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Robert F. Stambaugh, PhD:
Examining ESG Investment Returns



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EXAMINING ESG INVESTMENT RETURNS

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In December 2022, Robert Stambaugh spoke with members of the Journal of Investment Consulting editorial board about investor feelings regarding ESG investments, the impact of portfolio tilts from brown stocks to green, the use of models to predict expected rates of return, and the effects of uncertainty, mispricing, and tracking errors. Other topics covered in the discussion included the future of active portfolio management versus passive and the influence of retirees on needed changes in the advice offered by investment consultants.

Taking part in the discussion were Inna Okounkova, Columbia University and editor-in-chief of the Journal; Edward Baker, Mesirow Financial; Philip Fazio, Merrill Lynch; Geoffrey Gerber, TWIN Capital Management; and Margaret Towle, Yakima River Partners.

Inna Okounkova: What major factors helped shape your career and bring you to where you are today? What do you regard as



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your major achievement and your biggest mistake or disappointment?

Robert Stambaugh: The major factors that shaped my career were surely people—role models, mentors, or collaborators. There were many over the years, but perhaps the most influential in shaping the direction of my career were faculty members at the University of Chicago, where I enrolled first as an MBA student and started taking courses from Arnold Zellner¹ and

Eugene Fama.² Those experiences got me thinking seriously about getting a PhD and pursuing an academic career. Gene and Arnold, as well as others such as Merton Miller,³ Myron Scholes,⁴ and Henri Theil,⁵ were influential role models for me early on. Marshall Blume⁶ at Wharton was another important mentor early in my career. As I look beyond that period, the people who served as my collaborators, mentors, and role models had the biggest role in shaping my career.

As far as major achievements, I tend not to think of anything specific. To me, the most significant accomplishment was just reaching a level in our profession that for a long time allowed me to interact with and learn from the very best people in it.

As for my biggest disappointment, I'd have to point to the sudden loss in 2007 of Shmuel Kandel.⁷ We published eight articles together and were longtime friends and colleagues, first while we were on the faculty at the University of Chicago and later when I was at Wharton and Shmuel was a frequent visiting faculty member. So if I think of any one profound heartbreak in my career, it would be that.

Inna Okounkova: Thank you for sharing that. Moving on to questions about your work, in your recent paper "Sustainable Investing in Equilibrium," you outlined the potential impact of ESG [environmental, social, and governance] investing, on expected returns, and the overall economy in equilibrium. In fact, we published a summary of that paper in our journal.⁸ Then you subsequently published the paper, analyzing the empirical impact of ESG investing on returns. But how soon do you think we'll start to see a measurable impact of ESG investing on the real economy?

Robert Stambaugh: That depends a bit on what you mean by measurable. With sensitive enough measuring devices, we could already be experiencing measurable effects. If you mean substantial effects beyond just measurable, I'm not sure; it could be a while. If we think of the impact of investors tilting away from brown assets toward green,⁹ two essential components are involved. One is how much money is being tilted, and to what extent are portfolios being restructured? In other words, what's the size of the tilt? The second component is how much effect does a given tilt have on price? It's the effect on prices that could eventually induce corporations to take account of the fact that their costs of capital are affected and prompt them to engage in more ESG-friendly policies.

I don't think we'll have a definitive answer about this anytime soon. Some market observers claim we've already experienced effects on prices. My colleagues and I have been conservative in trying to quantify the impact on prices and capital costs because a lot hinges on how sensitive prices are to changes in quantity. Some have argued that we shouldn't expect to see much effect, given the relatively modest amount of tilting toward ESG investing. Others argue that even a fairly modest amount of ESG investing can have a nontrivial impact on prices because for various reasons elasticities are low. That's one of the new areas of inquiry in finance these days—thinking about how elastic prices are and what the demand elasticity is.

I wouldn't want to make a strong prediction about when we will all agree that portfolio tilts have had some effect on ESG outcomes. But there are other aspects of ESG investing that we didn't touch on in our paper. For example, there are well-publicized instances of activist investing, which allows investors to influence board elections.

This is the so-called engagement aspect of investing. Rather than divesting, investors take the opposite approach of engagement. We didn't treat this in our paper, but we could already be seeing some measurable effects of this approach. But figuring out how much impact portfolio tilts are having or are capable of having—both the magnitude of the tilt and the price impact of a given amount of tilt—are things that we and others are still in the process of investigating.

