



## The First 80 Years of the *Financial Analysts Journal*: Prolific Contributors and Major Ideas and Innovations

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# The First 80 Years of the *Financial Analysts Journal*: Prolific Contributors and Major Ideas and Innovations

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Since its inception in 1945, the *Financial Analysts Journal* (FAJ) has advanced some of the investment profession's most influential ideas by providing an outlet for innovative thinkers. We trace the FAJ's history by identifying the most prolific contributors and innovations featured over its first 80 years and in each of nine financial eras. Using the comprehensive database and rigorous methodology that we developed, this article provides rankings of the top authors and the most frequent words in titles and examines the context in which these words were used to identify seminal ideas and the authors behind them.

**I**T he history of mankind is the history of ideas," wrote the Nobel laureate in literature, Luigi Pirandello, in his book *The Late Mattia Pascal* (1923). In the inaugural issue of the *Financial Analysts Journal* (FAJ), Charles Tatham (1945) extolled as objectives for the profession high ethical standards, improved analytical techniques, and an interchange of ideas.<sup>1</sup> Those words were prophetic. The Journal has been at the forefront of the investment profession's most influential ideas and has served as an outlet for innovative thinkers since its inception. In Andrew Lo's article, "The Financial System Red in Tooth and Claw: 75 Years of Co-Evolving Markets and Technology" (2021), he thoughtfully identified and explored eight distinct financial eras during the Journal's first 75 years, with an objective of determining the most prolific contributors and the most significant ideas and innovations in each era.<sup>2</sup>

This article combines an improved methodology with a more comprehensive and accurate database to discern the prolific contributors and offers a deeper conceptual analysis of the key themes explored in the FAJ in each financial era. We also extend the analysis through the Journal's 80th year with a newly identified era: "Digital

**Keywords:** authors; FAJ; *Financial Analysts Journal*; financial eras; ideas; innovations; pseudonyms; rankings

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Transformation." This work traces the history of financial ideas that have appeared in the *FAJ*, and the database can enable further analyses of the contributions.<sup>3</sup>

## Data and Methodological Improvements

Lo's analysis used an existing but incomplete *FAJ* database and a methodology that had significant shortcomings to rank the most prolific authors, and the most frequent words in *FAJ* titles, in each era. His methodology relied on authors' surnames without consideration of their first names, favoring authors with common surnames. It neither reconciled variations in authors' names across their contributions nor identified the authors behind pseudonyms, and it excluded ties. Lo's rankings appear in his [Exhibit 2](#) (2021). For a discussion of the problems with the database and methodology, see Jacobs and Levy (2025).

We began our research by augmenting the existing *FAJ* database to include all contributions and refine the entries so searches would provide a complete representation of the Journal's first 75 years.<sup>4</sup> First, we manually cross-checked the 4,748 contributions in the *FAJ* database against our own full set of hard copy *FAJ* issues, validated or corrected the contributions in the database, and entered by publication year, volume, issue, and corresponding financial era the contributions that had been omitted from the *FAJ* database. We identified 2,191 contributions through the first 75 years that were omitted from the original *FAJ* database upon which Lo relied. We also extended the database to include contributions through 2024, the Journal's 80th year.

Second, we categorized each database entry by the type of contribution. We took this additional step to distinguish those categories that are most likely to give rise to new ideas and innovations. In the existing *FAJ* database, contributions were not categorized by type except for reviews of articles and books. We identified nine categories of contributions—(1) Articles (typically listed in the table of contents [TOC] as such); (2) Editorials (typically listed in the TOC as such, identified within the piece itself, or editorial in nature)<sup>5</sup>; (3) Educational (typically part of a series)<sup>6</sup>; (4) Letters to the Editor (typically listed in the TOC as such or identified within the piece itself, and including author responses or a dialogue with the *FAJ* editors); (5) Technical Notes (typically listed in the TOC as such or identified within the piece itself), referred to herein as

Notes; (6) Reprints (charts or articles from earlier *FAJ* issues or from another publication and excerpts from books); (7) Reviews (book and article reviews as well as recaps of conferences and recaps of talks)<sup>7</sup>; (8) Talks (presentations, often from the financial analysts' annual conference that were printed in the *FAJ* and sometimes comprised full issues, panel discussions, and interviews)<sup>8</sup>; and (9) Other (chart, questionnaire, or report). Contributions that were identified as administrative, including some that appeared as Editorials or Letters to the Editor, were omitted from the augmented database, as were two duplicate entries from the original *FAJ* database.

After removing administrative and duplicate entries, the revised *FAJ* database totaled 4,705 entries. Adding the 2,191 omitted contributions brought the augmented database to 6,896 contributions for the 75-year period. Including the contributions through the 80th year added 103 more contributions for a total of 6,999. In consultation with Lo, we included in the rankings the following five categories: Articles, Editorials, Letters to the Editor, Notes, and Talks (referred to herein as **AELNT**). The AELNT categories most closely capture the central purpose of the rankings, which was to represent ideas and innovations and related discussions.<sup>9</sup>

Third, we identified and distinguished contributors by their full names rather than by surnames only. We also parsed the multi-author contributions and created separate records for each individual contributor. This allowed sorts by full name and facilitated research of contributors' complete names, reconciling variations in name usage, and correcting typographical errors. We identified all contributors in the rankings with the naming convention they used most frequently in their contributions. Authors are now credited for contributions published under variations of their names, including their identified pseudonyms.<sup>10</sup> Each author received the same credit for contributions produced as a single author or as a co-author. We believe that fully recognizing each joint author encourages collaboration.

Breaking down the original *FAJ* database into separate records for each individual contributor expanded it to 6,604 entries. With the missing contributions broken down in the same way, the database was further expanded by 2,300 entries, bringing the new total to 8,904 entries for the 75-year period. With the new contributions through the 80th year, the database was further expanded by 283 entries, bringing the new total to 9,187 entries. [Exhibit 1](#) shows the number of

### Exhibit 1. Number of Contributions by Category Type

Each Contribution as a Separate Record		Each Contributor as a Separate Record*	
Contribution Type	No. of Contributions	Contribution Type	No. of Contributors
Articles	3,718	Articles	5,506
Editorials	363	Editorials	406
Educational	315	Educational	351
Letters to the Editor	592	Letters to the Editor	705
Notes	155	Notes	267
Reprints	38	Reprints	50
Reviews	1,220	Reviews	1,231
Talks	595	Talks	668
Other	3	Other	3
Total	6,999	Total	9,187

\*There was a total of 4,540 individual contributors.

contributions by category type for the full database. This exhibit contains a table for each *contribution* as a separate record and another table for each *contributor* as a separate record. Articles and Reviews constitute the largest categories, by far.

Fourth, the treatment of ties was modified to recognize all top-ranked authors with the same number of contributions, which expanded the rankings beyond 20 spots for most eras. The same treatment of ties was applied to top-ranked words in FAJ titles with the same number of mentions, which expanded the rankings beyond 20 for many eras.

We used Lo's era-by-era identification with a modification to his last era "Digital Assets," which we shortened to end in the Journal's 75th year, 2019, instead of in the first quarter of 2021. We identified a new era starting in 2020, which we call "Digital Transformation," and extended the contributions through 2024 in celebration of the Journal's 80th anniversary. Several transformative events paved the way for the emergence of this new era. The normalization of remote or hybrid work after the COVID-19 outbreak prompted firms to accelerate their adoption of digital tools and platforms. Additionally, the launch of the earliest version of ChatGPT in November 2022 became a catalyst for integrating AI into digital transformation. Despite the shorter span of years of this new era, we were able to conduct a meaningful analysis of author and word frequency and key concepts introduced.

These refinements provide a comprehensive representation of the FAJ's contributors in and across the financial eras. [Exhibit 2a](#) shows the top-ranked contributors in each era for the AELNT categories,

and [Exhibit 2b](#) shows the author rankings for each era for the Articles category. In addition to analyzing author rankings in each era, we examined author rankings for the entire period from 1945 through 2024. [Exhibit 3](#) shows the ranking of authors with 10 or more contributions in the AELNT categories and the Articles category, respectively, for the Journal's 80 years.

### An Analysis of Word Frequencies in FAJ Titles

Examining the most frequent words in FAJ titles for the AELNT and Articles categories, we address the most popular topics and innovative ideas in each financial era, as well as the top authors behind those ideas.<sup>11</sup> We focus on the top authors in the AELNT or Articles rankings in each era and during the entire 80-year period.<sup>12</sup> The most frequently used words in an era can indicate leading topics, and changes in those words from era to era can signal an evolution of key themes or the introduction of innovations, thereby providing historical insights. [Exhibit 4a](#) (AELNT) and [Exhibit 4b](#) (Articles) display the results by era.<sup>13</sup>

We reviewed the titles containing the top words in each era and the associated contributions to fully understand the context in which those words were used, and to identify the contributors behind those ideas and innovations. This synergistic approach yielded numerous insights into the ideas and innovations that drove—and defined—each era.

**Exhibit 2a. Top Authors by AELNT in the *Financial Analysts Journal* within Each of Nine Distinct Eras from 1945 through 2024**

Classical Financial Era: 1944-1951*			Modern Portfolio Theory Era: 1952-1963			Alpha Beta Era: 1964-1972		
Rank	Author	AuthFreq	Rank	Author	AuthFreq	Rank	Author	AuthFreq
1	Benjamin Graham	8	1	Nicholas Molodovsky	13	1	Julian Gumperz	17
2	Lucien O. Hooper	6	2	Robert W. Storer	12	Tie 2-3	Edmund A. Mennis	12
Tie 3-6	Pierre R. Bretey <sup>1</sup>	5	3	B. Barret Griffith	11		Nicholas Molodovsky <sup>1</sup>	12
	Walter K. Gutman	5	4	Pierre R. Bretey <sup>1</sup>	10	4	Stephen B. Packer	11
	Jeremy C. Jenks	5	Tie 5-6	Shelby Cullom Davis	8	Tie 5-7	Frank E. Block	9
	Charles Tatham <sup>1</sup>	5		Norvin R. Greene	8		Herbert E. Neil	9
Tie 7-10	Shelby Cullom Davis	4	Tie 7-8	G. Howard Conklin	7	Tie 8-9	Joseph H. Spigelman	9
	Charles Kerr	4		Edmund A. Mennis	7		Joseph E. Murphy	8
	Ragnar D. Naess	4	Tie 9-11	A. Hamilton Boulton	6	Tie 10-13	Beryl W. Sprinkel	8
	Harold H. Young	4		Benjamin Graham	6		Pierre R. Bretey	7
Tie 11-16	Schroeder Boulton	3		Paul A. Murphy	6		Douglas A. Hayes	7
	H. William Knodel	3	Tie 12-17	Walter E. Hoadley	5		Robert A. Levy	7
	Edward B. Laufer	3		John E. Kusik	5		Walter P. Stern	7
	Richard B. Schneider	3		Richard W. Lambourne	5	Tie 14-16	W. Scott Bauman	6
	John Stevenson	3		Roger F. Murray	5		Sidney Homer	6
	Rufus S. Tucker	3		Alan C. Poole	5		Jack L. Treynor <sup>1</sup>	6
Tie 17-41	Hubert F. Atwater	2		Clair M. Roddewig	5	Tie 17-28	Barton M. Biggs	5
	Justin F. Barbour	2	Tie 18-36	William M. Bennett	4		Ralph A. Bing	5
	Herbert Bernenko	2		Ralph A. Bing	4		John M. Birmingham	5
	Francis J. Calkins	2		Schroeder Boulton	4		Howard B. Bonham	5
	George Vaux Cresson	2		Charles J. Collins	4		Abraham J. Briloff	5
	J. Frederic Dewhurst	2		F.W. Elliott Farr	4		Charles D. Ellis	5
	Marshall Dunn	2		John D. Garwood	4		Robert W. Mayer	5
	William F. Edwards	2		Creighton Hartill	4		William C. Norby	5
	R.M. Fischer	2		Douglas A. Hayes	4		Edward F. Renshaw	5
	Martin R. Gainsbrugh	2		Lawrence R. Kahn	4		Lemont K. Richardson	5
	Joseph M. Galanis	2		Robert E. Kennedy	4		John P. Shelton	5
	Theodore H. Gerken	2		W. Sturgis Macomber	4		Murray L. Weidenbaum	5
	Walter F. Hahn	2		Sanford L. Margoshes	4			
	W. Truslow Hyde	2		Walter Maynard	4			
	Lyman S. Logan	2		M. Dutton Morehouse	4			
	Donald B. Macurda	2		Ragnar D. Naess	4			
	Oscar M. Miller	2		Alexander Pinney	4			
	Hugh Pastoriza	2		Donald H. Randell	4			
	A.S. Rudd	2		Edward F. Renshaw	4			
	Morris A. Schapiro	2		Charles Tatham	4			
	Helen Slade	2						
	Frank J. Soday	2						
	John W. Spurdle	2						
	E. Ralph Sterling	2						
	Robert W. Storer	2						

\*Lo defined the Classical Financial Era as starting in 1944.

