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PRACTITIONER'S DIGEST

The "Practitioner's Digest" emphasizes the practical significance of manuscripts featured in the "Insights" and "Articles" sections of the journal. Readers who are interested in extracting the practical value of an article, or who are simply looking for a summary, may look to this section.

A PORTFOLIO APPROACH TO ACCELERATE THERAPEUTIC INNOVATION IN OVARIAN CANCER

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Shomesh Chaudhuri, Katherine Cheng, Andrew W. Lo, Shirley Pepke, Sergio Rinaudo, Lynda Roman and Ryan Spencer

Biomedical innovation in oncology has become riskier and more expensive, precipitating a withdrawal of private sector funding from the sector. In this article, we consider a portfolio-based approach to funding in which multiple distinct ovarian cancer treatment candidates are funded within a single structure. Ovarian cancer is one of the most lethal gynecologic malignancies worldwide, with approximately 239,000 new cases and 152,000 deaths annually. Several clinical and scientific factors have made therapeutic innovation in ovarian cancer challenging, but these technical challenges are compounded by the fact that ovarian cancer receives disproportionately less public funding relative to other diseases. For example, as measured by its National Cancer Institute funding-to-lethality score, ovarian cancer received only $97,000 of funding per years of life lost per 100 new cases, one-nineteenth of the amount allocated to either prostate or breast cancer. Moreover, private investors are not incentivized to bridge this funding gap because of the substantial costs, long time-horizon, and low success rates associated with these projects. However, by investing in many programs simultaneously, a "multiple shots-on-goal" approach can reduce the risk of both scientific failure and financial loss.

In this paper, we demonstrate that both the dearth of funding and the need for multiple therapies to treat this heterogeneous disease can be addressed by new financing structures and a portfolio approach. Twenty-five potential early-stage drug development projects were identified for inclusion in a hypothetical portfolio through interviews with gynecological oncologists and leading experts, a review of ovarian cancer-related trials registered in the ClinicalTrials.gov database, and an extensive literature review. The annualized returns of this portfolio were simulated under a purely private sector structure both with and without partial funding from philanthropic grants, and a public-private partnership that included government guarantees. We find that a purely private-sector structure yields generally

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unattractive risk/reward profiles, which is consistent with the current lack of funding from for-profit entities. However, public-private structures can increase expected returns and reduce tail risk, allowing greater amounts of private sector capital to fund early-stage research and development.

Our results show that the interests of multiple stakeholders—including patients, investors, and payers—need not be misaligned in the search for breakthrough treatments for ovarian cancer or attractive returns on investment. The appropriate business models and financing structures can amplify the scale and scope of current research and development efforts, as shown by our simulations. Our simulation results are particularly relevant for the emerging practice of impact investing in which investors wish to effect change as well as earn an attractive return on investment. In the case of ovarian cancer therapeutics, we believe that both are simultaneously achievable. However, active collaboration from both the private and public sectors will be necessary to address the financial issues impeding the rate of medical innovation, and we hope this article will serve as a catalyst for such collaboration.

A MODEL OF BOND VALUE: EXPLAINING YIELDS WITH GROWTH AND INFLATION PAGE 17

Thomas Shevlin

This paper looks to establish a new heuristic for investors, giving them a simple, intuitive way to relate bond yields to prevailing trends in growth and inflation. The paper lays out a strong theoretical basis for the model as well as strong evidence of being empirically robust. The model is intended to be analogous to the long-run intrinsic value models available for equities, such as CAPE and Q. It also offers an alternative to forecasting surveys, which have been over-estimating 10-year Treasury yields for decades and continue to project yields above 4% in the long run.

Growth and inflation are the two most well established drivers of bond yields in economic theory. Using 10-year compound annual growth rates of these variables to model yields allows us explain yields across differing regimes of high and low inflation and growth. It also demonstrates a robust statistical link between these two drivers and yields in the long run. In addition, the model does well in in-sample and out-of-sample tests used in the literature to evaluate other, well established measures of equity value. The model can be used on its own or in conjunction with other models to forecast yields and also as a benchmark to evaluate yield forecasts.

Rather than suggesting that bond yields of recent years are artificially low, the bond value model outlined here provides evidence that low bond yields in recent years are actually consistent with trends in growth and inflation. This makes it consistent with a growing body of literature, including some studies using advanced economic models of interest rates, which support the hypothesis that low bond yields in recent years are in line with broader economic trends, rather than due to temporary factors that are likely to reverse quickly. Unlike some of these more advanced models, however, the bond value model outlined here is simple enough to be accessible to a broad range of investors and institutions.