Philip Fazio: If ESG portfolios exhibit lower alphas and returns than the market or than sin portfolios, what does this imply for corporate resource allocation and investors' portfolio returns? Does ESG investing misallocate resources?

Robert Stambaugh: If ESG-friendly portfolios have lower returns, or negative alphas, another way of expressing this is that the cost of capital faced by ESG-friendly firms is lower. That's the channel through which ESG-friendly policies could be induced at the corporate level—essentially by the market offering those companies lower capital costs.

Does ESG investing imply misallocation of resources? The answer depends on whose perspective the question comes from. If you ask the question from the perspective of someone who cares only about financial outcomes, you could say, "Yes, it misallocates." But if you ask the question from the perspective of someone who cares about both financial outcomes and ESG outcomes, there would not be a misallocation of resources.

Margaret Towle: Both of you appear to be talking about the conceptual framework that most institutional investors are applying to ESG investing, and the lens you're using is the assumption that alpha is lower. If you apply a different conceptual framework, perhaps one in which nonfinancial factors drive return, and you consider, for example, how companies treat their employees, which would be an aspect of the S component of ESG, that could enhance productivity.

Robert Stambaugh: You've raised an interesting point, which is what spurred us on to our second empirical paper. We fully acknowledge that a corporation that undertakes employee-friendly policies to improve productivity would score high on the S part of ESG. There's nothing to say that having an ESG-friendly policy is bad for corporate profitability. It may well be great for corporate profitability and productivity and efficiency. But that doesn't mean the stock is going to have a high expected rate of return.

This goes back to an old misconception about where expected returns on stocks come from. It's not the case that companies that are very profitable have high expected stock returns. Companies that are extremely profitable have high stock prices. Expected stock returns and alpha come from the expected rate of change in the price, not the level of the price. So a company that is ESG-friendly and adopts all of the best thinking about how to treat employees, how to govern its firm, how to achieve a smaller environmental footprint, and so forth, may boost corporate profitability, corporate value, and corporate stock price. But the question going forward is are these policies great for the expected rate of return on a stock that someone buys in that company?

Our point is, well, no. If the market is efficient, all of that company's properties and all of the implications of its ESG policies are in the current price of the stock. Everything that makes that company great and profitable and high value is in the current price. So what should an investor anticipate earning on such a stock? The point in our first theory paper is that if investors, in addition to caring about financial payoff, have any taste for just holding stock from companies with high ESG scores, the alpha is actually going to be negative for those investments.

And that's the point. It's not to say that ESG-friendly policies don't create great performance and high value for companies. It's just that when you think about pricing the stock and

evaluating the expected rate of return from buying that stock, you have to make this important distinction.

Edward Baker: One element of this issue that is probably being underestimated is the cost of the risk associated with brownness.

A lot of brown assets will end up being stranded and will have to be written off. We'll see a huge drop in the profitability of these assets, but this isn't being factored in at the moment because it's impossible to assess. Also, the market has an inclination to move incrementally rather than dramatically in adjusting these assessments. I think this could cause green stocks to outperform because of the low performance of brown stocks.

Robert Stambaugh: The risk point is important. But if brown stocks are riskier, if they involve more of the climate transition risk, think about what impact that risk has on their expected rate of return. It doesn't make the return lower; it makes it higher. So, again, you have to think of the current price. How does this risk affect the current price of these stocks? If these stocks are subject to this additional risk, their prices will be lower than they'd be otherwise.

Edward Baker: But the point I'm making is that this risk isn't being reflected in the price.

Robert Stambaugh: Then you're making the point that the market is inefficient.

Edward Baker: Yes, I am.

Robert Stambaugh: The inefficient market view is that all these things we're saying about ESG investing are true, but the market's not recognizing them. The brown stocks are risky, but the market's not recognizing that risk, so it's pricing the stocks too high. ESG-friendly policies make a company more productive and efficient, but the market's not recognizing that, so it's setting the price of stock in these ESG-friendly companies too low.

We completely agree. In an inefficient market in which the market is not correctly pricing in the risk characteristics and the profitability implications of the stocks, then of course you can argue that brown stocks are overpriced and green stocks are underpriced. Investors should buy green and tilt away from brown because they will get higher expected rates of return. But that's an inefficient market argument, which goes back to an old misconception about where expected returns on stocks come from. Instead, you can think of ESG as similar to another fundamental. If the market's not pricing this fundamental correctly because it's getting the profitability implications and the risk implications wrong, it's not setting the price correctly given the available information. Of course, things can go the other way.

