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Dispersion of financial analysts' earnings forecasts as a risk measure: Argument and evidence

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DISPERSION OF FINANCIAL ANALYSTS' EARNINGS FORECASTS AS A RISK MEASURE: ARGUMENT AND EVIDENCE

by

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Dispersion of Financial Analysts' Earnings Forecasts as a Risk Measure: Argument and Evidence

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This study is an investigation of analyst forecast dispersion as a risk measure. The study discusses the arguments that have made dispersion an intuitively appealing risk measure, and, based on these arguments, conducts empirical tests aimed at determining whether dispersion does represent risk.

The latest way of studying the earnings-returns relationship, the earnings response coefficient (ERC), makes finding a good proxy for future uncertainty an important goal. ERC's are hypothesized to be a function of noise and risk. If accounting researchers are to use ERC's to test the effects of accounting policy and choice on information system noise, an empirical proxy to control for risk differentials is needed.

The structure of the empirical tests flows from the argument that earnings uncertainty represents risk in

the underlying equity. This argument rests on the assumption that earnings play a central role in valuation. Recent work in earnings-based valuation theory is utilized to construct the setting in which forecast dispersion is tested for its ability to represent earnings uncertainty and therefore risk. The empirical model constructed is a multiple regression equation with market value of equity as the dependent variable, and book value of equity, current earnings, earnings growth expectations, and forecast dispersion as independent variables.

The empirical results show that forecast dispersion behaves much like the arguments would suggest. Although earnings is the dominant factor in explaining cross sectional variations in equity value, earnings uncertainty, represented by forecast dispersion, at times plays a role in explaining why some firms are valued less by the market.

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF TABLES-CONTINUED

CHAPTER I

INTRODUCTION

1.1 The Research Question

Finding an empirical proxy to control for risk has presented a considerable problem for market based accounting researchers in the past. Daley [1984] for example had difficulty getting the theoretically correct sign on risk when using a standard deviation of earnings-based measure as a risk proxy. Collins and Kothari [1989] resorted to a crude instrumental variable approach to evaluate potential measurement error problems with beta. The burgeoning area of earnings response coefficient (ERC) research, which views risk as one of the key determinants of the ERC, makes the need for a good risk measure an area of continuing concern.

Dispersion of analysts' forecasts of earnings has been offered as a potential way of controlling for the risk inherent in a firm's future cash flows. The notion of forecast dispersion as a risk measure is closely tied to a view of earnings as a determinant of firm value. If earnings determine value, then earnings uncertainty seems to be an intuitively appealing and natural risk measure. The key question to be answered is whether forecast dispersion represents earnings uncertainty. Imhoff and

Lobo [1992] have examined the effect of forecast dispersion on ERC's and speculate, based on an observed negative relationship between dispersion and ERC's, that forecast dispersion may represent noise in the earnings signal rather than risk (theory prescribes a negative link between ERC's and noise).

ERC theory is new however, and therefore does not provide an ideal framework for establishing the basic character of forecast dispersion. This study tests the behavior of forecast dispersion within the framework of a traditional model of equity value; it is an effort to independently establish the character of forecast dispersion for later use in empirically testing the validity of ERC theory and for controlling for risk in ERC-related studies.

1.2 The Method of the Study

The present study is an evaluation of analyst forecast dispersion as a risk indicator. The approach taken is to empirically test the following proposition: if forecast dispersion is a valid indicator of earnings uncertainty/risk, then it should be significantly related to observed market value of equity.

The empirical testing is done within the context of a formal model of equity valuation; i.e. other valuation

relevant variables will be identified and controlled for. A variety of valuation models have been used in accounting research (Atiase and Tse [1986]), all employing earnings, growth, and risk terms to explain market value of equity. Expected empirical coefficients are positive for earnings and growth, and negative for risk. If forecast dispersion does represent risk, then it should map into security values, while other valuation relevant variables are controlled for, with a significant, negative-valued empirical coefficient. This provides a critique on the validity of forecast dispersion as a risk indicator.

A second contribution of the study is an analysis of potential econometric problems associated with using the IBES (Institutional Broker Estimate System) summary data base. IBES provides mean and median forecasts and standard deviations of those forecasts for a selected sample of analysts. The summary statistics in the IBES survey represent a larger population of analysts with some sampling error. To treat this potential "errors in variables" problem and evaluate its degree of severity, an instrumental variables approach will be taken with respect to the analyst forecast data used in this study. Hausman tests will be performed to evaluate whether significant misspecification is present.

