1-1-1984

Analyzing the Language of Finance: The Case of Assessing Risk

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ANALYZING THE LANGUAGE OF FINANCE: THE CASE OF ASSESSING RISK

Working Paper 84-801*

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Abstract

Values in the marketplace are not merely numerical entitites; they are products of the decisions of individuals; and in turn, these decisions are products of complex thought and reasoning processes involving language. This paper discusses the role of language vs. numbers in the valuation process and illustrates the application of the technique of content analysis to financial research. Annual reports of 37 banks are examined to determine how the verbal contents on risk and uncertainty relate to numerical assessments of risk. The findings, indicating that verbal disclosure of risk and numerical assessments of risk are related, have implications for more advanced studies making use of data (verbal data) largely ignored by financial researchers up to this point in time.

ANALYZING THE LANGUAGE OF FINANCE: THE CASE OF ASSESSING RISK

I. Introduction

In his presidential address at the 1978 annual meeting of the Financial Management Association, Andrews (1979, p. 11) urged financial researchers to widen the scope of current research:

> . . .the monotonous rat-a-tat of the testable hypothesis deduced from statics is no proof in itself of relevancy, meaningfulness, or interest. . .we should enjoy true catholicity of taste in admissible research method until better theory devises a framework for deduction of practicable normative propositions. Our research, I insist, should be appropriately eclectic to the state of our innocence.

Pursuing eclectic research is not always easy. Both practitioners and academics may perceive that the uncertainties associated with the rewards for such research are far too great to compensate for the risks involved. Such research may not be publishable in the immediate future; and even if it does prove to be publishable, it may not be considered acceptable by colleagues and superiors, whose approval is vital to an individual's short-term survival within an institutional framework. At the same time, regardless of the risk/return framework apparent to the individual researcher, investigation of new research methodologies is vital to the survival and growth of finance as a discipline.

The research reported in this paper is an initial attempt to respond to Andrews' plea for meaningful, relevant and interesting research. This paper introduces a new methodology for research to finance -- that of content analysis. Content analysis is a technique which "attempts to characterize the meanings in a given body of discourse in a systematic and quantitative fashion" (Kaplan, 1943, p. 230). Waples and Berelson (1941, p. 2), authorities in the field, point out

that the role of systematic content analysis is "... to define more casual descriptions of the content, so as to show objectively the nature and relative strength of the stimuli applied to the reader or listener." According to Berelson (1952, p. 45), content analysis can "... provide the over-all picture of the product which otherwise might be lost from view." Moreover, he claims that this can be accomplished in a manner which satisfies the traditional standards of validity as well as reliability.

The paper is divided into three sections. First we provide a brief discussion of the role of language in shaping mind sets and world views. Applying content analysis to annual reports, with reference to the risk assessment process, is discussed and illustrated in the next section. Annual reports of 37 banks are examined to determine how the verbal contents on risk and uncertainty relate to numerical assessments of risk. In the conclusion, we provide some suggested directions for extensions of this research.

II. Role of Language in Shaping Mind Sets and World Views

Language is a powerful tool, as pointed out by Benjamin Lee Whorf, a noted linguistics scholar:

> We cut nature up, organize it into concepts, and ascribe significances as we do, largely because we are parties to an agreement to organize it in this way -- an agreement that holds throughout our speech community and is codified in the patterns of language. The agreement is, of course, an implicit and unstated one, but its terms are absolutely obligatory; we cannot talk at all except by subscribing to the organization and classification of data which the agreement decrees. -- Hayakawa (1941, p. 217)

The linguistic "agreement" discussed by Whorf can be quite subconscious. Magee (1973, p. 46) points out that Bertrand Russell once admitted that,

until he was forty-five years old, he ". . . had thought of language as transparent -- that is to say, as a medium which could be employed without paying attention to it." There is, however, a risk associated with regarding language as transparent -- a risk that the vehicle which is supposed to be expressing thought ends up molding it as well.