<sup>1</sup>Editor of the *Financial Analysts Journal* during this era.

Note: This exhibit is based on Articles, Editorials, Letters to the Editor, Notes, and Talks (AELNT).

**Exhibit 2a. Top Authors by AELNT in the *Financial Analysts Journal* within Each of Nine Distinct Eras from 1945 through 2024 (continued)**

Derivatives Era: 1973–1981			Automation Era: 1982–1988			Financial Globalization Era: 1989–1999		
Rank	Author	AuthFreq	Rank	Author	AuthFreq	Rank	Author	AuthFreq
1	Jack L. Treynor <sup>1</sup>	21	1	Martin L. Leibowitz	10	1	Jack L. Treynor	19
2	Roman L. Weil	15	2	Robert D. Arnott	9	2	Martin L. Leibowitz	15
Tie 3–4	Fischer Black	9	3	Robert Ferguson	8	Tie 3–4	Peter L. Bernstein	10
	Ben Lansdale	9	4	Peter L. Bernstein	7		Robert Ferguson	10
Tie 5–6	Robert Ferguson	7	5	Jack L. Treynor	6	Tie 5–8	Robert D. Arnott	9
	William S. Gray	7	Tie 6–8	Victor A. Canto	5		Fischer Black	9
Tie 7–9	Keith Ambachtsheer	6		Jess H. Chua	5		Stanley Kogelman	9
	Sidney Davidson	6		John W. Peavy	5		Meir Statman	9
	Peter M. Gutmann	6	Tie 9–14	T. Daniel Coggin	4	Tie 9–12	Edward I. Altman	8
Tie 10–13	Robert M. Baylis	5		Charles D. Ellis	4		Gary L. Gastein	8
	Abraham J. Briloff	5		Gary L. Gastein	4		Campbell R. Harvey	8
	Walter R. Good	5		Haim Levy	4		Ira G. Kawaller	8
	William W. Jahnke	5		Kenneth N. Levy	4	13	Martin S. Fridson	7
Tie 14–22	M. Edgar Barrett	4	Tie 15–43	Richard Roll	4	Tie 14–18	Keith Ambachtsheer	6
	Peter L. Bernstein	4		Edward I. Altman	3		William H. Beaver	6
	Charles D. Ellis	4		Keith Ambachtsheer	3		Zvi Bodie	6
	Robert S. Kaplan	4		W. Scott Bauman	3		Bruce I. Jacobs	6
	Martin L. Leibowitz	4		William H. Beaver	3		Kenneth N. Levy	6
	Wilbur G. Lewellen	4		Harold Bierman	3	Tie 19–26	Gregory Connor	5
	Franco Modigliani	4		G.O. Bierwag	3		Richard M. Ennis	5
	Barr Rosenberg	4		Zvi Bodie	3		H. Gifford Fong <sup>1</sup>	5
	William F. Sharpe	4		Richard Bookstaber	3		Lewis D. Johnson	5
				Robert I. Cummin	3		Donald B. Keim	5
				Jeffrey J. Diermeier	3		Mark Kritzman	5
				Richard J. Downen	3		Richard O. Michaud	5
				Edward A. Dyl	3		Edward F. Renshaw	5
				Robert O. Edmister	3			
				Walter R. Good	3			
				David A. Goodman	3			
				F.J. Gould	3			
				J. Parker Hall	3			
				Anthony F. Herbst	3			
				John E. Hunter	3			
				Roger G. Ibbotson	3			
				Bruce I. Jacobs	3			
				George G. Kaufman	3			
				J. Edward Ketz	3			
				Josef Lakonishok	3			
				Albert Madansky	3			
				Mark Rubinstein	3			
				William F. Sharpe	3			
				Eric H. Sorensen	3			
				Paula A. Tosini	3			

<sup>1</sup>Editor of the *Financial Analysts Journal* during this era.

Note: This exhibit is based on Articles, Editorials, Letters to the Editor, Notes, and Talks (AELNT).

**Exhibit 2a. Top Authors by AELNT in the *Financial Analysts Journal* within Each of Nine Distinct Eras from 1945 through 2024 (continued)**

Algorithmic Trading Era: 2000-2009			Digital Assets Era: 2010-2019			Digital Transformation Era: 2020-2024		
Rank	Author	AuthFreq	Rank	Author	AuthFreq	Rank	Author	AuthFreq
1	Robert D. Arnott <sup>1</sup>	34	1	Rodney N. Sullivan <sup>1</sup>	14	Tie 1-3	Guido Baltussen	4
2	Richard M. Ennis <sup>1</sup>	17	2	Charles D. Ellis	9		Campbell R. Harvey	4
3	Meir Statman	12	Tie 3-4	Clifford S. Asness	8		George Serafeim	4
Tie 4-5	Martin L. Leibowitz	8		Roger G. Ibbotson	8	Tie 4-8	Robert D. Arnott	3
	Rodney N. Sullivan	8	Tie 5-7	Lisa R. Goldberg	7		David Blitz	3
Tie 6-7	Peter L. Bernstein	7		Xi Li	7		William N. Goetzmann <sup>1</sup>	3
	Mark Hirschey	7		Laurence B. Siegel <sup>1</sup>	7		David Turkington	3
Tie 8-9	Jack L. Treynor	6	Tie 8-15	Jason Hsu	6		Pim van Vliet	3
	M. Barton Waring	6		Thomas M. Idzorek	6	Tie 9-37	Kenechukwu Anadu	2
Tie 10-18	Tom Arnold	5		Mark Kritzman	6		Andrew Ang	2
	Clifford S. Asness	5		Martin L. Leibowitz	6		Hendrik Bessembinder	2
	John C. Bogle	5		Robert Litterman <sup>1</sup>	6		David M. Blanchett	2
	Robert Ferguson	5		Sébastien Page	6		Alexander Cheema-Fox	2
	Bruce I. Jacobs	5		Lasse H. Pedersen	6		Te-Feng Chen	2
	Dean LeBaron	5		James X. Xiong	6		Goeun Choi	2
	Joshua Livnat	5	Tie 16-21	William J. Bernstein	5		Roger Clarke	2
	Harry M. Markowitz	5		Stephen W. Bianchi	5		Josh Davis	2
Tie 19-31	Laurence B. Siegel	5		John C. Bogle	5		David Forsberg	2
	Jeffrey J. Diermeier	4		Andrea Frazzini	5		David R. Gallagher	2
	William Fung	4		Larry Harris	5		Normane Gillmann	2
	David A. Hsieh	4		Vitali Kalesnik	5		Jan Jaap Hazenberg	2
	Roger G. Ibbotson	4					Clint Howard	2
	Gerald R. Jensen	4					Thomas M. Idzorek	2
	Robert R. Johnson	4					Vitali Kalesnik	2
	Paul D. Kaplan	4					Feifei Li	2
	Dean Leistikow	4					Juhani T. Linnainmaa	2
	Andrew W. Lo	4					Andrew W. Lo	2
Tie 32-41	Harindra de Silva	4					Tālis J. Putniņš	2
	Michael Stutzer	4					Xiao Qiao	2
	Jerry H. Tempelman	4					Harindra de Silva	2
	Steven Thorley	4					Laurens Swinkels	2
							Steven Thorley	2
							Jerry Tsai	2
							Hui (Stacie) Wang	2
							Zhenping Wang	2
							Geoffrey J. Warren	2
							K.C. John Wei	2

<sup>1</sup>Editor of the *Financial Analysts Journal* during this era (Note: Siegel Jan-Feb 2015).

Note: This exhibit is based on Articles, Editorials, Letters to the Editor, Notes, and Talks (AELNT).

## Major Ideas and Innovations by Era and Over the First 80 Years

**Classical Financial Era (1944-1951).** Lo's first designated era is the Classical Financial Era, marked by the Bretton Woods Agreement in 1944, which established fixed exchange rates between international currencies and the U.S. dollar. In this era, words such as *industry*, *market*, *utility*, *investment*, *railroad*,

*stock*, *security*, *analysis*, *earnings*, *growth*, *oil*, and *steel* appeared, in that order, in the AELNT rankings. The literature discussing market investment analysis typically focused on economically important industries, employing security and earnings analyses of individual stocks within those industries.

*Industry* is the most frequent word for this era both in AELNT and Articles. During this era, many

**Exhibit 2b. Top Authors by Articles in the *Financial Analysts Journal* within Each of Nine Distinct Eras from 1945 through 2024**

Classical Financial Era: 1944–1951*			Modern Portfolio Theory Era: 1952–1963			Alpha Beta Era: 1964–1972		
Rank	Author	AuthFreq	Rank	Author	AuthFreq	Rank	Author	AuthFreq
1	Benjamin Graham	6	1	Nicholas Molodovsky	13	1	Stephen B. Packer	11
Tie 2–3	Shelby Cullom Davis	4	2	Robert W. Storer	12	Tie 2–3	Julian Gumperz	8
	Walter K. Gutman	4	3	B. Barret Griffith	11		Nicholas Molodovsky <sup>1</sup>	8
Tie 4–12	Schroeder Boulton	3	Tie 4–5	Pierre R. Bretey <sup>1</sup>	8	Tie 4–6	Edmund A. Mennis	7
	Pierre R. Bretey <sup>1</sup>	3		Norvin R. Greene	8		Joseph E. Murphy	7
	Lucien O. Hooper	3	Tie 6–7	G. Howard Conklin	7		Joseph H. Spigelman	7
	Jeremy C. Jenks	3		Edmund A. Mennis	7	Tie 7–11	Frank E. Block	6
	Charles Kerr	3	8	Shelby Cullom Davis	6		Pierre R. Bretey	6
	Edward B. Laufer	3	9	Alan C. Poole	5		Douglas A. Hayes	6
	Ragnar D. Naess	3	Tie 10–21	John D. Garwood	4		Herbert E. Neil	6
	Rufus S. Tucker	3		Benjamin Graham	4		Walter P. Stern	6
	Harold H. Young	3		Creighton Hartill	4	Tie 12–16	W. Scott Bauman	5
Tie 13–28	J. Frederic Dewhurst	2		Douglas A. Hayes	4		Barton M. Biggs	5
	Marshall Dunn	2		Lawrence R. Kahn	4		Robert A. Levy	5
	William F. Edwards	2		Robert E. Kennedy	4		Edward F. Renshaw	5
	R.M. Fischer	2		Sanford L. Margoshes	4		John P. Shelton	5
	Joseph M. Galanis	2		Paul A. Murphy	4	Tie 17–29	Leonard W. Ascher	4
	W. Truslow Hyde	2		Alexander Pinney	4		Howard B. Bonham	4
	H. William Knodel	2		Donald H. Randell	4		Charles D. Ellis	4
	Donald B. Macurda	2		Clair M. Roddewig	4		Frank K. Reilly	4
	Oscar M. Miller	2		Charles Tatham	4		Lemont K. Richardson	4
	Richard B. Schneider	2					Lucy E. Ritter	4
	Helen Slade	2					Keith V. Smith	4
	Frank J. Soday	2					Beryl W. Sprinkel	4
	E. Ralph Sterling	2					Richard A. Stevenson	4
	John Stevenson	2					Jack L. Treynor <sup>1</sup>	4
	Robert W. Storer	2					Henry C. Wallich	4
	Charles Tatham <sup>1</sup>	2					Murray L. Weidenbaum	4
							J. Peter Williamson	4

\*Lo defined the Classical Financial Era as starting in 1944.

<sup>1</sup>Editor of the *Financial Analysts Journal* during this era.

authors analyzed specific industries from an investment perspective, including Richard Schneider (1947) on chemicals, Schroeder Boulton (1948) on textiles, Rufus Tucker (1949) on automobiles, John Spurdle (1949) on oil, Donald Macurda (1950) on brewing, Oscar Miller (1950) on whisky, and Frank Soday (1951) on petrochemicals. The word *industry* itself appeared in the first four eras only, as industry analysis gradually gave way to more analytical approaches; nonetheless, it still ranks fourth among the most frequent words over the FAJ's first 80 years.<sup>14</sup> *Oil* appeared in the AELNT ranking in the next era too, but no other industry appeared in the most frequent word rankings for any subsequent era.

