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## A PERSONAL TRIBUTE TO PROFESSOR HARRY MARKOWITZ ON THE OCCASION OF THE JOIM SPECIAL ACHIEVEMENT AWARD



**Gifford Fong, Editor**  
**Journal of Investment Management (JOIM)**

I had the pleasure of first meeting Harry probably in the latter part of the 1970s. By that time, Harry was already an icon of finance both as an academic and in the practitioner world. I was a neophyte just getting started in the business world. Harry was at that time and through the years always gracious with his patience and time even for a newcomer. Over the years I have been honored to spend time with Harry and have continued to enjoy his continuing research and insights to this day. A constant over the years is not only his ongoing contributions to finance but his enduring legacy of being an outstanding human being and thoughtfulness with all who interact with him.

**Sanjiv Das, William and Janice Terry Profes-  
sor of Finance and Business Analytics**  
**Santa Clara University**

I came to know Harry Markowitz more than a decade ago, when I worked with him and Meir Statman to examine how to map modern portfolio theory to behavioral portfolio theory. This culminated in a paper that was published in the JFQA

almost exactly a decade ago, in April 2010. That paper has since spawned many others I worked on, extending and applying the work to more academic ideas and to practical implementation. What I remember clearly from those interactions is that Harry challenged everything. He pushed me to think harder and better. I still do not know anyone who asks so many interesting questions. Harry sent me his books and they always contained beautiful little notes on the inside cover. I treasured and read those books, and learnt a lot more about him from his early work with which I was unfamiliar.

Harry's work spans all corners of investment management, from utility theory to optimization, from empirical to computational. And just like his work, Harry has lived, worked, and enlightened us all on east and west coasts, as well as the midwest. Harry was born in Chicago in 1927, which means he is now a sprightly 92 year-old. He has lived through wars and recessions, booms and busts, and is still telling it like it is. Harry's PhD in Economics was earned at the University of Chicago, under the tutelage of Jacob Marschak and Leonard Savage. And his ideas were instilled

by contact with the likes of Friedman, Koopmans, von Neumann, and Morgenstern. Since then Harry has been at the Cowles foundation in Chicago, the RAND corporation in Santa Monica, Baruch College in NY city, Daiwa securities in New Jersey, and now UCSD, criss-crossing the country in a hugely impressive cadence to push the frontiers of investment theory and practice.

Harry is well known not just for Modern Portfolio Theory (1952), but also for his work on sparse matrices (1957) and the simulation language SIMSCRIPT (1966). I vividly recall the first time I was introduced to Harry by Gifford, at a Q-conference, and we ate dinner together. No finance was discussed. We spent a lot of time talking about SIMSCRIPT, not portfolio theory, about code generators, not covariance matrices. In 1989, INFORMS gave Harry the John von Neumann Theory Prize for his work on portfolio theory, sparse matrices (these often arise in financial problems), and SIMSCRIPT. So, Harry is not just the father of investment management, but I can safely say that he is also the father of Computational Finance, well before that field was even recognized as a distinct science or art. Oh yes, another thing: Harry also created the EASE programming language in 1983, one of the early integrated development environments, known today as IDEs, that are used in almost all software development.

Some years ago Harry sent me a copy of his collected works. I deeply urge everyone to read this collection of papers. It is amongst the finest intellectual writing there is. There is not a word out of place. Harry has this amazing ability to write most clearly and parsimoniously, often expositing in just a few pages what takes others several. One of my favorite papers is titled “Portfolio Analysis with Factors and Scenarios” (with Ande Perold in JF 1981). This paper covers so many aspects of modern investment practice, that it is

embarrassing to say that Harry and Andre fit so much wisdom into, yes, just 6 pages! Harry managed to cover so many bases that papers today take 30–50 pages to do.