Margaret Towle: Some younger investors are beginning to price in externalities, which would become part of their assessments. A company in the Netherlands is actually measuring the cost of externalities. We're seeing instances of investors pricing in how coal companies trash the environment. How do these examples fit into the conceptual framework of the efficient market hypothesis?

Robert Stambaugh: If they're pricing these factors correctly, then we're back to the question of what's the effect on the expected rate of return. And if they're recognizing that these costs may contribute more to risk, and it's risk they care about, they're going to set the price on these brown company stocks lower, thus creating higher expected returns.

I think a lot of the ESG investing debate boils down to whether one takes an efficient market view of the world or not. If you think you have a better guess about what's going to happen than what the market's currently pricing in, then of course you can make a call. You could advise your clients: "Buy these green stocks because ESG is going to become a more significant influence than what the market is currently pricing in. Avoid these brown stocks because the risk they come with is going to be more important than what the market is currently pricing in."

If you don't know any better than the market knows about the way it's pricing in these risk and performance characteristics, then you don't have this reason for saying, "Buy green." In fact, we point out that things actually go the other way. If the market is pricing these factors correctly, it's going to make the expected returns on brown stocks higher, not just because of the extra risk they carry, but because these companies have characteristics that, other things being equal, investors don't like, so they may not want these stocks in their portfolios.

This makes the expected returns on green stocks lower because they have less of the risk that investors don't like and more of the characteristics investors like and are willing to pay a premium to hold. But as I said, if you think the market is not pricing in these factors correctly according to the perspective of an inefficient market, then certainly you can go the other way.

Philip Fazio: It seems to me that markets have anomalies that don't fit. Is it possible that in the framework of a Fama-French model, we could have risk factor pricing that might be significant for ESG-identified companies? Have you guys thought about that?

Robert Stambaugh: Yes. In our first paper we point out that in the simple equilibrium model we developed, there is such a thing as an ESG factor, a green factor. Again, stocks with higher positive sensitivities to that factor will have higher expected returns, but we note that those stocks are going to

be brown stocks. If you like, you can think of this as a risk factor.

If you think of ESG as creating this type of systematic risk, consider climate, for example. If adverse climate shocks that we can't predict occur, think of the implications of those events for various companies. Suppose one of those events spurs additional regulation. Think about what type of companies will be most severely affected if new regulations are put in place. The browner companies will be hurt more when that happens.

We don't know if adverse climate shocks are going to occur, but the possibility is a risk. Which companies are more exposed to that risk? It's the brown companies. And which companies will have a higher positive risk premium as a result? It's the browner companies. So you can definitely think of unpredictable events such as these as a risk factor, at least as we advanced that concept in our first theory paper.

In addition to the risk component, the other ingredient that causes a higher risk premium is the taste component. If, aside from any financial risk considerations, investors get a warm glow from holding green companies and feel some anguish about holding brown companies, those feelings create an additional piece of that risk premium.

Geoffrey Gerber: In your recent paper "Dissecting Green Returns," you suggest that this theoretical green factor could account for, say, 80 percent of the underperformance of value stocks in 2010. Could you expand on that idea? And to what would you attribute the other 20 percent? Is it easy monetary policy?

Robert Stambaugh: I don't know. We don't know what the other 20 percent might be. We view all of it as unanticipated. Our story was that this green factor exists, and unanticipated shocks in reaction to that factor proved to be important over the past decade. In other words, there were unanticipated responses to climate news that ended up helping the returns on green company stocks and hurting those on brown. This accounted for a significant part of the outperformance of green companies, relative to brown.

Based on forecasts, you would not expect green to outperform brown in any given period. When these sorts of unexpected adverse shocks improve the prospects for green firms at the expense of brown firms, the result is the outperformance of green relative to brown. And we think this played a big role in the outperformance of green stocks over brown during the past decade. This was not expected outperformance; it was definitely unexpected outperformance. Similarly, we attribute the outperformance of growth stocks compared with value stocks in the same decade to something unanticipated.

We know that in the long run there's a value premium, but over any relatively shorter episode, growth can outperform value. What we observed is that once you account for exposures of growth and value—a growth-value factor related to this green factor—you can account for a large part of the unanticipated performance of the value-growth factor.

