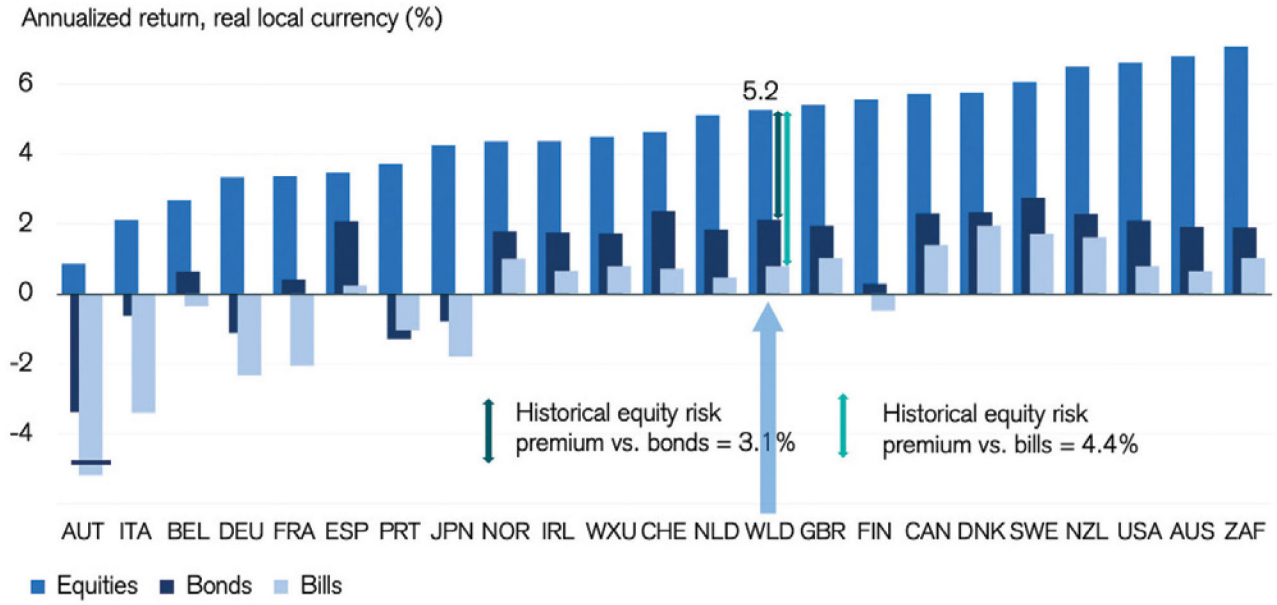
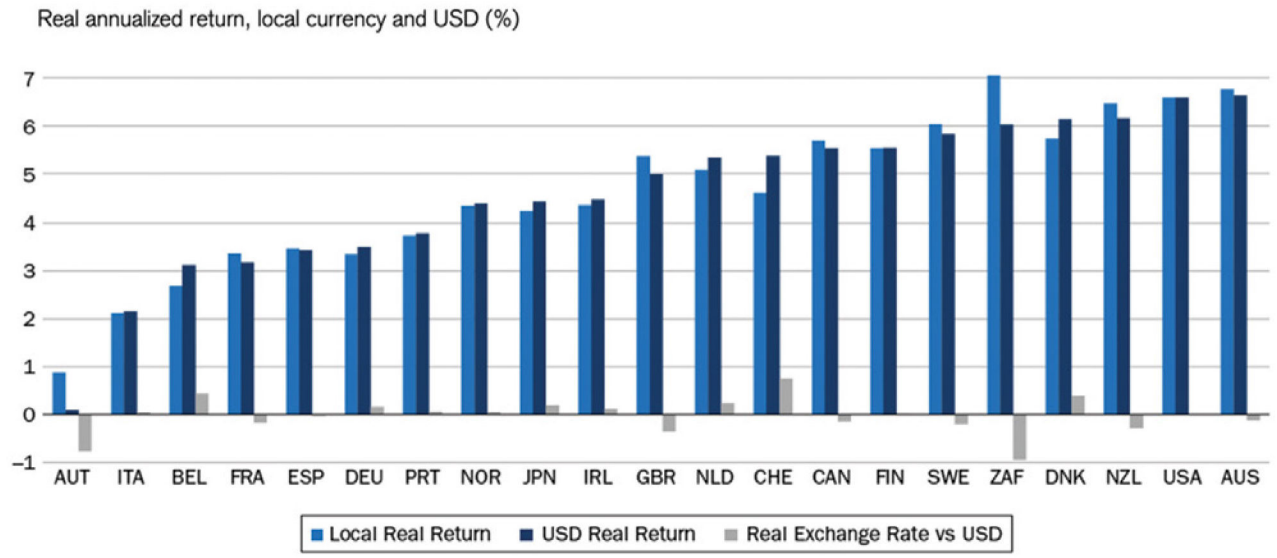
Exhibit 10. Equities versus Inflation, Bills, and Bonds: 1900–2020



Source: Dimson et al. (2021).

Exhibit 11. Real Equity Returns in Local Currency and US Dollars, 1900–2020



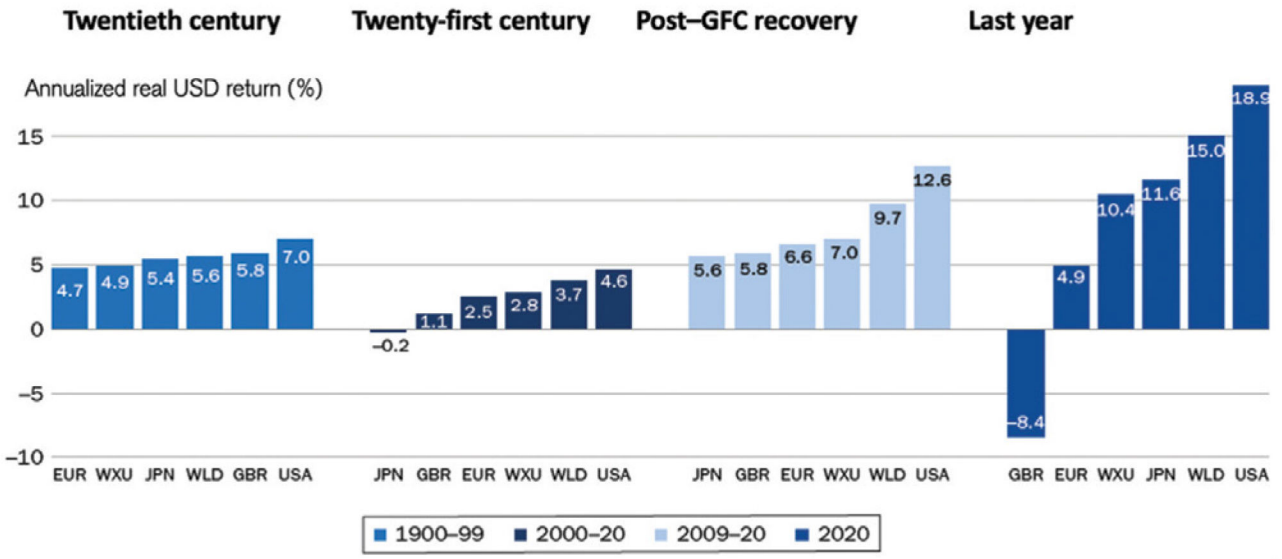
Source: Dimson et al. (2021).

would be exactly the same if we use dollars or yen or sterling to do our calculation.

If we want an anchor, we can look at the world market in US dollars adjusted for US inflation. Whereas for individual countries we look at returns in the local currency and adjust them for local inflation, we can't look at *regions* without choosing a numeraire. The annualized real return on the world market from a US dollar perspective was 5.2%. If we compare that number with the return on bonds, we have a realized premium of 3.1% annualized.

When reporting the equity risk premium, the more common academic measure is the difference between the

Exhibit 12. Relative Return of Major Markets, 20th and 21st Centuries



Source: Dimson et al. (2021).

annualized equity return and the *bill* return; that was well in excess of 4% over the 121 years. So, globally, equities beat inflation, they beat cash, and they beat bonds. All by a large margin, as Roger has pointed out—but it's quite a varying margin!

When I refer to the "realized premium," I do not mean the arithmetic difference that Roger highlighted, particularly in his early work. I mean the geometric or compound annual difference. **Exhibit 11** shows these real returns, along with the annualized rate of change in the exchange rate of each country versus the United States.

Currency Effects and Adjustments

These gaps between equity returns and fixed income returns—that is, the equity premiums—are about the same whether we do the calculation in local currency adjusted by local inflation or in US dollars adjusted by US inflation. It makes a difference year by year, but it makes almost no difference to our long-term figures.

The currency effect, shown by the little gray bars, is the appreciation (or depreciation) of the local currency in US dollars, adjusted for the corresponding inflation rates. In other words, it is the real return on the currency from a US investor's perspective, stated as an annual rate.

So, the *choice of market* has a big impact on the historical relative returns of equities and bonds. If you have a long-term perspective, however, the *currency* barely matters.

What have we learned? The difference between the world equity return and bill returns was 4.4%, and a little over 3% if we draw a comparison with bonds. Equity premiums do vary quite a bit between countries. Again, there are almost no currency effects over the long term. It's the market that matters, because we're looking at the difference between two returns measured in the same currency.

American Exceptionalism Revealed

Since 1900, the United States has had a high equity premium, 5.8%, reflecting strong equity markets. The world excluding the United States has had a much lower equity premium, and Europe's is a bit lower again. The developed world, taken as a portfolio, has done about the same as the world; emerging markets, on the other hand, have had a low premium, 4.0%. Your perspective makes a big difference. It also matters what period you look at: the last half-century or the full sample covering more than a century.

Exhibit 12 shows how markets performed over the 20th century, the 21st century through 2020, the period since the Global Financial Crisis, and last year (2020).

The United States "won" the last century. It won this competition against other major groupings such as Japan, Great Britain, Europe, the world ex–United States, and the world. The United States looks great. It looks great in the post–financial crisis period and great over the long term, so the United States has truly been exceptional. If we teach using

the assumption that the United States represents the world as a whole, we are not teaching accurately.

When we wrote *Triumph of the Optimists*, Paul, Mike, and I had a different view. The "optimists" of 1900 were investors who thought that risky securities (equities) would be rewarding and would outperform more cautious investments. Over the course of the 20th century, the optimists were vindicated, especially American optimists. We had noted that, while we expected the stock market to continue to provide a risk premium, it would be a smaller premium than before. And we cautioned against extrapolating from the history of a single country (the United States).

After almost a quarter of a century, we can look back and see whether our caution was justified. And so far, despite three bear markets and a pandemic, the United States has generated higher stock market returns than non-US markets. We discuss some explanations in our recent article, "American Exceptionalism."[9]

Discussion of Elroy Dimson's Presentation

Martin Leibowitz: Looking back at Exhibit 8, it reminds me of the great article called "Survival," by Stephen Brown, William Goetzmann, and Stephen Ross.[10] I thought that was an absolutely intriguing concept. Yes, the United States is exceptional, but was it just a kind of random draw where you had to have one exceptional country? I don't think any of us really believe that, but the exhibit does show that other countries have not done that well. These are not terrific returns compared with what you see in the United States. There have been periods of real asset destruction in places like Japan and Germany and Russia.

Elroy Dimson: The two big empires on the left-hand side, Austria and Russia, either entirely or virtually disappeared. They do reappear, so notice the colors when they do come back. China never had a very big national stock market, although it too disappeared and then came back.

But the United States has been a remarkable story. As financial economists, when we think we've seen an anomaly or a regularity that defies explanation, we assume the anomaly will go away. But there's now an increasing literature that says anomalies only partly disappear, and the success of the United States has at best partly gone away.

Roger Ibbotson: I will admit that there's a selection bias with my data because I was looking at the United States. It's obviously been one of the best performers over the period and may not be representative of the future of other places around the world, or even the United States, of course. It is one of the stronger performers, no question about it.

But I'm still struck by the fact that your data show these equity risk premiums are still there, everywhere around the world, even if not as large as in the United States.

Will Goetzmann: One of my takeaways from what you just showed was that people thinking about investing in emerging markets should look carefully at whether there is any evidence of superior rewards from those markets. That is a pretty compelling piece of evidence that your recent work is showing. You've gone back and gotten a lot of those markets that were originally missing. Yours is a much more comprehensive view of the whole spectrum of potentially investable markets. That was the exciting takeaway, which wasn't there in your earlier work, that you and your colleagues have put together nicely.

Elroy Dimson: A group called the World Federation of Stock Exchanges lists market capitalizations of different markets. They focus not on free float, which is what we do as soon as free-float information is available for each market, but on total market cap. If you switch to the World Federation of Stock Exchanges market-cap data, you would find even more disappointment, because those emerging markets that didn't do so well have full weighting instead of the roughly 50% weighting they have with float adjustment.

Jeremy Siegel: First, I want to push back on exceptionalism as it relates to stock market outperformance. Outperformance is relative to expectations and is not an absolute measure.

Second, South Africa—would you call that a huge success story because it has a better return than the United States? One of the most interesting graphs in the second edition of my book *Stocks for the Long Run* shows an *inverse* relationship between stock market returns and real GDP growth.

So, tell me about exceptionalism as measured by better stock market returns.

Elroy Dimson: Yes, we reported on the inverse relation in *Triumph of the Optimists*. Since 2002, we've written more on that topic.

Laurence Siegel: As an aside, I'd point out that South Africa beat the United States only in local-currency terms, not in dollar terms.

[9]See Dimson et al. (2021).

[10]See Brown, Goetzmann, and Ross (1995).

PRESENTATION BY CLIFF ASNESS: THE PRICE OF THE STOCK MARKET MATTERS

Cliff Asness: In preparation for this, I decided to look at how well the Shiller CAPE (cyclically adjusted price/earnings ratio) has actually done since Campbell and Shiller's work.[11] There are many measures other than the Shiller CAPE, and later we can discuss how to make the CAPE better. Because the CAPE has become something of a lingua franca for discussion of the price of the stock market, I continue that.

The CAPE is often maligned, including sometimes by Shiller lately, for being wrong. It's been wrong in the following sense: Since Campbell and Shiller first published their work on it, the stock market has been over its average CAPE far more often than under. As Elroy said, you expect that 25 years is a long enough period to cause an anomaly to change, but it has not.

I look at the CAPE's performance in a different way. In the original work and in most of our papers on this, the Shiller CAPE is not proffered as a great market timing tool, or at least it shouldn't be. What it should be used for are longer-term predictions. Those are not the same as market timing.

Accuracy of Forecasts Made Using the Shiller CAPE

I decided to see how the Shiller CAPE performed against some alternatives, out of sample—from 1997 on, because 1996 is about when they did their original work.[12] To do this, you use various techniques to make out-of-sample forecasts of the equity risk premium and evaluate those various forecasts in different ways. Keep in mind that you have only about two and a half independent 10-year periods. This out-of-sample stuff is not statistics; it is scenario analysis.

I look at the errors in the various forecasts and then look at some of the standard ways of evaluating how bad those errors were—the mean squared error, the average absolute error, and the worst absolute error of the forecast—all comparing some forecast of 10-year returns to the subsequent actual 10-year returns. That is, if you have a forecasting method, what was its mean squared error versus the actual outcome over the out-of-sample period?

I look at two forecasts based on the CAPE. One is a rolling out-of-sample regression method; the other I call a Gordon-model Shiller forecast, where you just invert the Shiller P/E and add a growth rate to it. This second way assumes less mean reversion.

I also looked at rolling out-of-sample means as a way to forecast the future. For this, you just look back 70 years starting in 1996; your forecast for the next 10 years is the prior 70 years' mean; and then you just expand that and keep continuing to use the long-term mean to make a forecast. And then, to get another estimate but in a cheating sort of way, I looked up the actual out-of-sample mean over the 25 years from 1996 to 2021. This last way is not fair, because this method says, "I know the average (in advance)—let me use that to forecast each 10-year period."

The two estimates based on the Shiller CAPE were significantly better than the rolling mean. And they were slightly better than the cheating mean, which surprised me a bit. This means that if you were going to forecast not the full out-of-sample 25 years but each 10-year period since Campbell and Shiller's work, you would have done better using two rather obvious versions of their work than you would by using the whole 25-year mean (known with hindsight) to forecast the subperiods. Even cheating doesn't beat the two CAPE-based methods.

That doesn't mean the criticisms of the Shiller CAPE are wrong. If you are timing the market—for example, by using the CAPE to sell stocks short when that metric is high—the CAPE method has been poor at that.

Market timing is not, I would argue, what the CAPE was designed to do. It was designed to give people an estimate of what they might expect on equities going forward. And for what it was designed to do, it's done quite well. Market timing is much harder than setting future long-term expectations. If your forecast is for an asset return that is considerably less than the asset's average return, but still positive, and you underweight or short that asset for 25 years, do you know what you get? Losses.

So timing is different from forecasting. But I'd say that efforts to make the Shiller CAPE better are great, as long as we use it for its intended purpose. When used in that way, even in its original form, it has been a pretty strong success. I found this very interesting, and I had not looked at it this way before.

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[11]For example, Campbell and Shiller (1998).

[12]Alan Greenspan made his famous "irrational exuberance" comments based on Campbell and Shiller's work in 1996.

Changes in Valuation of the US Equity Market versus Its Own History

It's still hard to grasp how much starting and ending valuations matter.

Looking at an approximately 70-year estimate, the appreciation in the Shiller CAPE is responsible for 1.3 percentage points of the excess return of 6.5% that equities earned over cash. Without the Shiller CAPE appreciating, that return, the equity risk premium over cash, would have been 5.2%.

There are two pieces of good news: (1) 5.2% is still a lot, and (2) when you take out the appreciation in the CAPE, you actually get a more robust estimate of the equity premium. While this second comment sounds a little mysterious, an explanation of it is in my blog.[13] The equity risk premium estimate is a little bit lower, but we know it with more certainty.

At any rate, valuation changes matter. A 1.3% difference in compound annual return over 70 years, which is the actual amount of time over which the CAPE appreciated at that rate, adds up to a lot of money. We ignore valuation changes at our peril.

Changes in the Valuation of the US Equity Market versus Other Countries

In the same article, I also looked at the United States against EAFE (Europe, Australasia, and Far East). Of course, you can only go back to about the 1970s on that. I also looked at the value strategy.

Let me focus on the United States versus EAFE because it applies directly to stuff that Elroy was talking about and that Jeremy was talking about. The United States is exceptional in its victory over EAFE. Over the whole period, from the beginning of the data, it's still been a solid victory. If you want to really cherry-pick from Japan's peak in 1989, the US victory is gigantic.

Just about 100% of this outperformance is explained by the CAPE of the United States going much higher, in relative terms, than the CAPE of EAFE. This doesn't mean the victory wasn't real—you got the money. At any rate, the United States has been exceptional.

But the most exceptional thing about the United States has been its leap in valuation, in price, against the world as measured by Shiller's price to trailing 10-year earnings. That's a form of exceptionalism, but if you think the United States is going to be better forever, that should bother you. Do you really think an ever-increasing valuation gap is reasonable?

If the United States just inherently generated much higher earnings growth, and that was 100% of the difference and valuations for those earnings stayed the same, you'd be more tempted to say there's something about the US system that is exceptional on an enduring basis. There still might be something, but it's coming almost entirely from people being willing to pay a much higher price for US equities than non-US equities, and also much higher than they used to pay for US as compared with non-US equities.

Value versus Growth

The value strategy has the same characteristics. Value has lost money almost entirely because the dynamic portfolio of stocks that were cheap got relatively cheaper versus the expensive ones. And, as someone with a horse in that race, I like that better in terms of the future prospects for the value factor. If value stocks had lost because the fundamentals deteriorated, you don't ever get that money back. If you lose from valuation differences expanding, you have a decent chance of getting the money back (nothing is guaranteed of course!).

Discussion of Cliff Asness's Presentation

Laurence Siegel: I believe that you're right, that these changes in valuation are responsible for most or all of the return difference between the United States and the rest of the world. However, the United States might have become expensive for valid reasons. Those would include an expectation that high valuations in the United States will continue, legitimizing the current valuation.

Setting that conjecture aside, what signals should we look for to say that it's somebody else's turn and maybe we should bet against the United States?

Was the Increase in US Relative Valuations Justified?

Cliff Asness: I'm not going to answer that; I'm going to answer the question I want to answer, which is correlated to your question. In my article on this issue, I have a footnote saying almost exactly what Larry said: "What if this was justified?" I ask this question in a few different areas where I looked at valuation changes. The question is whether you can expect the returns to mean revert going

[13]See Asness (2021).

forward. If the valuation change was justified, you don't expect valuations to mean revert.

If the United States tripled in value relative to other countries for good reasons, you take that money and run. But you still don't assume it's going to do it again over the next 30 years or the next 70 years. So I think that's a very good question. It does matter if it was justified. But it only matters for forecasting, going forward, which I'm going to be a coward on here.

If you want to get a long-term estimate of the relative expected return of the United States, using historical data overestimates it, whether that valuation increase was justified or not. By simply projecting past returns forward, you're projecting that the increase in relative valuation will happen again and again. This strikes me as a little crazy.

But, again, it does matter a lot for whether you think (1) we're just going to see similar returns in different places going forward—no more US exceptionalism, or (2) we're going to see mean reversion in returns, where US and non-US valuations come back toward each other and take back some of the gain from past revaluation. I'm going to let others take on that question.

Are Monopoly Effects Responsible for High US Relative Valuations?

Martin Leibowitz: Cliff, quick and simple question: Do you think there could be a monopoly effect here?

Cliff Asness: Some companies in the United States are just dominating the world with a network effect, and that could be part of it. I would bridge your question and Larry's and say that both of your comments are in the camp of today's valuation difference being justified. I think your story is a plausible one for the valuation in the United States being justified, but none of these stories forecasts *another* tripling of relative valuation over the next 50 years *from here*.

But again, if the United States has beaten EAFE by X percent historically—if that has all come from a justified increase in valuations—as long as you don't think that will happen again, you don't want to use the historical estimate. You want to use an estimate that doesn't give credit for the one-time revaluation event. Anyway, I think that the monopoly story is probably the most plausible one for why you might pay more for US companies. In other work,[14] however, I show that it's still unlikely that this is driving most of what's going on with systematic value.

Roger Ibbotson: In direct contrast to what's going on in the stock market where the United States has higher multiples, real estate seems to be much more expensive in major cities outside the United States. It seems like they have higher multiples than the United States.

Cliff Asness: As someone who has only lost money on real estate, I will accept your figures.

Laurence Siegel: Roger, I think that real estate is more expensive in the capitals because capital cities have a true monopoly position in many countries. In contrast, the United States has multiple capitals, as does Germany. Berlin is also quite cheap.

While multiple capitals may keep real estate prices under control, some of ours have gotten expensive, as in "London expensive." Look at Los Angeles, look at New York.

Thomas Philips: CAPE should never be used as a timing tool. It really is an estimator of future returns.

On to your comment on changes in valuation—this goes back to the mean reversion question. There really isn't any mean reversion. If there's a change in valuation, there's a change in expected returns and that's it. Begins there, ends there. You have to think of a valuation measure such as CAPE as an estimator of future returns, not as a basis for projecting forward a sequence of realized returns.

Bond investors are much quicker to get this than equity investors. Bonds have a printed number representing expected return: the yield. The expected return isn't printed for equities, so it's much easier to make that mistake (regarding an increase in price as a harbinger of higher, not lower, subsequent returns) in equities than in fixed income. It's always equity investors who make this error.

Cliff Asness: There is nothing in there I disagree with—I'll just reflect on that last point. For years, Rob Arnott has made this comment. I've marveled at the fact that in the bond world, if you have half the yield, people just understand they will make half the money.

Thomas Philips: That's right.

Cliff Asness: And in other parts of the investing world, they don't see this.

Laurence Siegel: That's right. In the equity market, if the yield falls in half, they may think they're going to make *double* the money because the market just doubled to produce the lower yield. They then mentally project that price performance forward.

Thomas Philips: Or they're using the historical mean as an estimator because they don't want to do the work of thinking about what's really going on under the covers. It's an easy cop-out, and it really does lead you astray.

[14]See Asness (2020).

PRESENTATION BY ROBERT ARNOTT: A SIMPLE FRAMEWORK FOR FORECASTING EQUITY RETURNS—THE DEVIL IS IN THE DETAILS[15]

Rob Arnott: A simple framework for determining forward returns would consist of (1) yield, (2) the norms and expectations for income growth, and (3) some measure of mean reversion. The investment firm Grantham Mayo van Otterloo (GMO) makes what I think is a mistake by assuming 100% reversion of the valuation level to its historical mean in seven years. Empirically, that doesn't happen. We take a more simplistic or naïve approach of saying that maybe the current spreads are a new normal. Maybe the current valuations are a new normal. Maybe they're not, and you're going to get mean reversion. So, let's just split the difference. Let's assume *halfway* mean reversion.

Now, if you do that, you get an equity risk premium (ERP) of roughly zero for the coming decade. If you don't have mean reversion at all, there is a risk premium. But the simple framework provides 10-year return estimates with a standard error of only 1 to 2 percentage points.

Where could the expectation that ERP is near zero over the coming decade be wrong? Soaring earnings would help, as would soaring bond yields. The former is arguably unlikely when stimulus is tapered. Low yields help the equity risk premium but do little to support lofty equity valuations unless buybacks are real and substantial. Empirically, they aren't.

The current pairing of high inflation and negative real bond yields is very dangerous; moreover, demographics offer headwinds that are worrisome. So, I believe that an ERP near zero is a reasonable expectation on a 10-year basis, because the headwinds are potentially quite dangerous. If you use yield, plus growth, but no mean reversion, you get a 2.9% real return for US equities. If you assume halfway mean reversion, you get a –0.8% real return, compounded over 10 years. That is slightly below the US aggregate fixed-income index, which is currently yielding less than inflation expectations.

We've gone back over the last 30 to 50 years, depending on the asset class, and asked whether this simplistic methodology would lead to pretty good forecasts. The short answer is yes. The longer answer is, the more pessimistic forecasts are likely to have a larger standard error, a larger degree of uncertainty. The fact that the forecasts have tended to be too pessimistic—in other words, that the outcomes were better than the range forecast—is largely a function of the overwhelmingly bullish tenor of the last 50 years (or at least the last 40): Yields tumbled, spreads narrowed, and valuation multiples for stocks soared.

