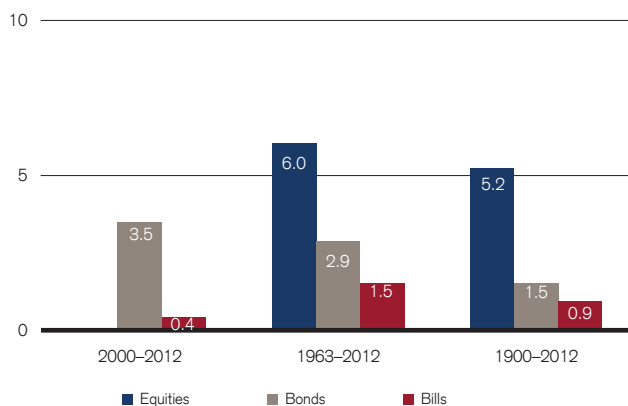
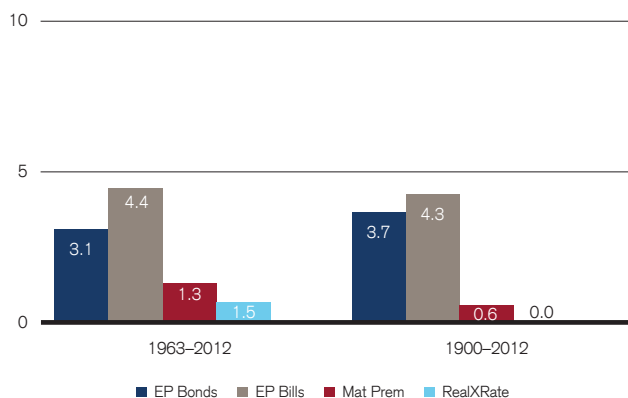


Figure 3  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



United States

# Financial superpower

In the 20th century, the United States rapidly became the world's foremost political, military, and economic power. After the fall of communism, it became the world's sole superpower. The International Energy Agency predicts that the USA will be the world's largest oil producer by 2017

The USA is also a financial superpower. It has the world's largest economy, and the dollar is the world's reserve currency. Its stock market accounts for 45% of total world value, which is over five times as large as the UK, its closest rival. The USA also has the world's largest bond market.

US financial markets are also the best-documented in the world and, until recently, most of the long-run evidence cited on historical asset returns drew almost exclusively on the US experience. Since 1900, US equities and US bonds have given real returns of 6.3% and 2.0%, respectively.

There is an obvious danger of placing too much reliance on the excellent long-run past performance of US stocks. The New York Stock Exchange traces its origins back to 1792. At that time, the Dutch and UK stock markets were already nearly 200 and 100 years old, respectively. Thus, in just a little over 200 years, the USA has gone from zero to almost a one-half share of the world's equity markets.

Extrapolating from such a successful market can lead to "success" bias. Investors can gain a misleading view of equity returns elsewhere, or of future equity returns for the USA itself. That is why this Yearbook focuses on global returns, rather than just those from the USA.

## Capital market returns for the United States

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 951.7 as compared to 9.4 for bonds and 2.7 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 6.3%, bonds 2.0%, and bills 0.9% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 5.3%. For additional explanations of these figures, see page 35.

Figure 1 Cumulative real returns from 1900 to 2012

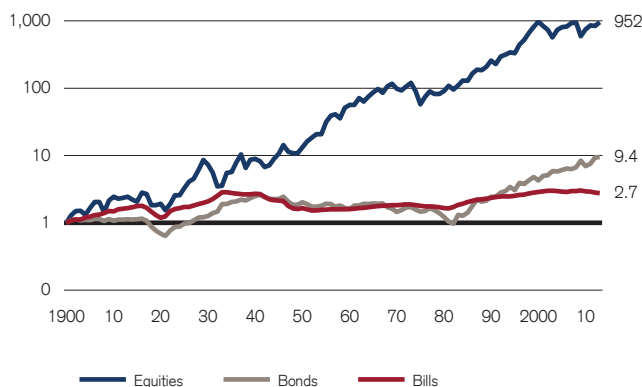


Figure 2 Annualized real returns on major asset classes (%)