It is amazing how Harry has managed to keep publishing seminal work decade after decade. From portfolio theory in the early 1950s, to sparse matrices in the late 1950s, to SIMSCRIPT in the 1960s, to long-run portfolios and system simulators in the 1970s, portfolio analysis and EASE in the 1980s, utility models and trading at Daiwa in the 1990s. In 1990, Harry won the Nobel Prize for his work on Portfolio Theory. In the 2000s, Harry developed fast algorithms for dynamic portfolio rebalancing problems with van Dijk in 2003, and merged mean–variance ideas with behavioral portfolio theory and higher-order moments, work with Meir and I, which we are very proud of. Having seen Harry at work at close quarters in the recent past, I am amazed at how much mental energy he brings to any discussion, even at this age, and it is safe to describe Harry as “creatively loquacious”. I almost felt sorry for Samuelson in his debates with Harry over what one might call MELOP-G, or “Max E Log one plus g”: an inside joke about which I will say no more, except to urge you to get Harry going by asking him about it in coffee breaks at JOIM conferences.

Thank you Harry, for creating this world, where logic and economics meet, and for infusing it with your very special kindness and humor.

**Harry Markowitz: OUR Alpha Laureate**  
**Martin L. Leibowitz, President**  
**Advanced Portfolio Studies, LLC**

The above title, like all good titles, says it ALL as far as I’m concerned.

However, my intent is to write a page or two about Harry Markowitz, and so I’m nevertheless going to have to provide some added verbiage.

When I was invited to write an encomium to Harry Markowitz, I first thought of all the usual WONDERFUL things one could say about this towering giant of financial theory. But on second thought, I realized that all that would have been well covered by the other invitees. So I decided to focus on just one of his many FAJ papers, and how much it taught me—not only about financial theory—but also about Harry Markowitz, the man himself.

This occasion dates back to 2005. It was the 60th anniversary of Financial Analyst Journal, and the then Editor Rob Arnott decided to curate a special volume in celebration. The plan was to have some of the Journal's more frequent authors contribute new papers as chapters.

Rob's plan was to make this special volume very readable. In stark contrast to the typical papers that had been published in the Journal in recent years, there were to be no equations, no diagrams, no figures, no tables and no appendices—just good old fashioned WORDS.

Rob was very emphatic in his marching orders: NO equations, NO diagrams, NO tables, and NO technical appendices.

Now I didn't know how this regimen affected most of the other authors who might have been more literary or more facile with English language, but all my writings over the past many years had been technically based, using lots of equations, diagrams, tables, etc.

However, I sympathized with Rob's goal and I took his instructions to heart, but I found it to be an enormous struggle to express my thoughts without calling upon the proscribed "Equations, diagrams, etc."

I found myself writing, and rewriting, and then re-re-writing. It took much longer than I had expected and ended up being an extremely painful experience.

I then confronted the biggest challenge of all—the TITLE. Titles are really important for many reasons.

For the authors, they act as a flag planted on the summit of all the effort that went into the composition of their just completed masterwork.

Most authors really struggle to find a title which they hope is content-appropriate, has a touch of humor (or irony), and is sufficiently poignant (and piquant) so as to capture the attention of the target reader.

And they hope that this carefully chosen and very precious title may be recalled long after the underlying material has been long forgotten by the readers (and may have even become just a distant memory to the authors themselves).

One might say that titles carry more weight than their short word count. So yes, titles are important.

My chapter was basically focused on various ways that active managers take on more idiosyncratic risk as they seek to capture positive alphas, while passive managers avoid incremental risk in favor of consistent participation in the broad market.

So once I finished this agonizingly—produced paper for Rob—without equations, etc., I turned to search for a title that would capture the essential distinction between active management versus passive management.

After an embarrassing amount of time pondering possible titles, I stumbled upon the image of a prehistoric hunter embracing great risks to bring down large animals that could provide high protein meals for the clan, versus the less risky but more consistently successful farmer, plowing and planting to supply the side dishes.

This image resonated, and led to the paper having the title, "Alpha Hunters and Beta Grazers."

When the FAJ 60th Anniversary volume came out in Sept 2005, I first checked my chapter for typos, and then raced to each of the reference sections to see who had been cited.

I then began to look more closely at the other chapters.

One by one, I was gratified to see that the authors had abided with Rob's instructions for "no equations, etc."—even the great Jack Treynor, the previous Editor who had pioneered the Journal's critical shift towards more analytically substantial content.