Dividend Yields and Expected Returns

Dividends have always been the dominant source of real stock market returns. Given that, should we worry about the current yield of 1.3%? Absolutely. **Exhibit 13** decomposes the return for stocks into various components. This is apropos of Roger's work and Elroy's work, but we've taken it back to 1800 using G. William Schwert's data.

In any event, the dividend comprises most of the return for stocks, and if you take out the inflation component (the red line), it's the vast majority. The blue line shows that real growth in dividends per share (of the S&P 500 and predecessor indexes, and of earlier hypothetical indexes in periods when no published indexes existed) has been only 11-fold over the last 221 years. And the revaluation upward (in the price/dividend ratio) has been threefold, as we see on the orange line—it is more if you start at market lows such as those in the early 1930s.

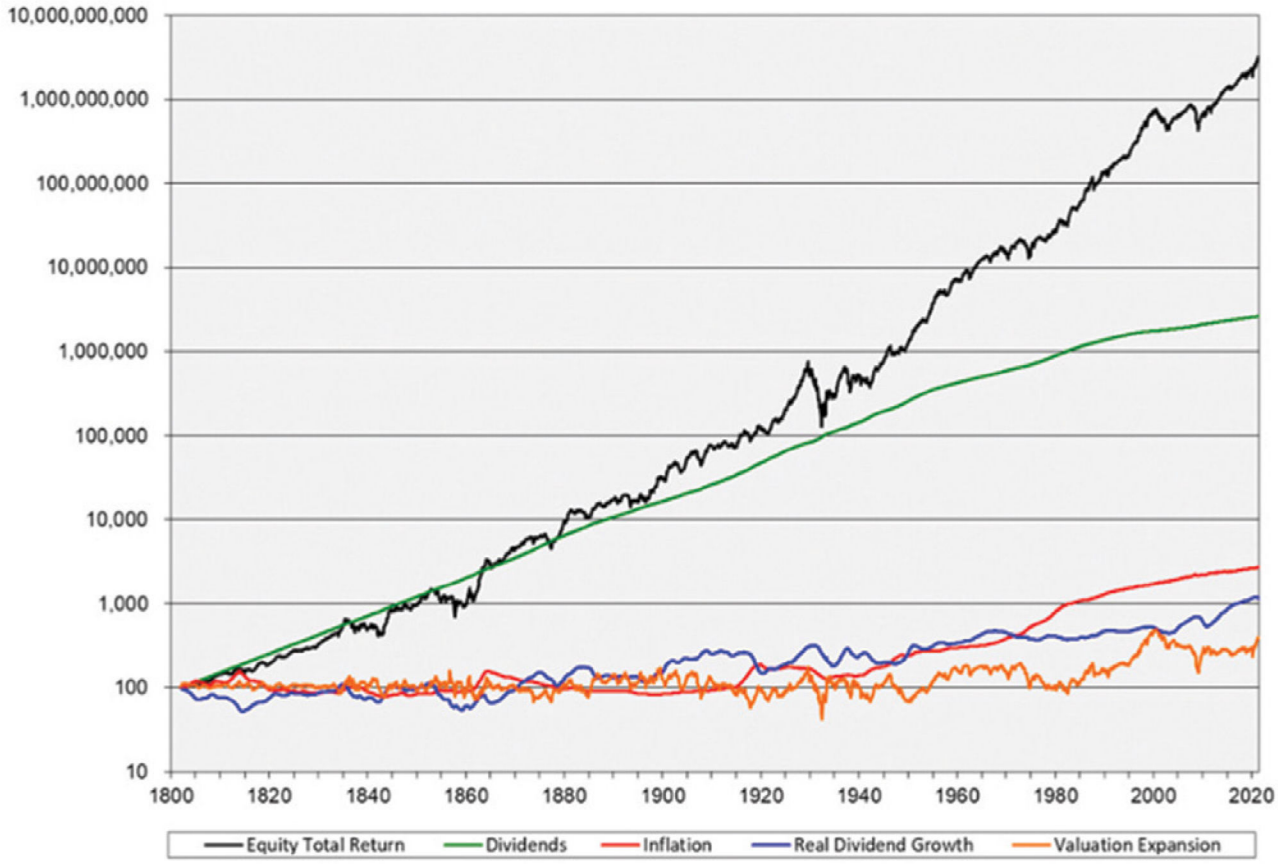
Dividends per Share Have Grown Very Slowly

My comment that dividends per share have grown only 11-fold in real terms in 221 years may come as a surprise. Aggregate dividends have, of course, grown roughly 1,000-fold with the macroeconomy. But, if we take away inflation, we're down to roughly 50-fold. Then we need to take away "dilution." The classic meaning of dilution is a diminished share of ownership, as the shares outstanding of a given company increase through secondary equity offerings (SEOs).

But, for the index investor, there's a second—and usually more powerful—form of dilution from new enterprise creation. Consider that over 50% of today's S&P 500, by market cap, went public less than 25 years ago. If we owned the S&P 500 from 25 years ago, and didn't trade it to stay current with changes in the index, we'd now own just under half of the index, because of new enterprise creation and secondary equity offerings. While new enterprises typically don't initially dilute the index investor's dividend stream,

[15]Thanks go to Amie Ko for her help on this presentation and exhibits.

Exhibit 13. Dividends Have Always Been the Dominant Source of Equity Market Real Returns



Source: Based on data from Ibbotson Associates. For more information, see Arnott and Bernstein (2002).

as they mature, they pay dividends, tacitly diluting the dividend income from the preexisting names.

The same effect comes into play even if we do trade to stay current with the composition of the index, as we have to sell stocks with a (typically) robust yield in order to rebalance into new index holdings with a (typically) low or zero yield. When all these various forms of dilution are taken into account, real growth in dividend income is brought down to 11-fold in 221 years for the investor who doesn't reinvest dividends.

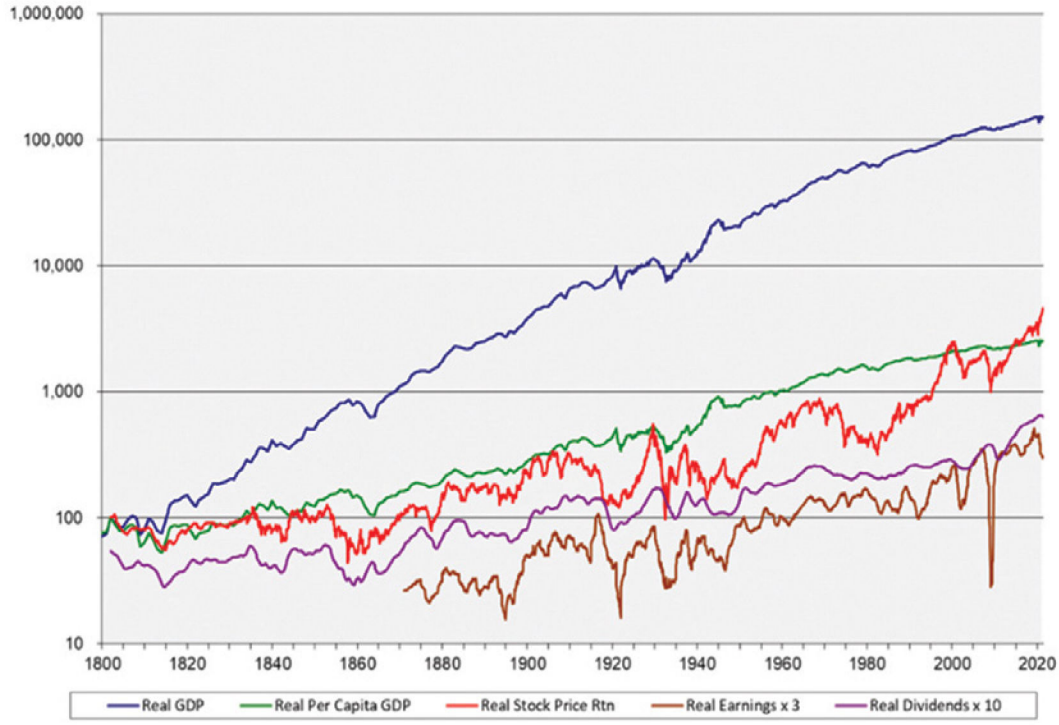
Do Earnings and Dividend Growth Keep Pace with GDP, or per Capita GDP?

When calculated on a per-share basis (this distinction is important), earnings and dividends have generally grown with per capita GDP, not with overall GDP. Why would that be? Because, when the population is growing, entrepreneurial capitalism tends to dilute existing shareholders. You need to raise new capital from the labor markets to fund new or growing businesses. You have the opposite of net buybacks—you have net new share issuance. And that net new share issuance is substantial.

So, what we find empirically in **Exhibit 14** is that whether you're looking at share prices in red, dividends in purple, or earnings in brown, you're looking at growth that largely keeps pace with per capita GDP, not aggregate GDP. There is an exception over the last 25 years in which it has more closely kept pace with aggregate GDP growth. But that's because profits have become a larger and larger share of GDP. The dilution has continued apace.

We also should note that earnings do mean revert. If you look at trailing 10-year real earnings growth and subsequent 10-year real earnings growth, the correlation of one with the other is about –57%, as shown in **Exhibit 15**. It's a pretty powerful correlation. It's not a superb predictor, but it's a pretty good one.

Exhibit 14. Earnings and Dividends Have Generally Grown with per Capita GDP Growth



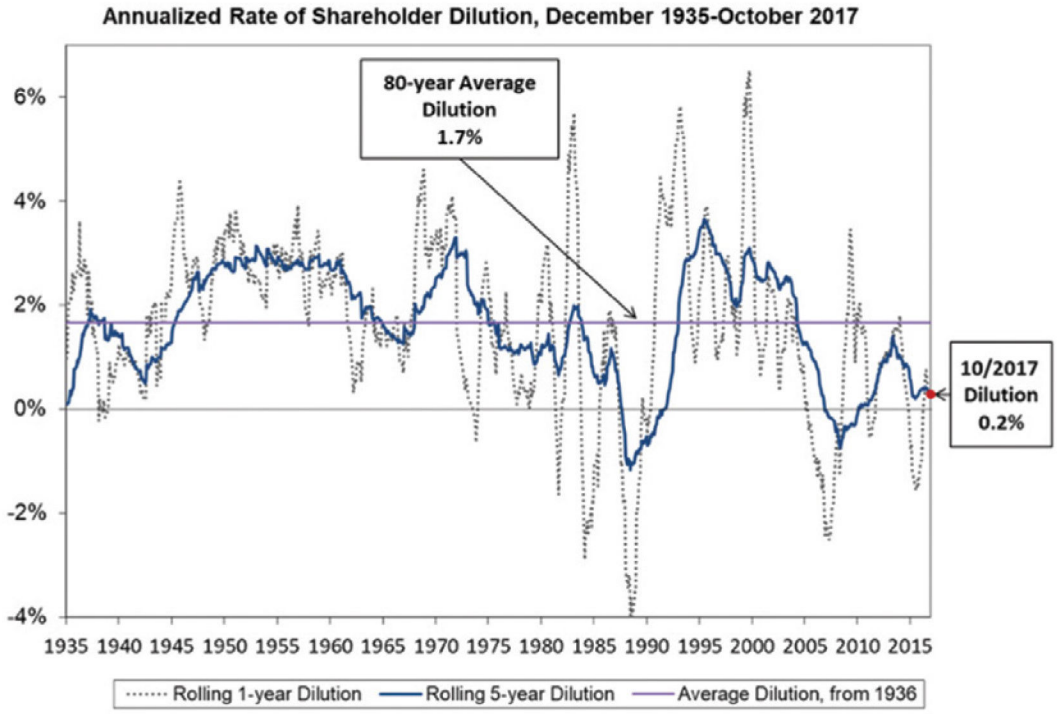
Source: Based on data from Ibbotson Associates. For more information, see Arnott and Bernstein (2002).

Exhibit 15. ...And Earnings Mean Revert



Source: Based on Ibbotson Associates data.

Exhibit 16. Do Share Buybacks Supplement Dividends? For Established Large-Cap Names, Sometimes. On the Broad Market, Rarely



Source: Based on data from the Center for Research in Security Prices (CRSP) at the University of Chicago.

The Role of Dilution in Equity Return

Do share buybacks supplement dividends for established large-cap companies? For some companies, they do; for the broad market, rarely. **Exhibit 16** shows dilution in the broad market year by year as well as over longer rolling periods. Dilution is measured by the amount by which the growth in the aggregate market capitalization of the CRSP broad-cap US equity index exceeds the growth in the index of share price action of that same portfolio. That is a very simple and very powerful way to measure the extent of dilution. The best way to think about dilution, I think, is to recognize that about 60% of the total market capitalization in the United States today is companies that didn't exist 30 years ago. Think about that for a second!

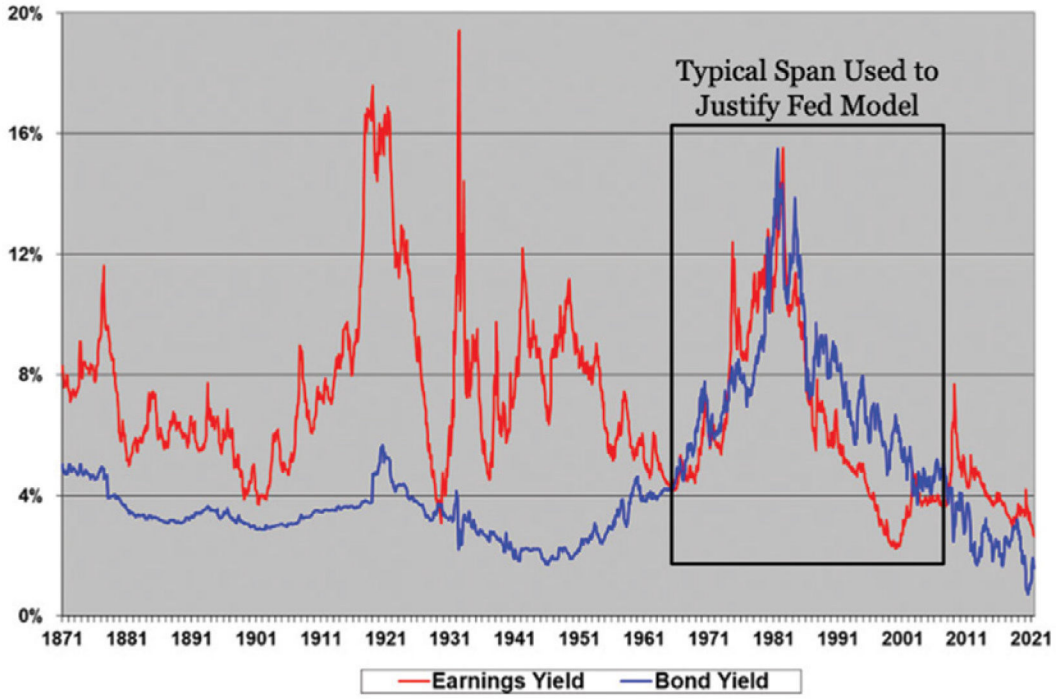
So, 50% of the market is new. If you owned an index fund 30 years ago and you didn't trade it—that is, if you didn't dilute your existing holdings by selling the tiny bit of any stock that is dropped from an index fund and a little bit of all the stocks still in the index fund, in order to buy Tesla (and the hundreds of other such changes in the index over the last 30 years)—you would today own only 40% of the market. So, dilution is in fact very powerful. Jeremy Siegel showed in a 2005 *Financial Analysts Journal* article that the untraded original 1957 S&P 500 beat the actual index by up to 0.5% per annum, depending how you handle corporate actions.[16]

Do Low Bond Yields Support High Equity Valuations or Growth Beating Value?

We also hear the narrative that low bond yields support high equity valuations or support growth relative to value. Narratives can become self-fulfilling prophecies, but only temporarily. It's useful to look at long-term data and ask, "Is the relationship sound?" The old-fashioned Fed model, which compared nominal bond yields to stock earnings yields, looked pretty good from the mid-1960s to the mid-2000s. But if you widen your horizons, the relationship is utterly useless before that time period and becomes pretty weak after 2006 (see **Exhibit 17**). And should one come to the conclusion that, gosh, if 2% yields are great for US stocks, then why are 0% yields not great for European and Japanese stocks? Shouldn't they be priced at infinity?

[16]See Siegel (2005).

Exhibit 17. Do Bond Yields Support High Equity Valuations?



Note: The US earnings yield series shown in this exhibit is calculated as the simple average of an earnings yield computed from Robert Shiller online data (US Stock Markets 1871–present) and an earnings yield from the Global Financial Database. The US bond yield series is calculated as the simple average of 10-year US bond yields from three sources: Bloomberg, Global Financial Data, and Ibbotson Associates, where available.

Source: Based on Robert Shiller online data, Ibbotson Associates data, and Bloomberg data.

It also fails back in the 1950s when you had very large Shiller earnings yields in the 7% to 10% range and 2% bond yields. We did some work (hat tip to Marty here) on the linkage between the level of inflation and real rates and the seemingly natural level of the Shiller P/E. **Exhibit 18** shows, based on global data spanning eight countries, that the Shiller P/E averaged across the countries, or within the eight countries and going back 40 to 50 years, is [in the] mid-20s. That's not a bad Shiller P/E, but it's highly dependent on both the real rate and the inflation rate.

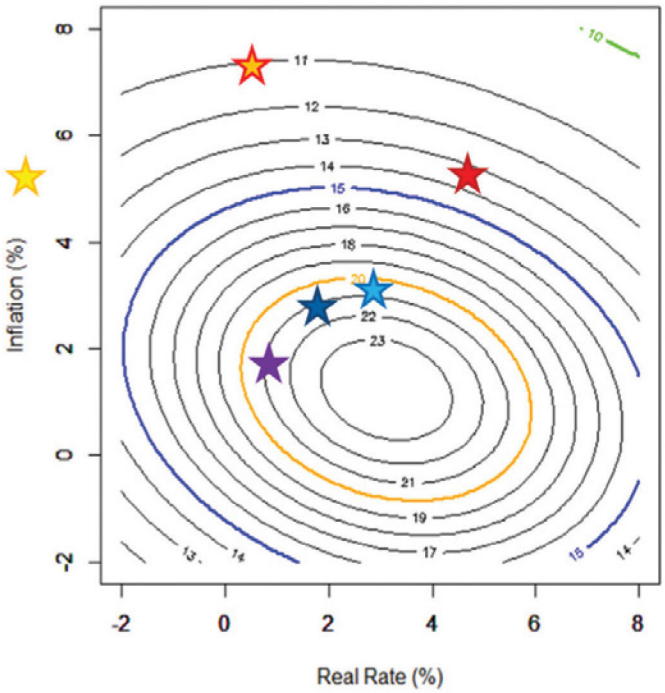
Back in the 1970s, we had high inflation and a negligible real yield. That corresponded empirically to an average CAPE of about 11. At the beginning of the 1980s, we had high inflation and a high real rate, the Volcker effects, which corresponded to a Shiller P/E of about 13. Then we came into this sweet spot: the 1990s, 2000s, 2010s, where we were kind of circling around this benign sweet spot of moderate inflation, moderate real yields. This dot that's off the chart to the left is the last 12 months, where inflation has been over 5% and real yields have been nearly –4%.

If you extend these lines, you'll see that this current observation point (5% inflation and –4% real yield) would normally, empirically across eight countries and spanning a half century, lead to a Shiller P/E of around 11. But we're at 38. So, this is a threat if the Fed has no exit strategy. If the Fed can move us back to this territory in the not-too-distant future, then that threat can go away.

Finally, we're left with GDP growth. **Exhibit 19** illustrates the dynamics of GDP growth and demographic trends. In the G-8 countries, the median age is sliding upward and the proportion of senior citizens is soaring. In emerging markets, you're right in this sweet spot where GDP growth is strongest when the population of young to middle-aged adults is soaring. GDP growth is hurt when the population of children is soaring and also when the population of senior citizens is soaring.

In the emerging markets, the population of children is falling and the population of senior citizens is rising—but not fast, yet. The next 20 years will change that. The median age is right in this sweet spot. So, you have a little bit of a headwind from demography. That headwind turns into a potentially major headwind for stocks in the coming 15 to 20 years because, as the population of senior citizens soars, the impact on average stock market returns is quite large.

Exhibit 18. Do Real Yields and Inflation Rates Have a Bearing on Equity Valuation Multiples?

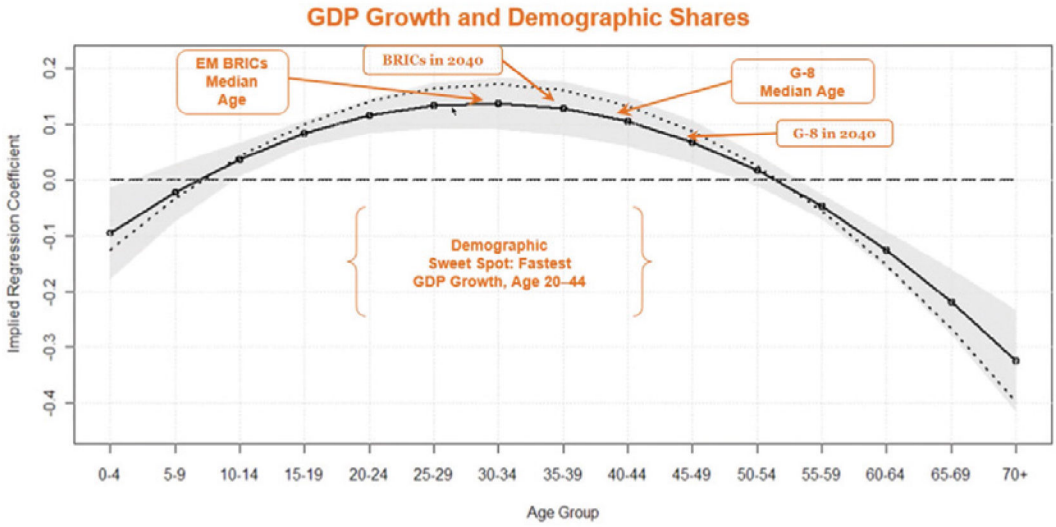


Hat tip, Marty. There's a powerful relationship between real yields, inflation and the natural CAPE ratio.

= 1970s
= 1980s
= 1990s
= 2000s
= 2010s
= 12 months to 9/2021 (left, off the chart)

Source: Based on data from Global Financial Data. For more information, see Arnott, Chaves, and Chow (2017).

Exhibit 19. GDP Growth Slows with a Growing Population of Children and Retirees



Note: The solid black line is the equal-weighted country weighting scheme. The dotted line is the square root of GDP weighting scheme. The gray-shaded area is the 95% confidence interval.

Source: Based on data from the United Nations, the Penn World Table, and Global Financial Data.

Discussion of Robert Arnott's Presentation

Are Buybacks a Substitute for Dividends?

Roger Ibbotson: I should respond right away, because one of the topics you've talked about is a zero expected return arising from the fact that dividend yields are so low and growth has been so low. Both of those points, though, change when you put buybacks into the picture. In 1980, there was a change in the US law to allow a safe harbor for buybacks. Before that, it was basically considered insider trading. So, after 1980, there was a general shift in companies paying dividends versus paying out cash in other ways.

If you look at a traditional discounted cash flow (DCF) model where the return is equal to the dividend yield plus dividend growth, it's sort of wrong on two points: first, if the dividend yield is artificially low, and second, if measured growth in dividends over, say, the last 40 years since 1980 has been really low because you started with a higher yield and moved to a lower yield, the DCF expected return is also very low. But neither of these inputs is good for forecasting because they are both downward biased.

But once you put the buybacks in, total cash flow payouts have been similar to what they've always been. What's happened is that buybacks have replaced dividend yields as the preferred form of cash flow to the investor. One reason is that it's far more flexible for a corporation to pay out cash when they want to, rather than on some regular schedule. They don't have to worry about cutting their dividends in bad times. If they cut out the buyback, it's no big deal. And it's much more tax efficient to not pay dividends, given that retail investors are getting more and more sensitive to tax efficiency.

So, for all these reasons, I think you sort of have the wrong model here. Not that DCF is the wrong method—DCF is the right method; it's how you apply it that would essentially get you the right kind of answer here.

Rob Arnott: My only pushback is that you're completely ignoring the dilutive effect from new enterprise creation. If you include that, the S&P 500 has had average dilution over the last 30 years of a little over 1% per year, meaning that net buybacks have been negative. There were times when buybacks were net positive—2005 to 2008, in particular.

Exhibit 16 desperately needs to be brought up to date because I last updated it in late 2017. Back then, the narrative was that buybacks are huge. No; net of new share issuance, net of changes in the index and the dilution that comes from new enterprise creation, net buybacks were only about 1%, and that was a little bit of an abnormal outlier. So, I would push back on your results.

Roger Ibbotson: You might have noticed that the actual paper we wrote did include share issuance.

Rob Arnott: It included share issuance, but it didn't include new enterprise creation and changes in the index itself, which dilutes shareholders in a big way. If you own that static portfolio from, let's say, 30 years ago that constitutes just 40% of the S&P, then you've missed out on the growth associated with those new enterprises coming into the picture. It's a very, very big missing component. I have a world of respect for your legacy, your work on long-term returns; I don't have a world of respect for that particular paper.

Roger Ibbotson: Okay—that whole debate is written up in letters to the *Financial Analysts Journal*.[17]

[17]See Arnott and Bernstein (2018); Straehl and Ibbotson (2018).

PRESENTATION BY MARTIN LEIBOWITZ: P/Es, RISK PREMIUMS, AND THE *g** ADJUSTMENT

Martin Leibowitz:[18] I'm not trying to solve the issue of risk premiums as much as trying to shed light on two different angles of it. Let's look at **Exhibit 20**. It is a very simple way of looking at total return in terms of dividend yield or, in view of the comments that were just made, cash flow yield: the flow or yield that accrues to investors without price appreciation—look at it that way. Then you add the growth.

Suppose a stock has a P/E of 22 and sells at a price such that its expected return, *k*, is 7.1%, a rate commensurate with the stock's risk. The 22 P/E provides an earnings yield of 4.6%. We apply, say, a 35% payout ratio to that earnings yield to arrive at a dividend yield of 1.6%. If you add to that a 5.5% growth rate, which is shown as the growth assumption in the exhibit, you get back to the total return of 7.1%. The other bars in the left panel of Exhibit 20 can be viewed as the two components of the 7.1% total return.