During the Classical Financial Era, *market* primarily appeared in the following contexts: market value, market barometer, appraising the market, and market trends. Walter Gutman (1946) found that the difference between book value and market value tends to be significant and specific to the individual firm. R. M. Fischer (1951) claimed that intangibles are often not adequately reflected in a firm's market value. *Investment* appeared in investment outlook, investments in common stocks, and investment management. William Edwards (1946) proposed an investment approach based on prudent judgment rather than relying on mechanical buy-and-sell signals. *Stock* was contextualized as in common stock, stock market averages, stock market trends, and

**Exhibit 2b. Top Authors by Articles in the *Financial Analysts Journal* within Each of Nine Distinct Eras from 1945 through 2024 (continued)**

Derivatives Era: 1973-1981			Automation Era: 1982-1988			Financial Globalization Era: 1989-1999		
Rank	Author	AuthFreq	Rank	Author	AuthFreq	Rank	Author	AuthFreq
1	Roman L. Weil	12	1	Martin L. Leibowitz	8	1	Martin L. Leibowitz	14
2	Jack L. Treynor <sup>1</sup>	7	Tie 2-3	Robert D. Arnott	5	Tie 2-3	Stanley Kogelman	9
Tie 3-4	Fischer Black	6		Victor A. Canto	5		Meir Statman	9
	Sidney Davidson	6	Tie 4-7	Robert Ferguson	4	Tie 4-5	Edward I. Altman	7
Tie 5-6	Robert M. Baylis	5		John W. Peavy	4		Campbell R. Harvey	7
	Robert Ferguson	5		Richard Roll	4	6	Fischer Black	6
Tie 7-13	M. Edgar Barrett	4		Jack L. Treynor	4	Tie 7-8	Gregory Connor	5
	Walter R. Good	4	Tie 8-22	Edward I. Altman	3		Robert Ferguson	5
	William S. Gray	4		William H. Beaver	3	Tie 9-24	Robert D. Arnott	4
	Peter M. Gutmann	4		G.O. Bierwag	3		William H. Beaver	4
	William W. Jahnke	4		Richard Bookstaber	3		Zvi Bodie	4
	Martin L. Leibowitz	4		Jess H. Chua	3		Claude B. Erb	4
	Barr Rosenberg	4		Jeffrey J. Diermeier	3		Frank J. Fabozzi	4
Tie 14-30	J. Devon Allen	3		Walter R. Good	3		Chris R. Hensel	4
	James Balog	3		Roger G. Ibbotson	3		Philippe Jorion	4
	Marilyn V. Brown	3		Bruce I. Jacobs	3		Ira G. Kawaller	4
	Hartman L. Butler	3		George G. Kaufman	3		Donald B. Keim	4
	Charles D. Ellis	3		Josef Lakonishok	3		Allen Michel	4
	Angela Falkenstein	3		Haim Levy	3		Robert A. Olsen	4
	William L. Fouse	3		Kenneth N. Levy	3		Israel Shaked	4
	David Hale	3		William F. Sharpe	3		Eric H. Sorensen	4
	Benjamin C. Korschot	3		Eric H. Sorensen	3		Hans R. Stoll	4
	Franco Modigliani	3					Steven Thorley	4
	David Norr	3					Tadas E. Viskanta	4
	A. L. Pakkala	3						
	Lee N. Price	3						
	Frank K. Reilly	3						
	William F. Sharpe	3						
	Clyde P. Stickney	3						
	George Terborgh	3						

<sup>1</sup>Editor of the *Financial Analysts Journal* during this era.

stock market outlook. Shelby Davis (1945) reported life insurance companies' growing interest in common stock investments. H. William Knodel (1948) cautioned against using the straight price-earnings ratio as a reliable method for evaluating the stock market, noting that the ratio tends to fluctuate with the business cycle. Not unexpectedly, the words *investment*, *market*, and *stock* (listed here in alphabetical order) appeared in every era—*investment* being the only exception in the final era—and were most often among the top 10 words.

Benjamin Graham ranks first among the FAJ contributors in AELNT and Articles in this era, notably associated with the word *security*. Graham (with

co-author David Dodd 1934, 1940, 1951) defined security analysis as an examination of a stock's fundamentals. Security analysis was not fully recognized as a profession in this era, as Graham (1945) and Lucien Hooper (1945), who ranks second in AELNT in this era, debated whether a professional rating needed to be established for security analysts. Graham, using the pseudonym Cogitator, discussed several aspects of security analysis in a series of papers.<sup>15</sup> He suggested how investors can determine whether security analysts' recommendations are right or wrong (1946a). Graham proposed constructing systematic knowledge from the historical behavior of stocks, appealing to the Hippocratic method, and drawing parallels between the work of

**Exhibit 2b. Top Authors by Articles in the *Financial Analysts Journal* within Each of Nine Distinct Eras from 1945 through 2024 (continued)**

Algorithmic Trading Era: 2000–2009			Digital Assets Era: 2010–2019			Digital Transformation Era: 2020–2024		
Rank	Author	AuthFreq	Rank	Author	AuthFreq	Rank	Author	AuthFreq
1	Meir Statman	12	Tie 1–4	Roger G. Ibbotson	6	Tie 1–2	Guido Baltussen	4
2	Martin L. Leibowitz	8		Xi Li	6		George Serafeim	4
Tie 3–6	Robert D. Arnott <sup>1</sup>	5		Sébastien Page	6	Tie 3–7	Robert D. Arnott	3
	Peter L. Bernstein	5		Rodney N. Sullivan <sup>1</sup>	6		David Blitz	3
Tie 7–17	Mark Hirschey	5	Tie 5–6	Lisa R. Goldberg	5		Campbell R. Harvey	3
	Joshua Livnat	5		Lasse H. Pedersen	5		David Turkington	3
Tie 7–17	Clifford S. Asness	4	Tie 7–16	Clifford S. Asness	4		Pim van Vliet	3
	John C. Bogle	4		Anthony Bova	4	Tie 8–36	Kenechukwu Anadu	2
Tie 7–17	Robert Ferguson	4		Andrea Frazzini	4		Andrew Ang	2
	William Fung	4		Jason Hsu	4		Hendrik Bessembinder	2
Tie 7–17	David A. Hsieh	4		Thomas M. Idzorek	4		David M. Blanchett	2
	Bruce I. Jacobs	4		Roni Israelov	4		Alexander Cheema-Fox	2
Tie 7–17	Harry M. Markowitz	4		Vitali Kalesnik	4		Te-Feng Chen	2
	Harindra de Silva	4		Martin L. Leibowitz	4		Goeun Choi	2
Tie 7–17	Steven Thorley	4		Ronnie Sadka	4		Roger Clarke	2
	Jack L. Treynor	4		James X. Xiong	4		Josh Davis	2
Tie 18–42	M. Barton Waring	4	Tie 17–29	Malcolm Baker	3		David Forsberg	2
	Manuel Ammann	3		Stephen W. Bianchi	3		David R. Gallagher	2
Tie 18–42	Tom Arnold	3		Tzee-Man Chow	3		Normane Gillmann	2
	Lawrence N. Bader	3		Charles D. Ellis	3		Jan Jaap Hazenberg	2
Tie 18–42	Louis K.C. Chan	3		Luis Garcia-Feijóo <sup>1</sup>	3		Clint Howard	2
	Roger Clarke	3		Campbell R. Harvey	3		Thomas M. Idzorek	2
Tie 18–42	Darrell Duffie	3		John Hull	3		Vitali Kalesnik	2
	Charles D. Ellis	3		Stanley Kogelman	3		Feifei Li	2
Tie 18–42	Don Ezra	3		Mark Kritzman	3		Juhani T. Linnainmaa	2
	Roger G. Ibbotson	3		Jean-Francois L'Her	3		Andrew W. Lo	2
Tie 18–42	Gerald R. Jensen	3		Matthew Richardson	3		Tālis J. Putniņš	2
	Robert R. Johnson	3		Laurence B. Siegel <sup>1</sup>	3		Xiao Qiao	2
Tie 18–42	Chansog (Francis) Kim	3		Alan White	3		Harindra de Silva	2
	Kees Koedijk	3					Laurens Swinkels	2
Tie 18–42	Josef Lakonishok	3					Steven Thorley	2
	Dean Leistikow	3					Jerry Tsai	2
Tie 18–42	Bing Liang	3					Hui (Stacie) Wang	2
	Jose Menchero	3					Zhenping Wang	2
Tie 18–42	Moshe A. Milevsky	3					Geoffrey J. Warren	2
	Christos Pantzalis	3					K.C. John Wei	2
Tie 18–42	Richard Roll	3						
	Richard W. Sias	3						
Tie 18–42	Laurence B. Siegel	3						
	Michael Stutzer	3						
Tie 18–42	Samuel H. Szewczyk	3						
	Raj Varma	3						

<sup>1</sup>Editor of the *Financial Analysts Journal* during this era (Note: Siegel Jan-Feb 2015).

the physician and that of the security analyst (1946b). He emphasized the importance of valuation in security analysis, recommending the

Securities and Exchange Commission's method of valuation—the application of standards of value to the relevant data (1946c). In a piece published at

Exhibit 3. Top Authors in the *Financial Analysts Journal* for the First 80 Years  
from 1945 through 2024

First 80 Years: 1945 through 2024 by AELNT

Rank	Author	AuthFreq
1	Robert D. Arnott <sup>1</sup>	59
2	Jack L. Treynor <sup>1</sup>	58
3	Martin L. Leibowitz	43
4	Robert Ferguson	31
5	Peter L. Bernstein	29
6	Charles D. Ellis	28
7	Nicholas Molodovsky <sup>1</sup>	26
8	Meir Statman	25
Tie 9-10	Fischer Black	24
	Richard M. Ennis <sup>1</sup>	24
Tie 11-12	Pierre R. Bretey <sup>1</sup>	22
	Rodney N. Sullivan <sup>1</sup>	22
Tie 13-14	Keith Ambachtsheer	20
	Edmund A. Mennis	20
15	Campbell R. Harvey	19
Tie 16-17	William F. Sharpe	18
	Roman L. Weil	18
Tie 18-21	Benjamin Graham	17
	Julian Gumperz	17
	Roger G. Ibbotson	17
	Bruce I. Jacobs	17
Tie 22-23	Gary L. Gastineau	16
	Edward F. Renshaw	16
Tie 24-27	Mark Kritzman	15
	Kenneth N. Levy	15
	Laurence B. Siegel <sup>1</sup>	15
	Robert W. Storer	15
Tie 28-32	Clifford S. Asness	14
	W. Scott Bauman	14
	Zvi Bodie	14
	John C. Bogle	14
	Shelby Cullom Davis	14
Tie 33-35	Edward I. Altman	13
	Walter R. Good	13
	Stephen B. Packer	13
Tie 36-39	Roger Clarke	12
	B. Barret Griffith	12
	Stanley Kogelman	12
	Steven Thorley	12
Tie 40-46	William H. Beaver	11
	Abraham J. Briloff	11
	Martin S. Fridson	11
	William S. Gray	11
	Douglas A. Hayes	11
	Ben Lansdale	11
	Herbert E. Neil	11
	Ralph A. Bing	10
	Frank E. Block	10
	G. Howard Conklin	10
	Don Ezra	10
	Mark Hirschey	10
	Jeremy C. Jenks	10

continued

**Exhibit 3. Top Authors in the *Financial Analysts Journal* for the First 80 Years  
from 1945 through 2024 (continued)**

**First 80 Years: 1945 through 2024 by AELNT**

Rank	Author	AuthFreq
	Ira G. Kawaller	10
	Andrew W. Lo	10
	Roger F. Murray	10
	Ragnar D. Naess	10
	Frank K. Reilly	10
	Richard Roll	10
	Joseph H. Spigelman	10
	Beryl W. Sprinkel	10
	Murray L. Weidenbaum	10
	Arthur Zeikel	10

<sup>1</sup>Editors of the *Financial Analysts Journal* who appear in the rankings: Arnott, 2003–2006; Treynor, 1970–1981; Molodovsky, 1964–1969; Ennis, 2007–2010; Bretey, 1947–1963; Sullivan, 2011–2014; Siegel 2015 (Jan-Feb). Note: This exhibit is based on Articles, Editorials, Letters to the Editor, Notes, and Talks (AELNT).

