Exhibit 36. Discard Worst Quarter to Fix Bias/Sigma/Skew/Kurtosis: Statistical Properties of Filtered and Unfiltered S&P 500 Earnings, 31 December 1925–31 December 2020

Earnings Series	N_{obs}	$\bar{X}$	σ_x	Min	Max	Skew	Kurtosis
E_{t+1}/E_t	95	1.088	0.331	0.22	3.43	3.5	24.2
$E3_{t+1}/E3_t$	95	1.064	0.184	0.49	1.53	−0.4	0.7
$E2_{t+1}/E2_t$	95	1.063	0.176	0.53	1.47	−0.3	0.5
$E1_{t+1}/E1_t$	95	1.061	0.170	0.65	1.48	0.0	0.2
$E_{t+1}/E3_t$	95	0.998	0.214	0.19	1.49	−0.9	1.8
$E_{t+1}/E2_t$	95	0.956	0.212	0.17	1.38	−1.0	1.6
$E_{t+1}/E1_t$	95	0.915	0.206	0.17	1.33	−1.0	1.4
OE_{t+1}/OE_t	32	1.068	0.174	0.60	1.47	−0.6	0.8
$OE3_{t+1}/OE3_t$	32	1.066	0.152	0.69	1.38	−0.5	0.0
$OE2_{t+1}/OE2_t$	32	1.068	0.145	0.71	1.32	−0.7	0.2
$OE1_{t+1}/OE1_t$	32	1.068	0.143	0.71	1.28	−0.8	0.2
$OE_{t+1}/OE3_t$	32	1.031	0.168	0.55	1.34	−0.8	0.6
$OE_{t+1}/OE2_t$	32	1.011	0.162	0.53	1.27	−1.0	0.8
$OE_{t+1}/OE1_t$	32	0.991	0.156	0.51	1.22	−1.1	1.1

Source: Philips and Kóbor (2020), using data from Robert Shiller and S&P Dow Jones Indices.

of Exhibit 36—there's essentially no bias in our forecast of next year's earnings using *E*3. The simple "throw out the worst quarter" trick results in a very good forecast of one-year forward earnings, certainly much better than a forecast based on CAPE. Interestingly, we don't see any real improvement when applying our trick to operating earnings (the various *OE* series).

Comparing Earnings-to-Price and Sales-to-Price Models of Expected Return

But our "throw out the worst quarter" trick doesn't give us a feel for what earnings might have been if we averaged over an economic cycle. I'm going to address this using the sales-to-price ratio, because sales times profit margin equals earnings. For any given level of earnings, profit margins must be low when sales are high and vice versa, and competitive forces in an open economy, often driven by new entrants, will tend to induce some degree of reversion in profit margins.

I can obtain two independent forecasts for the 10-year return of the S&P 500 from two models—one based on earnings to price (earnings yield), and another based on sales to price—and then combine the two forecasts to get my final forecast for the forward looking 10-year return of the S&P 500. I'll include a quadratic term in each of the models to capture the empirical concavity that I see in the data, and let's see where we come out.

Exhibit 37 shows the results. I plot actual 10-year realized returns against out-of-sample forecasts made using expanding-window robust regressions, of the 10-year return of the S&P 500 using the filtered earnings yield and the sales-to-price ratio. The *x*-axis displays the predicted return, and the *y*-axis displays the corresponding realized return.

In-sample, the fits (which I have not displayed to minimize visual clutter) are decent, even though they are noisy. The out-of-sample predictions, however—which are what really matter to investors—are awful: The relationships appear linear (but with the wrong slope) when returns are low

(i.e., when valuation ratios are high), but there is an enormous flat region when return forecasts are high (i.e. when valuations are low), say from a predicted return of about 8% per annum on up. The dashed line has a slope of 1 and an intercept of 0, and perfect forecasts would plot right along the line. Plotting the data in this way gives us a quick feel for how good (or bad) our predictions are. We can get formal and set up a Mincer–Zarnowitz framework here, but I'm not going to go down that road—a picture paints a thousand words.

Guess what happens when we add a quadratic term to our out-of-sample expanding window robust regressions? As you can see from **Exhibit 38**, the flat spots clean up, and the points plot roughly parallel to the dotted line! Not perfect, but very good. Revenues look better than earnings, but even so, the quadratic term has certainly cleaned things up.

By the way, the quadratic term also cleans up CAPE (see **Exhibit 39**). With the quadratic term added, CAPE's out-of-sample predictions are noticeably better.

Combining the Earnings-Based and Sales-Based Models

The way I'm going to make a forecast in practice is to take an earnings-based model, quadratic, robust regression, filtered earnings, and a sales-based model, again linear and quadratic, out-of-sample robust regressions, and combine their forecasts. Even with (naïve) equal weights for the two

Exhibit 37. Out-of-Sample Predictions Made Using $E3_t/P_t$ and S_t/P_t Aren't Great

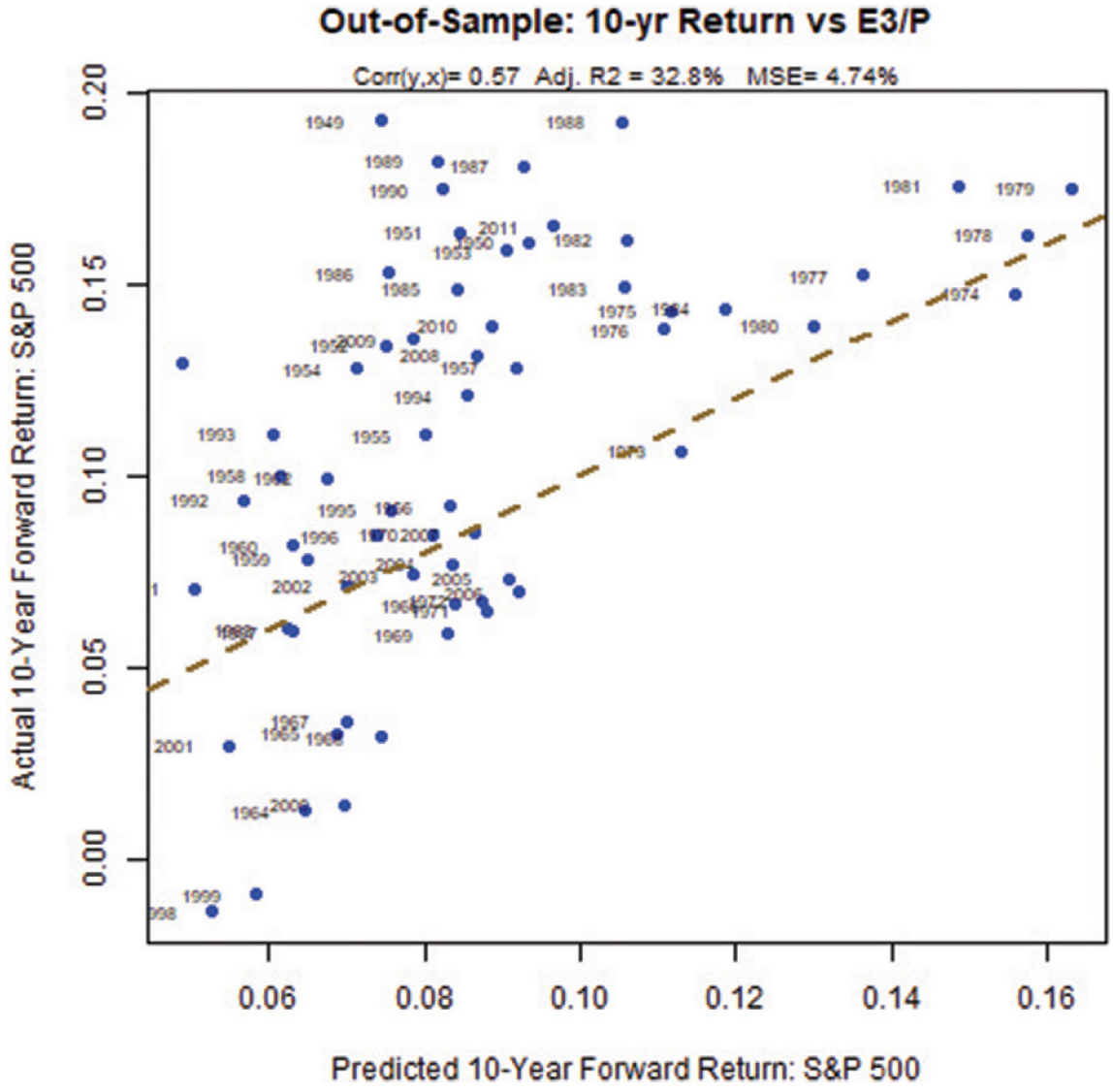

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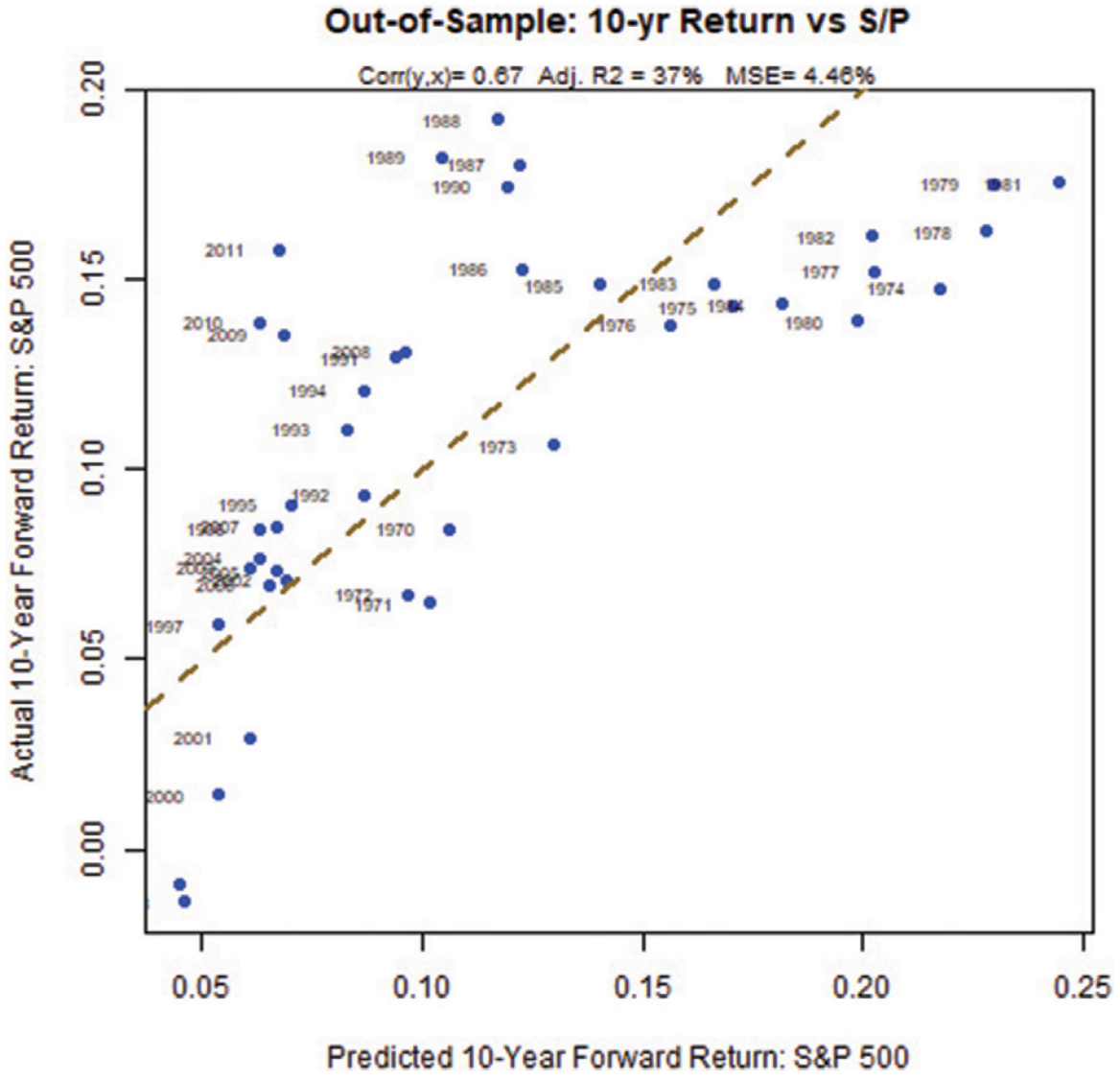
Exhibit 37. Out-of-Sample Predictions Made Using $E3_t/P_t$ and S_t/P_t Aren't Great (*continued*)



Notes: All dashed lines have slope = 1, intercept = 0. Dates on the plot are 1970–2010. I use data for sales and earnings from 1946. The first 25 years are used to build an initial model, and my first true out-of-sample forecast starts in 1970.

Source: Philips and Kóbor (2020), using data from Robert Shiller and S&P Dow Jones Indices.

models, forecasting ability is good, as shown in **Exhibit 40**. It is possible to refine the weights further and weight the forecasts in inverse proportion to their forecast error variance, and we've done that in Philips and Kóbor (2020; not shown).[33]

You can see a bias in that there are a lot of points that plot above the dashed line. That's a feature, not a bug, of our forecasts, because it's generally recognized that realized returns were higher than expected returns over the period we studied on account of a decline in expected returns.[34] So, it's a good thing, not a bad thing—in other words, it's to

[33]This combination of forecasts has proven so effective in a variety of settings that economists actually refer to it as the Forecast Combination Puzzle! See, for example, Claeskens, Magnus, Vasnev, and Wang (2016).

[34]For more on this, see Philips (1999).

be expected in a good model over this period—that we have more points above the line than below it.

Interpretation of the Philips and Kóbor Results

Let me put these graphs in perspective. If I just use filtered earnings-to-price and its square, I'm predicting 6% per annum returns for the next 10 years. That's essentially saying the very high profit margins of today are going to persist. If I use sales-to-price and its square, I get −1.6% per annum for the next decade. In effect, the model is telling me that profit margins are going to decline from their current level of about 12% of revenues toward their long-term average of about 6% of revenues. An equally weighted average of the two forecasts is 2.2% per annum.

If, instead of equally weighting the forecasts, I weight them in inverse proportion to the variance of their forecast errors, I get an expected equity return of about 2.3%. That's almost the same as what I get using a simple (equally weighted) average. Using CAPE and CAPE-squared, the predicted 10-year return of the S&P 500 is about 2.45% per annum. A quick peek into the Federal Reserve's FRED database tells me that breakeven inflation is about 2.6% per annum. So, my forecast of expected real return on equities is negative, but the equity premium is ever so slightly positive because my forecast of bond returns from the 10-year Treasury yield is 1.6%. **Exhibit 41** summarizes these forecasts.

Exhibit 38. ...But a Quadratic Term Perks Up the Models Nicely

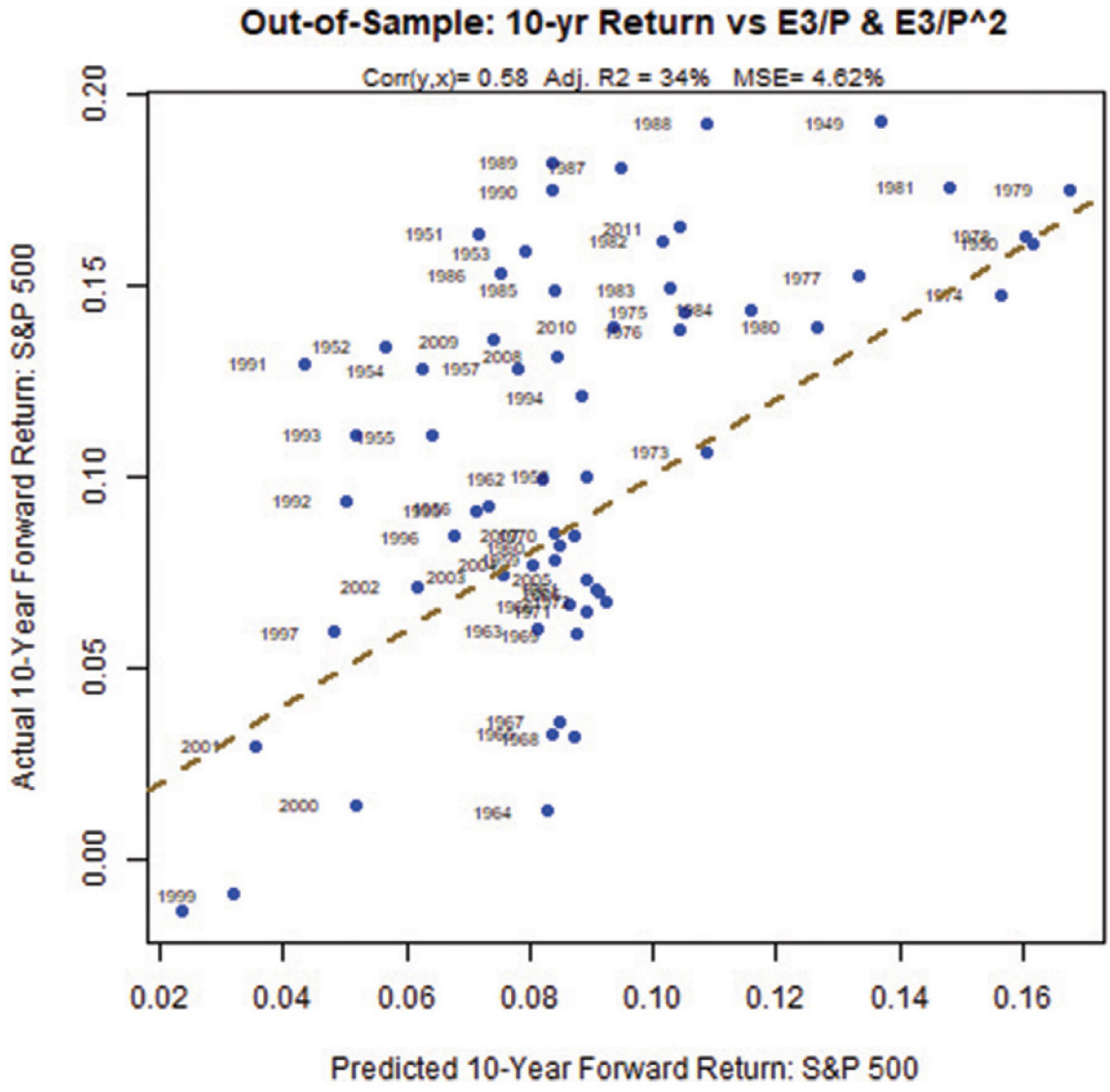


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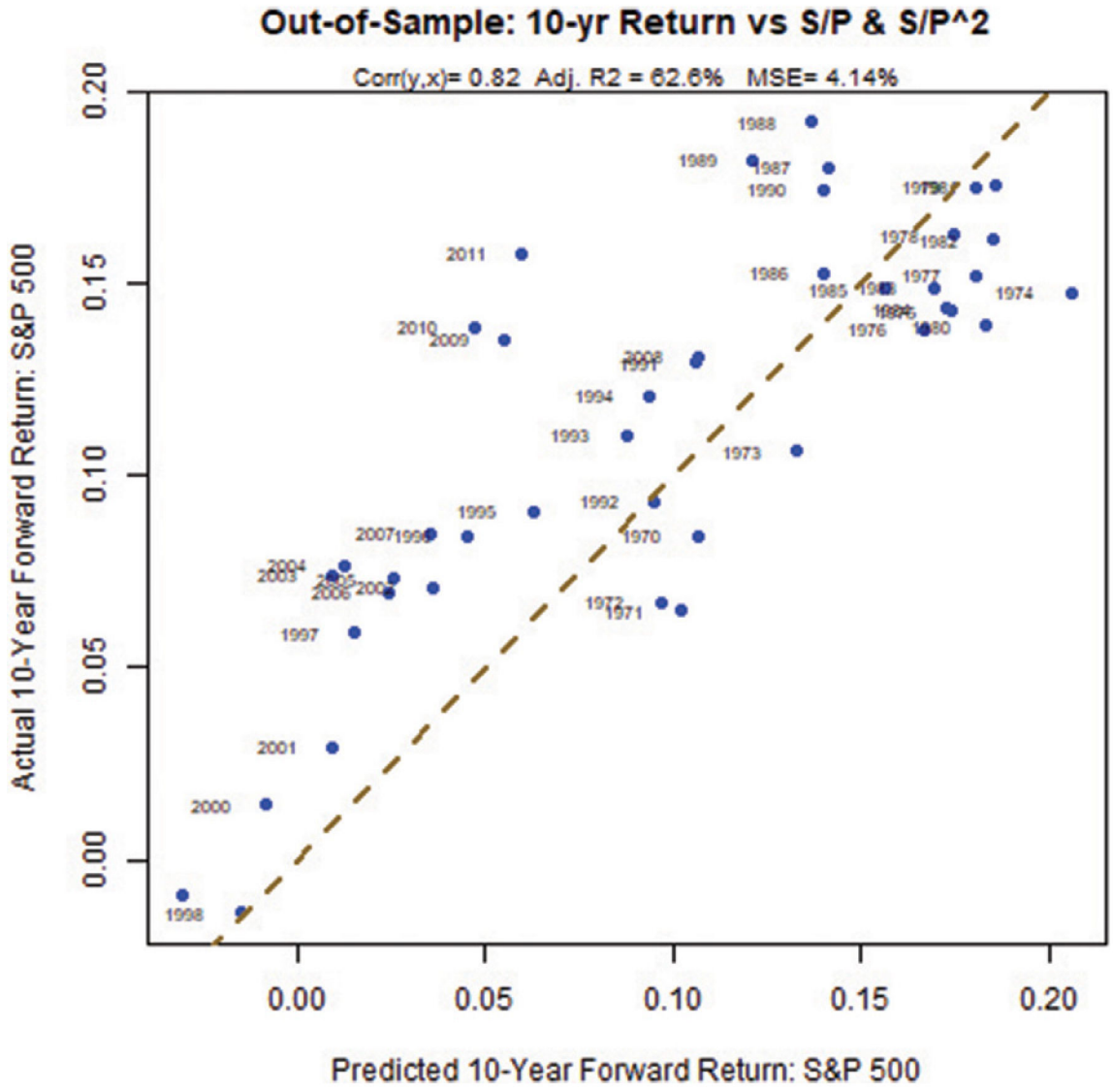
Exhibit 38. ...But a Quadratic Term Perks Up the Models Nicely (*continued*)



Notes: All dashed lines have slope = 1, intercept = 0. Dates on the plot are 1970–2010. I use data for sales and earnings from 1946. The first 25 years are used to build an initial model, and my first true out-of-sample forecast starts in 1970.

Source: Philips and Kóbor (2020), using data from Robert Shiller and S&P Dow Jones Indices.

Moreover, there's a big question that I've left unanswered. I have handled nonlinearities in the relationship between forecasts and realizations in one way (adding a quadratic term) but have not provided any evidence to suggest that it's the right way. Are there other ways to do it? Surely there are! If so, what is the best way, and why?

Another question to which I have no answer: Why are nominal returns more predictable than real returns? Is it because inflation is volatile and injects additional noise into real returns? I don't know. Also, will profit margins stay elevated? Again, I don't know, but I suspect they're going to converge toward their long-run average, which is about half their current level. Competition is a fierce force.

Mean Reversion in Equity Returns or Equity Risk Premiums

On the mean-reversion question, I'm not a fan of mean reversion, either in returns or in valuation ratios. In **Exhibit 42**, I don't see either CAPE or interest rates reverting to some historical mean. In fact, I think that there has been a structural shift in the mean of both series after 1980: The mean CAPE has risen, and interest rates have simultaneously declined.

I think most of what people think of as mean reversion in returns is just the result of a change in expected returns or interest rates, which results in a one-time shock to

realized returns—a decline in expected return results in above-average returns during the transition, and vice versa. Forward-looking returns will, of course, reflect the new level of expected return, and if this differs from the prior expected return, the new realized returns will, on average, be lower (or higher) than the old realized returns. It's easy to see what appears to be mean reversion in realized returns (i.e., high returns followed by low returns and vice versa)—and to fail to grasp that this is driven entirely by a shift in expected return.

It's easy to visualize this phenomenon for a 10-year zero-coupon bond that is issued with a yield of 10% and whose yield declines by 1% each year, so that its yield when it finally matures is 0%. The realized return of the bond in each of the first five years of its life exceeds its initial yield of 10%, and then falls below 10% in each of the subsequent five years. The return of the bond appears to be mean reverting, but it's not—the shift in returns is driven entirely by the steady decline in the bond's yield (which is a good proxy for its expected return). And over the entire 10-year life of the bond, the return is exactly 10% per annum, which is the same as its initial yield.

Mean Reversion in Value and Growth

That said, some things are indeed mean reverting. In fact, I'm going to show you an example where mean reversion is real and exists for sound theoretical reasons. Even so, mean reversion can disappear for an extended period without warning.

My example involves mean reversion in the per-share earnings of growth and value indexes. Style indices are reconstituted by the index provider every year. Growth and value indices, in particular, are reconstituted so that each has

Exhibit 39. The Quadratic Term Helps CAPE As Well

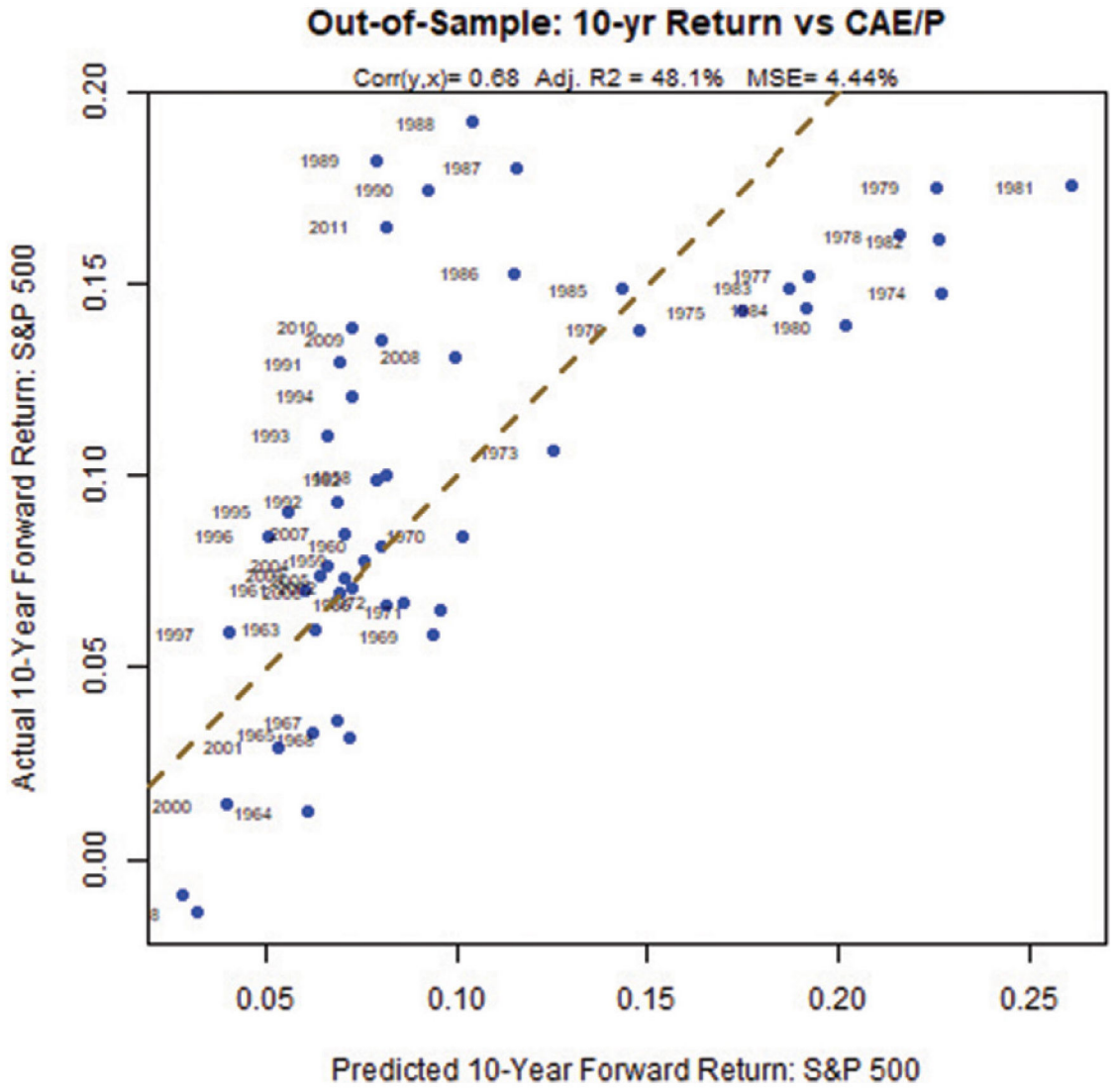


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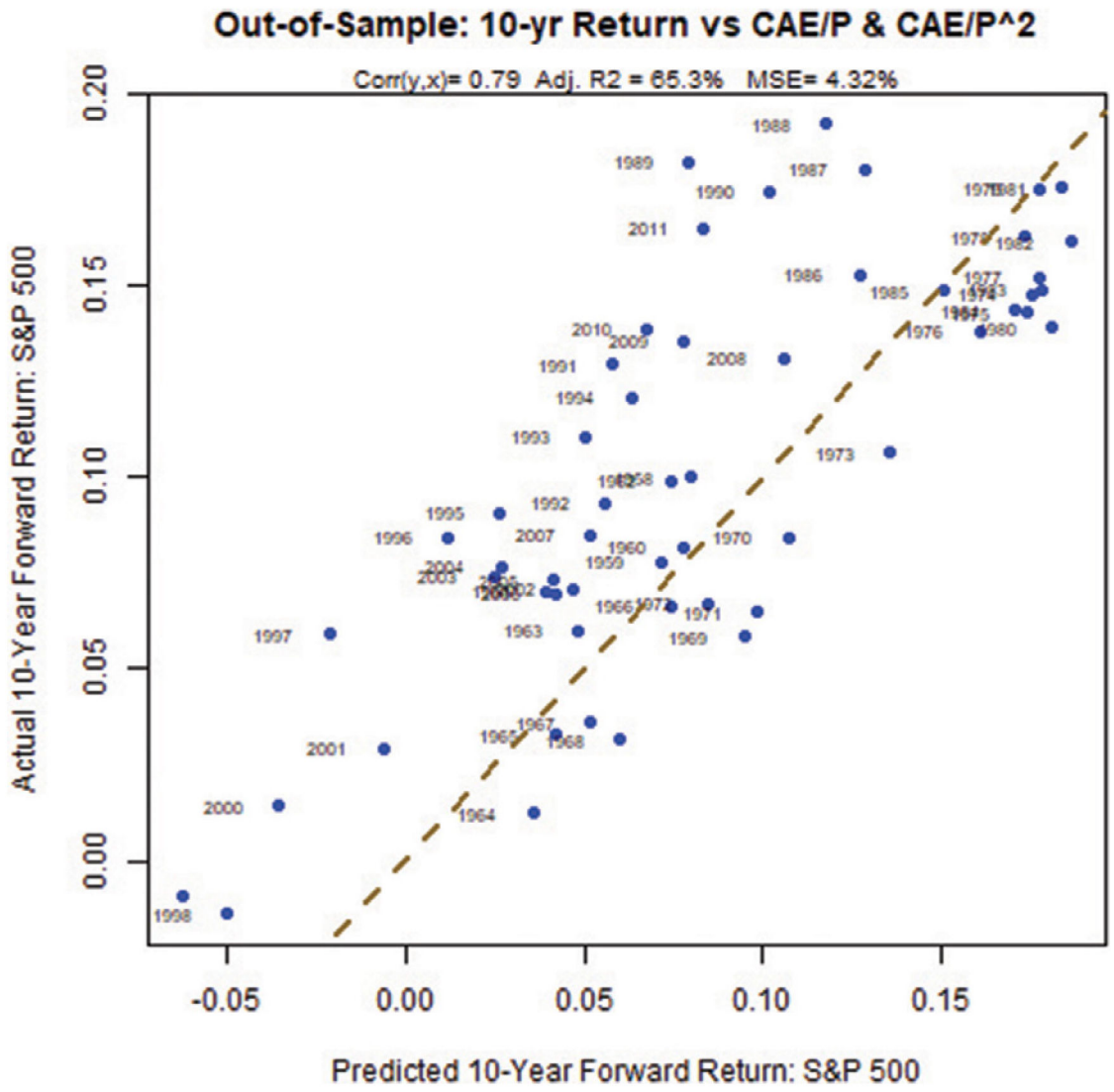
Exhibit 39. The Quadratic Term Helps CAPE As Well (*continued*)



Notes: All dashed lines have slope = 1, intercept = 0. Dates on the plot are 1970–2010. I use data for sales and earnings from 1946. The first 25 years are used to build an initial model, and my first true out-of-sample forecast starts in 1970.

Source: Philips and Kóbor (2020), using data from Robert Shiller and S&P Dow Jones Indices.

half of the capitalization of the market immediately after reconstitution. Rebalancing induces mean reversion in per-share earnings and equalizes their long-term growth rate.[35] It also equalizes the long-term price return (not the total return) of the two indices.

Exhibit 43 shows the situation I observed when I first noticed mean reversion in style-index earnings around 2001. The per-share earnings of the growth index are much more volatile than those of the value index. You can see the earnings of the value index implode, then recover and catch up with those of the growth index. The long-term growth rate of per-share earnings is about the same for both styles.

But when I pull the data window forward to 2021, the pattern looks very different: The reliable divergence-followed-by-convergence pattern that is so evident in Exhibit 43 disappears after December 2006.[36] From 2007 to 2021, the earnings of the value index grew much more

[35]For a proof, see Philips (2002).

[36]The graph is not shown but is available from the author at tkpmep@gmail.com and can also be found in Martin, Philips, Stoyanov, Scherer, and Li (forthcoming 2024).

slowly than those of the growth index. In fact, the earnings of the growth index grew substantially faster than nominal GDP, which is clearly unsustainable!

A close look at both time series of earnings makes clear that the earnings of the value index dipped very sharply during the Global Financial Crisis in 2008 (no surprise, as banks were hugely overrepresented in the value index), as well as during the COVID-driven blip in 2020, but in both cases, they did not rapidly recover and catch up to the earnings of the growth index as they had so reliably done in the past. In short, the mean reversion that my theory predicted just hasn't happened for 15 years!

This divergence in earnings growth explains a big chunk of the underperformance of value relative to growth since 2006. I don't have a good explanation for why the historical pattern went awry. But even with a very strong rebalancing force attempting to equalize the growth rate of earnings, markets can go in directions that are unexpected—and that run diametrically opposite to what theory predicts—for a long, long time.

I'm not a fan of the mean reversion story because it's so easy to misinterpret changes in expected return as movement toward some nonexistent historical mean—especially when your analysis is data driven, and you look only at realized returns and don't calibrate your thinking using a reasonable theoretical framework.