Now, that 7.1% can be viewed from a different angle. Look at the right panel of the same exhibit, which starts with the earnings yield instead of the dividend yield and then tries to build up to the 7.1% expected return in a different way.

The P/E of 22 gives you a 4.6% earnings yield, but that yield is not the expected return because it does not fully account for the firm's growth. If you were to add the total 5.5% growth rate to the earnings yield, you would get 10.1%—far above the 7.1% expected return. To match the 7.1% return, a "growth-like" number of 2.5% would have to be added to the 4.6% earnings yield, as shown in the left bar in the right panel of Exhibit 20.

The Missing 2.5%

This 2.5% figure serves as a kind of net growth add-on that trues up the earnings yield to the stock's expected return. This net growth term, *g**, plays a key role in estimating the equity risk premium.

The equity risk premium is typically portrayed as the expected return over the yield on some "riskless asset," but one sometimes sees this premium computed as the earnings yield less the riskless rate. Suppose we have a riskless rate of 2.7%, as shown in **Exhibit 21**. (I wrote these materials in 2018, three years ago, when a 2.7% yield was more realistic.) In our example, if we were to subtract that 2.7% yield from our earnings yield of 4.6%, we would get a risk premium below 2%, which is pretty bleak. If we add the 2.5% net growth term back in, however, we get a risk premium of 4.4%, which is consistent with the assumed 7.1% total return.

So that's one way of adjusting risk premium calculations based on an earnings yield so that they are more consistent and make more sense. If you just say that the earnings yield minus the riskless rate is the risk premium, it leaves out a growth measure of some sort. And the growth measure is *not* the growth of dividends. That would be an overstatement. It should be this 2.5% value-added growth, *g**, not the 5.5% growth in dividends or growth in earnings.

The key point is that using the earnings yield alone as a return estimate can fail to fully account for levels of earnings growth that reflect the economic value added, or franchise value, of the firm—that is, earnings growth higher than that predicted by the retention rate times the return on capital. To provide theoretically consistent long-term return projections, an adjustment term must be added to the earnings yield. That term is the *g** we have been discussing.

This "net growth" approach contributes to a more consistent estimate of equity risk premiums. Perhaps most importantly, when these premiums are based on the earnings yield alone, this adjustment helps compensate for the resulting underestimation.

Probability of Beating a Given Yield Target

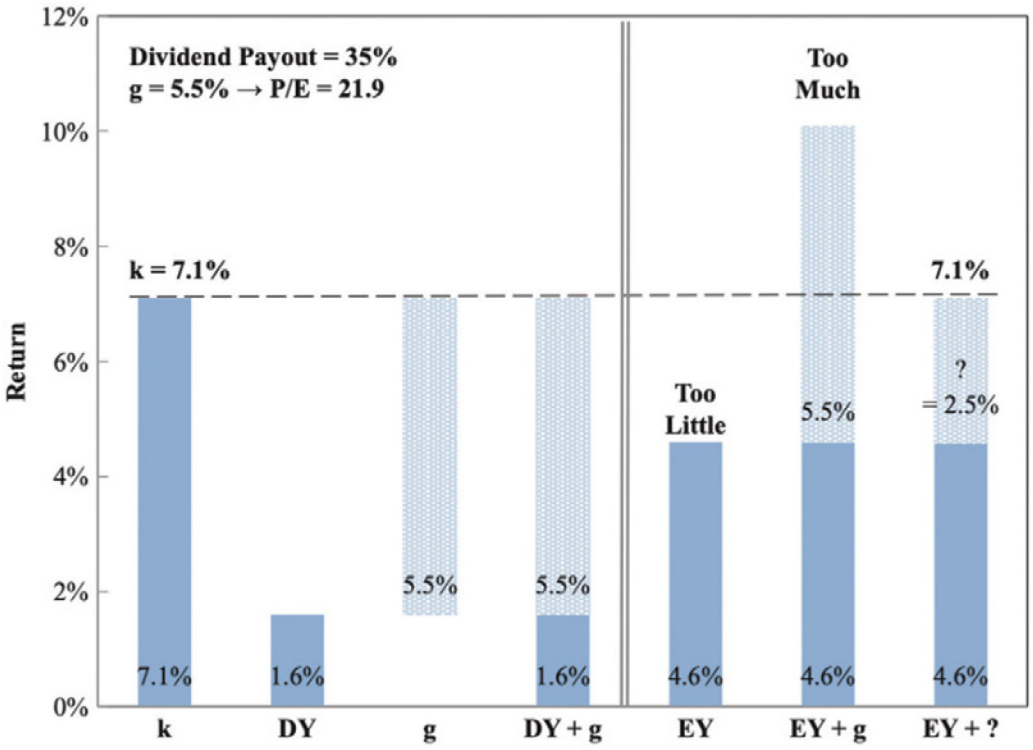
Exhibit 22 shows another way of looking at the equity risk premium.

The curves show the risk premium needed for equities to provide a 40%, 50%, 60%, and 80% probability of having returns greater than the riskless rate. Exhibit 22 assumes that equities have a 16% volatility. The lower curve shows that for an 80% probability of success over a 10-year period, the required premium is 4%. Over a five-year period, again using a simple normal distribution model, the required premium rises to 5.6%. This is in the range of numbers that we've been hearing throughout this conversation.

If you try to get a little more true to the real world—forget about the normal distribution and instead use a simulation that takes into account volatility drag, lognormal

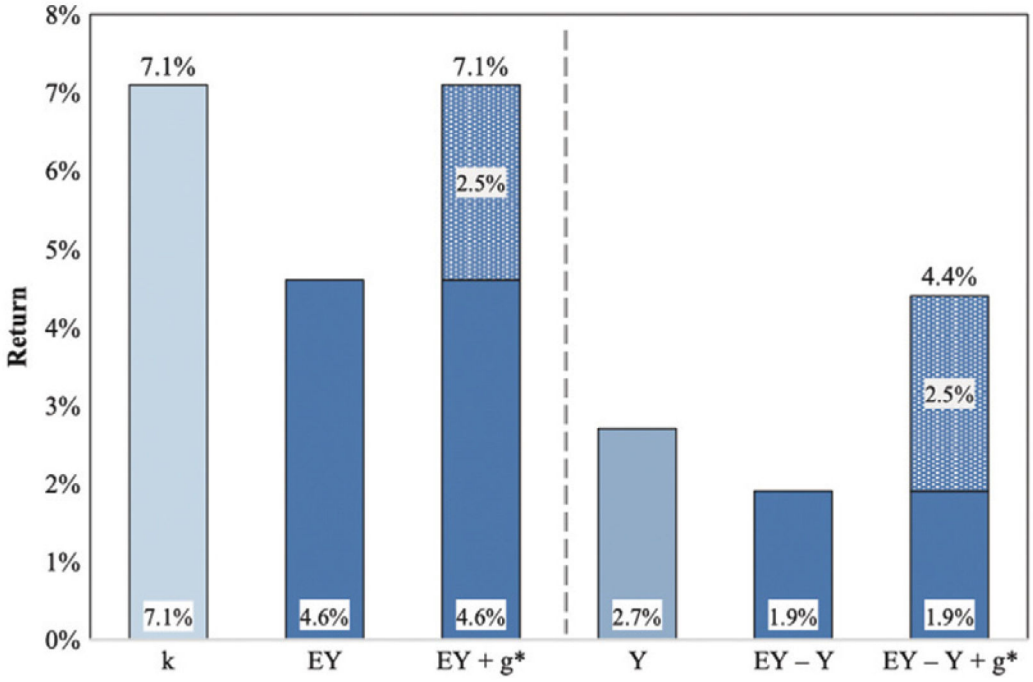
[18]I'm speaking as part of my new consulting organization with the snappy title of Advanced Portfolio Studies, rather than as a Senior Advisor of Morgan Stanley.

Exhibit 20. Return as Dividend Yield + Growth or Earnings Yield + "Growth Adjustment"



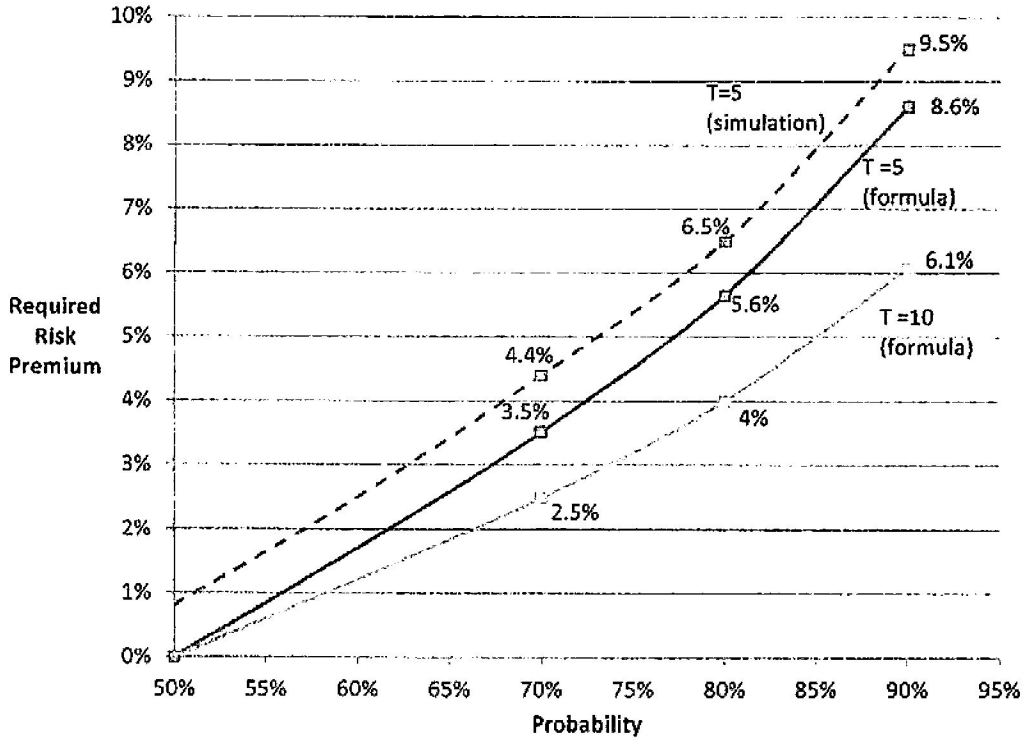
Source: Morgan Stanley Research.

Exhibit 21. Earnings Yield and Risk Premium Are Trued Up by Adding *g**



Source: Morgan Stanley Research.

Exhibit 22. Simulation-Based Risk Premium versus Probability of Beating Any Yield



Source: Morgan Stanley Research.

effects, and so forth—you need a 6.5% risk premium to have an 80% probability of beating the riskless rate over a five-year period.

While these seem like reasonable numbers, the probability of success is only one among many relevant factors. Nevertheless, this concept of a probability of success over some time horizon seems like a useful first-order consideration for the risk premium discussion.

Discussion of Martin Leibowitz's Presentation

Thomas Philips: Marty, I should note that what you call "net growth" can be written as growth times one minus book-to-price. Basically, you get earnings growth, but investors can't capture all of it. Some of it must be reinvested to put in place new assets to support the expanded business. You can actually derive that from first principles using the Edwards–Bell–Ohlson equation. And you can get an expression for your "net growth."

Martin Leibowitz: Yes, you can. And Jim Ohlson's work is important. But just in terms of the basic DDM, it comes out that net growth, g^*, is

$$g^* = \frac{b}{(1-b)} \times (r-k),$$

where b is the earnings retention rate, r is the company's return on capital, and k is the market rate of return or opportunity cost of capital. The key thing is to look at the spread over the market rate, $r - k$, because that's what generates added value.

PRESENTATION BY MARY IDA COMPTON: THE EQUITY RISK PREMIUM IN REAL LIFE

Mary Ida Compton: I'm the lone practitioner here, in a room full of scholars. When we (in the consultant community) think about the equity risk premium, we think about the way it applies in real life. I work for Alan D. Biller & Associates. We are a consultant to Taft–Hartley plans. They are governed by boards of trustees made up of company management and members of labor unions. They are not investment professionals, and they hire us to develop their investment policy statements. So that means that we need to have some asset allocation guidelines.

Asset allocation for these clients is an optimization problem with some asset class constraints. There's a target rate of return and the need to minimize risk at that level of expected return. It's pretty basic.

But here's the rub: For the last decade or two, the target rate of return has been increasingly difficult to achieve at modest levels of risk. Actuaries dictate the target investment return. We don't get to decide what that is. They expect the plan to meet this target return over the long term, and they base that number on historical market performance, which is problematic if markets are declining. There's a long time lag between what markets do and how quickly actuaries will change their numbers.

Conveying Reasonable Capital Market Assumptions to Clients

To help our clients, we try to set reasonable expectations for the future, so they can judge how much money there will be to distribute to the pensioners. The trustees want the higher actuarial return. They use that in their DCF model to apply to their future liabilities. They would like to make those liabilities appear smaller, so that both management and labor can contribute less to the pension plan. And should the company ever consider selling itself, it's better to have the lower apparent level of liabilities on its balance sheet. So, those are their incentives.

The actuary wants to keep the trustees happy and not get fired. So, they're reluctant to lower the actuarial rate, which would cause everybody a lot of pain in the short run while preventing pain in the long run if the lower rate is economically correct.

Then there's the consultant who, at least in our case, wants to provide the most accurate prediction of the future so that the clients can avoid huge surprises. The consultant would love to agree with the actuary to unify these goals, but we're constrained by the realities of the market. The consultant's returns are forward-looking rather than backward-looking, so clearly we will not always or even usually agree with the actuaries.

So the clients are trusting me in my role as a consultant. We meet with trustees at least quarterly and continually educate them on relevant topics. We don't have much time to talk to them—they have a lot of paperwork to deal with and the investment report is just one aspect of their meeting preparation. Capital market assumptions are an even smaller part of that. Between meetings, we email internally generated research pieces with data from academics, economists, and the likes of Bloomberg; and we truly appreciate the work that all of you in this forum are doing so we can use it as it filters into our capital market assumptions.

At every quarterly meeting, comments are tossed into the discussion, like those advertisements they used to have in the movies where they would show you, for a fraction of a second, a picture of a Coca-Cola and you're supposed to "subliminally" get thirsty and go out and buy one. In that way, we try to remind the trustees of market issues impacting their plans. We do it in conversations between meetings, dinners, phone calls, and even golf outings.

We're trying continually to talk to individual people with responsibility for the plan and understand how they think, and how we can best convince them of our capital market assumptions. This is a relationship business.

Capital Market Assumptions at the Present Time

It's no surprise that 10-year projected returns have been declining for at least 15 years, probably longer, but nobody remembers before that. **Exhibit 23** shows our capital market assumptions. We construct them by surveying 25 to 50 asset managers and gathering all of their expected 10-year projections. We do two things: (1) We look at the median number, and (2) we look at a Winsorized mean.[19] And then we average those two.

We throw out wildly obvious outliers. What you see in the exhibit is after these adjustments.

[19]A Winsorized mean is a type of average that removes the influence of the most extreme outliers. See Dodge (2003).

Exhibit 23. Capital Market Assumptions in 2021: 10-Year Projected Returns Are Down



Note: Eq = equities; RE = real estate; FI = fixed income; HY = high yield; Agg = aggregate.

Source: Based on data from Alan D. Biller & Associates.

Conversations with the Client

So, let's go into a meeting. The client will say, "Why are these expected returns so low? Are you kidding me?" And we say, "No, sorry, we're not kidding you. This is reality. You've heard about how high the prices of equities have gone. The prices have increased faster than expected earnings can support."

Then we provide some exhibits to illustrate that. You see how low bond yields are. Savings accounts pay peanuts. Certificates of deposit don't get you much more. Mortgage rates are super low. These are facts they can really relate to. They know them from their real lives; they understand these concepts.

They also kind of understand the concept of an equity risk premium, but we don't ever call it that. But we do convey the idea that, if bond yields are down at 1%, you can't have stocks up at 12% for the next 10 years. If stocks had an expected return of 12%, people would all put their money in stocks and then the stock market would go way up and then drop off a cliff. They kind of understand that concept, too.

At a recent meeting, one of the consultants talked about the recent increase in the 10-year Treasury yield and how that caused losses in fixed income and spooked some equity investors. High equity valuations and rising interest rates have created volatility that is likely to persist, so we want to get that idea in there, too.

The other thing we do is to pose questions being asked by the media and the general public. Is inflation here to stay? Can additional government spending be a positive catalyst, or could higher taxes be a negative catalyst? We then describe the trajectory of current variables that influence markets, using pictures, graphs, and whatever else is necessary to make the point.

We talk about the Fed having more impact on the markets than it used to. That is something that people need to pay attention to and look at.

So, that was one meeting. Outside the meeting, consultants have to use multiple approaches because we're dealing with a group of individuals who are all different from one another. Each of them has different expectations. There's macroeconomics, demographics, the idea of equity returns building on bond returns. As a result, consultants think of their job as an art form rather than a science. They are there to translate complex information into a language that their clients can understand and use to make decisions.

The Endless Zero Interest Rate Policy

I seem to be able to use **Exhibit 24** no matter what year it is. This is from 2017, but the slide is not out of date. Interest rates are near zero. We've been telling clients that interest rates are near zero for years, and we're glad they're still listening to us.

Back in the meeting, the client may ask: "Okay, now what do we do?" Maybe they say, "We just had this amazing year—that should help us pad the future." Or maybe they say, "The world has changed—see those recent [very positive] market returns?" We get all those comments.

We first respond that you shouldn't take a recent year of excellent performance as a windfall. It is more conservative to consider it as eating into future years' performance—so be aware. Second, don't take the last couple of years of excellent performance as an indication of future performance. This soaring market is not a new normal. We can help you get additional return, but it's going to involve taking some risks.

Ways of Enhancing Expected Return

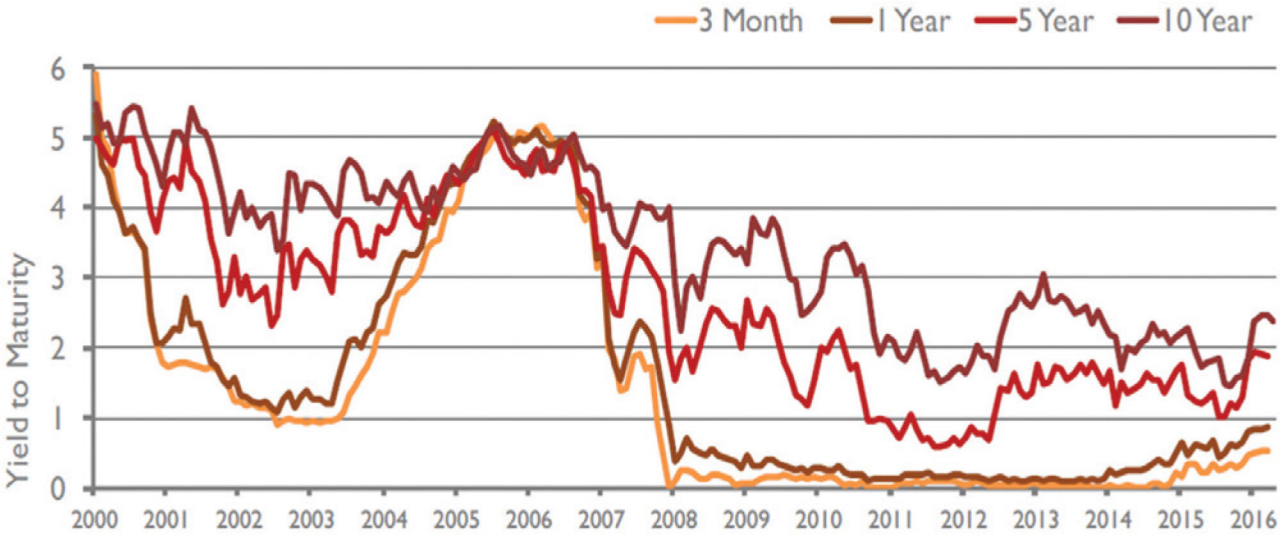
You can take on additional liquidity risk by going into private capital: private equity and private debt. We see a lot of flows going in that direction. It's a little scary, but we work hard to make sure that clients are not going to come up short by taking liquidity risk and getting nothing for it.

We can also expand the opportunity set of investments. Some clients are pretty traditional, pretty conservative. You can move into "core-plus" bonds from plain old core bonds. You can go into mid-cap equities. You can go into international equities. We make the case that international will give you diversification, and we never know when the United States is going to underperform. It will happen; we just don't know when. So maybe you should be prepared for that. (See **Exhibit 25**; note that the country and regional returns are presented as cumulative excess returns over the MSCI World benchmark, which may be an unfamiliar space.)

Some clients don't like to hear that. They say they're not going international, that it's just not happening. We have to respect that, and it becomes a constraint that we have to live with. We do make plainly clear that capital market assumptions, ours or anyone else's, don't always come true. So we show them **Exhibit 26**, which shows realized returns versus the expected returns based on our capital market assumptions over time. We've been humbled, to say the least. But the capital market assumptions help guide the discussion. They're pretty good directionally—they're not so good during market shocks.

To sum up, the most important thing we can do is to educate our clients to help them keep their expectations realistic.

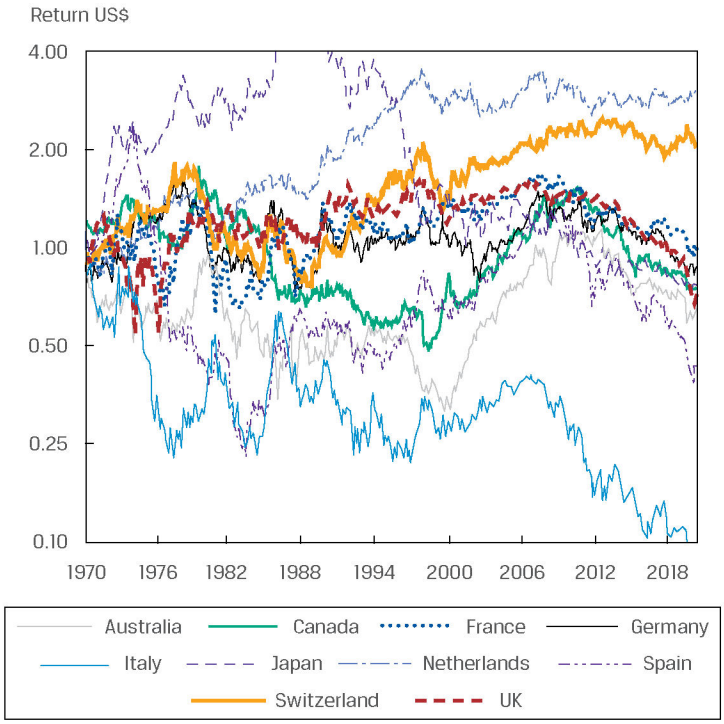
Exhibit 24. What's Happening Now: Interest Rates Near Zero



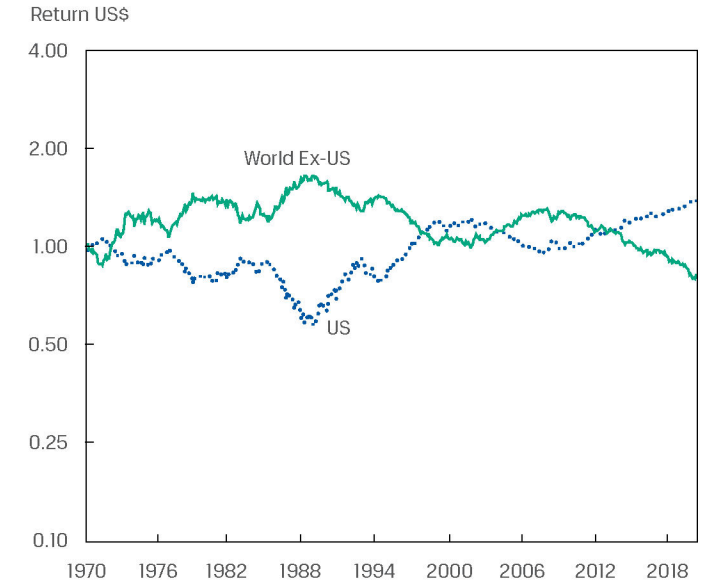
Source: Based on data from FRED (Federal Reserve Bank of St. Louis).

Exhibit 25. Nominal Total Returns on US, Non-US, and World Equity Markets

A. Nominal Total Return Indexes of 10 Leading Non-US Countries, in US Dollars, Expressed Relative to MSCI World Index, 1970–2020



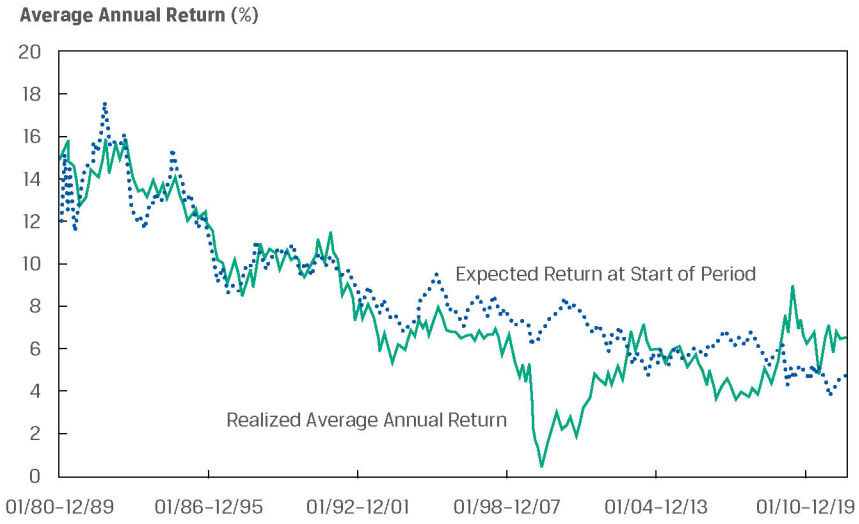
B. Nominal Total Return of US and World ex-US, in US Dollars, Expressed Relative to MSCI World, 1970–2020



Note: Panel B uses same scale as Panel A.

Source: Based on data from MSCI.

Exhibit 26. Realized versus Expected Returns, 60% Global Equities/ 40% Core Bonds, 1980–2019



Source: Based on data from Bloomberg L.P. and Alan D. Biller & Associates.

