

# Significant Contributions to Finance Literature

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## Introduction

Interest in the evolution of financial research has motivated the study of institutional sources of financial research [13], research productivity of doctoral programs [14], and geographic distribution of papers presented at finance association meetings [18]. A more recent empirical study sought to uncover differences in quality among finance articles by using citation counts as an index of significance [10]. The proposition that “significant” literature can be identified by how frequently it is referenced has also been invoked for analysis of literature in economics [16], psychology [5], and physics [6].

An alternate way of identifying the literature thought to be significant is to survey professional opinion. A study of this sort has been done on graduate programs in business [3]. Myopia may prevent recognition of works recently published, and time may erode positive perceptions of early works. Nonetheless, what represents seminal financial research ultimately will be determined by a jury of informed opinion.

This study identifies through a survey of professional opinion those finance articles that have made significant contributions to the literature of finance. Accompanying the survey findings are an estimate of the number of years required for full recognition of significance, the criteria for significance, and several characteristics of the authors of distinguished articles.

## Survey Methodology

We collected opinions from finance professors by mailed questionnaires in successive phases. The questionnaire in the first phase asked respondents to list ten or fewer articles that they believed to have been significant contributions to the finance literature and to identify the criteria used in their selection. Forty finance professors provided answers to these open-ended questions. In turn, these answers were used to construct the second questionnaire, sent to a larger number of potential respondents. This questionnaire

asked each respondent to choose a maximum of ten articles from a list of 35 articles and to note which of eight criteria they used for selection. A total of 2,562 votes were cast for articles and 954 votes for criteria. There was also space provided for respondents to write in articles and criteria of their own.

A mailing of 1,100 questionnaires yielded more than 300 responses, of which 296 proved usable for a response rate of roughly 27%. Questionnaires were mailed to members of three finance associations — Eastern, Western, and Southern — in order to achieve geographical diversity. Academicians from more than 170 different colleges and universities located in over 40 states responded.

The advantage of this two-phase procedure is a questionnaire that places less demand on respondent time, which should lead to a better response rate. A questionnaire with specific listings does have the potential disadvantage, however, of omitting an article that might have elicited some positive responses. In this case, though, the article list was fairly long and was generated from opinions of 40 finance professors at more than 35 different colleges and universities. Additionally, respondents wrote in articles of their own choice, which yielded a maximum of four votes for any one unlisted article.

Two pieces of evidence suggest that the procedure for collecting opinions produced reliable results. First, there is remarkable similarity between the article rankings according to number of votes received from the original 40 respondents and the 296 respondents of phase two. The similarity is especially pronounced among the articles ranked in the top ten. (Numerous ties among the lower-ranked articles based on votes from the original 40 respondents preclude calculation of a meaningful Spearman rank correlation to measure the degree of similarity. See Green and Tull [11, chapter 4] for an elaborate discussion on the means of obtaining information from respondents.) Second, respondents could anonymously submit the questionnaires, or they could provide their names and addresses for a summary copy of the survey results. Given assurance of confidentiality, over 80% of all respondents requested study results (providing us with useful demographic data), which suggests a high level of interest in the study and indicates a serious effort in completing the questionnaire.

## Significant Finance Literature

Although most new theories and major empirical tests in finance tend to appear first in article form, the

many exceptions in monograph form make clear our delimited use of the term, “finance literature.” Interpreting “finance literature” to include outstanding monographs would doubtless capture the works by F. Knight [15], J. Williams [22], J. Dean [8], H. Markowitz [17], and E. Solomon [20] — to name a few. Our somewhat narrowed scope of inquiry, which excludes monographs, does allow certain comparisons with related studies. Restricting the focus to finance articles (for which citation data are compiled) also allows analysis of citations. The academic community judges the finance articles reported in this study as having made significant contributions to finance, and the articles are also referenced frequently. By comparison, analysis of citation counts [10] indicates that roughly one of five finance articles may never be referenced by authors of other published articles.

## Finance Articles

Exhibit 1 contains a ranking of the 35 articles judged as making significant contributions to finance. The 1958 article by Modigliani and Miller heads the list, followed closely by Markowitz’s 1952 article. Modigliani and Miller’s article received 253 (85%) of the possible 296 votes. The oldest entrant on the list is Bernoulli’s exposition on utility theory, actually published in 1738, although best known by the reprinted version appearing in 1954. Roll’s 1977 critique of modern financial theory is the most recently published paper selected.

A majority (26/35) of the articles have only one author, running counter to the modern trend toward multiple-authored articles [19]. The incidence of multiple-authored articles among the top half of Exhibit 1, however, does suggest some benefits accruing from collaborative efforts. Collaboration on most finance articles seems to enhance the paper’s impact on the field. Measuring impact by citation counts, Ederington [10, p. 784] reported data suggesting that multiple-authored articles may receive up to 1.2 times as many citations, *ceteris paribus*, as single-authored articles.

