

The 1990 Nobel Prize in Economic Science Revisited

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### Overview

The exhibits that follow are related to the significant standoff between investment theory and investor practice. This standoff is characterized by the great divide between the two competing camps seeking to describe reality in the marketplace. In this regard we have academics vs. practitioners; mathematicians vs. behaviorists; statistical correlations vs. experienced judgment. And finally, of course, Markowitz & Sharpe versus Keynes & Graham – a standoff between four of the most informed observers in the field.

Of course Harry Markowitz (the founder of modern portfolio theory) and William Sharpe (lead developer of the capital asset pricing model) both received the Nobel Prize in 1990. (Interestingly, the CAPM leaned heavily -- at some cost to common sense -- upon Markowitz's normative model by assuming that all investors behaved according to its recommendations.)

After a brief introduction quoting press accounts of the 1990 prize awards, we let the recipients speak in their own words with selected passages from and about their work. Here, then, is the order of appearance for the various sections: (1) Introduction; (2) Harry Markowitz; (3) William Sharpe; (4) Benjamin Graham; (5) John Maynard Keynes; (6) Science and mathematics in relation to investor behavior; (7) Causality, correlation, prediction and positivism in the physical sciences as distinct from the social sciences.

Sections (6) and (7) are especially relevant in light of Sharpe's declaration that the capital asset pricing model is an exercise in positive economics and therefore the assumptions (causal underpinnings) of the theory do not matter so long as it results in good predictions -- or better predictions than any other method. Because it is broadly conceded that the core assumptions underlying the CAPM are indeed extraordinary, this places a heavy burden on the quality of its predictions.

The section on Keynes would normally consist of his incomparable 1936 essay on the stock market. That essay, with some additional information about Keynes, is covered at length elsewhere on this website. In the section that follows, therefore, we focus on Keynes personal investment philosophy and his interpretation of the convention in 1925 that the dividend yield on stocks was greater than the interest yield on bonds – a relationship that was not reversed until 1958. We want to also make note of the fact that if anyone doubts that Keynes classic 1936 essay on the stock market isn't as true today as when he wrote it, he need only tune into Jim Cramer's nightly show, Mad Money, on CNBC. And as further proof one could read chapter 2 ("Too Much Speculation, Not Enough Investment") in John Bogle's admirable new book enough.

Benjamin Graham is the acknowledged father of security analysis and the concept of intrinsic value -- the view that the "true worth" of a stock is often distinct from its market price and that informed analysis can discern the difference. For more than 70 years his book, Security Analysis, has been the Bible for investment practitioners seeking to appraise/forecast a firm's book value, earnings power and dividends. As Harry Markowitz noted in Portfolio Selection published in 1959, "the classic work on security analysis is...Security Analysis."

Honoring work with a practical slant, the 1990 Noble Memorial Prize in Economic Science was awarded to three Americans who performed pioneering research in financial markets and corporate finance.

Harry Markowitz for his development in the 1950s of a theory on how households and companies allocate financial assets, the so-called theory of portfolio choice. The theory analyzes how wealth can be optimally invested in assets that differ in their expected return and risk, and also demonstrates how risk can be reduced.

William Sharpe for his work in applying Markowitz's portfolio theory as the basis for a theory of price formation for financial assets, the so-called capital asset pricing model, which forms the foundation of price theory for modern financial markets.

Norton Miller for his work, initially in collaboration with Franco Modigliani that illuminated factors that determine a company's financial choices. This theory explains the relation – or lack of one – between companies' capital asset structure and dividend policy on one hand and their market value on the other.

“Widows live safer lives because their portfolio are invested according to the diversification principles developed by Markowitz and elaborated on by Sharpe,” said Harvard economist Lawrence Summers.

Fischer Black, a partner at Goldman Sachs, says the work by Messrs. Sharpe and Markowitz “showed that risk could be measured and that controlling risk was as important as maximizing expected return in managing a portfolio.” (1)

Harry Markowitz's work came first, in the early 1950s, and probably had the greatest intellectual fallout. The prudence of not putting all of one's eggs into one basket has been understood intuitively for centuries.

But it was Dr. Markowitz who refined the economic logic of diversification and offered a practical way to choose an “optimal portfolio” of assets...

Thus, mixing G.M. and Ford stock might not change the risk-return prospects much because each of the American auto makers is subject to similar market shocks. But mixing G.M. shares with those of, say, Exxon would probably allow the investor to achieve the same return with less chance of losing a lot of money. The high oil prices that would hurt G.M.'s sales would be offset by Exxon's higher profits at the pump.

Dr. Markowitz showed how to measure the risk associated with different assets and how to mix assets in way that would achieve the maximum likely overall return with the least possible risk. Those techniques, greatly enhanced by subsequent research and the number crunching ability of computers, are now routinely used by sophisticated institutional investors.

William Sharpe build on Dr. Markowitz's foundation. And along with James Tobin of Yale (who won the Nobel Prize in 1981) he greatly enriched the concept and the practical value of the portfolio theory. Dr. Markowitz had offered investors a menu of portfolio, different blends of assets that generated the best possible tradeoff between the virtue of high expected return and the vice of high risk.

One direct consequence of Dr. Sharpe's work was the emergence of "beta," a measure of the portfolio risk that clever diversification could not vanquish. Beta, which is widely used by Wall Street (and ignored less sophisticated investors at the peril of their purses), compares the risk of holding one mix of stocks with stocks in general.

A mutual fund with a beta of, say, 1.3, is likely to go up (or down) by 13 percent if the stock market goes up (or down) by 10 percent. When assets are properly valued, Dr. Sharpe's work suggests, the expected return should be roughly proportional to beta. (2)

For investors, the research offered a way to tailor one's holdings to mirror one's willingness to take risks. For financial specialists and economists, the theories explained how the weighing prices and how factors like tax changes and bankruptcy affect those values.