Exhibit 40. ...And Combined Forecasts Are by Far the Best

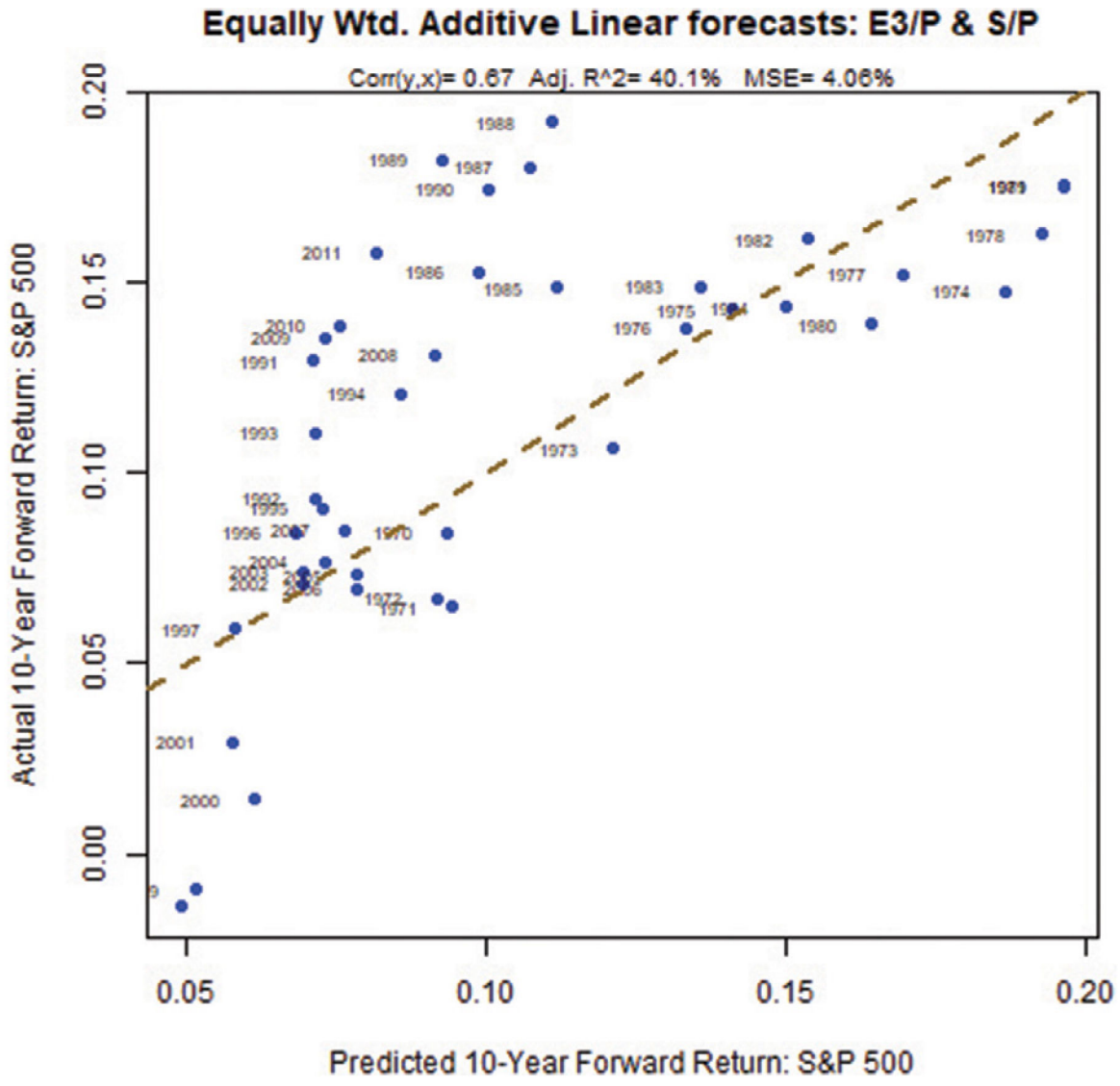


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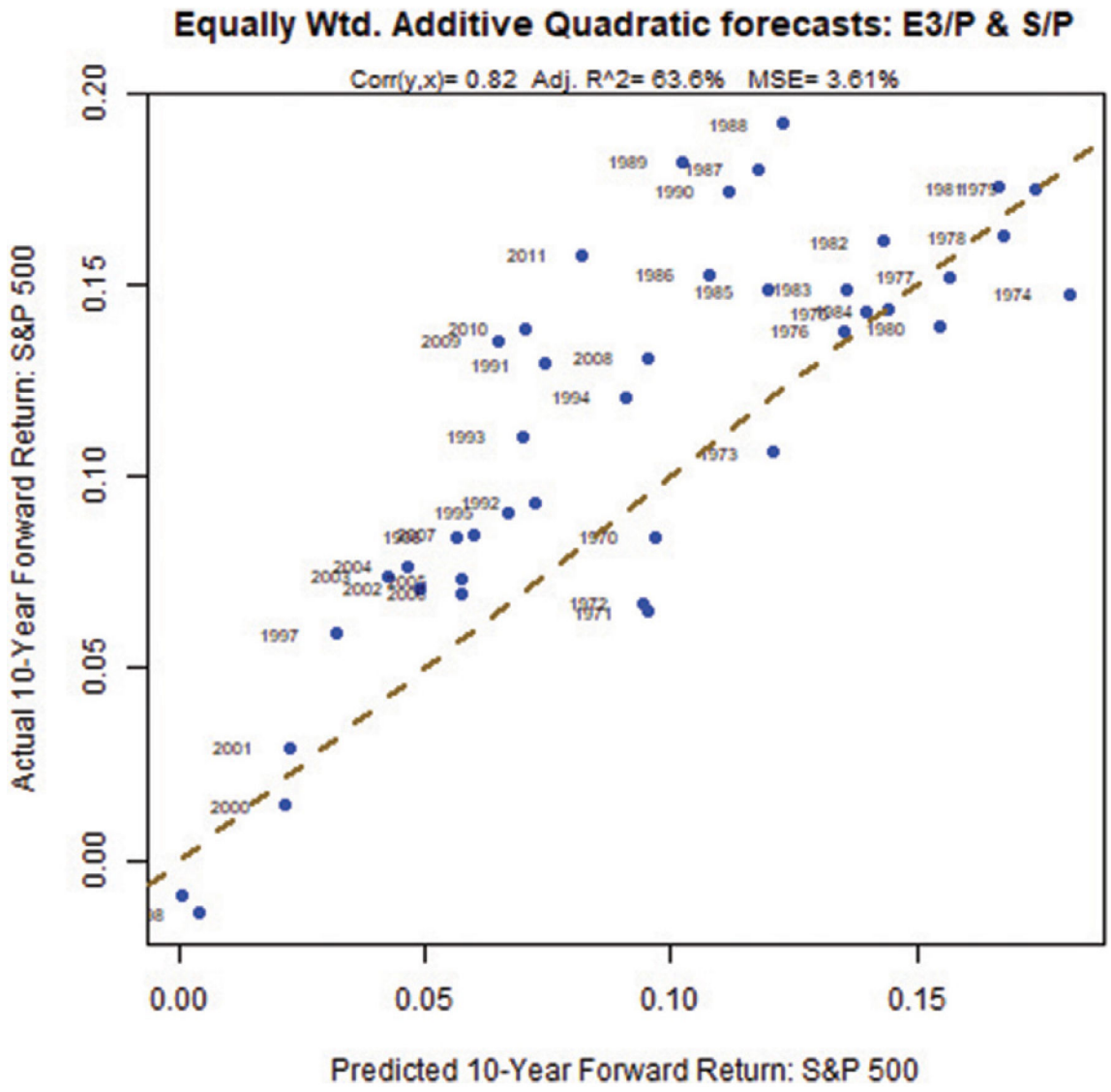
Exhibit 40. ...And Combined Forecasts Are by Far the Best (*continued*)

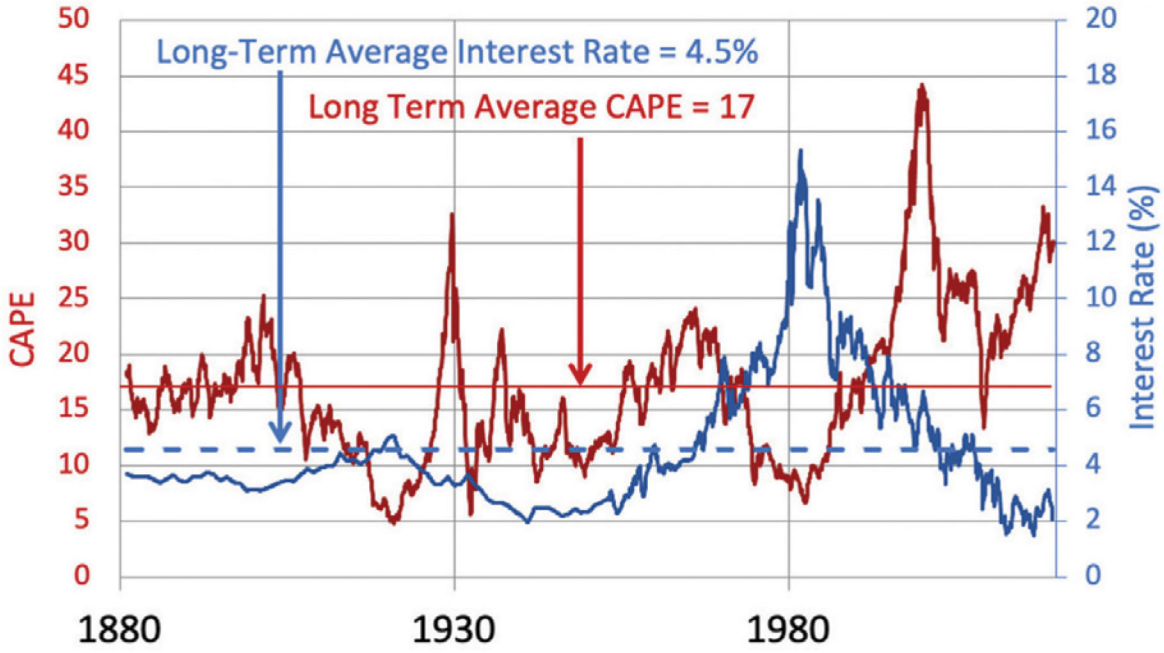


Source: Philips and Kóbor (2020), using data from Robert Shiller and S&P Dow Jones Indices.

Exhibit 41. Summary of Equity and Bond Expected Return and Equity Risk Premium Forecasts

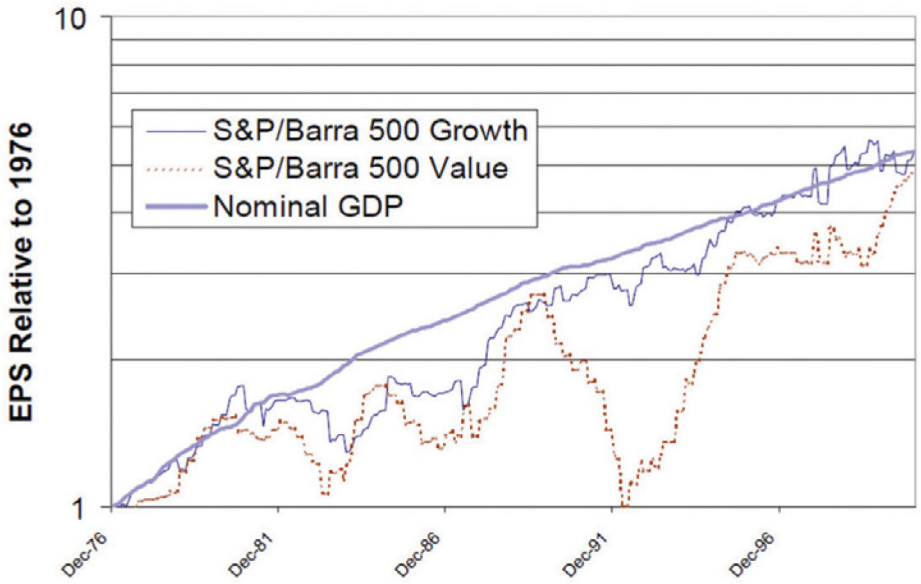
- My current views on *nominal* expected returns for the next 10 years:
  - S&P 500 via $^{E3}/_{P}$ and $(^{E3}/_{P})^2$: 6.0% per annum
  - S&P 500 via $^{S}/_{P}$ and $(^{S}/_{P})^2$: –1.6% per annum
  - $\frac{1}{\sigma_E^2}$ weighted average of these two forecasts: 2.3% per annum
  - S&P 500 via $^{CAE}/_{P}$ and $(^{CAE}/_{P})^2$: 2.45% per annum
  - UST10: 1.6 % per annum, 10-year Breakeven inflation: 2.6%
- My expected real returns are negative, but the equity premium is slightly positive.

Exhibit 42. Is There Mean Reversion in Expected and/or Realized Returns?



Source: Based on data from www.econ.yale.edu/~shiller/data/ie_data.xls.

Exhibit 43. Growth and Value Index EPS *Do* Mean Revert until 2000: Per-Share Earnings Growth, 31 December 1976 to 31 December 2000



Source: Philips (2002).

Discussion of Thomas Philips's Presentation

Rob Arnott: Just a quick observation: Empirically, mean reversion in returns is weak.

Thomas Philips: It probably doesn't exist at all. It's really a reflection of moving from one expected return regime to another. The transition induces a realized return that is different from the return that you expected. It's not that returns are mean reverting; it's that expected returns are unstable and move around a lot.[37]

Rajnish Mehra: I think the planning horizon has a lot to do with whether there is mean reversion. If you look at data at a daily, monthly, or even yearly frequency, you might not see it, but if you look at a lower frequency like five or seven years, there is a good capital-theoretic reason why these low-frequency returns should be mean reverting. The capital-theoretic reason has to do with the business cycle. The capital-output ratio is very stable—it's 3 or 3.5; and the share of output going to capital is about a third.[38]

Thomas Philips: That has been true historically, but there is no known reason for it to continue in perpetuity.

Rajnish Mehra: So, if you multiply these numbers together, $\frac{1}{3}\times\frac{1}{3}$, that will give you, as a ballpark number, gross return on capital of about 11%, that is, 1 divided by 9. Depreciation is 6 to 7 percentage points, so you're left with a stable number for return on capital. If you look at growth accounting, you're going to get a return on capital of 4% or 5%, assuming those numbers are stable.

Thomas Philips: But they have not been stable since 1991—profit margins for the S&P 500 have quadrupled, from about 3% of revenues to about 12% of revenues.

Rajnish Mehra: The capital-output ratio was very stable in the economy. This is one of Nicholas Kaldor's "stylized facts."[39] The share of output going to capital is, or used to be, pretty stable. In my talk I'll discuss what has gone wrong since 2007. But these relationships, on which most of our macroeconomic intuition is based, held up to 2007, and after that you've seen a huge change.

[37]For evidence of instability in expected returns, see Philips (1999).

[38]The capital output ratio is usually expressed as the ratio of GDP to capital employed in the economy; it is typically about 3. Its reciprocal, capital/GDP, is thus about one-third (although it has decreased in recent years). The share of output going to capital comes from the Cobb–Douglas production function.

[39]In 1957, the economist Nicholas Kaldor listed six "stylized facts" that he said described the dynamics of economic growth. Much effort in macroeconomics has gone toward either confirming or overturning them. See Kaldor (1957).

PRESENTATION BY RAJNISH MEHRA: REFLECTIONS ON THE EQUITY PREMIUM

Rajnish Mehra: I'm going to discuss something totally orthogonal to what has been previously presented here today. But it is relevant, especially to what Elroy Dimson said about American exceptionalism.

Is the Equity Premium a Risk Premium?

Empirically, we observe several factor premia—for example, the Fama–French three-factor model identifies three: the equity premium, the size premium, and the value premium. I want to address the question: Are these factor premia a premium for *risk*? If they are, we can ask a second question—*how much* of the factor premium is a risk premium? For example, Ed Prescott and I documented that only about 1 percentage point of the equity premium is a premium for bearing systematic risk—hence, the "Equity Premium Puzzle."[40]

Let me just share some thoughts on this, and then we can discuss it.

Textbook finance characterizes the equity, size, and value premia as risk premia. I will argue that, while the equity premium is at least partially a risk premium, size and value are not. My argument is based on the premise that a genuine risk premium is *invariant* to whether or not I know that the premium exists.

The Size Premium

The size premium was documented by Rolf Banz and Marc Reinganum at about the same time as we wrote our equity premium puzzle paper.[41] In the fall of 1979, Myron Scholes had invited me to visit the Center for Research in Security Prices (CRSP), and Ed Prescott was visiting the Economics Department at the University of Chicago. We worked in Fischer Black's old office on the top floor of the business school, now known as Booth. Many of you may remember the suite of offices on that floor, including Jim Lorie, Jon Ingersoll, Eugene Fama, and Myron Scholes.

Let's look at **Exhibit 44**.

You can see the dramatic size premium in the exhibit; I haven't put up the *t*-statistics or any other details, but the key finding in Rolf Banz's 1980 work was that the size premium was a huge 8.3% per year (of small- over large-cap stocks).[42] You'd do anything for that!

Exhibit 44. The Size Premium before and after It Was Documented in 1980

Annual Mean Value Weighted Returns (%)			
Period	**Small Firms**	**Large Firms**	**Size Premium**
1927–1979	18.81	10.51	8.30
1927–2020	16.64	11.79	4.85
1980–1989	15.01	17.79	−2.78
1990–1999	15.96	19.31	−3.35
2000–2009	10.29	1.25	9.04
2010–2019	13.35	14.36	−1.01
1980–2020	13.84	13.43	0.40

Note: "Value-weighted" means capitalization-weighted. Returns are arithmetic means.

[40]See Mehra and Prescott (1985).

[41]See Banz (1981); Reinganum (1981).

[42]See Banz (1981). Banz's definition of small cap was small indeed—the bottom quintile, by count, of New York Stock Exchange stocks sorted by capitalization each year. Later research revealed a smaller size premium (over the same historical period) for stocks that were in the intermediate quintiles.

But you couldn't do anything about it. Buying small-cap stocks was not, up until 1980, an actionable decision rule. Once you got to know about it in 1980, it became actionable. After that, the premium just isn't there, and the premium for the entire 1927–2020 sample (including the period where it was so large) is statistically indistinguishable from zero. That fact leads me to conclude that the small-cap premium is not a risk premium. It was a premium. But once it was in everyone's information set and became tradeable, it disappeared. The risk is still there, but the premium is not.

Exhibit 45 is the illustration that you would normally see in books documenting the differential returns of small and large stocks. (The use of an arithmetic rather than logarithmic scale exaggerates the difference, which is what many of these book authors want to do.)

But I think **Exhibit 46** is what you really want to show. This starts in 1980, and there is no big difference between the returns of large versus small stocks.

Something similar happened with the value premium (see **Exhibit 47**). For the sake of this analysis, I'm assuming that the value premium was discovered in 1990. Just looking at the realized returns, it is apparent that the value premium "disappeared" once it became a part of our information set. Changes in expected stock returns are hard to measure, however, and we need another decade of data to make a definitive statement about the value premium.

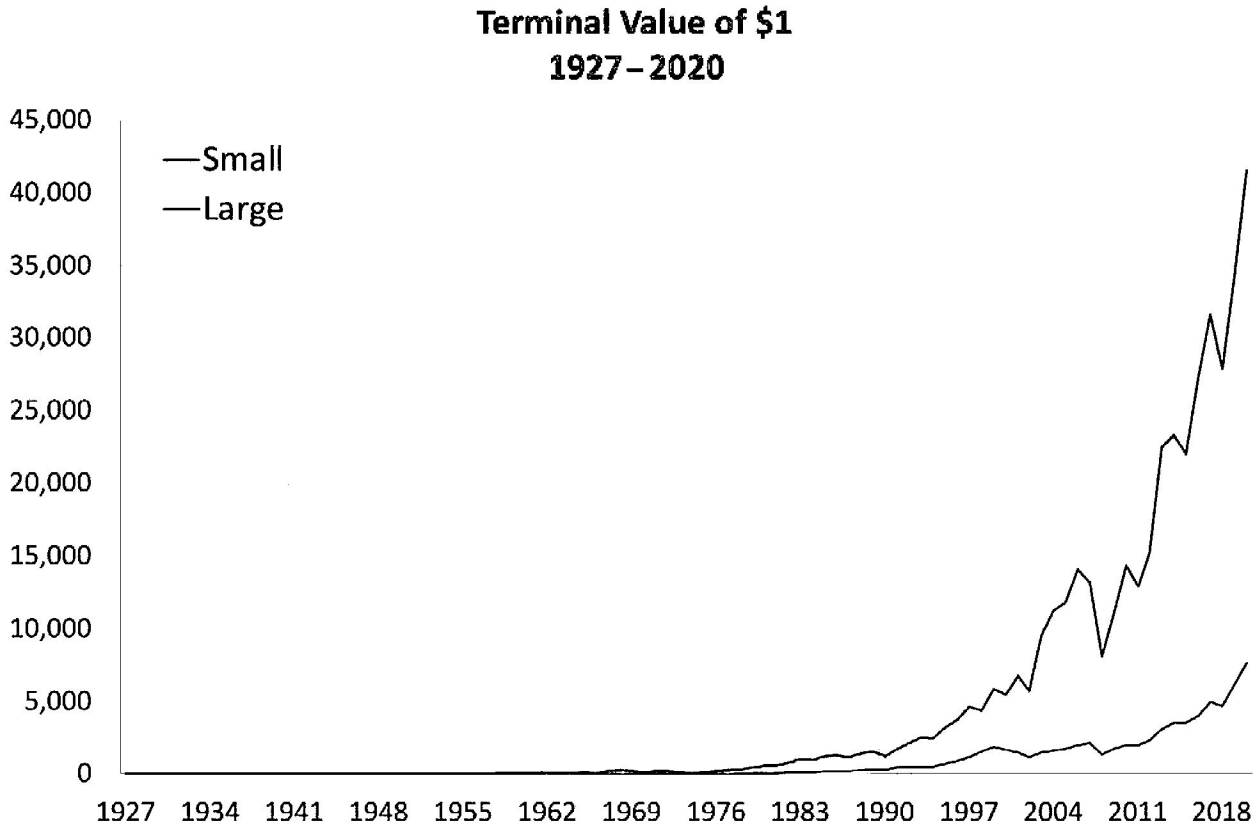
Persistence of the Equity Premium

On the other hand, if you look at the equity premium as shown in **Exhibit 48**, it's as stable as it ever was. Knowledge about the existence of the premium did not eliminate it. The persistence of the equity premium is considerably different than what you see with the value or the size premium. This is consistent with it being a risk premium.

Mean Reversion in Equity Returns

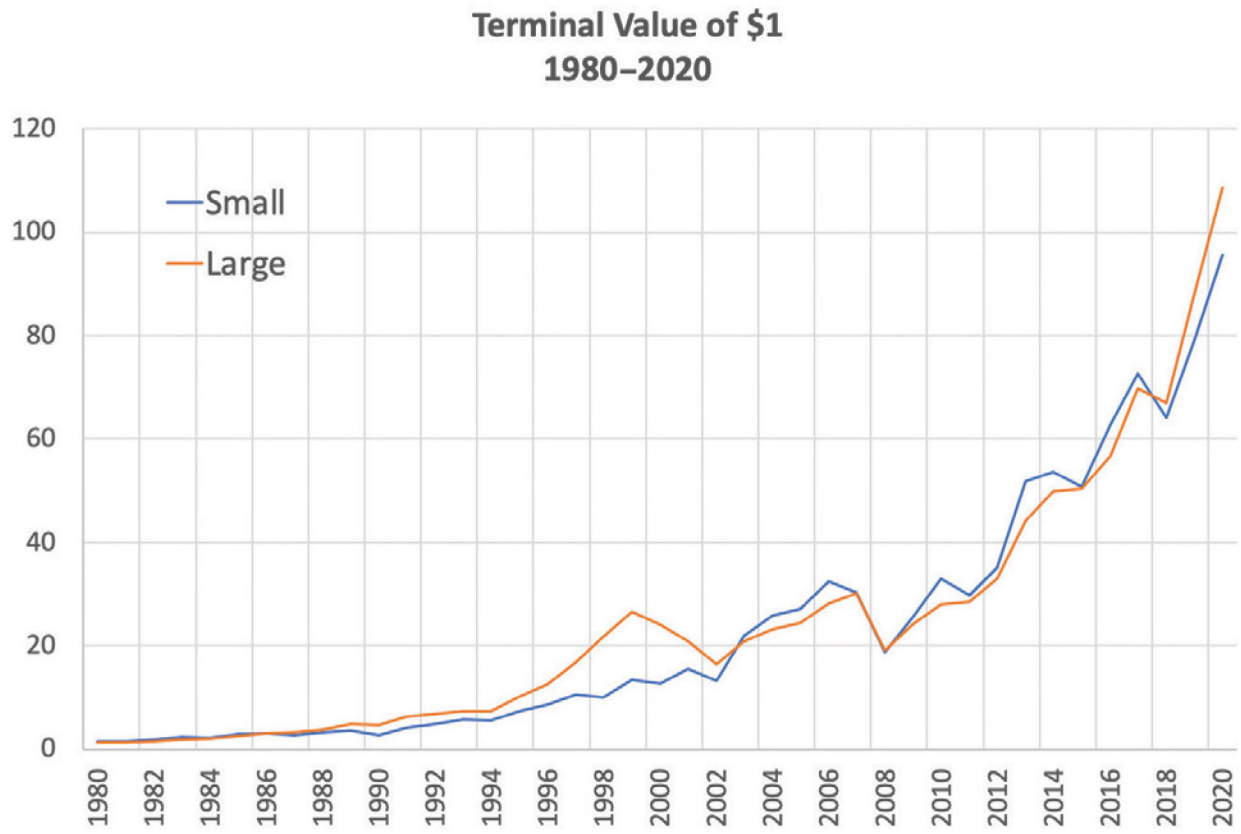
The other point I want to talk about is whether the equity premium is mean-reverting and perhaps predictable. The profession's view on this topic has shifted over time. The prevailing paradigm in the 1960s and 1970s (the halcyon days of the

Exhibit 45. Cumulative Total Returns on Small- and Large-Cap Stocks, 1927–2020



Source: Based on data from Kenneth French's website (https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/).

Exhibit 46. Cumulative Total Returns on Small- and Large-Cap Stocks, 1980–2020



Source: Based on data from Kenneth French's website (https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/).

Exhibit 47. The Value Premium before and after It Was Documented in 1990

Annual Mean Value Weighted Returns (%)			
Time Period	**Growth Firms**	**Value Firms**	**Value Premium**
1927–1989	11.27	17.59	6.32
1927–2020	11.88	15.86	3.98
1990–1999	20.34	17.57	–2.77
2000–2009	1.01	8.26	7.25
2010–2019	15.67	12.65	–3.04
1990–2020	13.13	12.34	–1.78

efficient market hypothesis!) is best characterized by a quote from Fama: "This paper has presented strong and voluminous evidence in favor of the random walk hypothesis."[43]

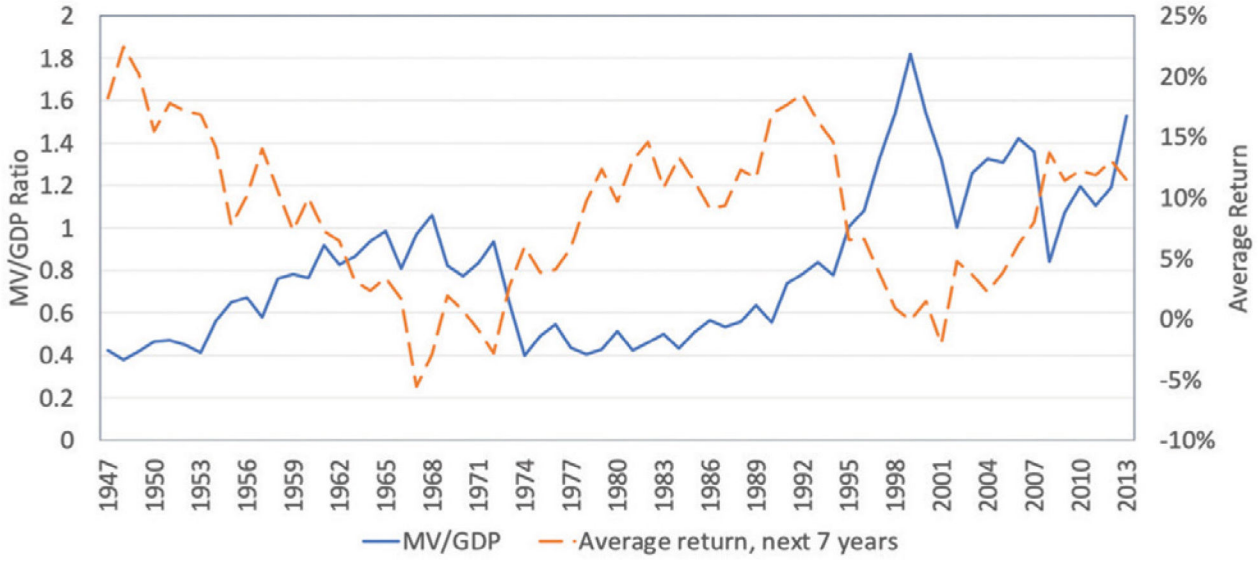
In the 1990s, there was a paradigm shift in whether stock returns are predictable or not. In their 1988 paper, Fama and French took a very different position: "There is much evidence

[43]See Fama (1965).

Exhibit 48. The Equity Premium before and after 1979

Time Period	% Real Return on Market Index Mean	% Real Return on Riskless Security Mean	% Real Premium Mean
1889–2020	8.2	1.3	6.9
1889–1978	6.98	0.8	6.18
1980–2020	9.6	1.5	8.1

Exhibit 49. Market Value to GDP Ratio and Subsequent Average Seven-Year Equity Return, 1947–2020



Note: Data are for the United States.

that stock returns are predictable"[44]—in other words, they are *not* a random walk. And then, in John Cochrane's presidential address to the American Finance Association, he said, "All price-dividend ratio volatility corresponds to variation in expected returns. None corresponds to variation in expected dividend growth, and none to 'rational bubbles.'"[45]

The implicit underlying belief is that the predicting variables (dividend-price ratios, earnings-price ratios) follow a stationary process that reverts to some unspecified normal value.

Campbell and Shiller succinctly summarize this view:

> It seems reasonable to believe that prices are not likely ever to drift too far from their normal relationships to indicators of fundamental value, ... Thus ... when stock prices are very high relative to these indicators ... [they] will ... fall in the future to bring the ratios back to more normal historical levels.[46]

Let me show you some empirical evidence regarding equity return predictability. **Exhibit 49** shows the ratio of US equity market capitalization to GDP along with subsequent seven-year returns.

This relationship held up well until the Global Financial Crisis. Looking at market value to GDP, it was a stationary series up to 2007. After that, however, it has no longer

[44]See Fama and French (1988).

[45]See Cochrane (2011).

[46]See Campbell and Shiller (1998, p. 11).

been so, as shown by applying the standard test for non-stationarity. A lot of our economic intuition was based on this earlier relationship. I entirely agree with the earlier presenters that this is not a market timing strategy, but it does give you an idea of what the average equity return is going to be.

In 2007, there was a structural shift in the economy. Real interest rates become negative; currently the entire term structure of real interest rates up to 30 years is negative, implying a negative marginal product of capital. Any assessment of the equity premium after 2007 must take into account these negative real interest rates.

One plausible explanation is that the equity premium went up after the Global Financial Crisis. If you take the historical (1929–2020) relationship between the market value/GDP ratio and subsequent equity return and extrapolate from it as shown in **Exhibit 50**, then the expected compound annual return on equities over the next five years is –5%. I wouldn't have too much faith in that forecast, however, because of the structural change.

To sum up my views on the mean reversion story, I think that it was valid until about 2007, but something changed in the economy around that time and we're out of that paradigm.

Discussion of Rajnish Mehra's Presentation

Jeremy Siegel: The ratio of equity market capitalization to GDP is often called the Warren Buffett indicator. It's his favorite indicator. I have often criticized it. Until the last 20 years or so, about 7% of the profits of the S&P 500 were from foreign sales. Now 40% to 45% of profits are from foreign sales. So, to compare US market cap to just US GDP is not an apples-to-apples comparison.

Rajnish Mehra: I'm looking only at domestic operations here. I'm not looking at foreign equity.

Jeremy Siegel: I'm not talking about foreign companies. I'm talking about profits of US firms and the market capitalization of US firms. Isn't that what you've used in Exhibit 49?

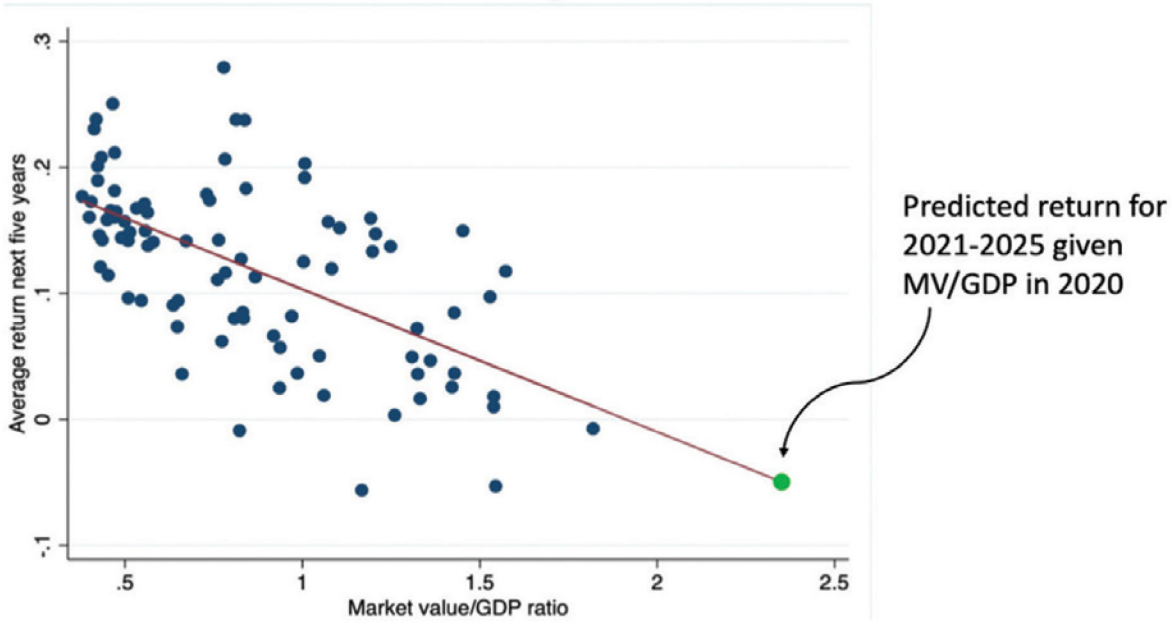
Rajnish Mehra: I have used domestic corporations, yes.

Jeremy Siegel: Yes, domestically housed corporations, but they're getting their profits from abroad, when they didn't before.

Laurence Siegel: Rajnish, when you use the term "domestic operations" it suggests that you've broken out the foreign

Exhibit 50. Market Value/GDP Ratio and Subsequent (Next Five Years) Average Equity Return, 1929–2020

$$R_{t\to t+5}^{e,avg} = \alpha + \beta\left(\frac{MV_t}{GDP_t}\right) + \varepsilon_t$$



operations of US-based companies. I don't think you've done that, have you?

Rajnish Mehra: No, I have not. What I'm saying is that the market capitalization of listed domestic corporations is not the full market value of all businesses in the United States.

Laurence Siegel: I am aware of that argument and agree with it—that the market cap of a stock market index misses a lot of privately held companies, sole proprietorships, and so forth. I think Jeremy is saying something different, which is that the S&P itself, holding that constant, has become more of a global index over time as its constituent companies became multinationals.

Rob Arnott: Rajnish, in looking at the past returns and past linkages with the linkage breaking down since 2007, I think it is strictly a function of what Cliff was alluding to earlier, which is revaluation. The valuation ratio has soared. A revaluation alpha should never be part of our forward-looking expected risk premium.

Rajnish Mehra: I think that's the most likely scenario. That the risk premium has gone up is consistent with the fact that real expected returns have become smaller and maybe gone negative.

But there are other stories that are floating around. There is an excellent paper by Farhi and Gourio called "Accounting for Macro-Finance Trends: Market Power, Intangibles, and Risk Premia."[47] They present evidence on the trends affecting some key macroeconomic and finance variables, focusing on six groups of indicators. I think the most plausible scenario is an increase in the risk premium, but one has to solve this puzzle jointly with other observations. You can't just pick one part of it—you must address the fact that the risk-free rate has declined so much and yet the return on equity has not declined. Why is that so? These are hard issues, and we don't have enough data after 2009 to resolve them.

[47]See Farhi and Gourio (2018).

PRESENTATION BY JEREMY SIEGEL: BACK TO THE FUNDAMENTALS—A CLOSE LOOK AT THE EQUITY RISK PREMIUM

Jeremy Siegel: Many of you are familiar with **Exhibit 51**, which covers 1802–2020, a period of more than 200 years. The compound annual real return on equities has been 6.8%; my forward prediction is between 4.5% and 5% per year from current valuations. Bonds have earned a real return of 3.6%, and bills have had a real return of 2.6%; real returns on fixed-income assets will almost certainly be negative in the future.

Then there's gold and the dollar. The dollar is measured against consumer goods in the United States (in other words, the inverse of the Consumer Price Index). Notice that the decline of the dollar has had no effect on the real return on stocks as would be expected since stocks are real assets. There are short-term effects of inflation on the stock market but no appreciable long-term effects, as theory would suggest.

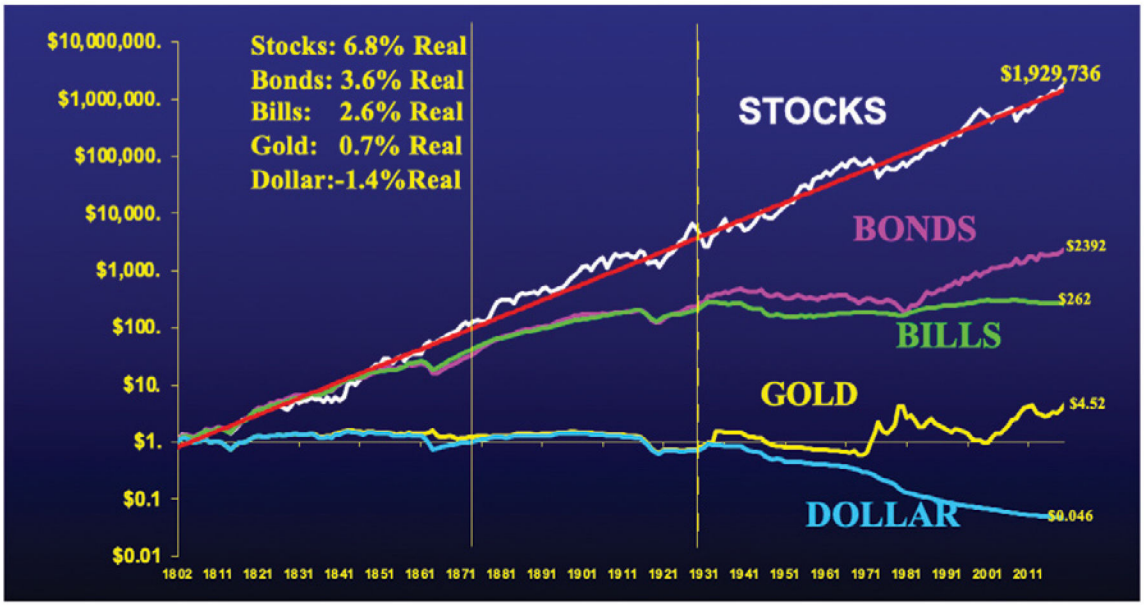
The CAPE Ratio through History

The CAPE ratio has gone through many transformations since Bob Shiller's original article in the 1990s. I have published an article about the problems with GAAP earnings (those based on generally accepted accounting principles) and believe a tight definition of operating earnings, with expensing for options, are much better indicators of market value.[48] This is especially true since GAAP earnings definitions have changed dramatically over the years.

I have also written about the "aggregation bias," which causes the CAPE ratio based on the sum of the earnings of S&P 500 companies to provide a very distorted view of the valuation of the market in recessions because it aggregates losses on individual stocks with profits on other stocks on a one-for-one basis. Bob Shiller agrees that it's a bias and, along with the changes in GAAP earnings definitions, has biased the CAPE ratio up dramatically since the Financial Crisis and yielded overly bearish projections.

Another source of bias in the CAPE ratio is the shift to buybacks from dividends, giving the earnings yield an upward tilt, so that the 10-year past average—which the CAPE ratio employs to determine the price-to-earnings (P/E) ratio—is biased downward compared to historical data. This can be

Exhibit 51. Real Total Returns on Major US Asset Classes, 1802–2020



Source: Siegel (2014), with updates to 2020.

[48]See Siegel (2016).

corrected by adding back share repurchases to dividends, which is called the total return CAPE and which Shiller has done.

In his products with Jeffrey Gundlach's DoubleLine Capital, Shiller uses another definition of CAPE, the "relative return CAPE," which measures the P/E relative to the last 20 years. This approach sharply reduces the CAPE ratio from his original and all later formulations.

Most recently, Shiller has pivoted to the "excess return CAPE," which measures valuation relative to interest rates. For years, Bob has told me that interest rates do not affect P/Es in the historical data, but perhaps he has changed his mind. All these transformations have reduced the magnitude of the CAPE ratio and made the market appear less "overvalued."

Epicycles

Are we like the ancients putting epicycles on the geocentric model of the solar system, trying to force the CAPE ratio to do something it cannot do? I've talked to smart investors who have been following CAPE and reducing their equities over the last decade. They are not happy with their results.

Clearly the CAPE ratio has been an extremely poor predictor over the past decade. But even over the last 40 years, the CAPE ratio has predicted that the market has been "overvalued" about 95% of the time. One flagrant example is that the market became overvalued according to the CAPE ratio in May 2009, when the S&P 500 was around 900, less than one-fifth of the current level. Clearly the overvaluation signaled by CAPE in the years immediately following the Financial Crisis has been one of the worst predictions in forecast history.