Article titles in Exhibit 1 reveal several different subjects forming the basis for significant finance articles. These subjects fit satisfactorily into the categories used by the *Journal of Finance* to classify articles in each May issue. For example, Modigliani and Miller’s article might be classified under “Business Finance;” Markowitz’s under “Investments;” and Sharpe’s under “Capital Theory.” Given their complexity and multifaceted nature, however,

Although most new theories and major empirical tests in finance tend to appear first in article form, the

many of the articles could be assigned to competing categories. Nevertheless, more articles would appear to be appropriately placed in the "Capital Theory" category than in any other. "Business Finance" and "Investments" appear to rank second and third, respectively, in representation. Articles dealing with international finance, monetary economics, and financial institutions are notable for their absence.

Capital theory appears to have been the most fertile area for seminal contributions to finance — perhaps because of the power of equilibrium analysis flowing from competitive markets and arbitrage. As noted by Cootner,

the success of our field has arisen from the fact that finance is largely a study of markets. Indeed, the areas within finance that have progressed more slowly are either those internal to the firm and most immune to market restraint, or those in which financial institutions' very *raison d'être* arises from the imperfection of markets [7, p. 554].

Many of the seminal articles published since the early 1960s draw strength from assuming static equilibrium in capital markets. Even the Modigliani-Miller capital-structure propositions published in 1958 depend on equilibrium at an assumed risk level. Black and Scholes had to call upon the power of equilibrium to develop their well-known option pricing model in 1973. Before this time, however, use of equilibrium analysis seemed to reach full bloom with the appearance of what is now commonly called the Sharpe-Lintner-Mossin capital asset pricing model. (Tobin's name is occasionally added because of his separation theorem.) Indeed, this theory of capital markets fostered the development of Financial Economics and provided parentage for many of the significant articles listed in Exhibit 1. Fama, Fisher, Jensen, and Roll used parts of the theory to investigate the informational impact of stock splits on capital markets. Their basic methodology provided the procedural paradigm for numerous subsequent studies, particularly in accounting. Black, Jensen, and Scholes sought to test the theory, developing an ingenious procedure frequently used by other researchers. Roll later criticized the validity of such tests, persuasively arguing that valid tests may continue to evade the discipline.

Not all significant financial research is built upon the structure of static equilibrium. Markowitz's contribution, which at the time was quite controversial, came as an imaginative application of mathematics. The implication of his mathematics, admittedly, was given expression by a theory of equilibrium that

tended to lead finance back into the arms of economic theory after decades of separation [9, p. 9]. Others among those identified in Exhibit 1 also studied financial problems relatively independently from cues of the capital market. Altman met with considerable success in predicting industrial bankruptcies using information previously locked in financial ratios. His application of linear discriminant analysis paved the way for its use in many following financial studies. In two of the more readable expositions among the significant works, Hertz introduced Monte Carlo methods of analyzing risk in capital budgeting, and Donaldson proposed procedures for dealing with the risk accompanying debt usage. Many of the significant works, and others, have built directly or indirectly on the behavioral insights of the three utility theory articles. Bernoulli applied the logarithmic utility function to rationalize a problem referred to as the St. Petersburg Paradox; Friedman and Savage explained simultaneous gambling-insuring behavior by using a triply-inflected utility function; and Pratt quantified absolute and relative risk aversion, which provided important insight into changes in risk-taking behavior with changes in stakes and wealth.

The articles noted in Exhibit 1 provide less guidance in foretelling future directions of significant financial research than might have been hoped. Naive extrapolation of the dominant role of capital theory seems unconvincing. Complete dismantling of modern capital theory and the consumption-investment paradigm of Hirshleifer and Merton is also unlikely, irrespective of increasing criticism [1]. The existence of large computers and data bases will probably continue to motivate large-scale studies of markets akin to those by Fisher and Lorie and by Fama. But the key question seems to be whether capital market theory will continue to occupy center stage. As a synthesizing and integrative force, capital market theory holds the allure of leading to a general theory of finance. If pursuit of completely general theory becomes recognized as an elusive fascination, however, financial research may become more "appropriately eclectic to the state of our innocence" [1, p. 11].