**First 80 Years: 1945 through 2024 by Articles**

Rank	Author	AuthFreq
1	Martin L. Leibowitz	38
2	Meir Statman	23
3	Jack L. Treynor <sup>1</sup>	22
4	Nicholas Molodovsky <sup>1</sup>	21
Tie 5–6	Robert D. Arnott <sup>1</sup>	19
	Robert Ferguson	19
7	Pierre R. Bretey <sup>1</sup>	17
8	Fischer Black	16
Tie 9–12	Charles D. Ellis	15
	Campbell R. Harvey	15
	Edmund A. Mennis	15
	Robert W. Storer	15
13	William F. Sharpe	14
Tie 14–15	Roger G. Ibbotson	13
	Stephen B. Packer	13
Tie 16–24	Edward I. Altman	12
	Roger Clarke	12
	Shelby Cullom Davis	12
	B. Barret Griffith	12
	Bruce I. Jacobs	12
	Stanley Kogelman	12
	Edward F. Renshaw	12
	Steven Thorley	12
	Roman L. Weil	12
25	Peter L. Bernstein	11
Tie 26–33	W. Scott Bauman	10
	Zvi Bodie	10
	G. Howard Conklin	10
	Don Ezra	10
	Benjamin Graham	10
	Douglas A. Hayes	10
	Kenneth N. Levy	10
	Frank K. Reilly	10

<sup>1</sup>Editors of the *Financial Analysts Journal* who appear in the rankings: Treynor, 1970–1981; Molodovsky, 1964–1969; Arnott, 2003–2006; Bretey, 1947–1963.

**Exhibit 4a. Word Frequency by AELNT in the *Financial Analysts Journal* within Each of Nine Distinct Eras from 1945 through 2024**

Classical Financial Era: 1944-1951*			Modern Portfolio Theory Era: 1952-1963			Alpha Beta Era: 1964-1972		
Rank	Word	WordFreq	Rank	Word	WordFreq	Rank	Word	WordFreq
1	industry	43	1	industry	133	1	investment	87
2	outlook	34	2	stock	89	2	stock	82
3	market	20	3	outlook	76	3	industry	69
4	utility	20	4	investment	74	4	market	60
5	investment	19	5	growth	69	5	earnings	57
6	railroad	19	6	market	69	6	financial	52
7	stock	18	7	stocks	54	7	new	42
8	security	17	8	business	44	8	performance	41
9	analysis	15	9	new	41	9	corporate	39
10	earnings	15	10	future	40	10	analysis	38
11	stocks	15	11	analysis	37	11	growth	36
12	securities	14	12	company	36	12	management	35
13	method	11	13	common	35	13	accounting	34
14	public	11	14	security	33	14	price	34
15	growth	10	15	economic	32	15	portfolio	33
16	new	10	16	oil	32	16	money	31
17	oil	10	17	financial	28	17	policy	31
18	common	9	18	research	28	18	capital	28
19	corporate	9	19	price	27	19	outlook	27
20	steel	9	20	analyst	25	20	economic	25
			21	earnings	25			

\*Lo defined the Classical Financial Era as starting in 1944.

Note: This exhibit is based on Articles, Editorials, Letters to the Editor, Notes, and Talks (AELNT).

the beginning of the next era, Graham (1952) reviewed the application of scientific methods to security analysis.

The word *earnings* was explored as price-earnings ratio and estimating earnings. Harold Young (1945) found that price-earnings ratio is closely correlated with the dividend payout ratio, based on a study of utility stocks. Tatham (1951) presented the earnings outlook for the electric utility industry within the context of a wartime economy. *Growth* distinguished between growth stocks and growth companies. Jeremy Jenks (1947) discussed characteristics of growth stocks, as well as their risks and returns. Gutman (1950) argued that size does not necessarily hinder growth and that growth companies can continue to expand even after becoming large.

**Modern Portfolio Theory Era (1952-1963).** The Modern Portfolio Theory (MPT) Era, inaugurated by Harry Markowitz's (1952) landmark work on portfolio theory, saw a profound shift, as *utility*,

*railroad*, and *steel* dropped out of the rankings and *business*, *future*, *company*, *economic*, *financial*, *research*, and *price* emerged, in that order, in the AELNT rankings.<sup>16</sup>

*Business* appeared as business cycles and business forecasting, and business machines (computers) became an area of focus. Edmund Mennis (1955) demonstrated that stock prices tend to lead business cycles. While *economic* reappeared in the AELNT ranking in the next era, it did not appear in subsequent eras. Nicholas Molodovsky (1963b), who ranks first among the FAJ contributors in AELNT and Articles for this era, illustrated that the complexities and challenges of financial analysis are ever-present and become even more pronounced during times of economic change.

The word *financial* has remained a stalwart across most succeeding eras, and during this era it was primarily used with *analyst(s)* in reference to financial analysts. Pierre Bretey (1952) discussed key financial and operating ratios for financial analysts

**Exhibit 4a. Word Frequency by AELNT in the *Financial Analysts Journal* within Each of Nine Distinct Eras from 1945 through 2024 (continued)**

Derivatives Era: 1973-1981			Automation Era: 1982-1988			Financial Globalization Era: 1989-1999		
Rank	Word	WordFreq	Rank	Word	WordFreq	Rank	Word	WordFreq
1	investment	55	1	stock	46	1	market	69
2	market	46	2	market	40	2	risk	66
3	stock	44	3	portfolio	35	3	stock	64
4	inflation	38	4	investment	29	4	performance	46
5	accounting	29	5	futures	23	5	returns	40
6	risk	26	6	pension	23	6	asset	36
7	financial	24	7	bond	20	7	equity	36
8	management	24	8	returns	20	8	investment	36
9	portfolio	21	9	risk	19	9	management	32
10	earnings	19	10	asset	18	10	bond	29
11	new	18	11	performance	18	11	bonds	29
12	long	17	12	bonds	15	12	stocks	27
13	analysis	16	13	duration	15	13	value	26
14	industry	16	14	financial	15	14	allocation	25
15	return	15	15	value	15	15	earnings	25
16	analysts	14	16	insurance	14	16	long	25
17	interest	14	17	model	14	17	financial	24
18	pension	14	18	allocation	13	18	fund	24
19	policy	14	19	analysis	13	19	international	24
20	prices	14	20	earnings	13	20	valuation	23
21	value	14	21	index	13			
			22	management	13			
			23	new	13			
			24	price	13			

Note: This exhibit is based on Articles, Editorials, Letters to the Editor, Notes, and Talks (AELNT).

in evaluating railroad securities. Mennis (1960) addressed challenges facing individuals and educational institutions in preparing financial analysts for the future. Graham (1963) claimed that financial analysis would be a rewarding profession for those with deep industry knowledge, technological expertise, keen management evaluation, insight into public psychology, or a talent for spotting bargains and special situations. Financial economics was in its nascent days, with an emphasis on research and market prices.

Research appeared in AELNT in the context of industry outlook research as well as research and development. It does not appear in subsequent eras. Jenks (1954) advised that investors should evaluate the quantity and quality of new product research when selecting securities. Price (or prices) appeared in this era and three others for both AELNT and Articles. Molodovsky (1953) developed a

theory for how the price-earnings ratio varies over a market cycle. Market and stock frequently appeared together, often in the phrase stock market. Robert Storer (1953), who ranks second among the FAJ contributors in AELNT and Articles for this era, suggested that stock markets can exhibit emotional behavior over short periods—an idea that was among the early contributions to what would later be known as behavioral finance.

Stock also appeared in the contexts of stock prices, stock valuation, and growth stocks. Molodovsky (1955) observed time-varying relationships between stock prices and current earnings, arguing that price-earnings ratios based on current earnings do not represent true capitalization multipliers. Molodovsky presented stock value as the present value of future earnings (1960a) and illustrated applications of this valuation method (1960b). The word growth frequently appeared with an increasing

**Exhibit 4a. Word Frequency by AELNT in the *Financial Analysts Journal* within Each of Nine Distinct Eras from 1945 through 2024 (continued)**

Algorithmic Trading Era: 2000–2009			Digital Assets Era: 2010–2019			Digital Transformation Era: 2020–2024		
Rank	Word	WordFreq	Rank	Word	WordFreq	Rank	Word	WordFreq
1	risk	46	1	risk	36	1	equity	13
2	stock	43	2	financial	28	2	fund	13
3	market	30	3	asset	26	3	investing	12
4	performance	29	4	market	22	4	returns	12
5	returns	28	5	stock	22	5	performance	10
6	investment	27	6	investing	21	6	factor	9
7	value	27	7	returns	20	7	market	9
8	pension	25	8	allocation	19	8	risk	9
9	fund	23	9	equity	19	9	stock	9
10	allocation	22	10	investment	18	10	alpha	8
11	portfolio	21	11	performance	18	11	corporate	8
12	asset	19	12	markets	17	12	ESG	8
13	equity	19	13	long	16	13	evidence	8
14	funds	19	14	management	16	14	markets	8
15	hedge	19	15	trading	15	15	mutual	7
16	return	19	16	portfolio	14	16	portfolio	7
17	corporate	17	17	strategies	14	17	private	7
18	earnings	17	18	active	13	18	bond	6
19	markets	17	19	volatility	13	19	long	6
20	investor	15	20	crisis	12	20	optimization	6
21	mutual	15	21	global	12	21	term	6
22	options	15	22	investors	12			

Note: This exhibit is based on Articles, Editorials, Letters to the Editor, Notes, and Talks (AELNT).

interest in growth-industry stocks and other growth stocks. Walter Maynard (1956) examined the challenges of investing in growth stocks, while Molodovsky (1963a) provided guidance on growth-stock investments.

*Investment* appeared in discussions on the investment process, including setting investment objectives and measuring and evaluating investment performance. *Investment* was also present in Edward Renshaw's proposal (with co-author Paul Feldstein 1960) for an unmanaged investment company to match the stock market's performance, advocating for passive index funds years before they were created. Interestingly, John C. Bogle, using the pen name John B. Armstrong (1960), offered a rebuttal in favor of active management, written well before his "conversion" to become the champion of index funds.

**Alpha Beta Era (1964–1972).** William Sharpe's (1964) foundational Capital Asset Pricing Model

(CAPM), developed contemporaneously with Jack Treynor's (1962) work, established the risk of an asset as its systematic risk, or "beta," versus the market portfolio. Michael Jensen (1968) proposed the measurement of a portfolio's performance versus a beta-adjusted market portfolio, or its "alpha." In the Alpha Beta Era, *performance*, *management*, *accounting*, *portfolio*, *money*, *policy*, and *capital* emerged as top-ranked words. The focus on portfolios had come of age, guided by accounting principles and policy. While *accounting* and *policy* appeared again in the Derivatives Era only, *portfolio* appeared in all subsequent eras in Articles.

*Portfolio* first emerged during this era and was used in various contexts, including portfolio management, goals, construction, diversification, performance, and evaluation. Frank Block (1969) noted the different approaches to portfolio construction between academia and practice. While academics focus on return, risk, diversification, and efficient markets, practitioners are more concerned with a

**Exhibit 4b. Word Frequency by Articles in the *Financial Analysts Journal* within Each of Nine Distinct Eras from 1945 through 2024**

Classical Financial Era: 1944-1951*			Modern Portfolio Theory Era: 1952-1963			Alpha Beta Era: 1964-1972		
Rank	Word	WordFreq	Rank	Word	WordFreq	Rank	Word	WordFreq
1	industry	22	1	stock	84	1	investment	78
2	investment	16	2	industry	70	2	stock	70
3	security	15	3	investment	63	3	industry	61
4	utility	15	4	market	57	4	earnings	51
5	analysis	14	5	growth	53	5	market	50
6	market	13	6	stocks	44	6	financial	39
7	stocks	13	7	analysis	37	7	performance	37
8	railroad	12	8	common	31	8	new	36
9	stock	10	9	new	31	9	management	35
10	public	9	10	security	31	10	growth	33
11	earnings	8	11	economic	26	11	price	33
12	method	8	12	business	25	12	analysis	29
13	outlook	8	13	price	24	13	corporate	29
14	corporate	7	14	earnings	23	14	portfolio	29
15	factors	7	15	corporate	19	15	accounting	26
16	securities	7	16	prices	19	16	policy	25
17	common	6	17	companies	18	17	capital	24
18	future	6	18	future	18	18	outlook	24
19	growth	6	19	analyst	17	19	money	23
20	impact	6	20	financial	17	20	stocks	22
21	trends	6						

\*Lo defined the Classical Financial Era as starting in 1944.

broader concept of risk, including time horizon, volatility, and imperfect markets. Fischer Black (1971a) argued that investors would be better off buying and holding well-diversified portfolios.

Policy appeared in the contexts of monetary policy, investment policy, and antitrust policy. Stephen Packer (1965), who ranks first in Articles for this era, advocated for the use of both fiscal and monetary policies, defending monetary policy against criticisms regarding its effectiveness in controlling business fluctuations. Mennis (1968), who is tied for second in AELNT in this era, provided a framework for establishing an appropriate investment policy for pension funds. This framework includes setting investment objectives, determining the fixed-income-to-equity ratio, selecting investment advisers, and ensuring diversification.