In a telephone interview from Cambridge, Mass., Franco Modigliani, a professor at the Massachusetts Institute of technology, called the price "the final seal of approval" for recognizing "for the first time that financial is a major area of economics. "Dr. Modigliani won the economics prize in 1985.

He added, "These three pieces of research work in a span of about 10 years changed finance from a field of purely institutional interest, where there was no theory or basic models to explain what was going on, into a flourishing area of economics that has given us a completely different understating of what finance is all about."

Dr. Markowitz, developed the portfolio theory, which analyzes how wealth or savings can be optimally invested in assets that differ in terms of expected return and risk. While investment managers and academic economists had long recognized the need to weigh potential returns against risks, Dr. Markowitz provided a formula to do so.

Dr. Sharpe used Dr. Markowitz theory to develop a model for explaining how securities prices and potential returns. His theory – the Capital Asset pricing model – is now widely used by investment in relation to the overall market. (3)

Mr. Markowitz's portfolio theory taught investors that investing goes beyond trying to pick winners. He showed that a diversified portfolio that includes, say, both airline and oil stocks would reduce an investor's risk and maximize returns. Mr. Sharpe built on this idea to identify the beta measure, which shows the level of risk that even the most exhaustive diversification cannot avoid.

The timing of this award to pioneers of the efficient market theory couldn't have been better... Every securities house is aware of the generational split between mathematical financial types of all ages and those who investment bible generally remains the non-theoretical Graham and Dodd text. (4)

What a great day for financial economist! The announcement that the Nobel Miller, William Sharpe has been awarded to Merton Miller, William Sharpe and Harry Markowitz finally acknowledges that the field of financial economics is a genuine science, in the same league with physics and mathematics.

Historically, portfolio theory focused on picking "winners." All sorts of ad hoc ideas about security pricing, many found in the still-popular book "Security Analysis" by Benjamin Graham and David Dodd, supported the central investment goal of attempting to pick undervalued stocks to beat the market.

Mr. Markowitz defined the risk to owning securities as variance, a familiar statistical concept, and rigorously developed the principles governing how portfolio variance, or risk, is affected by adding and subtracting individual securities from a portfolio, which is simply a combination of securities.

William Sharpe, in his 1964 Journal of Finance article. "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk," assumed that all investors looked at security risk and return as did Mr. Markowitz. Under these assumptions, Mr. Sharpe developed a model of market equilibrium that showed how the risk of individual securities would be priced in a "Markowitz world."

The main insight here was that only the so-called systematic risk of individual securities (the famous beta risk) would be priced in such a market. The holding of unsystematic risk, which is variance in returns to individual securities that could be eliminated through diversification, would earn no additional return. So, in such a market diversification was imperative to sensible and successful investing. Refusing to diversify exposed one to additional risk with no market-based prospect for reward. (5)

- (1) THREE U.S ECONOMIST WIN NOBEL PRIZE ALAN MURRAY  
THE WALL STREET JOURNAL 10-17-90
- (2) IDEAS THAT CHANGED WALL STREET & FATHERED MUTAUL FUNDS PETER PASSELL  
THE NEW YORK TIMES 10-17-90
- (3) THREE U.S ECONOMISTS WIN NOBEL: PROFESSORS' THEORIES EXPLAINING MARKETS ARE  
WIDELY APPLIED STEVEN PROKESCH  
THE NEW YORK TIMES 10-17-90
- (4) EDITORIAL  
THE WALL STREET JOURNAL 10-17-90
- (5) EN-NOBELING FINANCIAL ECONOMICS  
GREGG A. JARRELL  
THE WALL STREET JOURNAL 10-17-90

## HARRY MARKOWITZ REVISED

Uncertainty is a salient feature of security invest- investment. Economic forces are not understood well enough for predictions to be beyond doubt or error...A second salient feature of security investment is the correlation among security returns...the returns on securities tend to move up and down together...

If security returns were not correlated, diversification could ELIMINATE risk. It would be like flipping a large number of coins: we cannot predict with confidence the outcome of a single flip; but if a great many coins are flipped we can be virtually sure that heads will appear on approximately one-half of them... It would be convenient to have some undeniable principle which told us what probabilities to attach to possible outcomes.

The theory of rational behavior is usually presented as a study of the principals upon which a rational man would act. This Rational Man is unlike you or me in that he makes no errors in arithmetic or logic in attempting to achieve his clearly defined objectives...Every action, however, is perfectly thought out; every risk is perfectly calculated...Another interpretation can be given to the theory of rational behavior. Rather than visualizing a Rational Man we can visualize a perfect computing machine with unlimited speed and capacity... The study of rational behavior can be viewed as an enquiry into the principals by which we would have this perfect computing machine proceed... When objective probabilities are known for all contingencies, the Rational Man, following the axioms, maximizes expected utility.

Problems concerning the proper information to serve as the basic inputs concerning securities are outside the scope of this monograph. There are no magic formulas to supplement the rules of judgment of the securities analyst. [Still] the portfolio analyst requires that the final judgments of the securities analyst be cast in a somewhat new form He cautions the securities analyst from jumping too directly from the properties of a security to its place in a large portfolio. Other than this, the problem of arriving at reasonable beliefs about individual securities lies, as always, in the realm of the security analyst.

Security analysts are the meteorologists of stocks and bonds. The classic book on security analysis is... SECURITY ANALYSIS.