The scientific community provides an example of the subtle way in which language can bind, limit, and restrict modes of thought. For many years, the pituitary, a gland at the base of the brain, had been referred to as the "master" gland because its hormones or chemical secretions regulate hormone production or function in many organs. Then, two of the winners of the 1977 Nobel prize in physiology and medicine showed that the pituitary gland is, in itself, actually "mastered" or controlled by brain hormones -- see Cohn (1977, p. A4). One cannot help but wonder if researchers and medical students down through the years have been unconsciously misdirected by this misnomer. The study of the functioning of this gland was, in a sense, 'tainted' by the use of that word "master."

Thus we see that, although words should help to clarify and broaden understanding of the issues, they may at times do exactly the opposite of what they are intended to do; they can muddle instead of clarify, restrict rather than broaden, prejudge instead of call for judgment; and they can do this in such a subtle way that the process often goes unrecognized, unless it is very specifically and consciously detected and observed. It would seem that recognizing the prejudicial nature of language in any field is a big step forward; then, one must learn to actively search one's own discipline for that same kind of prejudice. Progress in any field and communication of that progress can only take

place through language and numbers, and so it is logical that the limiting and facilitating features of both of these vehicles be explored. At present, finance emphasizes numbers, rather than words; in the present study, we switch the emphasis to words.

III. Annual Reports: An Application

Values in the marketplace are products of the decisions of individuals; and, in turn, these decisions are products of complex thought and reasoning processes which are not fully comprehensible. However, we may reasonably assume that language plays a part in their development. Therefore, it would seem to follow that coming to a greater understanding of the role that language plays might lead to a greater understanding of the valuation process.

It is interesting, for example, to speculate on the specific roles that words play in corporate annual reports to investors. It would seem that words help to mold the perceptual framework within which investors interpret relevant numbers (earnings per share, return-on-investment results, etc.) and make investment decisions. Questions such as the following seem relevant: Do the words support the information conveyed through numbers? Can words "say" one thing and numbers another? Is the frame of reference different (for example, do words tend to be future-oriented and numbers past-oriented)? Efficient market research (based on the claim that "new" information is instantaneously incorporated into stock prices) tends to undermine the usefulness of annual reports, in that annual reports generally do not convey information that is completely "new." But this view may be too restrictive. Annual reports may not provide "new" information in terms of results that are purely

financial; they may, however, convey qualitative kinds of information (which is important, since investors do not make decisions on financial results alone) and/or they may "structure" financial results in a way that prompts a certain kind of interpretation.

In particular, the use of the words risk and uncertainty is one possible area for investigation. Risk is a concept that can be defined and communicated by words as well as numbers, although past research has capitalized on the numerical, rather than verbal, features of risk. Financial researchers have long bemoaned the fact that, although risk is essentially a future-oriented concept, the numbers portraying it must essentially be derived from ex-post data. However, it may be the case that the qualitative information available in annual reports may provide a view of risk that is truly ex ante. Thus we think it interesting to investigate how the qualitative portraits of risk provided in annual reports relate to numerical assessments of risk.

Many have commented that risk is really a subjective phenomenon; yet financial research may become buried in easily quantified, objective data on risk -- data which is, to a certain extent, inappropriate for studying an elusive concept such as risk. A verbal, rather than a numerical, study of risk may be valuable in that it will foster a return to the subjective elements of risk and risk assessment.

We know of no other research in finance along the lines we plan, although there has been some in other areas. For example, Bowman (1978, p. 70) has completed a number of projects analyzing the content of annual reports, and claims that:

> Many may believe that annual reports, especially the discussions and descriptions, are of little value. Our position is that sufficiently careful work can turn what is apparently base metal into gold . . .

He has compared "objective" evidence regarding corporate characteristics such as corporate responsibility and risk-taking behavior with linguistic indicators of these same characteristics and has shown that analyzing the language of annual reports can lead to meaningful insights.

