The "Harry Markowitz Effect": 50 Years Later and Still Counting

The Q-Group

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In Honor of Nobel Laureate Harry M. Markowitz

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Bruce I. Jacobs's Remarks in Honor of Nobel Laureate Harry M. Markowitz

I've heard Harry say: "I often get blamed for things I didn't do or say. By the same token, I often get credit for things I didn't do or say." But when it comes to financial economics over the past half century, it's hard to find a thing Harry *didn't* do, or at least have a hand in, from portfolio theory in 1952 to financial simulation in 2009.

I first met Harry in person in 1995 (at Q-Group, in fact). Five years before that, however, I had sent him my manuscript about portfolio insurance and the 1987 market crash, and asked for comments. Harry's reply, although brief, was very encouraging, and so I sent him a copy of the finished manuscript.

I called to follow up and toward the end of our conversation, Harry, you may recall, you said: "Bruce, is there something you wanted to ask me?" I replied: "Yes, Harry, in fact there is. Would you provide a foreword for the book?" Your response was: "I would be delighted to. Of course, it will depend upon whether I find something interesting to say." Of course, you did.

In Harry's subtle and piercing way, his foreword lucidly distinguishes between portfolio insurance and portfolio theory, and highlights their differing effects on financial market stability. Portfolio insurance strategies are market destabilizing, while portfolio theory implies rebalancing strategies, which are market stabilizing and, in Harry's words, "environmentally friendly."

My book, *Capital Ideas and Market Realities*, was published in 1999. One year later, Ken Levy and I were working on the publication of a collection of Jacobs Levy articles on quantitative finance, and I again asked Harry for his comments. He was particularly taken by our work on the integrated optimization of long-short portfolios and mentioned that he had some ideas he would like to contribute in a foreword.

Harry's foreword for the book, *Equity Management: Quantitative Analysis for Stock Selection,* echoes certain themes found in his foreword to *Capital Ideas and Market Realities*—in particular, how the translation of investment ideas into products and strategies must involve trade-offs between theory and practice. It discusses why mean-variance investors add constraints on security position sizes and sectors when optimizing portfolios, despite the theoretical costs of these constraints. As Harry indicated, "constraints are added because the investor seeks protection against contingencies whose probability of 'disutility' is underrated by mean-variance approximation."

Harry also mentions in this foreword that he used our earlier work on disentangling equity return regularities when working on return estimation for Japanese securities at Daiwa, just as we used his mean-variance theory in our portfolio optimization work. This shows how in our quant industry we can build on each other's research without even knowing each other personally, thanks to the journal literature; we get to know each other through our written works.

At about this same time, my colleagues at Jacobs Levy and I published in the *Financial Analysts Journal* an article "On the Optimality of Long-Short Strategies." This article examined the optimality of market-neutral long-short portfolios and, in deriving formulas for equitizing such portfolios, provided the theoretical underpinnings for 130-30 type strategies. We shared the article with Harry, and this turned out to be the start of a collaborative research relationship that is still going strong.

We addressed with Harry the optimization of long-short portfolios subject to realistic constraints on shorting, and developed the concept of trimability. We found that fast optimization algorithms, which were originally designed for long-only portfolios, can be used, without modification, to optimize long-short—provided the portfolios are trimable. Later, Ken and I applied the concept of trimability to demonstrate the equivalence of equitized market-neutral long-short portfolios and 130-30 type long-short portfolios.

Harry, Ken, and I published two works on portfolio optimization, one in *Operations Research* in 2005 called "Portfolio Optimization with Factors, Scenarios, and Realistic Short Positions," and another in the *Financial Analysts Journal* in 2006 called "Trimability and Fast Optimization of Long-Short Portfolios." In the course of our deliberations over some idea or model, when Harry said "Hmmm . . . that's interesting," we knew that something fascinating was about to happen. Harry's expertise in optimization theory proved invaluable.

Once, on a visit to our offices, Harry began to discuss the computational efficiency of a diagonalized version of the Critical Line Algorithm versus a comparable version of the Elton, Gruber, and Padberg algorithm. Since both algorithms map out the efficient frontier, they had to be equivalent in some way, but the connection was not obvious. Harry thought that the CLA (his creation) would be more efficient than EGP, and we set about looking at the problem. After a few hours of scribbling on the whiteboard, we had a proof in hand. There is a one-to-one correspondence between the steps of the CLA and the steps of the EGP.

Not content just to prove the equivalence, Harry proceeded with the meticulous task of counting the number of computer operations required by each algorithm. He was disappointed to find that EGP was marginally more computationally efficient than *his* CLA. Nevertheless, believing that the world should be informed of this truth, he published the result.

In recent years, we have collaborated with Harry on another project of mutual interest—financial market simulation. In modeling the evolution of financial markets and asset prices, most researchers have relied on continuous-time models. These are useful because many can be solved analytically. The familiar option pricing model, for instance, is a continuous-time model that can be solved by assuming underlying asset prices vary randomly and continually over time. What these models *can't* do is model markets in which changes in regulations or in the composition of market participants change the price process. Nor can continuous-time models tell us whether the behavior of financial agents and market mechanisms adds up to the observed market behavior.

Harry, like many of us here, is a computer nerd. He tells us that when he sees his doctor, and the doctor asks him how he is doing, he replies: “Not so good. I’ve got a bug again.” In fact, Harry is a leading figure in the simulation world. He created SIMSCRIPT, which introduced the concept of programming with Entities, Attributes, Sets, and Events (EAS-E). Such programming plays a vital role in the Jacobs Levy Markowitz Simulator, JLMSim.

JLMSim allows users to model financial markets using their own inputs about the numbers and types of investors, traders, and securities. It is an asynchronous-time simulator. That is, unlike a continuous-time model, it assumes that changes reflect events, which can unfold in an irregular fashion. Prices are the result of simulated market participants trading with one another in order to maximize their own individual utility functions as conditions change. Price changes may be discontinuous, gapping up or down in reaction to events.

JLMSim was presented in our article, “Financial Market Simulation,” published in the *Journal of Portfolio Management* in 2004. A second paper, “Simulating Security Markets in Dynamic and Equilibrium Modes,” is currently under review. It uses JLMSim to see how changes in the proportions of various types of investors affect security prices. It also describes how JLMSim can be used to find equilibrium expected security returns. Like Harry, Ken and I believe that an asynchronous-time model like JLMSim, which is capable of modeling the financial agents and market mechanisms behind observed prices, is better able than a continuous-time model to get to the reality of financial markets.

Harry’s body of work is extraordinary, not only for its caliber but for its range. Of course, he does have a secret weapon—his wife Barbara. Harry’s love for Barbara is apparent to anyone who has seen them together. Not too long ago, Harry and Barbara were in Princeton, where Harry was giving a talk on JLMSim. After having lunch with a group of professors, as he was riding along Princeton's busy main road, Harry spotted his wife on the sidewalk. He quickly lowered his window, stuck out his head, and in a very un-Nobel-Laureate-like fashion, bellowed at the top of his voice, "Hey beautiful, wanna ride?"

I hear Barbara would like to know when Harry is going to retire, but he always says: “Well, when I do retire, I’d want to do something I really enjoy. And that’s what I’m doing now, every day—playing in my sandbox.”

In collaborating with Harry over the years, I’ve often heard him say, after discovering something new or interesting, “Let’s write it up and give it to the world.” More than 50 years after “Portfolio Selection,” Harry is still making substantial contributions to the financial body of knowledge.

Harry often closes his e-mails with “cheers.” And now it gives me great pleasure to say: Cheers to you Harry for all that you have given to the world!