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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.

FINANCING FUSION ENERGY PAGE 5

Abdullah Alhamdan, Zachery M. Halem, Irene Hernandez, Andrew W. Lo, Manish Singh and Dennis Whyte

Fusion energy is a reaction in which energy is released by the *fusing* of atoms into new elements. This process, which powers stars and our sun, possesses the qualities of an ideal energy source: high-power density, high dispatchability (i.e., no intermittency), virtually limitless fuel availability, a low environmental impact with high sustainability, and no risk of a runaway reaction, since it relies on its fuel remaining hot, not a chain reaction. With greenhouse gas levels rising, the effects of global warming already tangible in the form of extreme weather events, and the world's oil supply expected to be depleted by the end of the century, the creation of a sustainable, unlimited energy source is of paramount importance. While solar and wind power technologies have improved in efficiency and cost, there are structural limitations preventing these renewable sources from supplanting the largely fossil fuel-dominated energy economy. Therefore, fusion energy is perhaps the only truly sustainable energy source for supporting human life over the next several millennia. And on December 5, 2022, the theoretical possibility of fusion became a reality when the National Ignition Facility at UC Berkeley's Lawrence Livermore Laboratory achieved the first fusion reaction in which net energy was produced.[1] (accessed 13 December 2022).

The two main challenges in realizing this carbon-neutral future are the feasibility of fusion to produce net power at scale, and the uncertain timeline of near-term deployment of power plant demonstrations. While fusion research has historically been funded and executed by governments or government-sponsored projects, there has been a recent surge in private ventures aiming to embrace a different approach than the bureaucratic behemoth of ITER (which means "the way" in Latin), the world's largest fusion program, backed by the European Union, China, India, Japan, Russia, South Korea, and

[1] https://www.nytimes.com/2022/12/13/science/nuclear-fusion-energy-breakthrough.html

the United States. While the likes of Jeff Bezos, Bill Gates, and Peter Thiel have supported some of these ventures, the private fusion industry is still woefully underfunded compared to the progress of the research, as the cumulative capital raised is only around 4% of ITER's budget.

In this article, we synthesize the perspectives of present and potential future stakeholders in a fusion energy economy, including (but not limited to) academic research groups, government labs, startups, and energy-sector specific and general investors, to assess trends and views on private fusion financing, and then provide recommendations on how to leverage financial engineering methodologies to incentivize greater capitalization. During its compilation, we have interviewed academics at leading research institutions; investors who have previously funded fusion projects; investors who have passed on fusion initiatives; members of energy advisor groups, investment banks, and sovereign wealth funds; founders of fusion startups; and members of the Department of Energy's Advanced Research Project Agency-Energy (DOE ARPA-E), the US government's research engine for energy technological exploration.

Drawing on insights from these stakeholders, we propose a megafund securitization approach to financing fusion, in which many high-risk projects are amalgamated into a single financial entity, thus improving the risk–return balance of a portfolio of fusion projects to a point that funding might be sourced through a series of optimized debt securities in addition to an equity tranche. We further derisk the megafund by leveraging first loss capital guarantees from philanthropic sources (ultra-high net worth [UHNW] individuals or private foundations) and governments to fund coupon payments to senior and mezzanine bondholders in its early years. This work represents the first application of the megafund concept outside of the biotech domain. This financial structure exploits the unique properties of the fusion sector, among them the ability of fusion companies to perform many types of divestitures (such as spinning off an independent company or executing equity carve-outs), the increasing industry demand for auxiliary technologies such as control systems, 3D printing, and rapid automated material testing, and the capacity for partnerships with academic institutions. This structure has the potential for immediate implementation, as long as the total assets under management (AUM) are consistent with the quantity of investable assets present in the fusion industry, but it will scale in relevance as the fusion industry proliferates in size and demonstrates commercial performance capabilities.

Fusion is the ultimate "green" investment, yielding a clean source of energy that can sustain human life for longer than any other energy source available to us. Although achieving commercially viable fusion reactors will require tens of billions of dollars of financing, this expense is trivial when compared to the cost of not pursuing this last best hope of humanity.