In turn, the great financial insights of the future would be focused closer to the firm in what might be called "micro-finance." Certainly the usefulness of managerial prescriptions flowing from "macro-finance," or the study of capital market equilibrium, has not gone unchallenged. One well-articulated position [1] suggests that the two main borrowings from economics — static equilibrium and intertemporal choice between consumption and investment — should

**Exhibit 1. Significant Finance Literature**

Rank	# of Votes*	% of Votes	Author**	Article, Journal, Year***
1	253	85%	F. Modigliani and M. H. Miller	"The Cost of Capital, Corporation Finance, and the Theory of Investment," AER, 1958
2	245	83	H. Markowitz	"Portfolio Selection," JOF, 1952
3	205	69	W. F. Sharpe	"Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," JOF, 1964
4	140	47	E. F. Fama	"Efficient Capital Markets: A Review of Theory and Empirical Work," JOF, 1970
5	133	45	M. H. Miller and F. Modigliani	"Dividend Policy, Growth, and the Valuation of Shares," JOB, 1961
6	125	42	F. Black and M. Scholes	"The Pricing of Options and Corporate Liabilities," JPE, 1973
7	109	37	J. Tobin	"Liquidity Preference as Behaviour Towards Risk," R. E. Studies, 1958
8	98	33	J. Hirshleifer	"On the Theory of Optimal Investment Decision," JPE, 1958
9	90	30	M. Friedman and L. J. Savage	"The Utility Analysis of Choices Involving Risk," JPE, 1948
10	85	29	E. F. Fama, L. Fisher, M. C. Jensen and R. Roll	"The Adjustment of Stock Prices to New Information," IER, 1969
11	80	27	W. F. Sharpe	"A Simplified Model for Portfolio Analysis," M. Sci., 1963
12	77	26	L. Fisher and J. H. Lorie	"Rates of Return on Investments in Common Stock: The Year-by-Year Record, 1926-65," JOB, 1968
13	69	23	F. Black, M. C. Jensen and M. Scholes	"The Capital Asset Pricing Model: Some Empirical Tests," Praeger, 1972
14 (tie)	66	22	E. I. Altman	"Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy," JOF, 1968
14 (tie)	66	22	J. Lintner	"The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets," R. E. Stat., 1965
16	56	19	J. Dean	"Measuring the Productivity of Capital," HBR, 1954
17	53	18	E. F. Fama	"The Behavior of Stock-Market Prices," JOB, 1965
18	52	18	R. Roll	"A Critique of the Asset Pricing Theory's Tests — Part I: On Past and Potential Testability of the Theory," JFE, 1977
19	46	16	D. B. Hertz	"Risk Analysis in Capital Investment," HBR, 1964
20	45	15	J. Lintner	"Security Prices, Risk, and Maximal Gains from Diversification," JOF, 1965

be returned. If static equilibrium has been pushed to or beyond its limits over the past two decades, perhaps "Business Finance" will overtake "Capital Theory" in future significant contributions. In any event, if controversy and disagreement are requisite for progress and vitality, the discipline of finance appears to be in good health.

### Citations Over Time

The relative youth of finance as a discipline is reflected in the publication dates of the articles in Exhibit 1. Almost two-thirds of the articles have been published since 1960; only two appeared before 1948. Besides this willingness of the profession to judge fairly recently published research as significant, em-

**Exhibit 1 (continued)**

Rank	# of Votes*	% of Votes	Author**	Article, Journal, Year***
21 (tie)	44	15	K. J. Arrow	"The Role of Securities in the Optimal Allocation of Risk-Bearing," R. E. Studies, 1964
21 (tie)	44	15	E. F. Brigham and M. J. Gordon	"Leverage, Dividend Policy, and the Cost of Capital," JOF, 1968
23	43	15	G. Donaldson	"New Framework for Corporate Debt Policy," HBR, 1962
24	41	14	L. Bachelier	"Theory of Speculation," MIT Press, 1964
25	40	14	J. E. Walter	"Dividend Policies and Common Stock Prices," JOF, 1956
26	35	12	J. H. Lorie and L. J. Savage	"Three Problems in Rationing Capital," JOB, 1955
27 (tie)	32	11	R. S. Hamada	"The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stocks," JOF, 1972
27 (tie)	32	11	J. W. Pratt	"Risk Aversion in the Small and in the Large," Econometrica, 1964
29	31	10	J. Mossin	"Equilibrium in a Capital Asset Market," Econometrica, 1966
30	28	9	D. Bernoulli	"Exposition of a New Theory on the Measurement of Risk," Econometrica, 1954
31	27	9	H. A. Latané	"Criteria for Choice Among Risky Ventures," JPE, 1959
32	25	8	D. Durand	"Growth Stocks and the Petersburg Paradox," JOF, 1957
33	21	7	R. C. Merton	"An Intertemporal Capital Asset Pricing Model," Econometrica, 1973
34	19	6	R. C. Merton	"Theory of Rational Option Pricing," Bell, 1973
35	7	2	R. C. Merton	"Optimum Consumption and Portfolio Rules in a Continuous-Time Model," JET, 1971

\*Modigliani and Miller's article received 253 (85%) of the possible 296 votes.

\*\*Write-in votes were cast for 28 other articles. Although none of the write-in articles ranked in the top 35, articles by Gordon and Shapiro, Evans and Archer, Hamada, and Ross received more than one write-in vote.