We shall not discuss the procedures of the securities analyst in arriving at reasonable beliefs about securities. Works on securities analysis are available. The topic of this monograph is portfolio analysis. Portfolio analysis begins where security analysis leaves off. Harry M. Markowitz PORTFOLIO SELECTION (1952)

No effort is made to determine how investors form probability beliefs about returns on risky ventures; the emphasis of the paper is on the proper financial decisions to be made, given the statistics which summarize such beliefs. It is one of the main functions of security analysis to form opinions as to the expected values, volatility and reliability of estimates of HPR's [returns] in the forthcoming investment period. In short we are attempting to build portfolios efficiently given such beliefs and not the equally important but different problem of how to form probability beliefs about the statistics. Henry Latane TEST OF PORTFOLIO BUILDING RULES

After the fundamental security analyst completes his task, he need ONLY convert his estimates into several possible rates of return and attach probability estimates to each...the possibility of product obsolescence, the aggressiveness of competitors, the productivity of research and development, management depth and ability...are all duly reflected in the forecasted rates of return and their probabilities. John C. Francis PORTFOLIO ANALYSIS

When I published my article in 1952...I thought that the portfolio selection process would have two parts. The first would be security analysis and the second would be portfolio analysis. And I thought that the security analysis would supply estimates of [mean-variance] expected returns...and covariance, and then portfolio analysis would trace out the efficient frontier.

But it turned out security analyst were very reluctant to make [mean-variance] expected return estimates...They were willing to give estimates of earnings...And so the staticians and the portfolio theorists found that they had to make their own [mean-variance] expected return estimates using either accounting data or using the earnings estimates that the analysts were willing to provide. Harry M. Markowitz I/B/E/S Seminar 1992

## WILLIAM SHARPE REVISITED

One of the problems which has plagued those attempting to predict the behavior of capital markets is the absence of a body of POSITIVE micro-economic theory dealing with conditions of risk.....the pervasive influence of risk has forced those working in this area to adopt models of price behavior which are little more than assertions. A typical classroom discussion of prices.....is generally followed by the assertion that somehow a market risk-premium is also determined, with the prices of assets adjusting to account for differences for their risk. William F. Sharpe (1964) Capital Asset Prices. . .

The [CAPM] reduces the situation to the most extreme possible case. Every investor is assumed to have the same information and to analyze it in the same way. Everyone thus agrees about the future prospects for securities. Since risk and return relate present price to future prospects, every investor in such a never- never land would agree with every other regarding all the ingredients required for portfolio analysis.

To complete the scenario, transactions costs are ignored...and every investor is allowed to borrow or lend money at the Treasury bill rate. Moreover, taxes are assumed to have no noticeable effect on investment policy...

In such a world, any investor can devise an appropriate strategy alone; no security analyst, portfolio manager, or investment adviser is needed. This may seem paradoxical, but it is not. The activities of professional analysts help make the market efficient... The investor need pay only a small amount for a newspaper to obtain these results of millions of dollars of analysis. The marginal value of additional analysis may thus be rather small: in a completely efficient market, it would be zero. William F. Sharpe *Investments*

Three philosophically distinct phases stand out in the development of efficient market theory. The first was the essential contribution of Markowitz in 1952. He suggested that both risk and return be considered, provided a formal method for measuring both and showed how relationships among security returns could be taken into account in the analysis...A series of subsequent contributions increased the practicality of Markowitz's procedure...

The second major phase began in 1964 with papers by Sharpe, Lintner and Mossin. Investors were assumed to be equally well informed and to be following Markowitz's recommendations. Given such a world, what could be said about security prices? What types of risks would be rewarded and what types would not? The Capital Asset Pricing Model was intended to provide answers to such questions.

The third phase is in process today. Given a market almost or entirely consistent with the implications of the Capital Asset Pricing Model what sorts of policies should an investment organization adopt? ...Almost All informed discussion of investment policy can be considered part of this phase. William F. Sharpe (1975) IS FINANCIAL ANALYSIS USELESS

**The key idea behind the theory is that of market efficiency...definition is difficult, but the idea is that...the price of a security will rarely diverge significantly for long from its intrinsic value defined as the certain present value of the uncertain future prospects assessed by a clever, well informed analyst. Market efficiency only requires that currently available information be properly reflected in price...there is increasing agreement that capital markets in the United States are highly (if not completely) efficient.** William F. Sharpe (1975) IS FINANCIAL ANALYSIS USELESS

In order to derive conditions of equilibrium in the capital markets we invoke two assumptions... Needless to say, these are highly restrictive and undoubtly unrealistic assumptions. However, since the proper test of a theory is not the realism of its assumptions but the acceptability of its implications, and since these assumptions imply equilibrium conditions which form a major part of classical financial doctrine, it is far from clear that this formulation



should be rejected - especially in view of the dearth of alternative models leading to similar results. William F. Sharpe (1975) *Capital Asset Prices...*

If the price of a stock reflects everything that is now known about the future, then the only thing that will cause a major change in the price will be new information, and new information by definition involves surprise... This leads to the notion that in an efficient market, a market in which prices reflect future prospects as they are now known, you should expect price behavior that is essentially random.

This kind of an approach suggests that the INTRINSIC VALUE of a stock ought to follow a kind of random walk. But it still begs the question since it doesn't specify what value is. To really know what you mean by saying price will equal value and value will follow a random walk, you have to have some notion as to what value is. What is the relationship between present value and future prospects, taking risk into account? That was the task undertaken by the Capital Asset Pricing Model - a model of the relationship between risk and return in a market which is efficient, in which knowledge is widely available and incorporated efficiently into stock prices. William F. Sharpe (1979)

The analyst must abstract from the full complexity of the situation, focusing instead on the most important elements. A mathematician would describe this process as building a model of the world, the market, and the security or securities in question. This is a useful view and one that well describes a number of valuation methods developed and used by the investment community.