We can't prove that's why value underperformed growth. All we're saying is, "Look, you can explain it this way." By the way, the explanation is more effective in that direction than in the opposite direction. If we try to explain what happened to the green-versus-brown spread by regressing it on the Fama-French value factor, we don't explain much of that spread. So it seems the ESG factor explains more of what happened to value versus growth than the value factor explains what happened to the ESG factor. As far as what happened to the other 20 percent of the unexpected performance of value and growth, there are a number of stories you could tell. We don't have a particular favorite. We just leave that as part of the surprise.

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Edward Baker: Another interesting aspect of "Dissecting Green Returns" was your use of a Media Climate Change Concerns Index.¹⁰ You noted that there's a one-month lag in the response of returns to changes in that index. What do you think accounts for that? Doesn't that sound a bit like market inefficiency?

Robert Stambaugh: Absolutely. Eugene Fama was probably my most influential mentor, and he remains a role model. Nevertheless, I am not a strong adherent to market efficiency, and frankly I don't think Gene would proclaim himself as that either. In this case, we found that the lagged response seemed to be concentrated mostly in smaller firms. And a large volume of previous literature in one way or another tends to document that smaller firms are slower to respond to news than bigger firms. You could attribute this phenomenon to various kinds of trading frictions or simply to lack of attention on the part of analysts. We categorize the result as being consistent with that thread of the literature, which indicates that there are times when smaller firms' stock prices just don't react as quickly as those of bigger firms. This goes back to early work by people

like Andrew Lo and Craig MacKinlay, who showed that a lead-lag effect exists. Experience with large stocks versus small stocks and much work since then point to specific elements of this effect and relate it to certain kinds of information. We were a bit surprised by this result.

Edward Baker: It is surprising. That index is relatively crude too. Have you looked at other kinds of indexes? Is more work being done on measuring the change in climate concern?

Robert Stambaugh: We considered other indexes in our paper. In our research on green returns, we did some work using other folks' climate indexes and found the overall results of our study to be pretty robust. We didn't actually drill down to that lead-lag effect and try to identify to what extent specific information is not being absorbed or not being absorbed quickly enough.

This climate concerns index is an interesting aggregation of information. If you think about how an investor would incorporate that in real time, it's not obvious that this is something the market would have in front of it to make use of. I don't have a good explanation for why the lag exists, other than it seems to point to some inefficiency. And certainly more could be done to determine exactly what kind of information is inadvertently eluding the attention of some market participants, at least temporarily.

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Margaret Towle: I'd like to ask about a slightly different aspect of market globalization and interaction with the ESG factor. Small companies might not have sufficient resources to pursue green initiatives and therefore might have a larger alpha with brown investments. Did you see this in your empirical work, or is it harder to measure that?

Robert Stambaugh: Yes, in general, we saw a correlation between ESG ratings and firm size. On average, larger firms tend to be greener. So far that's about the extent of what we know on this subject. But there definitely is a correlation between firm size and some of the popular ESG ratings, such as those of MSCI [Morgan Stanley Capital International], which were the principal ones we focused on.

Inna Okounkova: Switching from ESG to a conventional factor framework, you created a four-factor model that accommodates many anomalies better than the Fama-French model. Fama and French justified the factors they selected in their 2015 paper "A Five-Factor Asset Pricing Model." How did you come up with this specific set of factors?

Robert Stambaugh: The approach we took was fairly novel at the time. Rather than try to construct a factor based on one particular metric and tell a story explaining why that metric was particularly significant, we elected to examine the available evidence from a whole group of different characteristics and metrics that seemed to matter and to ask whether there was any parsimonious representation of these factors. We came up with the four-factor model by examining an array of characteristics that various other studies had found to be important in explaining average returns. Then we did different versions of cluster analysis on these characteristics to determine to what extent they moved similarly. We looked at different ways of clustering these characteristics, based on a cross-sectional clustering of the characteristics themselves as well as on returns-based measures.

When we did that, we found identical identities across clustering methods for the characteristics we had put in each of the two clusters. The factors we created were just what the data told us about the way in which these various characteristics, or anomaly variables, clustered together. So there was no particular magic. Once we let the data tell us how they should cluster, we looked at what characteristics were in each cluster and found that there seemed to be some themes we could apply. We named these two themes "management" and "performance," because one set of characteristics appeared to be things that management could influence fairly directly, and the other set comprised factors that had more to do with performance and thus were not as directly under management's immediate, hands-on control.