\*\*\*More complete journal names are as follows: *American Economic Review*, *Journal of Finance*, *Journal of Business*, *Journal of Political Economy*, *Review of Economic Studies*, *International Economic Review*, *Management Science*, *Review of Economics and Statistics*, *Harvard Business Review*, *Journal of Financial Economics*, *Econometrica*, *Bell Journal of Economics*, and *Journal of Economic Theory*. Bachelier's work was originally published by Gauthier-Villars (Paris) in 1900, but it is listed as an article because the better-known version appeared as a reading in *The Random Character of Stock Market Prices*, ed. Paul Cootner, MIT Press, 1964. The paper by Black, Jensen, and Scholes appeared as a reading in *Studies in the Theory of Capital Markets*, ed. Michael C. Jensen, Praeger Publishers, 1972.

empirical evidence from economics indicates a willingness also to discard rather rapidly less significant works. Lovell [16] judged article durability by apparent half life, which he estimated to be 5½ years; that is, half of all articles cited in a given year are published within the last 5½ years.

Articles judged as making great contributions would be expected to receive a larger number of citations than those not judged as making great con-

tributions. Seminal articles normally provide an impetus for many subsequent articles wherein the citations appear. Such great works provide ideas for empirical testing and suggest new extensions of theory. After the appearance of refinements and modifications induced by seminal articles, a broad-based recognition tends to develop and frequency of citations reaches a maximum. At some later point the direct impact of seminal articles would be expected to

decline, as would citations to them. According to this description, average annual citation counts in the years following publication would have to take on features similar to those of the life-cycle curve for a new product.

Exhibit 2 shows evidence consistent with the hypothesis that citation counts follow a pattern similar to the life-cycle curve. The annual number of citations for each of the 35 significant articles was taken from the *Social Science Citation Index (SSCI)*; averages of the annual citation counts are plotted for each year following publication.<sup>1</sup> Not all articles are represented each year, because 1969 is the first year of published citation counts. Thus, only articles published after 1968 can provide data for the publication year; only articles published after 1967 can provide data for one year since publication, and so on.

Shape of the curve in Exhibit 2 depends on patterns of citation counts over time for individual articles. The data suggest as reasonable, for instance, aggregating first-year citations in 1970 with first-year citations in 1973. One remaining issue, however, concerns the impact of growth in the pace of scholarly activity, which may bias the level of the curve. Lovell estimates the annual growth rate in economic articles at 5.1%; in economic journals at 3.8%; and in Ph.D. degrees in economics at 5.6% [16, p. 29]. These figures have obvious relevance to the 35 articles in Exhibit 1, as 15 of them were published in economics journals. Furthermore, if the stock of articles providing citations doubles every 14 years, older articles would tend to receive more citations in later years simply because more articles are being written. This implies an upward bias in the later two phases (Maximal Impact and Declining Impact) relative to the earlier phase (Developing Recognition). Publication lag times would tend to reduce citations in the publication year and the year following, but circulation of manuscripts before publication would tend to offset this downward bias.

During the first five to six years after publication, recognition of and reaction to a work develop, and

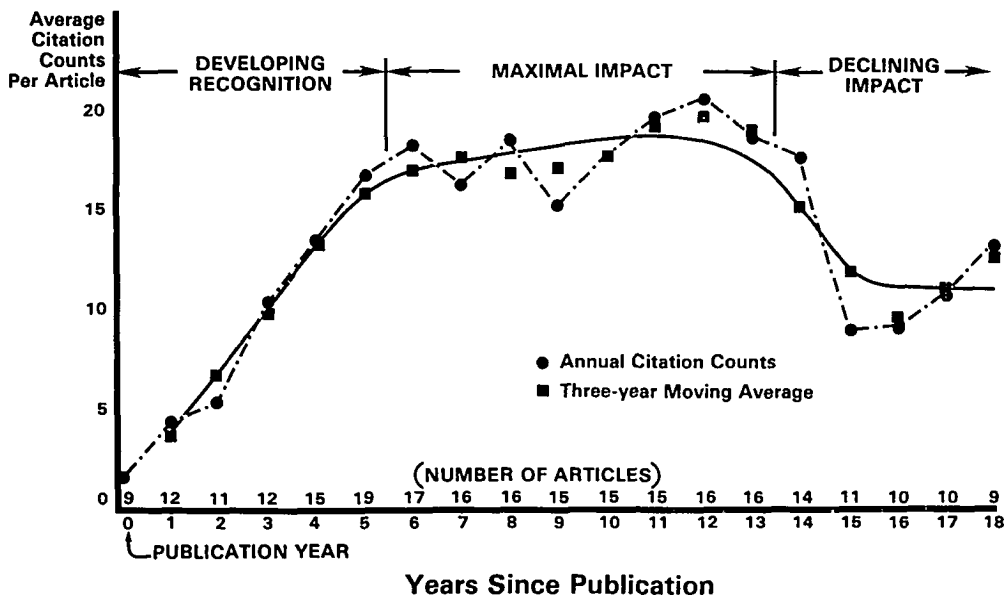
average annual citation counts increase rapidly. On average, the maximal impact of the work extends from around year 6 to between years 13 and 14. After seven or eight years of high relative importance, the work's direct impact seems to decline. Despite the eventual decrease in their citations, the significant articles do earn many more citations during all phases than do their more normal counterparts. The average of the annual averages shown in Exhibit 2 equals 14.2 citations. This figure looms rather large, compared to the .9 citations per year (estimated over six years) for the typical finance article [10, p. 779].