Over the last 150 years, the single-year P/E has averaged about 15. That implies an "earnings yield" or expected real return of one-fifteenth or 6.7%. That has been almost exactly the long-term real return on equity. It is simple and direct. Obviously, we need to be mindful of dips and booms in profits at business cycle peaks and troughs, but CAPE based on GAAP earnings is in my opinion fraught with too many problems to be a useful predictor.

Valuation and Current Return

I'm now going to provide a current forecast and thoughts on what earnings estimate to use.

Exhibit 52 shows the P/E based on historical 12 months operating earnings of the S&P 500 since 1954. The median value has been 17.3, but the trend is upward, as will be explained shortly. Yesterday the S&P 500 was at 4500. Stocks are selling for 21 times next year's earnings. **Exhibit 53** shows various measures of earnings on the S&P 500 as of a recent date.

The S&P 500 measure of operating earnings expenses options and all sorts of other items that could be capitalized: It's a very conservative look at earnings. The current estimate of next 12 months' S&P 500 operating earnings is $211, so that index is now selling at a 21 P/E. The expected return is then 4.6%, or 1 divided by 21.

Now, you might ask, is this cyclically adjusted? I don't know where we are in the cycle. We had a short recession last year after a long expansion; I'm going to be agnostic and say we are midcycle so no adjustment needs to be made. The real expected equity return of 4.6% is more than 5 percentage points above the real yield on TIPS, which is now about −1%. Currently the equity risk premium is 5.6%—that is, [4.6%−(−1%)]—almost double the 3.2% historical average (6.8% stocks minus 3.6% bonds). This is something we should think about.

Another important question: Why should the normal P/E for the market today be the 150-year historical average of 15? The cost of a diversified portfolio has declined radically over the last 50 years. This is something that I pointed out 20 years ago. I said that the ability to get a fully diversified, cap-weighted efficient portfolio at virtually zero cost did not exist through the 19th and first three-quarters of the 20th century.

How high would transaction costs have been from 1870 through 1970 to get a fully cap-weighted indexed portfolio, considering high brokerage commissions and wide bid and ask prices, to keep a portfolio balanced? Perhaps 1% to 1.5% per year? Today the cost to the investor of holding an index fund is 1 or 2 basis points. Those low costs make it possible to obtain a risk return trade-off that is far superior to what investors could receive in the 19th or early 20th century. That means that the average P/E should rise accordingly.

So, should the P/E be 20? 22? That would lead to a 5% to 5.5% expected forward-looking real return. The historical real return on stocks is 6.8%, but once you subtract transaction costs, you get this lower level. So, a 20–22 P/E today with costless indexing is about the 15 P/E of the 1870–1970 period.

Behind the Earnings Estimates

Returning to the S&P earnings estimates reported in Exhibit 53, I think these are underestimates. The "beats" this year, earnings beating averages of analyst expectations, have been prodigious. In **Exhibit 54**, the percentage of firms reporting upside surprises is at a high.

Back to Buybacks

I want to push back strongly on Rob Arnott's argument that buybacks are not substitutes for dividends. They are.

Exhibit 52. P/E of the S&P 500 Based on 12-Month Trailing Operating Earnings, March 1954–June 2022

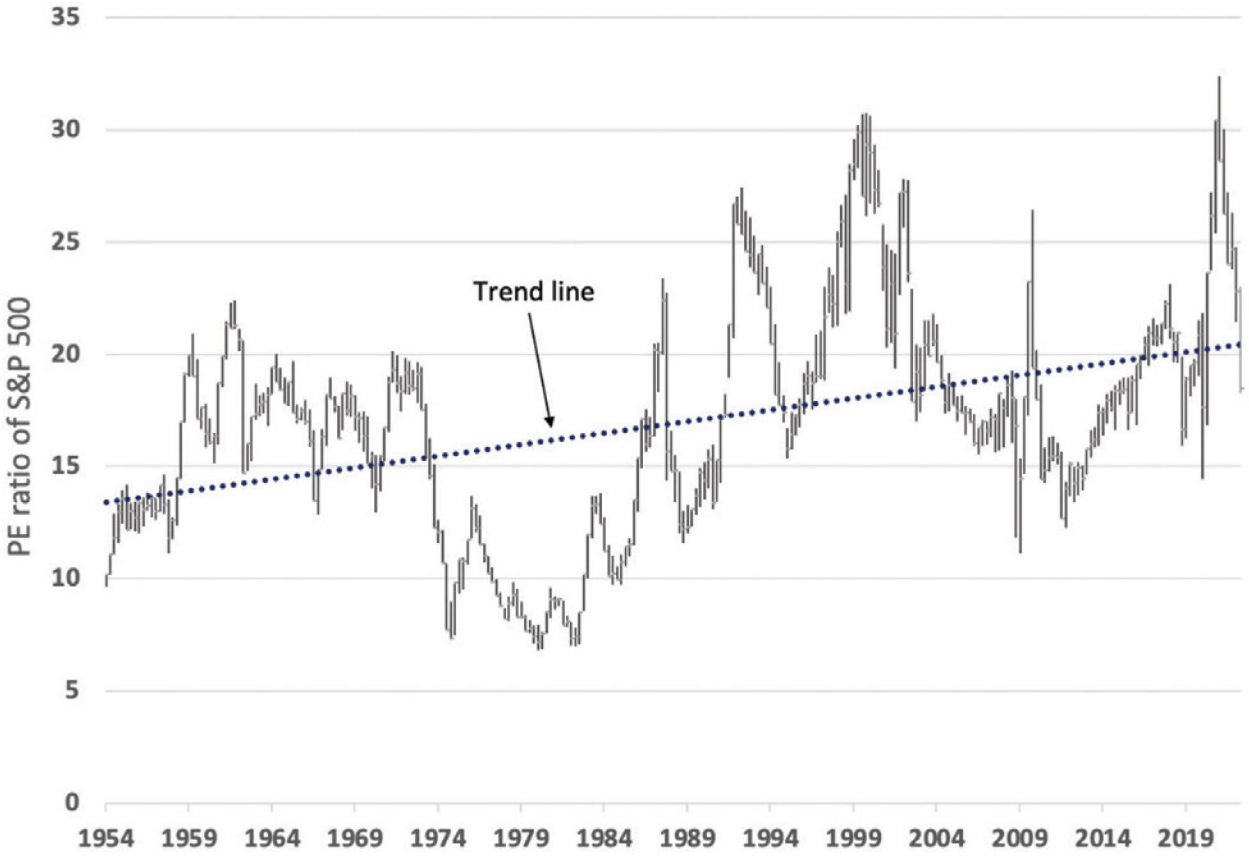
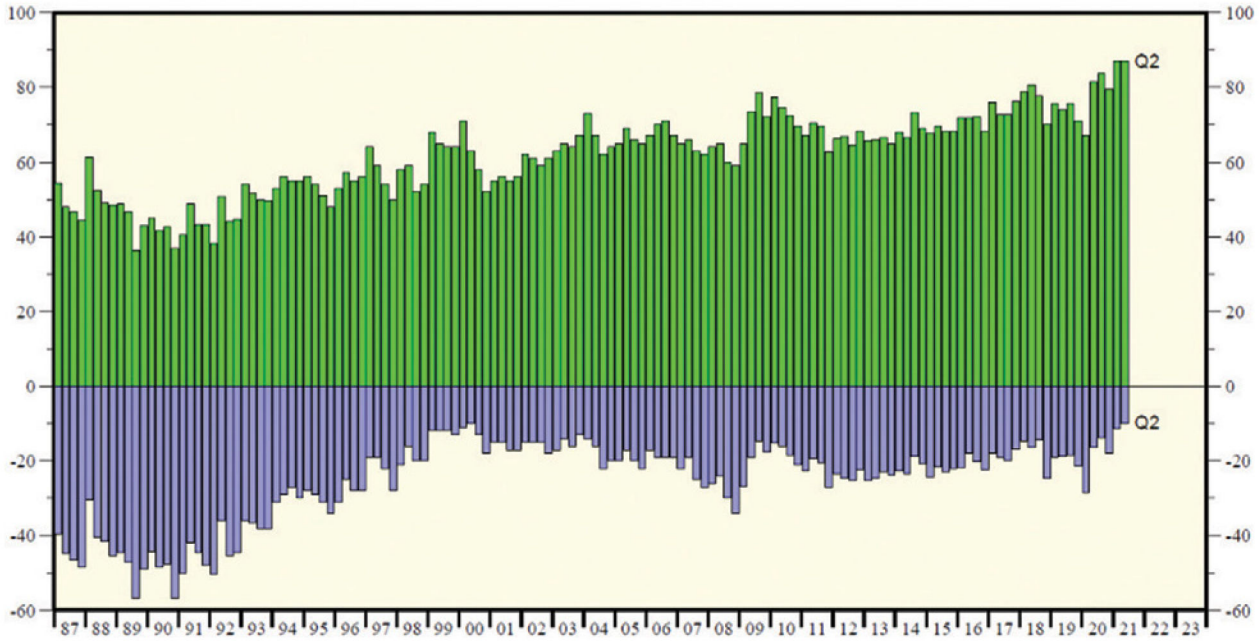


Exhibit 53. Current S&P Earnings Estimate

Date S&P 500 closing level Dividend yield (12 months)	7 October 2021 4399.76 1.35%					
Earnings Estimates (bottom up)						
Quarter Ending	One-Quarter Operating Earnings per Share ($)	One-Quarter Reported Earnings per Share ($)	Operating Earnings P/E	Reported Earnings P/E	Twelve-Month Operating Earnings per Share ($)	Twelve-Month Reported Earnings per Share ($)
31 December 2022	57.00	52.81	20.22	21.30	217.59	206.57
30 September 2022	55.32	51.36	20.83	21.97	211.19	200.23
30 June 2022	54.03	49.30	21.56	22.77	204.07	193.21
31 March 2022	51.24	53.11	21.77	22.88	202.09	192.30

Source: Based on data from the S&P Global website (www.spglobal.com).

Exhibit 54. Current S&P Earnings Estimates



Note: Percentage of S&P 500 companies that reported earnings above or below the consensus estimate at the time of the earnings report.

Source: Based on I/B/E/S data from Refinitiv; Yardeni Research Inc.

Exhibit 55. Lower Dividends, Higher EPS Growth

	Reported EPS Growth	Real Dividend Growth	Dividend Yield	Real Capital Gains	Real Stock Returns	Payout Ratio
1871–2021	2.04%	1.57%	4.29%	2.57%	7.1%	57.2%
1871–1945	0.67%	0.74%	5.31%	1.32%	6.8%	66.8%
1946–2021	3.41%	2.38%	3.28%	3.82%	7.4%	49.0%
1929–2021	2.34%	1.77%	3.89%	3.46%	7.6%	53.7%

As **Exhibit 55** shows, over 1871–1945, a very long period, there was very little real EPS growth or real per-share dividend growth. Since 1946, the dividend yield has gone down about 2 percentage points and real earnings growth has gone up about 2.7 percentage points. They come close to balancing each other out. Expected real stock returns stayed about the same from before 1946 to after; the dividend payout ratio went down and EPS growth went up.

Tax considerations aside, pure theory tells you there is an exact one-for-one trade-off between buybacks and dividends. I believe the long historical data confirm this.

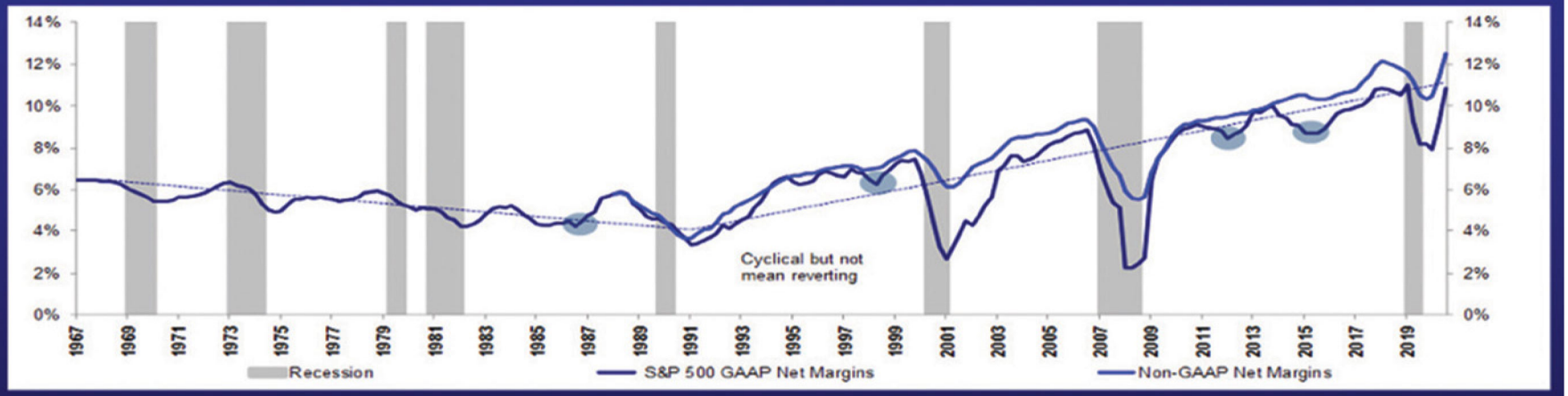
Rob, you talked about new companies causing dilution. I published a paper that tracked the stocks that were in the original S&P 500 when it was first constituted in 1957.[49]

Rob Arnott: I remember that paper. I accepted that paper (for the *Financial Analysts Journal*).

Jeremy Siegel: The portfolio of original stocks beat the actual, continuously reconstituted S&P 500. So, do you need these new stocks that were put into the S&P 500 to get the overall market return? Not between 1957 and the date of my paper (2006).

[49]See Siegel and Schwartz (2006).

Exhibit 56. S&P Profit Margins: Mean Reversion?



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	1Q21	2Q21
Communication Services	9.5%	6.7%	7.9%	9.4%	10.7%	9.5%	7.5%	5.1%	7.6%	6.9%	9.3%	10.3%	12.0%	12.3%	11.2%	12.5%	12.4%	13.6%	10.4%	11.8%	12.6%	13.1%	13.8%	15.5%	15.0%	15.1%	18.8%	18.7%
Consumer Discretionary	4.3%	4.4%	5.5%	5.0%	5.5%	4.6%	2.4%	3.4%	4.0%	4.1%	5.8%	4.8%	4.1%	2.9%	4.5%	5.9%	6.1%	6.1%	6.4%	6.2%	6.9%	7.2%	7.0%	7.6%	7.3%	5.3%	8.1%	8.1%
Consumer Staples	5.8%	6.4%	6.7%	6.5%	6.6%	6.4%	6.3%	6.8%	6.6%	6.6%	7.7%	7.6%	7.3%	7.2%	7.3%	7.5%	7.1%	6.9%	7.0%	7.0%	7.0%	7.2%	7.3%	7.7%	7.5%	7.5%	7.5%	7.8%
Energy	5.4%	6.1%	6.9%	4.9%	4.8%	8.4%	7.6%	5.3%	6.8%	8.5%	8.4%	9.7%	9.4%	8.9%	5.3%	7.5%	8.2%	7.9%	7.3%	7.6%	5.0%	1.5%	4.5%	7.2%	5.3%	-0.7%	4.3%	6.4%
Financials	9.6%	10.7%	11.8%	10.9%	11.3%	10.9%	9.7%	11.5%	13.4%	13.8%	13.6%	13.9%	12.3%	-2.6%	5.4%	11.0%	11.3%	12.9%	14.9%	14.1%	15.3%	15.1%	14.8%	17.3%	17.0%	13.7%	23.1%	22.2%
Health Care	9.9%	10.2%	9.6%	9.6%	9.9%	9.9%	9.9%	9.3%	10.3%	10.6%	10.2%	9.8%	10.0%	9.8%	9.6%	10.2%	10.3%	10.1%	10.1%	10.4%	10.6%	10.1%	10.2%	10.9%	10.3%	10.2%	11.9%	11.6%
Industrials	6.2%	6.3%	6.4%	6.4%	6.6%	6.6%	5.2%	5.4%	5.4%	5.9%	6.7%	6.9%	7.8%	6.3%	4.8%	6.8%	7.3%	7.8%	8.6%	9.0%	9.6%	9.4%	9.2%	10.0%	9.4%	5.5%	6.6%	9.2%
Information Technology	10.0%	9.2%	10.9%	10.7%	13.2%	15.4%	9.0%	10.0%	11.5%	13.6%	12.5%	12.7%	12.8%	12.1%	12.9%	16.3%	16.5%	15.3%	16.6%	17.1%	18.0%	19.2%	20.9%	22.4%	21.7%	21.8%	24.7%	25.1%
Materials	8.2%	7.0%	6.7%	5.9%	5.8%	5.8%	2.9%	3.5%	4.9%	6.4%	6.4%	7.4%	8.5%	3.9%	4.6%	7.0%	8.0%	6.5%	6.2%	5.5%	5.7%	6.1%	7.3%	8.9%	9.2%	8.8%	11.8%	14.8%
Real Estate	5.8%	6.9%	7.5%	8.3%	10.8%	8.7%	5.1%	5.0%	5.4%	7.2%	18.2%	19.4%	20.0%	19.2%	18.8%	21.4%	27.8%	29.2%	29.8%	32.7%	35.3%	33.9%	34.1%	34.1%	33.8%	33.9%	35.8%	37.5%
Utilities	10.7%	9.8%	7.9%	8.1%	8.0%	5.8%	5.1%	7.1%	9.0%	7.8%	7.8%	8.3%	8.9%	8.5%	9.5%	9.7%	9.9%	10.1%	9.8%	9.7%	10.7%	11.9%	11.7%	12.4%	13.6%	14.7%	13.0%	15.0%
S&P 500	**7.0%**	**7.2%**	**7.8%**	**7.6%**	**8.2%**	**8.2%**	**6.6%**	**7.0%**	**7.9%**	**8.5%**	6.9%	7.3%	7.5%	5.8%	6.5%	8.5%	8.8%	9.0%	9.4%	9.5%	9.9%	10.0%	10.5%	11.8%	12.0%	10.4%	13.5%	14.1%
S&P 500 ex. Financials &	**6.7%**	**6.7%**	**7.2%**	**7.0%**	**7.6%**	**7.7%**	**6.0%**	**6.2%**	**7.0%**	**7.5%**	6.0%	6.3%	6.7%	6.6%	6.6%	8.0%	8.3%	8.4%	8.5%	8.7%	9.0%	9.0%	9.6%	10.8%	10.9%	9.7%	11.9%	12.7%
S&P 500 ex. Energy & Fi	**6.8%**	**6.8%**	**7.3%**	**7.2%**	**7.8%**	**7.6%**	**5.8%**	**6.3%**	**7.0%**	**7.4%**	5.6%	5.7%	6.2%	6.1%	6.8%	8.1%	8.4%	8.5%	8.7%	8.9%	9.4%	9.6%	10.2%	11.2%	11.6%	10.5%	12.5%	13.3%
S&P 500 ex. Tech	**6.7%**	**7.0%**	**7.5%**	**7.3%**	**7.7%**	**7.6%**	**6.4%**	**6.7%**	**7.6%**	**8.0%**	6.5%	6.9%	7.0%	5.2%	5.9%	7.7%	8.0%	8.4%	8.7%	8.7%	9.0%	9.0%	9.3%	10.6%	10.8%	9.0%	12.0%	12.6%

Source: Based on data from David Bianco, DWS Americas.

In recent years, the new stocks added to the index have done better. So, I'm not going to say that if I repeat the experiment, I'm going to get that same result today. But it's not a given, empirically or theoretically, that you must have the "new" stocks to get a return that approximates the index.

Profit Margins

I think the issue of profit margins, which Raj mentioned, is important. **Exhibit 56** shows historical profit margins on the S&P 500. Currently the large profit margins are almost all in technology stocks, which have a profit margin of 25%. Is this phenomenon likely to mean revert? If you take out technology and communication services, which are really tech, you have 50% of the market where profit margins are much lower. The margin increase has been mostly in those two sectors.

We can debate whether this concentration of profits is permanent or not. Rob, your last paper, which touched on that topic, was really good.[50] You talked about intellectual capital not being included in book value, despite being tremendously valuable, and thereby making some value stocks look like growth stocks when you use price-to-classical-book as the choice variable. That could be one reason why the apparent value premium has declined. I don't agree with everything in that paper, and I'm sure we're going to talk about it in discussion, but you raised a valid issue.

The Changing Correlation between Stocks and Bonds

We have not talked enough about the collapse of real rates around the world, which is unprecedented and the biggest surprise for macroeconomists over the last two decades. **Exhibit 57** shows this for US TIPS.

Exhibit 58 illustrates that the massive decline in real rates is a worldwide phenomenon.

Exhibit 59 shows that the correlation between the S&P 500 and 10-year Treasuries has changed from positive to negative. John Campbell and Luis Viceira, among others, have

Exhibit 57. Ten-Year US TIPS Yield, 14 February 1997 to 9 September 2022

Source: Based on data from FRED.

[50]See Arnott, Harvey, Kalesnik, and Linnainmaa (2021).

Exhibit 58. Estimates of the "Natural" Real Rate of Interest, Five Major Countries/Regions, 1999–2021

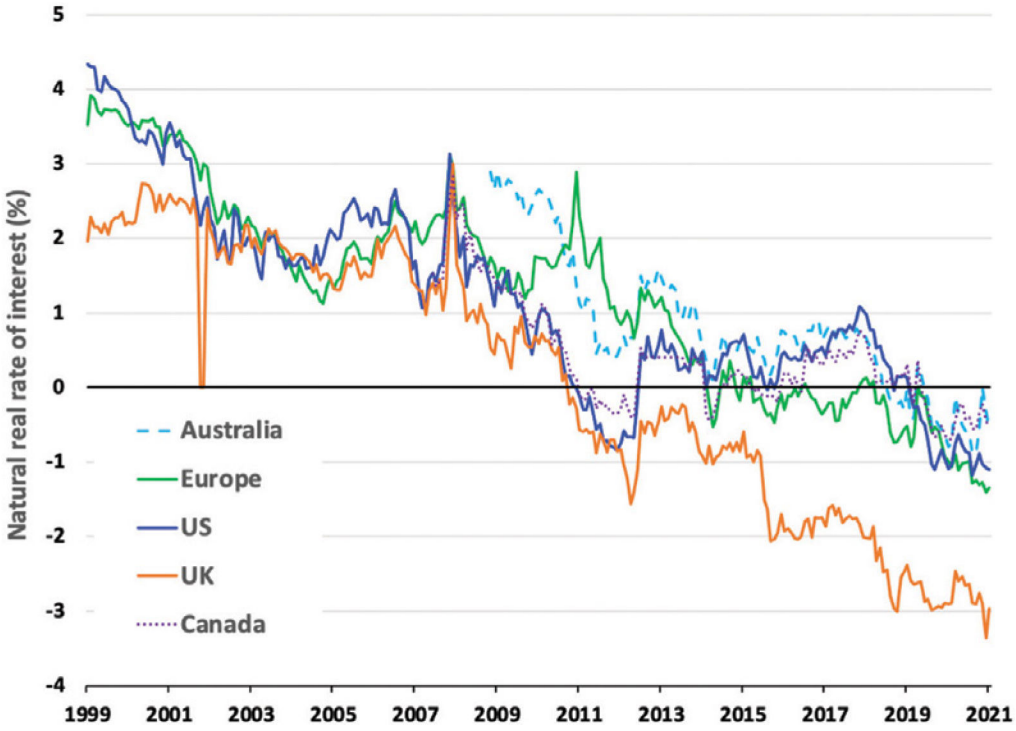
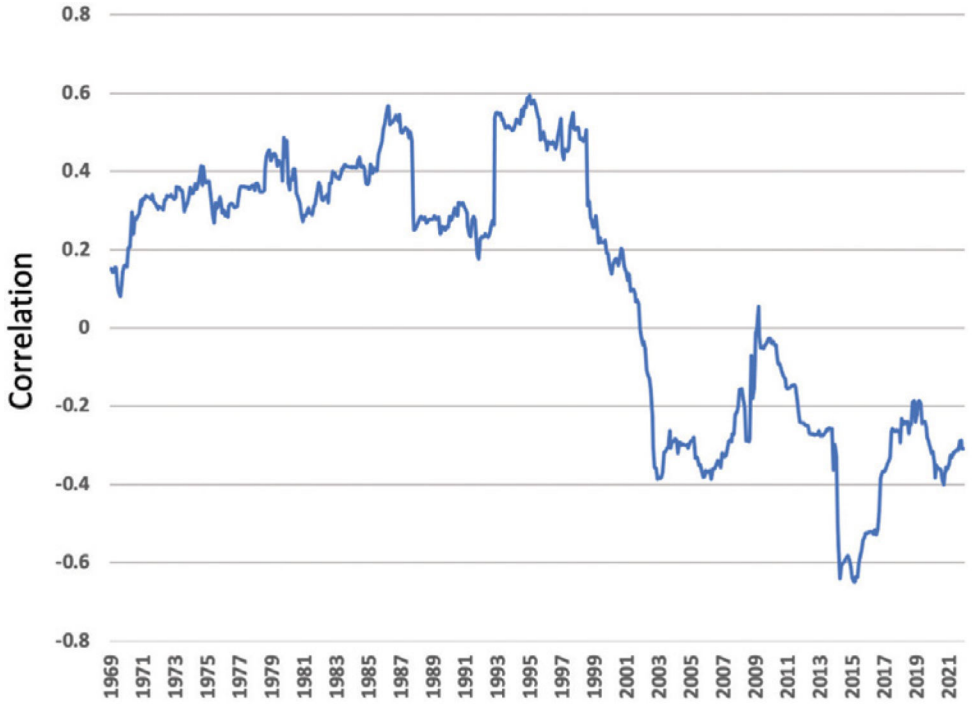
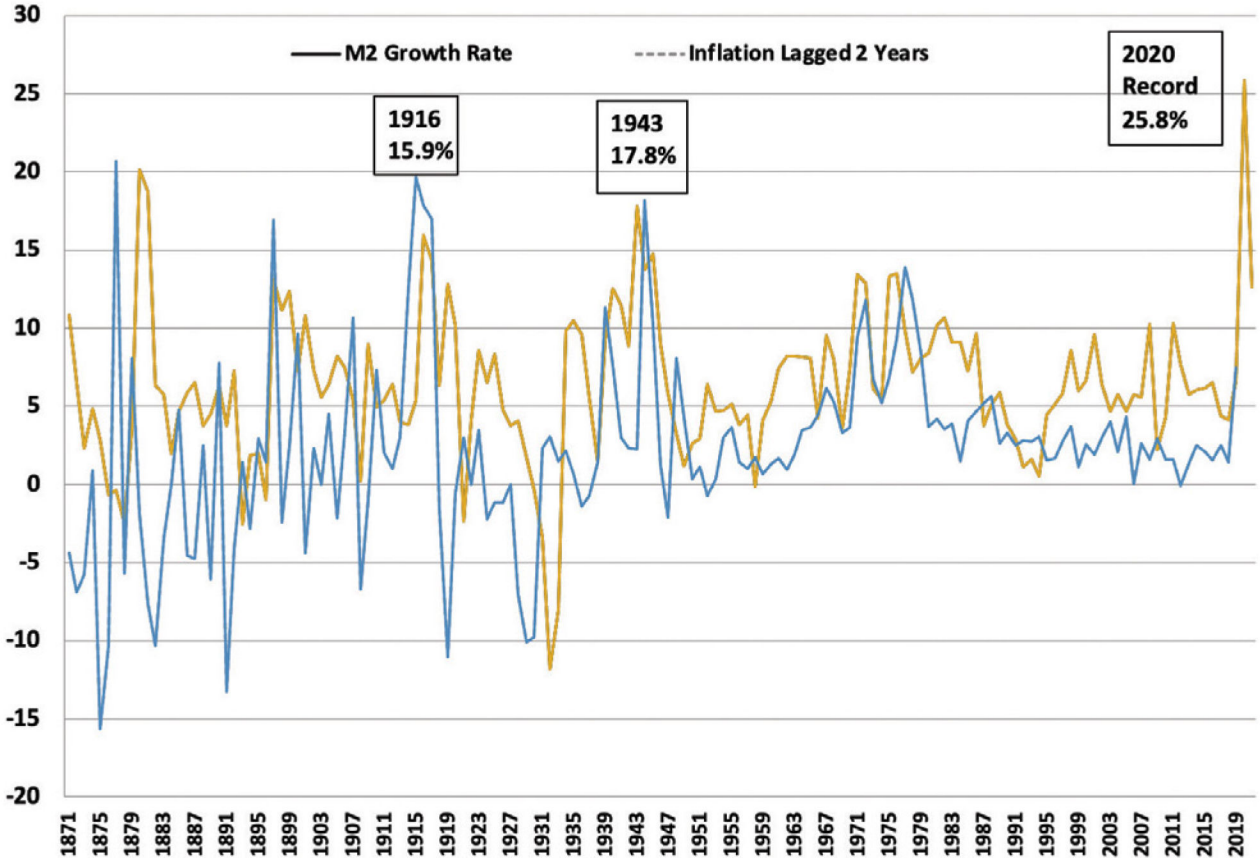


Exhibit 59. Trailing 12-Month Correlation of S&P 500 and 10-Year US Treasury Bonds, 1969–2021



Source: Clarida (2019).

Exhibit 60. Annual Rate of Money (M2) Growth vs. Inflation, 1868–2020: 150-Year Record Broken with 2020 Increase



talked about this.[51] Fed Vice-Chairman Richard Clarida gave an excellent address in Zurich about this issue, in which he claims that more than 3 percentage points of the decline in real term premium is caused by the change of the correlation between the 10-year Treasury and risk assets.[52]

We can speculate about whether that negative correlation is going to persist, but the impact of the real rate collapse that has already taken place is enormous. This forum is about the expected equity risk premium—the difference between expected returns on stocks and fixed-income assets (bills and bonds). So, the forecast for bonds is tremendously important to what we're discussing.

Upcoming Inflation

I want to end my presentation with a comment about how much inflation we're going to have. **Exhibit 60** is an update of Milton Friedman's long-term chart of the growth of the money supply. In more than 150 years, we have never seen the money supply grow as fast as it did last year (2020). I said in July 2020 we were going to have rapid inflation next year, and continued excessive money supply growth augurs badly for inflation in the future.

Discussion of Jeremy Siegel's Presentation

Rajnish Mehra: Jeremy, would you agree one of the more plausible explanations for lower expected returns in the future is that the realized risk premium has been much higher than expected?

Jeremy Siegel: I expect real equity returns to be lower by about 2 percentage points per year than their historical average. I'm not sure there's any mean reversion.

[51]See Campbell, Sunderam, and Viceira (2017).

[52]See Clarida (2019).

Rajnish Mehra: Isn't it possible that you have these low expected returns on real assets because people are really scared or our risk aversion is very high?

Jeremy Siegel: I don't see it that way. If people are scared, then prices should be low, causing expected returns to be high. But expected returns are low.

In addition, the correlation between stocks and bonds has turned negative, after being positive for decades. There are many reasons for this change. If you use any beta model to analyze this situation, when you change the correlation of two major assets from positive to negative, you change the expected return dramatically. Any hedge asset has a negative real expected return. And now, US Treasuries are viewed as the hedge asset of the world, and they're bought for that attribute. That wasn't happening in the 1960s, 1970s, and 1980s.

The real return on fixed income has dropped far more dramatically, in my opinion, than the real return on equities going forward. So, I predict a 4.5% real return on stocks; and −1% on TIPS because the yield on the 10-year TIPS is known. On nominal bonds, because there's going to be much more inflation, the real return will be −2% or −3% or −4%.

Roger Ibbotson: If you got a big jump in the risk premium, you're going to have an immediate drop in the market.

Jeremy Siegel: If you have a jump in expected real returns, you're absolutely right.

Roger Ibbotson: So, you can't justify this big rise in the stock market from a rise in the risk premium.

Jeremy Siegel: No—if expected real returns go up from the current level, the stock market goes down.

Laurence Siegel: All other things being equal, yes of course.

I have a great deal of concern about extremely low or negative interest rates being contractionary, although they're intended by central banks to be expansionary.

PRESENTATION BY WILLIAM GOETZMANN: 574 YEARS OF EQUITY RETURNS FROM THE BAZACLE WATER MILL IN FRANCE

Laurence Siegel: As Monty Python used to say, "And now for something completely different." Will is going to tell us about the long run. We all think we've been looking at the long run, but Will *really* is.

Will Goetzmann: It's amazing to see so many people who have spent decades of their careers collectively and separately studying the equity premium and making a huge difference in the way people invest their money. So, it's great to reconnect with everybody and also to see so many extreme pessimists and optimists in the same group.

The Oldest Joint-Stock Company

For something a little bit different, as Larry said, I present 574 years of equity returns. I am continuing to work actively on this ancient company that started in 1372 and another one that started in 1374. This quest began when I was in graduate school, and Roger and I were talking about early stock companies. I thought the Dutch East India Company was the earliest one, in 1602. Roger said he had heard there were some earlier companies in southern France—water mill companies. I don't know where he heard about them, but it took me a decade—I had to wait until the Internet became a practical tool for me to go and trace down this source.

Over the last decade or so, my colleagues David Le Bris and Sébastien Pouget, both in Toulouse, have been mining the archives of that city for incredible information about the very earliest corporations. They were full corporations with publicly traded shares, limited liability, juridical entity, annual shareholder meetings—anything you think a corporation should be, these companies had it before 1400.

The building in **Exhibit 61**—actually, the foundation of this 19th century building—was the location for one of those

Exhibit 61. Honor del Bazacle

- Earliest documented corporation 1372–1946
- Same business activity for ages (grain milling up to 1888, electricity afterwards)
- Dividends and prices from 1371 to 1947 (very rich data from 1520 onwards)

Source: Photo credit: Getty images/yvon52.

companies, called the Bazacle Company. It used the same technology, hydro power, for nearly 600 years—first to mill grain and eventually to generate electricity. David was able to find a rich vein of dividend and price information for this company from about 1530 onwards. It was a pretty big company, and Toulouse was famous through the centuries as the big market for grain in southern France. The mills that emerged were a significant part of the business of the city.

We've been able to collect transfer prices for shares in these companies from shareholder registers. We also have dividend information for long stretches of time. Interestingly, dividends were paid in grain until the late 1700s, which investors could easily convert to cash in the Toulouse market. We used prices from this market to express dividends and share prices in grams of gold or silver. There were negative dividends, which I'll discuss; and the companies had *de facto* limited liability, which makes it fun to argue about the origins of corporate governance and related matters.

Dividends Are Everything

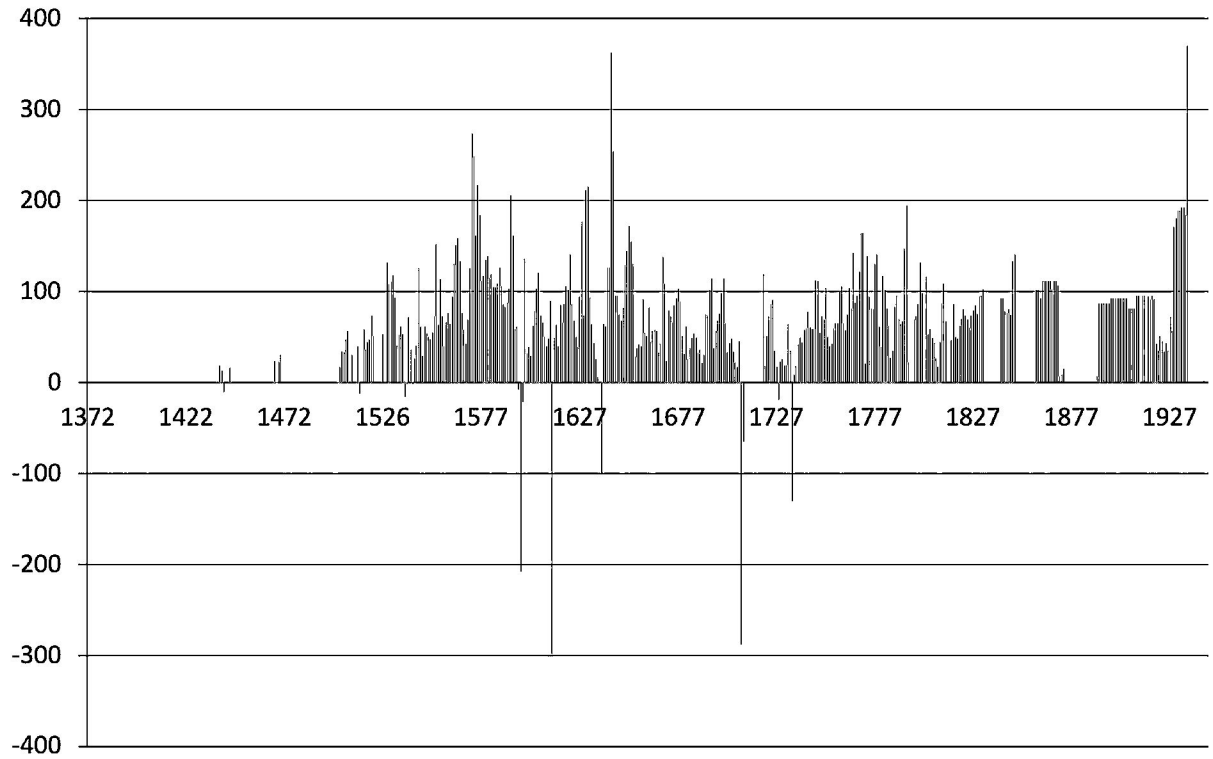
Exhibit 62 shows the dividend series. The paucity of the dividend data in the early years reflects the fact that we don't have registers for the period before about 1500. After that time, you can see that annual dividends were very volatile. There are also some negative dividends; those are calls on shareholder capital to make up the difference between income and expenses for a given year. The big capital calls are in times when there were huge floods, the mills were knocked out, and the company had to raise more capital to build them back. At such times, you had a choice as a shareholder: Either come up with the capital or hand the shares back to the company—that's the limited liability part.

Eventually these shares were listed on the Paris stock exchange in the 19th century. They traded there as public companies until 1946.

Exhibit 63 shows Bazacle Company prices and dividends in livres Tournois (Tours pounds, a currency in use in France in the Middle Ages). Prices are in red and dividends are in blue. We also show some moving averages. It is extremely pleasant to see that the prices and dividends do move together, suggesting that maybe there's some rationality to the whole process of asset pricing. Prices may actually represent expectations about future dividends.