We didn't impose any prior meaning on the four factors; we simply followed the way in which the data presented themselves. That was how we came up with the four factors. Well, that's how we came up with the two factors other than the market factor and the market-cap factor. We consider market and market cap to be two factors that would exist in any event, and then we asked to what extent all these other factors can be parsimoniously summarized by a couple of others.

Inna Okounkova: What are your views on factor investing in practice—using factors to create portfolios?

Robert Stambaugh: I'm thinking of some recent work I've done with Toby Moskowitz [Liu et al. 2022]. We have an early working paper written with Jianan Liu as well, and we're asking which of these various models would best capture asset prices

if there were no mispricing. We call it “pricing without mispricing.” The way we get at this is to say, “Suppose we take information that’s a decade old and use it to form an investment strategy.” We sort stocks on information that could have been observed ten years ago. Our assumption is that whatever that decade-old information is, the market has priced it by now. In other words, if you have the correct model to represent expected returns in the absence of mispricing, strategies based on ten-year-old information shouldn’t produce alpha with respect to that model.

We’re finding that the model that works best in this regard is the capital asset pricing model [CAPM]. In other words, if you use ten-year-old information to form long-short spreads, those spreads tend not to show any alpha with respect to the CAPM, but they do show alpha with respect to the popular multifactor models. Our interpretation is that multifactor models, which are quite good at describing expected returns over the next period, do so because they are good at capturing mispricing. So if part of the expected return over the upcoming period is due to mispricing on the part of the market, these additional factors may well be capturing that mispricing better and therefore producing zero alphas on strategies using current information.

One interpretation of multifactor models is that they do a good job of capturing sources of expected return, whether those sources arise from mispricing or risk compensation. Risk compensation would be what the sources of expected return should be in a world of efficient markets. And mispricing would be sources of expected return that would arise in inefficient markets. Multifactor models are good at picking up all these sources, but we think the mispricing they’re picking up is especially important.

So if you’re a traditional active manager, you want to construct portfolios with high expected returns over the upcoming period. Multifactor models can be very good at identifying which stocks have high versus low expected returns.

If instead you want to build a model that asks about the expected return on these stocks if they weren’t mispriced—in other words, if you want to gauge how much mispricing there might be—then a multifactor model can be less useful because it can incorporate a considerable amount of mispricing. Our results indicate that the CAPM may be a better model to use as a pricing benchmark. But it’s not going to do a good job of describing expected returns over the next period because we don’t seem to be in a world without mispricing. A fair amount of mispricing is going on, and these multifactor models are effective at capturing and summarizing much of it.

Geoffrey Gerber: As an active manager since the early ’80s when I left Wharton, I’ve enjoyed your research on the active

management industry and your recent paper “Skill and Profit in Active Management” [2020]. From a gestalt perspective, as the active management sector of the profession has grown, every manager’s ability to add value diminishes. Even the expected profits of a skillful manager will decline because other managers will be able to pick up that skill. This situation reduces the overall profitability of investment management. Will passive management ever totally take over active management? You talk about this as a slow process, but what does this look like ten or fifteen years from now?

Robert Stambaugh: I don’t think passive management will ever take over completely unless the pool of dumb money dries up. So you have to ask: “Where does the potential profit from active management come from? Where does smart money profitability come from?” It has to come from some pool of dumb money, what we sometimes call noise traders. Basically, there has to be a supply of dumb money used in investment decisions that pushes prices away from where they would otherwise be if they were priced rationally on the basis of available information. So long as there’s some nontrivial pool of that dumb money, there will be some room for smart money to take the other side of the trades and profit.

If you tell me how large you think the pool of dumb money will remain, I could tell you whether I think passive management will totally dominate. As I discussed in a simple scenario I included in my 2014 presidential address to the American Finance Association, if you simply think of a trend in which the pool of dumb money keeps getting smaller and smaller, then eventually the investment world essentially converges into one in which the only approach you can support is passive management. The presence of active management gets smaller and smaller too. Technically, the amount of fee revenues that active management can generate in aggregate gets smaller and smaller as well.

But I don’t know. The traditional view is that professional money managers represent the smart money and the people who don’t rely on professionals supply the dumb money. But since I wrote my 2014 paper, subsequent studies point to various pools of seemingly dumb money within the institutional segment. I don’t know how big those pools are or how dumb the money is, but if it’s nontrivial and persistent, then I think the hope for profitable active management springs eternal; a vital active management industry is still possible. I don’t know that I want to make a forecast about this, but I think that’s what your question really hinges on.