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OPTIMAL HOLDINGS OF ACTIVE, PASSIVE AND SMART BETA STRATEGIES PAGE 40

Edmund Bellord, Joshua Livnat, Dan Porter and Martin B. Tarlie

The evolution over the past decade of institutional equity portfolios to a "core and explore" model represents a significant shift in how institutional equity portfolios are managed. This dynamic motivates, once again, the basic question of how an asset manager, faced with the delegated problem of outperforming a strategic benchmark, should allocate between basic structural building blocks. We address this question from the perspective of faced with four stylized choices for building a domestic equity portfolio—a passive index, an enhanced index, a multi-factor smart beta portfolio and a high conviction portfolio.

The traditional approach, minimize tracking error for a given excess return target, ignores investment horizon and assumes that tracking error is the only measure of active risk. We apply an approach based on the idea that active risk is expected shortfall relative to a desired excess return target. This formulation naturally incorporates two preferences of the asset owner: (i) an excess return objective, and an investment horizon. Our main result is that investors willing (or able) to extend their investment horizon can have their cake—low expected shortfall—and eat it too—high expected surplus and low probability of shortfall. These desirable attributes however, come at the cost of higher tracking error. Furthermore, we find that optimal expected shortfall portfolios differ substantially from portfolios generated using conventional methods.

This work has several implications for asset owners. First, asset owners should revisit their equity strategy allocations from the perspective that active risk is expected shortfall over a range of investment horizons. Second, asset owners should reevaluate their stance towards tracking error as the tracking error that minimizes expected shortfall depends on portfolio horizon. Third, those asset owners that have adopted the core and explore approach and that have reasonable excess return targets and long portfolio horizons, should allocate away from the passive index to strategies with positive (after fee and transaction costs) expected excess returns.

AUTOMATED FINANCIAL MANAGEMENT: DIVERSIFICATION AND ACCOUNT SIZE FLEXIBILITY PAGE 63

Michael Reher and Celine Sun

Automated financial advisors (AFAs), popularly known as "robo advisors", have grown rapidly since 2008. In response, many traditional advisors have begun offering automated financial management (AFM) services. However, while it is of practitioner interest to understand the sources of demand for AFM services and their value added, little research has been conducted in this space. In this paper, we document the value added of AFM along two important dimensions: improved diversification and ability to manage accounts of almost any size. First, AFM providers often emphasize diversified portfolios over abnormal return. Second, AFAs' reliance on automation means that they can manage small portfolios at little additional cost, providing account size flexibility for clients who would otherwise

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be constrained by a minimum balance. We measure these effects using matched AFM and traditional portfolios from a large U.S. AFA, and are among the first papers to do so.

We find AFM portfolios are significantly better diversified, and the gains from diversification can attract clientele, since underdiversified investors are more likely to set up an AFM account. In terms of account size flexibility, an exogenous reduction in minimum account size led to a net increase in total deposit inflows, and disproportionately so for less-wealthy investors. This finding suggests that AFM practitioners can actually use minimum account sizes to raise assets under management even as the average account size falls.

QUANTIFYING THE SKEWNESS LOSS OF DIVERSIFICATION PAGE 76

James X. Xiong and Thomas M. Idzorek

Diversification is widely viewed as the "only free lunch" of finance. However, diversification not only leads to a reduction in variance—which is desired by investors—but it also leads to skewness loss—which is not desired by investors—suggesting a not widely realized trade-off between variance and skewness. We quantify the skewness loss of diversification using the corrected Corrado-Su option-pricing model that incorporates skewness and kurtosis, and show that skewness loss is a meaningful, often unrecognized, cost for lunch for investors with strong skewness preferences and short investment horizons.

Skewness is the key in understanding the under-diversification puzzle observed across individual investor portfolios in which many individual investors hold just a handful of stocks. Investors have preferences for skewness, leading some investors (investors seeking positively skewed investments) to buy lottery-type stocks or call options with upside potential, and some investors to buy insurance or put options to hedge downside risk (investors avoiding negatively skewed investments).

Our analyses provide useful information for portfolio construction and risk management for investors with skewness preferences and short horizons. By diversifying, investors give up the potential for lottery-type gains and must simultaneously tolerate market tail risk that is exasperated due to the negative skewness that goes hand-in-hand with diversification. For investors with strong skewness preferences and short horizons, they can hold a well-diversified portfolio, and additionally buy put options to hedge downside market tail risk and/or buy call options to capture the positively skewed upside potential of individual stocks. The combined excess option costs (priced by the Corrado-Su model) over the Black-Scholes model reveal the economic value of the skewness loss of diversification.

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