Other researchers share Bowman's view that the language of annual reports is worthy of study, although their conclusions are somewhat different in that they find some inconsistencies between narrative and numerical disclosure. Bettman & Weitz (1983), for instance, in an analysis of letters to shareholders in 181 annual reports published in 1972 and 1974 found that companies discussed outcomes primarily when they were unfavorable and then only to attribute them to "external, unstable, and unfavorable causes...." Such practice, while obviously human, does suggest that companies might be systematically, albeit unintentionally, biasing the nature of their narrative disclosure as opposed to their numerical disclosure. And, Ingram & Frazier (1983) examined the President's letter and management's analysis to determine whether themes revealed in this narrative disclosure by one of the techniques of content analysis "could alter perceptions of management's performance." They reported that although "little evidence was found in this study to imply management was attempting to conceal or distort the results of its behavior," there was a tendency for less profitable firms "to discuss the reasons for their performance in terms of external causes, whereas more profitable firms referred more directly to management performance." The work of these researchers is important, in that it provides evidence that it is possible and profitable to examine, in a rigorous fashion, the non-quantitative data in annual reports. The present study is an extension of this work to the field of finance. It focusses on risk in

the banking industry, a focus which seems particularly appropriate at the present time when risk levels facing the banking industry seem quite high. Fear of bank failures abound, and it is not an ungrounded fear. The New York Times (Kramer, 1984) recently reported that, "Since 1982, bank failures have been running at their highest levels since 1939 and at five times the pace of the 1970's."

Methodology

The research task was to compare verbal disclosure of risk (mentions of risk in financial statement footnotes) with numerical (figures drawn from the Value Line Investment Survey) risk assessments. For our sample, we chose the 50 largest banks as determined by Fortune in its survey published in July of 1980. The financial statement footnotes of firms in the sample were searched for use of the following words:

-- not certain

-- uncertain or a derivative (such as uncertainty)

-- risk or a derivative (such as risks or risky). Contingency footnotes dealing with litigation were excluded.

Risk is, of course, an elusive concept, and one can talk about it in numerous ways. Thus, words such as danger, possible loss, chance, doubt, etc. convey meanings that are the same (or similar to) the words risk and uncertainty. The latter two words are used, however, so often in finance that they appear to be a good starting point for research on verbal disclosure of risk.[1]

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[1]Future research may be expanded to include some of the other words mentioned above; the problem is that when one decides to go beyond risk and uncertainty, it may be difficult to decide where to stop!

We used the National Automated Accounting Research System (NAARS) to collect this data on verbal disclosure. NAARS is a computerized information retrieval system developed by the American Institute of Certified Public Accountants in conjunction with Mead Data Central, Inc. Through this system, one can research the financial statements, footnotes, and auditors' reports from the published annual reports to shareholders of over 7,000 companies. (At the time we used NAARS, the files of 1980 were more complete than more recent files; therefore, we decided to choose the annual reports of that year for our study.)

The numerical data on risk was provided by the Value Line Investment Survey, December 26, 1980. For each firm in the sample,[2] we collected the following data from Value Line:

Beta -- A measure of the sensitivity of the stock's price to overall fluctuations in the market.

Earnings predictability -- Based upon the standard deviation of percent changes in quarterly earnings over a 10-year period

Financial Strength -- Rating based on judgment as well as computer analysis of a number of key variables that determine financial leverage, business risk, and company size.

Growth persistence -- A measure of the consistency of relative price growth.

Safety -- Measures potential risk associated with individual common stocks rather than large diversified portfolios.

Price stability -- Based on the standard deviation of the weekly percent changes in the price of a stock over the last five years.

Timeliness -- Expected price performance over the coming 12 months.

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[2]The original sample of 50 banks was subsequently reduced to 37, since 3 were not public, 3 were not available on NAARS, and 7 were not listed in Value Line.

More information on the above is provided in Appendix A. The first six items are clearly risk measures; the last one, timeliness, has a strong return, as well as risk, dimension.

As numerical assessments of risk, these seven Value Line variables represent variety in terms of source (e.g., variability of earnings vs. variability of stock price) as well as time frame (based on past data only vs. based on past data along with judgment).[3] This variety makes these variables ideally suited to a preliminary investigation of possible relationships between verbal disclosure and numerical assessments of risk. In light of the lack of research in this area — the area of verbal vs. numerical assessment of risk — it seemed reasonable to begin with a wide variety of numerical assessments, a variety which may be narrowed over time. Hopefully, this beginning will set the stage for more advanced studies that would make use of data (verbal data) largely ignored by financial researchers up to this point in time.