Geoffrey Gerber: Right, it does. You also point out that an active manager’s skill is highly correlated with future asset returns. So is this result strictly a question of manager’s active share? Do skilled managers add value because they

take a high active share in the assets that are highly correlated with future returns? How does tracking error play within this equation?

Robert Stambaugh: That's a good question. I've had long debates with people about tracking error—specifically, whether it should be part of a measure of skill. Certain people in the profession would argue that skill can be well measured essentially by considering alpha. Or take a pool of money, ask how much expected alpha it generates, and that's in some sense a measure of the skill of the person who manages that money. There are also equilibrium models in which tracking error can be thought of as irrelevant. In other words, if there are a lot of actively managed funds whose tracking errors are relatively uncorrelated across funds, in principle an investor can just diversify among all those active funds. And if on average those funds produce alpha, no one cares about the tracking error.

But there are other scenarios in which tracking error becomes important. If you were to combine a passive portfolio with an active one and come up with an optimal allocation that would maximize your Sharpe ratio, you would clearly care about more than just the alpha on the active portfolio with respect to your passive portfolio. You'd also care about the tracking error because that would affect how much you allocate to the active portfolio. This echoes the early work of Jack Treynor and Fischer Black,¹¹ for example.

So I think, in general, tracking error matters. The ability of a manager to produce alpha with low tracking error would be thought of as skill. But there are reasonable models in which you can ignore the tracking error and focus only on the ability to create alpha. This is an interesting topic for further discussion, and I'm hoping more can be written on it, but as of now I think it's merely an interesting topic for discussion.

Edward Baker: If you have thoughts about the crypto industry, it would be interesting to hear them.

Robert Stambaugh: I do. I do not see the net societal benefit of cryptocurrency. The crypto part strikes me as potentially quite valuable; it's the currency part that I have a bit of an issue with. Effectively, what this industry has done is to facilitate the transfer of large pallets of currency or cash in a way that's completely costless and anonymous. If I'd approached you years ago with a proposal to make it really cheap for anyone who wants to transfer essentially airplane loads of currency in a way that is costless and anonymous, untraceable in terms of identities, would you have thought that was a good idea?

I don't see the fact that we have created a currency that can be transported in this way as a particularly positive innovation for society. In previous years, we've been moving in the

opposite direction. In fact, there are requirements for large currency transactions as well as for reporting on them. Now we've created technology that effectively makes those sorts of transactions child's play compared with what cryptocurrencies can enable.

I've yet to see the currency part of crypto as a net societal benefit. I could be wrong, and its worth could be demonstrated to me. I haven't made it my research focus to think hard about this, but my casual acquaintance with cryptocurrency at this point leaves me unconvinced that it constitutes a net societal benefit. That said, I recognize the potential utility of the blockchain in other applications.

Edward Baker: We've certainly seen that this lack of transparency has created many issues, in particular counterparty risk, that can't be assessed well. That's causing problems for individual investors and for markets more broadly.

Inna Okounkova: You use Bayesian analysis a lot, although it's not currently a standard tool in the industry. Do you have any advice about which areas of an investment practice could benefit from a Bayesian framework?

Robert Stambaugh: Well, Bayesian approaches give you two abilities that I think are hard to incorporate otherwise. One is the ability to incorporate some prior judgment, either disciplined by a model or stemming from some prior beliefs, into decision-making. The other thing Bayesian analysis offers is the ability to incorporate uncertainty in a more rigorous way. One example of the latter is the work I did with Luboš Pástor on long-run equity risk. The simple point of this work was that if you think about the equity premium or the expected rate of return on equity, you have to consider how uncertain you are about that going forward. I don't know about you, but I don't know what the exact equity premium is going to be over the next twenty, thirty, or fifty years.

So if I think about advising or making investment decisions for people who are saving for retirement and are considering the desirability of target-date funds and those sorts of investments, how important should uncertainty about the equity premium be? Our work shows that uncertainty about the equity premium becomes more important the longer your investment planning horizon is. If you're advising someone with a thirty-year planning horizon, I suppose you'd be simulating possible outcomes of your different asset allocations and different expected return scenarios. But I think you should be doing something akin to what we did—that is, when you write down an assumption for the expected equity return or look at the robustness of different assumptions, you should also include an uncertainty factor about each of those assumptions. In other words, if you think the equity premium is 3 percent, assign some uncertainty to

that factor and realize that whatever uncertainty you assigned hits the same way period after period.