Discussion of Mary Ida Compton's Presentation

Roger Ibbotson: I can't help pointing out that actuaries are not economists. For political reasons, their numbers—discount rates or expected returns—are way too high; they're playing some sort of game where they have to go along with that.

More to the point, I think that Miller and Modigliani's argument—that assets and liabilities are separate—is the relevant way to look at this. The discount rate for the liability is determined by the risk of the liability, not of the assets—and, if you are really making a commitment to pay these liabilities, the liabilities are a riskless asset to the beneficiary. So, the riskless rate would be the discount rate. It would not be the return on the stock market or a portfolio of different assets.

I'll leave it at that, realizing that those kinds of arguments are not what you need, Mary Ida, to handle your client.

Mary Ida Compton: We'd love it if they'd listen to you, Roger!

Robert Arnott: I was struck by the fact that, relative to your forward-looking returns, the actual subsequent returns were underwater during most of the last 25 years, as shown in Exhibit 26. This is all very familiar territory to us. Folks anchored on wonderful returns in the 1980s and 1990s and forecasted 10% annual returns when stocks were yielding 1% in dividends, so a 10% overall return was utterly implausible. The return forecasts made by actuaries have been coming down from implausible levels and are finally getting to something semi-sensible.

Mary Ida Compton: It's also interesting that our expected returns are much lower than those of our competitor consulting firms. I think they like to say, "Oh, sure, we can get you 8%."

Martin Leibowitz: Way back during the 1980s, the actuaries actually had kind of a standard discount rate of 4%. They kept it there—they didn't change it much at all—and this was at a time when interest rates soared, as we all know, until rates reached 15% on long-term bonds. And actuaries still kept the discount rate at 4%, okay? That was their conservative approach to things.

What one could do, of course, was to buy long-term bonds—"defease" or immunize the pension portfolios—and, all of a sudden, the cost of that strategy would be far, far less than your notional liabilities based upon the 4% discount rate. Some firms, like Salomon Brothers and a couple of others, did this, and it was a win–win for everybody, except possibly the actuaries.

As a result, corporations and their balance sheets greatly improved. The beneficiaries benefited from much sounder decisions in terms of the assets that are supporting their needs. Needless to say, some of the firms that were involved in the transaction process also did reasonably well. So, actuaries can be wrong in two directions!

Laurence Siegel: I appreciate Marty's historical perspective that there was a long period where the actuaries were too low, not too high.

PRESENTATION BY ANTTI ILMANEN: UNDERSTANDING THE MANY COMPONENTS OF EXPECTED RETURNS

Antti Ilmanen: Earlier presentations initially focused on historical average returns. Then we moved to the fuller picture of time-varying expected returns. I'll be very much in the second camp in my comments here.

Exhibit 27 shows 120 years of expected real returns on US stocks and bonds using some simple measures. I want to emphasize that this is not a world of compressed premiums right now; the premium between equity and bond expected returns is pretty normal. What is unusual is that *both* series are near their historical low points: second or first percentile. This scenario contrasts sharply with what we saw 20-some years ago during the dot-com boom, when bonds had 4% real returns. So, everything now seems expensive compared to its own history, and there is no easy solution to that problem for anybody. That is offered just as background.

Estimating the Inputs for the Dividend Discount Model

So, how did I come up with the equity expected returns? I did it from the perspective of the dividend discount model (DDM): yield plus growth and plus or minus mean reversion. For yield, I'm estimating the real yield at 1.4% by averaging two measures: (1) dividend yield and (2) half of the reciprocal of the Shiller PE. The second measure is meant to be a simple long-run way of looking at the payout yield through an earnings lens without getting involved in the buyback revolution.

The second number in the DDM equation, the growth rate, is the 1.5% real earnings-per-share (EPS) growth rate. Later on, I'll have an exhibit on each of yield and growth and at that point I'll go into details.

For the mean reversion term, I'm assuming no mean reversion over the forecast horizons, so that's different than what Rob Arnott, for example, was showing. The logic behind my choice is that there have been some structural changes, and we may return to that. But there's also a practical reason why I'm not including mean reversion. If you look at the dark blue line in Exhibit 27, it's quite time-varying. If I assume mean-reverting valuations, that would imply an implausibly wide historical range and an even lower expected equity real return today.

Components of the Yield on Equities: Buybacks, Dilution, and All That

On the question of yield, there has already been some debate here between Rob Arnott and Roger Ibbotson. **Exhibit 28** shows some data from the Straehl and

Exhibit 27. Simple Expected Real Return of the US Equity Market and 10-Year Treasuries, 1 January 1990–30 September 2021

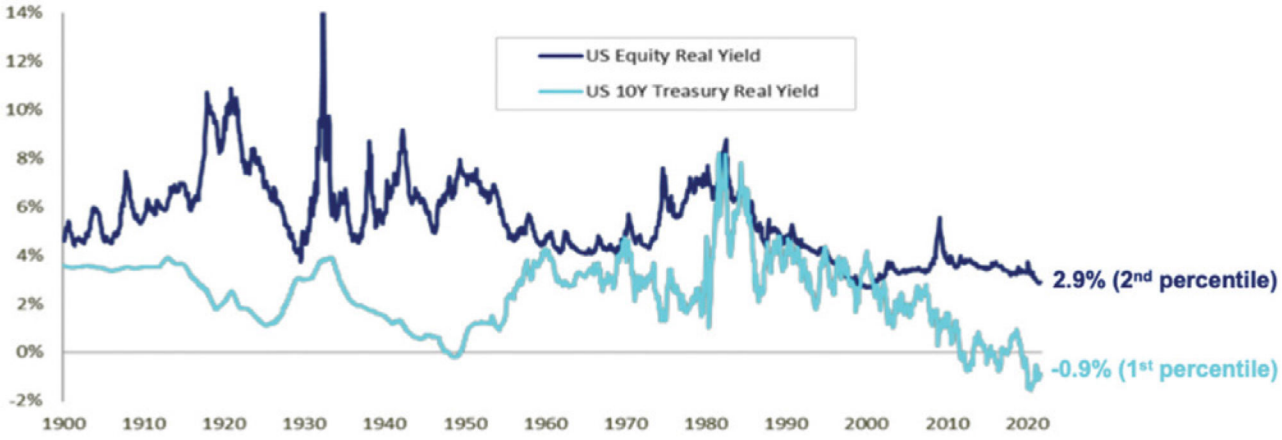
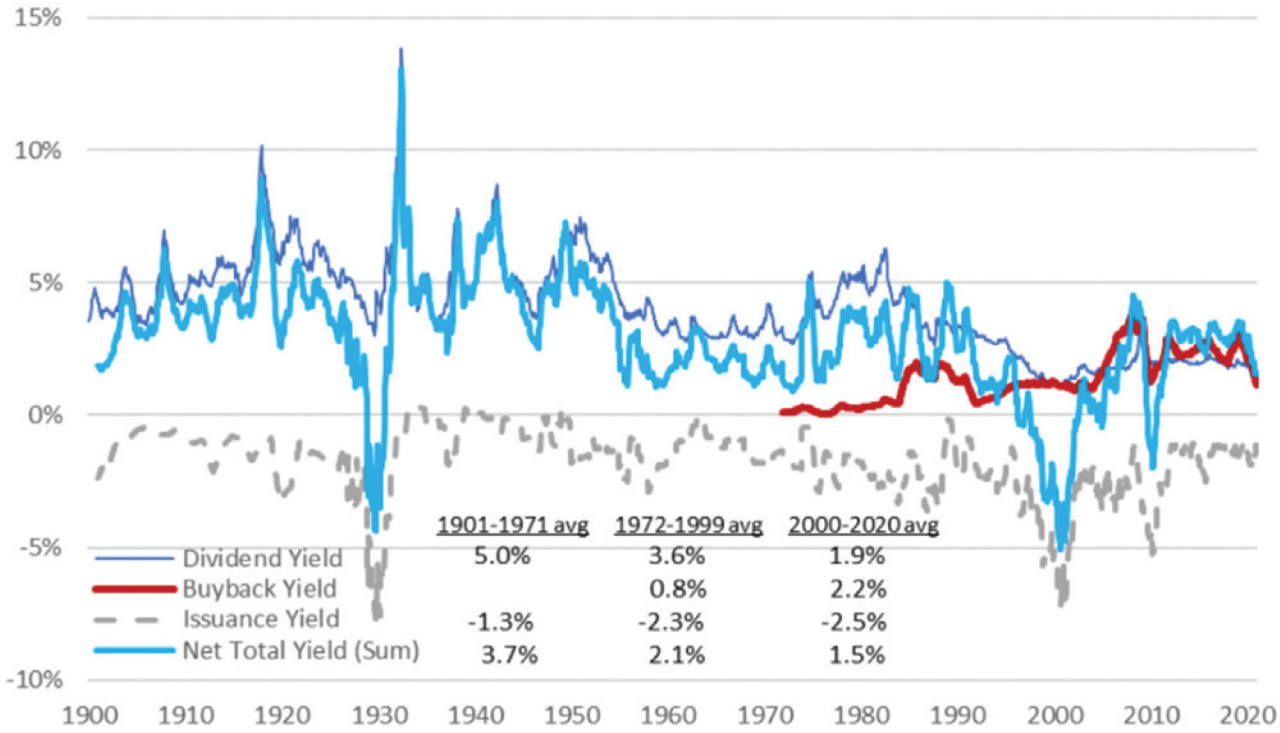


Exhibit 28. US Annual Dividend Yield and Other Parts of the Net Total Payout Yield, 1900–2020



Source: Straehl and Ibbotson (2017), extended by author.

Ibbotson study.[20] I really like this study, much more than Rob did. We start with a long history of dividend yields, and then the red line here adds buyback yields. Those are gross buybacks. In the spirit of what Rob was saying, you should then add the negative contribution from new share issuance. I've included both of those in the exhibit.

If you look at the last 20 years of these data, which are for the S&P 500 constituents, you can see buybacks and new share issues largely canceling each other out. In the olden days, we thought that dividend growth was subject to dilution of between 1.5% and 2% per year, with dilution caused by the growing number of shares and measured as the spread between the per-share and aggregate growth rates. Nowadays, that spread seems to be much closer to zero.

In other words, dilution has largely gone away because new issues are offset by buybacks. This means you are taking these two factors into account correctly in the calculation of the broad payout yield (dividend yield plus buybacks minus new issuance), so you don't need to also adjust for dilution in the growth term of the DDM equation. The growth term should then be aggregate earnings growth, not EPS growth, in this modern version of the DDM. Conveniently, there has recently been not much difference between aggregate earnings and EPS growth.

Is the 1.5% EPS Growth Estimate Too Low?

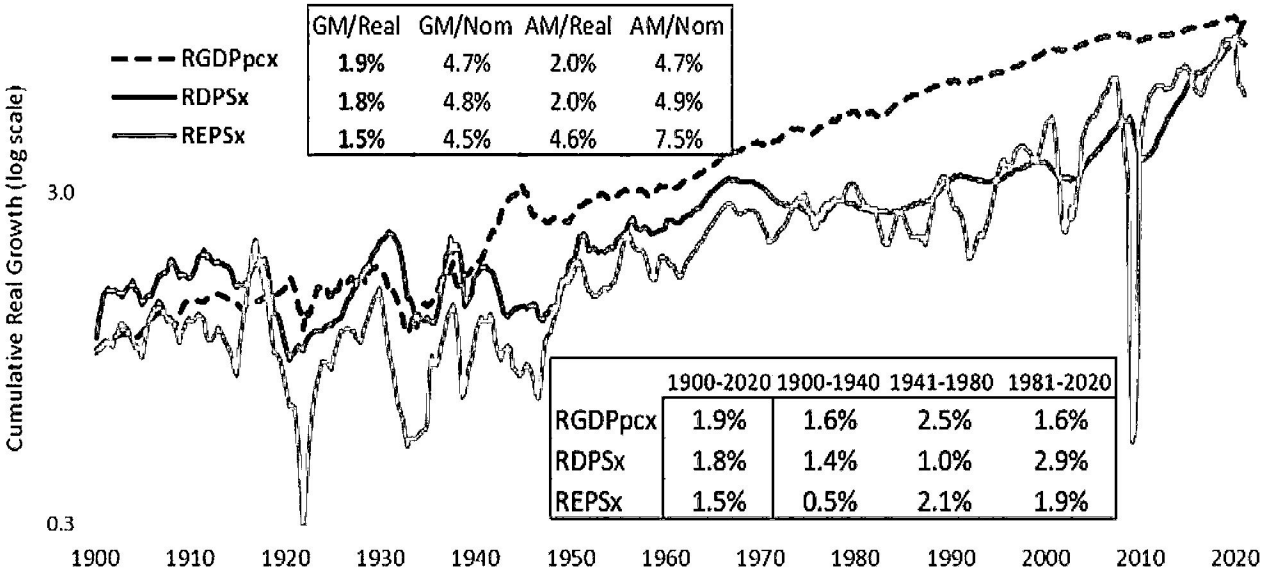
That may have been a little complicated. I have assumed, and I keep assuming, a 1.5% real growth rate for EPS. This is in the spirit of what Bernstein and Arnott did 20 years ago, looking at the historical growth rates of GDP per capita, dividends per share (DPS), and EPS.[21] Looking at the 120-year history in **Exhibit 29**, you can see that all those numbers are 1.5% or a little higher. Importantly, these are real compound growth rates (geometric means). If we looked at nominal rates and arithmetic means, instead of 1.5% we'd see 7.5% real EPS growth—not so stingy.

I looked at different time periods. Over the last 40 years, all these numbers are a little higher. DPSs have grown at a particularly high rate over the last decade and have had

[20]Straehl and Ibbotson (2017). This exhibit, like most others in this section, is from my latest book (Ilmanen 2022).

[21]See Arnott and Bernstein (2002).

Exhibit 29. US Economic, Dividend, and Earnings Growth, 1900–2020



Notes: RGDP = real gross domestic product (showing economic growth). RDPS = real dividends per share. REPS = real earnings per share. DPS and EPS on the S&P 500 index and its predecessors.

Source: Based on data from Robert Shiller's website (www.econ.yale.edu/~shiller/) and FRED.

the highest growth rate of any of these variables over that 40-year history.

I'd be open to thinking about 2% real compound growth instead of that 1.5%, but one reason why I haven't is the evidence that Elroy and his coauthors have gathered on markets outside the United States. They have looked at DPS growth in many other countries, and that variable has averaged near zero in real terms. So, again, I stick with that 1.5% estimate and I don't try to do anything fancier. In our practical capital market assumptions, we do perform a more complex calculation (time-varying, country-varying), but that's not based on empirical evidence because there aren't enough 10-year earnings growth numbers for a serious study.

The Deep Decomposition of Equity Returns

Exhibit 30 is a bit of a detour. I wanted to give a shout-out to the literature on deep decomposition of stock market returns. We've all done some versions of this, and the study that I've seen take it further than any other is by L'Her and his coauthors.[22] He refers to the components of return as "net buybacks and seven dwarfs."

L'Her et al. start with the total nominal return, and then split that into (1) real return and (2) inflation and currency effects. Next, in the second step in Exhibit 30, you use the DDM approach of splitting real return into the dividend yield, real DPS growth, and valuation change.

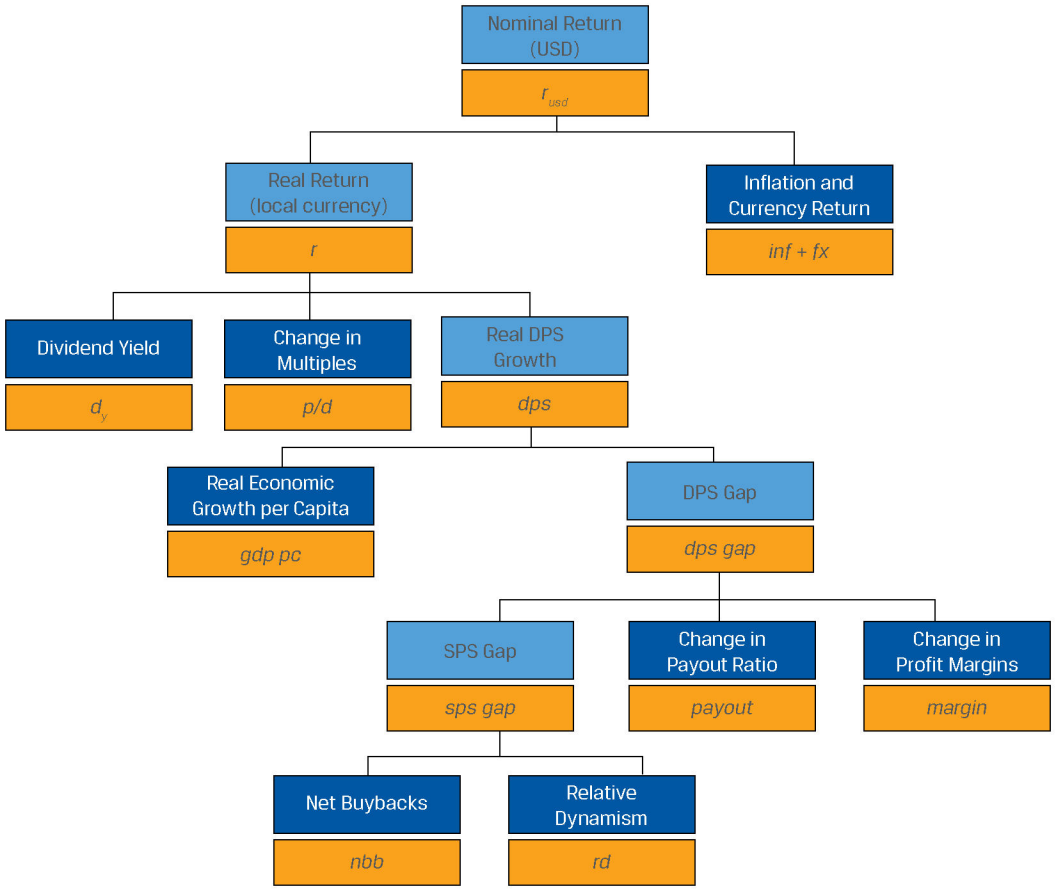
Then they go further. In the next step down in Exhibit 30, they split up real DPS growth into (1) real economic growth per capita and (2) what they call the DPS gap. The DPS gap is the difference between DPS growth and economic growth. In the subsequent step, they subdivide the DPS gap into sales-per-share gap (SPS) and some interesting economic measures: change in the payout ratio and change in profit margin. The last step apportions the SPS gap between net buybacks and relative dynamism of the listed sector.

The point is that you can use simple mathematical tricks, such as using logs and adding and subtracting terms, to come up with any decomposition of stock returns you want—but they have tried to come up with something economically interesting. At the bottom of Exhibit 30, you can see that they've applied this method on many countries, using 20-plus years of data, to decompose stock market returns into these pieces.

Overall, I think this is an interesting path to explore in the future—to try to better understand equity returns in the

[22]See L'Her, Masmoudi, and Krishnamoorthy (2018).

Exhibit 30. Decomposing Stock Market Returns into More Granular Pieces



	Dividend Yield, *dy*	Price-to-Dividend Change, *p/d*	Real per Capita GDP Growth	Net Buybacks, *nbb*	Relative Dynamism, *rd*	Payout Ratio Change	Margin Growth	=	Real Total LC Return, *r*	Inflation and Currency Return, *inf + fx*	=	Nominal Total Return in USD
All Mkt Avg	2.9%	−0.3%	2.1%	−2.2%	0.5%	0.5%	1.2%		4.7%	1.9%		6.6%
US	1.9	0.4	1.4	−1.8	2.4	0.7	1.2		6.1	1.9		8.0
China	2.6	1.0	8.2	−26.5	14.9	−0.9	1.3		0.7	2.8		3.5

Source: AQR; L'Her, Masmoudi, and Krishnamoorthy (2018).

past and looking forward by linking equity returns to their fundamental determinants.

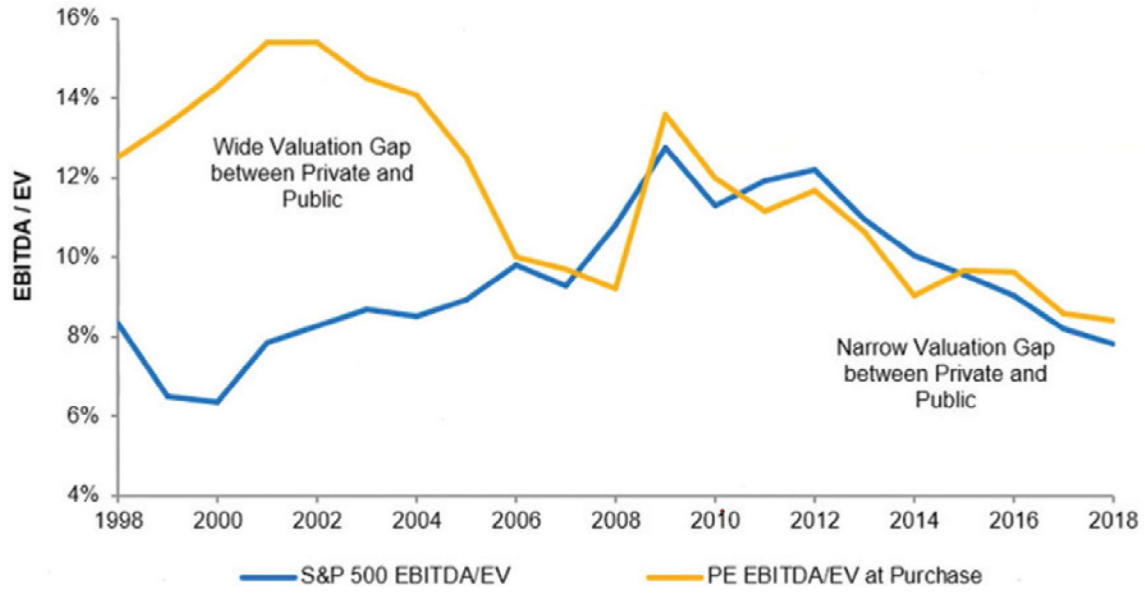
Private Assets

I want to address private assets very briefly. As shown in **Exhibit 31**, there's a pretty good case to be made that there was a bigger gap between private and public equity returns in the past than there will be in the future. The gap will probably be much more modest, unless private asset fees fall a lot. The time-series chart shows that there used to be a big valuation gap between private and public equity but that it narrowed hugely in the mid-2000s when the endowment model was popularized for the first time. Since then, it has been pretty narrow.

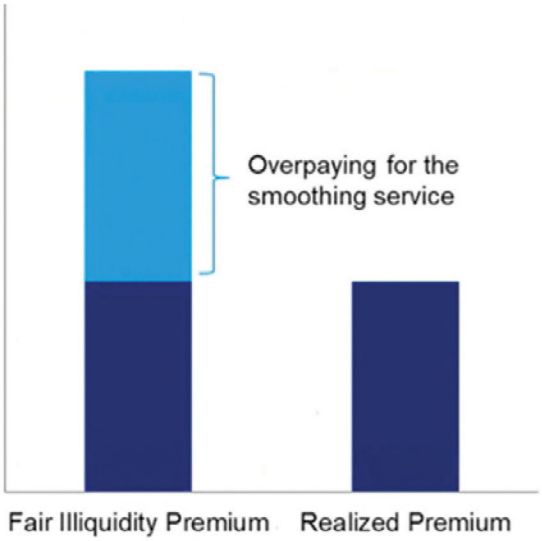
There's another argument that investors may be fine with private assets not earning a premium over public ones. While investors would prefer to get an illiquidity premium for private assets, they also like the smoothness of private asset valuations so much, for reporting and compensation purposes, that they may not insist on such a premium.

Exhibit 31. Equity Premia in Private and Public Equity: Expected Returns on the Two Asset Classes May Not Differ Much

A. *Ex Ante* Valuation Gap between US Public and Private Equity, January 1998–September 2018



B. Fair Illiquidity Premia in Private Assets May Be Offset by Investors' Paying for the Lack of Mark-to-Market



Notes: Increasing popularity of private equity since the mid-2000s may have reduced the prospective return edge over public equity. P/E managers' gross "alpha" is partly offset by high fees. Institutions' required returns may balance illiquidity and smooth returns. Despite its popularity, investable P/E AUM remains much smaller than public equity (about $5 trillion versus $100 trillion).

Discussion of Antti Ilmanen's Presentation

Thomas Philips: If you had to make a choice between using Shiller's CAPE or a decomposition method to make a forecast, which would you choose and why?

Antti Ilmanen: The Shiller CAPE is a really good starting point. You then ask whether you can do something better. First you should ask: Is it for timing, is it just for planning purposes, and so forth? An interesting aspect of the current situation is that it is not a world of compressed premia. The premia are pretty standard, but everything is expensive. So our question is whether we expect all these expensive valuations, including CAPE, to cheapen in the future.

I do think that there is a link to bond yields: If you start to see real bond yields rising, all asset classes, including equities, will be in more trouble. So, CAPE is a good starting point, but depending on the purpose, I would look at other information as well, including what's happening in bond land.

Roger Ibbotson: In the Straehl and Ibbotson paper,[23] we did use total payouts to predict market returns, and they actually were a little better at it than CAPE.

Antti Ilmanen: I do have a bit of a favorite, called equity share. It is equity market cap as a percentage of the total of all asset classes, and in past timing exercises, it performed clearly better than CAPE. It looks at the prospects for equities relative to, say, bonds, and so it has missed the richening of all asset classes together. That's been a good thing for backtests because, again, those low expected returns have not yet been converted into low realized returns. But, for relative purposes, I would look at equity share.

Laurence Siegel: Equity share misses two concepts. One is absolute as opposed to relative valuation, as you said. The other is the preference of governments and corporations for issuing debt. Governments have gone hog wild in spending, so they have had to float a lot of debt to finance it. That issuance drives equity share below what it otherwise would be.

Antti Ilmanen: Yes. As always, those types of metrics depend both on the performance of each series and on issuance. Maybe performance has dominated and the issuance part is just noise, but I don't know. Empirically, equity share has been helpful at forecasting, beyond the relative performance of equities and bonds.

Laurence Siegel: Interesting.

Thomas Philips: Do you calculate equity share using just corporate debt and corporate equity, or do you use overall debt?