We've been talking about the equity premium. Over the whole time period that we studied the Bazacle Company,

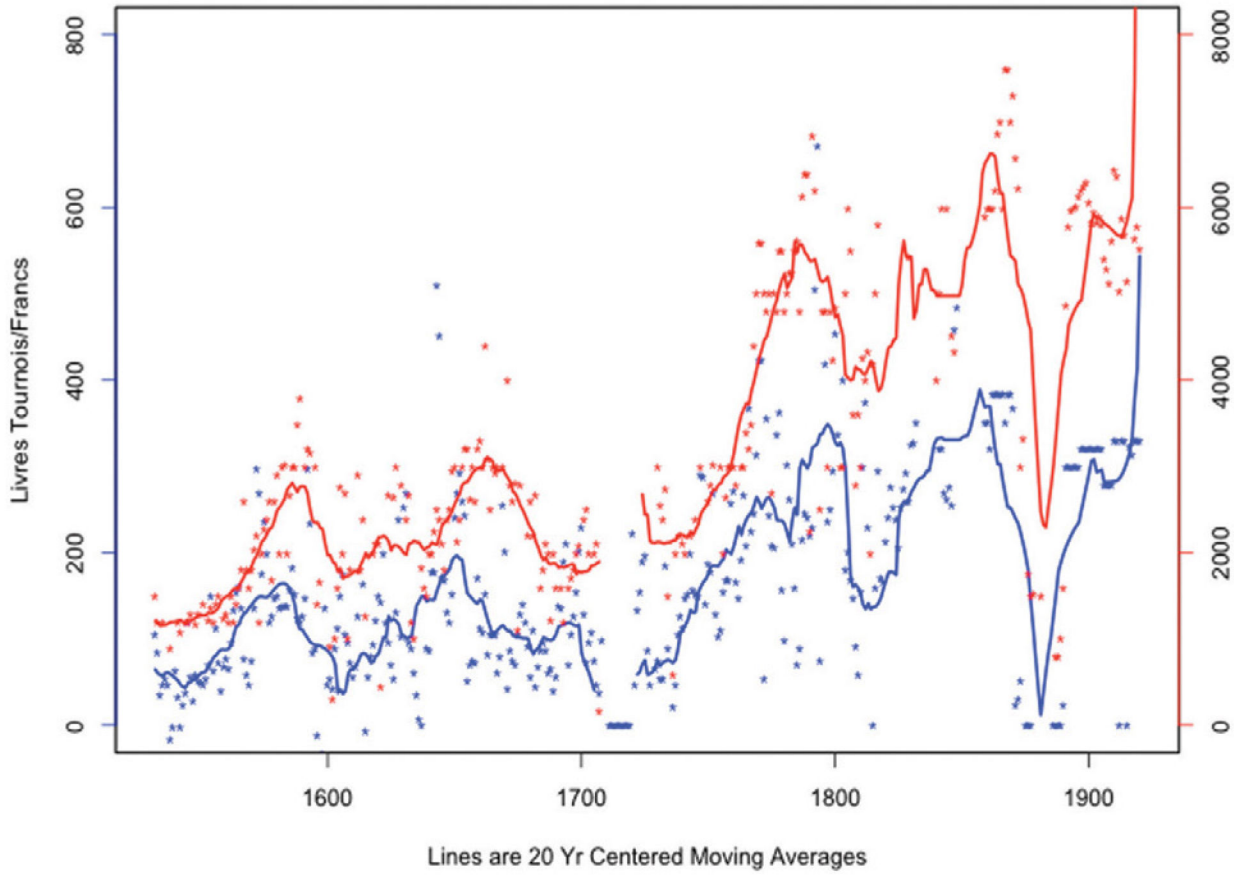
Exhibit 62. Dividends per Share of the Bazacle Company, Year by Year, 1372–1946



Note: Missing data prior to 1526 are shown as zeroes. This does not mean dividends were zero.

Source: Le Bris, Goetzmann, and Pouget (2019).

Exhibit 63. Bazacle Share Prices (red) and Dividends (blue), 1532–1920



Source: Will Goetzmann. For details, see Le Bris et al. (2019).

capital appreciation was *de minimis*. We have the whole history of the company—we know when it started, and we know when it was purchased at a low price by the French government that nationalized the generation of electricity in the 1940s.

Most of the returns, then, came from dividends. Inflation over that long time period is not easy to calculate, but we do have accurate prices for various goods stated in terms of silver. Based on this information, our best estimate of the dividend yield in real terms is just over 5%, as shown in **Exhibit 64**. That is not too far out of line with all these discussions we've been having—"real 5%" might be a little more optimistic than some of you. But that's what you got. This estimate could be said to contain survival bias, because we picked the oldest company, but the company did die in 1946, so there is a sense in which it didn't really survive.

A Medieval Test of a Modern Asset Pricing Model

Because there was not much capital appreciation, we were able to perform some estimations of asset pricing models,

Exhibit 64. Summary Statistics of Real Dividend Yields on Bazacle Company Stock, 1372–1946

Dividend Yield		
Real	**Mean**	**Std. Dev.**
1372–1946	5.16%	7.55%

Note: For details, see Le Bris et al. (2019).

given that we didn't have to deal with the problem of stock prices wandering off to infinity. We built a simple model, first describing the dividend process using an autoregressive moving average model. The autoregressive part is unsurprising: Dividends tended to be positively related to each other from year to year. The moving average part, however, suggests that there was—I hate to use these words, but I'm going to use them—some amount of mean reversion. These dynamics suggest that dividends were partially forecastable.

Exhibit 65. Asset Pricing Model for Bazacle Company Stock

- Does price reflect expected future dividends?
- Dividends autocorrelated, moving average
- Build a model and estimate
- Results:
  1. Dividends ARMA(1,1) = [0.80, −0.35]
  2. Expected dividends explain prices: 15% to 45% of variation.
  3. Cannot reject pricing model

We next use an asset pricing model to see whether the predictable future changes in dividends were reflected in the price of Bazacle shares. The answer is yes. There were shocks, like wars and famines, that also affected firm output. This model does a pretty good job of explaining changes in prices (see **Exhibit 65**). This makes it a bit of a novelty, a rational asset pricing model that we actually can't reject.

The model also allowed us to estimate an equity risk premium over 574 years. Calculating a premium over a riskless rate is difficult when there is no riskless rate starting in 1372. So, we used Parisian municipal bonds and other proxies. Nevertheless, the estimated premium may also reflect risk premium variations in the bond rate.

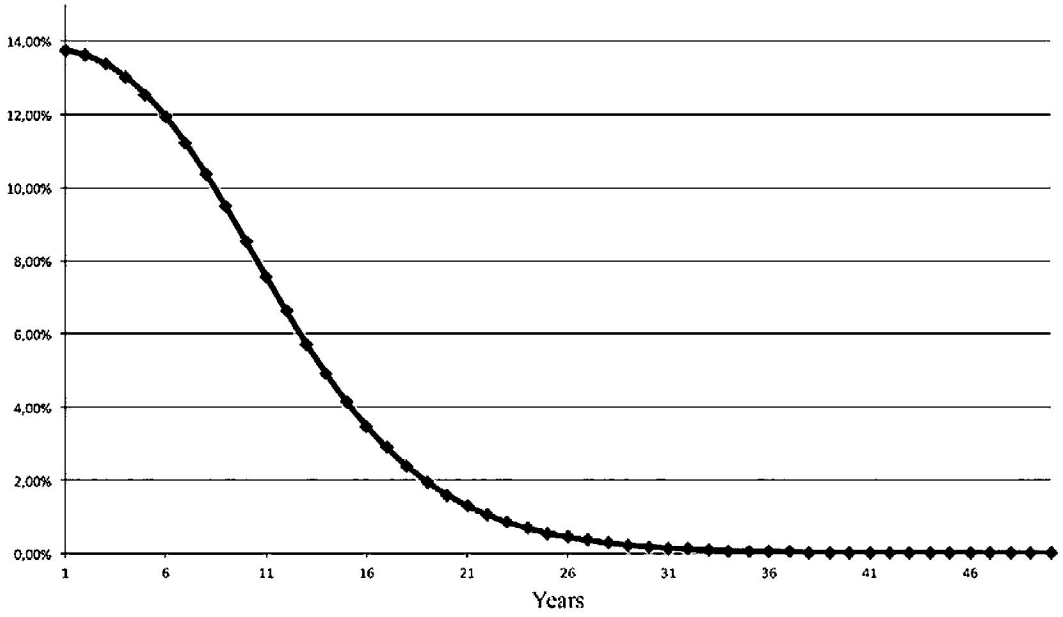
Term Structure of the Equity Premium

Scholars have long been interested in the term structure of the equity premium.[53] The equity risk premium must price uncertainty that can happen in both the near term and the distant future. Near-term fluctuations are mostly a function of current, stationary risks. Long-term risks, like uncertainty around climate change, may command their own premium.

Our model also allows us to estimate a term structure of the Bazacle Company equity risk premium, which we show in **Exhibit 66**. The benefit of using the Bazacle Company is that the six centuries of data mean that both short-term and long-term risks were realized in our sample.

We find that much of the premium for holding shares was associated with risk in the near term. Perhaps because of the long-term mean-reverting tendency of grain prices, the premium at longer horizons is much less than that of the near term.

Exhibit 66. Term Structure of the Risk Premium



Source: Le Bris et al. (2019).

[53]See, for example, van Binsbergen and Koijen (2017).

This downward-sloping equity risk premium term structure of the Bazacle Company is interesting because current theories about the equity risk premium imply an upward-sloping term structure.[54] Our findings are more consistent with term-structure estimates using dividend strips.[55] A natural question to ask of our term structure analysis is why the very long-term risk pictured in Exhibit 66 is near zero. One answer may be due to the survival of the company itself. Milling was an essential technology for centuries. Even when the Bazacle Company converted to generating hydroelectric power, it continued to generate profits. In fact, the company that acquired the firm in 1946 is now partially privatized, and you can now effectively invest in it.

So, get that 5% stuck in your head. It's not too far off from the equity risk premium that we have measured since 1926 using US stock market data. My coauthors and I collected centuries of archival data from a unique firm that allowed us to estimate an asset pricing model that reflected risks both near term and long term. The model suggests that equity investors from the Middle Ages to the modern era were not entirely foolish. The prices they set reflected the value of expected future dividends.

Laurence Siegel: ...and the risk of those cash flows.

Discussion of Will Goetzmann's Presentation

Jeremy Siegel: Gold has appreciated in real terms at almost 1% per year. If these dividends were paid in gold or precious metals, you might add almost a percentage point to the real yield, which would move it closer to 6%.

Will Goetzmann: That may be true. We did have a gold series as well, but I think we converted everything into silver.

Jeremy Siegel: I'm just saying that 6% is really right in the ballpark of what Elroy was saying the risk premium was around the world.

Laurence Siegel: I think there is some survival bias because, first, the company is even older than you said. When Roger Ibbotson and I first looked at this company (without traveling to France), we noted that it had been functioning as a water mill for a couple of hundred years before 1372. We didn't have stock prices, but it was a going concern, a business. And then in 1946, it was acquired by a government—it's not quite fair to say that it died; it just had a new owner. So, this company really survived every possible catastrophe that the world could have thrown at it, and it refused to die. I would moderate my return extrapolation by noting that it is the only company, that we know of, that has done that. It is a real survivor.

Will Goetzmann: That is true.

Antti Ilmanen: Will, you said there wasn't much, if any, dividend growth over this long history. We know that output was growing at close to a zero pace until about 1800 and then sped up to 1% plus, per year. Do you see anything like that in the dividend growth data?

Will Goetzmann: There were periods of technical innovation. For example, in the 1300s, I think output was much lower. Sometime before 1500, there was a huge jump in the company's technology. It may be related to them rebuilding the dam. In Exhibit 61, you can see there's a dam that had to be built through the collective efforts of investors contributing to it. That was one big jump. Then, of course, there was the transition to electricity generation, which is another technological change.

So, technological innovation happened in fits and starts. The Bazacle site itself is close to the Toulouse School of Economics. If you're ever there, it is worth a tour. The foundations of the building date back to the 14th century.

Jeremy Siegel: The good thing is that, with such a long time series, you have a terminal price. The price was probably very depressed because the company was nationalized. The government probably paid very little for it—just a year after World War II ended—but the terminal price doesn't matter that much to the annualized real return when the period is that long.

Will Goetzmann: There was one book written about this company and published in, I think, 1954 by a French legal historian. It got maybe six citations in its whole history up until about 10 years ago. I commissioned and worked with a translator, and we translated it into English and published it with Yale University Press.[56] It's an extraordinary story, and we keep finding new things to write about it.

Jeremy Siegel: It's interesting to compare it with World War II Germany and Japan. Japan had 90% of its capital bombed out and disabled. Yet Elroy and others have gotten return data for Japan starting in 1900, and they're only a little bit lower than the world return.[57] Germany and Austria also have returns spanning the war period, through a total destruction and a rebuilding, and equities in Germany and Austria maintained a premium over every other asset in those countries.

[54]See Bansal and Yaron (2004).

[55]See van Binsbergen and Koijen (2017).

[56]See Sicard (2015).

[57]The Japanese returns had much more risk, because of the near collapse (but not total collapse!) of the Japanese market in World War II.

Separation of Investors from Their Investments in Wartime

Laurence Siegel: The problem was that you couldn't hold onto your claims, to your shares. If you were taking the last boat out of Hamburg to go to Britain or the United States, you might have carried the share certificates with you but were unlikely to get any money for them. I think a lot of investors lost everything in Germany and Austria, but the indexes didn't. The indexes came back stronger. So, there's a wedge between any individual's experience and the market's collective experience.

Will Goetzmann: All of us working in this area have had to figure out what to do about those difficult periods when the markets broke down and people were separated from their capital. It's a heroic effort to put these pieces together. We do the best we can, but we know that it's impossible to do it perfectly.

Thomas Philips: Have you seen the Dimson, Marsh, and Staunton data showing that Austria did much worse than Germany during World War II?

Laurence Siegel: Yes. What happened?

Elroy Dimson: We use all of the data from 1900s to the current time. Apart from Russia and China, there's only one country that we are unable to bridge, and that is Germany in its first hyperinflation. We can bridge it in the 1948 hyperinflation but not in the 1922–1923 hyperinflation.

We had a then-doctoral student, now a Stockholm professor, collecting the data for Austria over a long period, so we got data for Austria that way. We missed two years for Germany. There are ways around that: One is to define history with hindsight, as Global Financial Data does—if they know that there is trouble coming up, they then switch to another data source to bridge it. That leaves me very uncomfortable.

Laurence Siegel: You may want to talk to Tom Coleman, with whom I've written a paper that may turn into a book.[58] He has a lot of data for Germany during the first hyperinflation.

Elroy Dimson: It is possible. Basically 1922–1923 was difficult because nobody had any vehicles that could move around fast enough to collect the prices that were going up so many hundreds or thousands of percent at the peak. There's no inflation index that actually works; they gave up on collecting data of that period.

Laurence Siegel: In our book draft, we use exchange rates, which were published continuously. The exchange rate of the reichsmark versus the dollar is a proxy for inflation.

Elroy Dimson: That is the only solution.

Martin Leibowitz: Will, if my memory is correct, about 25 years ago, you and Steve Ross and Steve Brown published the paper called "Survival."[59] Right?

Will Goetzmann: Yes.

Martin Leibowitz: If you were writing that paper now, given what we've talked about, what would you change, if anything?

Will Goetzmann: You know I love history, so I couldn't put this company down. But could we draw conclusions about 5% going forward for the whole world? We simply can't.

That is the insight: We are prisoners of the history that survived for us to study it. It's really important for us to recognize that. When we talk about premia for things that were discovered in the past, "P-hacking" is now the term in academia for this, so the conditioning process is really crucial. Steve Ross wrote a paper that Stephen Brown and I always loved—in fact Stephen and I wrote a paper about Ross's paper.[60] The Ross working paper, called "Regression to the Max,"[61] was about the belief that during a bubble, we should see more autocorrelation in prices and that autocorrelation identifies it as a bubble. In fact, that pattern may be misleading.

What Steve said is that whenever you identify an internal maximum in a price series retrospectively, you're going to see something that looks like autocorrelation preceding the maximum. In other words, it's easy to call a bubble ex post. This is relevant today, because so many novel investments like cryptocurrency have suddenly soared in value. A standard methodology to test for a bubble relies on autocorrelation of similar metrics.[62] Ross's insight is that these tests may not work well.

So, anyway, I think the insight of conditioning biases is really useful. I wouldn't change much in the paper; there is a little bit about the equity premium and kind of a spat about how big it could get, which I might revisit if really pushed.

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[58]See Coleman, Oliver, and Siegel (2021).

[59]See Brown et al. (1995).

[60]See Brown and Goetzmann (2018).

[61]See Ross (1987).

[62]See Phillips, Shi, and Yu (2015).

Martin Leibowitz: If I'm thinking correctly, Toulouse is at one end of the Canal du Midi, and it was built in something like 1617, wasn't it?

Will Goetzmann: That sounds right.

Martin Leibowitz: It was an amazing engineering feat at that time, and I think it was very much used for commercial transport between the Atlantic and the Mediterranean coast. Could that have had any impact on the company in terms of its long survival?

Will Goetzmann: That's a good point. Another early company, a company chartered by Jean-Baptiste Colbert, built the Canal du Midi.[63] The Canal du Midi passes right near the Bazacle, so the canal must have been a way for barges to transport grain. So, yes, the canal and the mill must have been really closely connected.

Mary Ida Compton: It's amazing that the company actually got money out of their equity investors on an ongoing basis. Could you imagine that happening today—if you bought equity shares in a company and the company said, "We need more money"?

Will Goetzmann: We have a theory that the occasional negative dividends solved a Jensen and Meckling agency problem. Bazacle investors did not leave "free cash flow" in the firm for managers to exploit.[64]

Robert Arnott: You could have secondary equity offerings. We've seen several bubble companies take advantage of this year's wild valuations to issue new shares and get some cash to do whatever with.

Mary Ida Compton: Yes, but never is a public equity investor asked to fork over more money.

Robert Arnott: Welcome to the world of partnerships.

Elroy Dimson: It sounds to me like a family business in that sense.

Laurence Siegel: Or a private equity investment.

Mary Ida Compton: Yes, maybe.

Will Goetzmann: It's an interesting business because, as the company matured, we got a lot of information about who the investors were because they listed their professions in the registers. Very few of them were bankers, but a large and increasing chunk of the shares were owned by religious institutions—institutional investors. That led to frictions of various sorts, because, if a church owned, say, 30% of the equity in the company, they did not have 30% of the votes. It was not one share, one vote; it was one shareholder, one vote. So large investors didn't dominate in terms of control.

And there were transaction costs. If you wanted to sell your share, you had to have a big dinner for every shareholder. Those were expensive dinners. The church never sold their shares, so people were saying that it was unfair for the church to never have to throw dinners for everybody. There was a big discourse about that, never resolved.

Martin Leibowitz: The Church, I presume, was tax exempt.

Will Goetzmann: I think so.

Elroy Dimson: And it probably had a large holding in TIPS, in the sense that the tithing of people's income was a hedge against increasing labor costs; in effect zero exposure to people's human capital.

Will Goetzmann: That's an interesting wrinkle.

This marks the completion of the Equity Risk Premium Forum 2021: Presentations and Discussions.

[63]Jean-Baptiste Colbert (1619–1683) was (among other positions) controller-general of finances under King Louis XIV of France.

[64]See Jensen and Meckling (1976).

REVISITING THE EQUITY RISK PREMIUM

EQUITY RISK PREMIUM FORUM ROUNDTABLE DISCUSSION

PAUL MCCAFFREY, EDITOR

PART I: BUBBLES, MOMENTUM, AND WINNOWING

Editor's Introduction

> Don't gamble! Take all your savings and buy some good stock and hold it till it goes up, then sell it. If it don't go up, don't buy it.
>
> —Will Rogers

In the first part of the Equity Risk Premium Forum Roundtable Discussion, the participants conduct an in-depth and freewheeling exploration of the bubble phenomenon in finance, touching on the momentum factor and the winnowing process, or how certain emerging and frothy sectors grow more concentrated over time, separating into a small number of winners and many more losers.

Indeed, the various bubbles of the past 75 years have tended to echo one another in their development and outcome and have all taught the same lesson, as Laurence Siegel observes.

"After the automotive bubble, we had bubbles in aviation and radio; then, in the 1960s, the electronics boom; and various others later on," he says. "You can always look back and say that the bubble was justified because of one great company that is still prospering, like IBM or Boeing. But did you want to hold the index of that industry? Probably not."

Of course, then the question becomes how to distinguish the Googles from the AltaVistas, the Fords from the Studebakers, early in their development. Unfortunately, there is no easy formula.

"The basic message may be," as Martin Leibowitz observes, "you want to have that company which can, if I can use the term, compound its success."

And, of course, even the company that can compound its success can't do it forever—maybe not even for very long. "Palm Computing was briefly worth more than General Motors," Robert Arnott says. "Disruptors get disrupted."

Roundtable

Robert Arnott: Funny anecdote: My eldest son is somewhat of an entrepreneur, and he came to me in late 2019 and said, "Dad, I've got a quarter million I want to invest. Where should I invest it?" I answered, "You're in tech, so don't invest it in tech. You'll want to diversify. Your revenues all come from the United States, so you want international diversification; invest outside the United States. I'd recommend emerging markets value, but more broadly I'd recommend diversification."

He then said, "What do you think of Tesla and Bitcoin?"

I replied, "They're very speculative; they're very frothy. If you want to go for it, go for it, but don't put any money into those that you can't afford to lose."

So, three months later he came to me and said, "Dad, I put the money half in Bitcoin and half in Tesla." At the end of 2020 he sent me his account statement, and it showed +382% for the year. He asked, "Dad, how'd you do?" I said, "I'm pretty happy with my 12%."

It's awfully interesting to see that what we regard as "bubbles" can go much, much further and last much longer than most people realize. My favorite example is the Zimbabwe stock market during the hyperinflation in the first six weeks of summer 2008. Suppose you saw this hyperinflation in Zimbabwe and said, "Get me out of here. In fact, I'm going to take a short position. I'm going to short Zimbabwean stocks, and I'll do it on a safe, small part of my portfolio—2% of the total."

The Zimbabwe stock market, in local currency terms, then rose 500-fold in six weeks as the currency tumbled 10-fold. So, in dollar terms, it went up 50-fold, meaning that you just got wiped out. A 2% short position became a 100% short position. Eight weeks later, the currency had fallen another 100-fold and the market basically dropped to zero and stopped trading. So, you would have been right, but you would be bankrupt. These bubbles are very, very interesting. It is very dangerous to bet against them except in modest ways.

Momentum Investing, Pro and Con

Martin Leibowitz: In the short-term factor studies that people have done, one of the factors that keeps cropping up—with the heaviest weights—is momentum. This is very curious: Why should momentum have that kind of emphasis in these types of analysis? If the market is efficient, would you really expect that momentum would be such a powerful force? I think there's an explanation for it, but it certainly raises eyebrows.

Robert Arnott: We published a paper entitled, "Can Momentum Investing Be Saved?"[1] This was a deliberately ironic title, because how can something that works possibly need saving? Well, it works in the sense that, if you buy stocks that have gone up historically, they keep

[1]See Arnott, Kalesnik, Kose, and Wu (2017).

going up—but the effect has a very short half-life, three months or less. The stocks stop going up after about six or eight months on average, and then they give it all back and then some, which means that you'd better have a sell discipline or you're in trouble.

That's why momentum and value aren't at odds with one another. Value says to buy antimomentum stocks. Momentum says to buy momentum stocks (obviously). The former is right in the long term, and the latter is right on a very short-term basis. (Cliff Asness is far more expert on momentum trading than I am, so maybe he'll comment.) One last observation would be that standard momentum, wherein you build the portfolio using the last 12 months' return other than the last 1 month, has not added value since 1999. So, you got 22 years of slightly negative returns, overwhelmingly driven by the momentum crash in 2009.

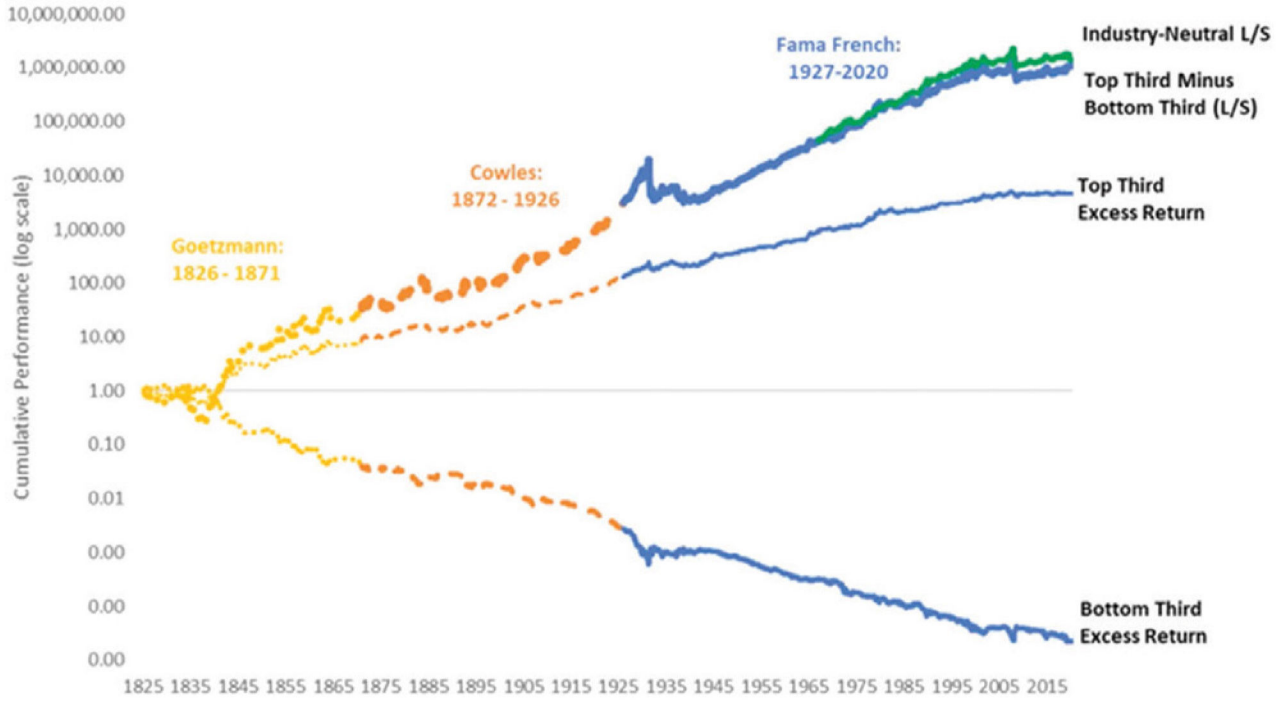
Laurence Siegel: I think Cliff would admit or confirm that momentum can't really work indefinitely.

Cliff Asness: These are all facts. We knew before the 2009 reversal, the momentum crash, that it has a bad left tail. Like anything that is asymmetric or option-like, that risk is present. Option replication is essentially a momentum strategy, so there's something to the analogy between momentum (in stocks) and the return pattern of options.

How many of those left-tail events occur is the variable that drives everything. If you see one 2009-style momentum reversal every 100 years—and, at that magnitude, that's about what we've seen—momentum is fine. Every once in a while, it gets killed, but it's fine. If you see *three* in the next 100 years, it could wipe out the premium. So, momentum investing is a bet that the next 100 years will look like the last 100. See **Exhibit 67**.

Momentum works a lot better in combination with a value strategy that not only uses value as a metric but that also updates the prices fairly frequently—at least at the same frequency as momentum so that they're highly negatively correlated. I wrote some material on the momentum crash in 2009 in which I showed that if you combined momentum with value, this was actually not a very tough period for our firm (AQR). It wasn't a great period, but it wasn't all that bad because value did so well. So, it's a classic case of evaluating something in isolation versus in a portfolio. If I were to trade only momentum, I would be somewhat terrified. Not everything we do has a Sharpe ratio that lets us sleep well every night.

Exhibit 67. Monthly Returns on Momentum (top third of stocks by trailing return) vs. Antimomentum (bottom third) Strategies, 1825–2020



Notes: Trailing return: previous 12 months except for previous one month. L/S denotes long–short portfolios of top third minus bottom third, with and without adjustment to make portfolios industry neutral. Momentum uses the last-year return with a skip month.

Source: Mikhail Samanov, Two Centuries Investments, using data from Goetzmann, Cowles, and Fama–French studies. Industry-neutral return series since 1968 from AQR.

But momentum alone? The left tail has been too bad. You can make money for a long, long time like some people are now, and—no one believes it now—they can lose it really, really fast. Momentum is part of a process that's also looking for cheap and, in a different vein, high-quality stocks. We think the long-term evidence is still very strong about that overall process, but momentum alone is and should be terrifying.

Laurence Siegel: I've tried to describe momentum as: You look at what stocks have gone up and you buy them because you're betting that other people are looking at the same data and they're also going to buy them. Obviously, there has to be a point where that game is over.

Cliff Asness: There really doesn't have to be, Larry. One of the themes of this talk is that people can keep doing stupid things way longer than we ever thought they could.

There are two main explanations for momentum, and they're amusingly opposite. One is your version, which is essentially overreaction: You're buying something because it has gone up. You are using no fundamental knowledge whatsoever.

The other is underreaction. Yes, you can laugh at finance when it has two competing theories that start with the opposite word. Underreaction is very simple: Fundamentals move, and so do prices, but prices don't move enough. You would expect this latter effect from the anchoring phenomenon in behavioral finance.

My personal view: It's very hard to disentangle these explanations because I think both are true and one or the other dominates at different points in time. On this panel, it's controversial to say this, but I think this is a very bubble-ish time. The overreaction version of momentum is dominating. In more normal times, with more typical value spreads and nothing too crazy, momentum makes a lot of its money because people don't react enough, particularly when changes in fundamentals are revealed.

Momentum even changes your philosophical view of markets, because overreaction is a disequilibrium strategy. And, to the extent any of us care about whether we're helping the world, if momentum is overreaction, then momentum investing is hurting the world. It is moving prices farther away from fair value than they already are. On the other hand, if momentum is underreaction, then momentum investing is fixing an inefficiency caused by people not reacting early enough; it moves prices toward fair value, toward equilibrium.

One of my holy grails is to disentangle this question: When is one effect driving momentum, and when is the other? And I would like it to be of practical use, which we all know is not always the same as disentangling it successfully.

Roger Ibbotson: Some people have tried to explain momentum as if it were consistent with efficient markets, although I think that's a stretch. But it's overreaction or underreaction. The market cannot be completely efficient if you can make money with momentum trading.

Cliff Asness: I've heard all the efficient-market explanations for momentum. I'm fine with it either way. As I've said many times, I don't care if our premiums are risk premiums or behavioral premiums. I've just never bought the efficient-market explanations.

Laurence Siegel: What are these explanations?

Cliff Asness: There are a few. One of them is really bad and is still brought up. It's that momentum is an estimate of the expected return. Eleven or 12 months of returns *are* the return people expect. So, of course, on average it should predict. I studied this as part of my dissertation. I showed both analytically and through simulations that it does predict, but you get a 0.2 t-statistic over 100 years.

Estimates of the expected return based on one year of historical data are incredibly noisy. Then you have to ask why you are using one instead of five years, because five-year returns have a reversal aspect to them and should lead to a better estimate. Other explanations are a little bit more philosophical—they use real option theory to say that the Nasdaq was fairly priced at 5000 in the year 2000. Perhaps there were states of the world where the Nasdaq was really worth 25,000! This explanation says that momentum wasn't irrational; it just didn't pay off because the stocks turned out not to be worth those prices. But there was a chance. I'll never say the chance was zero, because we're all statisticians on this forum, and we'd all recoil from giving 0% or 100% odds to anything; we don't issue guarantees. But I come fairly close to guaranteeing that the tech bubble was net irrational. It got Amazon right.

Back to Bubbles

Laurence Siegel: The tech bubble has been like every other bubble. It's rational to expect one company to win and all the others to go away; we just don't know which company the winner will be. We had at least 1,900 automobile companies (not all at the same time) in the early part of the 20th century. Now, we have two and a half in the United States.

Cliff Asness: Two and a half?

Laurence Siegel: I can't decide if Chrysler is a domestic or a foreign company.

After the automotive bubble, we had bubbles in aviation and radio; then, in the 1960s, the electronics boom; and various others later on. You can always look back and say that the bubble was justified because of one great company that is still prospering, like IBM or Boeing. But did you want to hold the index of that industry? Probably not.

Robert Arnott: A few years back, we tried to come up with a definition of the term "bubble" that could actually be used in real time. Cliff, having written "Bubble Logic,"[2] would probably be very sympathetic to this effort. What we came up with is this: If you're using a valuation model, such as a discounted cash flow (DCF) model, you'd have to make implausible assumptions—not impossible assumptions, but implausible ones—to justify current prices. And, as a cross-check on that first part of the definition, the marginal buyer has zero interest in valuation models.

To apply this method to Apple, you'd have to use aggressive assumptions but not implausible ones. So, it's not a bubble. To apply it to Tesla—I debated Cathie Wood about three weeks ago at the Morningstar conference, and I asked what her sell discipline was, and she said "We have a target price of $3,000. You get there, if you assume 89% growth over the next five years and valuation *pari passu* with today's FAANG stocks at the end of the five years." And I had to grant that her analysis was mathematically correct.

What I didn't say, because I had been told by my host to play nice, was—gosh—89% compounded for five years is 25-fold growth. Do you really think that Tesla will be 25 times its current size in five years? Amazon grew to 14 times the size it was 10 years ago, and that company is a stupendous growth story.

So, you can use techniques in real time to gauge a bubble. Where it gets really squishy is that you can't use it to value Bitcoin. But you couldn't use it to value the US dollar either.

Old Bubbles

Will Goetzmann: So, Rob, I'm going to show you **Exhibit 68**.

This is a book, or pamphlet, published by Archibald Hutcheson in 1720 during the South Sea Bubble. Your strategy is exactly the strategy he took. He said, "What assumptions do you have to make about the South Sea Company's profits in order to justify the price levels of that company's stock?" I think you just followed the footsteps of somebody who called that particular bubble before it burst.

Robert Arnott: That's pretty good.

Roger Ibbotson: In the Louisiana Purchase, they actually did achieve the profits needed to justify the bubble price of the Mississippi Company. It's just that shares in the company didn't provide the ownership rights to them.

Robert Arnott: The implausible part of the definition leaves room for the exception that proves the rule. Amazon wasn't bubbling to new highs in 2000. It was cratering after 1999, but it was trading at crazy multiples even so. If you asked, in 2000, what assumptions would justify the then-current price, you would have said that those assumptions aren't plausible. Well, guess what? They exceeded it. They're the only one.

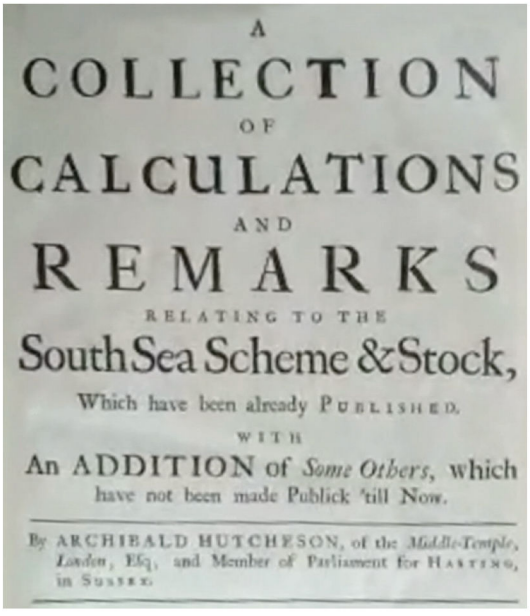
Cliff Asness: To be interesting, any of these conversations has to be about a portfolio. There may be individual stocks that I would say are ridiculous, but you can never feel nearly as strongly about one stock as about a portfolio. One company could invent the cure for male pattern baldness or figure out how not to fog up your glasses when you're wearing a COVID mask. These are two of the most lucrative possible inventions. The exception, clearly, should not drive the rule.

Robert Arnott: Correct.

Winnowing—How Industries with Many Companies Become Concentrated over Time

Laurence Siegel: What I was saying about the electronics bubble, the airline bubble, and all the others is that you don't want an index of those companies—you want the winner. You had no idea who that was going to be until after the battle is over.

Exhibit 68. Title Page of 1720 Pamphlet about the South Sea Bubble


A
COLLECTION
OF
CALCULATIONS
AND
REMARKS
RELATING TO THE
South Sea Scheme & Stock,
Which have been already PUBLISHED.
WITH
An ADDITION of *Some Others*, which
have not been made Publick 'till Now.
By ARCHIBALD HUTCHESON, of the *Middle-Temple*, *London*, Esq; and Member of Parliament for HASTING, in SUSSEX.

Source: William Goetzmann.

[2]See Asness (2000).

Cliff Asness: Yes.

Elroy Dimson: At the end of the 19th century, there was a very large number of automobile companies. How do you know which automobile company is going to survive?

Robert Arnott: You don't.

Elroy Dimson: The canal companies had a hot issue period. But people didn't realize that within 30 years there would be railways all over the country.

Robert Arnott: And the rail companies in the 1840s—same thing.

Martin Leibowitz: There were 5,000 different models of automobiles in the early part of the 20th century.

Robert Arnott: Just try getting spare parts for them these days. [Rob Arnott is an antique car collector. *Ed.*]

Martin Leibowitz: Exactly. Does a company—one that survives and prospers and has the ability to sell stock and the ability to dominate the market—does that produce a certain kind of momentum that is real and carries forward up to a certain point? I would think so.

Elroy Dimson: That's a question for strategy professors.

Robert Arnott: That holds true until the disruptor gets disrupted. Palm Computing was briefly worth more than General Motors. It was also briefly worth more than the company that spawned it, 3Com. And its product, Palm Pilot, was ubiquitous. Two years later, the BlackBerry crowded it out, and six years after that, the iPhone was invented. Disruptors get disrupted. How many web search firms were disrupted sequentially, one after another, after another?

Cliff Asness: I'm still using AltaVista.

Laurence Siegel: You've always been a little different, Cliff.

Jeremy Siegel: If you continuously rebalance, portfolios of a few big winners and lots of losers tend to go toward zero. But if you buy 10 stocks, equally weighted, and you hold the shares and never rebalance, all you need is one winner.

Cliff Asness: But, Jeremy, that means that three years later you're willing to own a very concentrated portfolio and ride it for a very long time. You have to be plausible in framing the experiment. Who's really going to own that portfolio in a few years?

Jeremy Siegel: But that is what a lot of people do.

Cliff Asness: And the people who do that are *ex ante* idiots. *Ex post*, we laud *some* of them.

Robert Arnott: Jeremy, you won't necessarily be ahead. In 2000, Cisco was the largest market-cap company on the planet for about a nanosecond. Since then, its sales have grown 12% per year for 21 years; its profits have grown 13% per year for 21 years. That's stupendous growth, yet its share price is below the year 2000 peak by a goodly margin.