In other words, the uncertainty doesn't diversify away; it just builds up. It compounds across time. So the longer your investment horizon is, the more uncertainty matters. Our work shows that it can have a big effect on the desirability of different target-date allocation decisions that one would make at an initial stage. If you contemplate a target-date decision you make thirty years out as a set-it-and-forget-it prescription, you'll tell an investment manager: "Okay, allocate my money this way as a function of my age, as time progresses. I'm going to make that decision today." To what extent does uncertainty about the equity return matter at the time you make that decision? You'll see that it matters.

In fact, it can matter considerably in terms of how attractive something like a target-date fund is in a long-run planning scenario. So that's one example of how Bayesian analysis can be used in decision-making that allows you to incorporate uncertainty in a way that's not so clear how you would do that otherwise.

Another way Bayesian analysis can be useful is with a well-known Black-Litterman approach to asset management, which basically involves allowing some kind of pricing model to play a role that incorporates prior information, or you basically shrink your forecast toward a prior judgment you've made. This approach incorporates prior judgment and information and data in a rigorous, unified way.

These are all attributes that feed into decision-making. Ultimately, investment management is about making a choice among some set of asset weights, as opposed to doing statistical inference. Investment managers are not in the business of accepting or rejecting hypotheses; they're in the business of choosing among decision variables. Bayesian analysis is inherently a theoretical approach to making choices beyond just accepting or rejecting a particular variable.

Margaret Towle: I think you're pointing to an important consideration regarding the trickle-down effect. Even if the analysis recognizes uncertainty, when you get down to the level of financial advisors, some of them treat uncertainty as if that is what's going to happen. This misleads clients. What's needed is an educational process that trickles down to those who deliver the output of the analysis.

Robert Stambaugh: You're right. One thing that has inhibited a wider adoption of Bayesian approaches is that often they involve a computational complexity that doesn't translate easily. But those are technical problems that I think clever people can overcome.

Philip Fazio: I'd be curious to hear how you look back on your 2003 paper "Liquidity Risk and Expected Stock Returns" and how it's changed investment finance.

Robert Stambaugh: I haven't conducted a survey to assess how the paper has changed the field so I don't know if I can answer that, but I can tell you how I think it's changed some thinking. Prior to our work, liquidity was often thought of as an asset characteristic. The thinking was that if assets were less liquid, they would be worth less as a result. Liquidity was considered an asset-specific influence that contributed to the asset being risky, but that doesn't necessarily mean it was part of some systematic priced risk. Our paper simply said, "We can think of fluctuations in overall market-wide liquidity as something that is conceivably a priced risk."

In other words, liquidity is something investors can't diversify away. It affects assets systematically. Before we wrote our original 2003 paper and certainly since, we've seen episodes of liquidity drying up in a systematic way and demonstrating that liquidity crises can be a systematic risk. Given that, a natural thing for investors to ask is, "Okay, which assets expose me more to those crises and which assets expose me less?" The difference in exposure to that systematic risk in a world where such risk exposures are priced is going to feed through into expected return implications. If you consider two otherwise equivalent assets, which might even be equally liquid or illiquid assets, and the price of one asset is likely to suffer more than the price of the other during an overall liquidity crisis, when those assets are priced today, they're going to sell at different prices as a result of that different risk exposure.

A few years ago we got to examine a couple of studies commissioned by the *Critical Finance Review*, and then we got to write a follow-up paper in response. We noted that a liquidity-risk premium is a subtle thing to discover and verify because these liquidity events don't happen often. It's not like you get to observe them every month and therefore can accurately quantify which assets that investors are more exposed than others to such events. Nevertheless, we now have multiple decades of data, including two decades after our original study, that can be used to evaluate the basic premise of the model, and the model seems to have held up reasonably well.

Inna Okounkova: What do you see as the appropriate role for investment consultants in the world of institutional as well as personal investing? Are consultants fulfilling these roles today? And what advice would you give a young person who is entering the investment consulting or asset management profession?

Robert Stambaugh: There will always be some role for investment consultants because people aren't born with an innate knowledge of how to invest their money. There will always be

a need for people to advise others who aren't experts, just as we will always need people to give us advice on how to take care of our health and help us make important health-related decisions. So I don't see why there would be a decline in the need for investment consultants. The question is what are they going to be consulting on and what advice are they going to be giving investors?