Then I came to Harry's chapter.

Being very attuned to titles, my first thought was that his title, "Market Efficiency: A Theoretical Distinction & so what?", was not really what you would call a grabber. But far more problematic was that his paper was replete with – equations, diagrams, and tables.

Having worked so very hard to be a good soldier, I was dismayed to see that Harry had skirted around Rob's very explicit instructions.

Then I started to read his paper.

It was basically a deep probing into the foundations of his earlier work. The very nature of this approach showed that he did not rest on his prior accomplishments, but rather continued to relentlessly question the key assumptions underlying his own theories.

Moreover as I read on, it became clear that there was no way that he could present his argument without using his elegant equations, his very illuminating diagrams, and his beautifully structured tables.

As I read on, I could not help but admire the intellectual honesty and courage that was evident in every one of Harry's paragraph. And I was then

reminded of all the great work that he had done over the years in so many different areas.

I began to envision Harry as a courageous Cro-Magnon hunter, who put aside the obvious career risk, and went forth to analytically challenge the lumbering beast of anecdotally-based beliefs that had dominated the investment landscape for many decades.

And not only did he win a Nobel Prize, but he won THE Nobel Prize that revitalized the field, opened the door of respectability for new forms of investment analysis, and enabled so many of us to dig ever deeper into this fascinating area of human endeavor.

So, given all that he has done for the field and for all of us who try to till the same soil, I came to feel that Harry had the right to All the equations he could derive, All the diagrams he could design, And all the tables he wanted to compile.

These musings took me back to the title I had chosen for my own chapter, "Alpha Hunters and Beta Grazers", and it suddenly seemed to me that the most appropriate title for this note had to be:

"Harry Markowitz: OUR Alpha Laureate!"

**Andrew W. Lo, Charles E. and Susan T. Harris  
Professor  
MIT Sloan School of Management**

This Special Achievement Award is just the latest in a series of many awards marking the extraordinary contributions of Harry Max Markowitz to financial science, engineering, and practice, and I'm deeply honored to be asked to say a few words about him on this occasion.

First, let me begin by apologize for having to deliver this message via written testimony instead of in person—it would have been a hugely popular event, a rare occasion to see one of the founding fathers of our discipline in person and experience

first-hand his wisdom and great humor. However, Nature had other plans, and I hope we'll have another occasion in the near future to celebrate with Prof. Markowitz in person.

Now it's pretty much impossible for me to say anything about Prof. Markowitz that hasn't already been said. So at the risk of being unoriginal, let me provide my personal take on his place in the pantheon of financial giants.

I wasn't speaking casually when I remarked upon Prof. Markowitz's contributions to financial science, engineering, and practice. Not only has he contributed to all three fields, but I believe that Prof. Markowitz played a major role in turning finance into a science, precisely because of the engineering and practical aspects of his work.

To understand what I'm getting at, we need to first define what we mean by "science". Many skeptics would argue that economics—nevermind finance—is no science, so how could a subset be such?

In my view, the definition of a science is a body of knowledge that contains useful facts related to each other, and a process of establishing new useful facts. The two operational words in that definition are USEFUL and PROCESS.

What do we mean by "useful"? This can be debated endlessly by various stakeholders but suffice it to say that "useful" involves the ability to solve problems that people care about. This is where engineering comes in—the utility of a body of knowledge isn't truly established until and unless a corresponding field of engineering emerges around it.

Physics became useful as fields such as mechanical engineering, electrical engineering, and civil engineering emerged to apply the principles on which their fields were based. Biology became useful as fields such as bioengineering and

biotechnology emerged to apply the principles on which biomedicine is based. And finance became useful as portfolio theory and mean–variance optimization emerged, eventually turning into financial engineering and transforming the asset management industry into a more systematic and scalable endeavor.

And with respect to "process", Prof. Markowitz has demonstrated throughout his entire career that the scientific method applies also to finance. His untiring efforts to apply the principles of portfolio construction to many practical contexts has inspired generations of students to do the same. And he continues to be productive in his research and professional activities, striving to push the frontiers of knowledge forward despite having received virtually every possible award that exists in his field.