Results and Discussion

The analysis proceeded in a number of steps. First we looked at the correlations among the independent variables as well as the correlations between verbal disclosure (the dependent variable) and the various independent variables. T tests were then performed; firms that did verbally disclose risk were compared with those that did not, in order to examine whether the former group differed from the latter in regard to earnings predictability, growth persistence, and the other measures provided by Value Line. Finally, discriminant analysis was employed in

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[3]Appendix B provides a scheme for categorizing these variables according to source and time frame. The variables fall into three groupings, indicating that the present study is quite general in nature.

order to measure the extent to which the verbal disclosers could be statistically distinguished, based on the Value Line measures, from the non-disclosers.

Table I shows the correlations among all the variables used. All but two of the correlations (timeliness and growth persistence; timeliness and beta) among the independent variables are signed as expected;[4] both of these correlations are insignificant and involve the variables of timeliness, which has a strong return, as well as a risk, dimension. In total, 52% of the correlations among the independent variables are significant at the 5% or better level. All of these are correctly signed. Examination of the relationships among the independent variables bears out the fact that timeliness and safety are, in the words of Value Line, the two "main signals." Safety is significantly related to five of the other measures while timeliness is significantly related to none of the other measures. Thus it appears that most of Value Line's information is captured by these two variables.

Table I shows that all but one of the correlations between the dependent variable (risk disclosure) and the independent variables are correctly signed -- the exception being growth persistence. However, only one correlation, that between risk disclosure and beta, is significant. This is an interesting finding and one that is very much in tune with modern portfolio theory; this preliminary evidence indicates that

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[4]Variables can be divided into two groups - Group 1 is composed of timeliness, safety and beta; and Group 2 is composed of financial strength, price stability, growth persistence, and earnings predictability. One would normally expect the variables within each group to be positively correlated, while the variables in each group should be negatively correlated with the variables in the other group.

firms with a higher level of systematic risk, as measured by beta, more often provide verbal disclosure of risk than firms with lower betas.

T tests were done on the two groups of disclosers (19 firms) vs. non-disclosers (18). If we assume that the disclosers are firms of higher risk than the non-disclosers, then we would expect the disclosing firms to have higher means in regard to timeliness, safety, and beta and lower means in regard to financial strength, price stability, growth persistence, and earnings predictability. The results were as expected with one exception; in terms of growth persistence, the disclosers had a slightly higher mean (44.2) than the non-disclosers (43.3). This was not a significant difference, however. None of the above mentioned differences in means were significant, with one exception. The mean beta of the disclosers was significantly higher (at a significance level of .008) than the mean beta of the non-disclosers, bearing out the finding mentioned above that riskier firms (when risk is measured by beta) are more likely to provide verbal disclosure of risk.

Lastly, discriminant analysis was employed to measure the extent to which the firms verbally disclosing risk could be statistically distinguished, based on the Value line measures, from the firms not verbally disclosing risk. Wilks' lambda was used as the criterion for the stepwise selection of discriminating variables, although certain variables were forced into the function in subsequent runs to gauge their impact. Table 2 shows the various functions that resulted. For each function, the standardized canonical discriminant function coefficients are shown, along with Wilks' Lambda, Chi-squared, the significance, and the

percentage of the 37 cases correctly classified.[5] The coefficients are signed as expected throughout -- with one exception. Price stability (which measures total risk -- both systematic and unsystematic) has a positive, rather than a negative, coefficient. It appears that firms are more likely to disclose if they are high in systematic risk (that is, beta) but low in unsystematic risk. That is, firm-specific (unsystematic) risk does not seem to prompt verbal disclosure -- a surprising result, since we are dealing with disclosure at the level of the individual firm in its annual report. This preliminary research did not categorize the risk disclosure in terms of systematic or unsystematic, but some additional research might provide this categorizing scheme and follow-up study.