The literature on performance included the evaluation of pension fund and mutual fund investment performance as well as a growing emphasis on the performance of sell-side analysts. Contrary to the random walk hypothesis (Eugene Fama 1965),

Robert Levy (1967) showed that stocks exhibited relative strength, which later became known as momentum. Motivated by this finding, Renshaw (1968) found that a strategy of investing in the prior year's best-performing industries outperformed the market in the subsequent year. Bogle (1970) suggested an approach for evaluating mutual funds—one that considers not just performance, but risk, expectations, and the market environment.

The discussion of money reflected growing interest in the notions of easy money, tight money, and the quantity of money. Leonard Ascher (1965) examined the economic impact of the easy money policy that began in 1960 during the U.S. recession. Capital was explored in the contexts of cost of capital, capital markets, capital budgeting, and venture capital. Joseph Murphy (1967) concluded that neither the rate of return on equity capital nor the earnings retention ratio are reliable predictors of future earnings-per-share growth. Sidney Homer (1969) warned that inflation expectations would lead investors to demand not only higher yields from bonds but also higher growth rates from equities.

**Exhibit 4b. Word Frequency by Articles in the *Financial Analysts Journal* within Each of Nine Distinct Eras from 1945 through 2024 (continued)**

Derivatives Era: 1973-1981			Automation Era: 1982-1988			Financial Globalization Era: 1989-1999		
Rank	Word	WordFreq	Rank	Word	WordFreq	Rank	Word	WordFreq
1	investment	45	1	stock	33	1	risk	53
2	market	43	2	market	30	2	market	48
3	stock	38	3	portfolio	24	3	stock	41
4	inflation	33	4	investment	20	4	performance	39
5	accounting	29	5	returns	18	5	asset	31
6	risk	23	6	asset	17	6	returns	30
7	financial	22	7	futures	17	7	equity	26
8	management	21	8	pension	16	8	international	23
9	new	17	9	performance	14	9	bond	22
10	industry	16	10	risk	14	10	bonds	22
11	portfolio	16	11	bond	13	11	allocation	21
12	analysis	13	12	allocation	12	12	fund	20
13	earnings	13	13	model	12	13	value	20
14	long	12	14	bonds	11	14	investment	19
15	pension	12	15	financial	10	15	management	19
16	policy	12	16	index	10	16	portfolio	18
17	corporate	11	17	return	10	17	stocks	17
18	equity	11	18	trading	10	18	model	16
19	funds	11	19	analysis	9	19	portfolios	16
20	prices	11	20	corporate	9	20	valuation	15
21	securities	11	21	earnings	9			
22	value	11	22	inflation	9			
			23	management	9			
			24	options	9			
			25	price	9			

Market appeared in the contexts of stock market, capital market, money market, market valuation, and market instability. Renshaw (1967) argued that mutual fund managers' failure to actively exploit buying opportunities during market declines partially contributed to the market instability observed in 1962 and 1966. Market was also associated with market sensitivity (beta), as explored in an article by Sharpe (1972). Stock(s) appeared in the contexts of stock valuation models and defensive stocks. Black (1971b, 1971c), in a prescient two-part article, advocated for an automated stock exchange with centralized electronic trading. Sharpe (with co-author Guy Cooper 1972) stratified common stocks into risk-return classes using an empirical implementation of the CAPM.

Julian Gumperz (1967), who ranks first in AELNT in this era, acknowledged the usefulness of computers

in financial analysis but cautioned that they cannot replace analysts' disciplined search for investment value. The word *earnings* was scrutinized in the literature addressing reported earnings, earnings dilution, and overstated earnings. Mennis (with co-authors Sidney Cottle and Mary Schuelke 1971) discussed the roles of long-term *corporate* earnings projections in investment decision-making.

**Derivatives Era (1973-1981).** With the advent of the Black-Scholes-Merton option pricing model (Black and Myron Scholes 1973; Robert Merton 1973), the Derivatives Era saw the emergence in the rankings of *inflation*, *risk*, *long*, *return*, *analysts*, *interest*, *pension*, and *value*. Analysts identified rising inflation and interest rates as key risks that could impact unfunded pension liabilities.

**Exhibit 4b. Word Frequency by Articles in the *Financial Analysts Journal* within Each of Nine Distinct Eras from 1945 through 2024 (continued)**

Algorithmic Trading Era: 2000–2009			Digital Assets Era: 2010–2019			Digital Transformation Era: 2020–2024		
Rank	Word	WordFreq	Rank	Word	WordFreq	Rank	Word	WordFreq
1	risk	42	1	risk	28	1	equity	13
2	stock	34	2	market	19	2	fund	12
3	market	26	3	stock	18	3	investing	12
4	returns	24	4	equity	17	4	returns	12
5	performance	22	5	investing	16	5	factor	9
6	value	22	6	performance	16	6	performance	9
7	fund	20	7	asset	15	7	risk	9
8	funds	17	8	financial	15	8	stock	9
9	allocation	16	9	returns	14	9	alpha	8
10	investment	16	10	trading	13	10	corporate	8
11	asset	15	11	volatility	13	11	evidence	8
12	earnings	15	12	allocation	11	12	market	8
13	hedge	15	13	markets	11	13	markets	8
14	pension	15	14	factor	10	14	ESG	7
15	equity	14	15	fund	10	15	private	7
16	corporate	13	16	funds	10	16	bond	6
17	credit	12	17	investment	10	17	mutual	6
18	financial	12	18	long	10	18	asset	5
19	management	12	19	management	10	19	factors	5
20	mutual	12	20	portfolio	10	20	financial	5
21	portfolio	12	21	return	10	21	long	5
			22	strategies	10	22	management	5
						23	portfolio	5
						24	portfolios	5
						25	return	5
						26	term	5

In this high-inflation era, *inflation* was studied in terms of its influence on valuation and productivity. Sidney Davidson and Roman Weil (1976), who ranks first in Articles for this era, examined the impact of inflation accounting using replacement costs on financial statement analysis. Franco Modigliani (with co-author Richard Cohn 1979) hypothesized that market valuation errors stem from inflation illusion arising from divergences and misperceptions of nominal and real interest rates. Roger Ibbotson (with co-author Rex Sinquefield 1979) presented historical annual returns since 1926 for common stocks, long-term government bonds, long-term corporate bonds, Treasury bills, and a consumer-goods measure of inflation. *Inflation* appeared again in the Automation Era for the Articles category, but not in subsequent eras, which saw declining rates of inflation, and thus diminished concern about rising prices. *Interest*, affected by inflation, referred to the cost of

borrowing and, in a different context, to short interest representing shares sold short.

The appearance of *pension* as a top word in this era reflects the passage of the Employee Retirement Income Security Act of 1974 (ERISA), which set standards for corporate retirement plans and mandated fiduciary responsibilities. Adopting a more disciplined approach to managing pension portfolios was encouraged (Cottle 1977). Treynor (with co-authors Patrick Regan and William Priest 1978), who ranks first in AELNT for this era, suggested that pension beneficiaries should verify whether their pension claims are fully secured by examining an augmented corporate balance sheet that treats pension claims, discounted at the riskless rate, as corporate liabilities and includes the market value of pension assets as corporate assets. *Pension* appeared again in the Automation and Algorithmic Trading eras.

During this era, *risk* took center stage and appeared in a variety of contexts—including risk and return, risk and liquidity, market risk, portfolio risk, risk policy, risk reduction, and risk measurement.

Modigliani (with co-author Gerald Pogue 1974a, 1974b) provided an introduction to portfolio and capital market theories, offering a framework for defining and measuring investment risk, establishing relationships between risk and expected return, and evaluating the performance of portfolios. Barr Rosenberg (1979) developed a practical method for deriving the appropriate risk-reward tradeoff for active management based on the asset-allocation decision. Zvi Bodie (with co-author Victor Rosansky 1980) examined the complementary nature of the risk and return of commodity futures compared to stocks and their ability to act as an inflation hedge. *Risk* also appeared in every subsequent era.

*Value* appeared in diverse contexts—including Value Line, intrinsic value, current value accounting, and residual value. Weil and Robert Kaplan (1973) questioned the efficacy of the Value Line ranking system. In contrast, Black (1973), who is tied for third place in AELNT and Articles for this era, was more supportive of its effectiveness. *Investment* morphed into alternative investments, such as hedge funds, commodities, private equity, and venture capital, as these unconventional investments continued to grow in popularity.

*Market* had numerous contexts, including capital market theory and efficient market hypothesis. Sharpe (1973) demonstrated that a portfolio comprised of bonds and stocks is more mean-variance efficient than portfolios consisting solely of either asset class, consistent with the capital market theory. *Market* also appeared in terms of market structure, specifically market impact and market maker, as well as markets for futures and options. *Stock* was considered in terms of small-cap stocks (Marc Reinganum 1981), which gained attention in both the literature and practice due to their performance relative to the predictions of the CAPM. *Management* appeared in various contexts, including bond management and pension fund management. Keith Ambachtsheer (with co-author James Farrell 1979) recommended an approach for effective active portfolio management.

Charles Ellis (1975) cautioned that active management was a loser's game, and that investors could win by playing defensively. Treynor (1976) wrote that *long-term* investing success depended on insightful, unconventional thinking. Further complicating investing, corporate *earnings* were often

*managed* and their *quality* was questioned; nevertheless, Black (1980) suggested that earnings are a more reliable measure of value than book value.

**Automation Era (1982–1988).** In the Automation Era, with the ascent of program trading of baskets of stocks, *futures*, *bond*, *asset*, *duration*, *insurance*, *model*, *allocation*, *index*, and *options* appeared in the rankings. Models proliferated in this era. Stock index futures volume soared with automated stock-futures arbitrage.

The word *bond* first appeared in this era, coinciding with the development of term structure models, advances in bond pricing models, and the rapid growth of the high-yield debt market. Martin Leibowitz (1986a, 1986b), who ranks first in AELNT and Articles for this era and holds the top position in Articles over the entire 80-year span, introduced dedicated bond portfolios designed to minimize the risk of not meeting nominal-dollar pension liabilities. Edward Altman (with co-author Joseph Spivack 1983) developed a bond-default-prediction system using company financial variables. Altman (1987) analyzed the elevated default rate of high-yield debt in 1986 and suggested that the high-yield market would remain resilient as the quality of lower-rated debt and new issues improved. *Bond* also appeared in the ranking in the next era and in the Digital Transformation Era.

*Duration* and convexity became standard tools in bond portfolio management, particularly with the rise of portfolio immunization strategies. G.O. Bierwag and George G. Kaufman (with co-author Alden Toebs 1983) noted that duration is a better measure of interest-rate exposure than term to maturity. Jess Chua (1984) introduced a generalized closed-form formula for calculating bond duration. Leibowitz (1986c) developed a measure of total portfolio duration using bond market duration and a derived estimate of the duration of the stock market.

The increasing complexity of managing large, diversified *pension* portfolios led to a stronger focus on strategic asset allocation and the adoption of modern portfolio theory and asset-liability management techniques. Leibowitz (1987) explained that a pension plan's surplus risk (plan assets less the present value of plan liabilities) is related to the mismatch between the duration of its assets and its liabilities. Pension plan assets consisting of both equity and debt typically have a lower duration than that of plan liabilities, exposing the plan to interest rate

risk. Ambachtsheer (1987) advocated for a 60/40 equity/debt asset mix in pension fund asset allocation, reasoning that this balance would be effective in meeting long-term pension liabilities. Leibowitz (with co-author Roy Henriksson 1988) explored using portfolio optimization to determine the asset allocation when assets and liabilities are considered jointly.

The phrase *asset allocation* also appeared in a broader context beyond pension fund management. Robert Arnott, who ranks second in both AELNT and Articles during this era and first in AELNT over the entire 80-year period (with co-author James von Germeten 1983) advocated for a systematic approach to asset allocation, an inherently contrarian strategy that resists the prevailing market consensus. Sharpe (1987) introduced integrated asset allocation, which considers an investor's risk tolerance and capital market conditions. Sharpe (with co-author Andre Perold 1988) discussed dynamic asset allocation and compared four strategies: buy-and-hold, constant mix, constant-proportion portfolio insurance, and option-based portfolio insurance. Dynamic asset allocation also appeared as synthetic-option asset allocation. *Allocation* appeared in all subsequent eras except the Digital Transformation Era.