Which is why Gifford have to create this new one!

If Milton Friedman were alive today, I wonder what he would say to Professor Markowitz about that thesis; the one that Friedman initially claimed wasn't really economics? I'd like to think he would be magnanimous enough to finally acknowledge that Professor Markowitz's thesis changed the course of an entire discipline, transforming finance from an administrative function into science, engineering, and a tremendously exciting field of practice. My colleagues and I in finance owe a tremendous debt of gratitude to you, Harry, for the gift you have given all of us. Thank you!

**Mark Kritzman, CEO  
Windham Capital Management**

I am honored to have been asked to offer a few comments about Harry Markowitz in connection with the JOIM Special Achievement Award.

I have often been asked by students and young professionals to describe my career track, presumably so they could replicate it. And my response has always been that you cannot replicate my career because it was determined in large part by when I was born. The date of my birth placed me at the beginning of my career when the finance industry began to embrace modern portfolio theory, and it afforded me the invaluable opportunity to meet and to get to know Harry Markowitz. And that explains as much as anything the trajectory of my career.

Everyone in our field knows of Harry as the father of modern finance, for which he was awarded the Nobel Prize. Merton Miller put it so aptly when he referred to the publication of “Portfolio Selection” as the Big Bang of Finance.

But many people in finance may not know that, in addition to the Nobel Prize, Harry also received the John von Neumann Award in operations research, not only for his work in portfolio theory but also for his work with sparse matrices, which is still used in large electrical grids, and for developing the programming language SIMSCRIPT, which was used by the U.S., NATO, and many other countries for operations planning.

And it may not be commonly known that Harry is also considered the grandfather of behavioral finance for his other paper in 1952 called “The Utility of Wealth,” which played an important role in the development of behavioral economics.

And there is yet another achievement by Harry that is not well known, for which I had minor involvement. Harry and Erik van Dijk developed a quadratic heuristic to overcome the curse of dimensionality associated with dynamic programming. After having published their paper describing this heuristic, Harry read a paper written by some of my students at MIT that applied dynamic programming to portfolio rebalancing.

He called me and pointed out that their solution wasn’t scalable to more than a few assets because it suffered from the curse of dimensionality. He went on to say that he had developed a heuristic that he believed would help. With Harry’s guidance Simon Myrgren, Sebastien Page, and I wrote a paper showing that Harry and Erik’s heuristic was scalable up to hundreds of assets. Harry asked us to submit our paper to an operations research journal, which we did. When I told Harry that the paper was rejected, he asked me what reason they gave. I told him they said that although his heuristic worked in this particular application, they did not think it could be generalized. I’ll never forget Harry’s response. He said that’s like asking Newton if his theory works as well with pears as it does with apples. In any event, we published our paper in the *Journal of Investment Management*, thus documenting Harry’s role in solving the curse of dimensionality. The final comment I would like to make is that setting aside all of Harry’s great accomplishments, he is a truly generous and nice person. He is the quintessential gentleman and scholar.

**Kenneth Blay, Head of Investment Solutions  
Thought Leadership  
Invesco**

It is an honor to have been asked to share a few thoughts about Harry Markowitz’s contributions to finance as part of JOIM’s first Special Achievement Award.

I’ve had the extraordinary privilege of working with Harry Markowitz for most of the past decade. Our work started as a function of seeking to address some of the common misconceptions that had developed about mean–variance optimization over the 60 years since its introduction, something Harry calls “The Great Confusion.” This work resulted in the production of a four-volume book titled *Risk-Return Analysis: The Theory and Practice of Rational Investing* where

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we initially revisited the underlying concepts of portfolio theory and where Harry details the fundamental assumptions and philosophy supporting it, as well as relevant advances in portfolio theory since 1952.

Among the many things I have learnt in working with Harry is that many recognize him merely as the father of Modern Portfolio Theory. While that isn't inaccurate, it significantly understates the extent of the impact he has had, and will likely continue to have, on modern finance. That said, it is difficult to imagine anyone better suited to the task of championing and advancing portfolio theory, as he has for almost 70 years. A brief overview of Harry's life will help illustrate what I mean.