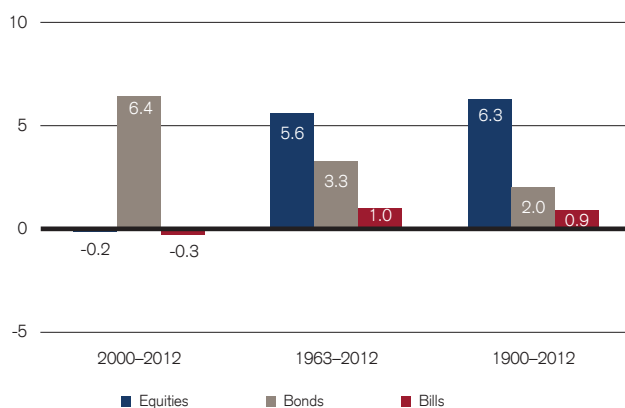
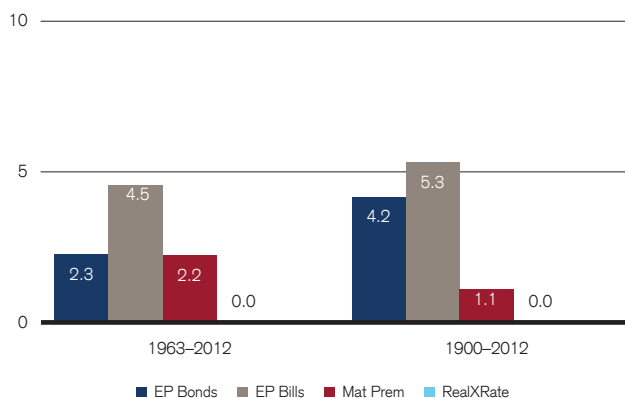


Figure 3 Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.





World

# Globally diversified

It is interesting to see how the Yearbook countries have performed in aggregate over the long run. We have therefore created an all-country world equity index denominated in a common currency, in which each of the 22 countries is weighted by its starting-year equity market capitalization. We also compute a similar world bond index, weighted by GDP.

These indexes represent the long-run returns on a globally diversified portfolio from the perspective of an investor in a given country. The charts opposite show the returns for a US global investor. The world indexes are expressed in US dollars; real returns are measured relative to US inflation; and the equity premium versus bills is measured relative to US treasury bills.

Over the 113 years from 1900 to 2012, the middle chart shows that the real return on the world index was 5.0% per year for equities, and 1.8% per year for bonds. The bottom chart also shows that the world equity index had an annualized equity risk premium, relative to Treasury bills, of 4.1% over the last 113 years, or a very similar 4.2% over the most recent 50 years.

We follow a policy of continuous improvement with our data sources, introducing new countries when feasible, and switching to superior index series as they become available. In 2013, we have added Austria, China and Russia. Austria has a continuous history, but China and Russia do not. To avoid survivorship bias, all three countries are fully included in the world indexes from 1900 onward. Two markets register a total loss – Russia in 1917 and China in 1949. These countries then re-enter the world indexes after their markets reopened in the 1990s.

### Capital market returns for World (in USD)

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 249.5 as compared to 7.1 for bonds and 2.7 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 5.0%, bonds 1.8%, and bills 0.9% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 4.1%. For additional explanations of these figures, see page 35.