Antti Ilmanen: I've seen both versions, and it looks fine either way. I've also seen versions that throw in real estate or other assets.

Elroy Dimson: If you were talking to a standard endowment, not one that has special access and special skills, what would you regard as a sustainable level of spending, one that would maintain the real value of the assets?

Antti Ilmanen: The type of exercise that you see here suggests a real return of less than 2% for a 60/40 portfolio, so I think 2%. For the next decade, a 5% real return or spending rate is a pipe dream. Two percent is realistic; you could get 3% with some useful strategies on top of 60/40. But that's just for the next decade. US public pension plans, which use such optimistic expectations, say somewhere in their fine print that they have a 40-year horizon. With such a long horizon, we can look beyond the next decade during which we have negative real bond yields and so on. The subsequent 30 years could be better. Horizon matters.

Martin Leibowitz: As one who has sat on a number of investment boards of major universities—from Harvard, with the biggest endowment, all the way down to the Institute for Advanced Study, with probably the smallest endowment of a prestigious organization, and along with Cliff on the board of the University of Chicago, that wonderful bastion of intellectual volcanic eruptions—none of them has a spending rate below 4%. They're almost all in the 4%, 4.5%, 5%, sometimes 5.5% range.

These numbers are the basis of extensive and very thoughtful discussions that, I think, are eventually determined by one factor: The institutions need the money. They cannot tolerate a lower spending rate. And many of them have a spending formula that is not only based upon a combination of forecasts but heavily weighted toward what they did last year.

Laurence Siegel: Having also worked for a very large endowed institution, the Ford Foundation, I can see the problem. If you stop paying your professors, you're going to have bigger problems than a slightly shrunken endowment. Sometimes, as Jack Bogle said, you just have to budget for a shrinking asset base in real terms.

Cliff Asness: I'd like to comment on Marty's comment, lest he or I ever get accused of being a perma-bear. Marty and I share the distinction of basically being fired from the investment committee at the University of Chicago for saying we should not sell stocks relatively close to the 2009 low, and, if possible, that we should buy them. So, you can take even a hallowed institution with brilliant people on a committee, and still get panicky, herd-following behavior. Marty and I were saying, "We don't know if stocks will go lower, but they're much lower than they were before; who should own stocks now, if not us?" And we lost that fight and our jobs.

Martin Leibowitz: Yes, but it saved me a lot of donations.

Thomas Philips: That's very human, a universal problem. It's not just the University of Chicago.

Cliff Asness: The other guy who agreed with Marty and me on the University of Chicago investment committee was David Booth, who didn't get fired. When you lose an argument where the school's biggest donor is on your side, that's impressive. That reveals how hard it is to go against bad thinking. This was the opposite of the current

[23]See Straehl and Ibbotson (2017).

discussion about low expected returns being ignored—for once, we were screaming that expected returns were better than normal. People don't like to buck the trend in either direction; whatever has been going on will continue.

Thomas Philips: I'm going to make a comment on the flip side of this. I'm in India, taking care of my parents. There's a venture capital boom out here. It's like the United States in the late 1990s or China in the 2010–2015 period, and people think this is going to go on forever. The idea that it might not is a difficult conversation to have at either end. It's not one-sided.

Martin Leibowitz: People tend to stick with their asset allocation no matter what. Institutional investors will choose an allocation and rebalance back to it, in many cases almost mechanically.

Now, stop and think—does that really make sense in a world where any kind of forecast, any kind of judgment, any kind of sense of valuation matters? If the stock market is booming, you'd think what you should do is not only sell it back to your original allocation but go below that, because presumably the market is less attractive than when you made your original allocation. And vice versa—if the market is down and you're in a situation where you think the evaluations are really attractive, should you go back to your previous allocation? No, you should go beyond that. But no one does. I can assure you that no one does that.

Thomas Philips: Yes, we're human. We're all humans.

PRESENTATION BY THOMAS PHILIPS: LINKING EXPECTED RETURNS TO FUNDAMENTALS

Thomas Philips: In my mind, the right way to address the questions being raised in this meeting is to first weave economic insights into simple models of expected return, and to then estimate these models using robust statistical techniques, because the signal-to-noise ratio in finance is truly awful, as you can see from **Exhibit 32.** (It's actually easier to communicate with Voyager than it is to predict financial markets!) So, forget ordinary and generalized least squares, the Gauss–Markov theorem, the consumption CAPM, and above all, forget TensorFlow, which is the modern-day equivalent of "plastics."

The way I calibrate my thinking about expected returns is to start by asking whether I should think about them in nominal, real, or excess return terms. (By "excess return" I mean the return in excess of cash.) And, for reasons I don't fully understand, nominal returns are far more predictable than real returns and excess returns. So, I work out everything in nominal terms and then translate between nominal and real quantities using inflation breakevens, which are traded.[24]

Expected Returns on Bond Portfolios

Let me start with bonds. I'm going to appeal to a very beautiful theorem originated by the late Terence Langetieg, Marty Leibowitz, and Stan Kogelman (LLK).[25] It can be succinctly summarized as: "Over a $2D_{mod}$-year horizon, the return of a constant duration zero-coupon bond is close to its initial yield."[26] (D_{mod} means modified duration.) A $2D_{mod}$-year horizon means a time horizon or holding period equal to twice the modified duration of the bond. Remarkably, the theorem applies surprisingly well in practice to coupon bonds as well as to portfolios of coupon and zero-coupon bonds that are rebalanced back to their initial duration monthly or even annually, provided that the holding period is shortened by one year to $2D_{mod} - 1$ years. So, if the modified duration of a constant duration bond portfolio is five years, its return over a nine-year period starting at time t is close to its initial yield at time t. **Exhibit 33** tests this principle against the subsequent realized returns[27] of the Bloomberg Barclays US Aggregate Index, which has a fairly stable duration, over a long period.

Remarkably, the LLK theorem works even better for the Agg than it does for the US Treasury Index. At any rate, LLK is a great way to calibrate your thinking about the expected return of bonds. So, my estimate of the expected return of 10-year US Treasuries is 1.6% per year, compounded.

Does it work in credit? Yes, it does, as **Exhibit 34** illustrates using a short-term, high-grade credit factor constructed using a long position in the ICE BofA one- to three-year

Exhibit 32. Signal-to-Noise Ratio in Finance versus Other Applications

Application	Signal-to-Noise Ratio
Capital markets	0.5
Deep space communications	*1–10*
AM radio	100
FM radio	1,000
Good audio amplifier	10,000–100,000
Very low-noise laboratory amplifier	100,000–10,000,000

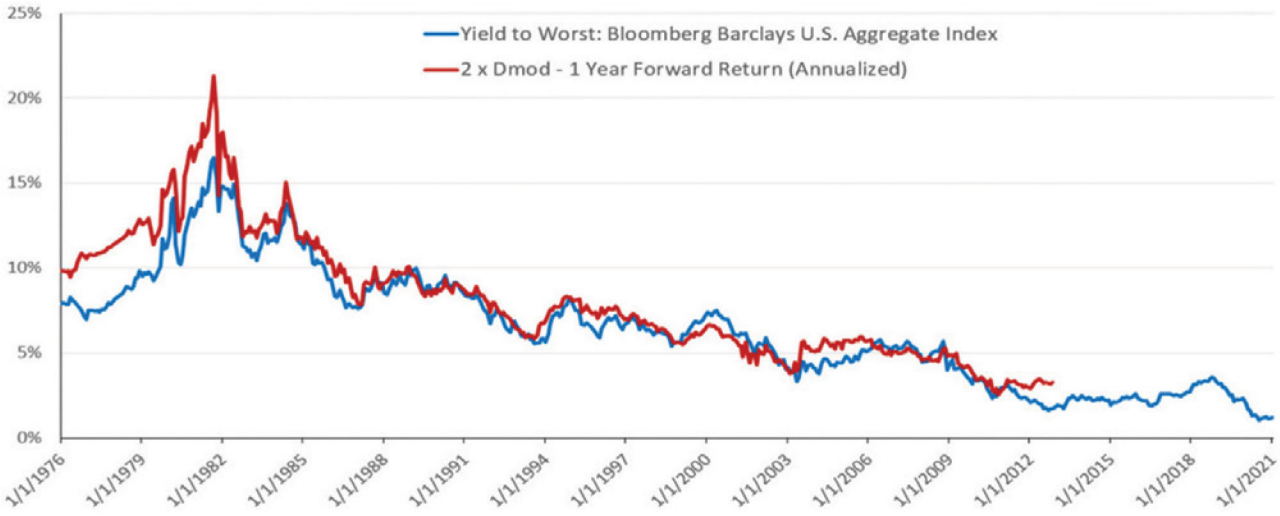
[24]Breakeven inflation is the difference between the nominal yield of a nominal Treasury bond and the real yield on a maturity-matched inflation-protected Treasury bond (a TIPS bond). It is the market's expectation of future inflation. A long breakeven position can be created by taking a long position in a US TIPS bond and a maturity-matched (ideally a cash flow timing matched) short position in a US Treasury nominal bond.

[25]See Langetieg, Leibowitz, and Kogelman (1990).

[26]A constant-duration zero-coupon bond is a hypothetical bond that is continually renewed so that its duration stays constant. Think of this as continually selling the currently held bond and buying a new bond with the same duration using the proceeds of the sale.

[27]That is, the return of the index from time t to time $t + 2D_{mod} - 1$.

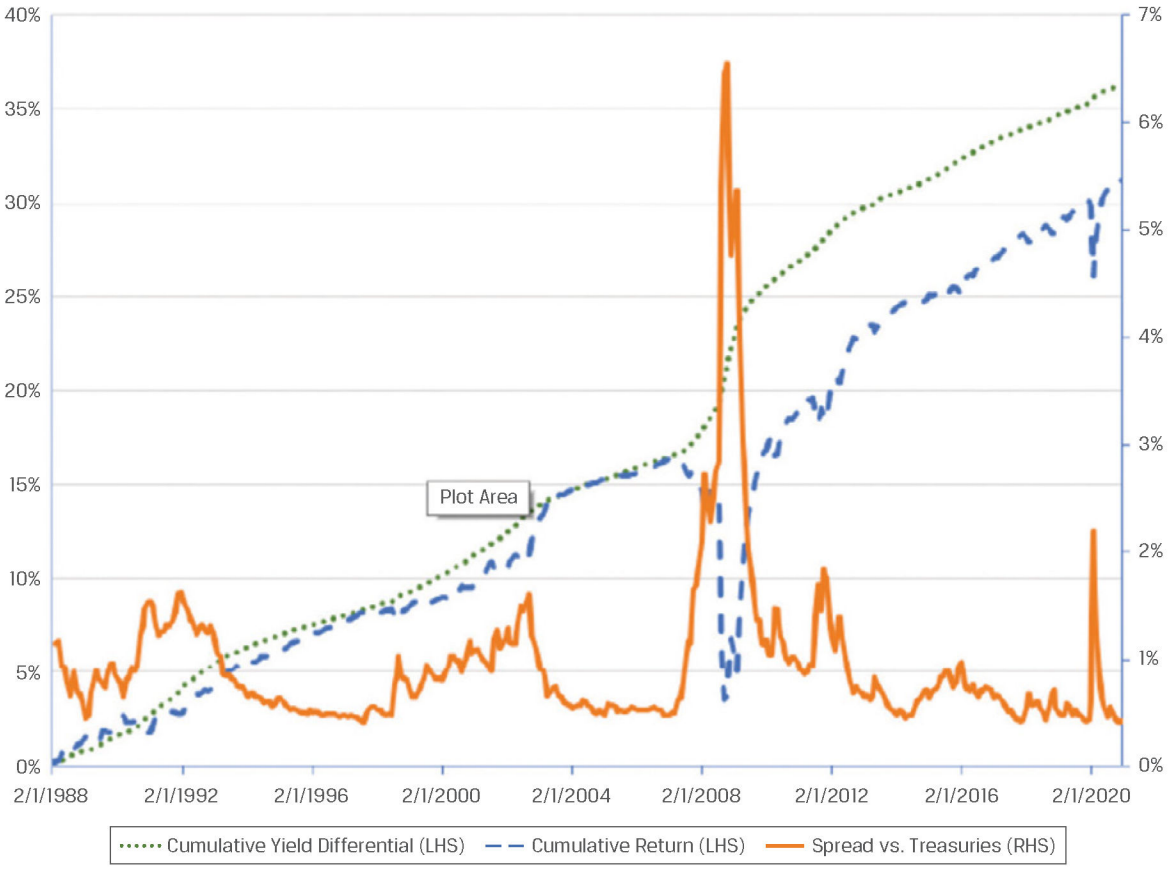
Exhibit 33. Bond Portfolio Return Predictions from LLK Model Compared with Realizations, 1976–2020



Note: LLK = Langetieg, Leibowitz, and Kogelman (1990).

Source: Based on Bloomberg data.

Exhibit 34. The Short-Term, High-Grade Credit Factor



Source: ICE Data Indices LLC. All rights reserved.

AAA-A index and a short position in the ICE BofA one- to three-year Treasury index. The LLK model works remarkably well, but you do have to worry about defaults and index construction rules that force bonds out of an index if their rating drops below some limit. In this case, the index in question is a AAA-A short-term index;[28] and if a bond gets downgraded to BBB+ or worse, it gets pushed out of the index. The issuer doesn't always default, and the bond often pays out par at maturity (but not always—Lehman bonds didn't pay out in full)—but you, as an index investor, don't get to participate in its recovery.

You can see some losses getting locked in during the 2008 Global Financial Crisis, but even so, this is a decent way to calibrate your thinking about credit premia. What do I think the short-term, high-grade credit factor is going to give us? About 0.3% per annum.

Expected Returns on Equities

I now come to equities. Many years ago, I derived the following expression for the expected return of the stock market, starting with the Edwards–Bell–Ohlson equation and making some simplifying assumptions:[29]

$$E[r]_{Market} = \frac{E[E_{t+1}]}{P_t} + g \times \left(1 - \frac{B_t}{P_t}\right) = \frac{E[S_{t+1} \times \text{Profit Margin}_{t+1}]}{P_t} + g \times \left(1 - \frac{B_t}{P_t}\right). \quad (1)$$

In the first line of Equation 1, the expected return of the market is the forward earnings yield plus a scaled growth term that is functionally the same as Marty's g^*. (Marty might have a different perspective on that term.) In effect, not all of the growth in earnings accrues to investors—some of it must be reinvested in assets needed to support the growth. You can also write the expression in terms of sales and profit margins, as I did in the second line of the equation, and that ties in nicely with Warren Buffett's emphasis on the market cap-to-GDP ratio as a powerful predictor of future equity market returns.[30]

We can proxy forward earnings yields very roughly with 1/CAPE (Shiller's 10-year CAPE), which is the current price divided by the average of the most recent 10 years' real earnings. We can also proxy expected returns with realized returns—though you need to be careful when doing so; changes in expected returns can drive realized returns far away from expectations. You can see in **Exhibit 35** that the relationship is close to linear, except that it's a bit concave when prices are depressed (i.e., when CAPE is low and 1/CAPE is high). I don't understand why; the reason may relate to real economic activity, such as restructurings that start to become popular when prices are depressed. Despite not fully understanding the reason for the convexity in the relationship between valuation ratios and realized returns, I'm going to exploit it when I predict the returns of the S&P 500.

Noise Reduction by Eliminating the Worst Quarter Each Year

Given all the attention that CAPE has attracted in the media, it's worth thinking about the economics of what Campbell and Shiller are actually doing when they average 10 years of real earnings to compute the denominator of CAPE. In my view, the 10-year average does three things:

1. It reduces noise in earnings (the 10-year average is a simple linear filter),
2. By adjusting for inflation, it makes past earnings more readily comparable to present earnings,[31] and
3. It gives you a better perspective on the earning power of the S&P 500 over an economic cycle.

Ádám Kóbor, who works at NYU's endowment, and I reduce noise in earnings in a very different way that also eliminates the need for any inflation adjustment (see **Exhibit 36**).[32] We find that the worst quarter's earnings in each year are by far the noisiest, and if you discard the worst quarter, add up the remaining three quarters' earnings, and multiply the resulting three-quarter sum by four-thirds, you get a remarkably good, unbiased, low-noise predictor of next year's earnings. Think of this as a simple nonlinear filter that is applied to quarterly earnings. The first line of Exhibit 36 summarizes the statistics of annual (i.e., sum of all four quarters) earnings. The volatility of this series is about 33% per annum—it has lots of skew, and the excess kurtosis is 24, so the total kurtosis is about 27.

By throwing out the worst quarter's earnings each year (the *E*3 series), volatility comes down by about 45% and skew and excess kurtosis dissipate almost completely. You could throw out the two worst quarters and multiply the sum by 2 (*E*2) or keep only the best quarter and multiply by 4 (*E*1), but there's little benefit to throwing out more than the worst quarter. Additionally, look at line 5

[28]An AAA-A (often pronounced "six-A") index is one that consists only of bonds rated AAA, AA, or A.

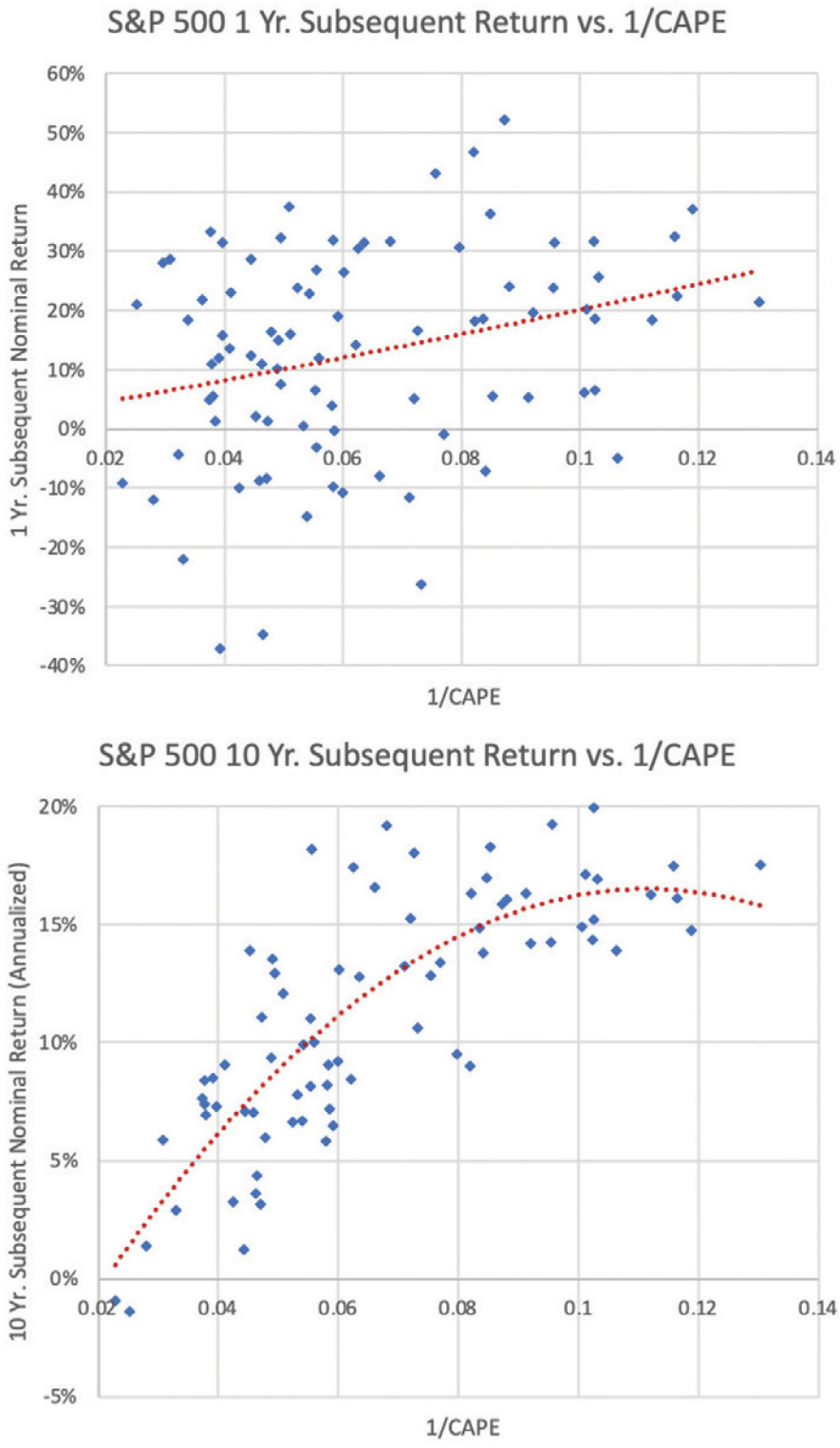
[29]See Philips (1999).

[30]See Buffett and Loomis (2001).

[31]Adjusting by revenues would be even better and can be shown to be equivalent to averaging profit margins over the past 10 years. See Philips and Ural (2016).

[32]See Philips and Kóbor (2020).

Exhibit 35. Empirical Relationship between Valuation Ratios and Subsequent Realized Returns, 1925–2010 (subsequent returns until 2020)



Notes: The subsequent return is the realized return from time *t* (the time at which the CAPE is computed) to *t* + 1 (one-year subsequent return) or from *t* to *t* + 10 (10-year subsequent return). The last year that can be included in a subsequent return computation (either *t* + 1 or *t* + 10) is 2020, because that is the last year for which we have realized return data.

Source: Based on data from Robert Shiller's website (www.econ.yale.edu/~shiller/).

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.

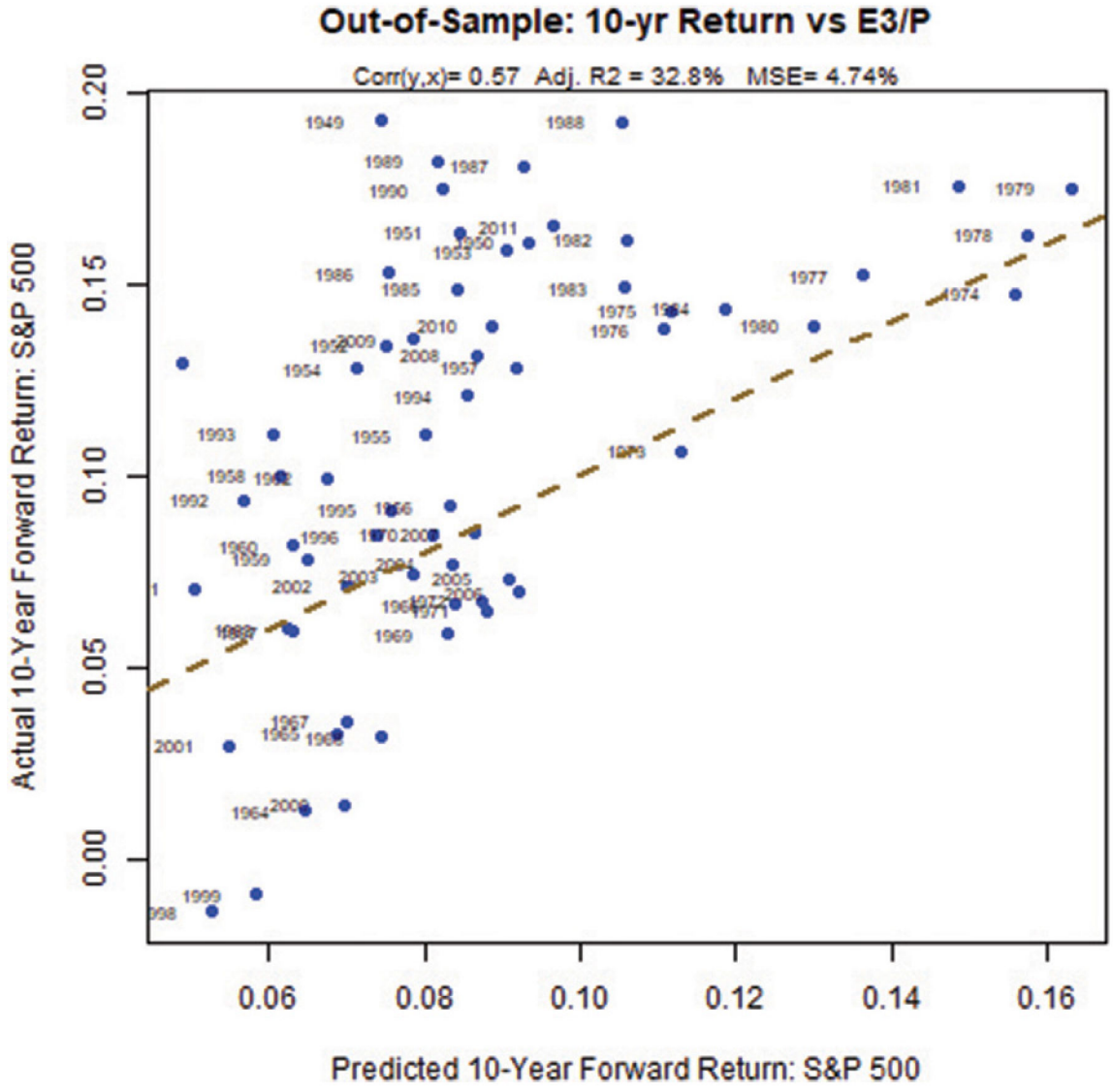
Guess what happens when we add a quadratic term to our out-of-sample expanding window robust regressions? As you can see from **Exhibit 38**, the flat spots clean up, and the points plot roughly parallel to the dotted line! Not perfect, but very good. Revenues look better than earnings, but even so,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

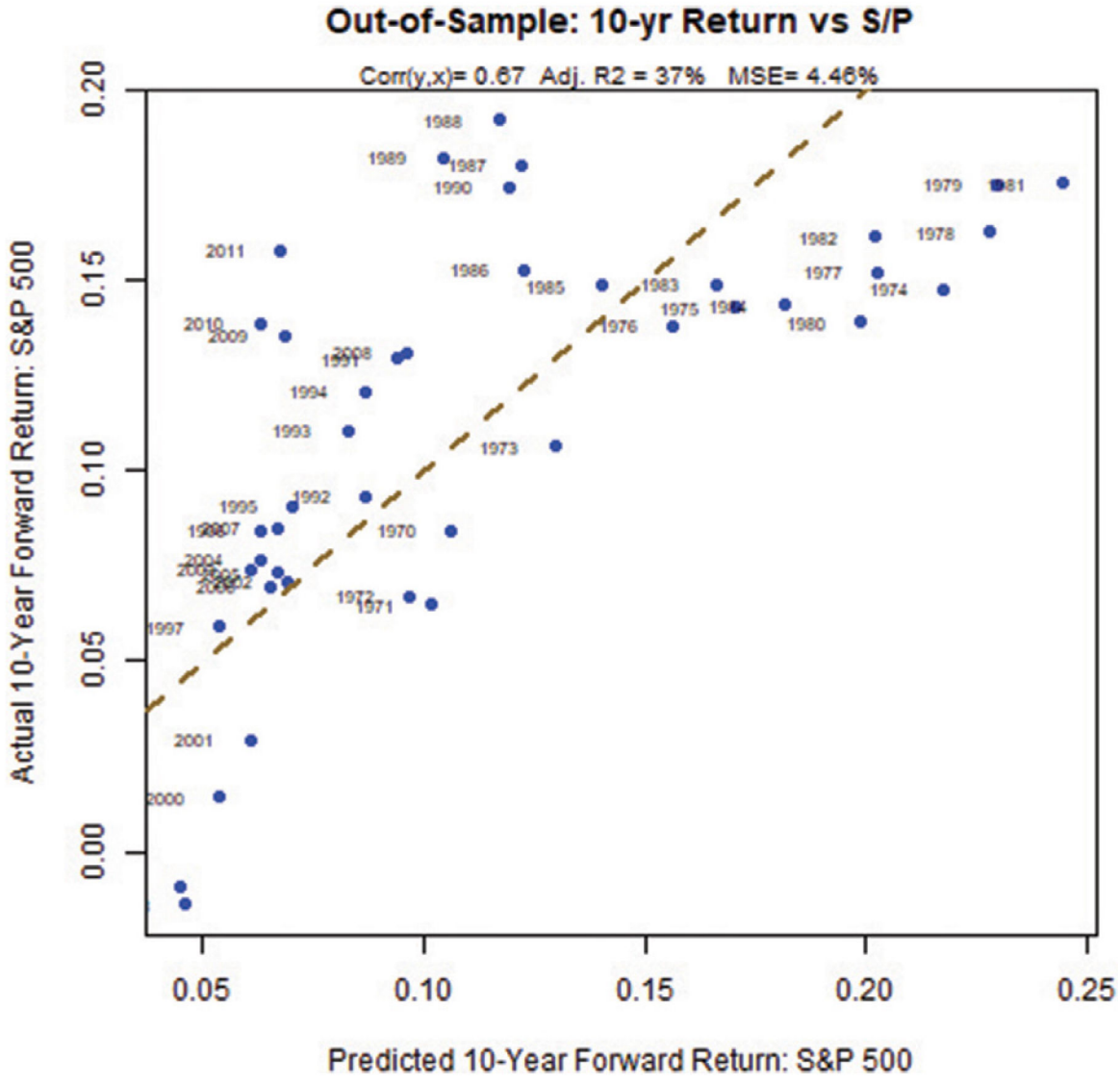
The way I'm going to make a forecast in practice is to take an earnings-based model, quadratic, robust regression, filtered earnings, and a sales-based model, again linear and quadratic, out-of-sample robust regressions, and combine their forecasts. Even with (naïve) equal weights for the two

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



(*continued*)

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).