At the age of 13, Harry began reading about biology, physics, astronomy, and original works on philosophy. He was particularly influenced by David Hume and Rene Descartes and concerned himself with understanding what we know and how we know it. A gross simplification of the ideas espoused by these philosophers is that we all make our way through our daily lives, not with some compilation of universal truths, but with a set of "working hypotheses" about how things work which are sometimes erroneous. We all face uncertainty, even in the things we believe we know. This philosophical perspective would serve Harry well over his lifetime.

Harry studied under and worked with some of the most distinguished names in mathematics, statistics, economics, and finance. This included (in no particular order) people like John von Neumann, Leonard J. Savage, George Dantzig, Jacob Marschak, Tjalling Koopmans, Milton Friedman, Kenneth Arrow, Richard Bellman, James Tobin, Paul Samuelson, and Robert Merton, to name a few. I believe that what has made Harry special is not only his willingness, given his philosophical views, but also his ability to innovate and

challenge many of the ideas presented to him by his mentors and colleagues.<sup>d</sup>

Harry made his official debut in sharing and challenging ideas in 1952. It was Harry's "annus mirabilis" as well as what some have called the "Big Bang" of modern finance. Just as Einstein's four *Annalen der Physik* papers in 1905 laid the foundation for modern physics, Harry's three papers in 1952 established the foundation of modern finance. His now famous Portfolio Selection paper formally introduced the idea of risk as a central part of investment decision-making and forever changed how we practice investing. The ideas he introduced in his Utility of Wealth paper went on to form part of prospect theory and behavioral finance. And his Social Welfare Functions Based on Individual Rankings paper countered Kenneth Arrow's impossibility theorem and demonstrated that the impossible was, in fact, possible.

That was just the beginning. Harry continued to innovate on critical aspects of what modern finance is benefitting from today. Most notable has been his work on advancing the use of simulation in finance. In the early 1960s Harry developed the SIMSCRIPT programming language that facilitated the practical application of simulation. He would later be awarded the Jon von Neumann Prize for this work as well as for his work on portfolio theory and sparse matrix techniques. This has since led to the use of agent-based models for financial market simulation, which served to provide insights into the impact of portfolio insurance in the 1987 stock market crash (see Kim and Markowitz, 1989) and is now advancing the practice of portfolio risk management.

Harry has also been a proponent of simulation in addressing the real-life complexities of the many decisions required of investors in planning for their lifetime financial needs. He first proposed the idea of a "Game-of-Life" simulator which

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could provide decision rules that are more credible than those produced by analytic methods in his 1991 paper Individual versus Institutional Investing. He later went on to work with GuidedChoice not only to advance the theory behind this concept but also to implement the theory in practice as part of a computer-assisted portfolio selection service for retirees. Today, the idea of portfolio management robo-advice is a well-known concept.

Harry has continued to advance the use of simulation in the context of portfolio selection, and I have been fortunate enough to be a part of those efforts. Initially, we used simulation to address the complexities of considering the impact of taxation on portfolio selection. More recently, we used simulation to provide a flexible approach to the multi-period portfolio selection problem.

There is no doubt that Harry has been a key figure in developing the theory behind the practice of investing. However, with his respect for what we

can really know about the future and, more importantly, a lifetime of thinking deeply about how we should act in the face of uncertainty, Harry has also contributed significantly to advancing the practice of theory, well beyond what is narrowly described as Modern Portfolio Theory.

For almost 70 years, the practice of investing has often had to catch up to Harry's thinking. We saw this with portfolio theory. And we are now seeing this with use of advanced simulation methods for risk management. . .with the development of ever more sophisticated computer-assisted portfolio management advice systems. . . and with the development of simulation-based approaches to multi-period portfolio selection. If past is prologue, I expect that we will all continue to benefit from Harry's insights for a long time to come.

I believe there is no one more deserving of JOIM's first Special Achievement Award than Harry Markowitz.