*Insurance* in this era referred not to the insurance industry, but rather to the portfolio insurance strategy, which was introduced in the last year of the previous era by Mark Rubinstein (with co-author Hayne Leland 1981). Portfolio insurance sought to protect equities by using a put-option-replication formula for changing the allocation to stocks as the market rose or fell. Rubinstein (1985) advocated for such dynamic asset allocation given the shortcomings of exchange-listed options. Roger Clarke and Arnott (1987) evaluated the costs of the portfolio insurance strategy.

Rubinstein (1988) argued that it was "unlikely" portfolio insurance contributed to the Black Monday stock market crash of October 19, 1987, attributing the strategy's failure instead to the lack of price continuity and higher-than-normal transaction costs. Richard Roll (1988) contended that the crash started overseas.<sup>17</sup> Published at the outset of the next era, Robert Ferguson (1989) suggested that investors generally behave like portfolio insurers, selling during a crash. To overcome the liquidity problems that beset the portfolio insurance strategy, Rubinstein (1989) argued that trading large, diversified portfolios of stocks might reduce the risk of market destabilization. However, an imbalance

between portfolio insurers and value investors could give rise to market instability (Joanne Hill and Frank Jones 1988).

Ibbotson, Jeffrey Diermeier, and Laurence Siegel (1984) posited that capital *market returns* are dependent on non-risk characteristics such as taxation, marketability, and information costs, as well as risk. *Market* appeared as market inefficiency, contrary to the efficient market hypothesis, and as market anomalies. The word *returns* was used in the contexts of disentangling equity returns cross-sectionally through multivariate regression on firm characteristics and calendar anomaly returns, both explored by Bruce Jacobs and Ken Levy (1988a, 1988b), offering insights into market inefficiencies. *Risk* was examined in diverse contexts—equity risk premium, risk control, systematic risk, and political risk. Josef Lakonishok (with co-author Willard Carleton 1985) analyzed the challenges of using historical return data to estimate the equity risk premium.

Roll (with co-author Stephen Ross 1984) provided an intuitive exposition of Ross's (1976) Arbitrage Pricing Theory (APT) and explored its empirical implementation in *portfolio* strategy design, emphasizing the optimal selection of exposures to systematic economic factors. Richard Bookstaber and Clarke (1985) evaluated the *performance* of portfolios on which *option* positions are taken, requiring consideration of portfolio skewness and other higher moments of the return distribution. Haim Levy (with co-authors Robert Brooks and James Yoder 1987) showed that stochastic dominance is useful for evaluating the relative benefits of various portfolios with options.

*Performance* was a predominant theme across various contexts, including the relative performance of gold and U.S. common stocks after inflation adjustment, global portfolio performance involving emerging markets, determinants of portfolio returns, convexity and bond performance, and performance fees in investment management. An analysis of U.S. pension plans showed that total portfolio return was mostly explained by investment policy, rather than market timing or security selection (Gary Brinson, Randolph Hood, and Gilbert Beebower 1986).

Several *models* were introduced, including the binomial option valuation model, a stock valuation model based on expected growth in book equity, several variations of the dividend discount model,

and a multifactor asset pricing model. Richard Dowen and W. Scott Bauman (1986) found that both the low price-earnings ratio factor and the small capitalization factor positively affected portfolio returns, highlighting the inadequacy of relying solely on the CAPM. *Model* appeared again in the next era in the Articles ranking but not in AELNT. Despite the introduction of inflation-adjusted *earnings* measures, historical earnings remained a reliable indicator in explaining corporate dividend decision-making (Sasson Bar-Yosef and Baruch Lev 1983). Lakonishok (with co-author Dan Givoly 1984) presented evidence that analysts' earnings forecasts serve as a reasonable proxy for market expectations, and that the dispersion among these forecasts is a meaningful proxy for risk.

**Financial Globalization Era (1989–1999).** The rise of the internet facilitated global communication and commerce during the Financial Globalization Era. Consequently, *international* became a top-ranked word in this era, encompassing *valuation* of international investment, international asset allocation, international accounting standards, and international diversification. Preceding this era by over a decade was a prescient article, "Why Not Diversify Internationally Rather Than Domestically?" (Bruno Solnik 1974). Sharpe (with co-authors Carlo Capaul and Ian Rowley 1993) documented a value effect in international stock markets. Bauman (with co-authors Mitchell Conover and Robert Miller 1998) found that value stocks outperformed growth stocks, and small-cap stocks outperformed large-cap stocks in international markets.

*Equity* duration was investigated by Leibowitz and Stanley Kogelman (1993) in their Franchise Factor Model, which incorporates the varying sensitivities of a firm's current and future businesses to changes in interest rates and inflation. *Equity* was also explored in the contexts of the equity risk premium and mispricing of shorts, and Jacobs and Levy (1996) debunked certain myths about long-short equity strategies.

*International* and *equity* were associated with international equity returns and optimizing currency risk and reward in international equity portfolios. Black (1989b) proposed a universal hedging formula that would apply to all investors holding international equity portfolios based on the assumption that they share common expectations regarding stocks and currencies. Mark Kritzman (1989) presented a simple procedure for determining the optimal currency hedge.

*Market* was used in the contexts of market regulation and market makers. Gary Gastineau (with co-author Robert Jarrow 1991) suggested curtailing market manipulation by improving the efficiency of markets through appropriate regulation. Meir Statman (with co-author Hersh Shefrin 1993) explored the tradeoff between ethics or fairness and economic efficiency in shaping the regulation of financial markets. Hans Stoll (1998) argued that increasing competition across markets and the rise of electronic trading would reduce the role of market makers.

As in earlier eras, *risk* was used in various contexts, including risk tolerance, risk aversion, downside risk, shortfall risk, default risk, and political risk. Peter Bernstein (1995) documented the evolution and changing perceptions of risk throughout history. Black (with co-authors Emanuel Derman and William Toy 1990) introduced a one-factor *model* of interest rates and used it to value a Treasury bond option. Gregory Connor (1995) compared the explanatory power of three types of factor models—macroeconomic, fundamental, and statistical. Philippe Jorion (1996) analyzed estimation error in the value-at-risk (VAR) measure. Gifford Fong (with co-author Oldrich Vasicek 1997) analyzed risk in three dimensions—sensitivity analysis, VAR, and stress testing. Jacobs and Levy (with co-author David Starer 1998) examined the optimality of long-short strategies and introduced the concept of 130-30 equity portfolios.<sup>18</sup>

Black (1989a) argued that stocks can serve as a hedge against rising pension liabilities due to the positive relationship between stock returns and salary inflation. During this era, numerous papers emerged examining various stock styles—such as growth versus value and large-cap versus small-cap—as well as the relationship between stocks and bonds, including their correlation, performance, and associated risk. Donald Keim (1990) found that the size and earnings-yield effects are significant, although the size effect appears only in January. Bodie (1995) questioned the conventional wisdom that stocks are less risky in the long run. Renshaw (1990) proposed several rules for identifying stock market bubbles, including indicators such as low dividend yields and high price-earnings ratios. Renshaw (1997) also suggested the possibility that due to a decline in both dividend and earnings yields, the before-tax returns on stocks may not exceed those of corporate bonds.

Richard Michaud (1989) and Jorion (1992) examined estimation errors in *portfolio* optimization inputs

and advocated for Bayesian shrinkage and other methods to address them. Black (with co-author Robert Litterman 1992) introduced global portfolio optimization anchored by equilibrium expected returns. Statman (1999) explained investor apprehension toward adding foreign stocks to their portfolios, suggesting that they engage in mental accounting by categorizing assets into separate psychological compartments.

Performance was analyzed across various contexts, including international equity markets, currency-hedged foreign bonds, multicurrency performance attribution, the globalization of performance presentation standards, and the performance of analysts' buy and sell recommendations. Statman (with co-authors Sally Hamilton and Hoje Jo 1993) found that the performance of socially responsible mutual funds does not significantly differ from that of conventional mutual funds. Ambachtsheer (with co-authors Ronald Capelle and Tom Scheibelhut 1998) documented the weak performance of pension fund investments and examined several factors influencing performance, including fund size proxying for professional management, the proportion of assets managed passively, and the quality of the fund's governance.

There was active research into the determinants of stock *returns*—both at the individual security and portfolio levels—and the underlying sources of their predictability. Campbell Harvey (with co-author Wayne Ferson 1991) indicated that much of the predictability in portfolio returns can be attributed to variations in beta and shifts in risk premiums, as captured by a multi-beta asset pricing model. Black (1993) argued that estimating expected returns requires theory, as reliance solely on data is vulnerable to data-mining biases. Bernstein (1997) found that a significant portion of the realized long-term excess returns of equities over bonds was driven by an upward revaluation of equities and a downward revaluation of bonds. Connor (with co-authors Stan Beckers and Ross Curds 1996) found that national and global factors contribute approximately equally to the co-movements observed in equity returns.

The phrase *asset allocation* was used in various contexts, including global and international asset allocation, asset allocation with downside risk, and optimal asset allocation. Arnott (with co-author Henriksson 1989) proposed a disciplined approach to global asset allocation based on comparing relative risk premiums across countries. Don Ezra (1991) recommended that asset allocation should consider the valuation of pension plan

liabilities, which depends on the actuarial assumptions for salary growth, inflation, and other factors. The word *asset* was also studied in the context of a manager's capacity to handle assets under management (Perold and Robert Salomon 1991).

*Management* appeared in Sharpe's (1991) simple yet incisive analysis of the arithmetic of active management, which states: "[B]efore costs, the return on the average actively managed dollar will equal the return on the average passively managed dollar." Eric Sorensen (with co-authors Keith Miller and Vele Samak 1998) discussed the allocation of investment between active and passive management based on the skill of the active managers.

Leibowitz and Kogelman (1994), who rank first and second in Articles for this era, respectively, illustrated the concept of *earnings* growth illusion, noting that while earnings growth may reflect value preservation from existing opportunities, only growth that exceeds current expectations truly enhances value. *Earnings* was also used in the contexts of earnings expectations life cycle, using earnings estimates for global asset allocation, and earnings manipulation. Clifford Asness (1997) documented that while *value* generally performs well, it tends to underperform for stocks with strong momentum; whereas momentum is broadly effective, especially among low-value stocks. *Fund* appeared in the context of mutual fund performance, pension funds' global asset allocation, and the shortfall risk in pension fund asset management.

**Algorithmic Trading Era (2000–2009).** The Algorithmic Trading Era began with the bursting of the internet bubble, witnessed the birth of high-frequency trading, and ended with the Global Financial Crisis (GFC) of 2008–2009. This era saw the introduction of *hedge* as hedge funds became more dominant, and *options* reappeared with options trading.

Hedge fund activism was a popular topic, along with hedge fund performance and hedge fund benchmarks. Bing Liang (2001) studied hedge fund risk and performance, finding that hedge fund returns as a group were less volatile than the S&P 500 Index, although their total returns were lower than the index. William Fung and David Hsieh (2002, 2004) identified hedge fund styles modeled with asset-based style factors to measure risk-adjusted performance, and Liang (with co-authors Stephen Brown, William Goetzmann, and

Christopher Schwarz (2009) developed a model to measure hedge fund operational risk. M. Barton Waring and Siegel (2006) argued that hedge funds' absolute-return investing is misleading, as all investing is ultimately relative. Success lies in generating alpha over benchmarks.

Options were examined in various contexts, including index options, employee stock options, and real options. Manuel Ammann (with co-author Silvan Herriger 2002) compared the implied volatilities of several pairs of highly correlated stock index options and identified numerous mispricings, only a small fraction of which could be realized as profitable arbitrage opportunities net of transaction costs. Ammann (with co-author Ralf Seiz 2004) examined various models for valuing employee stock options and found that pricing differences were generally negligible across the models. Tom Arnold (with co-author Timothy Crack 2004) proposed a real option valuation model using the weighted average cost of capital and physical probabilities as an alternative to a more complex model that employs risk-free rates and risk-neutral probabilities.

Various aspects of *risk* were scrutinized in this era. For instance, Lo (2001) examined several unique aspects of risk management for hedge funds. Darrell Duffie (with co-author Alexandre Ziegler 2003) found that market turmoil can lead to illiquidity and substantial increases in various risk measures such as likelihood of insolvency, value at risk, and expected tail loss. Jacobs (2004) discussed the fragility of financial institutions offering products that purport to protect investors from systematic market risk. Foreshadowing the GFC, Jacobs argued that taxpayers could become the risk bearer of last resort if such firms were deemed "too big to fail." Sharpe (2002) observed that due to the significant correlations among the returns of managers in a typical *pension fund*, pension fund risk cannot be accurately represented as the simple sum of the individual components' risks. Richard Ennis (2007) critiqued current public pension valuation and funding practices, advocating for reforms such as fair value accounting, risk-sharing mechanisms, and responsible legislative oversight to promote long-term sustainability and fairness for taxpayers.

