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Recollections of William Sharpe
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I may have known Harry Markowitz for a longer period of time than anyone in this room.

Here is how I first met him.

In 1957, after completing my M.A. in Economics at UCLA and my military service I took a position at the RAND Corporation in Santa Monica, California. RAND was very supportive of advanced degree study so I pursued my PhD in economics at UCLA while working there.

My initial choice of a topic for my PhD dissertation was transfer pricing for allocating resources within a firm. When I had the initial work completed, my advisor Armen Alchian told me that Jack Hirshliefer, whose work I was extending, was coming to RAND and UCLA and should take over the project. I introduced myself to Jack who asked for a week to read what I had written. Afterwards, he said politely that he thought there just wasn't a dissertation there. I then went to Fred Weston, a finance professor for whom I had worked as a research assistant, and asked him for ideas. He recalled that I had been very keen on work by Harry Markowitz and even presented a summary of it when I took Fred's seminar. Moreover, Harry was about to return to RAND so I should introduce myself to him. In addition, Armen Alchian, my economics mentor at UCLA had suggested to Harry that he get in touch with me. So we met. I was somewhat in awe and found Harry not only brilliant, but very friendly and supportive. We chatted a few times and I soon decided to turn my PhD research to portfolio theory.

There were three sections in my dissertation. In the first I developed and tested a program to solve the special case in Harry's book in which all correlations among security returns were due to sensitivities to a common factor – that is, a single index model. In the second, I worked with a financial advisor friend of Fred Weston to get inputs for the model and see what the set of efficient portfolios might be. Sadly, they all turned out to be woefully concentrated in a few securities. In the third section I used the single index model, assumed that everyone followed Harry's approach to create portfolios, and then found the properties of the resulting market equilibrium. The results were appealing. All efficient portfolios were invested in the market portfolio plus borrowing and/or lending. Equilibrium expected returns were related to sensitivities to market returns and the riskless interest rate, etc. etc.. In 1961, I received my PhD and began my academic career at the University of Washington.

Throughout the time I was working on the thesis, Harry read some of my drafts, looked at my programs and provided feedback. For all practical purposes, he was my thesis advisor.

Here is what Harry wrote in 2002 about this time (in an article titled: Efficient Portfolios, Sparse Matrices, and Entities: A Retrospective", published in "Operations Research).

"My last substantial contribution to the early development of portfolio theory was to advise a young colleague at the RAND corporation who was considering writing his dissertation (for UCLA) on portfolio theory. This led to his first publication: Sharpe 1963".

The article he referenced, based on the first part of my dissertation, was:
"A Simplified Model for Portfolio Analysis". It analyzed the properties of markets in which security returns were generated by a single index model which I called the "Diagonal Model" (based on the properties of the covariance matrix). Given this assumption, I showed how it might be used normatively and provided an algorithm for finding efficient portfolios when its conditions held.

I submitted that paper in the fall of 1961, after I started teaching, although it wasn't published until 1963. As for subsequent research, I was enamored with the results of an equilibrium model that I developed in the third section of my dissertation, titled "A Positive Theory of Security Market Behavior". In that analysis, I also assumed that security correlations were generated only by dependence on a single index. In the dissertation I called the variable which measured the magnitude of such dependence simply "B". As many here know, it was later termed "beta".

In any event, given this assumption I showed that, in equilibrium, securities and portfolios would plot along a straight line in a diagram with expected return on one axis and the measure of sensitivity to the market (B or beta) on the other axis.

I felt that I had pulled a great rabbit out of a hat but that I had more or less put it in by assuming the single index model rather than using a full covariance matrix. I agonized over this until I managed to get the same results without the simplifying assumption. I wrote a paper on it in early 1962 but an initial negative review and changes in editors at the Journal of Finance delayed publication to 1964. The paper was titled "Capital Asset Prices - A Theory of Market Equilibrium Under Conditions of Risk" and the relationship was termed the Capital Asset Pricing Model (or CAPM).

Of course all of this work sprang from Harry's prior portfolio theory. Was he a key influence on my career? You bet.

Let me now turn to a few of the many things I could tell you about Harry.

First, his fascination with and contributions to programming languages. When he was at RAND in the 1950's and early 1960's he became fascinated with a broad range of decisions under uncertainty and concluded that what was needed was a programming language specifically designed for what were then called Monte Carlo simulations. No problem – he would create one. Working with Bernie Hausner, he developed and implemented SIMSCRIPT – the world's first simulation programming language, a version of which RAND placed in the public domain

When I was at the University of Washington business school in the 1960's I created a course on "Programming Language Appreciation" in which we studied a few key examples including Fortran, Cobol and Simscript. The students were fascinated with Harry's creation and the many things one might do with it.

In the early 1960's Harry and Herb Karr formed a company – California Analysis Center, Incorporated. It developed software for a new version of the Simscript language and contracted for studies utilizing it. In 1968 CACI went public. At the time Harry had about 47% of the stock. Herb and the Vice President of Finance had the rest, and they fired Harry. I remember Harry telling me that for a week thereafter he wandered the trails in Topanga canyon trying to plan his future thereafter.

Second, a visit I made some years later to the office in New York city where he ran a company that used complex proprietary methods to try to create superior investment returns. He and I talked in the outer office but Harry said I was one of a few people that he could not allow into the conference room because I would be able to figure out their secret approach by looking at the writing on the blackboards.

Third, our times at meetings of the Institute for Quantitative Research in Finance, known then and now as the "Q group", founded in 1966 by Dale Berman "with the intention of exploring the application of Modern Capital Market Theory (MPT) to the investment process".

We were both fellows of the Q group (as were Bob Merton and Myron Scholes) and could attend with no fees. As many here know, tradition held that attendees would be seated at tables forming the three sides of a rectangle, with the podium at the top. Generally, seating was first come, first seated. However, the seat in the back row at the right as one faced the podium was reserved for Harry and the one to his left was reserved for me. This enabled us to exchange remarks with each other as the session progressed and to sometimes raise our hands to ask questions of the speaker and/or provide comments on the presentation. On most points we were in agreement but there were notable exceptions. Often we would sometimes discuss a presentation after it concluded – shortly or at length.

A long-standing tradition for the Q meetings was a small dinner out organized by Marty Liebowitz. The usual attendees were Marty, Harry and Barbara Markowitz, and my wife Kathy and I. Upon occasion we were joined by Marty and Ellie Gruber and perhaps a guest speaker.

Fourth – as many of you know, in the last 25 years Harry helped form an investment advisory firm and I helped form a different one. That said, we chose to not discuss them with one another.

Let me conclude. The question sometimes arises: Was Harry an economist, mathematician or operations researcher? The story is that in Harry's dissertation defense, Milton Friedman said that his work certainly wasn't literature. I think Harry would say he was a mathematician. My answer would be that he was all three.

Harry Markowitz was a pioneer, a key contributor to the field of financial economics and a mentor for me and many others. He is gone but his many profound contributions live on.