So just figuring out which company is going to be the survivor and winner doesn't always help. It depends on what you pay. Of the top 10 market-cap tech names in the year 2000, 10 (all of them) underperformed over the next decade. Even though the overall market is up hugely since 2000, 9 of the 10 top-cap tech stocks declined on average over the next two decades. The one winner was Microsoft, and it beat the S&P by only about 1.5% to 2% per annum over the last 21 years.

Martin Leibowitz: So, the basic message may be that you want to have that company that can, if I can use the term, compound its success.

Laurence Siegel: Yes.

Robert Arnott: Or, as Will Rogers famously said, "Investing is simple. You just buy what's going up."

Martin Leibowitz: "If it don't go up, don't buy it" is the exact quote.

PART II: RISK PREMIUM OR FEAR PREMIUM?

Editor's Introduction

> Suppose a Roman centurion had invested one drachma at 4% and this compounded in a totally safe way over the years.
>
> —Sidney Homer

Yes, suppose he did. How much would the centurion's descendants have today?

We don't have the exact answer, but decades later, Rob Arnott ran a similar calculation. "In a footnote, I hypothesized one ounce of gold, which at the time was $350 an ounce," he says. "So, 1/350th of an ounce of gold back at the birth of Christ growing at 5% [would have resulted in] a sphere of gold as large as the earth's orbit around the sun."

One could say that Arnott's result shows the incredible power of compound interest, but that would be wrong. What it really shows is the absurdity of compounding up any growth rate for very long periods of time.

We thus must be careful about extrapolating too far into the future from an estimate of the equity risk premium, or of the riskless interest rate unless that number is zero, or about any other growth rate. With that as a caveat, let's return to our task of estimating the equity risk premium for the next 10 years.

What explains most stock returns? And, is a "risk premium" an accurate description of what equities provide? In the second installment of the Equity Risk Premium Forum Roundtable Discussion, panelists address these questions and consider the components that make up the equity risk premium as well as why the phenomenon is so large.

They start by noting that only a few stocks account for most of the returns of an equity index. Indeed, according to a study by Hendrik Bessembinder, a paltry 4% of the stocks in the market outperformed Treasuries over his study period. So just a handful of companies are responsible for the equity premium.

But is that premium really a risk premium? "For at least 20 years I've been an advocate of the notion that we shouldn't call it a risk premium," Rob Arnott says. "We should call it a fear premium."

"I've used the word 'popularity,' which includes all kinds of premiums, whether they are risk or non-risk," Roger Ibbotson says. "And I think that risk has become too dominant in the discussion of asset pricing because the key idea is *preferences*."

In terms of what makes up the premium, Rajnish Mehra wonders, "How much of it is a *risk* premium and how much of it is due to other factors?"

Mehra concludes that about 1.5% of a 6% premium comes down to risk. The rest is the result of other factors.

Roundtable

Do Most Stocks Underperform the Market?

Roger Ibbotson: Hendrik Bessembinder has a paper that says most of the return comes from just a few companies.[3]

Robert Arnott: Oh, that is so true.

Antti Ilmanen: And potentially so misleading. That study should be a paean to diversification, not for concentrated stock picking. It is often read the other way.

Laurence Siegel: What Bessembinder said is that only 4% of the shares in the market outperformed Treasury bills. But because you don't know in advance *which* 4% are going to generate all the return, you have to diversify. If someone misinterprets his paper as saying you should concentrate, they really don't understand the paper.

Cliff Asness: I've skimmed the paper, and I think he looks at compound returns. You would expect most companies to underperform the average when measured by compound returns, because companies leave the sample when they die or have near-death experiences, driving the compound return down, potentially toward zero.

I'm not denying for a second that the distribution of long-period returns is going to be asymmetric and that a few winners drive a lot of the market's overall return. I suspect he is painting too negative a case. If we had a large number of equally good stocks, their average geometric return (which I think is what he looks at) would be considerably lower than the return on the portfolio. And you'd say that most of these stocks underperformed the market when that really wouldn't be true.

Roger Ibbotson: I think that if you measure each company as though that's all you held, you'd get that geometric

[3]See Bessembinder (2018).

return. And most of them would underperform. So, I think it's appropriate to measure the geometric return.

Cliff Asness: I'm not denying that, Roger. And I'm not saying it's not a good point. But it is a less surprising point than it is often painted as.

The Weird Behavior of a Geometric-Mean Stock Index Futures Contract

Jeremy Siegel: The Value Line index, traded on the Kansas City Board of Trade, was a geometric-mean index, and it was the first stock futures index. It preceded the S&P 500. The futures contract sold at a premium until a great economist that we all know, Fischer Black, determined that geometric indexes will always underperform. He worked at Goldman Sachs, and he had them take huge multibillion dollar positions against the premium in the Value Line contract. He made a lot of money for the firm because the premium finally disappeared, and it traded at the discount that he talked about. Eventually they just delisted the entire index.

Elroy Dimson: There's a neat little article that Jay Ritter wrote about that.

Jeremy Siegel: Yes, I was at Wharton with Jay. I was the one pulling the January effect off the Kansas City Value Line contract.

Laurence Siegel: I never thought that the market could possibly be deep enough for a firm the size of Goldman Sachs to make real money off of the Value Line geometric-mean effect.

Jeremy Siegel: I'm not saying how much money. Fischer made some off of Jay Ritter. He made some off of me, although I started disentangling myself from that pretty early, because I realized that someone knew something on the other side of the trade. But I don't know the magnitude for Goldman Sachs back then.

Fischer was the one who taught everybody. He figured it out. This should be at a discount. It should never be at a premium. For three years, it was at a premium, and it was the only stock index that was trading.

Roger Ibbotson: When Fischer Black was working at Goldman Sachs, he'd come up with an idea once a year, or something like that. Some of the other people there were wondering what was going on with him—this guy hardly works. But when he had an idea, it was always a really impactful one. He wasn't your typical investment banker.

Several speakers at once: No!!!

Jeremy Siegel: I wrote a paper called "The Nifty-Fifty Revisited,"[4] where 20 years later I said that if you had bought the Nifty 50 on an equally weighted basis at the peak of the mania back in 1972, you actually did as well as the S&P, but you became concentrated again. Interestingly, again, a few winners compensated for most of the stocks being losers—but everyone depicts that period as "crazy prices." But, depending on how you played it, you did as well in those crazily priced stocks as in the S&P 500. You just didn't have as much diversification. It's the same phenomenon we were talking about with Cliff earlier.

Roger Ibbotson: What we have been discussing also related to the increasing concentration of wealth. As entrepreneurs, you are putting all your bets on your particular enterprise, and most of them fail. The few winners stand out, but that is not the typical entrepreneur's experience.

Robert Arnott: That's the best argument for a very low capital gains tax, because if you are taxed on your winnings and get no rebate on your losings, you sharply diminish the incentives for risk-bearing.

Martin Leibowitz: Rob, if you look at personal portfolios, not of the ultrarich but of more typical well-to-do investors, you'll find that, after the kind of run-ups that we've had, people have held onto their stocks. They have an aversion to paying capital gains taxes, so their portfolios have become extraordinarily concentrated. One can only wonder whether society wants to encourage that kind of risk-taking.

Are Stocks Used to Smooth Personal Consumption?

Rajnish Mehra: Larry had asked me to comment on the macro models from which an equity premium can be derived. I wanted to bring up one point here, which is that as wealth concentration increases, stocks are not being used to smooth consumption over time. People are holding on to their stocks, passing them from generation to generation.

If stocks are not used to smooth consumption, then the valuation of stocks has very little to do with the real economy. The macro models are only valid if you have some substitution over time. I have a paper showing that if you don't have any substitution of current for future consumption but the stocks instead go into bequests, the value of the market is going to be detached from the underlying economy.[5] Any thoughts on that?

Laurence Siegel: I think that, on the margin, stocks are being used to smooth consumption within one person's lifetime. The average person who owns stocks has several

[4]See Siegel (1995).

[5]See Constantinides, Donaldson, and Mehra (2007).

hundred thousand dollars in capital. They're going to retire on that as best they can, with the added benefit of Social Security. They do not have any other way to smooth consumption other than to follow the classic lifecycle model.

If you only look at ultra-high-net-worth people, they are different—but there are not many of them.

Rajnish Mehra: But more and more are not using stocks to smooth consumption. There used to be a time when people were using it.

Jeremy Siegel: It's always been that way. Franco Modigliani pioneered the lifecycle hypothesis after Friedman's permanent consumption model. That is how people behaved. But, then as now, there were people for whom stocks were just a means to build wealth and pass it on.

Today, something like 50% of the population owns some stocks directly or through their pension funds. That number used to be 10% or 15%, and they skewed richer than they do now. So, I would actually say that more people are using stocks for consumption smoothing in retirement than they used to.

Laurence Siegel: Jeremy's right. We used to be a defined benefit pension plan world, where middle- to upper-middle-class people—the only people that count on the margin in this exercise—had their consumption smoothed for them by corporations, unions, and governments. Now you have to do it yourself. You're going to sell stocks when you get low on money, now more than ever. The fact that a few people have so much money that they'll never need to sell stocks isn't really relevant.

Mary Ida Compton: Also, we're all living longer.

Laurence Siegel: Wait until you're 90! You'll sell stocks to provide for your consumption.

Robert Arnott: Demography is a very big factor in lifecycle consumption smoothing. We have an enormous roster of baby boomers, right here on this forum, who are looking to convert assets accumulated during a working lifetime into goods and services late in life. And there is a proportionally smaller roster of prospective buyers than in past generations.

Laurence Siegel: Millennials are a larger generation than we are, and eventually they'll be rich enough to buy our stocks. But it may be a long wait.

Robert Arnott: And it's proportional relative to the past.

Martin Leibowitz: Rob, I think this question also connects with your graph on demographics. If I'm thinking correctly, you were trying to assess the productivity of the society when you look at the demographic profiles.

Arnott: In fact, if you look at Japan, you find that Japan's per-working-age adult GDP has, in the last 25 years, grown roughly *pari passu* with Europe's per-working-age adult GDP, which has grown roughly *pari passu* with the United States. The difference in growth rates is entirely a function of the demographics.

A Deranged Market Hypothesis?

To interject something that will sound like it's out of left field but has a very direct bearing on the risk premium dialogue—for at least 20 years, I've been an advocate of the notion that we shouldn't call it a risk premium. We should call it a fear premium. Many of you may remember David Hirshleifer's famous thought experiment in 1999, in which he said (paraphrasing): Suppose a school in Chicago had come up with the Deficient (or Deranged) Market Hypothesis and Bill Blunt (i.e., not Bill Sharpe) at Stanford had come up with DAPM, the Disorderly Asset Pricing Model, they would be declared to be the most validated and proved set of hypotheses in the social sciences.[6]

He was joking, but he meant that if your starting point was market inefficiency, you could find ample proof of that, just as many efficient-market types say it's well documented that the market is efficient. If it had been called a fear premium from the beginning, the value effect would be expected—not as a risk factor, but because buying loathed and feared companies is scary. The size effect would be expected but relatively weak, because buying small companies that are not widely understood engenders a little more fear than buying well-established companies.

Roger's liquidity factor would be expected. Long-horizon mean reversion would be expected. Even momentum would be expected, based on fear of missing out. If we thought of the equity premium as a fear premium—if we had the luxury of going back 60 years and labeling it a fear premium—a lot of the so-called anomalies that we've talked about would not be anomalies at all. They would be totally reasonable and expected.

Roger Ibbotson: I think that the fear premium is an interesting concept, and I'll give it some thought. I've used the word "popularity," which includes all kinds of premiums, whether they are risk or non-risk. And I think that risk has become too dominant in the discussion of asset pricing because the key idea is *preferences*.

We started out with the Capital Asset Pricing Model, where you only are afraid of one thing, one kind of risk. Ultimately, we generalize it to include many dimensions of risk, but we

[6]See Hirshleifer (2001).

want to generalize it even further, to non-risk characteristics. For example, I don't think of liquidity (actually the lack of it) as a risk, even though the literature talks about liquidity risk. You can conceive of a liquidity factor, but that factor does not make liquidity a measure of risk. Illiquidity may be a source of fear. However, there are a lot of preferences that go beyond fear.

But I agree with you, Rob, that fear encapsulates a broader notion than risk as we measure it. It's an interesting concept, but it might not be general enough.

The Equity Premium "Puzzle" Literature: Why is the ERP So Big?

Jeremy Siegel: I'd like to address Raj's original article,[7] which asks, "Why is the equity risk premium so big?" Everyone has twisted and turned, used the Von Neumann–Morgenstern utility function, and done various other things to get an answer. Does anyone here have an explanation with which they feel satisfied for why the equity risk premium is so large and persistent and universal?

Rajnish Mehra: I've tried to give some answers. I think the borrowing constraint stuff that I did with George Constantinides and John Donaldson is one answer.[8] If younger people can't borrow to buy enough equities to hedge their future income uncertainty, and older workers have mostly resolved their income uncertainty, then (as we wrote),

> fluctuations in [the] consumption [of older workers] occur from fluctuations in equity income. At this stage of the life cycle, equity income is highly correlated with consumption. Consumption is high when equity income is high, and equity is no longer a hedge against fluctuations in consumption; hence, for this group, it requires a higher rate of return.[9]

And this middle-aged group is the dominant, price-setting group in the equity market. So this market segmentation story is, I think, a reasonable explanation for equity prices that are low enough to provide, on average, a high rate of return.

Why High Equity Returns Have Not Made Everyone Rich

Laurence Siegel: Some decades back, I wrote that the equity market is much riskier than it looks from the Ibbotson chart because nobody gets those returns. The evidence that nobody gets those returns is that we're not all rich. (See my introductory article in this book, "Why Aren't We All Rich?") From time to time, almost everyone has cash flow needs, emergencies, times when you need to withdraw from the market or at least can't contribute to it. As Jeremy has said, you spend the "income," but income is a legal concept denoting whatever is subject to the income tax. More likely you spend your market "profits" in whatever way your mental accounting defines "profit." So, the vagaries of human life make it impossible to realize a 5%, 6%, 7% equity premium.

Martin Leibowitz: On that score, I'm reminded of an event that took place when Sidney Homer and I were writing *Inside the Yield Book*.[10] It goes back to the 1960s and early 1970s. After we had written the book, Sidney asked me a question. He said, "Suppose a Roman centurion had invested one drachma at 4%, and this compounded in a totally safe way over the years." He asked me to calculate what that total amount would be today.

This turned out to be a very difficult problem because standard calculators couldn't do the math. Even using a computer didn't work. I had to use logarithms, and when I got the answer, it turned out to be far more than the total wealth of the world at that point in time.

Laurence Siegel: I'm calculating it while you speak…

Martin Leibowitz: The next question was an even better question. Sidney asked, "What happened to it all?"

Laurence Siegel: Where did all the money go? Of course, I would say that all that wealth was never created in the first place. The idea of investing a drachma at 4% for 2,000 years is a thought experiment that has never been put into practice—and won't be.

Jeremy Siegel: People consumed the dividend. The growth-of-a-dollar, or drachma, calculation assumes that we invest the dividend.

Laurence Siegel: Consumption!

Jeremy Siegel: You consume the dividend.

Martin Leibowitz: Consumption, wars, pandemics.

Jeremy Siegel: No. Just consume the dividend. You don't need any of that other stuff.

Laurence Siegel: It's 2.6×10^{34} drachmas.

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[7]See Mehra and Prescott (1985).

[8]See Constantinides, Donaldson, and Mehra (2002).

[9]See Constantinides et al. (2002, p. 271).

[10]See Homer and Leibowitz (2004).

Robert Arnott: I did that as a thought exercise in one of my *Journal of Portfolio Management* papers.[11] In a footnote, I hypothesized one ounce of gold, which at the time was $350 an ounce. So, 1/350th of an ounce of gold back at the birth of Christ growing at 5% and the outcome was a sphere of gold as large as the earth's orbit around the sun.

Laurence Siegel: And if you add a few more millennia and go back to the days of the Pyramids, the sphere of gold might be larger than the universe.

Elroy Dimson: If you look at Victor Haghani's website, you see where he asks, "Where are the billionaires?" He used the long-term data that we've been discussing to work out how many billionaires there ought to be if it weren't for all those who are siphoning it all off.

And of course, there would be many more billionaires than there actually are.

Laurence Siegel: What website is this, please?

Rajnish Mehra: Elm Partners.

Elroy Dimson: Victor Haghani was one of the LTCM partners, who started up another firm to look after the modest amount of wealth that he still had.

Elroy Dimson: He's done that in a TEDx Talk as well.[12] It's very amusing. But the problem is that what he was modeling was somebody who never spends any of it. If people behaved like that, there would be loads and loads of billionaires, but they would be worse off than somebody who doesn't have any money at all. They both end up having spent nothing, but the Victor Haghani clients would have spent their time also worrying about how things are going.

Laurence Siegel: The billionaires wouldn't really be worse off because they would have a nonexpiring option to stop being misers and live a little, but the point you've made is indeed very funny.

Back to Asking Why the Equity Premium Is So Large

Jeremy Siegel: Larry, I want to go back to your point that the market is actually riskier than we perceive. Raj's original model is a model of consumption maximization under uncertainty, with risk and all the rest, and it can't derive the premium. There are some variations of his model where you have a minimum amount of consumption, and so on. But the standard models that have been derived to try to explain the equity risk premium have already taken into account your point about the market being riskier than what we see.

Martin Leibowitz: What's the problem with just looking at the issue of moving from a riskless asset into a risky asset and asking the question: What level of premium does it take to achieve a sufficiently satisfactory level of success—of beating that base level over a typical relevant investment period like 5 years or 10 years?

Roger Ibbotson: It's not too high.

Martin Leibowitz: When you do that, you get numbers of 4% to 6%, which is in the range of the numbers we've been talking about. So that is not unreasonable in terms of how people would think about making the move from riskless too risky.

Rajnish Mehra: So, Marty, let me set the stage a little bit. What's happening is that we're observing a premium, 6.5%. That's an observation. Now, you try to come up with a model that is consistent with other observations in insurance literature, other macro models, other possible estimates of risk aversion, and so forth. That model, which is consistent with other observations and with macro, generates a risk premium of only about 1% or 1.5%.

The question is, why such a big difference between the observation and the model answer? There's no dispute about the size of the realized premium. But how much of it is a *risk* premium and how much of it is due to other factors? That is something that I wanted to bring up today in a serious way. How much of this 6.5% is a premium for bearing risk itself?

Once the existence of a premium is known—once it is in the information set—it must persist if it is a genuine risk premium, because the risk continues to be there. If it's a factor premium, it does not have to persist. All factors come into and go out of fashion. People will say, "value is working." So, at that stage, there may be a value premium; or "size is working," or "momentum is working," or "accruals are working." So, I wouldn't say that those are risk premiums; those are factor premiums.

The question is: Is this premium that we observe for equities a risk premium? We have several theories that address the question, and some of them would say that not all of the 6% is a risk premium. They say part of it is a risk premium and the rest is a premium for other things.

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[11]See Arnott and Bernstein (1997).

[12]Victor Haghani's TEDx Talk "Where Are All the Billionaires? Why Should We Care?" is available at www.youtube.com/watch?v=1yJWABvUXiU. It is also accessible from the website of Haghani's firm, Elm Partners: https://elmwealth.com.

PART III: BEARS AND HAWKS, EQUITIES AND INFLATION

Editor's Introduction

> The problem with timing ... is that there just aren't enough data points to prove anybody can do it. So why bother? You're just shooting yourself in the foot.
>
> —Mary Ida Compton

When the Equity Risk Premium Forum was held in October 2021, inflation had only just begun to spike and was far from reaching its recent highs. Nevertheless, the participants expected it to increase further thanks to all the expansive monetary policy. In the third part of the Roundtable Discussion, they delve into the inflation outlook as well as the shortcomings of the Shiller cyclically adjusted price earnings (CAPE) ratio and the prospects of a low-return environment in the years ahead, among other topics.

CAPE's principal weakness is as a timing mechanism, according to the panelists. "The more times you respond to a CAPE signal in a given period," Elroy Dimson explains, "the lower your long-term return is going to be."

Of course, that doesn't mean the CAPE isn't useful, even essential, it's just a question of applying it in the proper contexts. As Cliff Asness remarks, "When you are forecasting poor 10-year returns, even if you don't explicitly say to underweight equities, sometimes that's what it sounds like. But we should remember that CAPE is not that good for that. The forecast is, nevertheless, important."

As for the outlook for equities over the next decade, the panelists were decidedly bearish.

Jeremy Siegel posed the question, "How many here think the next 10-year equity returns are going to be below the long-run average?"

All agreed.

They weren't optimistic about inflation, either.

"The Fed balance sheet has exploded to record levels," Roger Ibbotson notes. "Where is that money going to go?"

Much of it went into real estate and the stock market. But goods and services weren't immune. And don't bet on that changing any time soon, at least according to Jeremy Siegel.

"I think we're going to have 20% inflation in the next two or three years," he says. "Not each year, but cumulatively."

Roundtable

Does Equity Risk Decline with Longer Investor Time Horizons?

Martin Leibowitz: We've been talking about "the" risk premium. Will Goetzmann pointed out, though, that over the course of time, the risk premium has declined, depending on whether you invest for 40 years or 400. The idea of the risk premium as being a term structure is very important. Because what premium you would demand if you're investing for 1 year will be different from when you're investing for 5 years or, say, 100 years. We would expect that to be a declining curve. That's very important, because the investors can choose their time horizon, just as they can in bonds. Over a long time horizon, the risk that is relevant for them may be much less.

Rajnish Mehra: No, Marty, that is not correct. You're assuming mean reversion. If you have an IID (independent and identically distributed) process, then horizon shouldn't matter. The result that Will got is precisely because there is a mean-reverting component in the dividend structure. If you have mean reversion, Marty, you are 100% correct. Risky assets will look less risky over time. But if the returns are IID draws, then the time horizon wouldn't make a difference.

Jeremy Siegel: That is true, but I'm making one correction. You have to have a degree of risk aversion over 1 for that. You need two conditions for getting a higher equity allocation for longer periods: mean reversion and risk aversion greater than 1.

Robert Arnott: Mean reversion has been a lively topic today. It is weak on a short-term basis, which is one reason the CAPE is such a lousy predictor of 1-year returns. But, on longer horizons, it's pretty good. Jeremy, you've written about this, where 30-year S&P volatility, when annualized, is distinctly lower than the volatility of 1-year returns. This comes from the fact that there is mean reversion over long horizons. For example, 10-year real returns for US stocks have a –38% serial correlation with subsequent 10-year earnings; and 10-year real earnings growth has a –57% correlation with subsequent 10-year earnings growth. That means there is mean reversion. But it acts over a long enough horizon that most people think that returns are IID.

Will Goetzmann: I spent the first 10 years of my early research career on the weakness of the mean reversion evidence. But then the 2013 Nobel Prize award cited

Bob Shiller's work demonstrating the predictability of stock returns. The evidence is always a bit marginal, and it depends on your assumptions and on where you get the data. And, as Goyal and Welch have shown, sometimes it sort of falls in the statistically significant zone, and sometimes it kind of falls out of it.[13] It depends on when you're doing your measurement. So, it's a bit of a chimera to say that we know for sure. I'm not entirely convinced that you would bet your wealth on this reversion process.

Antti Ilmanen: When I look at the literature, I see evidence of mean reversion over time horizons from 3 years up to 15 years. It's similar to business cycles having turned from 4-year cycles into 10-year cycles. We have many questions on structural changes. The evidence is really fuzzy, and usable or actionable evidence is almost zilch because of all this horizon uncertainty.

By the way, I wanted to comment earlier on mean reversion in a different context, not about the premium but about the riskiness of stocks being related to the time horizon. There is a counterargument by Pastor and Stambaugh that equity risk doesn't decline with horizon.[14] When you take into account parameter uncertainty—the fact that we don't know how big the equity premium is—their analysis suggests that risk in equities doesn't decline with the time horizon and, if anything, rises with it.

Visualizing Returns over Time: Trumpets and Tulips

Roger Ibbotson: Even if returns were IID, what you would get, of course, is a lognormal spreading out of wealth outcomes over time—multiplied by the square root of time. And the compounded return is *divided* by the square root of time. So, you get two entirely different shapes, depending on whether we're talking about the compound return or just your ending wealth. Over time, ending wealth spreads out in the shape of a tulip. The compound annual return, in contrast, is averaging out and looks more like a trumpet.

The tulips and trumpets apply only if returns are IID. If there's some other sort of return pattern, then the shapes will be different.

Coping with Parameter Uncertainty

Jeremy Siegel: Antti, I want to return to what you said about Stambaugh. Parameter uncertainty also applies to bond returns—you don't know what the parameters are for the real risk-free rate, either.

That doesn't mean that you'd change your stock/bond allocation even if you buy his model. He seemed to imply that it did. I pointed out that that parameter uncertainty would be true of every asset. Furthermore, even TIPS are not risk-free, as they adjust with a lag and would suffer greatly in hyperinflation. Every asset has that same extra degree of uncertainty, what's called parameter uncertainty.

Noise

I also want to mention one thing in response to what Rob said about using fear for value investing. All you need is a noisy market, where there are shocks to prices away from equilibrium, plus or minus, to have value "work." There might be more than just noise in the market, but noise is all you need. Prices just flip up and down. This has nothing to do with sentiment, overreaction, underreaction, or anything like that—just price movement unrelated to fundamentals. And that will yield a value premium, I believe. That's it. You don't need anything else.

Does CAPE Work Internationally?

Elroy Dimson: Paul Marsh and I tried the Shiller CAPE on a large number of different countries. We took all of the countries that had data from 1900 onwards. Of course, we don't have P/Es. I doubt that earnings in the United States from a century ago are comparable to earnings calculated today, but they're better than earnings figures for other countries, which we don't have at all. What we do have is dividends, and those numbers are reliable.

In the United States, we can look at the relationship between the Shiller $CAPE_{10}$ and what could be called the Shiller $CAPD_{10}$ (cyclically adjusted price/dividend ratio). D_{10} is dividends averaged over a cycle of 10 years. We extrapolate from that relationship to get a pseudo-CAPE for all the countries.

We created some trading rules to move away from equities when the Shiller pseudo-CAPE is telling you that you should be out of equities. For almost all countries, the trading strategy reduces your long-term return from that country. It reduces the return even though it sometimes tells you to get out of equities for moderately good reasons, because on balance equities give you a premium, and you missed the premium. So, the more times you respond to a CAPE signal in a given period, the lower your long-term return is going to be.

Laurence Siegel: Doesn't part of this result from building in a 10-year lookback as Bob Shiller did? That seems

[13]See Goyal and Welch (2003).

[14]See Pástor and Stambaugh (2012).

awfully long to me. The world was a very different place 10 years ago. Or did you look at different periods?

Elroy Dimson: We did it with 1, 2, 5, and 10 years. The conclusions are the same. The Shiller signal is an inaccurate signal, and the number of times that it takes you out of equities and into something else—typically cash, whatever the lower-risk alternative would be—the more costly it is to pursue the Shiller strategy. So, I'm not as convinced as most of you are that CAPE works. I think CAPE maybe works in the United States.

When we looked at different countries, it only really worked in the United Kingdom. In the United Kingdom, it took you into equities in late 1974 when share prices were very depressed, and then in the first six weeks or so of 1975, the stock market doubled. In that one instance, CAPE produced a very large benefit. But that's an anomaly—it's one observation.

What Is the Right Benchmark for Testing a Stock-Bond Switching Strategy?

Robert Arnott: Elroy, the relevant benchmark for a switching strategy would be a static mix strategy. Not equity returns, but a balanced portfolio return that matches your average equity exposure.

Elroy Dimson: No, that's using hindsight. We roll forward, and we had alternative strategies that only used either past data or contemporaneous data from other markets. If you know what is going to happen—if you know what the unchanging passive strategy would be—then Shiller wins hands down. But that's not what we looked at.

Laurence Siegel: I think he's saying your benchmark should be of comparable risk, so it should match the amount of equity exposure on average over time in your CAPE strategy up to that point, whether it's 50/50 or 60/40 or some other fixed mix.

Elroy Dimson: No, not at all, Larry. For most of the historical period, having anything close to half your money in equities would have been so crazy that nobody would have imagined doing it. You have to use data that exist at the point of measurement, and then model that going forward. You can't take a peek at what's going to happen in the next century and conclude that 60/40 is a plausible asset mix.

Laurence Siegel: Why do you think it was crazy to have half your money in equities if there was a supply of equities that would have allowed you to do that?

Elroy Dimson: Because the aggregate value wasn't there. I know the British figures better than I know them for other countries. The proportion of equities was something like 15%, and the rest was fixed income.

Laurence Siegel: Maybe you just use the aggregate supply of securities as the benchmark.

Elroy Dimson: You could do that. We didn't. I think that would lead you in the same direction.

Martin Leibowitz: Even in the United Kingdom, the fixed-income market was mostly government bonds.

Elroy Dimson: Outside of the United States, there are no markets with a long-term history for corporate bonds.

Will Goetzmann: Another thing, though, is that if you're flipping between cash and stocks, it's not the same risk as a 50/50 portfolio. The reason is that the probability of an overall portfolio decline of 20% is larger for the flipping strategy than for the 50/50 strategy, because the flipping strategy is sometimes all equities and the 50/50 strategy is always diversified. So, a benchmark that is 50/50 or 60/40 is not the same risk profile at all. If you're concerned about the magnitude of losses, you're facing a higher chance of something extreme happening if you're flipping.

Elroy Dimson: Yes. This was not a *Journal of Finance* paper. It appeared in our yearbook in 2013.[15] People were interested in it. One would do much more if this was an academic paper.

Robert Arnott: I'm guessing more practitioners read it than read the *Journal of Finance*.

Will Goetzmann: If you improve on this, it might be worthy of the *Financial Analysts Journal*, Elroy.

Elroy Dimson: If I do a few more like that, I might get tenure. [Dimson has been tenured since the late 1970s. *Ed.*]

Will We Be in a Low-Return Environment?

Cliff Asness: The discussion seems to have regressed to CAPE or some similar measure as a timing tool again. I want to reemphasize something I said in my presentation. I think CAPE has been an empirical failure for timing. It has still been a success if all you want to know is whether you expect the next 10 years to be better or worse than average.

Robert Arnott: Very much so.

[15]See Dimson, Marsh, and Staunton (2013).

Laurence Siegel: I agree that CAPE is a tool for forecasting, not timing—but some people will use long-term forecasts as a timing tool, although they should not.

Cliff Asness: Larry, if you remember, I also said we've all been guilty of that. When you are forecasting poor 10-year returns, even if you don't explicitly say to underweight equities, sometimes that's what it sounds like. But we should remember that CAPE is not that good for that. The forecast is, nevertheless, important. If you're a pension plan and expecting 2% instead of 6% on stocks in the next 10 years, that information might be relevant to you.

Laurence Siegel: No kidding.

Cliff Asness: It helps you answer questions like, how much do you have to save? How much can you spend? It is an important number. It's just not an important number for deciding when to get in and out of the market.

Jeremy Siegel: But what happens if you say that stocks are going to return less, but bonds will return much less?

Will Goetzmann: Then Mary Ida has a problem when she talks to her clients.

Laurence Siegel: She sure does.

Jeremy Siegel: That means you go into stocks. They're going to return less, but you go into stocks.

Mary Ida Compton: It's a strategic asset allocation decision, not a tactical one. Stick with it over the long term, but what you as a pension plan sponsor are going to have to do is suck it up and put some more money into the fund.

Cliff Asness: Yes, you're exactly right. When expected returns on everything are low, and you don't have the ability to know when those low returns will be realized, you simply lower your expectations.

Laurence Siegel: That's what Jack Bogle said: Budget for it.

Cliff Asness: It's important to note that saying "returns on an asset will be lower than normal" is different than saying "they have a negative expected return." So, when we say stocks will be worse than bonds, do we mean that stocks have a negative expected return? If you actually believe that, you should underweight them or short them.

But if you believe that stocks have a healthy positive risk premium, just half of the normal amount—and if you underweight them now and overweight them later on when they're more attractive, you could still make money (if the timing signal is any good). Underweighting a positive hurts you, but overweighting a positive helps you more. This is a very long game…

Robert Arnott: …and it will be wrong at times.

Martin Leibowitz: On the other side of that coin: How often have you heard the argument that "I have to be in stocks because bonds don't give me any return"?

Mary Ida Compton: A million times.

Martin Leibowitz: When will that argument be false?

Laurence Siegel: When the expected return on stocks *is* lower than the expected return on bonds.

Jeremy Siegel: You're right.

Robert Arnott: That was the case in the year 2000.

Jeremy Siegel: That was about the only time.

Robert Arnott: Mary Ida's task is very challenging. Any sort of timing mechanism is going to be suggesting buying when equities are fiercely out of favor, unloved, cheap—and will suggest trimming when they're relatively fully priced and people are comfortable with them. So, for far too many institutional investors, that sort of information, while useful, is not actionable.

Mary Ida Compton: The problem with timing, which we never do, is that there just aren't enough data points to prove anybody can do it. So why bother? You're just shooting yourself in the foot.

Laurence Siegel: Mary Ida faces a situation that I believe most of us don't, which is that her clients have fixed liabilities. As individual investors, we can adjust our consumption to the varying fortunes of our portfolios, but a pension fund really can't. They have to come up with outside money. Moreover, the fortunes of markets and of pension plan sponsors are correlated. When the market's down, the company is usually also not doing well. It really puts you in a terrible situation. You are supposed to earn something like 7% to meet your pension obligations, but there's nothing to buy that has an expected return of 7%.

Cliff Asness: If you literally have a subsistence level of required return that is considerably higher than any reasonable portfolio's expected return—and it's true subsistence, like you have to make it or you die—you are forced to do the opposite of most of our instincts. You're forced to take more risk when risk is not being very well rewarded. While that's a real-world problem for some, it is not the optimal strategy.

Sometimes people skip a step and end up saying that their expected return on stocks is 11%. Sometimes Wall Street strategists do this. They engage in a kind of magic prestidigitation where they say to themselves, "I've explained to you why holding stocks is justified; justified means normal; normal means 11%." [Crowd laughter.]

That last step is not right. You have to accept the lower expected return on both stocks and bonds. I think some people forget that bonds now have very low yields and

that you add the equity risk premium to that low number. You don't get 11%.

Reaching for Yield—in Bonds and in Stocks

Roger Ibbotson: Clearly, this happens in the bond market because people reach for yield when spreads are really tight. Obviously, that is a time when lower-quality bonds are not giving much payoff for the extra risk, but at such times, bondholders actually start buying more of them. You may see something analogous in the stock market: When the equity risk premium is low (signifying less payoff for risk), Mary Ida's clients may want her to invest more in equities, not less, because that's the only way they have a possibility of meeting their goals.

Mary Ida Compton: What happens in reality, though, is that when they realize they're going down the tubes—instead of moving out on the risk axis to get potentially higher returns, they stick all the money in something that's very stable, like core bonds. The problem with the risk assets is that their volatility is high, and the client doesn't want to take a chance on being underwater three years earlier than they would have been otherwise. They may assume that the pension fund will go under in five or 10 years and say to themselves, "We got a death sentence and we're just going to hunker down and pay out what we can, and we know it's only going to last for five years." They face a weird set of incentives.

The Psychology of Investing in Terrible Markets

Elroy Dimson: Don't these people need some personal advice, as well as advice about management of the pension fund?

Mary Ida Compton: Emotional advice? You mean psychological advice?

Elroy Dimson: To work longer. And maybe at a slower pace.

Mary Ida Compton: Well, the jobs may not be there.

Elroy Dimson: You have to get your mind around that. Cutting your expenditure on holidays or lowering your cost of living in some other way. You've got to adjust to it.

Martin Leibowitz: The mentality is this: If you find yourself in dire straits, you invest with some hope that the market will somehow bail you out. You just continue doing what you're doing in the short run and postpone deciding to cut back on expenses.

So, a change of strategy is something that is not done casually. It's done very reluctantly—either when you have to, or when some event forces you to. So, the continuation of a strategy in an institution, and in individuals as well, has inertia—in other words, a bias to the strategy that is already being pursued. That observation has a power beyond just the theory that you should maintain a certain allocation over time. Never mind the theory. There is a behavioral imperative that forces people in an institution to maintain a consistent strategy.

And in fact, in some ways, even for an institution it doesn't make sense, because, as we were saying earlier, if they had a belief that the original allocation was based upon some set of risk premium assumptions, then if the market changes radically, wouldn't you think that if those risk premium assumptions change radically, there should be some corresponding shifts in the allocation? No, they typically seem to be rebalanced back to the same allocation they had a year before, two years before, three years before, four years before. One of the most amazing behavioral phenomena is that allocations are amazingly stable over time.

Is It Time to Pray?

Elroy Dimson: There was another solution to that in 2008. I was, like many of you, invited to a number of conferences about what should we do as this crisis unfolded. When things looked really bad and one of the fund managers asked the audience, "What should I do?" somebody piped up and said "Pray."

Jeremy Siegel: I'd like to ask a very informal poll. How many here think the next 10-year equity returns are going to be below the long-run average? I certainly do. Is there anyone here who doesn't? Or are you uncertain?

Cliff Asness: I agree, they will be below. [Crowd nods agreement.]

Jeremy Siegel: Okay, so everyone. Here's the harder question. How many here believe the equity risk premium—the title of this decennial conference—is going to be lower than its historical value? Let's say it's 3.5% expressed on a compound basis, or 4%?

Mary Ida Compton: That's the historical level?

Robert Arnott: On a 20-plus year basis, I would say no—it will be higher.

Jeremy Siegel: Okay, 20 years, given what we're facing in bonds, with TIPS yields being −1.

Robert Arnott: I get it.

Jeremy Siegel: I'm just wondering: if TIPS go to −2, you got a capital gain on TIPS.

Robert Arnott: Right, but if the Shiller P/E just goes halfway back to historical norms, that costs you about 4% per year.

Jeremy Siegel: If, if.

Robert Arnott: I know, I know.

Bond Duration and Equity Duration

Cliff Asness: I agree with Rob on that one, because one thing I think is missing is the bond duration is far shorter than what you might call equity duration. The time path also matters with interest rates. If they shot up today and stayed there for 10 years... another interpretation of duration is the breakpoint on expected return. You make more, not less, because they went up from the investment.

Jeremy Siegel: I disagree with you. The duration of TIPS is less... I mean, a 30-year TIPS is less than that of the stocks, because the stocks give a dividend 1.5 to 2 real. The real is negative on the TIPS. The duration is actually higher.

Cliff Asness: I was thinking, I said 10-year, Jeremy.

Jeremy Siegel: Well, 10-year I'd have to think about and work the math. But go to the 30-year TIPS and it's still like −1.

Robert Arnott: But no, it's not.