In each case, the assumptions are necessarily simplistic, in order to provide a sufficient degree of abstraction to allow some success in the analytical process. The "reasonableness" of the assumptions (or lack thereof) is, in the final analysis, of little direct relevance. Just as the test of a cake is in the eating, so the test of a model is its ability to help one understand (and perhaps predict) the process being modeled. William F. Sharpe *Investments* (1978)

In the fictional world of the capital asset pricing model it is a simple matter to determine the relationship between risk and return. William F. Sharpe *Investments* (1978)

Financial innovations in the field of derivatives have brought reality much closer to the assumptions of this [CAPM] model. Whatever the situation in the real world may have been 25 to 30 years ago when the CAPM was developed, it is considerably closer today. William F. Sharpe *Institutional Investor* November 1991

There are two reasons for not including advice on ways to "beat the market" in this book. First, to do so would make a successful system public and hence unsuccessful. Second, the author knows of no such system. William F. Sharpe *Investments* (1978)

FORTUNE: Why do you now have doubts about the efficient market theory?

SHARPE: I've seen too many studies now where some phenomenon takes place, such as earnings being reported that are higher than predicted or insider trading reports showing that a bunch of insiders bought stock last month. After the information becomes public there seems to be a little warp. It's not gigantic and it doesn't always happen, but, on average, the stock moves 2% or so after the information becomes public. It ought to be zero if people are really paying attention and processing information efficiently. I still believe the market is highly efficient, but I can no longer adhere to a hard line view that the market is hyper-efficient and never processes its information wrongly. William F. Sharpe

What does efficient market theory have to say about the market's recent gyrations, especially Monday's crash? "We're all totally perplexed," concedes William Sharpe... "it's pretty weird." *The Wall Street Journal* October 23, 1987

Diversification provides substantial risk reduction if the components of a portfolio are uncorrelated. In fact, if enough are included, the overall risk of the portfolio will be almost (but not quite) zero! William F. Sharpe (1982)

Portfolio theory cannot directly help those for whom probability distributions are fuzzy. William F. Sharpe (1970) *Portfolio Theory and Capital Markets*

Most of the readers of this Journal are familiar with Markowitz's prescriptions for portfolio analysis... Programs for performing these tasks have been available for many years...but they have not played a major role in the portfolio management process...portfolio analysis is not widely used for the selection of securities. William F. Sharpe *Financial Analysts Journal* (1985)

## John Maynard Keynes Revisited

Keynes as Portfolio Manager: Keynes explained his own success as an investor in very different terms than he used to describe how the majority of investors behave and why they behave as they do. Thus, during his 22 year career as portfolio manager of the King's College endowment fund (1924-46), Keynes achieved a 400% return while the United Kingdom Ordinary Share Index was flat. In a 1938 review of the fund, he outlined his investment philosophy as follows:

- Careful selection of a few types of investments having regard to their cheapness in relation to their probable actual and potential *intrinsic value* over a period of years ahead and in relation to alternative investments at the time.
- A steadfast holding of these in fairly large units through thick and thin, perhaps for several years until either they have fulfilled their promise or it is evident that they were purchased on a mistake.
- A balanced investment position, i.e., a variety of risks in spite of individual holdings being large, and if possible opposed risks.

On the topic of market timing, Keynes observed:

We have not proved able to take much advantage of a general systematic movement out of and into ordinary shares as a whole at different phases of the trade cycle...As a result of these experiences I am clear that wholesale shifts are for various reasons impracticable and generally undesirable.

Returning to the principle of diversification he noted:

I am convinced that the good results shown by King's are mainly due to the large proportion of its assets held in less than 50 favorite securities. To carry one's eggs in a great number of baskets, without having time to discover how many have holes in the bottom, is the surest way of increasing risk and loss.

Keynes on Stocks versus Bonds: There is an element of compound interest operating in favor of sound industrial investment. Over a period of years, the real value of the property of a sound industrial is increasing at compound interest, quite apart from the dividend paid to shareholders. Thus...an index of shares yields more in the long run than its apparent rate of interest. So far, therefore, from the apparent rate of interest on shares [before 1958] as compared with that on bonds, being required to compensate the greater risk of loss, the reverse is true. Shares work out better than bonds by more than the difference between the apparent rates of interest upon each. Will not the investment department of one of each. Will not the investment department of one of our great insurance companies put the work in hand? It is a task well adapted to the training and mentality of actuaries, and not less important I fancy, to the future of the insurance industry than the further improvement of Life Tables. [added] John Keynes – *An American Study of Shares versus Bonds as Permanent Investment* – May 1925

In his classic 1936 essay on the stock market Keynes made the following observation: Nor is it necessary that anyone should keep his simple faith in the conventional basis of valuation having any genuine long-term validity. For it is, so to speak, a game of Snap, of Old Maid, of Musical Chairs--a pastime in which he is victor who says Snap neither too soon nor too late, who passes the Old Maid to his neighbor before the game is over, who secures a chair for himself when the music stops. These games can be played with zest and enjoyment, though all the players know that it is the Old Maid which is circulating, or that when the music stops some of the players will find themselves unseated. More recently, on December 15, 2006, an article in *The Wall Street Journal, Fast Lane: Firms Seek Edge Through speed As Computer Trading Expands* observed:

.....In Dave Cummings's obscure corner of the stock-trading universe, speed is critical and fractions of seconds loom large. Tradebot's computers are programmed to detect, among other things, tiny, fleeting

differences between bid and offer prices of stocks, then to pounce, buying stocks at one price and almost immediately reselling them for a fraction more.....It now takes Tradebot's about 1/1000 of a second to trade a stock, compared with 20/1000 before the move—a difference of about the time it takes a computer signal to zip at nearly the speed of light from Kansas City to New York and back.....