Evidence from citations seems to corroborate the significance attributed by academic judgment to the 35 articles. The reinforcing nature of citation counts and expert judgment is also demonstrated by their statistically significant intercorrelation. Similar to Clark's [5] findings in the field of psychology, Pearsonian correlations between finance citations and vote frequencies range from .65 to .68. The narrow range in correlation magnitudes suggests that these results are insensitive to the number of years used to accumulate citations. Aggregate citations for 1969–1978 lead to a correlation of .65; aggregate citations for 1977–1978 and 1974–1978 lead to correlations of .67 and .68, respectively. While there are well-known problems in using citation counts, this less-than-perfect correlation may also result from analyzing articles in different phases of their life cycles. To illustrate, Bernoulli's article may receive fewer citations, even though it is perceived as a significant article, because it tends to be referenced more frequently as a historical footnote than as an authoritative source.

The life-cycle interpretation of financial research supports the concept of finance as an evolving discipline. One of the better examples of cycles in financial thought begins with the heretical views on capital structure suggested in 1938 [22] and "proved" in 1958, which asserted that leverage decisions were inconsequential. In 1963, the addition of corporate taxes to the model re-established the importance of debt-equity decisions. Later, in the 1960s, bankruptcy costs were thought to offset the tax shields generated by debt securities. At about this same time, effects of personal taxes were also suggested as offsetting interest tax shields. In 1977, evidence surfaced showing bankruptcy costs to be too small to offset completely the debt advantage. Effects of personal taxes, it was argued, however, may well re-establish the 1938 and 1958 contention that capital structure does not matter. Having come full circle over decades of evolution in thought on capital structure, researchers are currently

<sup>1</sup>SSCI compiles citations from an extensive list of journals. In 1978, citations were taken from over 1,100 journals. Potential problems with judging quality of literature by citation counts has been well documented [6, 10, 16], but evidence suggests some validity in their use. For example, rank of economic journals by citations approximates fairly well the opinions of economists [4]. Also, rank of schools by citations to finance faculty research proves quite similar to school rankings based on quantity (articles and pages) of published research [10]. Correlation of citations with expert judgment of psychologists' contributions to their field is also quite high (.67) [5].

## Exhibit 2. Article Citation Incidence



building on the new theories, attempting to estimate magnitudes of effects of key variables such as personal taxes and agency costs. Simply put, in retrospect newer ideas replace older ones.

### Alternate Peer Ratings

The evolution of financial research reflects continual challenge to historically sacrosanct theories. Prodigious efforts, for example, have been mounted over the past decade to discover holes in the efficient market theory enunciated by Fama. Added to previous attacks on efficiency are the current frontal assaults on efficiency with respect to corporate earnings. Even Markowitz's beta, which later was explicated more fully by Sharpe, suffers occasional violence from non-believers who question its comprehensiveness. One of the more recently beleaguered seminal studies is that by Black, Jensen, and Scholes. Roll questions whether that or any other study has validly tested the capital asset pricing model created by Sharpe, Lintner, and Mossin.

With so many challenges from differing quarters, the selections in Exhibit 1 may well vary across different samples of opinion. The degree of variation can be analyzed by correlating the vote frequencies across different peer groups within the sample. Cita-

tion analysis of the 35 articles as a whole implies a pre-eminence, which is reassuring, because we assume that articles are cited by qualified researchers familiar with the subject matter whose own research has survived the vagaries of the refereeing system. Research pecking orders established by peer ratings must, of course, assume absence of the nonpareil. The question is, however: What is the appropriate peer group? For example, the views of finance professors who are heavily engaged in research may differ from the views of the general population represented by the sample.<sup>2</sup> Comparison of the former group's perceptions with those of other respondents would provide evidence on the degree of stability in the rankings shown in Exhibit 1. The Pearsonian correlation coefficient between the number of votes received by each article from each of