THE ROLE OF OPTIONS IN GOALS-BASED WEALTH MANAGEMENT PAGE 52

Sanjiv R. Das and Greg Ross

Goals-Based Wealth Management (GBWM) seeks to apply modern portfolio theory to achieving investor goals and frames risk in terms of the probability of achieving goals, not just in terms of portfolio return standard deviations. This paper extends the GBWM literature by including call and

put options on the market index in addition to standard model portfolios as choice assets in dynamic asset allocation. The results show that the probability of achieving financial goals improves materially, especially for more aggressive goals.

The paper develops a methodology using dynamic programming for goals-based wealth management over long horizons where portfolio rebalancing uses the standard securities and also derivative securities. A kernel density estimation approach accommodates derivative assets, solving a high dimensional problem with fast computation. The approach accommodates skewed and fat-tailed distributions. Improved performance in terms of goal probabilities arises because options unlock additional leverage, which is useful for reaching upside goals. Calls are preferred to puts unless upside goals are modest. The framework is extensible with periodic withdrawals and multiple goals, while being cognizant of downside risk. Viewed more generally, the approach in the paper may be used by practitioners for many kinds of dynamic optimization problems that aim to expand the portfolio choice set beyond mean-variance assets.

LEVERAGING TEXT MINING TO EXTRACT INSIGHTS FROM EARNINGS CALL TRANSCRIPTS PAGE 81

Andrew Chin and Yuyu Fan

As investment alphas have become more elusive, active managers are pursuing alternative datasets and more sophisticated techniques like machine learning and natural language processing to uncover investment opportunities. Earnings call transcripts provide a good testing ground for these aspirations because these transcripts capture exchanges between company management and the investment community, and text mining techniques can be leveraged to summarize and extract insights.

We apply natural language processing techniques on earnings call transcripts to extract meaningful features that capture management and investment community signals. Using a corpus of transcripts of earnings calls for global companies from 2010 to 2021, we create fundamentally driven features spanning document attributes, readability, and sentiment on different sections of the transcripts. We test the efficacy of these features in predicting the future stock returns of companies and find that there are opportunities for investors to use these signals in stock selection. Specifically, we find that readability and sentiment-based techniques can enhance an investor's ability to differentiate amongst outperformers and underperformers. While the results are strongest in the US Small Cap universe, our findings are consistent across market capitalization as well as geographies.

We also introduce methods to create more robust sentiment features for active and systematic investors. By analyzing the performance patterns of the various call participants, we find evidence that the analyst questions may contain more information than the executive sections. Specifically, company executives may be adapting their semantic usage to account for the increased use of text mining techniques across the industry. Finally, we fine-tune a BERT-based model to predict sentiment on earnings call transcripts and observe that sentiment features derived from context-driven deep learning language models are promising and have more efficacy than bag-of-words approaches.

HOW INEFFICIENT IS THE $1/N$ STRATEGY FOR A FACTOR INVESTOR? PAGE 103

Kevin Khang, Antonio Picca, Shaojun Zhang and Minzhi Zhu

Factor investing has been one of the fastest-growing investment categories of the last decade, and today roughly $2 trillion is allocated to various investment vehicles dedicated to delivering factor premia. While this space used to be dominated by hedge funds and institutional investors, financial advisors and individual investors have driven much of this recent growth and are now the primary users of factor funds. With the rise of individual investors and advisors as primary factor users, how to allocate to factors in long-only portfolios has become an important portfolio construction question.

This paper seeks to answer this question subject to real-world implementation considerations and provide investors with practical investment guidance. In particular, we curate commonly available long-only factor funds (value, momentum, and quality) in both small- and large-caps, adjust factor premia for transaction costs, and impose reasonable constraints on concentration. Utilizing block-bootstrapped return environments, we then compare a simple $1/N$ allocation to mean-variance and minimum-variance allocations.

We find that $1/N$ is surprisingly hard to beat by other optimization-based allocations. There are two drivers behind this find. First, with realistic transaction costs, long-term premia are comparable across factors. Second, against this backdrop, optimization-based allocations would outperform $1/N$ only if they predicted short-term factor returns with consistency–which they do not. Our results show that most investors without the edge in factor timing may stand a better chance of success in factor investing by investing uniformly across factors and the capitalization spectrum.