Figure 1  
Cumulative real returns from 1900 to 2012

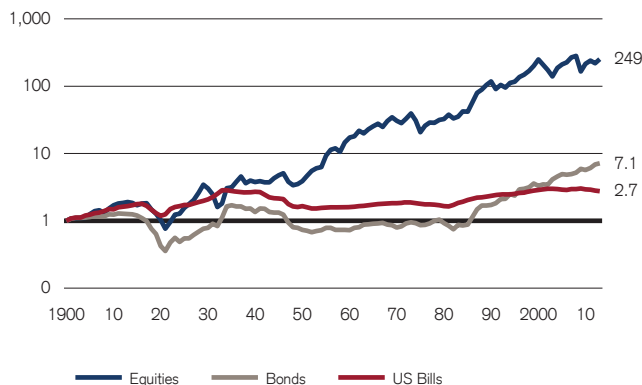


Figure 2  
Annualized real returns on major asset classes (%)

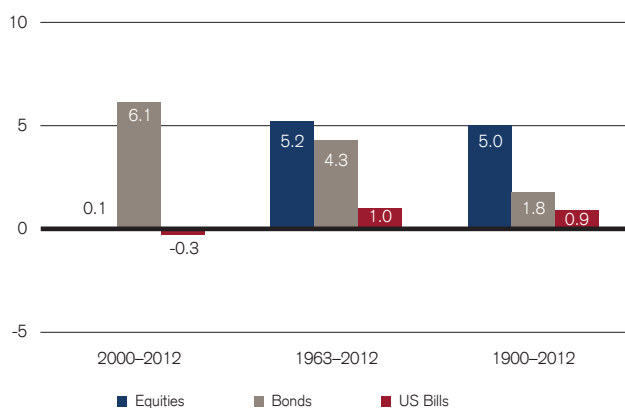
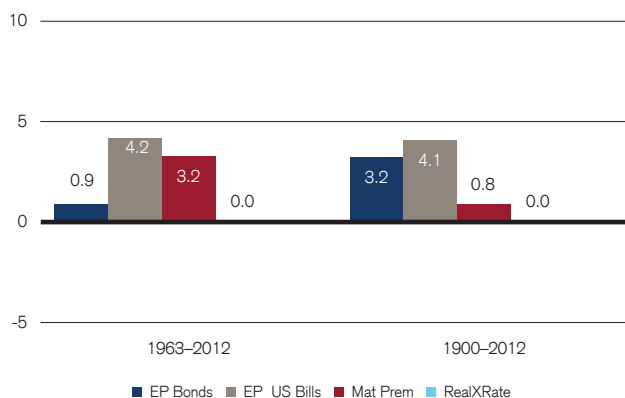


Figure 3  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



World ex-USA

# Beyond America

In addition to the two world indexes, we also construct two world indexes that exclude the USA, using exactly the same principles. Although we are excluding just one out of 22 countries, the USA accounts for roughly half the total stock market capitalization of the Yearbook countries, so that the 21-country, world ex-US equity index represents approximately half the total value of the world index.

We noted above that, until recently, most of the long-run evidence cited on historical asset returns drew almost exclusively on the US experience. We argued that focusing on such a successful economy can lead to “success” bias. Investors can gain a misleading view of equity returns elsewhere, or of future equity returns for the USA itself.

The charts opposite confirm this concern. They show that, from the perspective of a US-based international investor, the real return on the world ex-US equity index was 4.4% per year, which is 1.9% per year below that for the USA. This suggests that, although the USA has not been the most extreme of outliers, it is nevertheless important to look at global returns, rather than just focusing on the USA.

We follow a policy of continuous improvement with our data sources, introducing new countries when feasible, and switching to superior index series as they become available. In 2013, we added Austria, China and Russia. Austria has a continuous history, but China and Russia do not. To avoid survivorship bias, all three countries are fully included in the world indexes from 1900 onward. Two markets register a total loss, Russia in 1917 and China in 1949. These countries then re-enter the world indexes after their markets reopened in the 1990s.

## Capital market returns for World ex-US (in USD)

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 132.2 as compared to 4.7 for bonds and 2.7 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 4.4%, bonds 1.4%, and bills 0.9% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 3.5%. For additional explanations of these figures, see page 35.