In Mr. Cummings's world, the fundamentals of a stock are of little consequence.....Tradebot takes no long-term views on where stock prices are heading.....His firm sometimes trades more than 1,000 times a minute. It ended most days owning no stock, cashing out all its positions....By 2001, other firms were employing computer strategies similar to his, and some of them had an advantage: Their computers sat in Island's headquarters building in lower Manhattan. As a result, Tradebot's computers were a fraction of a second behind its rivals in trying to grab the best prices. **"We were excluded because of the speed of light," Mr. Cummings says. "We had to move our computers"**....On Oct. 9, 2002, Tradebot for the first time traded 100 million shares in a single day, most of them stocks listed on Nasdaq. At that time, the NYSE was still a private cooperative controlled by floor brokers and specialists who traded stocks the old fashioned way....Over the past three years, about 40 other firms have moved their computers closer to the action, with bigger brokerage firms following smaller trading firms. Merrill Lynch & Co., Goldman Sachs Group, Deutsche Bank AG and J.P. Morgan Chase all have computers sitting near marketplace mainframes, or at least in the same neighborhoods. [Emphasis added]

## BENJAMIN GRAHAM REVISITED

Common stocks have one important investment characteristic and one important speculative characteristic. Their investment value and average market price tend to increase irregularly but persistently over the decades, as book value builds up through the reinvestment of undistributed earnings. However, most of the time common stocks are subject to irrational and excessive price fluctuations in both directions, as a consequence of the ingrained tendency of most people to speculate.

My reputation - such as it is...seems to be associated chiefly with the concept of "Value". But I have been truly interested solely in such aspects of value as present themselves in a clear and convincing manner, derived from basic elements of earnings power and balance sheet positions, with no emphasis placed at all on such matters as small variations in the growth rate from quarter to quarter...most significant here, I have resolutely turned my back on efforts to predict the future.

To that extent I share the skepticism expressed by the "efficient market" theoreticians as to the ability of all but very superior security analysts to do a good job of individual stock selection. But this is far from saying that I think that individual stocks reflect in general and under most conditions the "fair value" of each issue. On the contrary, my present emphasis on the tendency of most stocks to fluctuate widely and often wildly in price over the years should show my conviction that stock prices are often out of line with their fair or intrinsic values...

I deem this to be the consequence of the psychological or rather the pathological nature of stock speculation... The zebra will grow but not change his stripes... If a high price can turn an investment issue into a speculation can a low price turn a speculative issue (the shares of a secondary company) into an investment?

Of the various basic approaches to common stock valuation, the most widely accepted is that which estimates the average earnings and dividends for a period of years and capitalizes those elements at an appropriate rate. This element is reasonably definite in form, but its application permits of the widest range of techniques and assumptions, including plain guesswork. The analyst has at first a broad choice as to the future period he will consider; then the earnings and dividends for the period must be estimated, and finally a capitalization rate selected in accordance with his judgment or his prejudices...

We may observe here that there is no a-priori rule governing the number of years to which the valuer should look forward into the future. It is almost inevitable that in bull markets investors and analysts will tend to see far and hopefully ahead, whereas at other times they will not be so disposed to "heed the rumble of a distant drum". Hence arises a high degree of instability in the market valuation of growth stocks...

When it comes to estimating future earnings few analysts are willing to venture forth, Columbus-like, on uncharted seas... The student of security analysis...tends to have a special preoccupation with the past record as distinct from an independent judgment of the company's future. He can be taught and learn to analyze the former, but he lacks a suitable equipment to attempt the latter.

What he seeks typically, is some persuasive method by which a company's earnings record... can be transmuted first or a primitive facsimile thereof] into a projection of future earnings and dividends, and secondly into a valuation based on such projection...

A closer look at this process will reveal immediately that earnings and dividends... [atone do not}...produce the final value... [Thus] It is the multiplier of earnings that my students would dearly love to learn about and to calculate. When I tell them that there is no dependable method of finding this multiplier they tend to be incredulous or to ask, "What good is security analysis then?"...They feel as if the right weight is given to all the relevant factors...at least a reasonably good present valuation can be produced as a guide to determine the attractiveness or the reverse of the issue at its current market price.

Our own "formula valuations" for individual stocks ... have little if any utility in themselves... it would be silly to assert that stock "A" is worth only half its market price, or stock "B" twice its market price because these figures result from our valuation formula...On the other hand they may be suggestive and useful as COMPOSITE reflections...The older and more experienced I get, the less confidence I have in judgmental choice as distinct from the figures themselves.

In selecting the common stock portfolio, do you advise careful study of and selectivity among individual issues?

In general, no. I am no longer an advocate of elaborate techniques of security analysis in order to find superior value opportunities. This was a rewarding activity, say, 40 years ago, when our textbook "Graham & Dodd" was first published; but the situation has changed a good deal since then. In the old days any well trained security analyst could do a good professional job of selecting undervalued issues through detailed studies; but in the light of the enormous amount of research now being carried on. I doubt whether in most cases such extensive efforts will generate sufficiently superior selections to justify their cost.

What general approach to portfolio formation do you advocate?

Essentially, a highly simplified one that applies a single criterion, perhaps two criteria, -to the price to assure that full value is present and that relies for its results on the performance of the portfolio as a whole - on the group results rather than on the expectations for individual issues.

We are just finishing a performance study of these approaches over the past half-century. They consistently show results of 15% or better per annum, or twice the record of the DJIA for this long period. I have every confidence in the three fold merit of this general method based on (a) sound logic, (b) simplicity of application and (c) an excellent supporting record. At bottom, it is a technique by which true investors can exploit the recurrent excessive optimism and excessive apprehension of the speculative public.