The word *market(s)* was explored within competing theoretical frameworks, such as rational markets versus market bubbles, and in the context of financial market regulation. Markowitz (2005) showed that the central conclusions of the CAPM—that the market portfolio is efficient and a security's

expected return depends linearly on its beta—are only valid under the unrealistic assumption that investors either have access to unlimited borrowing at the risk-free rate or can short unlimited amounts and use the proceeds to buy securities long. Statman (2009) contrasted supporters and opponents of financial market regulation, highlighting how market crashes and booms shift the balance between them. *Market* also referred to the burgeoning area of market microstructure, the examination of which had been initiated by Treynor under the pseudonym Walter Bagehot (1971) in the Alpha Beta Era. Treynor explained that market makers set their spread between bid and ask prices so that the profit they earn from liquidity-motivated traders is greater than the losses they incur from information-motivated traders. The issues and challenges of the market for structured financial products—mortgage-backed and asset-backed securities—were addressed (Frank Fabozzi 2005).

Arnott, the top-ranked author in AELNT for this era, (with co-authors Jason Hsu and Philip Moore 2005) introduced a new type of stock market index with weightings based on company fundamentals rather than stock market capitalization. The word *stock* appeared in contexts related to stock returns, market crashes, market bubbles, and employee stock options. Several factors influencing stock returns were analyzed, including investor sentiment, money flows, value at risk, accruals, and capital investments. *Portfolio* appeared in contexts related to portfolio construction, performance evaluation, and optimization. Clarke, Harindra de Silva, and Steven Thorley (2002) developed a method to measure the impact of portfolio constraints on performance. Jacobs, Levy, and Markowitz (2006) demonstrated that portfolio optimization with factor or scenario models developed for long-only portfolios generally can be applied to long-short portfolios.

Ibbotson and Paul Kaplan (2000) analyzed the proportion of fund performance attributable to the *asset allocation* policy. The performance characteristics of a diversified portfolio of commodity futures as a distinct *asset class* were explored (Gary Gorton and K. Geert Rouwenhorst 2006), and Harvey (with co-author Claude Erb 2006) found that commodity futures offer potential strategic and tactical value.

*Corporate* appeared prosaically as corporate valuation, corporate profitability, and corporate governance. With the Enron bankruptcy in 2001, however, *corporate* was also associated with corporate fraud, corporate fiascos, and corporate

malfeasance. Bogle (2005) explored the implications of the financial intermediation costs associated with active management versus less costly passive management. Leibowitz (2005) contrasted the opportunities and challenges of active management with those of passive management.

In 2009, the Journal published a series of articles about the GFC, reflecting on the preceding era and exploring potential future developments. Markowitz (2009) advocated for a government survey of exposures to obscure financial instruments to obtain transparency and restore trust in the financial system. Jacobs (2009) found that the *credit* crisis of 2008–2009 was caused by the collapse of a tower of structured mortgage products that had shifted the risk of lending from one party to another until the real risks were not observable. In the next era, Roll (2011) argued that the crisis was not related to excessive leverage, subprime mortgages, exotic derivatives, reckless risk taking, or easy money, but rather to investors' nervousness over the expansion of the public sector relative to the private sector.

**Digital Assets Era (2010–2019).** The Digital Assets Era was heralded by the introduction of bitcoin, the pioneering cryptocurrency. Weil (with co-authors Franklin Edwards, Kathleen Hanley, and Robert Litan 2019) addressed the benefits and risks of crypto asset markets and the role of regulation. Lo (2021) also discussed various digital technology, including smartphones, apps (e.g., taxi and ridesharing, banking, trading, and financial advisory), social media, meme stocks, Reddit, and artificial intelligence (AI) tools such as machine learning and natural language processing, as well as environmental, social, and governance (ESG) investing, as developments during this era. ESG made the rankings in the next era.<sup>19</sup>

The GFC undoubtedly boosted the ranking of the word *risk* in the previous and current era, as the risk of mortgage securities, tail risk, liquidity risk, disaster risk, and risks to financial stability became concerns. Litterman (2011) suggested investors price climate change risk. Asness, Andrea Frazzini, and Lasse Pedersen (2012) discussed a portfolio allocation strategy called risk parity, which uses leverage to equalize the allocation of risk across asset classes. Siegel (2010) had earlier questioned whether the risk parity approach was consistent with classical finance theory. Lisa Goldberg and Stephen Bianchi (with co-author Robert Anderson 2012) cautioned about the time-period dependency and transaction costs of the risk parity approach.

The growing interest in alternative equity strategies such as "smart beta" boosted the ranking of *equity*. Hsu, Vitali Kalesnik, and Tzee-Man Chow (with co-author Bryce Little 2011) found that the outperformance of various alternative equity index strategies compared to market-capitalization-weighted indices is due to their exposure to value and size factors. Asness (2014) explained that these strategies—specifically smart beta, fundamental indexing, scientific indexing, and risk parity—are not passive; rather, they entail deviating from capitalization weights, which is the definition of active management.

*Asset* mainly appeared in the context of asset allocation. Ibbotson (2010), who is tied for first place in Articles for this era, indicated that while asset allocation is important for determining fund performance, it may not be as dominant as previously thought. Sharpe (2010) proposed asset allocation policies that adapt to the current relative market values of asset classes. Thomas Idzorek (with co-author Maciej Kowara 2013) advised exercising caution regarding the claimed superiority of *factor-based* asset allocation over *asset-class-based* asset allocation.<sup>20</sup>

The frequency of the word *markets* reflected alternatives to the efficient market hypothesis, including Lo's (2012) adaptive markets hypothesis, which views markets as efficient at certain times and behavioral at others.<sup>21</sup> Markets also were analyzed in the context of Jacobs and Levy's (2014) multidimensional markets with numerous factors and Jacobs and Levy's (with co-author Markowitz 2010) simulator for modeling security market behavior.

*Investing* appeared in factor investing, investing in emotional assets, style investing, low-risk investing, value investing, passive investing, active investing, and carry investing. *Trading* appeared in the contexts of pairs trading, high-frequency trading (HFT), and informed trading (insider transactions). Larry Harris (2013) discussed the potential value and risks of HFT.

*Stock* and *return(s)* often appeared together in the context of stock return prediction. Ibbotson (with co-author Philip Straehl 2017) provided evidence that total payouts (dividends plus buybacks) are the key drivers of long-run stock market returns. Sébastien Page, who is tied for first place in Articles for this era (with co-authors Hailey Lynch, Robert Panariello, James Tzitzouris, and David Giroux 2019) found that when the trading volume of ETFs spikes, the correlations between the index constituents increase to

levels not justified by company-level fundamentals, giving rise to opportunities for stock pickers.

*Performance* appeared in the contexts of active investing, levered strategies, mutual funds, hedge funds, bond funds, and private equity. Ellis (2014) recommended that investment managers' performance goals focus on determining each client's objectives and designing the appropriate long-term investment programs to meet those objectives. Bianchi and Goldberg (with co-author Anderson 2014) analyzed several determinants of the cumulative return to a levered strategy. Frazzini and Pedersen (with co-author David Kabiller 2018) documented that Warren Buffett's exceptional performance can be attributed to his steadfast adherence to the Graham and Dodd principles and prudent use of leverage.

*Fund* was primarily associated with mutual funds and hedge funds. Bogle (2016) proclaimed that the triumph of index mutual funds refuted naysayers' rallying cry 40 years earlier that index funds are "unAmerican." However, Bogle drew a distinction between traditional index funds—intended for long-term investors—and exchange-traded funds (ETFs), which are frequently used for short-term trading, speculation, or hedging.

The appearance of *volatility* was associated with the option-implied volatility skew, short volatility strategies, and idiosyncratic volatility. Xi Li, who is tied for first place in Articles for this era, Rodney Sullivan, who ranks first in AELNT and is tied for first place in Articles for this era, and Luis García-Feijóo (2014) found that the low-volatility anomaly is not robust after consideration of transaction costs. Harris (with co-author Vineer Bhansali 2018) cautioned that short volatility strategies could potentially lead to a serious market crash if investors were to unwind positions simultaneously.

*Portfolio* mostly appeared in the contexts of portfolio construction, portfolio performance, and portfolio optimization. Kritzman and Page (with co-author David Turkington 2010) demonstrated that optimized portfolios outperform 1/N portfolios when plausible estimates of expected returns, volatilities, and correlations are used. Jacobs and Levy (2012) developed a mean-variance-leverage (MVL) optimization model to determine the optimal leveraged long or long-short portfolio by adding investor leverage aversion as a third dimension to the traditional mean-variance model. The MVL model allows investors to determine the "right amount" of portfolio leverage with the "right kind" of diversification,

taking into account an investor's volatility aversion and aversion to the unique risks of leverage. Chow (with co-authors Engin Kose and Feifei Li 2016) analyzed the impact of applying commonly used constraints on the characteristics and turnover of minimum-variance portfolios.

In this era, *active* made the rankings in AELNT and referred to active management and active share. James Xiong, Ibbotson, and Idzorek (with co-author Peng Chen 2010) documented that active management is about as important as asset allocation in explaining return variations among funds within a peer group of portfolios. Ellis (2015), who ranks second among top authors in AELNT in this era, argued that active management, despite often falling short of the market return, does the work of price discovery and thereby makes the markets more efficient for all investors and for the allocation of capital. Pedersen (2018) challenged Sharpe's arithmetic of active management equality, arguing that even passive investors need to trade and may do so at less attractive prices than active investors because the market portfolio is constantly evolving due to new issuances, repurchases, index reconstitutions, and other factors.

*Crisis* first appeared in this era, often linked to financial and retirement crises. Kritzman (2011) asserted that the key principles of successful investing remain as valid after the GFC as they were before the crisis: diversify, eliminate unnecessary expenses, respect the micro-efficiency of markets, and manage the macro-inefficiency of markets. Siegel (2015) discussed various causes of the retirement crisis and suggested a template for future retirement saving and investing. Siegel (with co-author Waring 2015) proposed the annually recalculated virtual annuity, a retirement spending strategy that allows sustainable withdrawals without depleting savings.

### Digital Transformation Era (2020-2024).

The Digital Transformation Era began as organizations adopted and implemented digital technology in response to the COVID-19 pandemic. Remote or hybrid working environments, virtual medical appointments, the rise of the FAANG stocks and the Magnificent Seven, and the popularity of generative AI, particularly ChatGPT, became prevalent during this era.<sup>22</sup> *Alpha, ESG, private, and optimization* newly appeared in the rankings, and *bond* re-emerged in the rankings in this era.

*Equity* was the most frequent word in this era, used in contexts such as equity market, equity factor, equity investing, and private equity. Tālis Putniņš

(2022) found that the U.S. Federal Reserve's aggressive quantitative easing during the COVID-19 pandemic significantly influenced the equity market rebound. David Blitz, Guido Baltussen, who is tied for first place in both AELNT and Articles for this era, and Pim van Vliet (2020) examined the long and short legs of five widely used academic equity factors and found that factor premiums are typically stronger in the long legs. Clarke, de Silva, and Thorley (2020) found that managing intertemporal risk of optimally constructed multifactor equity portfolios improves the Sharpe ratio. The same authors (2024) also documented that incorporating nonlinear relationships between factors and stock returns enhances information ratios. *Private* entered the rankings in this era, reflecting a growing interest in private equity and private debt.

*Fund* remained one of the most frequent words in this era, commonly associated with mutual funds and hedge funds. David Forsberg, David Gallagher, and Geoffrey Warren (2021) proposed a cohort model that evaluates hedge funds against peer groups with similar investment strategies, identified through return correlations. The same authors (2022) extended the analysis and documented a negative relation between hedge fund performance and the size of the cohort's aggregate assets under management.

*Alpha* tended to appear together with *factor(s)*. Andrew Ang (with co-authors Linxi Chen, Michael Gates, and Paul Henderson 2021) presented a methodology of determining the optimal allocations of the market capitalization index, factors, and alpha strategies. Blitz and van Vliet (with co-authors Matthias Hanauer, Iman Honarvar, and Rob Huisman 2023) presented evidence that combining multiple short-term signals can earn alpha beyond the common Fama-French factors.