Figure 1  
Cumulative real returns from 1900 to 2012

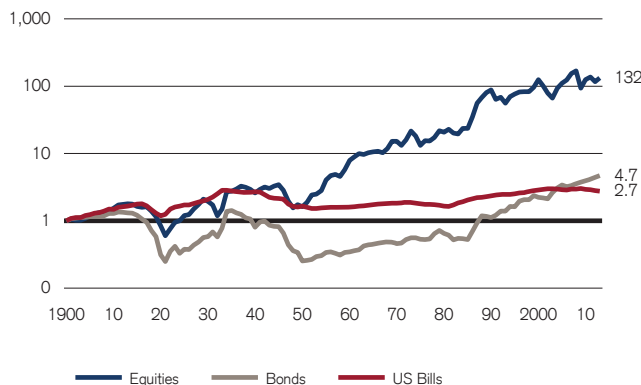


Figure 2  
Annualized real returns on major asset classes (%)

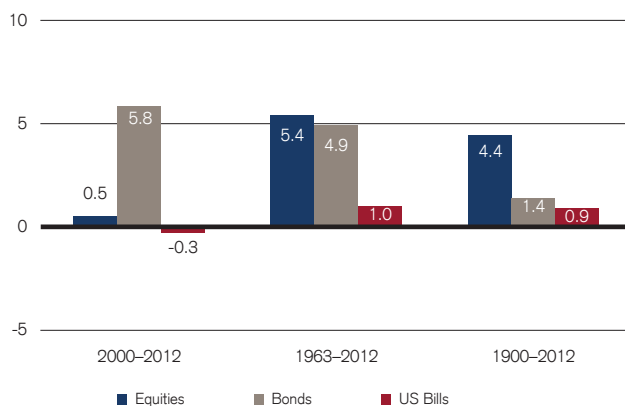
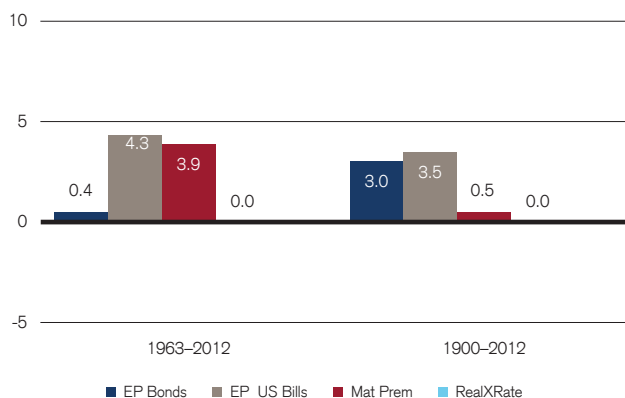


Figure 3  
Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the inflation-adjusted change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.



Europe

# The Old World

The Yearbook documents investment returns for 15 European countries, most (but not all) of which are in the European Union. They comprise nine EU states in the Eurozone (Austria, Belgium, Finland, France, Germany, Ireland, Italy, the Netherlands and Spain), three EU states outside the Eurozone (Denmark, Sweden and the UK), two European Free Trade Association states (Norway and Switzerland), and the Russian Federation. Loosely, we might argue that these 15 EU/EFTA countries represent the Old World.

It is interesting to assess how well European countries as a group have performed, compared with our world index. We have therefore constructed a 15-country European index using the same methodology as for the world index. As with the world index, this European index can be designated in any desired common currency. For consistency, the figures opposite are in US dollars from the perspective of a US international investor.

The middle chart, opposite, shows that the real equity return on European equities was 4.2%. This compares with 5.0% for the world index, indicating that the Old World countries have underperformed. This may relate to the destruction from the two world wars (where Europe was at the epicenter) or to the fact that many of the New World countries were resource-rich, or perhaps to the greater vibrancy of New World economies.

We follow a policy of continuous improvement with our data sources, introducing new countries when feasible, and switching to superior index series as they become available. In 2013, we added two new European countries, Austria and Russia. Austria has a continuous history, but Russia does not. To avoid survivorship bias, both countries are fully included in the Europe indexes from 1900 onward, even though Russia registered a total loss in 1917. Russia re-enters the Europe indexes after her markets reopened in the 1990s.