If you just consider demographics, one area in which I think investment consulting will become more important is advising retirees. We now have a larger fraction of investors who are retired and whose investment portfolios are their source of income for potentially a long time. So the mix of advice investment consultants offer could shift a bit. The traditional view of investment was saving for retirement. But as more people are retiring and fewer are saving in terms of the proportion of income they need, that can change the mix of the kinds of investment advice being offered.

However, I don't have any particular insight to offer on what investment consultants should do. My advice to students is that they should just become well-grounded in the fundamentals. I think one tendency of the investment consulting industry is to do a lot of repackaging of old ideas under new names and new concepts. Without being well-grounded in the fundamentals, a consultant is less likely to recognize the old ideas as something we already know about and can turn to for that knowledge. Being well-grounded in the fundamental concepts of investment analysis and risk management and portfolio management equips students best for dealing with whatever innovations come down the road. ●

ENDNOTES

1. Arnold Zellner (1927–2010) was an American economist and statistician specializing in Bayesian probability and econometrics. Zellner contributed pioneering work in the field of Bayesian analysis and econometric modeling. He was the H.G.B. Alexander Distinguished Service Professor Emeritus of Economics and Statistics at the Graduate School of Business of the University of Chicago. The founder of the International Society for Bayesian Analysis, he also served as president of the American Statistical Association.
2. Eugene F. Fama, a 2013 Nobel laureate in economic sciences, is widely recognized as the "father of modern finance." He is the Robert R. McCormick Distinguished Service Professor of Finance at the University of Chicago's Booth School of Business. His research is well known in both the academic and investment communities. He is strongly identified with research on markets, particularly the efficient markets hypothesis. Much of his research focuses on the relation between risk and expected return and its implications for portfolio management. His work has transformed the way finance is viewed and conducted.
3. Merton H. Miller (1923–2000) was an American economist and the co-author of the Modigliani-Miller theorem (1958), which proposed the irrelevance of the debt-equity structure. He shared the 1990 Nobel Memorial Prize in Economic Sciences with Harry Markowitz and William F. Sharpe. Miller spent most of his academic career at the University of Chicago's Booth School of Business.
4. Myron S. Scholes is the Frank E. Buck Professor of Finance, Emeritus, at the Stanford Graduate School of Business. Co-originator of the Black-Scholes pricing model, Scholes was awarded the Nobel Memorial Prize in Economic Sciences in 1997 for his new method of determining the value of derivatives.
5. Henri Theil (1924–2000) was a Dutch econometrician and professor at the Netherlands School of Economics in Rotterdam, known for his contributions to the field of econometrics.
6. Marshall E. Blume (1941–2019) was the Howard Butcher III Professor of Finance, director of the Rodney L. White Center for Financial Research, and past chairman of the Finance Department at The Wharton School of the University of Pennsylvania. In addition to his 44 years as a faculty member at the University of Pennsylvania, he served as a visiting professor of finance at the New University of Lisbon, the Stockholm School of Economics, and the European Institute for Advanced Studies in Management in Brussels. Blume conducted extensive research into investments, the financial markets, and investor behavior.
7. Shmuel Kandel was an economist and a professor at the University of Chicago and Tel Aviv University. He was born in Israel and earned a PhD from Yale University. He published numerous influential articles in financial economics, particularly in the areas of asset pricing and investments.
8. See *Journal of Investment Consulting* 21, no. 1 (2022): 83–84.
9. "Green" assets are those with favorable ESG characteristics; "brown" are the opposite.
10. The Media Climate Change Concerns (MCCC) Index is available at <https://sentometrics-research.com/>. The MCCC Index uses news about climate change published by major U.S. newspapers and newswires. Ardia et al. (2020) found that on days with an unexpected increase in climate change concerns, the stock prices of green firms tend to increase whereas the stock prices of brown firms decrease.
11. Jack Treynor and Fischer Black created the Treynor-Black model, a mathematical model for selecting securities. Published in 1973, the model assumes investors consider that most securities are priced efficiently but believe they have information that can be used to predict the abnormal performance (alpha) of a few of them. The model describes the optimal portfolio to be held under such conditions. See "How to Use Security Analysis to Improve Portfolio Selection," *Journal of Business*, vol. 46, no. 1, 1973: 66–86.

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