This paper will discuss the results of a rather extensive investigation of the behavior of common stock prices in the last 15 years. The study was inspired by my observation that during this period the most impressive characteristic of the stock market was the WIDE AMPLITUDE AND REPETITIVENESS OF PRICE FLUCTUATIONS in the typical NYSE issue. The question presented itself whether some simple method or methods could have been devised for taking profitable advantage of these up-and-down-movements of the majority of listed issues...I could easily name five such criteria which might be applied singly or in combination:

- AN ATTRACTIVE P/E RATIO
- AN ATTRACTIVE DIVIDEND YIELD
- A PRICE BELOW BOOK VALUE; OR, SAY, AT 2/3 THEREOF
- A PRICE WELL BELOW ITS PREVIOUS HIGH - AN ATTRACTIVE PRICE IN RELATION TO PAST EARNINGS GROWTH...

By our simple methods, the investor could have averaged 5 to 15% greater than in a typical NYSE random portfolio... Nevertheless, to most, our techniques themselves must seem) too simple to be convincing. They involve NO FORECASTS of the economy or the stock market...the sole reliance is placed on a single criterion of PRICE ATTRACTIVENESS, applied INDISCRIMINATELY on a GROUP basis...So far I have been talking about the virtues of the value approach as if I had never heard of such newer discoveries as "the random walk", "the efficient market", "efficient portfolios", the beta coefficient, and others such. I have heard of them and I want to talk first for a moment about beta. This is a more or less useful measure of past price fluctuations of common stocks. What bothers me is that authorities now equate beta with the concept of "risk". Price variability, yes; risk no. Real investment risk is measured not by the percent that a stock may decline in price in relation to the general market in a given period, but by the danger of a loss of quality and earnings power through economic changes or deterioration in management...The idea of measuring investment risks by price fluctuations is repugnant to me, for the very reason that it confuses what the stock market says with what actually happens to the owners stake in the business.

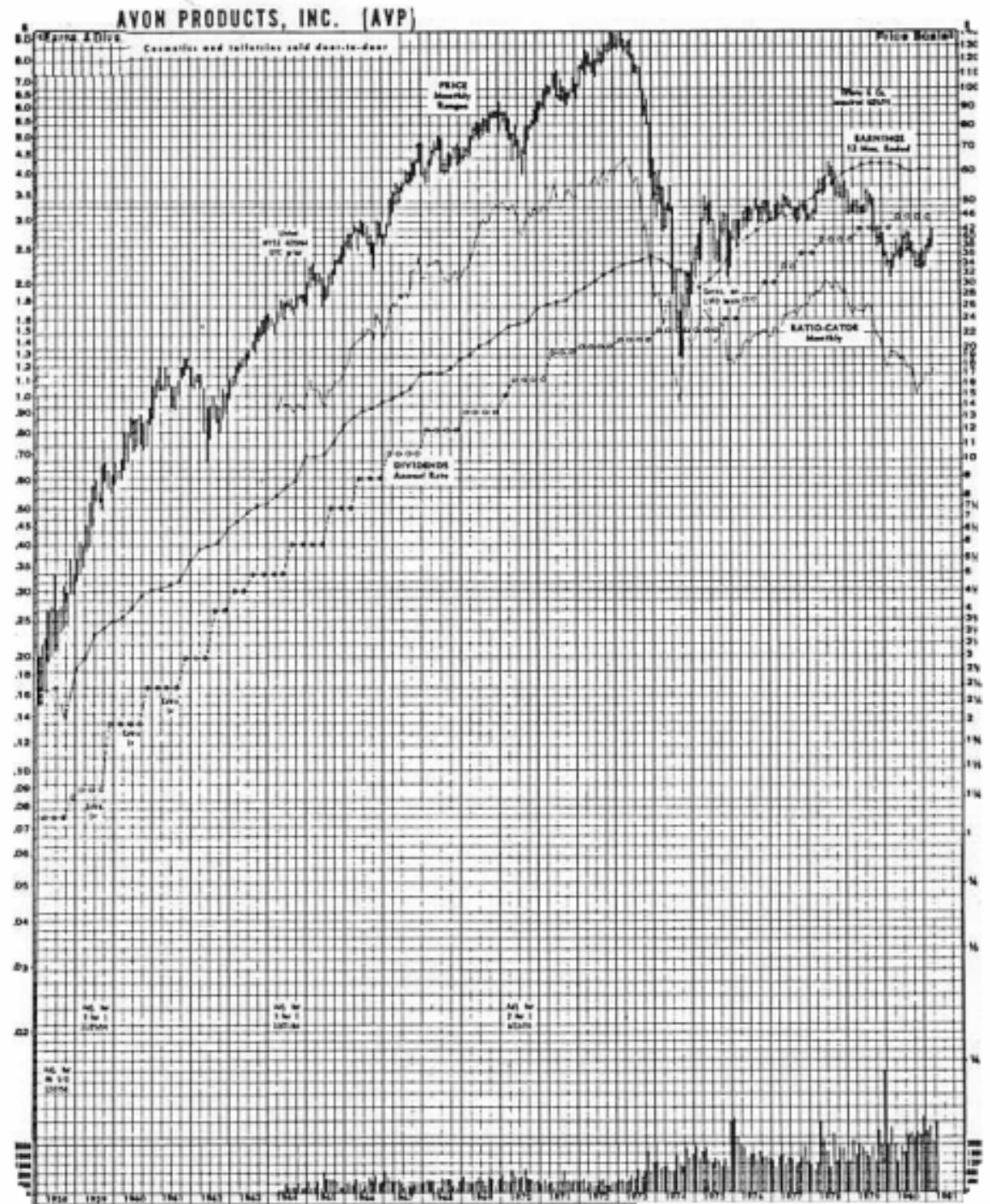
**There is a well-established principle which states that the investment value of a common stock equals the "present worth" of ALL its future dividends. To apply this principle in practice would require dividend projections for, say, between 40 and 50 years. We do not believe that estimates for so remote a future can be made with enough dependability to be really useful. The stock exchanges appear to me chiefly as a John Bunyon type of Vanity Fair, or a Falstaffian joke, that frequently degenerates into a madhouse - "a tale of sound and fury, signifying nothing."**