<sup>2</sup>Highly-regarded finance programs tend to contain productive academic researchers whose work is often cited [10]. Brooker and Shinoda [3] identified highly-regarded finance programs through an opinion survey of finance department chairmen. The finance department chairmen perceived the following 23 schools as having the best graduate programs in finance at either the doctoral or masters level: Stanford, Chicago, Pennsylvania, Massachusetts Institute of Technology, University of California at Los Angeles, Harvard, Carnegie-Mellon, New York University, Michigan, University of California at Berkeley, Purdue, Northwestern, Rochester, Indiana, University of Washington, University of North Carolina at Chapel Hill, Dartmouth, Columbia, Cornell, Georgia State, Michigan State, University of Texas at Austin, and Virginia.

the two groups equals .88. Although some differences exist, had proportionately more respondents been from “top” institutions, the results probably would have been similar to those reported in Exhibit 1.

Despite the evidence of reasonably well-informed respondents, another potential bias exists. If the 296 responding academicians differ from non-respondents in their perception of significant finance articles, generalizing to the population would be questionable. Although arguments have been made that non-response bias in large-sample surveys of this type is minimal [3, p. 242], time trend analysis can be used to substantiate these arguments. Time trend analysis assumes that responses of late respondents are more similar to those of non-respondents than those of early respondents [2]. If opinions of late respondents are similar to those of *early* respondents, therefore, a low non-response bias is implied. Correlating the number of votes received by each article from the last 25% (74) and first 75% (222) of respondents produces a correlation coefficient of .95. This evidence suggests that increasing the sample size would yield little change in the results recorded in Exhibit 1. Similar analyses reveal relative invariance across geographic region and school size.

### Criteria for Significance

After they identified the articles presented in Exhibit 1, we asked respondents to choose from eight criteria the ones they found most influential in their selection. Individual importance of the criteria is shown in Exhibit 3. That financial research is perceived as having “changed direction of [the] finance field” and/or having provided a “theoretical or empirical breakthrough” greatly enhances its probability of being recognized as significant. Approximately two-thirds of all respondents report that they used these two criteria in their selection. That the work provided “stimulus for further research” appears important to about one-half of the respondents, while works that are merely “often cited or referenced” impressed only about one-fourth of the respondents. The least important criterion, “rigor,” seems to be a necessary but not a sufficient condition for significance. One respondent reported using rigor as a major criterion for two specific articles and other criteria for other articles. Generalizing from this observation, criteria for significance would appear to be made up of a complex function of the details surrounding a work and therefore not to be universally applicable across research. Although it was not feasi-

### Exhibit 3. Criteria for Significance

Criterion*	# of Votes**	% of Votes
Changed direction of finance field	205	71%
Theoretical or empirical breakthrough	199	69
Stimulus for further research	141	49
Originality	109	38
Test of time	100	35
Often cited or referenced	78	27
Explains real world	65	23
Rigor	57	20

\*Some respondents added: Synthesis and clarification, effect on policy, and real-world recognition.

\*\*“Changed direction of finance field” received 205 (71%) of the possible 287 votes.

ble for a large survey like this one, in-depth probing for reasoning underlying individual selections would provide a richer understanding of researcher perceptions and preferences.

### About the Authors

Studying the top-rated finance articles affords the opportunity to investigate several characteristics of eminent financial researchers, including their institutional affiliation. Previous studies of quantity of research (pages and articles) show heavy concentrations of financial research in a small number of academic institutions [13, 14]. The same institutions also tend to dominate in research impact, judging by citation counts [10]. Thus, both quantity and quality of financial research appear rather concentrated. Affiliation of the authors identified in Exhibit 1 reveals additional evidence of institutional concentration. Eight of the authors were affiliated with the University of Chicago at the time of publication. Approximately 15 institutions are represented by all authors.<sup>3</sup> Twelve of the 15 institutions were previously ranked by Ederington in terms of citations to faculty research and total pages published [10, p. 783]. The 15 institutions, followed parenthetically by citation and page ranks from the Ederington study, are as follows: Chicago (1, 5), Harvard (14, 18), Massachusetts Institute of Technology (6, 15), Carnegie-Mellon (13,

<sup>3</sup>Institutional affiliation at the time of publication could not be found for two authors, and two temporary leaves are ignored. Information on affiliation was obtained from article footnotes, from *American Assembly of Collegiate Schools of Business Faculty Personnel*, 11th ed., 1975, and from *Who's Who in America*, 40th ed., 1978-1979. Bachelier and Bernoulli are excluded from discussion in this section.



21), Rochester (9, 9), New York University (4, 2), Stanford (5, 4), University of California at Los Angeles (3, 1), University of North Carolina at Chapel Hill (11, 19), University of Washington (13, 12), University of California at Berkeley (8, 7), Northwestern (18, 13), Columbia (not ranked), Yale (not ranked), and Norwegian School of Economics and Business Administration (not ranked).