Jeremy Siegel: It's minus what?

Robert Arnott: −0.2, I think.

Jeremy Siegel: Okay, but...

Martin Leibowitz: What if you don't?

Jeremy Siegel: There's something called index risk when you go 30 years out. But I'm not going to talk about that.

Martin Leibowitz: Relative to real rates, the duration is very different.

Cliff Asness: But they're ...

Jeremy Siegel: I'm talking about real assets—we should be talking about real rates.

Martin Leibowitz: The duration of stocks with respect to real rates is very long.

Jeremy Siegel: Yeah, really, really long, but not with stocks that are giving you large dividends. So that's a positive 2% a year, like a consol paying 2% a year.[16]

The Effects of Negative Real Yields, Monetary Expansion, and the Exploding Fed Balance Sheet

Robert Arnott: Jeremy, whether you're looking at forecasts of nominal stock returns against nominal 10-year bonds or real stock returns against real 10-year TIPS, you're talking about the same thing. But you're describing stocks as a real return vehicle, which they are. I've always advocated comparing stocks with TIPS; that was the basis for my paper in 2001, "Death of the Risk Premium."[17]

By the way, I'm glad the topic of bonds came up because I'm reminded of Larry's earlier comment about negative real yields perhaps actually doing damage. Knut Wicksell, the Swedish economist, not as widely known as he should be, postulated a natural rate of interest for bonds, and it was not negative. Of course, back then, the gold standard was everywhere, so he was really talking about real yields. Positive real yields serve as a speed bump to discourage malinvestment, misallocation of resources, and propping up of zombie businesses. If the speed bump is too high—if you have 5% real yields—then it stops all kinds of things, including a lot of good ideas. If the speed bump is negative, then you're proactively encouraging malinvestment.

What's interesting about malinvestment is that it can be in the private or the public sector. So-called modern monetary theory (MMT) is all about facilitating government spending as if government spending is inherently a good thing. But government spending often involves a great deal of waste. So, I would argue that negative real yields will damage long-term growth, not help it.

Roger Ibbotson: I certainly agree with that. Was it you, Rob, or was it Jeremy who had a slide about the money supply affecting the Fed balance sheet?

Jeremy Siegel: It was me.

Roger Ibbotson: The Fed balance sheet has exploded to record levels. It really rose after the financial crisis, but then it kept on going and now, with this COVID crisis, has truly exploded. At the same time, the deficit has exploded, too, to record levels relative to GDP. It's higher than in World War II. So, you have all that money flying into the economy—this is the supply of money. Where is that money going to go? It could go into inflation, although not that much of it has so far. It has to go somewhere.

[16]A consol (short for "consolidated annuity") is a bond that never matures but continues to pay the coupon rate "forever." It can be sold to another investor. The British government began to issue consols in the mid-1700s and paid their coupons for more than 250 years. The last ones were redeemed (called) in 2014. Nothing is forever.

[17]See Arnott and Ryan (2001).

Jeremy Siegel: There is a lot of inflation, and there will be more.

Roger Ibbotson: I think it's been going into the stock and bond markets.

Jeremy Siegel: Both.

Laurence Siegel: And real estate.

Roger Ibbotson: I think that's what's inflating the markets. It's not inflating consumer goods as you typically would in the kind of inflation that Milton Friedman described. It's inflating the bond and stock markets.

Jeremy Siegel: It's totally inflating consumer goods. I think we're going to have 20% inflation in the next two or three years. Not each year, but cumulatively.

Cliff Asness: Cumulative is not that bad.

Jeremy Siegel: But at 7% a year?

Cliff Asness: I'm joking!

PART IV: EQUITY DURATION, NEGATIVE REAL RATES FOREVER, BULLISH ON BEAR MARKETS?

Editor's Introduction

> You're better off with all stocks if you have a 50- or 100-year horizon. If you are 100% in stocks, you would be much better off if the stock market crashed. You [would] never buy another penny's worth. You just reinvest whatever cash you might get—the dividend flow. Your final real returns are going to be so much higher.
>
> —Jeremy Siegel

How much chocolate would you give up today to ensure that you had a supply of chocolate tomorrow?

That might seem an odd question, but the panelists explore it as a way to better understand negative interest rates in this section of their roundtable discussion. What the phenomenon of negative rates comes down to is a bet that the future will be worse than the present and that locking in what you are going to receive tomorrow, even though it is less than you have today, is rational.

"If times are good today and times are really bad tomorrow," Rajnish Mehra says, "then I would give up a lot of stuff today to get something guaranteed tomorrow in a very, very bad state of the world where the marginal utility is very high. [Under such conditions] I will get negative rates. But that's not a world I want to live in."

Before delving into that, the participants first consider equity duration, shrinking bond allocations, and the appeal of bear markets, among other topics.

The loose monetary policies adopted by central banks since the Global Financial Crisis have influenced equity duration. The excess cash that flowed into the economy needed a place to go, and it flooded into stocks and other risk assets and raised their valuations. That seemed to work for a while to sustain economic growth.

"So, you will have higher returns in the near term," Martin Leibowitz says. "But over the longer term, it's going to be disastrous. As a result, you definitely have a term premium, a term structure regarding the effects of very low interest rates. And, unless you're riding the short-term wave, it's not a happy prospect."

As interest rates have fallen, investors have shrunk their allocations to fixed income. This, too, comes with potential consequences.

"Bonds are so unattractive that individual and institutional portfolios have become massively overweighted in equities and much riskier than they used to be," Laurence Siegel says. "At the Ford Foundation, we got down to 9% in fixed income at one point. This allocation, if widespread, increases the amount of risk in society tremendously."

That risk is often made manifest in bear markets. But the panelists stress that such down markets are not wholly negative. Depending on the investment horizon, they can be critical opportunities.

"If you're spending in the near term, you really hate bear markets," Rob Arnott says. "If you're saving now for expenditures in the future, you really love bear markets."

Love or hate, the reaction tends to come down to age: The old hate bear markets, whereas the young love them.

"Unless you care a lot about your bequests," Cliff Asness adds, "in which case we're all essentially immortal."

Roundtable

Back to Equity Duration

Antti Ilmanen: I want to revert to the duration question. If you are talking about 30-year versus 10-year TIPS, that's very easy. But equity duration is harder. We can debate whether the duration is 15 or 25 or some other number.

Martin Leibowitz: Back in the old days, when actuaries were actually computing equity duration, they came out with numbers like 25 and 50. The way they did it was to just look at the dividend discount model and note that the flows are back-ended. So, they came up with a very long duration, assuming essentially a deterministic model.

If you actually looked at the sensitivity of equity returns to changes in interest rates, however, you find that durations were about three to four years. The relationship was extremely sloppy; it had a terrible *R*-squared. So, I think that to try to identify a clear-cut, short-term relationship between movements of equities and short-term movements of bonds or bond yields is a fool's errand.

Antti Ilmanen: I think you have to use equities' own discount rate in this exercise.

Roger Ibbotson: I mentioned the growth in the money supply. I don't quite see this as a present value calculation.

Yes, with negative interest rates, the present values would soar, but I think it's an overpricing actually, because the money has to go somewhere, so it goes into the equity and bond markets. I classify the high prices as overpricing and not just the present value calculation that is high due to a low discount rate.

Martin Leibowitz: Well, go back to what Rob Arnott was talking about earlier in terms of malinvestment. If you have low rates and lots of money, you will invest in more things and, as you point out, Roger, you will raise valuations of equities and all risky assets. So, you will have higher returns in the near term.

But over the longer term, it's going to be disastrous. As a result, you definitely have a term premium, a term structure regarding the effects of very low interest rates. And, unless you're riding the short-term wave, it's not a happy prospect.

Itsy-Bitsy, Teeny-Weeny Bond Allocations

Laurence Siegel: I'm also concerned about the supply side of the economy. Negative real rates in the 1970s were called financial repression.[18] They discouraged savings and impinged on growth. In some ways, financial repression has come back even worse than in the 1970s. Private, profit-seeking actors are reluctant to buy the bonds, but the governments need the money. So, the central banks are buying them with newly created money.

Bonds are so unattractive that individual and institutional portfolios have become massively overweighted in equities and much riskier than they used to be. At the Ford Foundation, we got down to 9% in fixed income at one point. This allocation, if widespread, increases the amount of risk in society tremendously.

Martin Leibowitz: Larry, do you know what the average fixed-income holdings of endowment and foundation portfolios are these days?

Laurence Siegel: I haven't seen it lately, but 9% would be my best guess.

Martin Leibowitz: It's under 11%—even if you include cash as fixed income.

Laurence Siegel: I would call cash fixed income.

Martin Leibowitz: The most important aspect of that is not what its return will be but the fact that it's nonequity.

How Should Perpetual Institutions Invest?

Jeremy Siegel: Endowments and foundations are long-term money, so why is that wrong?

Martin Leibowitz: That's their theory. It's not necessarily wrong, but it leads to a level of risk that is tough to stomach...

Laurence Siegel: ...such as in the crash of 2008.

Antti Ilmanen: How about 2008? Mary Ida has written about it.

Martin Leibowitz: There is an argument that if you had an infinite horizon, you'd be 100% in stocks.

Laurence Siegel: Or 200% stocks.

Mary Ida Compton: Even better.

Laurence Siegel: I was being sarcastic. We don't have an infinite horizon, because we have liabilities or payouts or whatever, and then we die. Say no to leverage.

Martin Leibowitz: ...if you had a long enough horizon, and if you had enough resources to meet the margin calls.

The Beauty of Bear Markets (If You're a Buyer)

Jeremy Siegel: You're better off with all stocks if you have a 50- or 100-year horizon. If you are 100% in stocks, you would be much better off if the stock market crashed. You would never buy another penny's worth. You just reinvest whatever cash you might get—the dividend flow. Your final real returns are going to be so much higher.

Laurence Siegel: We all want to buy low, but that train seems to have left the station.

Jeremy Siegel: We want to anticipate the change in the discount rate if there's going to be one. That's what you want to do.

Robert Arnott: Peter Bernstein and I wrote a paper in the mid-1990s entitled "Bull Market, Bear Market, Should You Really Care?"[19] The point of the paper was: If you're spending in the near term, you really hate bear markets. If you're saving now for expenditures in the future, you really love bear markets. But very few people think that way.

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[18]See McKinnon (1973); Shaw (1973).

[19]See Arnott and Bernstein (1997).

Jeremy Siegel: That's actually age-related. If you're very young, you love bear markets. If you're really old, you love the bull market.

Cliff Asness: Unless you care a lot about your bequests, in which case we're all essentially immortal.

Jeremy Siegel: That's right.

Cliff Asness: The conversation about two minutes ago, "What if you can just stick with this, no matter what?" becomes a Saint Petersburg paradox. If you could keep the same level of investment in a risk asset—or, in the case of the Saint Petersburg strategy, doubling down—you would eventually win. But we all know that that's not how the world works.

Martin Leibowitz: Gambler's ruin.

Cliff Asness: Gambler's ruin will occur at some point.

Do Real Interest Rates Represent the Marginal Productivity of Capital?

Rajnish Mehra: What is your best explanation for the negative real term structure? How will this end? How long will it persist? Do you think this could be an equilibrium?

Jeremy Siegel: Theory says the real term structure should be negative. You're hedging against changes in the discount rate for your future consumption if you build these intertemporal models. The real term structure appeared to be positive before we had TIPS yields to measure it, because our then-measure of the real term structure mixed nominal risk and inflation risk. That biases you toward an upwardly sloped real term structure. But many macro models produce only inverted real yield curves. And some of those models, given risk aversion and age and other factors, give you a negative long-term real return.

Rajnish Mehra: But if I weren't living in a world of certainty, I wouldn't get real negative rates, would I?

Jeremy Siegel: No, in a world of uncertainty, you would still get negative real rates.

Rajnish Mehra: Just start with a simple world of certainty. Rates should reflect the marginal product of capital.

Jeremy Siegel: The rate of return on risky capital...

Rajnish Mehra: Just hold on there for a second. Cut out the risk; we're talking about TIPS. Their yield would be the marginal return on capital.

Jeremy Siegel: No, it isn't. It's absolutely not. In my opinion, the return on physical capital is the unlevered equity return, which is definitely positive. Unless you think there's a lot of mean reversion, as Rob does, it's positive.

Negative Real Interest Rates Forever?

Then, the risk-free rate gets determined by the risk aversion of individuals and how much they want to guarantee a certain amount of consumption in the future, even if achieving that guarantee means a negative real return. They can't do any better, there is no other, better investment to have; if you want a certain return in the future, it could very well be negative because there's nothing economically to stop it.

Rajnish Mehra: The riskless rate could very well be negative; that is fine; it is not under dispute that it could be negative. But is this an equilibrium phenomenon?

Jeremy Siegel: Yes, it could be negative forever and you can get a very nice steady state as long as the rate of return on risky capital is positive.

Laurence Siegel: What's the logic behind that?

Jeremy Siegel: That the real return could be negative forever?

Laurence Siegel: Yes.

Jeremy Siegel: Because of the amount of risk aversion. If I want to guarantee chocolates tomorrow, to get 1.9 chocolates tomorrow, I may have to give up two today.

Laurence Siegel: Isn't there a liquidity trap? Just buy the two chocolates today and eat them tomorrow. Storage costs cannot be that high.

Rajnish Mehra: But it's a terrible economy to live in, Jeremy. It assumes that the economy is getting worse and worse and worse.

Jeremy Siegel: If someone *guarantees* me some quantity of chocolate tomorrow, and if I know I will need it—I'll take 1.9 chocolates in exchange for giving up two chocolates today. That's totally a long-run equilibrium.

Rajnish Mehra: The only time you're going to get negative real rates is when the marginal utility is *increasing* over time.

Jeremy Siegel: No, I disagree. You're going to have a negative real "sure" (riskless) rate forever. In a growing model, in a steady-state model, in a perfectly fine long-term model.

Rajnish Mehra: Wouldn't it be a declining economy?

Jeremy Siegel: No, not at all.

Laurence Siegel: This is a little above my pay grade, but at some level, you only know what you learned in school. If I defer my consumption voluntarily, I should get something for it. Somebody else gets to use what I'm not using for that amount of time, and I should be able to charge for that use.

Jeremy Siegel: No. In an uncertain world, you have positive real rates only if there's a storage technology that enables you with zero cost to have goods today stored so that you have the same goods tomorrow. That is impossible, so you absolutely have negative rates in equilibrium.

Robert Arnott: Jeremy, I will never give up two bars of chocolate today for 1.9 tomorrow. Never.

Rajnish Mehra: If there is a famine tomorrow—if times are good today and times are really bad tomorrow—then I would give up a lot of stuff today to get something guaranteed tomorrow in a very, very bad state of the world where the marginal utility is very high. Then I will get negative rates. But that's not a world I want to live in.

Laurence Siegel: That's a declining economy. You can get negative rates in equilibrium in a declining economy, but not in any other state. We had less storage technology in the past than we do now; and we got positive real rates from thousands of years in the past until 13 years ago. Which is the rule and which is the exception?

Jeremy Siegel: You can get a negative risk-free rate of interest in a growing economy. I'm not saying that it will happen. But it can be an equilibrium in a growing economy.

Roger Ibbotson: I agree with Jeremy because most of your investments involve risk and have positive payoffs.

Jeremy Siegel: Absolutely.

Laurence Siegel: You have to put so many weird conditions on the economy and on behavior to get negative real rates in equilibrium.

Roger Ibbotson: It's just the risk-free rates—the real risk-free rates—that are negative. I don't see any reason why they couldn't continue over indefinitely.

Jeremy Siegel: It can continue for 100 years.

Laurence Siegel: It's an interesting question.

Roger Ibbotson: But I don't think it's such an interesting question that we have to talk about it indefinitely.

Laurence Siegel: It's interesting to me because I just said the opposite and, if I'm wrong, I want to know why.

PART V: WHAT IS THE ERP? NEGATIVE RETURNS AS A HEDGE, MODERN MONETARY THEORY

Editor's Introduction

> There's one aspect of MMT that I have some sympathy for—the notion that what we spend money on is far more important than how we finance it.
>
> —Cliff Asness

In the final part of their roundtable discussion, panelists return to the nature of the equity risk premium and home in on what it is and what it isn't. Jeremy Siegel sums up his view: "It should always be the difference between whatever the real riskless return is, positive or negative, and the return on risky equity."

From there, they consider the utility of negative nominal yields and why the correlation between stocks and bonds has flipped from positive to negative over the last several decades and flipped back to positive recently. On the former, negative nominal yields on fixed-income assets do serve a purpose: If the investor wants to consume later or hedge against a future economic collapse, the fixed income is still a good deal. These rationales should not, however, distract from the sea change that the emergence of negative nominal yields represents.

"Over 3,000 years of history," Laurence Siegel observes, "nominal yields have always been positive until the last 12 or 13 years. Has the hedge property overtaken the investment property of fixed-income assets, suddenly, for the first time?"

The consensus among participants is that the hedging component has indeed eclipsed the investment property as the primary reason for holding bonds.

As for changes in the correlation between stocks and bonds, Antti Ilmanen attributes it to two kinds of uncertainty.

"Stocks and bonds tend to be driven by growth and inflation," he observes. "When there is more growth uncertainty, stocks and bonds tend to move in opposite directions, so we've had negative stock/bond correlation for the last 20 years. Before that, there was, relatively speaking, more inflation uncertainty and we tended to have positive stock/bond correlations."

The panelists also address modern monetary theory (MMT), which "seems to have taken over the government and the Fed," according to Roger Ibbotson. Their collective take is largely negative, with Rob Arnott pointing to data suggesting that, far from the redistributive effect envisioned by MMT proponents, MMT policy does quite the opposite in practice.

"The implication is that, if you pursue MMT, you're going to be enriching the people that you're ostensibly looking to 'milk' with the intent of enriching the poor and the working class," Arnott says.

For his part, Cliff Asness gives a nuanced, contrarian take.

"The one good point in MMT, which they don't stress enough, is this," Asness contends. "If the government did much less and charged zero tax rates, so that there was a big deficit, the libertarian in me would think that's a good world. And if the government spent a ton of money and fully financed it with taxes, I might think that's a bad world. I think MMT does make that distinction."

Before wrapping up, the panelists revisit their forecasts in the 2001 and 2011 Equity Risk Premium Forums of what the equity risk premium would be, and once again consider why it is so large and whether it really is a risk premium.

It is instructive to compare all these forecasts to the actual results after the fact. The speakers calculated a *realized* equity risk premium relative to a 10-year Treasury bond of 11.73% for the 10 years from 30 September 2011 to 30 September 2021, and 2.88% for the 20 years from 30 September 2001 to 30 September 2021.

So, what accounts for the size of the premium?

"One possibility would be that stocks are perceived as being much riskier than they are," Roger Ibbotson says.

"It could be the Tversky–Kahneman loss aversion explanation," Jeremy Siegel observes. "It is a behavioral explanation for why there's such a high risk premium. People react asymmetrically to losses versus gains."

"My theory is that we're all listening to bad news and constantly bombarded with anxieties about the world coming to an end," Will Goetzmann remarks. "We know that those emotions make people really worried about stock market crashes."

As to which explanations best fit the data, panelists will likely revisit that question at the fourth Equity Risk Premium Roundtable in 2031. So stay tuned.

Roundtable

Back to the Equity Risk Premium

Jeremy Siegel: Well, Roger, what is meant by the equity risk premium? I don't think it matters whether the reference asset is long- or short-term bonds.

Martin Leibowitz: If bond returns are prospectively negative, shouldn't the risk premium be measured against positive returns?

Jeremy Siegel: No. It should always be the difference between whatever the real riskless return is, positive or negative, and the return on risky equity. Always.

Martin Leibowitz: If someone is investing and they want to get a positive return, bonds would not be a consideration.

Jeremy Siegel: Yes, they would. It's their hedge. What do you mean—just because the return is negative, it doesn't do anything?

Martin Leibowitz: Negative returns are not an exciting hedge.

Jeremy Siegel: They're not exciting, but they're absolutely a hedge. A lot of hedges have a negative expected return.

Roger Ibbotson: If you want to consume later instead of earlier, because we are planning for some future thing, you'll get a negative real interest rate.

Robert Arnott: This whole discussion hinges on whether there is a zero-return alternative to the negative-return risk-free asset.

Jeremy Siegel: There is not. If there were a storage technology, there would be.

Robert Arnott: Stuff it under your mattress. The return on that will be zero in nominal terms. But a lot of governments around the world are trying to replace currency with something else.

Jeremy Siegel: Paul Samuelson wrote that famous article about money having a zero nominal return. Remember? Long-term equilibrium with and without social contrivance of money, the forced equilibrium.[20] But, the truth is, as you're saying, Rob, money gives you a zero nominal return in an inflationary environment. It is a negative *real* return, so you have no zero real return alternative.

Rajnish Mehra: Jeremy, let me just continue one second more and then we're done with it. The real rate of return is going to be the sum of three terms. The first term will be the time preference, the rate at which we prefer to consume today rather than tomorrow. That's about 1% per year.

The next term is the growth rate of consumption times the inverse of the elasticity of intertemporal substitution. In a growing economy, the consumption growth rate is positive (historically about 2%). The elasticity of intertemporal substitution is about a half or a third or something in that ballpark, implying a coefficient of relative risk aversion about 2 or 3.

The third term is $-0.5\gamma^2\sigma^2$, where γ (gamma) is the coefficient of risk aversion and, σ^2 the variance of the growth rate of consumption (about 0.00123). Unless you become extremely risk-averse with a risk aversion parameter of 45 or 50, this third term will be negligible, and the first two terms will dominate—so, normally, the risk-free rate increases as your risk aversion goes up. It will start declining only if you become extremely risk-averse,[21] resulting in a negative real return even when the growth rate of consumption is positive.

This is Fischer Black's solution to the equity premium puzzle, by the way. His solution, in private conversation, was that you have a risk aversion of 45. In such a case, you can solve everything. Why? Because the risk-free rate will become very small and may become negative.

Roger Ibbotson: You have a preference to consume later instead of now.

Rajnish Mehra: You can just use constant relative risk aversion. That's not going to change. I could cook up an example, but that will be inconsistent with everything you know—the risk aversion will come out to be so high that you would not get out of your bed every day.

Nominal Fixed Income as a Hedge or Insurance

Jeremy Siegel: There's another reason why you might have negative equilibrium real rates. That is government reaction. If things collapse and prices go down as in a great depression, nominal assets are the best assets to hold. They become a negative-beta asset. That's why I talked about the negative correlation between bonds and risky assets that will prevail if things go bad. That would cause people to hold more bonds. How much they hold has to do with the perception of whether those nominal assets are in fact effective risk hedges or not.

Laurence Siegel: They become an insurance asset.

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[20]See Samuelson (1958).

[21]See Equation 18 and the discussion following it in chapter 1 of Mehra (2008).

Jeremy Siegel: Yes. An insurance asset, as you know, will very often give you a negative return. When nominal assets are perceived as an insurance asset, which has happened at various times in history, one could ask why—maybe the concern is default by the government, money not being redeemed in gold properly.

When everything is priced in money, and the concern is about another financial crisis or a pandemic crisis or whatever, prices of goods and services and real assets decline, and bonds do extremely well. Nominal fixed assets do extremely well. They take on a really negative beta, which I think gives them a tremendous hedging ability. I think trillions of dollars' worth of demand are generated to hold that asset.

Laurence Siegel: Some form of money or bonds has always had that hedge property. Yet over 3,000 years of history—as you and Sidney Homer showed, Marty—nominal yields have always been positive until the last 12 or 13 years. Has the hedge property overtaken the investment property of fixed-income assets, suddenly, for the first time?

Jeremy Siegel: Yes.

Laurence Siegel: Why?

Antti Ilmanen: It changed 20 years ago. Before that, there was rarely a negative correlation between stock and bond returns.

Jeremy Siegel: Let me tell you an interesting story. A lot of people analyze the VIX equity volatility index. I was confused about why there was so much demand for VIX assets, and then someone told me, "We love VIX assets because they're negatively correlated with the stock market." And I said, "Yes, but do you know that, if you hold them, they're going to deteriorate by 5% to 10% a year every single year, all the time?" They didn't really understand that.

So, I gave a lecture about government bonds being negative beta assets. One money manager came to me and said, "Jeremy, I had $3 billion in VIX products for the negative correlation. Why don't I try to get a positive nominal return, even if it's only 1%, by holding long-term nominal US government bonds instead?" And he did that. He said, correctly, "Forget about those VIX assets. Bonds are so much better, even though they give negative returns."

Cliff Asness: Jeremy, I very much agree with you, but we should acknowledge that not everyone on earth agrees that long-volatility assets have a negative expected return. Antti Ilmanen has gone quite a few rounds with Nassim Taleb on this very issue.

The Flip from Positive to Negative Stock-Bond Correlation

Antti Ilmanen: I don't think that issue is directly related to the equity premium. There are other things that I can talk about.

I want to say something quickly on the stock/bond correlation. We have a nice story on why the sign flipped from positive to negative 20 years ago. Stocks and bonds tend to be driven by growth and inflation. When there is more growth uncertainty, stocks and bonds tend to move in opposite directions, so we've had negative stock/bond correlation for the last 20 years. Before that, there was, relatively speaking, more inflation uncertainty and we tended to have positive stock/bond correlations. So, we are waiting to see if those relative uncertainties flip again.

Laurence Siegel: The stock-bond correlation was negative from the mid-1950s to the mid-1960s. I think there was growth uncertainty then, but relatively little inflation uncertainty.[22] That supports your story, Antti.

Jeremy Siegel: I think you're right. The correlation flip is also related to the fact that, when you have supply shocks, you will have a positive correlation between stock and bond returns. By the way, I'm not talking about the constrained supply situation that is happening right now; that is very specific to current news. I mean oil shocks and other more typical shocks—you're going to have that positive correlation. The reason is that supply-shock inflation is bad for the economy, so stocks and bonds go down together. You get a positive beta on long bonds.

If the stocks are more demand-related, caused by financial crises or pandemics or something else like that, then you tend to get a more negative correlation. The difference, as I mentioned earlier, is enormous. Go through the math and see what that does to real yields. It depresses them tremendously. So, I agree with you—the correlation changed, and I think it had to do with supply shocks versus demand shocks in a macro system.

Martin Leibowitz: Rob, does this observation relate to the P/E smile that we've talked about so much in the past?

Robert Arnott: I think it does, but spell out to me with what you mean by the question.

Martin Leibowitz: As real rates go up beyond a certain point, P/Es start to come down as the high real rates become a constraint on growth, first naturally and then Fed-induced. As real rates go lower, you find yourself in a situation where, beyond that tipping point, the prospects

[22]See, for example, Ilmanen (2003).

for equity growth or economic growth are sufficiently dour that the correlation goes in the other direction.

Robert Arnott: I think that's exactly right; **Exhibit 69** ties into that. While you described it as a smile, it's more of a frown.

Martin Leibowitz: Yes, it is a frown.

Robert Arnott: The peak multiples are found at moderate levels of inflation—1% to 2%—and moderate real rates, 2%, 3%, maybe even 4%. The multiples fall off pretty sharply from there. So, a lot of this variability in multiples hinges on central bank policy. And, in an MMT world, I'm not sure the central bankers are likely to be pursuing policies of anything other than moderate to high inflation and negative real rates.

Modern Monetary Theory

Roger Ibbotson: Does anybody here have a positive opinion about MMT? It seems to have taken over the government and the Fed. Does anybody think there's something positive to that?

Robert Arnott: We (at Research Affiliates) have a draft paper that Chris Brightman wrote a year ago, and he hasn't published it because he was worried about upsetting clients in the middle of the COVID pandemic. The paper shows a direct link between deficits and corporate profits. That is to say, a trillion dollars of deficit spending goes hand in hand with a trillion dollars of incremental corporate profits over the next four years. This relationship has a theoretical basis that would take too long to get into right now. The implication is that, if you pursue MMT, you're going to be enriching the people that you're ostensibly looking to "milk" with the intent of enriching the poor and the working class.

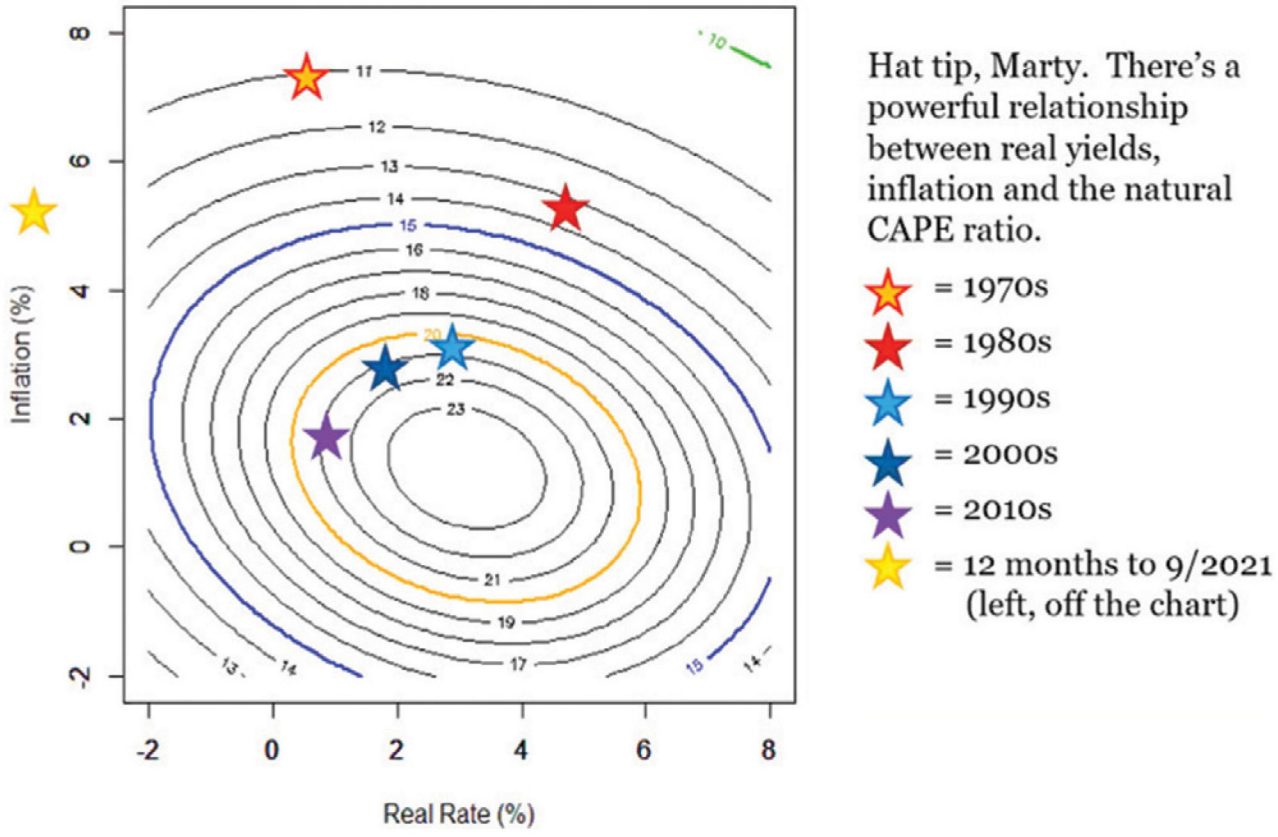
Laurence Siegel: I think most of us knew that. We just couldn't prove it. I'd love to read Chris's paper.

Cliff Asness: That's the verdict on quantitative easing for 10 years now. There's one aspect of MMT that I have some sympathy for—the notion that what we spend money on is far more important than how we finance it.

Robert Arnott: Yes.

Laurence Siegel: Yes.

Exhibit 69. Does MMT Pose a Threat to the ERP? Only If Fed Has No Exit Strategy



Source: Research Affiliates; RAFI Indices.

Cliff Asness: The one good point in MMT, which they don't stress enough, is this: If the government did much less and charged zero tax rates, so that there was a big deficit, the libertarian in me would think that's a good world. And if the government spent a ton of money and fully financed it with taxes, I might think that's a bad world. I think MMT does make that distinction. I just then make every policy choice opposite from them.

Robert Arnott: The level of taxation is not the taxes we pay. It's the money that we spend. Because whatever is spent is either coming out of tax revenues or pulled out of the capital markets through running deficits and increasing the debt. The money is being pulled out of the private sector in both cases. So, spending sets the true tax rate and is what's disturbing about a $3 trillion to $5 trillion deficit.

Elroy Dimson and **Robert Arnott** thanked the group and said goodbye.

Martin Leibowitz: Why don't we plan on getting together in 100 years and see how good our projections were?

Jeremy Siegel: I think we should get together 10 years from now.

Elroy Dimson: I'll put it in my diary.

Laurence Siegel: We *are* going to do it in 10 years.

Mary Ida Compton: Good!

Laurence Siegel: 100 years is a good idea too.

Reflecting on Our Past Forecasts

Rajnish Mehra: Larry, after the last forum in 2011, you sent an e-mail with everybody's forecast for the equity premium.

Laurence Siegel: It was an e-mail with all the forecasts from 2001, so we could compare our then-current (2011) forecasts to the old ones (2001). I don't have a record of the forecasts from 2011. But I do remember that Brett Hammond gave a talk at the Q Group in 2011, where he said that all the 2011 forecasts were very close to 4%.

Roger Ibbotson: I missed the last forum because of a snowstorm, but I think markets exceeded almost everybody's expectations.

Laurence Siegel: It sure did.

Roger Ibbotson: So, it doesn't matter what we said. Whatever the forecasts were, the market did better.

Laurence Siegel: That's right.

Roger Ibbotson: The person who had the highest estimate won.

Jeremy Siegel: And, by the way, I would say that bonds did much better than everyone predicted.

Roger Ibbotson: Definitely.

Jeremy Siegel: Stocks and bonds both exceeded expectations over the last 10 years.

Martin Leibowitz: My recollection—I could be wrong, and you'll correct me on this, Larry—was that the numbers ranged from a 0% risk premium up to around 6%, with an average of 3.5% to 4%. It's very interesting how those forecasts correlate with a lot of the numbers we've been bouncing around today, with very different types of explanations for how we got there.

Laurence Siegel: Marty, those were the forecasts in the 2001 forum, the first one. In the 2011 forum, the estimates were all very close to 4%.

Looking at the 2001 (20 years ago) forecasts, the lowest was Rob's and it was zero. But these were not 20-year forecasts; they were 10-year forecasts. The highest forecast was that of Ivo Welch, but the highest forecast from among those present today was Roger's. Congratulations, Roger.

Roger Ibbotson: Whoever was highest won. There was nothing especially prescient about my forecast. Also, we should repeat that these were 10-year forecasts made 20 years ago. Apparently, Larry doesn't have the 2011 forecasts handy.

Laurence Siegel: No, I don't. I'm sorry.

Jeremy Siegel: Was mine 4.5% or 5%? I forget.

Laurence Siegel: Jeremy, yours was 3% to 4%.

Martin Leibowitz: What was Roger's?

Laurence Siegel: 5%.

Martin Leibowitz: That was the highest?

Laurence Siegel: Ivo Welch gave 6% to 7%.

Martin Leibowitz: Okay.

Antti Ilmanen: Did we specify what maturity bond?

Laurence Siegel: A 10-year bond.

Jeremy Siegel: What is the right answer?

Mary Ida Compton: Do you mean, what actually happened?

Jeremy Siegel: What was the last 10 years' realized equity risk premium, and what was the last 20 years' realized premium?

Mary Ida Compton: I have the 10-year numbers here. For the 10 years ended September 2021, the S&P 500

returned 16.63%, compounded annually. Long Treasuries returned 4.39%.

Laurence Siegel: So the realized 10-year equity risk premium from 30 September 2011 to 30 September 2021 was $\frac{1.1663}{1.0439}-1=11.73\%$.

Over the 20 years from 30 September 2001 to 30 September 2021, it was $\frac{1.0951}{1.0644}-1=2.88\%$.

That is a pretty thin margin over bonds, and the highest forecaster wouldn't have won, but we didn't ask for 20-year forecasts in 2001—so there is no winner, and no loser.

Roger Ibbotson: So I guess I didn't win.

Laurence Siegel: Actually, Roger, you did win because Ivo Welch isn't here. For 2001–2011, you had the highest forecast of the people who are here, and the actual return was much higher than the highest forecast.

Cliff Asness: My forecast for the next time is 1 basis point above the highest forecast.

Everyone: [Laughter]

Afterthoughts: Good News and Bad News

Roger Ibbotson: Before we close, I want to address Rajnish's comment about the premium for equities not being a *risk* premium. I'm trying to think of what the premiums could be for. One possibility would be that stocks are perceived as being much riskier than they are. Is that a possibility?

Laurence Siegel: Yes, that's a possibility.

Roger Ibbotson: Or there's a really extreme tail risk that people price in?

Jeremy Siegel: It could be the Tversky–Kahneman loss aversion explanation. It is a behavioral explanation for why there's such a high risk premium. People react asymmetrically to losses versus gains.

Mary Ida Compton: True.

Will Goetzmann: My theory is that we're all listening to bad news and constantly bombarded with anxieties about the world coming to an end. We know that those emotions make people really worried about stock market crashes.

There's plenty of evidence of that. In a paper I'm working on with Bob Shiller, we look at earthquakes in the region where people are making their market forecasts. They get more pessimistic, and they think there's going to be a crash when they find out that there has been a local earthquake. So, I think that this issue is behavioral and not necessarily easily modeled.

Jeremy Siegel: But you're also saying that we've been heavily bombarded with bad news for 150 years?

Will Goetzmann: I think the most recent period is the most extreme example. People have been talking down the market for the last decade, and the market has been doing pretty well.

Mary Ida Compton: People love that kind of stuff; they cling to it. It's on the media, it's on social media, it's in the newspapers. Remember the Y2K problem? Was that crazy or what? I know people who liquidated their equity portfolios because they were afraid of the Y2K problem.

Jeremy Siegel: You're talking about being bombarded over the last 10 years with negativity. You're writing a paper with Bob Shiller, whose CAPE ratio is exactly the reason why people have been bombarded with negative news. The CAPE ratio was on the cover of the *Economist* magazine twice.

Will Goetzmann: One time I was in a bus for one of these National Bureau of Economic Research conferences on behavioral finance, and Bob Shiller and Dick Thaler were both on the bus. One of them was saying, "I'm 100% in stocks." And the other one says, "I'm 100% out."

And they both had great theories supporting their decision, right? So, what am I supposed to do?

Laurence Siegel: And they both have Nobel Prizes, so they both must be right.

I want to thank our 11 extremely distinguished speakers, plus everyone else who helped organize this forum and made it happen.