In its extreme form the hypothesis of the efficient market makes two declaration: 1) The price of nearly all times reflects whatever is knowable about the company's affairs; hence no consistent profits can be made by seeking out and using additional information, including that held by insiders.' 2) Because the market has the complete or at least adequate information about each issue, the prices it registers are therefore 'correct,' 'reasonable' or 'appropriate.' This would imply that it is fruitless, or at least insufficiently rewarding, for security analysis to look for discrepancies between price and value.

“I have no particular quarrel with declaration one, though assured there are times when a researcher may unearth significant information about a stock, not generally known and reflected in the price. But I deny emphatically that because the market has all the information it needs to establish a correct price, the prices it actually registers are in fact correct. Take as my example a fine company such as Avon Products. How can it make sense to say that its price of 140 was ‘correct’ in 1975? Could anything have happened – outside of stock-market psychology to reduce the value of the enterprise by 77 percent or nearly six billion dollars? The market may have had all the information it needed about Avon; what it has lacked is the right kind of judgment in evaluating its knowledge.

Descartes summed up the matter more than three centuries ago, when he wrote in his ‘Discours de la Methode’: ‘Ce n’est pas assez d’avoir l’esprit bon, mais le principal est de l’appliquer bien.’ In English: ‘It is not enough to have information’ – ‘the principal thing is to apply it well.’

I can assure the reader that among the 500-odd NYSE issues selling below seven times earnings today, there are plenty to be found for which the prices are not ‘correct’ ones, in any meaningful sense of the term. They are clearly worth more than their current selling prices, and any security analyst worth his salt should be able to make up an attractive portfolio out of this ‘universe.’”





## SCIENCE & MATHEMATICS IN RELATION TO INVESTOR BEHAVIOR

It is a great fault of symbolic pseudo-mathematical methods of formulating a system of economic analyst that they expressly assume strict between the factors involved; whereas, in ordinary discourse we can keep "at the back of our heads" the necessary reserves and qualifications.. .Too large a proportion of recent "mathematical" economics are merely concoctions, as imprecise as the initial assumptions they rest on, which allow the author to lose sight of the complexities and interdependencies of the real world in a maze of pretentious and unhelpful symbols. John M. Keynes

The problem of the managed economy is like the problem of the waves of the sea. We have identified the forces that cause them, we understand the conditions that must be met for a solution of the problem, and we can even reduce it to an equation - but its solution is hopelessly beyond our capabilities. Jacques Ruff

Theorists are more like members of a religious community. Here the most holy are the Mathematical Economists, a priestly order that has renounced the world and among whom communication is by algebraic symbol. Their only concession is to call their symbols by economic names, which led G.D.N. Worswick to comment (in his presidential address to the Economic Section of the British Association for the Advancement of Science) that it might be more correct to say that there are some new branches of mathematics that contain vestigial traces of economics.

Next are the General Theorists, writers of great textbooks, who minister to students and governments. They fill the void of ignorance with convenient assumptions and, by ingenious deductions, lead inexorably to what was, a priori, to be proved.

Below these are the Applied Economists, an itinerant order who are supposed to be in touch with reality. They are not, for they have long since established that businessmen, workers, bankers and housewives (the people, that is, who make economic decisions) do not know what they (the Applied Economists) are talking about and are unwitting to be taught. Guy Routh

By "uncertain" knowledge...I do not mean merely to distinguish what is known for certain from what is only probable. The game of roulette is not subject in this sense to uncertainty . . . about some matters, there is no scientific basis on which to form any calculable probabilities whatever. We simply do not know. John Maynard Keynes

In 1963. Sharpe put CAPM into final form and sent his paper off to the JOURNAL OF FINANCE. This paper - which has since been cited more than 2000 times by other writers - was quickly rejected by the editor of the JOURNAL, Dudley Lockett...Lockett told Sharpe that his assumption that all investors made the same predictions was so "preposterous" as to make his conclusions "uninteresting". Yet that assumption is the logical consequence of a market in which all investors are rational, risk-averse diversifiers. Treynor recently remarked: "Assuming, as Sharpe and I did that all investors had the same expectations was merely an analytical convenience like Newton assuming away air resistance in theorizing about falling bodies. One tackles the world's complexities one at a time." Peter Bernstein *Capital Ideas*

How can a scientist tell an unconventional idea from a crank idea? I say "scientist" because I do not think a nonscientist can make this judgment at all. In fact, I do not think most scientists can do it in a field that is very far removed from their own...A paper that purports to be a refutation of Einstein is very likely to be the work of a crank...On occasion, scientific theories offered by very reputable scientists can also be dismissed. An example is the distinguished biologist Francis Crick's odd notion that the origin of life on earth can be "explained" by postulating that it was imported here on space ships... What is this supposed to explain about the origin of life and how would one test the theory?...Unconventional experimental data that come from reputable scientists are another matter...As

Einstein might have put it, the "dear Lord" may well be unorthodox, but his predictions had better be verifiable.  
Jeremy Bernstein

To test capital market theory, expectations must be observed – an obviously impossible task . . . John C. Francis

The mathematical economist, when he really has been investigating the actions of a non-existent "economic man", has defended a failure to reproduce the facts of the market place by suggesting that his solution was that to which conditions tended and that deviations were merely the result of "disturbing factors." The statistician has struggled to formulate a rigidly logical foundation for the "behavior pattern" that his correlations seemed to suggest.