IV. Conclusion

These results show that verbal disclosure of risk and numerical assessments of risk are related. There is a significant relationship between verbal disclosure of risk and beta, which is, at present, probably the best known and most widely used of the numerical assessments of risk. Also, a model -- see Function No. 5, Table 2 -- using beta as well as three additional numerical assessments of risk (Value Line's timeliness, price stability, and earnings predictability) was shown to predict verbal disclosure or non-disclosure of risk at an

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[5]This percentage figure represents the adequacy of each discriminant function; the figure results from classifying the original set of 37 cases by means of each discriminant function in order to see how well the function performs in predicting whether each of the 37 firms disclosed risk verbally or not.

81.08% level of accuracy. It is interesting to note that this model includes at least one variable from each of the three groupings shown in Appendix B. From the time frame of the past, it includes earnings predictability (accounting data) as well as beta and price stability (both providing market data). And, moving to a future time frame, it includes timeliness (based on accounting and market data).

Since the sample is fairly small and limited to financial statement footnotes of firms in the banking industry, these results are preliminary in nature and await further study before generalizations can be made. Nevertheless, this evidence on the connection between verbal and numerical disclosure of risk is interesting in itself; in addition, it suggests a variety of ideas for future research. The sample of companies could be extended to other non-industrial firms (e.g., transportation, retailing, utilities, etc.) and/or to the Fortune '500' Industrials. Thus the banking model developed in the present study could be tested in terms of how well it applies to non-banking firms and/or to the same or different banking firms in a variety of time periods. And, as previously mentioned, the word search could be extended to words other than risk and uncertainty that convey a similar concept. Or, verbal communications other than financial statement footnotes might be examined — e.g., the press releases of the firms and/or articles about the firms in popular literature (publications such as The Wall Street Journal, Barron's, Fortune, Forbes, Business Week). And, Compustat might be used in place of Value Line data.

More importantly, since risk is ultimately a future-oriented concept, it would be interesting to see how well verbal disclosure (either alone or in concert with numerical disclosure) actually predicts "real"

risk. For example, one could examine how well such disclosure from 1975 through 1979 predicts the future variability of return from 1980 through 1984. Such research may indicate, for example, that the predictive ability of mathematical models may be improved by adding input on the verbal disclosure of risk. Along these lines, one is reminded of the following story concerning the problems faced by three umpires:

> The first umpire said, "Some's balls and some's strikes and I calls 'em as they is." The second umpire said, "Some's balls and some's strikes and I calls 'em as I sees 'em." While the third umpire said, "Some's balls and some's strikes but they ain't nothing 'till I calls 'em." -- Cantril (1957, p. 126)

And so it is with risk. It "ain't nothin'," until it is perceived, and verbal comments on risk may be vital determinants of this perception process.

Resource allocation decisions affect the quality of life. Financial research, which has the charge of dealing with resource allocation decisions, should use <u>every</u> available avenue (not just the traditional ones) to investigate all aspects of such decisions. Content analysis, as just such an avenue, is worthy of investigation; and, application in the area of risk analysis is a good place to begin.

Whitehead (1967, p. vii) once commented that philosophy "...has to insist on the scrutiny of the ultimate ideas, and on the retention of the whole of the evidence in shaping our cosmological scheme." No matter what the field, it is good practice to look for "the whole of the evidence." In the modern world, there is a great tendency to divide issues into small compartments (by subject matter and perhaps even further divided by specialty), and the subsequent thinking and decision making

on these issues is limited. But one must learn to cut through these confining boundaries when the limits they impose impede rather than help. According to H. Tennessen (1962, p. 221), "A particularly interesting situation arises, when... philosophically interesting problems -- linguistic or nonlinguistic -- have not yet been tackled by the scientists within any ramiculated branch of existing science disciplines." Applying content analysis to finance could be just such an "interesting situation." Such application could be exciting, not only because it is relatively new and untried, but also because it really is needed and shows promise of adding to knowledge in a most practical way.