APPENDIX A: 2023 UPDATES

Because of the rapidly changing financial environment since the time of the forum, we asked the 11 participants to provide updated estimates of the equity risk premium. Here is the request:

> Given that many changes have taken place since this forum was held in late 2021, **what is your best estimate of the ERP now?** *(Single-point best estimate, geometric mean, 10-year horizon, US equity total return in excess of the 10-year Treasury yield, which was 1.82% on 3 February 2022 and 3.54% today.)*

We also asked the participants to elaborate on their answers if they felt like it—not required.

Here, we present their answers in the order in which they spoke in the forum. Many thanks to the participants for their prompt and revealing responses.

Roger Ibbotson

As you know, I am mostly a very long run forecaster. But given the rise in rates, I am lowering my ERP to 5%.

Elroy Dimson

For strategic asset allocation, we learn little—and nothing statistically significant—from recent annual performance. So, my estimates have not changed. I remain at around a 3.5% premium relative to Treasury bills. You asked for a premium relative to bonds, so an ERP of 2.5% relative to 10-year Treasuries is still in the right ballpark.

Cliff Asness

Please reduce my estimate by 1%.

[*It was 4% on February 3, 2022, so his current estimate is 3%. —Ed.*]

Rob Arnott

My answer 14 months ago is shown following my current answer. Since that time, we've seen an unprecedented bear market in bonds and a reasonably ordinary equity bear market. Bear markets boost prospective returns. Specifically, the equity dividend yield has risen by 0.4% (1.7% versus 1.3%) over the period, while the starting CAPE ratio has fallen 9 points (28 versus 37). Meanwhile, our 10-year expectations for inflation remain elevated, consistent with our expectations for "higher for longer" inflation in the next decade. These are the main drivers behind our equity expected return being well above what it was last year.

Far too many investors ignore the role of starting valuations in determining their capital market expectations for the next decade. When valuation multiples have soared, past returns look fabulous, but forward returns are impaired. Our central expectation of a fair value CAPE multiple for the S&P 500 in 10 years is 23.4, while our expectation for the yield of a 10-year bond in 10 years is 3.1% (0.6% above our expected inflation rate in 2033), both well below current levels. Mean reversion in valuation multiples will likely erode stock market returns (albeit far less than a year ago), while the bond yield expectation has almost no impact on the bond market return.

Exhibit A1 shows the changes in our expectations broken out by component.

Exhibit A1. Change in Expectations

S&P 500 10-Year Return	Feb 2022	Apr 2023
Dividend yield	1.4%	1.7%
Real dividend growth	1.2%	1.4%
Inflation	2.6%	3.2%
Mean reversion	−3.2%	−2.2%
Nominal 10-year return		
No mean reversion (IRR)	**5.3%**	**6.4%**
50% mean reversion	**2.0%**	**4.1%**
Real 10-year S&P return		
No mean reversion (IRR)	*2.7%*	*3.1%*
50% mean reversion	*−0.6%*	*0.9%*
10-Year Treasury return		
Bond yield	1.8%	3.5%
Yield roll-down	0.1%	−0.2%
Nominal 10-year return	**1.9%**	**3.3%**
Real 10-year bond return	*−0.7%*	*0.1%*
ERP with no mean reversion	**3.4%**	**3.1%**
ERP with mean reversion	**0.1%**	**0.7%**

In valuing a 10-year bond over a 10-year horizon, we look to model a "close to constant maturity" bond by assuming a string of 1-year holding periods of 10-year bonds. This adds a roll return over the next year. Two major changes alter our bond return expectations: (1) With an inverted yield curve, the roll yield swings negative; and (2) with inflation expectations up materially, the real return on bonds has more of a headwind from inflation, which is a tailwind for the nominal return for stocks.

One might expect, then, that because bond yields have moved much more than stock market earnings yields, our ERP is down. If we ignore prospective mean reversion toward historical norms, that is indeed the case; **on an internal rate of return basis, the ERP has softened slightly from 3.4% to 3.1%.** Adjusting for mean reversion, however, we find the opposite: Because mean reversion won't erode equity returns as much as was the case at recent peaks in CAPE ratios (and because mean reversion doesn't much affect 10-year bond returns), **the ERP, with mean reversion toward historical valuation norms, has improved from 0.1% to 0.7%.**

[I later asked Rob to modify his answer, if needed, to reflect the fact that the other participants, responding to a later version of my request, compared the expected equity return to the 10-year Treasury bond yield*—that is, the expected return on a 10-year bond bought today and held to maturity—not the expected return on a bond portfolio managed to have a roughly constant 10-year maturity, which could be different. He responded,* "With an inverted yield curve, the difference in expected returns between a buy-and-hold 10-year Treasury and a rolling 10-year Treasury portfolio is not material, not more than about 0.2%." *—Ed.*]

My 2022 Response:

- 10-year T-Bond: 1.82% yield. Steady state, that's the return.

  Because the duration is less than 10 years, rising yields would boost (not lower) this return. If inflation is 2.6% over the coming decade, and the real yield migrates toward its historical norm of 1.6%, then income will be reinvested at steadily higher rates, pushing the return up by about 0.1% (yep, it moves the needle *that much*) to around 1.9%.

- S&P 500, steady state return of 5.2%. Yield is 1.4%, our expected inflation is 2.6%, and real growth in dividend income (and earnings) is 1.2%. So, *without any mean reversion toward historical valuation norms, the equity return is 5.2% and the ERP is 3.4%.*

  Returning from a current Shiller P/E of 36.9 to a still-expensive level of 27 (halfway to the long-term historical median; for what it's worth, I agree that the long-term median is way too low in today's world) would cost us about 3.2% per annum because of falling valuation multiples. That takes us to 2.0% per annum as a 10-year return expectation, or a 0.1% ERP.

So, with mean reversion halfway to historical norms, the ERP is 0.1%. If this world of negative real yields and nosebleed valuation levels is a long-term sustainable "new normal," I'd expect a 3.4% ERP. But I think our aging demographic increases the likelihood of the former. So, let's go with that number, 0.1%.

Marty Leibowitz

I don't have a fresh new ERP estimate, but my current thinking is that the risk premium needs to include a term that represents some component of the expected growth over the relevant horizon.

This growth term should ideally estimate the real growth after deducting the capital cost of such growth. (See my article with Stan Kogelman and Anthony Bova, "P/E Ratios, Risk Premiums, and the g* Adjustment," *Journal of Portfolio Management*, April 2019.)

To neglect this admittedly hard-to-quantify term is analogous to confounding a discount bond's current yield with its yield to maturity.

Given this point, with the standard risk premium (based on the earnings yield) appearing now to be quite modest, and with the current growth outlook being arguably more muted than usual, the combination of these two terms suggests that the today's risk premium is actually rather low on a historical basis.

Of course, the more fundamental question is whether this risk premium is sufficient to justify the risk inherent in equities.

Mary Ida Compton

On average, I think the ERP is 5%. Thinking about the markets between now and 10 years from now, I expect the US equity market to have outperformed today's 10-year bond yield by about 3% per year.

I believe in mean reversion, which contributes to my expectation of a 5% ERP on average over long periods. I think the ERP is tied to the economic cycle, which includes as subcomponents the growth cycle and the debt cycle. The inflation trajectory presents a layer on top of the cycles to influence the ERP for the coming 10 years.

My estimate is primarily driven by the increase in rates for two reasons. One is that the discount rate is higher, which affects the attractiveness of equities. The second is that the market can choose to get less volatile decent (better than we've had in recent memory) returns from

fixed income for the first time in ages, so I expect higher allocations to that asset class. This will decrease the demand for equities. I also believe there is a recession coming, and I'm not sure of its magnitude. Although the jury is still out on the impact that will have on equities for a decade (you could argue they will go up because Jerome Powell will be happy and cut rates, or you could argue they will go down because of decreased demand), I think the recession will be a headwind.

I consider a different lens that reinforces my opinion. I believe we have recently peaked on the growth rate, in part because debt is no longer nearly free, so we're headed for slower growth, detracting from the 5% average. At the same time, equities seem to be pricing in fairly strong growth. This disconnect also detracts from the 5% average. So—bottom line—3%. Thanks for the opportunity to contribute.

Antti Ilmanen

My updated ERP estimate is 3%.

The most important reason for reducing my estimate by 0.5% is that Treasury yields rose by 1.7% while equity yields rose at best half of that (e.g., the simple cyclically adjusted earnings yield, inverse of the CAPE ratio, rose from roughly 2.75% to 3.5%). Broadly speaking, we have shifted from a world where most long-only assets were expensive because of their low common real riskless discount rate—and any premia beyond riskless rates were ordinary—to a world where the real riskless discount rate has normalized to a positive level. For example, the 10-year TIPS yield has risen by two percentage points, from about −1% to a bit more than 1%. Non-bond assets, in contrast, now have compressed risk premia.

Based on those simple yield changes, I could have reduced my estimate to 2.5%, but I round up my estimate to 3% for two reasons: (1) Our broader capital market estimates, which use somewhat fancier inputs, give a 4% expected real return for US equities and 1% for Treasuries. (2) Although my estimate does not reflect mean-reverting valuations, there clearly was more potential for that to be a negative consideration when the CAPE ratio was in the high 30s than today when it is in the high 20s. As an aside, I suspect that the lowest estimates in this survey from early 2022 will now be revised upward the most if they were predicated on mean-reverting valuations.

Clearly, inflation uncertainty is elevated despite the recent decline in headline inflation rate. Changes in the inflation environment would influence my estimate more, but the impact of higher inflation in the next decade is unclear—it could boost nominal equity returns a little but more likely would reduce real returns. So the net impact on the equity premium is unclear, even if I were to get the inflation forecast right.

Our prediction game focuses on the S&P 500, as did most of the ERP Forum discussion. Let's look a bit more broadly. I'd consider the S&P 500 to still be mildly on the rich side, whether compared to its own history or compared to 10-year TIPS or nominal Treasuries. Some pockets of US equity markets are clearly cheaper (have higher starting yields and likely higher prospective returns), given the wide valuation spread between so-called value stocks and growth stocks. Likewise, many equity markets outside the US are cheaper and seem to have higher prospective returns for the coming decade, especially emerging markets.

Finally, describing the current environment as one of compressed risk premia seems most apt for *private equity* and many other private illiquid asset classes. These are essentially long-duration assets, yet their valuations have not responded much to the 2022 rise in the riskless part of their discount rate from −1% to +1% (or, stated differently, to a less benign funding environment). Even before 2022, increasing inflows into private equity had brought valuations of this asset class close to those in public markets, while fees remained high, thus suggesting that one should not count on an illiquidity premium, net of fees, in private markets.

Tom Philips

My estimate of the ERP has declined.

My current estimate of the nominal return of the S&P 500 for the next decade is 3.62% per annum, and so my estimate of the equity premium relative to the 10-year Treasury yield of 3.54% is 0.08%. I see that you rounded our earlier estimates to the nearest 0.1%, which makes my current estimate of the equity premium for the next decade 0.1%.

The change in my estimate is driven by the following factors:

1. the rise in interest rates from 1.82% to 3.54%, *increasing* the expected return of bonds,
2. the decline in the S&P from 4501 to 4130, contributing to an *increase* in the expected return of stocks, and
3. the decline in the profits of the S&P 500 over the past year (from $197.87 in 2021 to $172.75 in 2022), contributing to a *decrease* in the expected return of stocks.

The combination of the second and third factors has raised my expected return for stocks from 2.6% in early 2022 to 3.62% today, but the expected return of bonds has risen even faster.

Although my estimate is a point estimate using currently available data using the same methodology that I used in February 2022 (see below), I think there is a

better-than-even chance that the realized equity premium will actually be *negative*, for two reasons:

1. I expect corporate profit margins to continue their decline from their 70-year high on account of an increase in protectionism, wages, and government spending that will likely be funded by an increase in taxes, and
2. I expect the *prospective* equity premium to increase over the decade, further depressing the realized premium over that time span.

Note: My February 2022 number was based on the formula 1/(Residual variance weighted average of two expected return estimates)—one estimate based on filtered earnings, the other based on revenues.

Rajnish Mehra

The biggest challenge in making a forecast at a 10-year horizon is Fed policy, which has distorted markets since the global financial crisis. Historically, MV/GDP (that is, the market capitalization of US equities divided by same-year US GDP) was a stationary time series that was mean-reverting. Unfortunately, it is no longer so. (The MV/GDP time series no longer passes the test for stationarity; at a later date, I may revisit the issue with data going back to 1929.)

In light of this, using ratio analysis (P/E, MV/GDP, etc.) and predictive regressions to estimate the equity premium is unlikely to be very informative. At a 10-year horizon, my estimate is revised down to 4.5%–5%, largely because I expect the Fed to gradually let rates revert back to their historical norm.

Jeremy Siegel

Here's my view on the subject. The current P/E of the market is just short of 20, and about 20 is what I believe is equilibrium. Yes, it is higher than the historical P/E, but because of lower real rates, more-liquid markets, and the ease of total diversification, I believe the equilibrium P/E has risen over time. This would be my base case—no mean reversion here. (I have even convinced super-bear Jeremy Grantham of that, although he may not agree with my number!)

A P/E of 20 translates into a 5% earnings yield and hence a 5% expected long-run real return on equities.

For bonds, inflation-compensated bonds (TIPS) are yielding just over 1%.

This makes the equity risk premium, computed in compound returns, between 3.5% and 4%—very healthy in my opinion!

Will Goetzmann

I'm sticking to 5% based on the *very* long-term data.

[*Recall that Professor Goetzmann presented data on the world's oldest public traded company, Honor del Bazacle (also known as Société des Moulins de Bazacle), going back 574 years. —Ed.*]

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The Shrinking Equity Premium

Historical facts and future forecasts.

Jeremy J. Siegel

Few conundrums have caught the imagination of economists and practitioners as much as the "Equity Premium Puzzle," the title chosen by Rajneesh Mehra and Edward Prescott for their seminal 1985 article in the *Journal of Monetary Economics*. Mehra and Prescott show that the historical return on stocks has been too high in relation to the return on risk-free assets to be explained by the standard economic models of risk and return without invoking unreasonably high levels of risk aversion.[1] They calculate the margin by which stocks outperformed safe assets — the *equity premium* — to be in excess of 6 percentage points per year, and claim that the profession is at a loss to explain its magnitude.

There have been many attempts since to explain the size of the equity premium by variations of the standard finance model. I shall not enumerate them here, but refer readers to reviews by Abel [1991], Kocherlakota [1996], Cochrane [1997], and Siegel and Thaler [1997].

I review here the estimates of the equity premium derived from historical data, and offer some reasons why I believe that most of the historical data underestimate the real return on fixed-income assets and overestimate the expected return on equities. I shall also offer some reasons why, given the current high level of the stock market relative to corporate earnings, the forward-looking equity premium may be considerably lower than the historical average.

REAL RETURNS ON "RISK-FREE" ASSETS

From 1889 through 1978, Mehra and Prescott estimate the real return on short-dated fixed-income

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assets (commercial paper until 1920 and Treasury bills thereafter) to have been 0.8%. In 1976 and again in 1982, Roger Ibbotson and Rex Sinquefield formally estimated the real risk-free rate to be even lower — at zero, based on historical data analyzed from 1926. This extremely low level of the short-term real rate is by itself puzzling, and has been termed the "real rate puzzle" by Weil [1989]. The essence of this puzzle is that, given the historical growth of per capita income, it is surprising that the demand to borrow against tomorrow's higher consumption has not resulted in higher borrowing rates.

The low measured level of the risk-free rate may in fact be in part an artifact of the time period examined. There is abundant evidence that the real rate both during the nineteenth century and after 1982 has been substantially higher. Exhibit 1, based on Siegel [1998], indicates that over the entire period from 1802 through 1998, the real compound annual return on Treasury bills (or equivalent safe assets) has been 2.9%, while the realized return on long-term government bonds has been 3.5%. Exhibit 2 presents the historical equity premium for selected time periods for both bonds and bills based on the same data.[2]

EXHIBIT 1
COMPOUND ANNUAL REAL RETURNS (%)
U.S. DATA, 1802-1998

	Stocks	Bonds	Bills	Gold	Inflation
1802-1998	7.0	3.5	2.9	–0.1	1.3
1802-1870	7.0	4.8	5.1	0.2	0.1
1871-1925	6.6	3.7	3.2	–0.8	0.6
1926-1998	7.4	2.2	0.7	0.2	3.1
1946-1998	7.8	1.3	0.6	–0.7	4.2

Source: Siegel [1998] updated.

The danger of using historical averages — even over long periods — to make forecasts is readily illustrated by noting Ibbotson and Sinquefield's long-term predictions made in 1976 and again in 1982 on the basis of their own analysis of the historical data. In 1976, they made predictions for the twenty-five-year period from

EXHIBIT 2
EQUITY PREMIUMS (%) — U.S. DATA, 1802-1998

	Equity Premium with Bonds		Equity Premium with Bills	
	Geometric	Arithmetic	Geometric	Arithmetic
1802-1998	3.5	4.7	5.1	5.5
1802-1870	2.2	3.2	1.9	2.9
1871-1925	2.9	4.0	3.4	4.6
1926-1998	5.2	6.7	6.7	8.6
1946-1998	6.5	7.3	7.2	8.6

Source: Siegel [1998] updated.

1976 through 2000, and in 1982 they made predictions for the twenty-year period from 1982 through 2001. Their forecasts are shown in Exhibit 3. Since we now have data for most of these forecast periods, it is of interest to assess their estimates.

The last two decades have been extremely good for financial assets, so it is not surprising that Ibbotson and Sinquefield underestimate all their real returns. But their most serious underestimation is for fixed-income assets, where they forecast the real bill rate to average essentially zero and the real return on bonds to be less than 2%. Given the standard deviation of estimates, realized annual real bond and bill returns have been 9.9% and 2.9%, respectively, significantly above their estimates. Since negative real returns on fixed-income assets persisted between the two surveys, Ibbotson and Sinquefield more seriously underestimate long-term real bill rates in their 1982 forecasts than they did in 1976.[3]

My purpose here is not to highlight errors in Ibbotson's and Sinquefield's past forecasts. Their analysis was state-of-the-art, and their data have rightly formed the benchmark for the risk and return estimates used by both professional and academic economists. I bring these forecasts to light to show that even the fifty-year history of financial returns available to economists at that time was insufficient to estimate future real fixed-income returns.

It is not well understood why the real rate of returns on fixed-income assets was so low during the 1926-1980 period. The bursts of unanticipated inflation following the end of World War II and during the 1970s certainly had a negative effect on the realized real returns from long-term bonds. Perhaps the shift from a gold standard to a paper monetary standard had a negative effect on these real returns until investors fully adjusted to the inflationary bias inherent in the new monetary standard.[4]

Whatever the reasons, the current yields on the Treasury inflation-protected securities, or TIPS, first issued in 1997 support the assertion that the future real returns on risk-free assets will be substantially above the level estimated over the Ibbotson-Sinquefield period. This is so even when the estimating period includes the higher real rates of the past two decades. In August 1999, the ten- and thirty-year TIPS bond yielded 4.0%, nearly twice the realized rate of return on long-dated government bonds over the past seventy-five years.[5]

The market projects real returns on risk-free assets to be substantially higher in the future than they have been over most of this century. It is also likely that the expected returns in the past are substantially greater than they have turned out ex post, especially for longer-dated securities. If one uses a 3.5% real return on fixed-income assets, the geometric equity premium for a 7.0% real stock return falls to 3.5%.

EXHIBIT 3
LONG-TERM FORECASTS OF REAL RETURNS — COMPOUND ANNUAL RATES OF RETURN

Forecast Period		Stocks	Bonds	Bills	Inflation
1976-2000	Forecast	6.3 (23.5)	1.5 (8.0)	0.4 (4.6)	6.4 (4.8)
	Actual*	11.0	5.3	2.1	4.8
1982-2001	Forecast	7.6 (21.9)	1.8 (8.3)	0.0 (4.4)	12.8 (5.1)
	Actual*	14.6	9.9	2.9	3.3

*Data through 1998.
Standard deviations of annual returns in parentheses.
Source: Ibbotson and Sinquefield [1976, 1982].

HISTORICAL EQUITY RETURNS AND SURVIVORSHIP BIAS

The real return on stocks, as I have emphasized [1998], has displayed a remarkable long-term stability. Over the entire 196-year period that I examine, the long-term after-inflation geometric annual rate of return on equity averages 7.0%. In the 1926-1998 period, the real return has been 7.4%, and since 1946 (when virtually all the thirteenfold increase in the consumer price index over the past two hundred years has taken place) the real return on equity has been 7.8%. The relative stability of long-term real equity returns is in marked contrast to the unstable real returns on fixed-income assets.

Some economists believe the 7% historical real

return on equities very likely overstates the true expected return on stocks. They claim that using the ex post equity returns in the United States to represent returns expected by shareholders is misleading. This is because no investor in the nineteenth or early twentieth century could know for certain that the United States would be the most successful capitalist country in history and experience the highest equity returns.

This "survivorship bias" hypothesis, as it has been called, is examined by Jorion and Goetzmann [1999] in "Global Stock Markets in the Twentieth Century." They conclude that of thirty-nine equity markets that existed in 1921, none of them show as high a real capital appreciation as the United States, and most of them have had substantial disruptions in their operations or have disappeared altogether. They report that the median real capital appreciation of non-U.S. markets has been only 0.8% per year as opposed to 4.3% in the U.S.[6]

But this evidence may be misleading. Total returns of a portfolio, especially over long periods of time, are a very non-linear function of the returns of the individual components. Mathematically it can be shown that if individual stock returns are lognormal, the performance of the *median* stock is almost always worse than the market portfolio performance.[7]

So, it is not surprising that the median performance of individual countries will not match the "world portfolio" or the returns in the dominant market. Jorion and Goetzmann recognize this near the end of their study when they show that compound annual real return on a GDP-weighted portfolio of equities in all countries falls only 28 basis points short of the U.S. return. In fact, because of the real depreciation of the dollar over this time, the compound annual *dollar* return on a GDP-weighted world is actually 30 basis points *higher* than the return on U.S. equities.[8]

But examining international stock returns alone does not give us a better measure of the equity premium. The equity premium measures the *difference* between the returns on stocks and safe bonds. Although stock returns may be lower in foreign countries than the U.S., the real returns on foreign bonds are substantially lower. Almost all disrupted markets experienced severe inflation, in some instances wiping out the value of fixed-income assets. (One could say that the equity premium in Germany covering any period including the 1922-1923 hyperinflation is over 100%, since the real value of fixed-income assets fell to zero while equities did not.)

Even investors who purchased bonds that promised precious metals or foreign currency experienced significant defaults. It is my belief that if one uses a world portfolio of stocks and bonds, the equity *premium* will turn out higher, not lower, than found in the U.S.[9]

TRANSACTION COSTS AND DIVERSIFICATION

I believe that 7.0% per year does approximate the long-term real return on equity indexes. But the return on equity *indexes* does not necessarily represent the *realized* return to the equityholder. There are two reasons for this: transaction costs and the lack of diversification.[10]

Mutual funds and, more recently, low-cost "index funds" were not available to investors of the nineteenth or early twentieth century. Prior to 1975, brokerage commissions on buying and selling individual stocks were fixed by the New York Stock Exchange, and were substantially higher than today. This made the accumulation and maintenance of a fully diversified portfolio of stocks quite costly.

The advent of mutual funds has substantially lowered the cost of maintaining a diversified portfolio. And the cost of investing in mutual funds has declined over the last several decades. Rea and Reid [1998] report a decline of 76 basis points (from 225 to 149) in the average annual fee for equity mutual funds from 1980 to 1997 (see also Bogle [1999, p. 69]). Index funds with a cost of less than 20 basis points per year are now available to small investors.

Furthermore, the risk experienced by investors unable to fully diversify their portfolios made the risk-return trade-off less desirable than that calculated from stock indexes. On a risk-adjusted basis, a less-than-fully diversified portfolio has a lower expected return than the total market.

Given transaction costs and inadequate diversification, I assume that equity investors experienced real returns more in the neighborhood of 5% to 6% over most of the nineteenth and twentieth century rather than the 7% calculated from indexes. Assuming a 3.5% real return on bonds, the historical equity premium may be more like 1.5 to 2.5 percentage points, rather than the 6.0 percentage points recorded by Mehra and Prescott.

PROJECTING FUTURE EQUITY RETURNS

Future stock returns should not be viewed independently of current fundamentals, since the price of

stocks is the present discounted value of all expected future cash flows. Earnings are the source of these cash flows, and the average price-to-earnings (P-E) ratio in the U.S. from 1871 through 1998 is 14 (see Shiller [1989] for an excellent source for this series).

Using data from August 13, 1999, the S&P 500 stock index is 1327, and the mean 1999 estimate for operating earnings of the S&P 500 stock index of fifteen analysts polled by Bloomberg News is $48.47.[11] This yields a current P-E ratio on the market of 27.4. But due to the increased number of write-offs and other special charges taken by management over the last several years, operating earnings have exceeded total earnings by 10% to 15%.[12] On the basis of reported earnings, which is what most historical series report (including Shiller's), the P-E ratio of the market is currently about 32.[13]

There are two long-term consequences of the high level of stock prices relative to fundamentals. Either 1) future stock returns are going to be lower than historical averages, or 2) earnings (and hence other fundamentals such as dividends or book value) are going to rise at a more rapid rate in the future. A third possibility, that P-E ratios will rise continually without bound, is ruled out since this would cause an unstable bubble in stock prices that must burst.

If future dividends grow no faster than they have in the past, forward-looking real stock returns will be lower than the 7% historical average. As is well known from the dividend discount model, the rate of return on stocks can be calculated by adding the current dividend yield to the expected rate of growth of future dividends. The current dividend yield on the S&P 500 index is 1.2%. Since 1871, the growth of real per share dividends on the index has been 1.3%, but since 1946, due in part to a higher reinvestment rate, growth has risen to 2.1%. If we assume future growth of real per share dividends to be close to the most recent average of 2.1%, we obtain a 3.3% real return on equities, less than one-half the historical average.

A second method of calculating future real returns yields a similar figure. If the rate of return on capital equals the return investors require on stocks, the *earnings yield*, or the reciprocal of the price-earnings ratio, equals the forward-looking real long-term return on equity (see Phillips [1999] for a more formal development of this proposition). Long-term data support this contention; a 14 price-to-earnings ratio corresponds to a 7.1% earnings yield, which approximates the long-term real return on equities. The current P-E ratio on the S&P 500 stock index is between 27 to 32, depending on whether total or operating earnings are considered. This indicates a current earnings yield, and hence a future long-term and real return, of between 3.1% to 3.7% on equities.

One way to explain these projected lower future equity returns is that investors are bidding up the price of stocks to higher levels as the favorable historical data about the risks and returns in the equity market become incorporated into investor decisions.[14] Lower transaction costs further enable investors to assemble diversified portfolios of stocks to take advantage of these returns. The desirability of stocks may be further reinforced by the perception that the business cycle has become less severe over time and has reduced the inherent risk in equities.[15]

If these factors are the cause of the current bull market, then the revaluation of equity prices is a one-time adjustment. This means that future expected equity returns should be lower, not higher, than in the past. During this period of upward price adjustment, however, equity returns will be higher than average, increasing the historical measured returns in the equity market.

This divergence between increased historical returns and lower future returns could set the stage for some significant investor disappointment, as survey evidence suggests that many investors expect future returns to be higher, not lower, than in the past (see "PaineWebber Index of Investor Optimism" [1999]).

SOURCES OF FASTER EARNINGS GROWTH

Although the increased recognition of the risks and returns to equity may be part of the explanation for the bull market in stocks, there must be other reasons. This is because the forward-looking rates of return we derive for equities fall below the current 4.0% yield on inflation-protected government bonds. Although one could debate whether in the long run stocks or *nominal* bonds are riskier in real terms, there should be no doubt that the inflation-protected bonds are safer than equities and should have a lower expected return.

Hence, some part of the current bull market in stocks must be due to the expectations that future earnings (and dividend) growth will be significantly above the historical average. Optimists frequently cite higher growth of real output and enhanced productivity, enabled by the technological and communications revolution, as the source of this higher growth. Yet the long-run relation between the growth of real output and *per share* earn-

ings growth is quite weak on both theoretical and empirical grounds. Per share earnings growth has been primarily determined by the reinvestment rate of the firm, or the earnings yield minus the dividend yield, not the rate of output growth.[16]

The reason why output growth does not factor into per share earnings growth is that new shares must be issued (or debt floated) to cover the expansion of productive technology needed to increase output. Over the long run, the returns to technological progress have gone to workers in the form of higher real wages, while the return per unit of capital has remained essentially unchanged. Real output growth could spur growth in per share earnings only if it were "capital-enhancing," in the growth terminology, which is contrary to the labor-augmenting and wage-enhancing technological change that has marked the historical data (see Diamond [1999] for a discussion of growth and real return).

But there are factors that may contribute to higher future earnings growth of U.S. corporations, at least temporarily. The United States has emerged as the leader in the fastest-growing segments of the world economy: technology, communications, pharmaceuticals, and, most recently, the Internet and Internet technology. Furthermore, the penetration of U.S. brand names such as Coca-Cola, Procter & Gamble, Disney, Nike, and others into the global economy can lead to temporarily higher profit growth for U.S. firms.

Nonetheless, the level of corporate earnings would have to double to bring the P-E ratio down to the long-term average, or to increase by 50% to bring the P-E ratio down to 20. A 20 price-to-earnings yield corresponds to a 5% earnings yield or a 5% real return, a return that I believe approximates realized historical equity returns after transaction costs are subtracted. For per share earnings to temporarily grow to a level 50% above the long-term trend is clearly possible in a world economy where the U.S. plays a dominant role, but it is by no means certain.

CONCLUSION

The degree of the equity premium calculated from data estimated from 1926 is unlikely to persist in the future. The real return on fixed-income assets is likely to be significantly higher than that estimated on earlier data. This is confirmed by the yields available on Treasury inflation-linked securities, which currently exceed 4%. Furthermore, despite the acceleration in earnings growth, the return on equities is likely to fall from its historical level due to the very high level of equity prices relative to fundamentals.[17]

All of this makes it very surprising that Ivo Welch [1999] in a survey of over 200 academic economists finds that most estimate the equity premium at 5 to 6 percentage points over the next thirty years. Such a premium would require a 9% to 10% real return on stocks, given the current real yield on Treasury inflation-indexed securities. This means that real per share dividends would have to grow by nearly 8.0% to 9.0% per year, given the current 1.2% dividend yield, to prevent the P-E ratio from rising farther from its current record levels. This growth rate is more than six times the growth rate of real dividends since 1871 and more than triple their growth rate since the end of World War II.

Unless there is a substantial increase in the productivity of capital, dividend growth of this magnitude would mean an ever-increasing share of national income going to profits. This by itself might cause political ramifications that could be negative for shareholders.

ENDNOTES

This article is adapted from a paper delivered at the UCLA Conference, "The Equity Premium and Stock Market Valuations," and a Princeton Center for Economic Policy Studies Conference, "What's Up with the Stock Market?" both held in May 1999. The author thanks participants in these seminars and particularly Jay Ritter, Robert Shiller, and Peter L. Bernstein for their comments.

[1]A few economists believe these high levels of risk aversion are not unreasonable; see, e.g., Kandel and Stambaugh [1991].

[2]In the capital asset pricing model, equity risk premiums are derived from the *arithmetic* and not geometric returns. Compound annual geometric returns are almost universally used in characterizing long-term returns.

[3]Their wildly high 12.8% long-term inflation estimate in 1982 is derived by subtracting their low historical real yield from the high nominal bond rate. This overprediction has no effect on their estimated *real* returns.

[4]But real rates on *short-dated* bonds, for which unanticipated inflation should have been less important, were also extremely low between 1926 and 1980.

[5]I am very persuaded by the research of Campbell and Viceira [1998], who argue that in a multiperiod world the proper risk-free asset is an inflation-indexed annuity rather than the short-dated Treasury bill. This conclusion comes from intertemporal models where agents desire to hedge against unanticipated changes in the real rate of interest. The duration of such an indexed annuity is closely approximated by the ten-year inflation-indexed bonds.

[6]They are unable to construct dividend series for most foreign countries, but they make a not-unreasonable assumption that dividend yields in the U.S. were at least as high as abroad.

[7]Intuitively, the return of the winners more than compensates for the lower returns of the more numerous losers.

[8]Furthermore, the dollar return on the foreign portfolio is much better measured than the real return. These data are taken from Jorion and Goetzmann [1991], Tables VI and VII.

[9]To avoid the problems with default, gold is considered the "risk-free" alternative in many countries. But gold's long-term real returns are negative in the U.S. even before one considers storage and insurance costs. And precious metals are far from risk-free in real terms. The real return on gold since 1982 has been a negative 7% per year.

[10]I abstract from taxes, which reduce the return on both bonds and stocks.

[11]These data were taken from the Bloomberg terminal on August 16, 1999.

[12]From 1970 through 1989, operating earnings exceeded reported earnings by an average of 2.29%. Since 1990, the average has been 12.93%.

[13]There are other factors that distort reported earnings, some upward (underreporting option costs: see Murray, Smithers, and Emerson [1998]) and some downward (overexpensing R&D; see Nakamura [1999]). No clear bias is evident.

[14]This is particularly true on a long-term, after-inflation basis. See Siegel [1998, Chapter 2].

[15]Bernstein [1998] has emphasized the role of economic stability in stock valuation. Also see Zarnowitz [1999] and Romer [1999]. Other reasons given for the high price of equities rely on demographic factors, specifically the accumulations of "baby boomers." This should, however, reduce both stock and bond returns, yet we see real bond returns as high if not higher than historically.

[16]From 1871 to 1998, the growth of real per share earnings is only 1.7% per year, slightly less than obtained by subtracting the median dividend yield of 4.8% from the median earnings yield of 7.2%.

[17]This should not be construed as predicting that equity prices need fall significantly, or that the expected returns on equities are not higher, even at current levels, than those on fixed-income investments.

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REVISITING THE EQUITY RISK PREMIUM

Laurence B. Siegel and Paul McCaffrey

June 2023

Overview

In 2001, Martin Leibowitz organized an Equity Risk Premium (ERP) Forum for CFA Institute, in which the participants discussed issues related to the ERP and made estimates for the future. This forum was repeated by Leibowitz, Brett Hammond, and Laurence Siegel in 2011, setting a precedent for a decennial forum. Siegel organized and moderated the discussion in 2021, and the proceedings from that event make up the current book.

The participants in 2021 were (in alphabetical order) Robert Arnott, Clifford Asness, Mary Ida Compton, Elroy Dimson, William Goetzmann, Roger Ibbotson, Antti Ilmanen, Martin Leibowitz, Rajnish Mehra, Thomas Philips, and Jeremy Siegel. Each participant made a presentation, which was then discussed by the whole group. Finally, a roundtable discussion involving all of the participants was moderated by Laurence Siegel.

Ibbotson and Dimson discussed historical returns in different countries. Ibbotson focused on the United States, while Dimson took a global industrial-country view. The history goes back almost a century (Ibbotson) or more than a century (Dimson), providing a look at how returns have evolved over a wide variety of conditions. Ibbotson also presented his method for making probabilistic forecasts of returns. Dimson, who is British, showed that "American exceptionalism" is one way to understand the results.

Asness looked at the effectiveness of Robert Shiller's CAPE (cyclically adjusted price-earnings ratio) valuation measure for forecasting. Valuations rose over the period he studied, and a lively discussion was had about why this may have occurred. Arnott focused on the growth rate of dividends, which has been very slow in per-share terms, and argued (with much debate from the other participants) that buybacks are only a partial substitute for dividends. Leibowitz, also looking at valuation as the lodestone of return forecasts, set forth a "growth adjustment" that brought his forecast in line with those made by others.

Compton, a consultant to pension plans, discussed the challenges of communicating lower expected returns to clients. She also emphasized that expected returns "don't always come true," they're just someone's best forecast.

Ilmanen broke up the expected return into its component parts: dividends, real growth, inflation, and so forth. Doing this, he said, allows one to debate the estimates for each part and ascertain how accurate each of the estimates is. Philips started by presenting a method for forecasting bond returns. He then turned to equities, for which he compared forecasts with subsequent realizations using a variety of forecast methods.

Mehra discussed a number of issues related to the existence of premiums (equity risk, value, small cap, and so forth) and concluded that, although some of these are unstable, the ERP is highly stable. Jeremy Siegel advocated a "back to basics" approach using dividend and earnings yields, dividend and earnings growth rates, payout ratios, and price-to-earnings ratios. He emphasized that earnings can be calculated in a number of different way, and said that accounting practices have become more conservative over the years.

Goetzmann concluded the session by reporting that one company, a water mill in France, had almost 600 years of historical return data and that an asset pricing model could be tested using those data. According to this model, the stock price is the present value of expected future dividends and is supported by the evidence.

In sum, because of high valuations and low interest rates, the participants expect lower total returns in the future than in the past. A forward-looking ERP of 4% to 5% was the consensus of the group.

US corporate-bond spreads tipped to remain low even as Fed scales back support

Monday, June 7, 2021 12:49 PM ET

By Peter Brennan
Market Intelligence

U.S. investment-grade corporate bonds are as expensive as they have been since 2018 as the gap between yields for company credit and government debt has fallen to its lowest point since then.

The difference is tipped to remain near its current low even as the Federal Reserve starts to scale back the policies designed to boost companies' liquidity during the pandemic, experts say.

"Spreads are tight and will remain tight for the foreseeable future. But they're tight for a reason," David Sekera, chief U.S. market strategist at Morningstar, said in an interview. "Default rates should remain low for the next couple of years in our view, and we would expect to see more [credit rating] upgrades than downgrades."

The ICE Bank of America U.S. Corporate Index Option-Adjusted Spread — a closely watched measurement of the premium an investor receives for the added risk of holding corporate bonds rather than Treasurys — narrowed to 90 basis points on June 2, as a recovering economy makes Corporate America an increasingly safe bet.

The recent low in spreads matched a brief drop to the same level in early 2018, which was the lowest point since 2007. Bond yields fall as prices rise, meaning higher-priced corporate bonds push yields for that debt lower.

US corporate bond spread at tightest level since 2007

Data as of June 2, 2021.
ICE Bank of America U.S. Corporate Index Option-Adjusted Spread.
Calculated as the difference between a computed option-adjusted spread index of all bonds in a given rating category and a spot Treasury curve.
Source: Federal Reserve Bank of St. Louis

Investors expect an improving economy, stable outlook for interest rates and a reduced supply of bonds to keep spreads low, even if the Fed begins to tighten the loose monetary policy it adopted during the pandemic to support

liquidity in credit markets.

"A well-telegraphed and highly anticipated tapering by the Fed is unlikely to have a marked impact on corporate credit spreads," Gene Frieda, global strategist at PIMCO, said in an email. "As long as the Fed communicates a belated and gradual process of interest rate hikes well beyond the period of tapering, we expect spreads to remain well contained."