Concentration also appears at a lower level — that is, the author level. Thirteen of the 30 authors of the peer-rated articles appear more than once as an author or co-author: Black, Fama, Fisher, Jensen, Lintner, Lorie, Merton, Miller, Modigliani, Roll, Savage, Scholes, and Sharpe. Another form of concentration reveals itself through analysis of faculty ranks at the time of article publication. In general, authors and co-authors at publication time of their first peer-rated article (shown in Exhibit 1) are concentrated in the higher ranks: 12 professors, 9 associate professors, and 5 assistant professors. (Academic rank of four authors could not be identified.) Some of the authors, though, were promoted between the time of authorship and publication, meaning that this concentration would be diluted somewhat if recognition could have been given to ranks at the time the research was actually conducted.

Two final aspects concerning authors of seminal articles relate to their choice of journals for publication and the relationship between peer ratings and output. In addition to the 13 journals presented in Exhibit 1, we searched the following seven journals for the authors' contributions: *Financial Analysts Journal*, *Quarterly Journal of Economics*, *Accounting Review*, *Journal of Financial and Quantitative Analysis*, *Journal of Money, Credit and Banking*, *Financial Management*, and *Journal of Monetary Economics*. As a group, the authors averaged 12.5 (median = 11, range = 1–32) articles authored or co-authored in 5.3 (median = 5.5, range = 1–10) of the journals during the period 1950–1978. Two thirds of the authors published in the *Journal of Finance*, making a total of 62 appearances. They also contributed nine of their peer-rated significant articles to the *Journal of Finance*. Second in overall patronage by these researchers is the *Journal of Business*, followed by the *Journal of Political Economy*.

Finally, results from other disciplines (e.g., psychology and physics) indicate that moderate correlations exist between surrogates for quantity and quality of research [6]. Among the general population of researchers, the more prolific authors tend to produce the works rated as more significant. Exhibit 4

#### Exhibit 4. Distribution of Authors by Number of Publications and Number of Votes Received by Best Article

Number of Publications	Number of Votes Received by Best Article	
	High (≥66)	Low (<66)
High (≥ 11)	Type I 11	Type II 4
Low (< 11)	Type III 1	Type IV 10

Note: Excludes Bachelier and Bernoulli. Includes only authors listed first for co-authored articles, thus excluding 4 non-leading co-authors. High and low number of publications divide at the median (11) number of publications by the authors in 20 journals. High and low number of votes received by best article are determined arbitrarily by a "natural" breaking point shown in Exhibit 1. Note that the correlations reported in the text do not depend on the breaking points used for this illustration.

illustrates how this phenomenon operates among distinguished researchers in finance. Four types of authors are illustrated according to number of publications in leading journals and number of votes received by their most highly-rated article. The large number of authors classified as Types I and IV supports the hypothesis that prolific authors tend to produce the most significant works. Care must be taken not to overdraw the implications of lower quality among Types II and IV since "less significant" refers to works among a distinguished set.

The relationship between surrogates for quantity and quality of research can be statistically analyzed by correlating number of articles published with votes received by an author's most significant work. Both Pearsonian (.46,  $p = .02$ ) and Spearman (.57,  $p = .003$ ) correlation coefficients support the hypothesis of a positive relationship between quantity and quality of research. These correlation coefficients are based on the following surrogates: Number of publications by the lead author and number of votes received by the lead author's most highly-rated article. Roughly comparable correlations result from using the average number of publications of co-authors. Even though the 20 leading journals probably capture a significant portion of the authors' research, obviously not all of the authors' articles are included in these journals. If the omitted articles are evenly distributed over authors, either absolutely or in proportion to individual output, the results would remain unchanged irrespective of the number of omissions.

Further support for the hypothesized positive relationship between quantity and quality of financial

research is provided by the correlation of number of articles published with total 1974–1978 citations to the peer-rated works: Pearson,  $.39$ ,  $p = .05$ ; Spearman,  $.39$ ,  $p = .05$ . Analysis of the data using various operational definitions for quality suggests that one or two of the authors are perfectionists (Type III) who, like their more prolific brethren (Type I, 10–12 authors), produce what Vandermeulen calls “theoretical diamonds” [21, p. 55]. Of the remaining authors, four or five are prolific producers, whose most significant work receives less acclaim than that of the perfectionists or the more prolific Type I authors. The last group (Type IV) of nine or ten authors, although counted among the distinguished, produce less than the Type IIs but receive similar acclaim.

## Conclusions

By its selective nature, this opinion survey of significant contributions to the finance literature has omitted many works with theoretic and pragmatic value. Revolutions in scientific thought occur only infrequently, however, and evolutionary advances are less likely to be viewed as significant. Moreover, it is basic research, not applied, that normally receives the plaudits of academic researchers. Only three finance articles, each of which created revolutions in financial research, received more than two-thirds of the possible 296 votes — works by Modigliani and Miller, by Markowitz, and by Sharpe.