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Table 1

Pearson Correlation Coefficients

	Independent Variables						
	Timeliness	Safety	Beta	Financial Strength	Price Stability	Growth Persistence	Earnings Predictability
Safety	.1153 (.239)						
Beta	-.1075 (.255)	.4490 (.002)*					
Financial Strength	-.2458 (.063)	-.7462 (.001)*	-.0679 (.339)				
Price Stability	-.1215 (.228)	-.6835 (.001)*	-.6889 (.001)*	.5282 (.001)*			
Growth Persistence	.2103 (.096)	-.4412 (.002)*	-.1044 (.261)	.5262 (.001)*	.2110 (.096)		
Earnings Predictability	-.0854 (.300)	-.4293 (.003)*	-.0517 (.376)	.6913 (.001)*	.3121 (.025)*	.6249 (.001)*	
Dependent Variable							
Verbal Disclosure of Risk	.1898 (.130)	.2387 (.077)	.4195 (.005)*	-.0669 (.347)	-.1876 (.133)	.0161 (.462))	-.1531 (.183)

Notes: Significance levels are presented in parentheses below the coefficients.

*Significance at level of 5% or below.

Table 2

Canonical Discriminant Functions

Function No.	Variables	Standardized Canonical Discriminant Function Coefficients	Wilks' Lambda	Chi-Squared	Significance	Percentage of Cases Correctly Classified
1	Safety	1.0	.9430279	2.0237	.1549	62.16%
2	Beta	1.0	.8240332	6.6773	.0098	67.57%
3	Timeliness Beta	.53777 .95238	.7716026	8.8157	.0122	70.27%
4	Timeliness Beta Price Stability	.67729 1.34113 .69340	.7234893	10.843	.0126	75.68%
5	Beta Timeliness Price Stability Earnings Predictability	1.44032 .66100 .93200 -.50235	.6754770	12.947	.0115	81.08%

Appendix A

Definitions of Value Line Variables*

Beta -- The "beta coefficient" is derived from a least-squares regression analysis between weekly percentage changes in the price of a stock and weekly percentage changes in the NYSE Average over a period of five years. In the case of shorter price histories, a smaller time period is used, but two years is the minimum. The betas are periodically adjusted for their long-term tendency to regress toward 1.00.

Earnings Predictability -- A measure of the reliability of an earnings forecast. Predictability is based upon the stability of year-to-year comparisons, with recent years being weighted more heavily than earlier ones. The most reliable forecasts tend to be those with the highest indices (100); the least reliable, the lowest (5).

Financial Strength -- Ratings range from A++ to C in nine steps. Ratings are based upon computer analysis of a number of key variables that determine (a) financial leverage, (b) business risk, and (c) company size plus the judgment of Value Line analysts and senior editors regarding factors that cannot be quantified across-the-board for all stocks.

Growth Persistence -- The historic tendency of a stock to show persistent growth compared to the average stock. Indices range from 100 (Highest) to 5 (Lowest).

Price Stability -- Based upon a ranking of the standard deviation of weekly percent changes in price of a stock over the last five years. The top 5% (lowest standard deviations) carry a Price Stability Index of 100, the next 5%, 95; and so on down to 5.

Safety --A measure of potential risk based on stability of price adjusted for trend and other factors -- including company size, the penetration of its markets, product market volatility, the degree of financial leverage, the earnings quality, and the overall condition of the balance sheet. Safety ranks range from 1 (Highest) to 5 (Lowest).

Timeliness -- The rank for a stock's probable relative market performance in the year ahead. Ranks range from 1 (Highest) to 5 (Lowest).

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*Source: How to Use the Value Line Investment Survey: A Subscriber's Guide by Arnold Bernhard.

Appendix B

Categorizing of Value Line Measures

Source	Time Frame: Past Only	Time Frame: Past and Future (That is, includes judgment as well as past results)
Accounting Data (Earnings Only)	Earnings predictability	
Market Data Stock Price Only)	Beta -- systematic risk Price Stability -- systematic and unsystematic risk Growth Persistence	
Accounting and Market Data (Earnings and Price)		Timeliness Safety Financial Strength

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