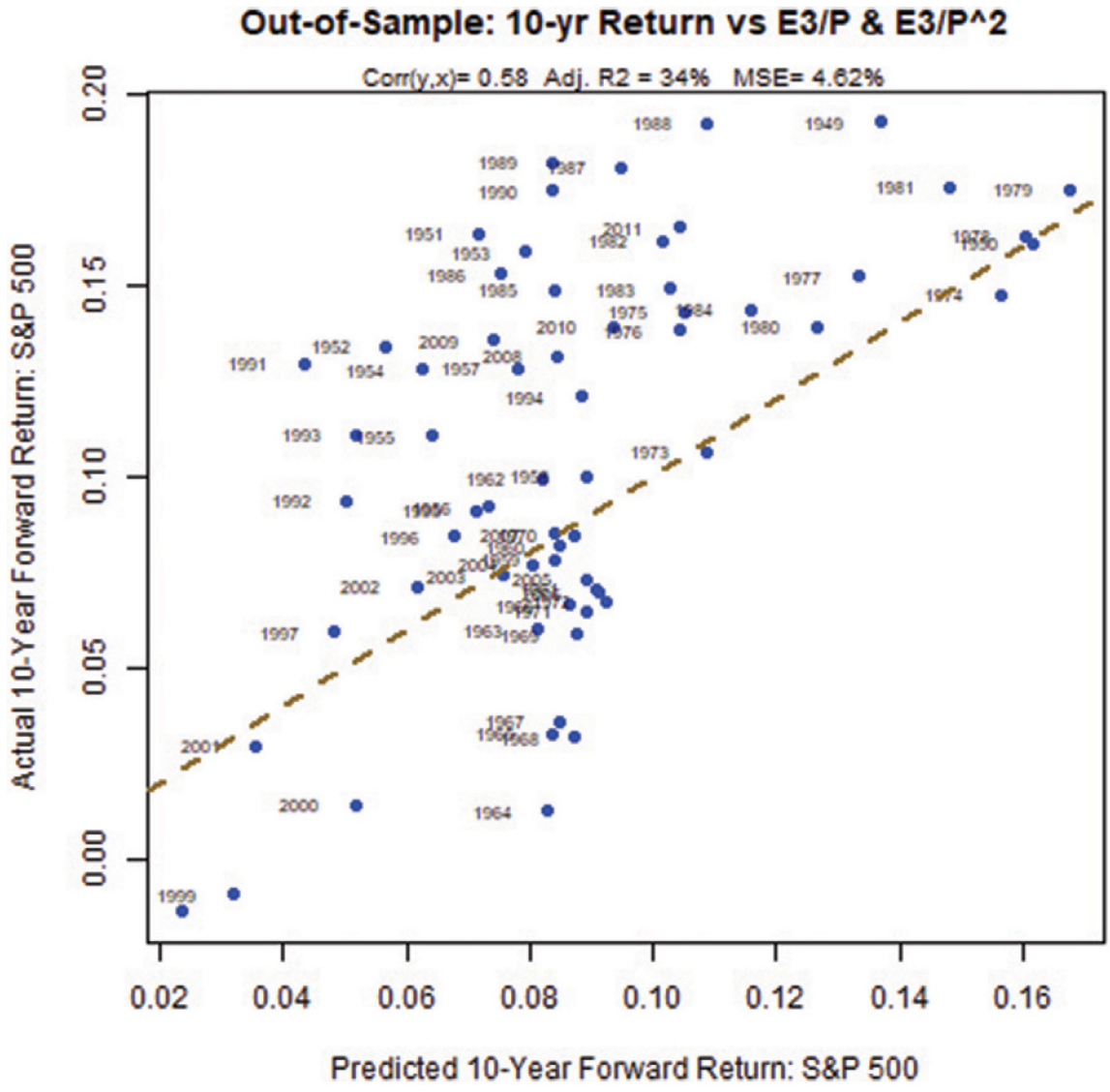
be expected in a good model over this period—that we have more points above the line than below it.

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.

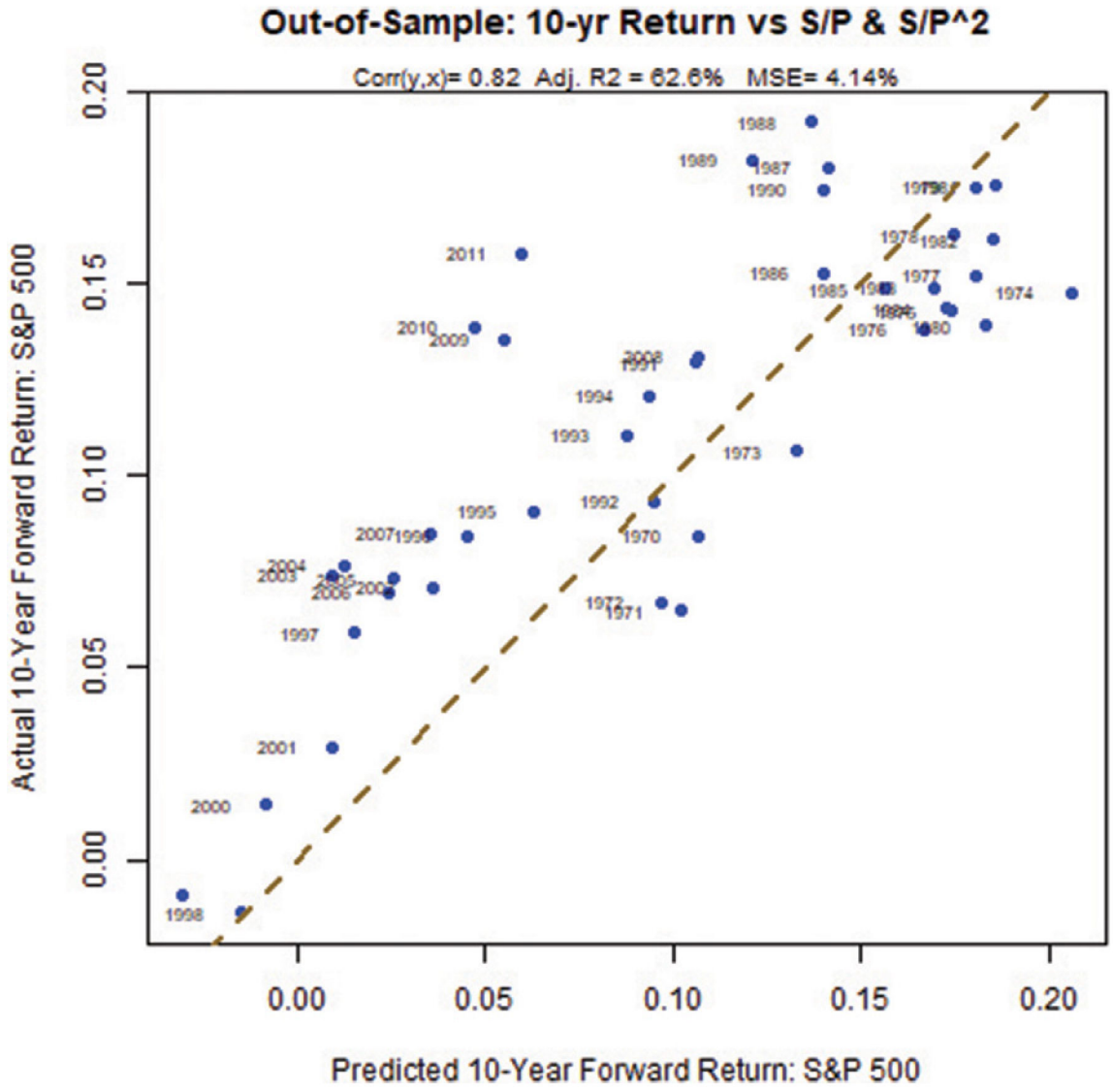
If, instead of equally weighting the forecasts, I weight them in inverse proportion to the variance of their forecast errors, I get an expected equity return of about 2.3%. That's almost the same as what I get using a simple (equally weighted) average. Using CAPE and CAPE-squared, the predicted 10-year 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



(*continued*)

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.

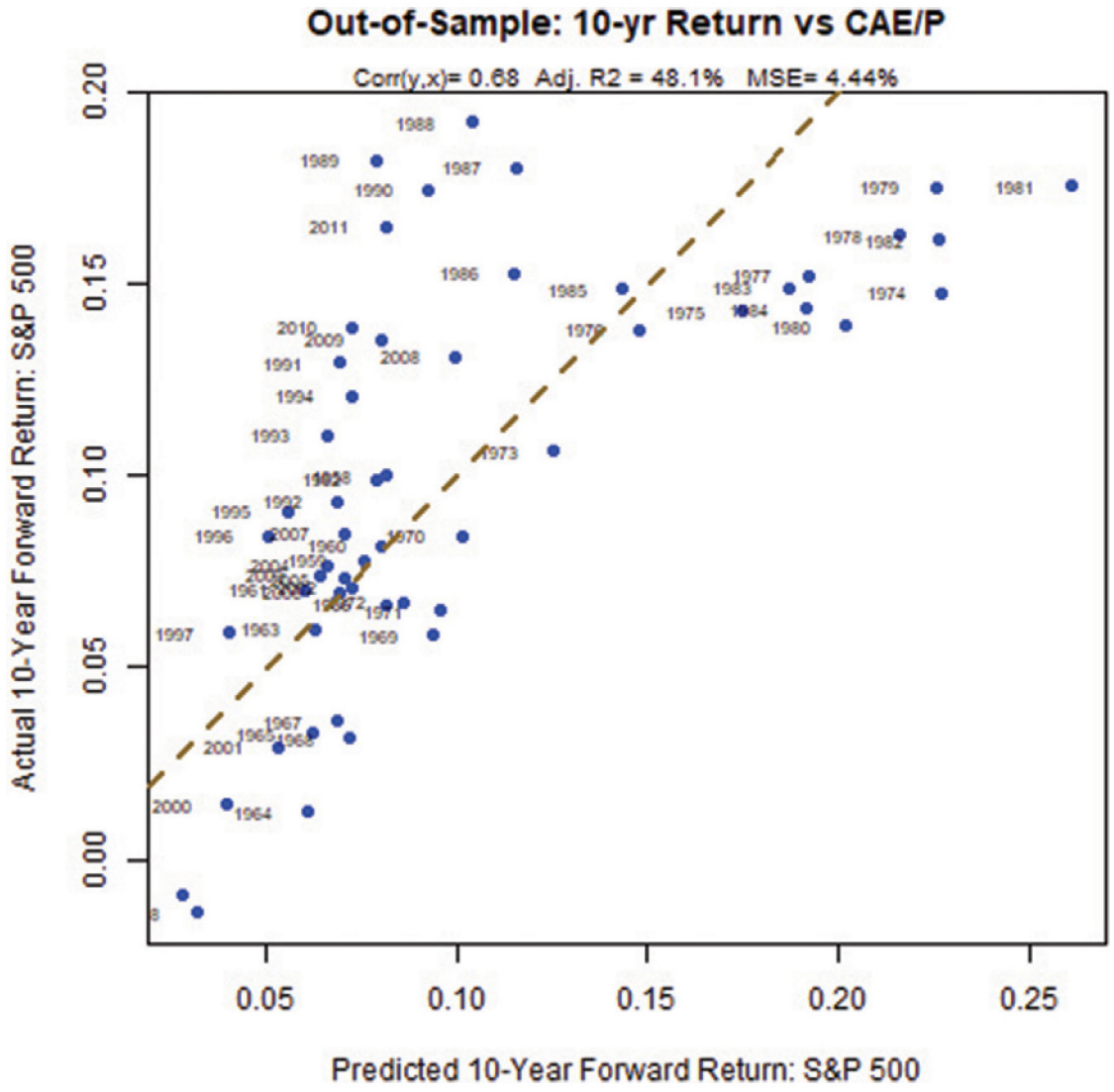
It's easy to visualize this phenomenon for a 10-year zero-coupon bond that is issued with a yield of 10% and whose yield declines by 1% each year, so that its yield when it finally matures is 0%. The realized return of the bond in each of the first five years of its life exceeds its initial yield of 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.

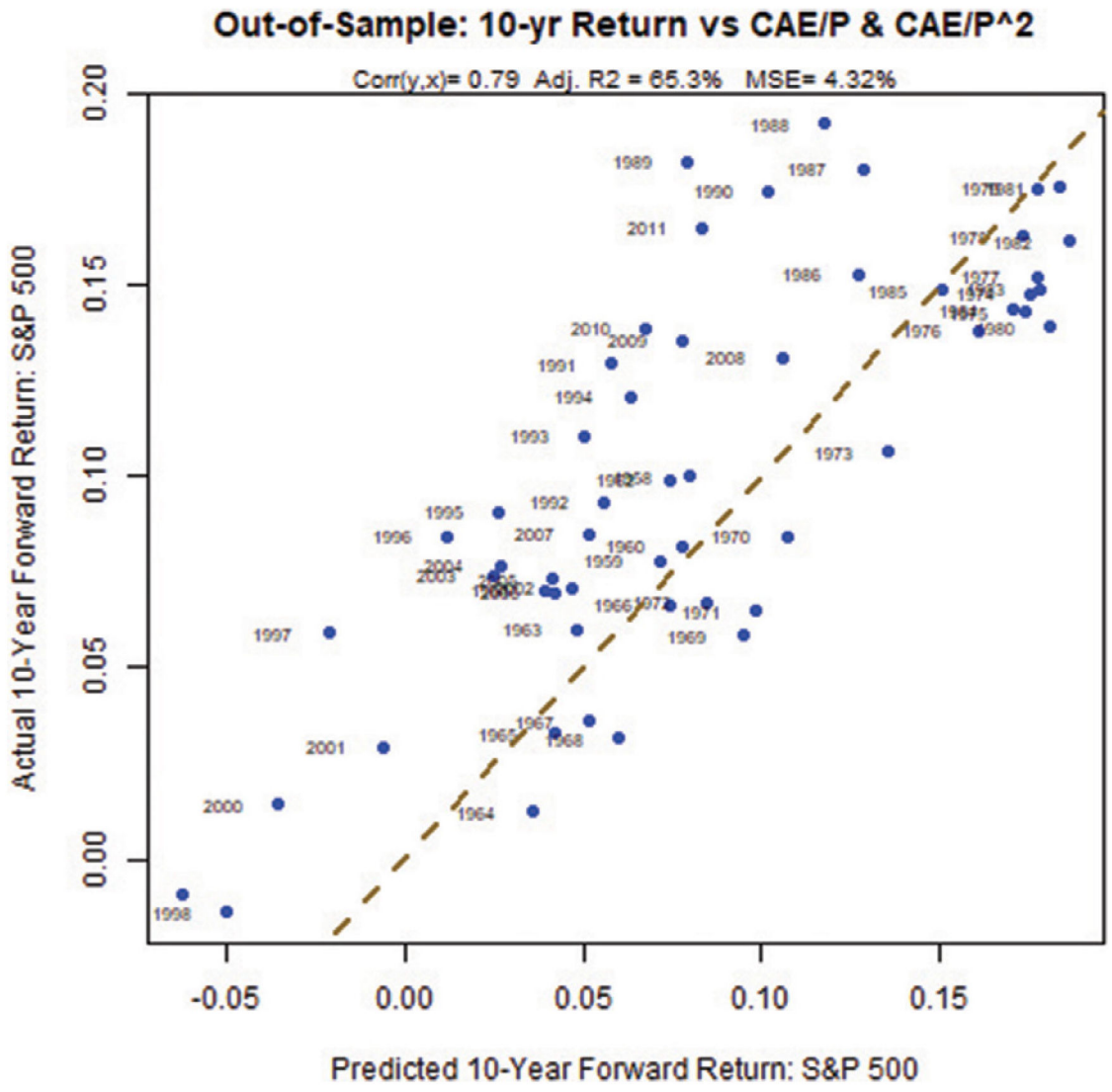
My example involves mean reversion in the per-share earnings of growth and value indexes. Style indices are reconstituted by the index provider every year. Growth and value indices, in particular, are reconstituted so that each has

Exhibit 39. The Quadratic Term Helps CAPE As Well



(*continued*)

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).

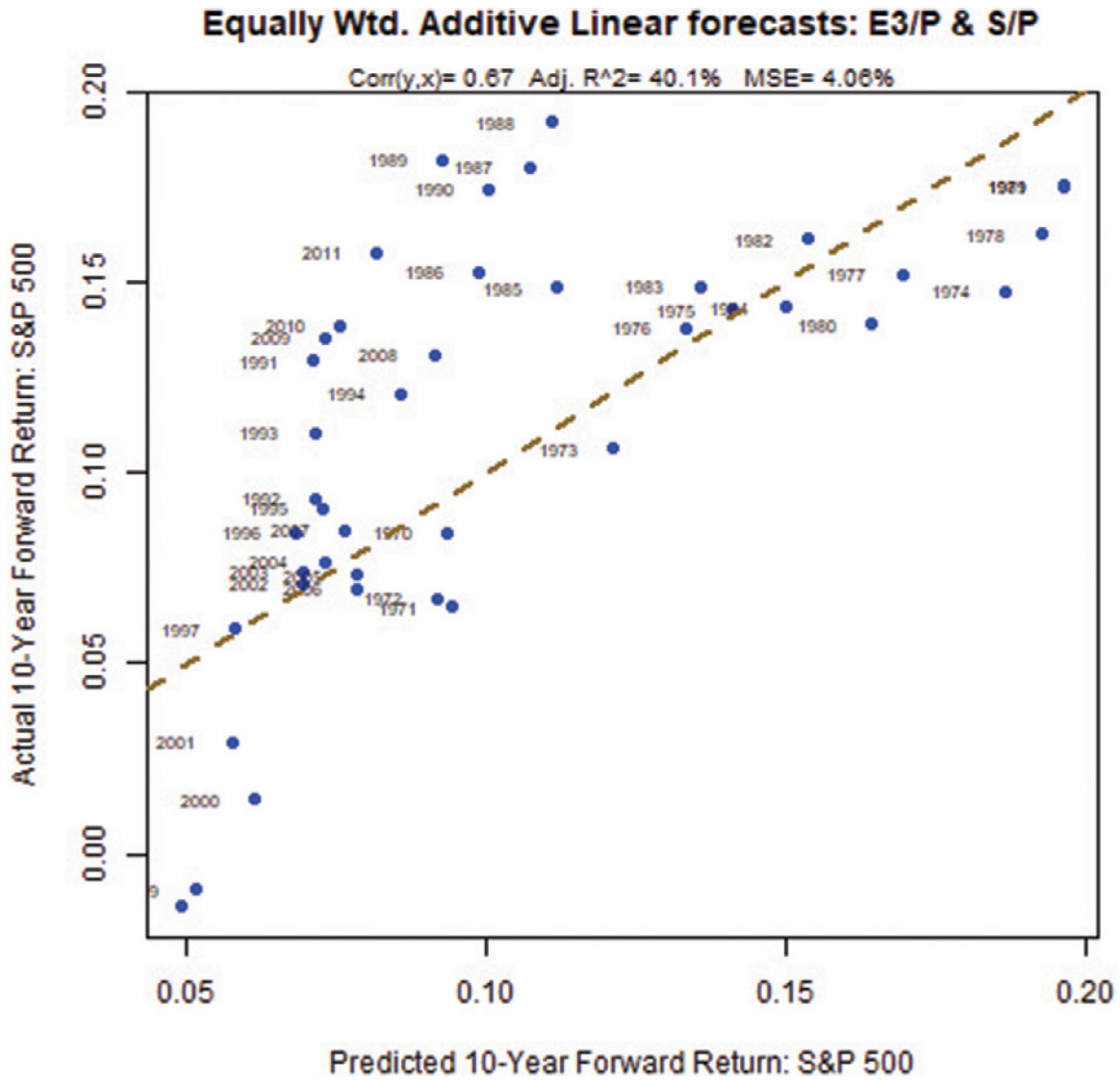
slowly than those of the growth index. In fact, the earnings of the growth index grew substantially faster than nominal GDP, which is clearly unsustainable!

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.