The survey produced evidence with varying degrees of strength to support several hypotheses. For brevity, the qualifications we have provided throughout have been omitted from the following conclusions:

1. The most prominent advances in finance have occurred in capital theory and business finance.
2. Full recognition of finance articles making significant contributions takes 5 to 6 years; decline in direct impact on the field begins 13 or 14 years after publication.
3. Perception of what constitutes significant financial research is relatively independent of the academic researcher’s environment — top-rated versus non-rated school, school size, and geographic region.
4. “Changed direction of the finance field” and “provided a theoretical or empirical breakthrough” are the major criteria for significance.
5. The most prolific among distinguished finance authors tend to produce the most significant research.

6. Outstanding contributions to finance literature tend to be produced by a small number of researchers.

As Gordon Donaldson has noted:

Most academicians are like surfers who, with their shiny new doctoral surfboards tucked under them, paddle out in search of an intellectual wave created by a force outside themselves and who, with a host of others, will proceed to mount and ride the crest until the wave loses its energy and breaks as a gentle ripple on the shore of established thought [9, p. 9].

## References

1. Victor L. Andrews, “Sterile Premises in Corporate Capital Theory,” *Financial Management* (Winter 1979), pp. 7–11.
2. J. Scott Armstrong and Terry S. Overton, “Estimating Nonresponse Bias in Mail Surveys,” *Journal of Marketing Research* (August 1977), pp. 396–402.
3. George Brooker and Phillip Shinoda, “Peer Ratings of Graduate Programs for Business,” *Journal of Business* (April 1976), pp. 240–251.
4. W. C. Bush, P. W. Hamelman, and R. J. Staff, “A Quality Index for Economics Journals,” *Review of Economics and Statistics* (February 1974), pp. 123–125.
5. Kenneth Clark, *America’s Psychologists: A Survey of a Growing Profession*, Washington, D.C., American Psychological Association, 1957.
6. Stephen Cole and Jonathan R. Cole, “Scientific Output and Recognition: A Study in the Operation of the Reward System in Science,” *American Sociological Review* (June 1967), pp. 377–390.
7. Paul H. Cootner, “The Theorems of Modern Finance in a General Equilibrium Setting: Paradoxes Resolved,” *Journal of Financial and Quantitative Analysis* (November 1977), pp. 553–562.
8. Joel Dean, *Managerial Economics*, Englewood Cliffs, N.J., Prentice-Hall, Inc., 1951.
9. Gordon Donaldson, “Making Intellectual Waves,” *Financial Management* (Winter 1977), pp. 7–10.
10. Louis H. Ederington, “Aspects of the Production of Significant Financial Research,” *Journal of Finance* (June 1979), pp. 777–786.
11. Paul E. Green and Donald S. Tull, *Research for Marketing Decisions*, Englewood Cliffs, N.J., Prentice-Hall, Inc., 1970.
12. William R. Henry and E. Earl Burch, “Institutional Contributions to Scholarly Journals of Business,” *Journal of Business* (January 1974), pp. 56–66.
13. Robert C. Klemkosky and Donald L. Tuttle, “The Institutional Source and Concentration of Financial Research,” *Journal of Finance* (June 1977), pp. 901–907.
14. Robert C. Klemkosky and Donald L. Tuttle, “A Ranking of Doctoral Programs by Financial Research Contributions of Graduates,” *Journal of Financial and*

- Quantitative Analysis* (September 1977), pp. 491-497.
15. Frank H. Knight, *Risk, Uncertainty and Profit*, Boston, Houghton Mifflin Co., 1921.
  16. Michael C. Lovell, "The Production of Economic Literature: An Interpretation," *Journal of Economic Literature* (March 1973), pp. 27-55.
  17. Harry Markowitz, *Portfolio Selection: Efficient Diversification of Investments*, New York, John Wiley & Sons, 1959.
  18. Glenn H. Petry and Russell J. Fuller, "The Geographic Distribution of Papers at the Seven Academic Finance Associations in the United States," *Journal of Financial and Quantitative Analysis* (November 1978), pp. 785-793.
  19. Glenn H. Petry and Hal Kerr, "The Rising Incidence of Co-Authorship in Major Academic Journals in Business and Economics," presented at the Financial Management Association meeting, Boston, October 1979.
  20. Ezra Solomon, *The Theory of Financial Management*, New York, Columbia University Press, 1963.
  21. Alice Vandermeulen, "How to Fabricate an Article," *American Economist* (Spring 1975), pp. 55-59.
  22. John B. Williams, *The Theory of Investment Value*, Cambridge, Mass., Harvard University Press, 1938.