The term *ESG* first ranked in this era. The Journal has been at the forefront of publishing papers on ESG issues for over 60 years (Laura Starks 2021). Ang (with co-authors Ananth Madhavan and Aleksander Sobczyk 2021) examined the relationship between a fund's ESG scores and its active returns in excess of benchmark, style factor loadings, and alpha beyond factor exposures. Weil (with co-authors Jonathan Karpoff, Robert Litan, and Catherine Schrand 2022) summarized the Financial Economist's Roundtable's recommendations on the SEC's ESG disclosure mandates. Xiao Qiao (with co-authors Rajkumar Janardanan and Rouwenhorst 2024) presented a conceptual framework for applying ESG considerations to derivatives, using commodity futures as an example.

*Corporate* frequently appeared in connection with ESG efforts, including corporate sustainability, corporate social performance, corporate ESG news, and impact investing using corporate debt. George Serafeim (2020), who is tied for first place both in AELNT and Articles for this era, found that the market undervalues companies' sustainability activities when public sentiment about corporate sustainability is negative. Serafeim (with co-author Aaron Yoon 2022) also found that stock prices only react to corporate ESG news that is likely to affect a company's fundamentals, suggesting that investors are motivated by a financial rather than a nonpecuniary motive.

Recent advances beyond standard mean-variance portfolio optimization have elevated *optimization* to a frequent word. Idzorek (2023) developed a multi-account, alpha-tracking error optimization model whose objective function includes an investor's preferences for other characteristics, such as ESG. Idzorek (with co-author P. Kaplan 2024) also called for the integration of lifecycle models and mean-variance optimization to answer questions posed by lifecycle finance.

*Bond* reemerged in this era, in the contexts of bond returns, corporate bonds, and stock-bond correlation. Baltussen (with co-authors Martin Martens and Olaf Penninga 2021) provided evidence of the predictability of government bond returns using international data. Laurens Swinkels and Zhenping Wang (with co-authors Roderick Molenaar and Edouard Sénéchal 2024) found that inflation, real interest rates, and government creditworthiness are key variables influencing stock-bond correlation.

*Investing* appeared in impact investing, investing with styles (momentum, value, etc.), geographic investing, factor investing, sector investing, and thematic investing with big data. Blitz and Clint Howard (with co-authors Mike Chen and Harald Lohre 2024) demonstrated a mean-variance-sustainability optimization, which allows for tradeoffs between return, risk, and sustainability.

In this era, *return(s)* appeared in the context of return prediction for various asset classes, particularly in connection with ESG and machine learning. ESG-related factors considered for stock return prediction include ESG rating disagreement and employee satisfaction. Alexander Cheema-Fox, Serafeim, and Hui Wang (2022) found that portfolios of currencies with decreasing vulnerability to climate changes have earned positive abnormal returns. Howard (2024) emphasized the importance of carefully considering modeling choices

when applying machine learning models to stock return prediction.

## Most Frequent Words Over the First 80 Years

Over the first 80 years of the Journal, the top 10 words in the AELNT categories are, in order: *stock, market, investment, industry, risk, financial, earnings, performance, management, and portfolio*. For the Articles category, the top 10 words are similar but in a slightly different order: *stock, market, investment, industry, risk, performance, earnings, financial, management, and analysis*. The top five words in both AELNT and Articles are identical and in the same order: *stock, market, investment, industry, and risk*. The top three words form the term "stock market investment"—the most popular topic throughout the history of the *FAJ*.

## Conclusion

The correction, categorization, and augmentation of the original *FAJ* database, and the use of a rigorous methodology that accounts for authors' full names, reconciles variations in authors' names, identifies pseudonyms, and recognizes ties, result in a more thorough and accurate representation of the top authors and most frequent words in titles for each of the nine financial eras and during the *FAJ*'s first 80 years. We commend Lo for initiating this analysis to recognize those contributors and ideas that have bolstered the success of the *FAJ* and, by extension, the profession,

### Editor's Note

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### Notes

1. The inaugural issue was published as *The Analysts Journal* by the New York Society of Security Analysts. It published under this name through 1959 before becoming the *Financial Analysts Journal* in 1960. In the reference list, we use the successor name *Financial Analysts Journal* for the entire history.
2. We believe that Lo did an exemplary job with his financial era classifications. The first half of Lo's eight eras was predominantly characterized by modeling developments in academic finance (Classical Financial, Modern Portfolio Theory, Alpha Beta, and Derivatives). The classification of the second half is based on technical innovation, and our word frequency analysis largely aligns with the financial milestones in those eras. For

and for his steadfast encouragement of this article. We hope to see these rankings again, perhaps every five or 10 years, to recognize new eras, new contributors, and new ideas.

It behooves us to acknowledge, however, that the number of contributions alone does not necessarily reflect an author's impact on the profession nor the breadth, depth, and innovation of their contributions to the field. That must be determined qualitatively, though certain metrics (for example, the number of citations) may be useful in that regard.

We have created the Rank Program, available on our website (<https://jlem.com/research#faj-rank>), to conduct searches using information from our database. Users can sort or search the database in or across various eras and for the full 80-year period by contribution type for the full universe of authors and words in titles.

We delight in recognizing the past contributors and contributions that have given life to the *FAJ*, and congratulate the prolific contributors for making the *FAJ* so influential during each era and over its first 80 years. Let us celebrate the rich history of our discipline and, in particular, that of our esteemed *Financial Analysts Journal*.

*We appreciate the assistance of Sangwoo Lee from Jacobs Levy Equity Management.*

instance, we identified newly ranked words: *insurance, international, hedge, and factor* in the Automation, Financial Globalization, Algorithmic Trading, and Digital Assets eras, respectively. The words represent the rise of portfolio insurance, the globalization of the financial industry, the increased presence of hedge funds, and the growing popularity of factor investing, all of which are financial landmarks in their respective eras.

3. We recommend that the *FAJ* post and provide links to contributions that were previously omitted. With all published material posted online, researchers could fully synthesize the various works and assess the strength of evidence on different topics.

4. We have made a best effort to augment the original FAJ database with missing contributions, properly categorize the contributions, reconcile variations in author names, and identify pseudonyms. We welcome comments and inquiries regarding the augmented database and methodology.
5. Examples of editorial contributions include "Keynote Review," "Guest Speaker," "From the Board," "Guest Editorial," "Viewpoint," and "Samizdat." The Samizdat series was authored by Jack L. Treynor.
6. The top five authors in the Educational category were John G. Gillis (79 contributions), primarily for the series "Securities Law & Regulation;" Patrick J. Regan (49), for "Pension Funds Perspective;" William C. Norby (37), primarily for "Accounting for Financial Analysis;" Phil Davis (24), for "In Practice;" and Mark Kritzman (23), for "What Practitioners Need to Know."
7. The top five reviewers were Helen Slade (338), Martin S. Fridson (153), Robert I. Cummin (122), Warren Burns (48), and Mark S. Rzepczynski (43). The FAJ ceased publishing Reviews with the fourth-quarter issue of 2018. Since then, Reviews have been published digitally on the CFA Institute *Enterprising Investor* blog.
8. Talks from the financial analysts' annual conference were the primary content for certain issues of the FAJ. Very few talks have been published in the FAJ since 1975. Two notable talks were published in 2013, one by Robert J. Shiller and the other by William Poole.
9. We analyzed the Articles category alone to determine the most prolific authors and most frequent words and found that, compared to using AELNT, it excluded numerous key contributors, their associated contributions, and the associated frequent words in titles. Using Articles only also fractures the community of authors who have contributed to the FAJ in the various formats the Journal welcomes. We find that these various formats serve a worthwhile purpose for discussion and elaboration of key ideas and innovations, and we believe that an inclusive analysis using AELNT is a more thorough representation of the Journal's impact. Nonetheless, our discussion of major ideas and innovations draws from both the AELNT and Article rankings and is therefore even more inclusive of major contributors.
10. The reference list in this article credits authors with their actual names and indicates any identified pseudonyms parenthetically. Based on our review of the FAJ volumes and other CFA Institute publications, John B. Armstrong was used by John C. Bogle, Walter Bagehot by Jack L. Treynor, Cogitator by Benjamin Graham, and David Ricardo by Charles D. Ellis. We were unable to identify the individuals behind Coriolanus, John Law (his Letter to the Editor indicated this is the pen name of an officer of a well-known financial institution), John Maynard (his Editorial indicated this is the pen name of a well-known Wall Streeter with long experience in institutional research and money management), Menippus, Zetetic, An Interested Reader, A. Constant Reader, and Constant Reader. Also, there were some contributions that did not indicate an author, many of which were Reviews.
11. Compared to using the most frequent words in titles, keywords can potentially provide more specific topics. However, the Journal did not require keywords until 2022.
12. Authors' names appear in parentheses when they are neither ranked as prolific authors for that era nor for the entire 80-year period.
13. We counted each instance in which a word appeared more than once in a title because the usages and meanings differed. We did not conform singular and plural versions of words; both may appear in the same word frequency table. The words have meaning in context, so we present them as they are. For example, *future* in the Modern Portfolio Theory Era is used in the ordinary sense of time still to come, which differs from *futures* in the Automation Era, a reference to index futures. We also excluded stop words such as *and*, *a*, and *the*. To construct our stop word list, we combined the most widely recognized sources in natural language processing: the Natural Language Toolkit (NLTK), SpaCy, and Scikit-learn. However, we made exceptions for four words—*bill*, *call*, *interest*, and *put*—as they can carry substantive meaning in a financial context. Additionally, we excluded the words *letter*, *forum*, and *time*, as they generally do not represent meaningful contributions in financial discussions. These words were primarily used in titles of Letters to the Editor, talks given at financial analysts' annual conferences and forums, and colloquially in titles, respectively.
14. Exhibits listing the top words over the Journal's first 80 years—defined as those with 100 or more mentions—are available upon request for both the AELNT and Articles categories. A total of 25 words met this threshold in AELNT and 18 in Articles. The most frequent word for both categories is *stock*, with 417 mentions in AELNT and 337 in Articles.
15. As Graham stated (1946b), the pseudonym Cogitator was inspired by the book *The Practical Cogitator or The Thinker's Anthology* (Curtis Jr. and Greenslet 1945).
16. Markowitz later shared his MPT work with the *Financial Analysts Journal* (1976, 1999).
17. For an alternative view on the link between portfolio insurance and the crash, see Jacobs (1999).
18. See Jacobs and Levy (2007) for a description of 130-30 type portfolios.
19. The term *ESG* tends to be underrepresented in titles because ESG-related papers are often titled under terms such as carbon, green, environmental, social, governance, climate, impact, sustainability, and decarbonizing.
20. *Factor* in the Digital Assets Era is among the most frequent words in Articles. *Factors* was a most-frequent word in the Classical Financial Era for Articles too. However, the meaning differs. In the Digital Assets Era, it was primarily used to denote an attribute that serves as a proxy for a common source of risk or a firm characteristic that has a measurable relationship to stock returns. In the Classical Financial Era, factor referred to its common meaning such as "Factor in Bank Stock Appraisal." We examined other words in the word frequency tables and found a few that had significantly different meanings over time. One of interest is the word *efficient*, which started with its association with efficient portfolios and evolved to its usage in market efficiency and tax efficiency. Another nuance with the word analysis is whether words with

similar meanings should be aggregated for the frequency analysis. Examples of such words are leverage/gearing, stock/equity, and international/global. We allowed the words to stand on their own, because they can have different meanings depending on the context.

21. Despite the wide recognition of behavioral finance in investment management in both academia and practice since the work of Werner De Bondt and Richard Thaler (1985), its presence in the word frequency analysis is notably limited. One explanation is that research in behavioral finance tends to be dispersed across various empirical observations rather than centered around a few distinct keywords. For instance, explaining a specific anomaly pattern often necessitates delving into distinct facets of behavioral biases. Consequently, word frequency analysis tends to underestimate the presence of *behavioral finance* within the pages of the FAJ. We conducted an analysis of the frequency of the word *behavioral* in FAJ article titles across different eras. The word *behavioral* first appeared during the Financial Globalization Era, with a count of 7 occurrences in the AELNT categories and 6 in the Articles category. However, its usage in FAJ titles has gradually declined since then. The FAJ published a Special Issue on Behavioral Finance in November/December 1999, in which the word *behavioral* appeared twice in titles. In this issue, Nobel Prize-winning behavioral economist Thaler predicted "The End of Behavioral Finance" (1999) because financial economists "will routinely incorporate as much 'behavior' into their models as they observe in the real world."

22. FAANG stocks refer to five major American technology companies: Facebook (now Meta Platforms), Amazon, Apple, Netflix, and Google (now Alphabet). The term "Magnificent Seven," coined in 2023, refers to seven major technology companies that have significantly outperformed the market in the past decade. It includes Alphabet, Amazon, Apple, Meta Platforms, Microsoft, Nvidia, and Tesla.

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