## Capital market returns for Europe (in USD)

Figure 1 shows that, over the last 113 years, the real value of equities, with income reinvested, grew by a factor of 106.6 as compared to 2.3 for bonds and 2.7 for bills. Figure 2 displays the long-term real index levels as annualized returns, with equities giving 4.2%, bonds 0.8%, and bills 0.9% since 1900. Figure 3 expresses the annualized long-term real returns as premia. Since 1900, the annualized equity risk premium relative to bills has been 3.3%. For additional explanations of these figures, see page 35.

Figure 1 Cumulative real returns from 1900 to 2012

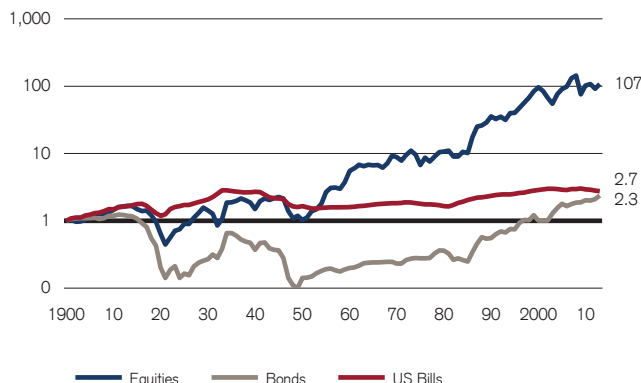


Figure 2 Annualized real returns on major asset classes (%)

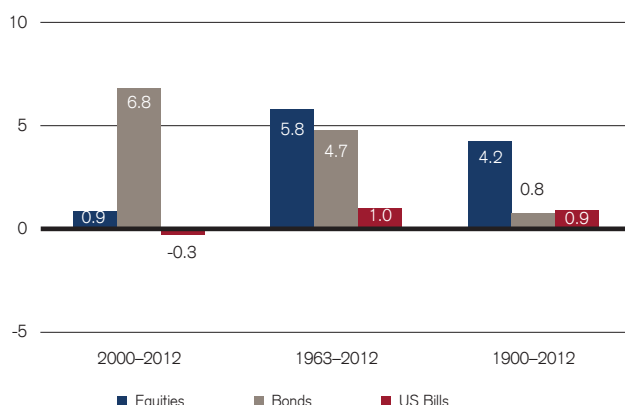
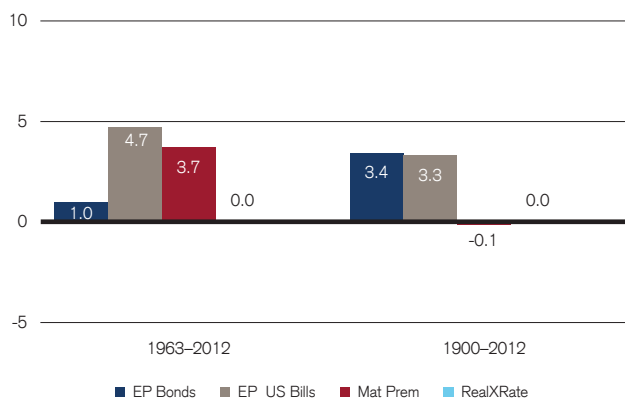


Figure 3 Annualized equity, bond, and currency premia (%)



Note: EP Bonds denotes the equity premium relative to long-term government bonds; EP Bills denotes the equity premium relative to Treasury bills; Mat Prem denotes the maturity premium for government bond returns relative to bill returns; and RealXRate denotes the real (inflation adjusted) change in the exchange rate against the US dollar.

Source: Elroy Dimson, Paul Marsh, and Mike Staunton, Credit Suisse Global Investment Returns Sourcebook 2013.







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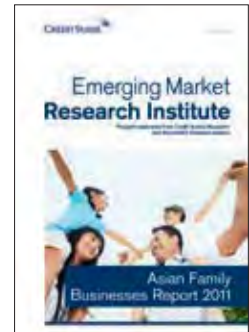
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