In virtually all discussions of "method" in economics it has been tacitly assumed that the value of studying what would occur if men acted rationally, depends on how closely an analysis of hypothetical rational behavior explains how, in fact, they do act. No one has seriously suggested that one of the chief reasons for studying the economics of a "rational" society might be because it would, in some respect, be so unlike the economics of real life. Yet we have in this chapter come to the conclusion that erratic social irrationality constitutes one of the chief reasons for the major economic disturbance of society. Frederick R. Macaulay (1938)

Mr. Krugman a professor from MIT and one of the world's economic superstars... extracts larger lessons about...the real limits of economic knowledge..."It's a primitive science, of course," he writes..."If you want a parallel, think of medicine at the turn of the century. Medical researchers had, by that time, accumulated a great deal of information about the human body and its workings, and were capable of giving some critically useful advice about how to avoid disease. They could not, however, cure very much." Sylvia Nasar

[One of the most important assumptions underlying Capital Market Theory] is that individuals evaluate the risk of a portfolio as a whole rather than each asset individually... [Thus,] if it is always the case that when one asset has a high return, the other has a low return, the return on a combination of these assets may be constant [or] risk free whereas each of the assets has a highly uncertain return. The discussion of such an obvious point may seem unwarranted, but there is precious little empirical work which indicates that people do in fact behave according to it. Marshal Blume (1970) *On the Assessment of Risk*

## CAUSATION, CORRELATION, PREDICTION & POSITIVISM

The basic postulate of science is that nature is predictable...If an explosion could happen without any prior existing conditions, it would signify a new creation - a distinct addition to the universe...William S. Jevons (1934)

The law of causation, which is the main pillar of inductive science, is but the familiar truth that invariability of succession is found by observation to obtain between every fact in nature and some other fact which has preceded it - independently of all considerations regarding the ultimate nature of "things in themselves."... The phenomenon of nature exist in two distinct relations to one another; that of simultaneity (correlation), and that of succession (sequence). Every phenomenon is related in a uniform manner to some phenomenon that co-exist with it, and to some that have preceded and will follow it.... The undoubted assurance we have that there is a law to be found if only we knew how to find it, will be seen presently to be the source from which the canons of inductive logic derive their validity...Laws of nature —can nothing but the uniformities which exist among natural phenomena. John S. Mill (1843)

Whenever a consistent correlation between events is said to be understood...the explanation offered always cites some link of causality. Either one event causes the other or both events have a common cause. Until such a link has been discovered the mind cannot rest satisfied. Moreover it cannot do so even if empirical rules for predicting future correlations are already known. A correlation between the tides and the motion of the moon was observed in antiquity; and the rules were formulated for predicting future tides on the basis of past experience. The tides could not be said to be understood, however, until Newton introduced his theory of universal gravitation. The need to explain observed correlations is so strong that a common cause is sometimes postulated even when there is no evidence for it beyond the correlation itself. Bernard d' Espagnat

The simplest bit of matter, or the most trivial incident, such as the stroke of two billiard balls, offer infinitely more to the human intellect than the human intellect can ever fathom. The word cause covers just as much untold meaning as the words substance, matter, thought, existence. William S. Jevons (1934)

**Ampere wrote..."In mechanics, experiments are not necessary or required since THE MATHEMATICS tell us what is possible and what is impossible."** John N. Wilford (1986)

As far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality... All knowledge of reality starts from experience and ends in it. Propositions arrived at by purely logical means are completely empty as regards reality. Albert Einstein

Through the preceding argument... I have been able to avoid the metaphysical difficulties which surround the true meaning of cause...Those antecedent circumstances which we are usually content to accept as causes, are only so in strictness under a favorable conjunction of innumerable other influences...It is clear that whether or not there are independent series in the order of causation, there is often a sense in which we may hold that there is a closer intimacy between some series than others. This intimacy is relative, I think, to particular information which is actually known to us...

It will be useful, therefore, to give precise definitions to the wider sense in which it is often convenient to use the expression cause. Two events are causally independent if no part of either is a possible cause of any part of the other... But, after all, we wish to know whether knowledge of one fact throws light of any kind upon the likelihood of another. The theory of causality is only important because it is thought, by means of its assumptions, light can be thrown by the experience of one phenomenon upon the expectation of another. John Maynard Keynes

**The relevant question to ask about the "assumptions" of a theory is not whether they are descriptively "realistic" for they never are, but whether they are sufficiently good approximations for the**

**purpose at hand. And this question can only be answered by seeing whether the theory works, which means whether it yields sufficiently accurate predictions. Milton Friedman (1941)**

There remains the Positivist doctrine concerning law, namely; that a law of nature is merely an observed persistence of pattern in the observed succession of natural things; Law is then merely description... There is an attractive simplicity about this doctrine. Without doubt this Positivist doctrine contains a fundamental truth about scientific methodology. For example consider the greatest of all scientific generalizations, Newton's Law of Gravitation - Two particles of matter attract each other with a force directly proportional to the product of their masses and inversely proportional to the square of their distance...the form of the Law...is strictly based upon observed fact... Without a shadow of a doubt, all science bases itself upon this procedure. It is the first rule of scientific method - enunciate observed correlations of observed fact...At one stage, the method of all discovery conforms to the positivist doctrine. There can be no doubt that, with this restriction of meaning, the Positivist doctrine is correct...Certain branches of science halt for centuries in this stage. There is, however, a motive of unrest which urges scientists beyond mere satisfaction with the simple description, beyond even the general description. It is the desire to obtain the explanatory description which may justify the speculative extension of Laws, beyond actual, particular instances of observation. Alfred North Whitehead

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