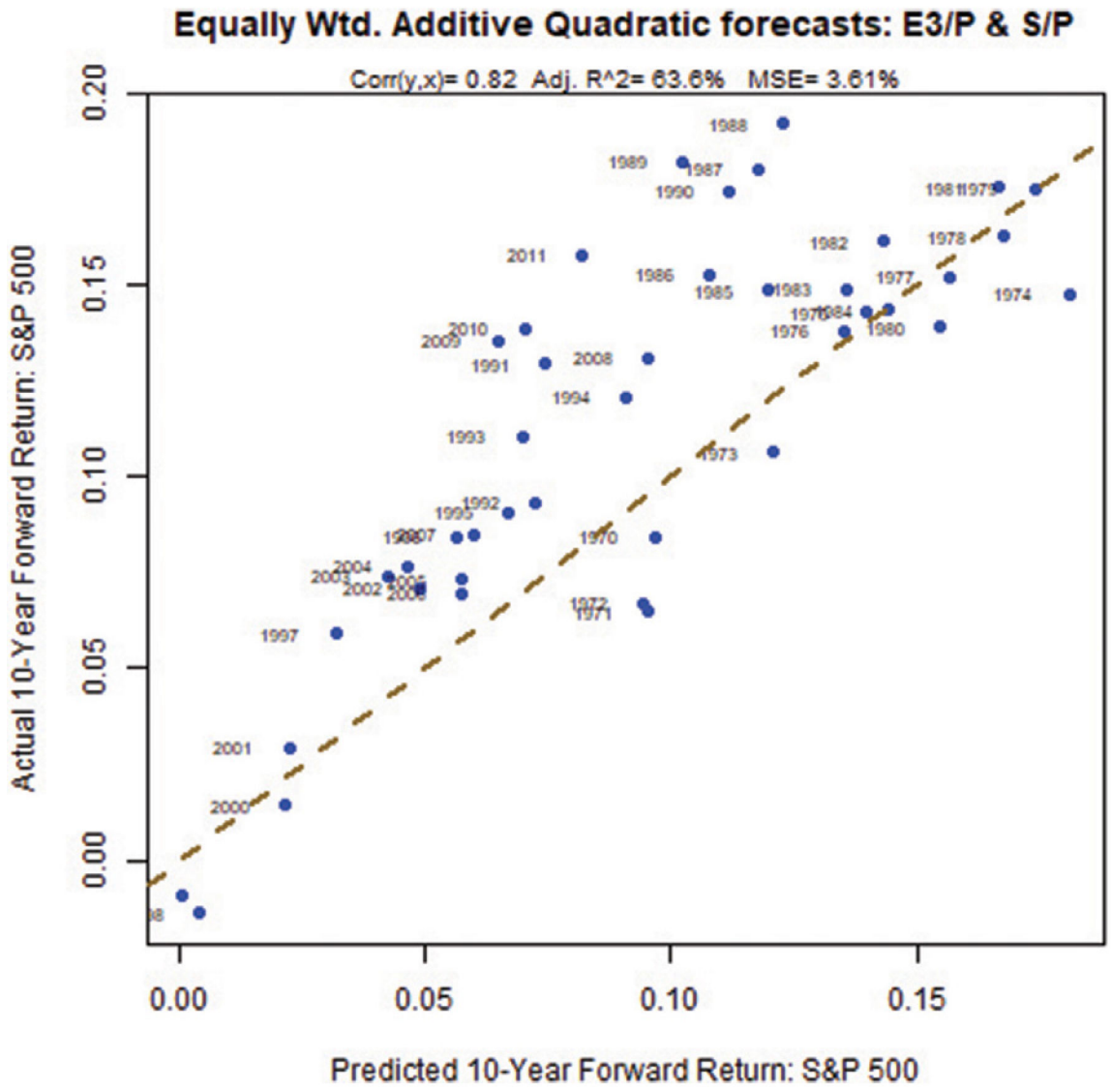
I'm not a fan of the mean reversion story because it's so easy to misinterpret changes in expected return as movement toward some nonexistent historical mean—especially when your analysis is data driven, and you look only at realized returns and don't calibrate your thinking using a reasonable theoretical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

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



(*continued*)

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

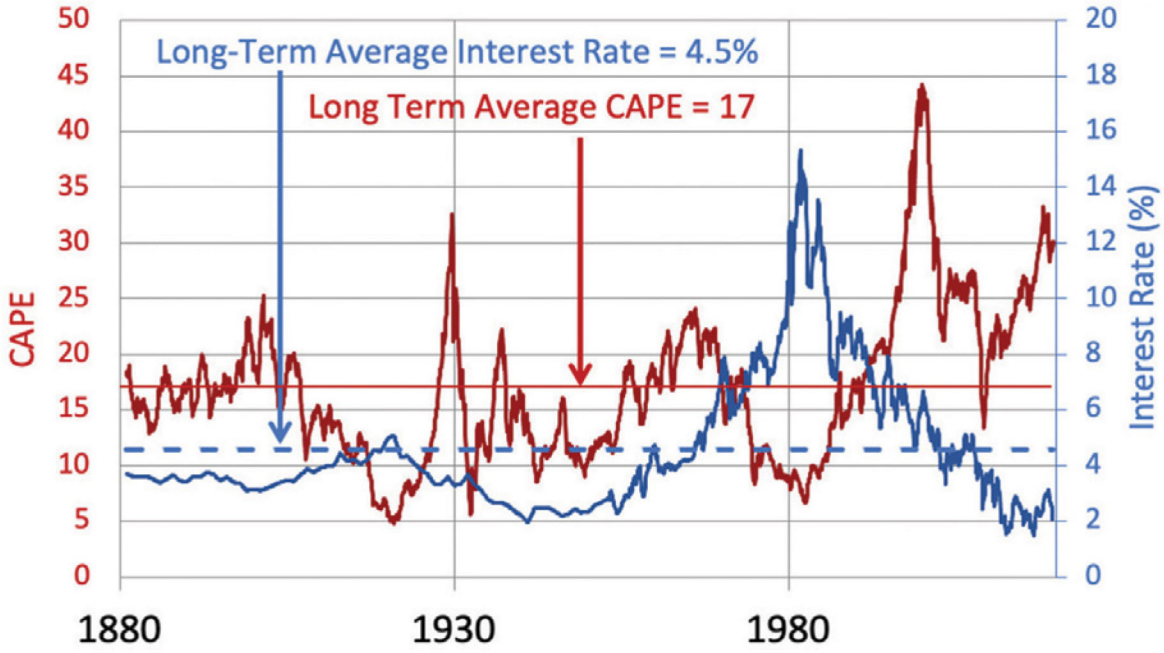


Source: Philips and Kóbor (2020), using data from Robert Shiller and S&P Dow Jones Indices.

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

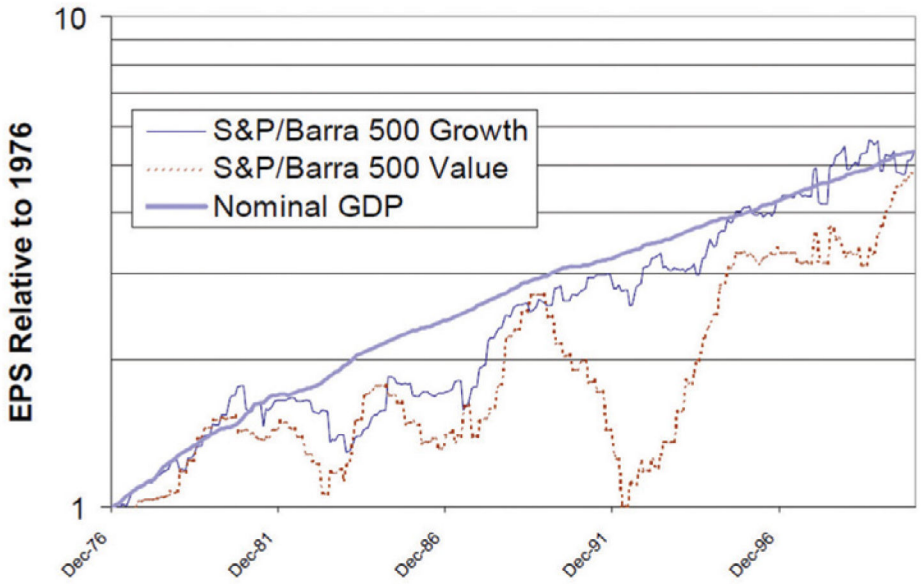
- My current views on *nominal* expected returns for the next 10 years:
  - S&P 500 via $^{E3}/_{P}$ and $(^{E3}/_{P})^{2}$: 6.0% per annum
  - S&P 500 via $^{S}/_{P}$ and $(^{S}/_{P})^{2}$: –1.6% per annum
  - $\frac{1}{\sigma_E^2}$ weighted average of these two forecasts: 2.3% per annum
  - S&P 500 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.

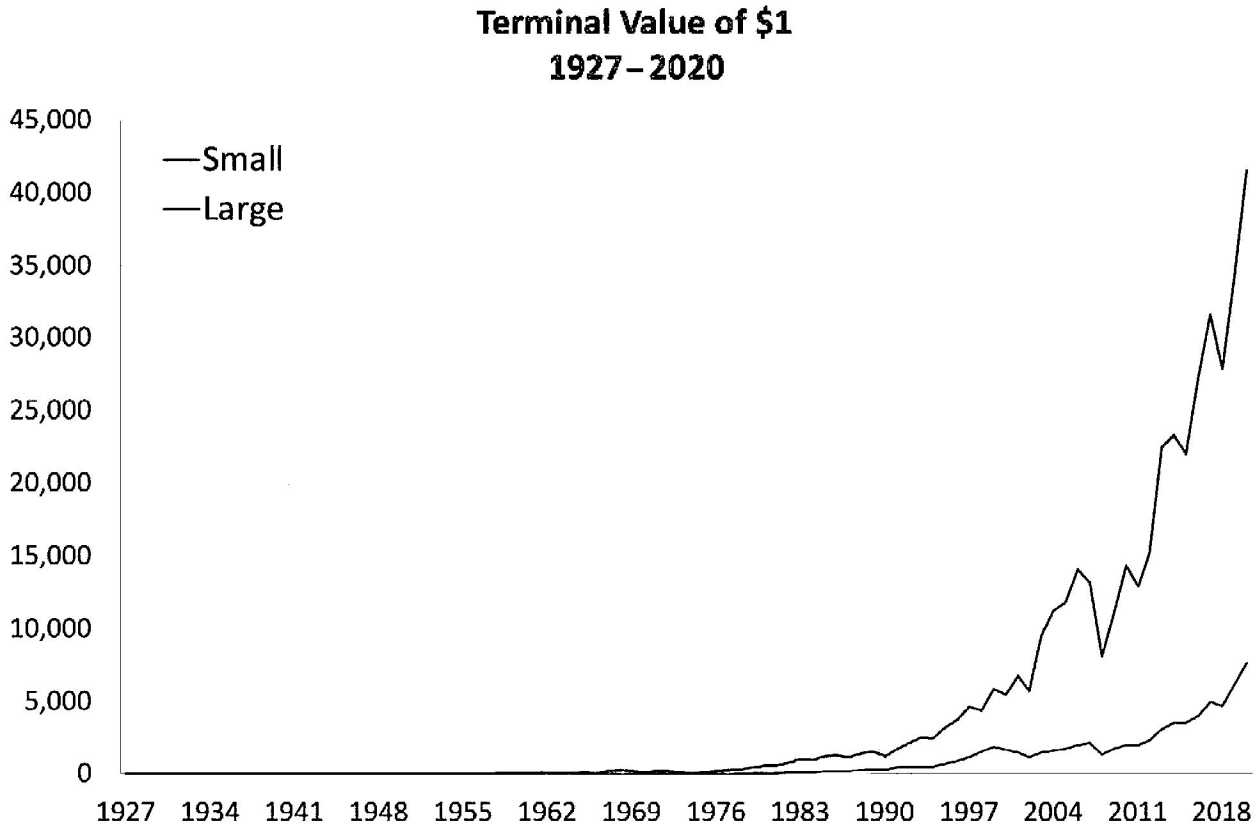
Persistence of the Equity Premium

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

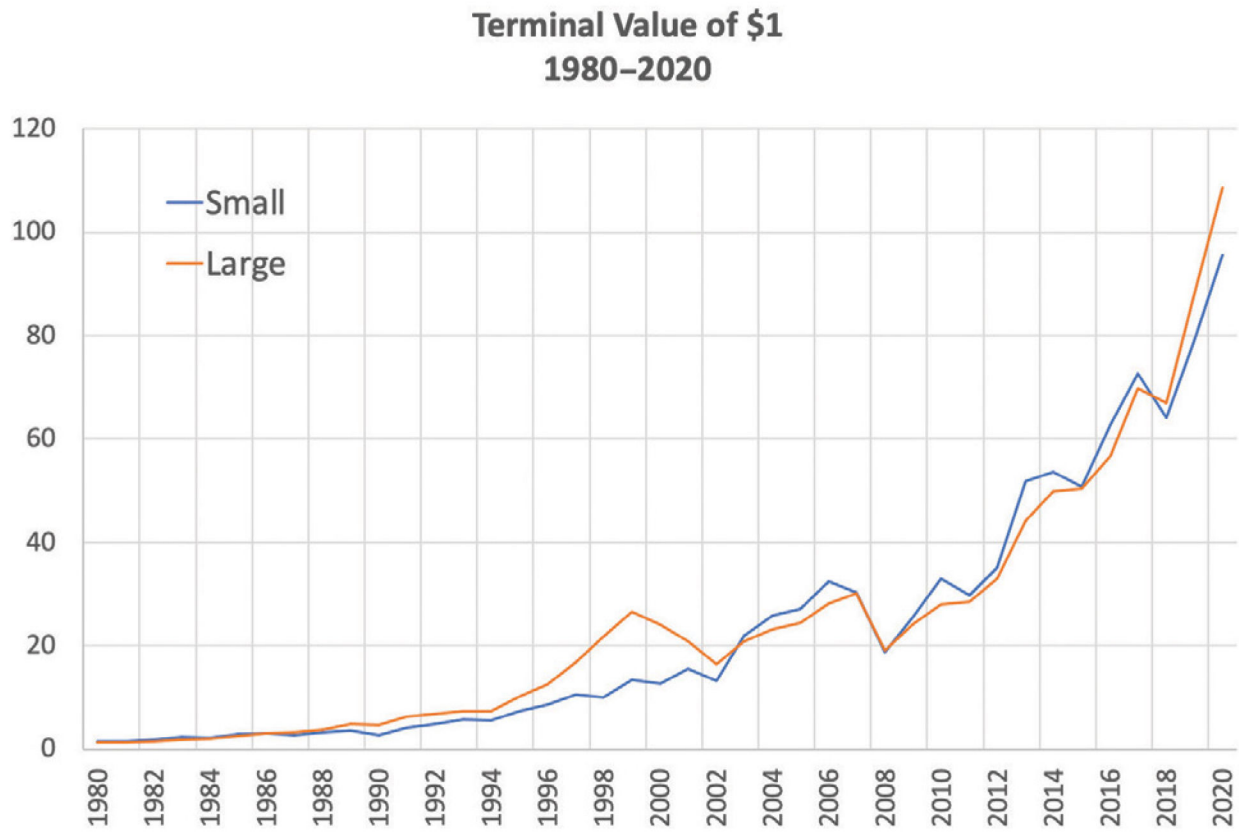
The other point I want to talk about is whether the equity premium is mean-reverting and perhaps predictable. The profession's view on this topic has shifted over time. The prevailing paradigm in the 1960s and 1970s (the halcyon days of the

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]

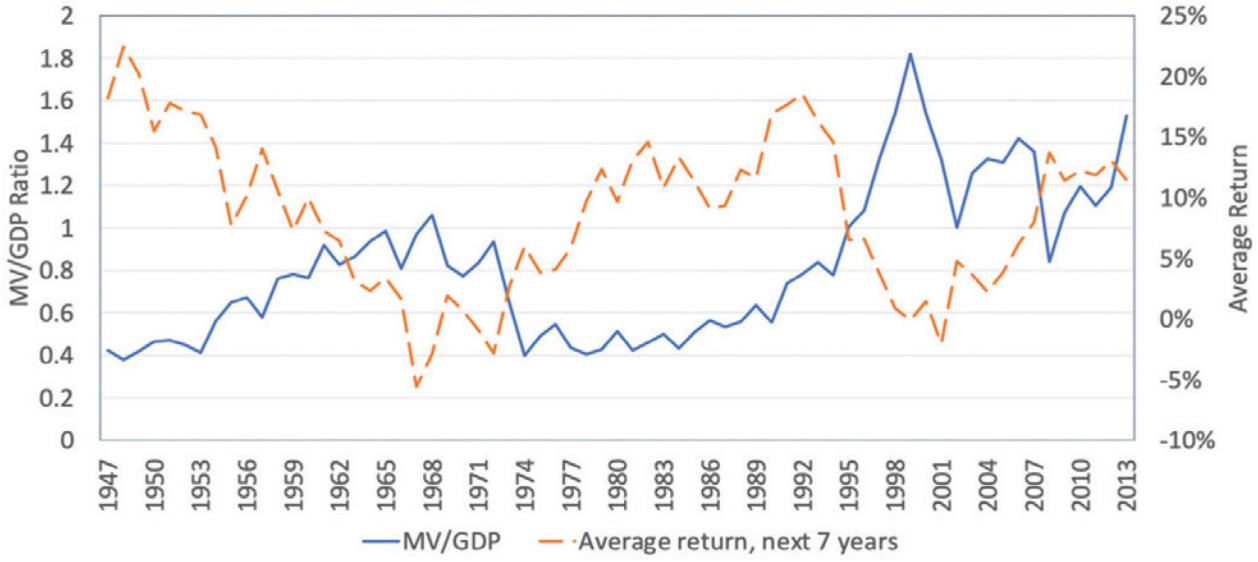
In the 1990s, there was a paradigm shift in whether stock returns are predictable or not. In their 1988 paper, Fama and French took a very different position: "There is much evidence

[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?

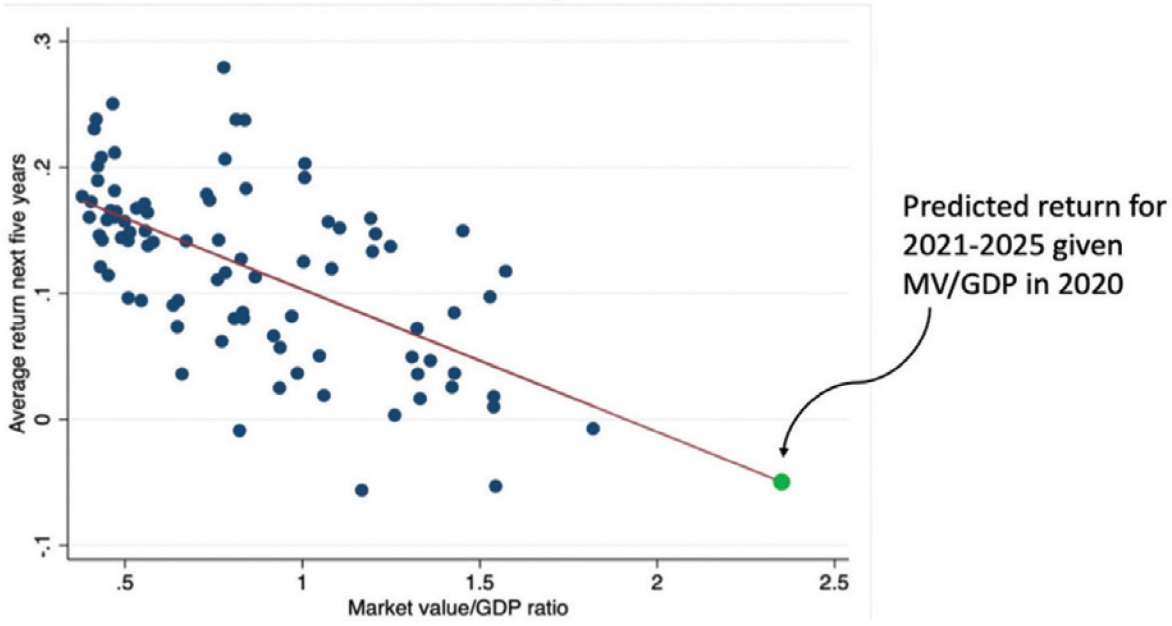
Rajnish Mehra: I have used domestic corporations, yes.

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.

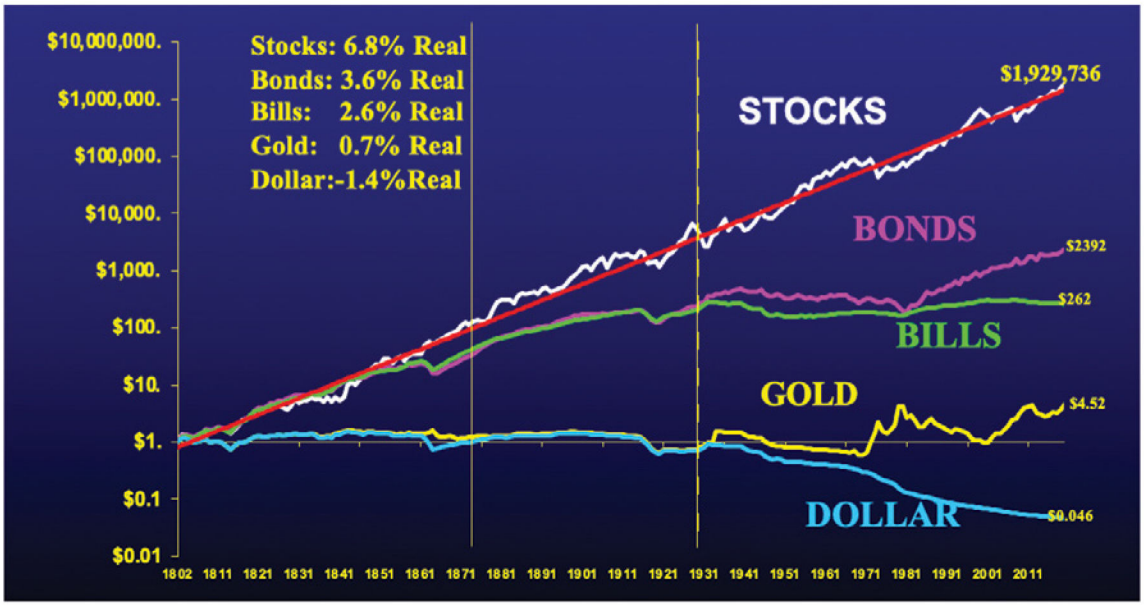
The CAPE Ratio through History

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

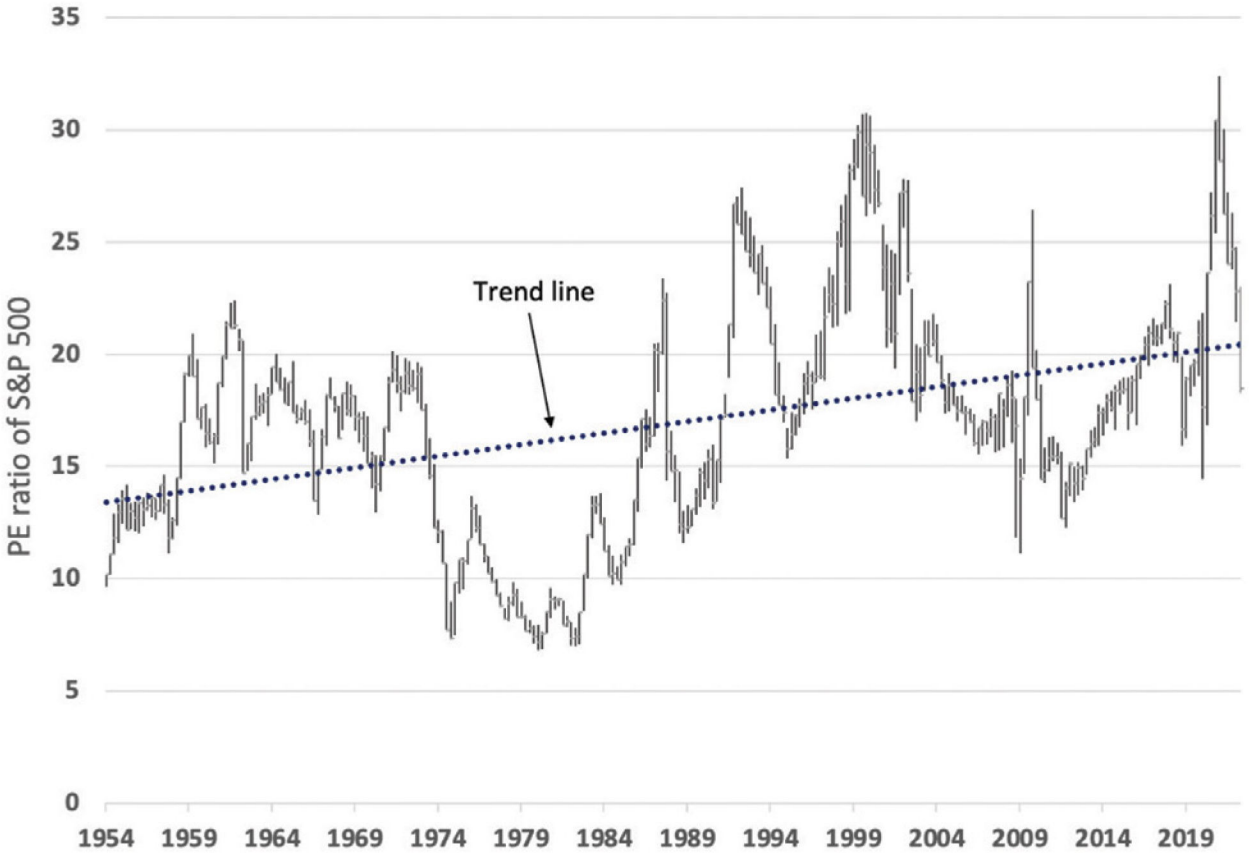
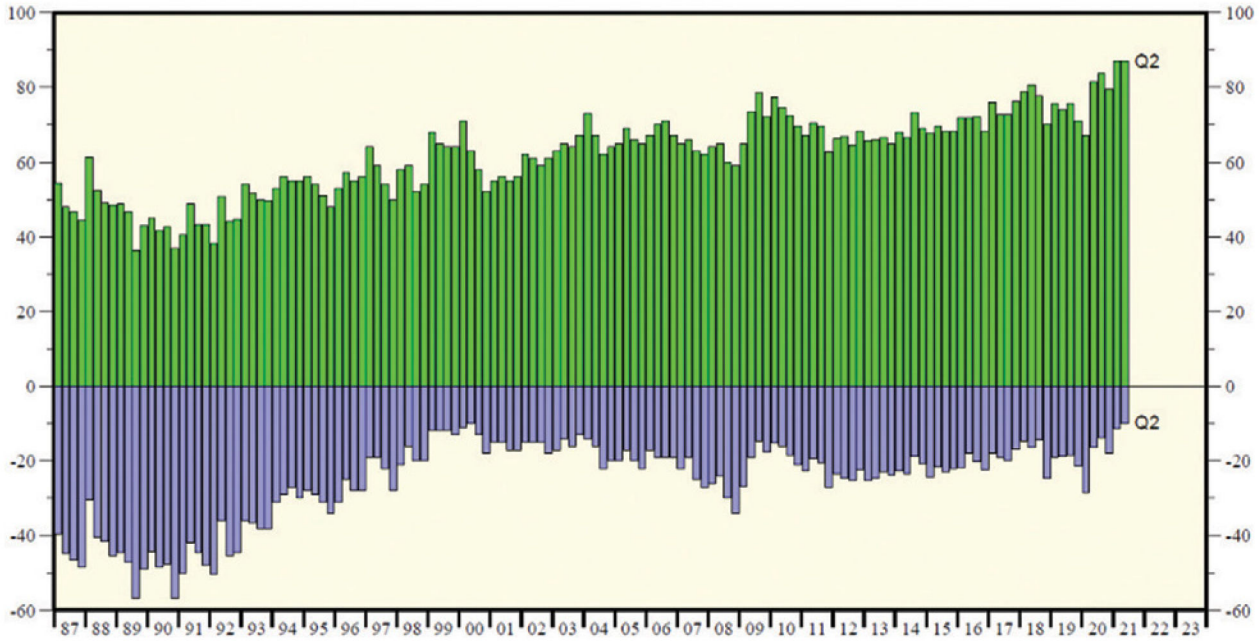


Exhibit 53. Current S&P Earnings Estimate

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.