Fed no longer a backstop

The spread exploded when COVID-19 reached the U.S., rising from a pre-pandemic level of 102 bps to a peak of 401 bps on March 23, 2020, as investors anticipated a rise in corporate defaults. The Fed then pumped trillions of dollars into financial markets to restore liquidity in debt markets, lowering borrowing costs for companies.

> ***READ MORE:*** *Sign up for our weekly coronavirus newsletter here, and read our latest coverage on the crisis here*.

The central bank acted as a backstop for the bond markets during the pandemic, primarily through its $120 billion monthly asset purchases. While the program principally targeted Treasurys rather than corporate bonds, each time the Fed hoovers up a government bond, the seller needs to reallocate their cash, diverting capital toward other assets, such as corporate bonds, and allowing companies to borrow.

The question of when the Fed will eventually taper its bond-buying program is dominating financial markets even though Chairman Jerome Powell is adamant that the governing council is not even discussing scaling back purchases.

One of the central bank's smaller economic support programs will soon end. The Federal Reserve Board announced June 2 its plans to begin winding down the Secondary Market Corporate Credit Facility, through which the Fed holds $13.7 billion of outstanding corporate bonds and ETF holdings. The Federal Reserve Bank of New York will handle the sell-off, which is expected to begin June 7.

The gradual unwinding of the program "will hardly be a rounding error on the Fed's balance sheet," Marc Chandler, chief market strategist at Bannockburn Global Forex, wrote in a June 3 market commentary, and investors do not expect corporate bond spreads to change dramatically even when the main bond-buying program slows down.

Improving credit fundamentals

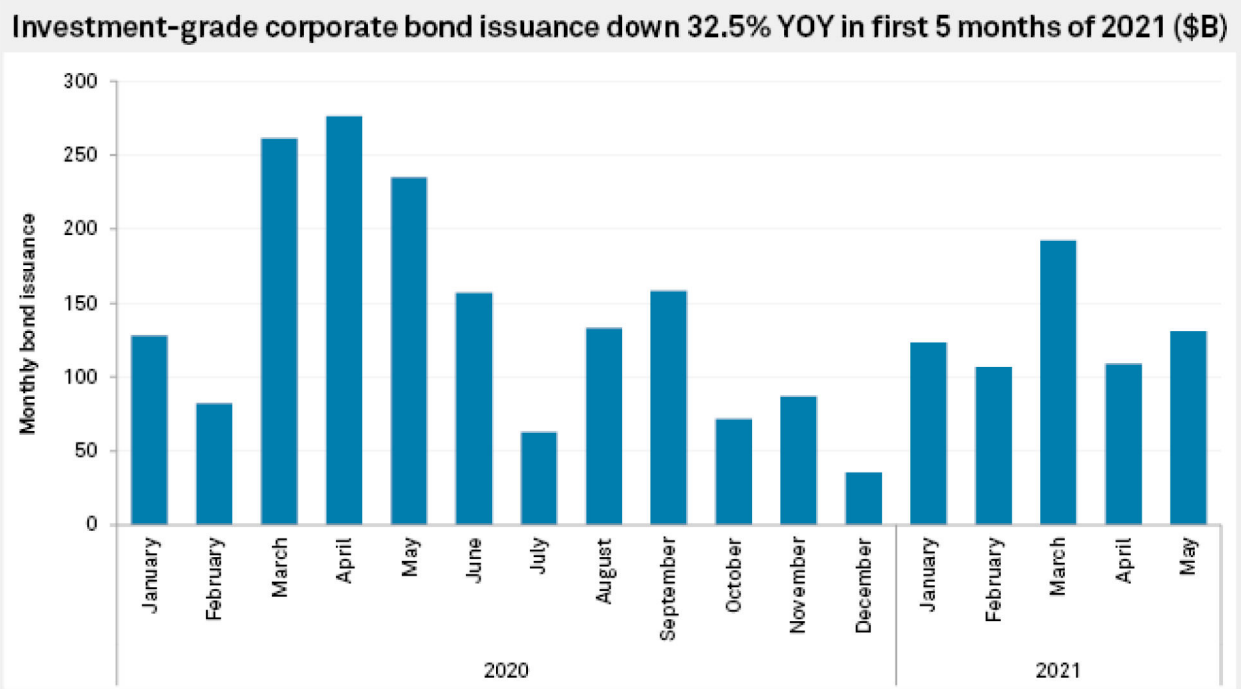
The main threat to the outlook for corporate spreads is if interest rates rise, according to Morningstar's Sekera, though the Fed does not expect to raise rates until 2023.

The prospect of a rate hike was compared to an oncoming "steamroller" by Viktor Hjort, global head of credit strategy at BNP Paribas. "But that steamroller is likely far away leaving plenty of pennies to pick up and coupons to clip," Hjort said in an email.

The accelerating relaxation of social distancing measures and reopening of the economy is removing much of the risk in the corporate sector, which has already done much to improve its financial position. High cash ratios and increasing interest coverage ratios highlight a healthy business environment, even as debt levels rose over the course of the pandemic.

Bolstered by high cash levels, many companies have less need to issue bonds than they had in 2020 — a year of record issuance forced by lost revenues — reducing the supply-side pressure on spreads. Fewer bonds mean fewer assets for investors to buy, pushing up prices and lowering yields.

Bond issuance by investment-grade rated companies is down 32.5% year over year in the first five months of 2021 to $662.14 billion, according to LCD. While this is still a historically high level — 35.3% higher than in 2019 — the volume of issuance should be easily absorbed by the market, according to BNP Paribas' Hjort.



Data as of June 2, 2021.
Total volume of bonds issued by investment-grade rated companies.
Source: LCD, an offering of S&P Global Market Intelligence

Investors are also backing companies with lower credit ratings. The ICE Bank of America U.S. High Yield Index Option-Adjusted Spread hit a three-year low of 324 basis points in April and has hovered around that level since, ending June 4 at 328 bps. This means bonds are relatively expensive for investors, and the cost of borrowing is relatively low for non-investment-grade-rated companies.

"We believe the [high-yield] asset class should be supported by the continued search for yield amid accommodative global central bank policies, and default risks should abate as social activity normalizes and growth and earnings recover," Mark Haefele, global chief investment officer at UBS Wealth Management, said in a May 26 research note.

The recovery in credit is reflected by the number of rising stars — companies upgraded from non-investment-grade credit ratings to investment grade — outpacing the number of fallen angels by seven to two so far in 2021, with companies such as WPX Energy Inc., Parsley Energy LLC and Advanced Micro Devices Inc. all being upgraded.

7 rising stars so far in 2021

Issuer	To	From	Sector/subsector	Rated debt affected ($B)
WPX Energy Inc.	BBB-	BB-	Oil and gas	4.8
Parsley Energy LLC	BBB	BB	Oil and gas	4.8
Advanced Micro Devices Inc.	BBB-	BB+	High technology	1.3
QEP Resources Inc.	BBB-	B	Oil and gas	1.6
PulteGroup Inc.	BBB-	BB+	Homebuilders/real estate companies	2.1
MDC Holdings Inc.	BBB-	BB+	Homebuilders/real estate companies	0.9
Qorvo Inc.	BBB-	BB+	High technology	1.6

2 fallen angels so far in 2021

Issuer	To	From	Sector/subsector	Rated debt affected ($B)
Host Hotels & Resorts Inc.	BB+	BBB-	Media and entertainment	4.8
Hexcel Corp.	BB+	BBB-	Aerospace and defense	0.7

Data as of June 2, 2021.
Fallen angels are investment-grade issuers currently with bonds outstanding that have been downgraded to speculative-grade (i.e., from 'BBB-' or above to 'BB+' or below).
Rising stars are speculative-grade issuers currently with bonds outstanding that have been upgraded to investment-grade (i.e., from 'BB+' and below to 'BBB-' and above).
Includes all rated issuers with valid outstanding debt at the time of the ratings action.
Sectors defined by S&P Global Ratings.
Source: S&P Global Ratings

BNP forecasts the amount of rising star debt in 2021 to grow from the current $17.1 billion to $80 billion. And while high-yield issuance is up 68.5% year over year at $246.8 billion, according to LCD, BNP Paribas does not expect BBs — the highest rated tranche rated below investment-grade — to increase the supply of bonds to the same extent as single-Bs and loans.

"Such low level of vulnerability means it will have to take unusually dramatic shocks to move spreads widely in either direction," Hjort said.

LCD is an offering of S&P Global Market Intelligence.

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Beat It (or Don't): An Update to a Chilly Earnings Season

February 6, 2023 Liz Ann SondersKevin Gordon

In the face of persistent macro headwinds, earnings growth continues to deteriorate, putting the fundamental backdrop for the market at risk.

With fourth-quarter earnings season now in full swing (half of S&P 500 members have reported results at the time of this report's publishing), it's worth taking stock of the outcome thus far. Overall, results continue to skew less impressive, with downward momentum building for the blended growth rate, beat rate, and percentage by which companies are beating estimates. Profits haven't been apocalyptic by any means, but it's worth noting that the bar has been lowered significantly of late—thus making "beats" seem less severe and "misses" that much gloomier.

The latest Refinitiv data show a blended earnings growth rate (already-reported earnings combined with forward estimates of what is still to be reported) of -2.8%, and as has been the case for the past year, the rate drops significantly (to -7%) when excluding the Energy sector. The percentage of companies beating estimates has fallen to 69.3%, down from the average of 76% over the prior four quarters, but above the long-term average (since 1994) of 66%. The "surprise" factor—the percentage by which companies are beating estimates—has fallen to 1.2%. That compares to an average of 5.3% over the prior four quarters and a long-term average (since 1994) of 4.1%.

As shown in the table below, the Energy sector is yet again outpacing its peers with a growth rate of 59.8%, while Communication Services is decisively in last place with a decline of -27.2%. In fact, the latter has the lowest beat rate and surprise factor among all sectors, along with the largest deterioration in consensus estimates for overall growth relative to last April. Conversely, even though earnings growth for Utilities isn't the strongest, the sector currently has the highest beat rate and surprise factor among its peers.

Earnings weakness persists

S&P 500 y/y earnings by sector										
Sector	**1Q22**	**2Q22**	**3Q22**	**4Q22**	**1Q23**	**2Q23**	**3Q23**	**4Q23**	**FY22**	**FY23**
Consumer Discretionary	-27.9%	-12.1%	13.3%	-12.1%	32.1%	30.5%	14.9%	15.2%	-9.6%	23.1%
Consumer Staples	7.9%	2.2%	1.3%	-3.3%	-1.5%	6.4%	8.0%	10.0%	1.8%	5.8%
Energy	269.5%	295.5%	140.9%	59.8%	20.3%	-31.0%	-25.4%	-9.9%	154.1%	-15.0%
Financials	-17.1%	-19.3%	-16.4%	-10.7%	5.7%	10.3%	18.1%	14.7%	-15.8%	11.8%
Health Care	18.3%	8.7%	1.5%	-2.8%	-15.3%	-10.4%	-4.3%	1.3%	6.3%	-7.0%
Industrials	40.5%	31.6%	19.6%	40.7%	19.4%	3.0%	13.7%	8.3%	32.5%	10.2%
Materials	46.3%	17.5%	-7.8%	-20.1%	-28.4%	-22.0%	-3.5%	4.3%	8.8%	-15.2%
Real Estate	25.5%	13.1%	14.8%	7.3%	-5.7%	-1.9%	-4.3%	6.8%	15.4%	-1.6%
Technology	14.6%	1.5%	-0.2%	-9.5%	-11.9%	-3.5%	2.0%	13.1%	1.1%	0.1%
Communication Services	-2.8%	-20.3%	-26.1%	-27.2%	-10.1%	7.3%	22.0%	31.0%	-19.9%	9.2%
Utilities	24.6%	-3.7%	-7.0%	4.4%	-8.1%	4.2%	11.8%	22.1%	3.0%	6.4%
S&P 500	**11.4%**	**8.4%**	**4.4%**	**-2.8%**	**-2.9%**	**-2.8%**	**3.4%**	**9.9%**	**5.2%**	**1.9%**
S&P 500 ex-Energy	**5.2%**	**-2.1%**	**-3.3%**	**-7.0%**	**-4.8%**	**1.4%**	**7.5%**	**12.2%**	**-1.8%**	**3.9%**

Source: Charles Schwab, I/B/E/S data from Refinitiv, as of 2/6/2023.

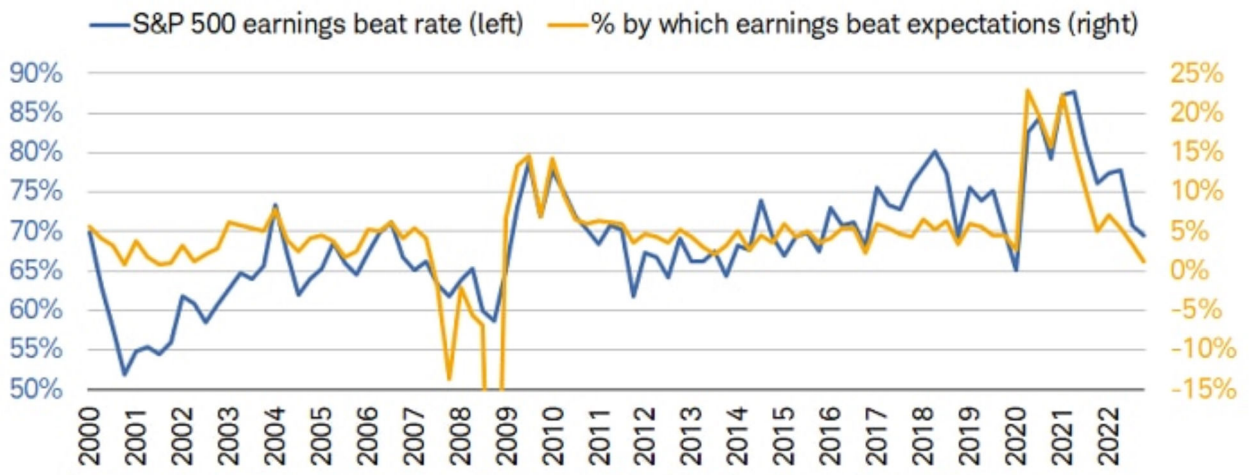
Forecasts contained herein are for illustrative purposes only, may be based upon proprietary research and are developed through analysis of historical public data. **Past performance is no guarantee of future results.**

A closer look at the table's third row shows what looks to be a troubling road ahead for the Energy sector, given estimates for double-digit percentage declines starting in the second quarter of this year. Much of that is due to steep year-over-year comparisons as opposed to a significant deterioration in underlying fundamentals. In fact, Energy is the only sector with a consensus estimate for earnings growth higher today than it was last April. The worst deterioration has been concentrated in large-cap growth sectors like Communication Services, Tech, and Consumer Discretionary (worth noting given they will start to face relatively easy base effects this year).

Surprise party of none

As mentioned, a glaring feature of this earnings season has been an unimpressive showing for the beat rate and surprise factor. Both are shown in the chart below—plotted on different axes—to underscore not only how swiftly they've fallen, but that they're at risk of falling further into recessionary territory. In fact, the current surprise factor of 1.2% is the lowest since the fourth quarter of 2008. We're nowhere near the drop seen back then (-55.4%), but it's still worth noting given the bounce back during the pandemic has been completely reversed.

Pandemic beat boom over

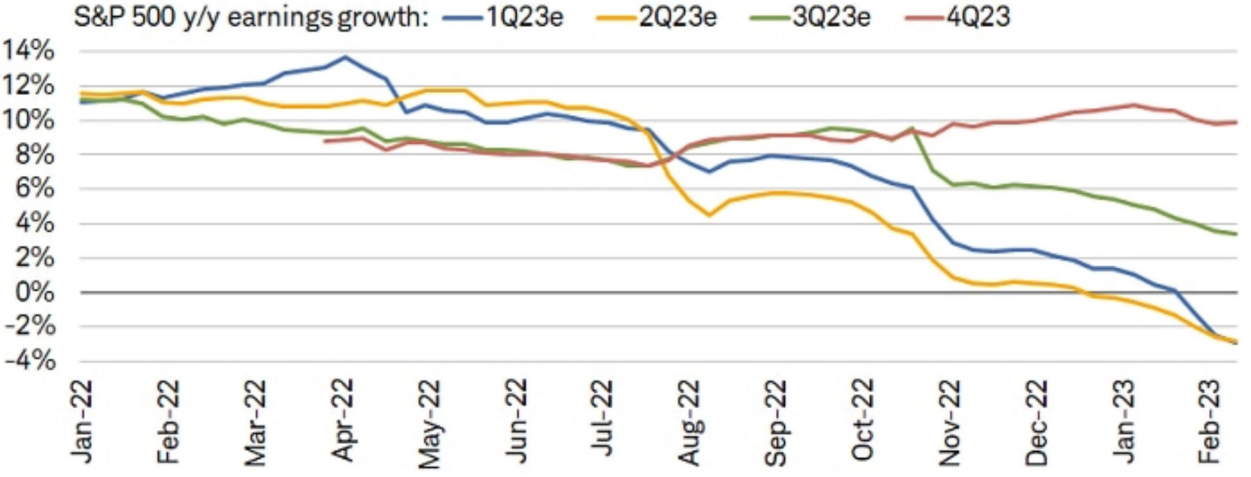


Source: Charles Schwab, I/B/E/S data from Refinitiv, as of 2/6/2023.

Right y-axis truncated for visual purposes.

We've been vocal—particularly, over the past couple quarters—about the risk that earnings present to the market moving forward, namely because analysts (up until now) have been quite slow to cut forward estimates. As shown in the chart below, it wasn't until the end of 2022 that estimates for the first half of this year fell sharply. The upside is analysts are adjusting to reality in the near term, but the downside is they are likely still too optimistic looking further out—evidenced by the relatively sanguine outlook for the fourth quarter of 2023.

Pace of downward revisions accelerates



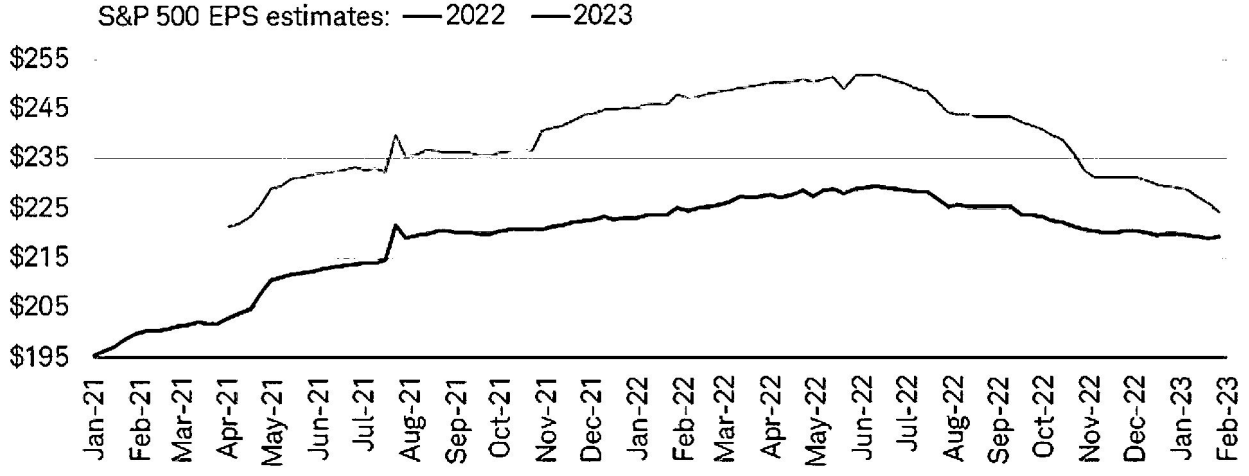
Source: Charles Schwab, I/B/E/S data from Refinitiv, as of 2/6/2023.

Forecasts contained herein are for illustrative purposes only, may be based upon proprietary research and are developed through analysis of historical public data.

Maybe next year

Upping the pace of negative revisions in the first half of the year has brought estimates for calendar year (CY) 2023 earnings down quite rapidly. As shown in the chart below, the consensus estimate for the overall dollar amount of earnings this year has fallen to $224, down markedly from the peak of $252 and relatively close to CY 2022's $219.

2023 estimates down sharply



Source: Charles Schwab, I/B/E/S data from Refinitiv, as of 2/6/2023.

Forecasts contained herein are for illustrative purposes only, may be based upon proprietary research and are developed through analysis of historical public data.

As is implied by the chart above, estimates still point to positive earnings growth by the end of this year, which we think is unlikely. Not only does the downward momentum in revisions give little support for a pop in growth this year, but there are several macro headwinds keeping pressure on profits. The lagged impact of tighter monetary policy is

still working through the economy and input costs remain high for many segments of the market; in the face of decelerating growth, that continues to weigh on productivity.

Not only that, but leading economic indicators continue to show increasingly less support (if any at all) for earnings growth. To wit:

- The Leading Economic Index (LEI) from The Conference Board is contracting by -6% year-over-year and has fallen on a month-over-month basis for 10 consecutive months (a streak only seen during recessions).

- The ISM Manufacturing Index's new orders component has fallen further into contraction and is at its lowest since the pandemic began.

- Rapid disinflation on the goods side of the economy is sending a worrisome signal for revenue and profits, especially given S&P revenue growth in 2022 was mostly due to high inflation (unit growth was mediocre).

- Homebuilder sentiment—though ticking up slightly of late—remains far from its peak and has collapsed at a rate only seen during recessions.

In sum

There are indeed likely brighter days ahead for earnings and the stock market's trajectory, but we need to see confirmation from leading indicators (those listed above among them) that growth is turning a healthy corner before asserting high conviction that risk assets are out of the woods. Of course, in the eyes of the Federal Reserve, an eventual bounce in growth must happen without a worrisome resurgence in inflationary pressures. If that isn't the case, the case for a hard landing strengthens considerably.

We continue to think the economy will suffer from rolling recessions, evidenced by the fact that corporate earnings growth is now entering its downturn (nearly a full year after

housing entered its own recession). With a shrinking number of companies maintaining strength on the bottom line, investors should keep their focus on segments of the market that are high-quality in nature—namely, those with positive earnings revisions, healthy profit margins, and strong balance sheets.

The Equity Risk Premium: An Annotated Bibliography

Zhiyi Song, CFA
Greenwich Alternative Investments
Hong Kong

The equity risk premium is broadly defined as the difference between the expected total return on an equity index and the return on a riskless asset. The magnitude of the equity risk premium, arguably the most important variable in financial economics, affects the asset allocation decisions of individual and institutional investors, and the premium is a critical factor in estimating companies' costs of capital. This literature review explores research by academics and practitioners on this topic during the past three decades.

The equity risk premium (or, simply, equity premium) is broadly defined as the difference between the expected total return on an equity index and the return on a riskless asset. (Which index and which riskless asset need to be defined precisely before numerically estimating this premium.) The equity premium is considered the most important variable in financial economics. The magnitude of the equity premium strongly affects the asset allocation decisions of individual investors and institutional investors, including pensions, endowment funds, foundations, and insurance companies, and is a critical factor in estimating companies' costs of capital.

History of Research on the Equity Risk Premium

The topic of the equity risk premium (ERP) has attracted attention from academics and practitioners. There are three major themes in the intellectual history of the equity premium. The first theme builds on Gordon and Shapiro's suggestion that a dividend discount model (DDM) be used to estimate the required return on capital for a corporate project, and, by extension, the expected return on an equity (if the equity is fairly priced).[1] Specifically, the DDM says that expected total equity return equals the dividend yield plus the expected dividend growth rate; the equity premium is this sum minus the riskless rate. The DDM was widely used by practitioners to estimate the equity premium until Ibbotson and Sinquefield (1976) introduced a different approach based on historical returns. An early work by Diermeier, Ibbotson, and Siegel (1984) attempted to bolster the use of the DDM for long-range forecasting, but it was not widely used; the recent, and quite remarkable, revival of the DDM as an estimator of the equity premium dates back only to the late 1990s.

The second theme arose from Ibbotson and Sinquefield's 1976 article, which decomposed historical returns on an equity index into a part attributable to the riskless rate and a part attributable to the equity premium. The arithmetic mean of the equity premium part is assumed to be stationary—that is, the same in the future as in the past. Thus, if equities had beaten riskless Treasury bills by an arithmetic mean margin of 7 percent a year over the historical measurement period, which was usually 1926 through the then-current time, then equities were forecast to beat bills by the same amount in the future. This approach dominated practitioners' estimates of the equity premium starting in the late 1970s, but its influence has faded recently, under attack from both the DDM and the "puzzle" literature that began with Mehra and Prescott (1985).

Mehra and Prescott's 1985 article, "The Equity Premium: A Puzzle," began a third theme. The puzzle they described is that the historical equity risk premium during the period of 1889–1978 (or any other similarly long period, such as 1926 to the present) was too high, by at least an order of magnitude, to be explained by standard

[1] Myron J. Gordon and Eli Shapiro, "Capital Equipment Analysis: The Required Rate of Profit," *Management Science*, vol. 3, no. 1 (October 1956):102–110.

"general equilibrium" or "macroeconomic" asset-pricing models. Using these models, such a high premium can only be explained by a very high coefficient of risk aversion, one in the range of 30 to 40. Risk aversion parameters observed in other aspects of financial behavior are around 1. So, Mehra and Prescott argued, either the model used to describe investors' behavior is flawed or equity investors have received a higher return than they expected.

We call the asset-pricing models referenced by Mehra and Prescott (1985) "macroeconomic" because they originated in that specialty, but more importantly to distinguish them from asset-pricing models commonly used in investment finance—such as the capital asset pricing model, the three-factor Fama–French model, and arbitrage pricing theory—that are silent on the absolute size of the risk premium (in fact, requiring it as an input) and that distinguish instead among the expected *relative* returns on specific securities or portfolios.

The rest of this introductory essay focuses on attempts to resolve the equity premium "puzzle" identified by Mehra and Prescott (1985). Their "puzzle" has stimulated a remarkable response in the academic literature. Most practitioners today, however, use estimates of the equity premium that emerge from the DDM—the earliest method. Moreover, practitioner debates tend to focus on which DDM estimate to use and the extent to which the estimate should be influenced by historical returns, not the question of whether either the DDM or the historical approach can be reconciled with that of Mehra and Prescott. Reflecting practitioners' concerns, this annotated bibliography covers all three major themes in the literature.

Reconciling the "Puzzle"

Research on the question of why the realized equity premium was so large can be grouped into two broad categories: (1) studies alleging bias in the historical data and (2) studies suggesting improvements in the macroeconomic model. A third category, studies that set forth methods for estimating for the equity risk premium *independent* of the macroeconomic model, is also addressed in this review.

Biases in Historical Data. Potential biases in the historical data vary from survivorship bias and variations in transaction and tax costs to the choice of short-term bills versus long-term bonds as the riskless asset.

- *Survivorship bias.* Brown, Goetzmann, and Ross (1995) argued that the historical equity premium calculated using U.S. data is likely to overstate the true (expected) premium because the U.S. stock market turned out to be the most successful in world history. However, Dimson, Marsh, and Staunton (2006) examined stock and bond returns using data from 1900 to 2005 for 17 countries and concluded that the high historical equity premium obtained for the United States is comparable with that of other countries.
- *Transaction costs, regulations, and taxes.* McGrattan and Prescott (2001) suggested that the higher historical equity premium is mainly because of a large run-up in the equity price caused by the sharp decline in the tax rate on dividends. In their 2003 article, they claimed that the equity premium is less than 1 percent after accounting for taxes, regulations, and costs.
- *Short-term bills vs. long-term bonds as the riskless asset.* McGrattan and Prescott (2003) argued that short-term bills provide considerable liquidity services and are a negligible part of individuals' long-term debt holdings. As a result, long-term bonds should be used as the riskless asset in equity premium calculations. Siegel (2005) argued that the riskless asset that is relevant to most investors (that is, to long-term investors) is "an annuity that provides a constant real return over a long period of time" (p. 63). And the return on long-term inflation-indexed government bonds is the closest widely available proxy for such an annuity.
- *Unanticipated repricing of equities.* Bernstein (1997) suggested that because equities started the sample period (which begins in 1926) at a price-to-earnings ratio (P/E) of about 10, and ended the period at a P/E of about 20, the actual return on equities was higher than investors expected or required. Thus, the historical return overstates the future expected return. This finding was bolstered by Fama and French (2002), who used the DDM to show that investors expected an equity risk premium of about 3 percent, on average, from 1926 to the present.
- *Unanticipated poor historical bond returns.* Historical bond returns may have been biased downward because of unexpected double-digit inflation in the 1970s and 1980s (Arnott and Bernstein 2002; Siegel 2005). However, subsequent disinflation and declines in bond yields have caused the bond yield to end the historical study period only a little above where it started, thus mostly negating the validity of this objection.

Improvements in the Theoretical Model. The second broad category of research on the equity risk premium is a large body of literature exploring a variety of improvements in the original Mehra and Prescott (1985) model.

- *Rare events.* Rietz (1988) suggested that the ERP puzzle can be solved by incorporating a very small probability of a very large drop in consumption. If such a probability exists, the predicted equity premium is large (to compensate investors for the small risk of a very bad outcome). In the same year, Mehra and Prescott countered that Rietz's model requires a 1 in 100 chance of a 25 percent decline in consumption to reconcile the equity premium with a risk aversion parameter of 10, which is the approximate degree of risk aversion that would be required to predict an equity premium equal to that which was realized.[2] However, they argued, the largest aggregate consumption decline in the last 100 years was only 8.8 percent. Campbell, Lo, and MacKinlay pointed out in 1997 that "the difficulty with Rietz's argument is that it requires not only an economic catastrophe, but one which affects stock market investors more seriously than investors in short-term debt instruments" (p. 311).[3] Recently, Barro (2006) extended Rietz's model and argued that it does provide a plausible resolution of the equity premium "puzzle."
- *Recursive utility function.* One critique of the power utility function used by Mehra and Prescott (1985) is the tight link between risk aversion and intertemporal substitution. Hall argued that this link is inappropriate because the intertemporal substitution concerns the willingness of an investor to move consumption between different time periods whereas the risk aversion parameter concerns the willingness of an investor to move consumption between states of the world.[4] However, Weil (1989) showed that the ERP puzzle cannot be solved by simply separating risk aversion from intertemporal substitution. More recently, Bansal and Yaron (2004) argued that risks related to varying growth prospects and fluctuating economic uncertainty, combined with separation between the intertemporal substitution and risk aversion, can help to resolve the ERP puzzle.
- *Habit formation.* Constantinides (1990) introduced habit persistence in an effort to explain the ERP puzzle. His model assumes that an investor's utility is affected by both current and past consumption and that a small fall in consumption can generate a large drop in consumption net of the subsistence level. This preference makes investors extremely averse to consumption risk even when risk aversion is small. Constantinides showed that the historical equity premium can be explained if past consumption generates a subsistence level of consumption that is about 80 percent of the normal consumption rate.

  Abel defined a similar preference, called "catching up with the Joneses," where one's utility depends not on one's absolute level of consumption, but on how one is doing relative to others.[5]
- *Borrowing constraints and life-cycle issues.* Constantinides, Donaldson, and Mehra (2002) introduced life-cycle and borrowing constraints. They argued that as the correlation of equities with personal income changes over the life of the investor, so too does the attractiveness of equities to that investor. The young, who should borrow to smooth consumption and to invest in equities, cannot do so. Therefore, equities are priced almost exclusively by middle-aged investors, who find equities to be unattractive. Thus, equities are underpriced and bonds are overpriced, producing a higher equity risk premium than predicted by Mehra and Prescott (1985).
- *Limited market participation.* Mankiw and Zeldes (1991) examined whether the consumption of stockholders differs from that of nonstockholders and whether this difference helps explain the historical equity risk premium. They showed that aggregate consumption of stockholders is more highly correlated with the stock market and is more volatile than the consumption of nonstockholders. A risk aversion parameter of 6 can explain the size of the equity premium based on consumption of stockholders alone. Although this value is still too large to be plausible, it is much less than the magnitude of 30 to 40 derived by Mehra and Prescott (1985) using the aggregate consumption data of both stockholders and nonstockholders.

[2]Rajnish Mehra and Edward C. Prescott, "The Equity Premium: A Solution?" *Journal of Monetary Economics*, vol. 22, no. 1 (July 1988):133–136.

[3]John Y. Campbell, Andrew W. Lo, and A. Craig MacKinlay, *The Econometrics of Financial Markets* (Princeton, NJ: Princeton University Press, 1997).

[4]Robert E. Hall, "Intertemporal Substitution in Consumption," *Journal of Political Economy*, vol. 96, no. 2 (December 1988):212–273.

[5]Andrew B. Abel, "Asset Prices under Habit Formation and Catching Up with the Joneses," *American Economic Review Papers and Proceedings*, vol. 80, no. 2 (May 1990):38–42.

- *Incomplete markets*. Heaton and Lucas introduced uninsurable, idiosyncratic income risk into standard and dynamic general equilibrium models and showed that it can increase the risk premium.[6] Brav, Constantinides, and Geczy (2002) showed that the equity premium can be "explained with a stochastic discount factor calculated as the weighted average of the individual households' marginal rate of substitution with low and economically plausible values of the rate of risk aversion coefficient." This explanation relies on incomplete markets in that all risks would be insurable if markets were "complete."
- *Behavioral approach*. Starting with prospect theory as proposed by Kahneman and Tversky,[7] a large swath of behavioral finance literature argues that the combination of "myopic" loss aversion and narrow framing can help to resolve the ERP puzzle, including works by Benartzi and Thaler (1995), Barberis, Huang, and Santos (2001), and Barberis and Huang (2006).

Summary

The various (and quite different, almost unrelated) approaches to estimating the equity risk premium is best summarized by Ibbotson and Chen, who categorized the estimation methods into four groups:[8]

1. *Historical method*. The historical equity risk premium, or difference in realized returns between stocks and bonds (or stocks and cash), is projected forward into the future. See Ibbotson and Sinquefield (1976), which is updated annually by Ibbotson Associates (now Morningstar), and Dimson, Marsh, and Staunton (2002).
2. *Supply-side models*. This approach uses fundamental information, such as earnings, dividends, or overall economic productivity, to estimate the equity risk premium. See Diermeier, Ibbotson, and Siegel (1984); Siegel (1999); Shiller (2000); Fama and French (1999); Arnott and Ryan (2001); Campbell, Diamond, and Shoven (2001); Arnott and Bernstein (2002); and Grinold and Kroner (2002).
3. *Demand-side models*. This approach uses a general equilibrium or macroeconomic model to calculate the expected equity return by considering the payoff demanded by investors for bearing the risk of equity investments. Mehra and Prescott (1985) is the best known example of this approach, and the "puzzle debate" is an attempt to reconcile the results of this approach with the much higher ERP estimates given by the other approaches.
4. *Surveys*. An estimate of the equity risk premium is obtained by surveying financial professionals or academics (e.g., Welch 2000). Such results presumably incorporate information from the other three methods.

In closing, the equity risk premium has been the topic of intense and often contentious research over at least the last three decades. As Siegel (2005) said, although there are good reasons why the future equity risk premium should be lower than it has been historically, a projected equity premium of 2 percent to 3 percent (over long-term bonds) will still give ample reward for investors willing to bear the risk of equities.

[6] John Heaton and Deborah Lucas, "Evaluating the Effects of Incomplete Markets on Risk Sharing and Asset Pricing," *Journal of Political Economy*, vol. 104, no. 3 (June 1996):443–487.

[7] Daniel Kahneman and Amos Tversky, "Prospect Theory: An Analysis of Decisions under Risk," *Econometrica*, vol. 47, no. 2 (March 1979):263–292.

[8] Roger Ibbotson and Peng Chen, "The Supply of Stock Market Returns," Ibbotson Associates, 2001.

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Aït-Sahalia, Yacine, Jonathan A. Parker, and Yogo Motohiro. 2004. "Luxury Goods and the Equity Premium." *Journal of Finance*, vol. 59, no. 6 (December):2959–3004.

This article proposes a partial solution to the ERP puzzle by distinguishing between the consumption of basic goods and that of luxury goods. The authors argue that the aggregate consumption does not measure the marginal risk of investing in the stock market. Using several novel datasets on luxury goods consumption, such as sales of imported luxury automobiles, this study shows that the covariance of luxury goods and excess returns implies a risk aversion parameter of 7, significantly lower than that implied by aggregate consumption data.

Ang, Andrew, and Angela Maddaloni. 2005. "Do Demographic Changes Affect Risk Premiums? Evidence from International Data." *Journal of Business*, vol. 78, no. 1 (January):341–379.

This article examines empirically the relation between the equity risk premium and demographics using a long-term data sample (1900–2001) from the United States, Japan, the United Kingdom, Germany, and France as well as a shorter-term data sample (1970–2000) for 15 countries. By pooling international data, the authors show that a negative relation exists between the expected equity risk premium and the percentage of adults over 65 years old. The international results from this study support Abel's prediction that the equity risk premium is likely to decrease as the Baby Boom generation enters retirement.[9]

Arnott, Robert D., and Clifford S. Asness. 2003. "Surprise! Higher Dividends = Higher Earnings Growth." *Financial Analysts Journal*, vol. 59, no. 1 (January/February):70–87.

Contrary to the predictions of Ibbotson and Chen (2003) and others who apply Modigliani and Miller (M&M) dividend invariance intertemporally, earnings growth has been fastest when dividend payout is highest, not lowest, because of diminishing marginal productivity of capital. Thus, investors should not look to today's low payout ratios as a sign of stronger-than-historical earnings growth in the future.

Arnott, Robert D., and Peter L. Bernstein. 2002. "What Risk Premium Is 'Normal'?" *Financial Analysts Journal*, vol. 58, no. 2 (March/April):64–85.

The expected equity return equals the dividend yield, plus dividend growth, plus the expected change in valuation, if any. As of year-end 1925, investors expected about 5.1 percent (about 1.4 percent more than the bond yield). The subsequent positive surprise was because of four historical accidents: (1) bonds had unanticipated losses; (2) valuations quadrupled, as measured by the price-to-dividend ratio (P/D); (3) the market survived; and (4) accelerated growth in real dividends and earnings occurred because of regulatory reform. These observations are used to construct a framework for estimating the equity risk premium at each point in time, including the present. The "normal" equity risk premium, or historical average of what investors were actually expecting, is 2.4 percent, and the current equity risk premium is around zero.

[9] Andrew B. Abel, "Will Bequests Attenuate the Predicted Meltdown in Stock Prices when Baby Boomers Retire?" *Review of Economics and Statistics*, vol. 83, no. 2 (November 2001):589–595; "The Effects of a Baby Boom on Stock Prices and Capital Accumulation in the Presence of Social Security," *Econometrica*, vol. 71, no. 2 (March 2003):551–578.