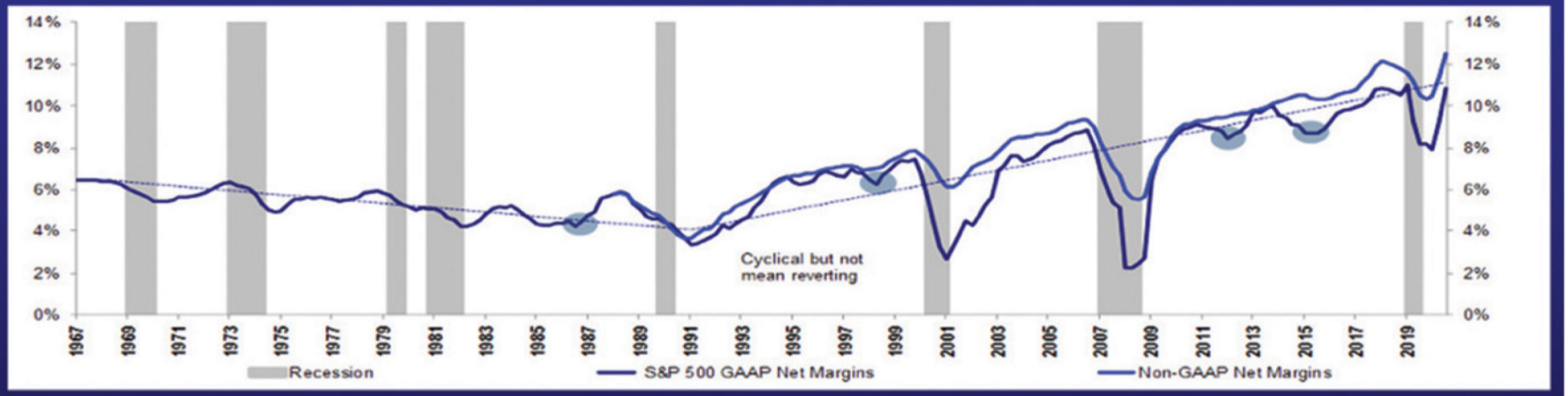
Rob, you talked about new companies causing dilution. I published a paper that tracked the stocks that were in the original S&P 500 when it was first constituted in 1957.[49]

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

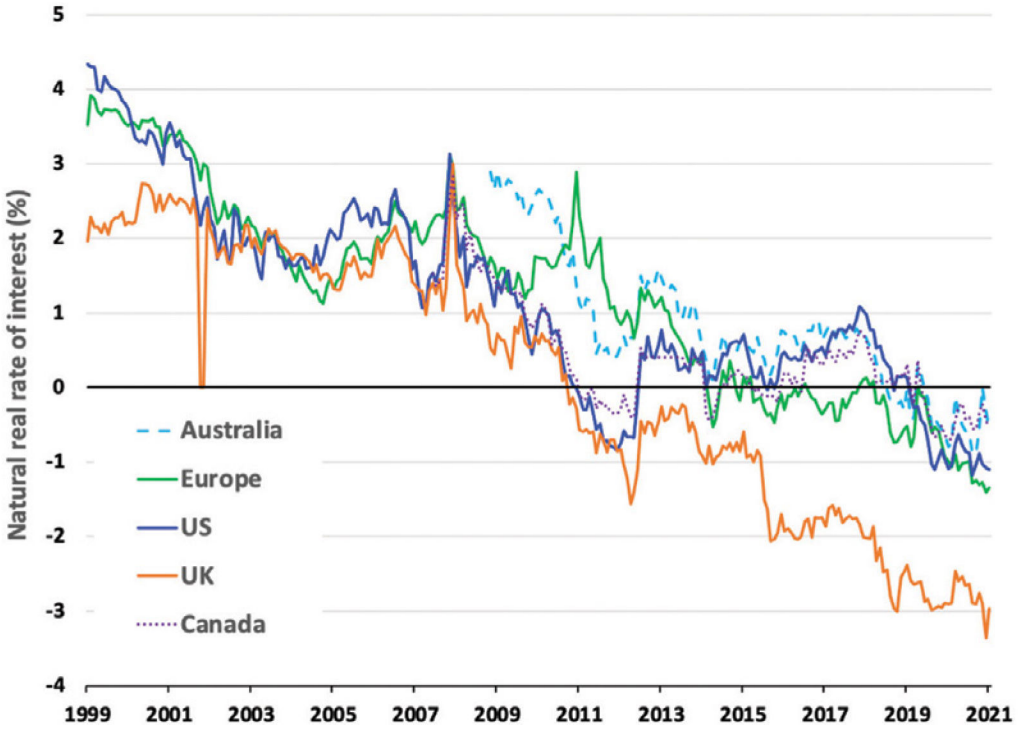
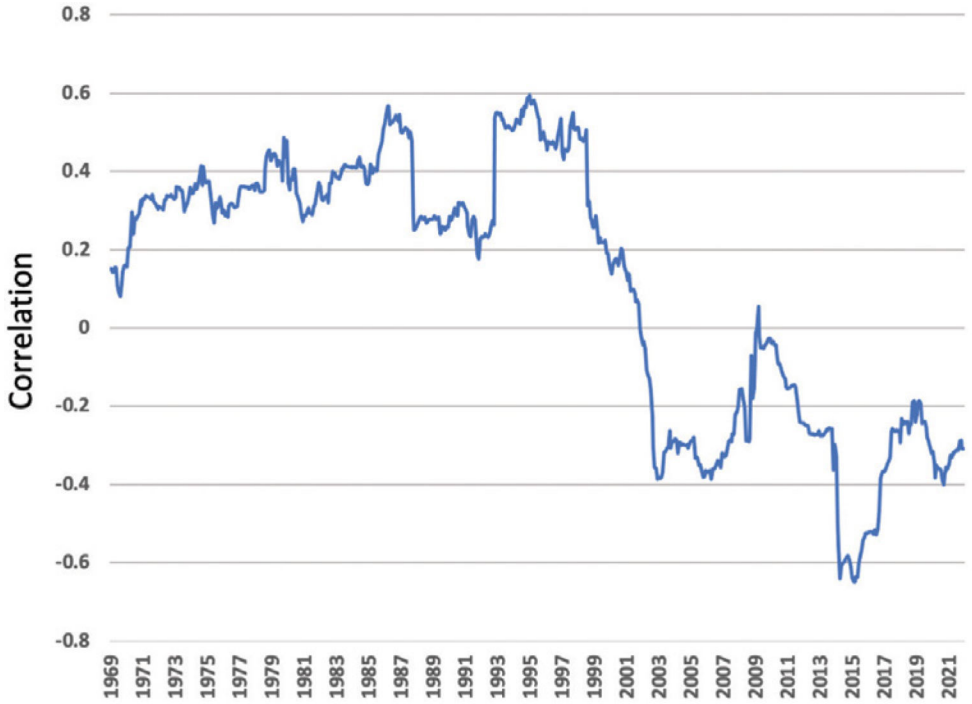
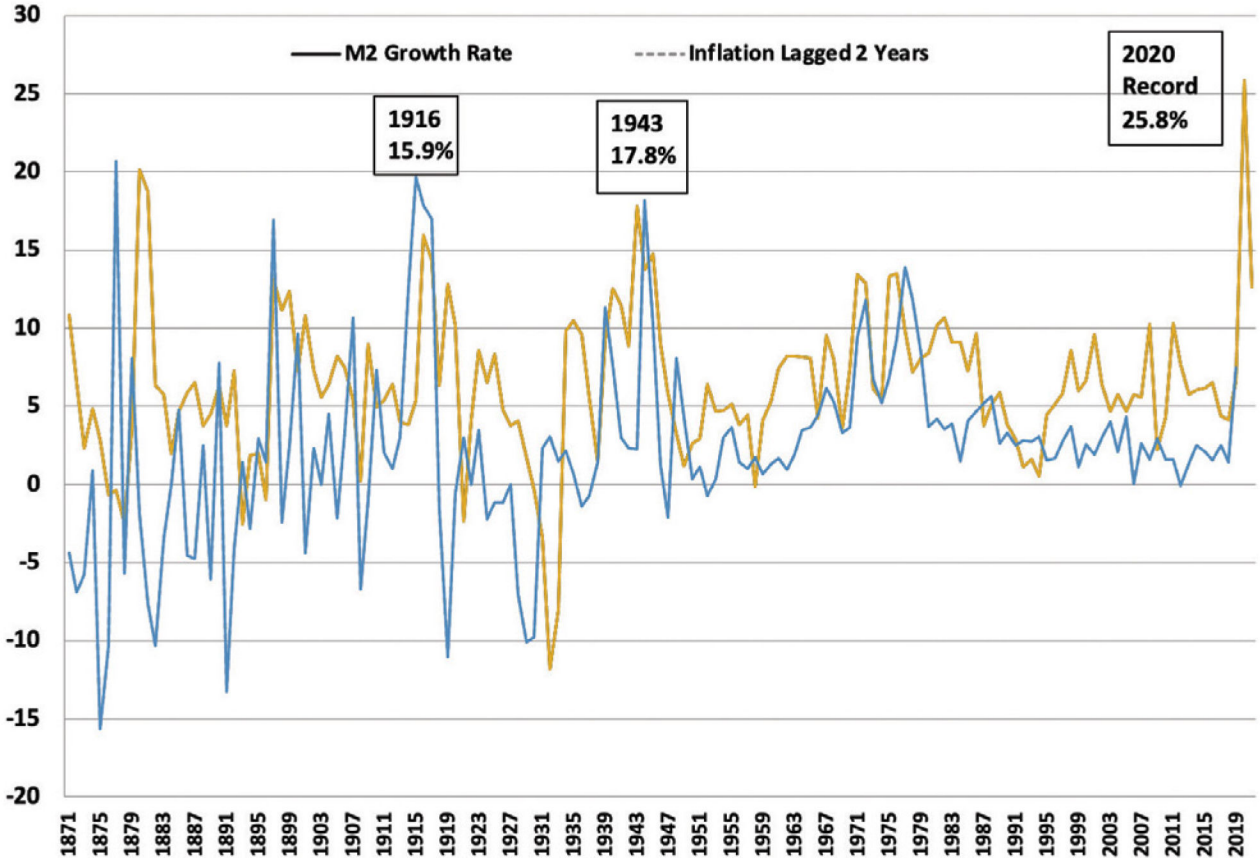


Exhibit 59. Trailing 12-Month Correlation of S&P 500 and 10-Year US Treasury Bonds, 1969–2021



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

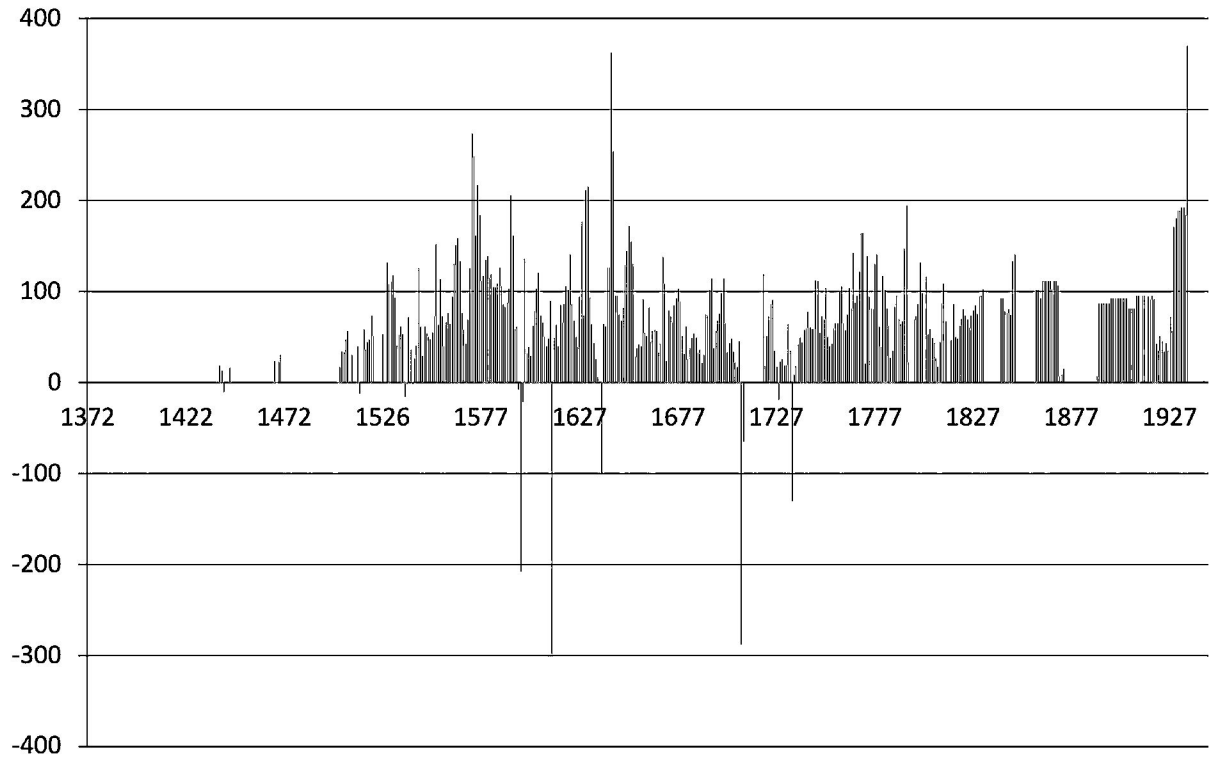
Exhibit 62 shows the dividend series. The paucity of the dividend data in the early years reflects the fact that we don't have registers for the period before about 1500. After that time, you can see that annual dividends were very volatile. There are also some negative dividends; those are calls on 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,

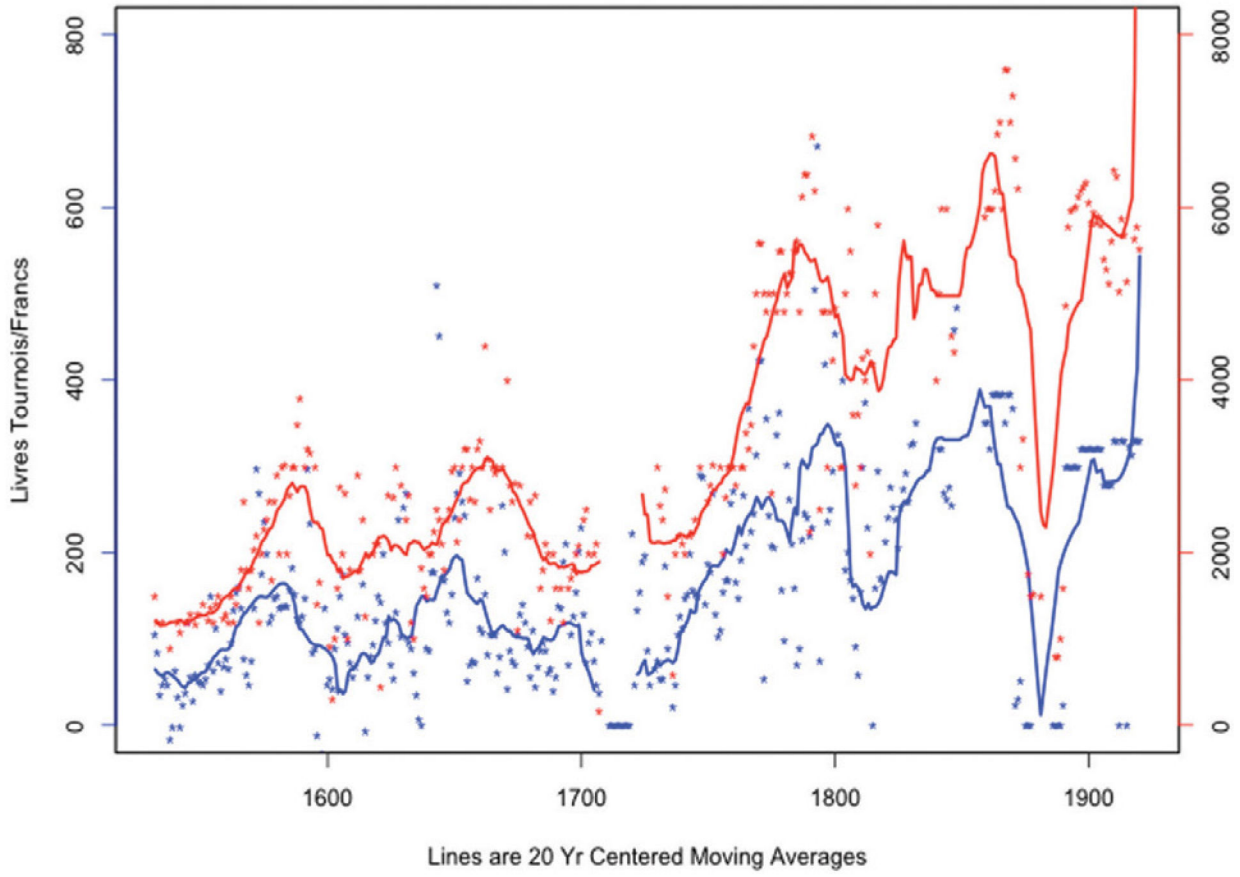
Exhibit 62. Dividends per Share of the Bazacle Company, Year by Year, 1372–1946



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.

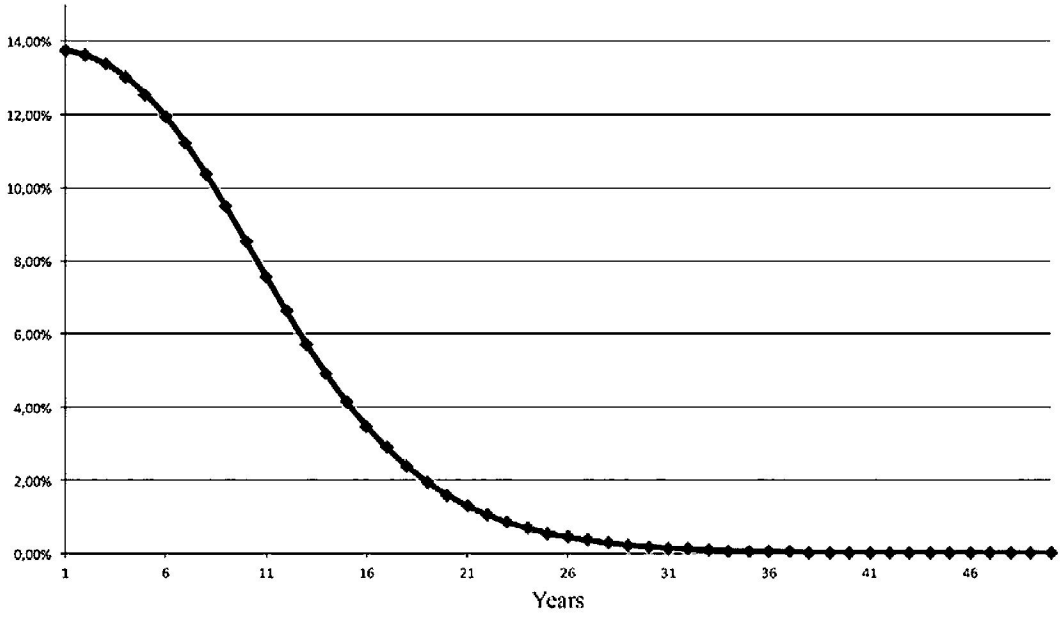
Term Structure of the Equity Premium

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.

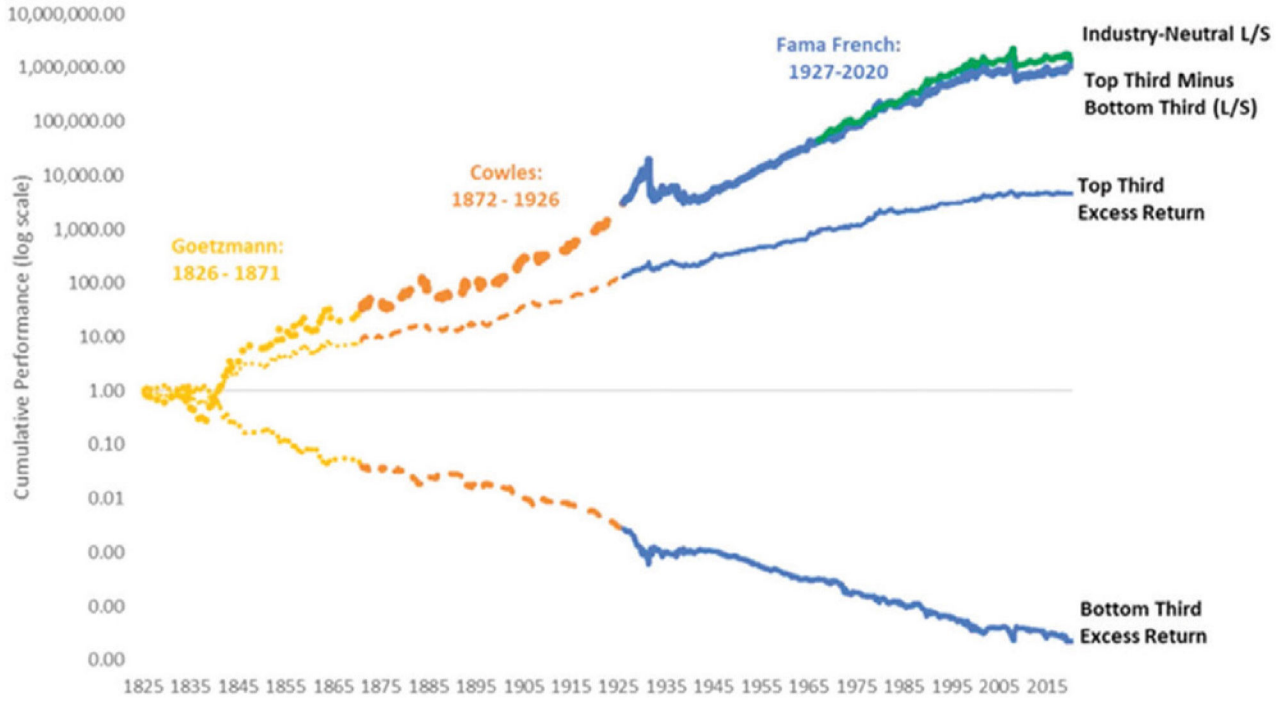
Laurence Siegel: I think Cliff would admit or confirm that momentum can't really work indefinitely.

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.

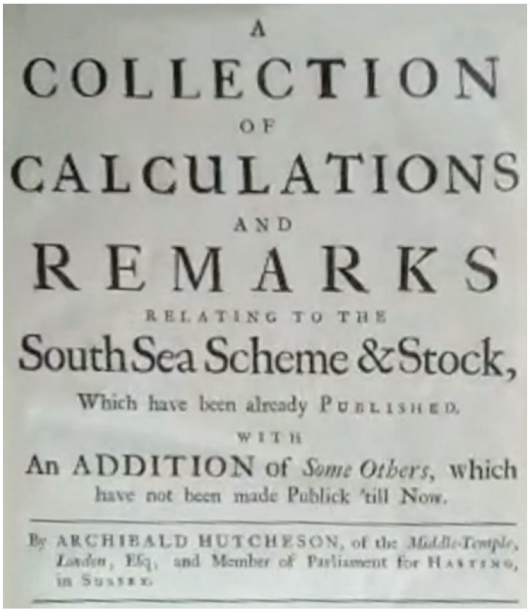
Cliff Asness: To be interesting, any of these conversations has to be about a portfolio. There may be individual stocks that I would say are ridiculous, but you can never feel nearly as strongly about one stock as about a portfolio. One company could invent the cure for male pattern baldness or figure 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.

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[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.

[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.

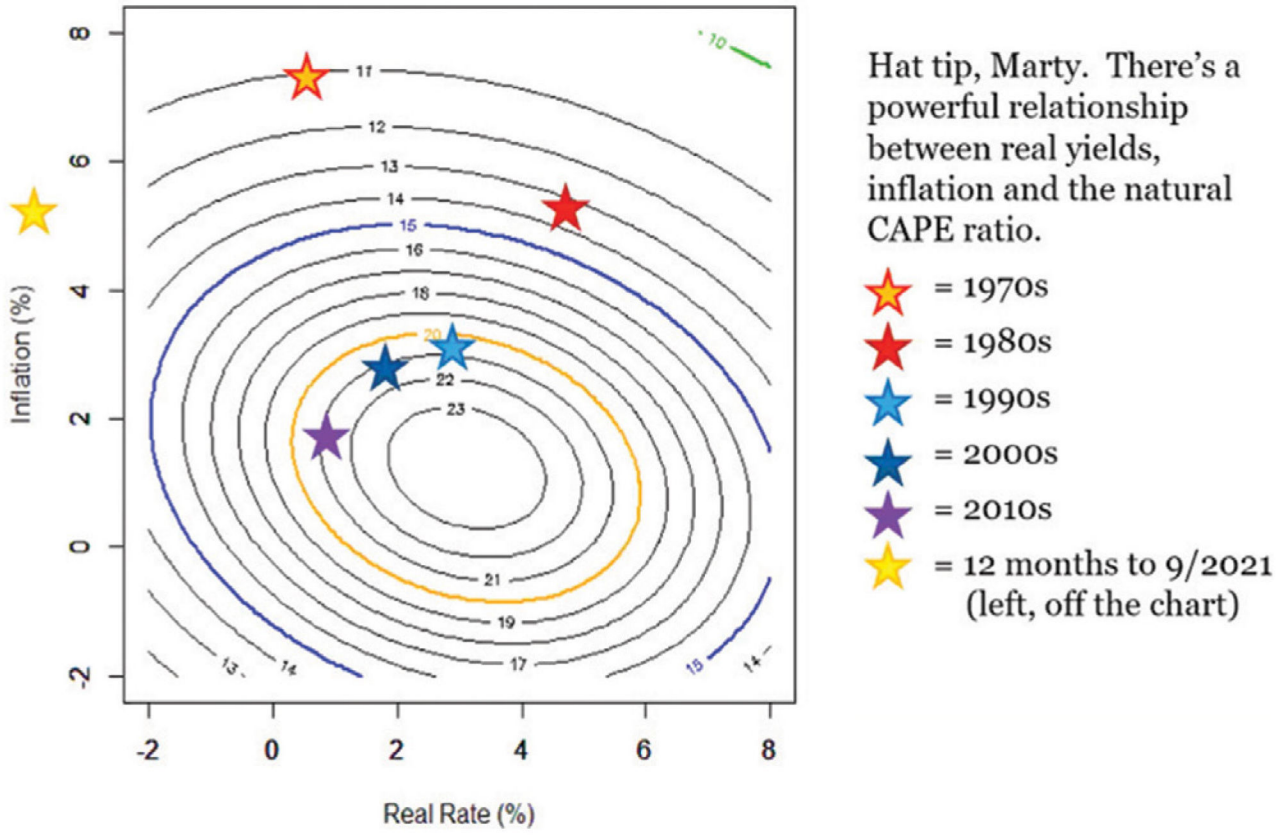
Laurence Siegel: I think most of us knew that. We just couldn't prove it. I'd love to read Chris's paper.

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 nose-bleed 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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