The instrumental variables approach mentioned above provides an opportunity for a third contribution, a re-interpretation and extension of the work of Beaver, Kettler, and Scholes [1970]. Beaver et al. began a stream of research examining the relationship between accounting risk variables such as debt to total assets (leverage) ratio, current ratio, payout ratio, etc., and beta. Their work can be interpreted as an attempt to identify accounting variables as providers of basic information about firms' risk characteristics. The present study will utilize the accounting variables as instruments for the forecast dispersion metric, and in doing so will provide evidence on the correlation between the accounting based risk measures and a new risk measure, analyst forecast dispersion.

1.3 Summary of Contributions of the Study

This chapter has introduced the objectives of this research and summarized the principle methods that will be utilized to achieve those objectives. The contributions of the study are two-fold.

First, the study empirically evaluates whether analyst forecast dispersion is significantly related to market value of equity. This evaluation establishes

whether forecast dispersion represents earnings uncertainty and therefore risk.

Second, the study evaluates the degree to which use of IBES summary statistics represents a serious measurement error problem. This evaluation involves an instrumental variables approach which provides, as a by-product, the analysis of correlations between accounting based risk measures and analyst forecast dispersion.

1.4 Limitations

This research is subject to limitations that are common when analyzing archival data drawn from established data bases such as COMPUSTAT and IBES. The following paragraphs discuss external and internal validity issues which apply to the study.

The sample firms must exist on the machine-readable data bases and meet minimum data availability criteria in order to be selected. For example, the present study includes only firms listed on the COMPUSTAT and IBES data bases which have at least two analysts making forecasts. Restrictions such as these generally exclude smaller and newer entities from the sample. The results of this study therefore cannot be generalized to categories of firms which, because of the data collection techniques employed, have no chance of being included in the sample.

Because the study involves passive observation of archival data which excludes experimental manipulation, some of the tenets of causation cannot be satisfied. In an effort to strengthen internal validity, factors systematically related to the dependent variable are identified and included as control variables. The study is limited however in that all factors which affect each sample firm's market value of equity cannot be identified and included as control variables. To the extent that these unidentified factors are important, conclusions drawn about the effects of the included variables of interest on the dependent variable may not be valid.

1.5 Organization of the Study

The remainder of this dissertation is organized as follows: Chapter 2 is a review of literature dealing with analyst forecast dispersion and includes discussion of a theoretical framework which explains why forecast dispersion should be considered a risk indicator. Chapter 3 outlines basic methodology including an earnings-based model of equity value, the testable model, and the form of hypothesis tests to be performed. Chapter 3 also discusses econometric problems relating to the estimation of the empirical model and includes a discussion of the instrumental variables approach and

Hausman specification tests to be used. Chapter 4 describes the full set of instrumental variables and their hypothesized relationships with risk. Chapter 5 presents the data sources, variable definitions, and descriptive statistics for the sample. Chapter 5 also presents and discusses the results of the multivariate analyses and hypothesis tests. Chapter 6 presents contemporaneous (five-year) correlations between accounting risk measures and forecast dispersion and compares them with the correlations between accounting risk variables and beta found by Beaver, Kettler, and Scholes. Chapter 7 concludes with a summary of findings and suggestions for future research.

CHAPTER II

REVIEW OF RELEVANT LITERATURE

2.1 Studies Dealing With Forecast Dispersion

Consensus measures of analysts' forecasts have been tested for their ability to proxy for market expectations of earnings (e.g. O'Brien [1988]) and for their information content (e.g. Givoly and Lakonishok [1979], Brown, Hagerman, Griffin, and Zmijewski [1987]). Other studies have attempted to explicate reasons for superior forecast accuracy on the part of analyst forecasts relative to mechanical time series model predictions (e.g. Kross, Ro, and Schroeder [1990]). The attention given to the mean of analysts' forecasts of earnings is due largely to a continuing interest in finding better representations of market expectations of earnings for use in empirical accounting research. Considerably less attention has been given in the accounting literature to the dispersion (standard deviation) of analysts' forecasts about the mean. The following three sub-sections discuss studies that deal with analyst forecast dispersion as a measure of risk, empirical properties of forecast dispersion numbers, and correlations between traditional risk proxies and dispersion.

2.1.1 Dispersion of Professional Expectations as a Risk Indicator

The notion that the degree of disagreement among professional analysts represents the risk of investing in a firm's securities is not new. Friend, Granito, and Westerfield [1978] empirically tested the relative ability of beta, market model residual variance, and a measure of heterogeneity of expected rates of return among several financial institutions to explain cross sectional differences in firms' expected and realized rates of return. They found that the heterogeneity measure was the most useful explanatory variable in accounting for variations in rates of return.

Carvell and Strebel [1984] examined the relative ability of historical beta and an adjusted beta to explain cross sectional variation in rates of return. The adjusted beta consists of the historical beta plus an adjustment factor which makes use of the information contained in analyst forecast dispersion. They found that the adjusted beta was the stronger variable in explaining cross sectional variation in realized rates of return.

Cragg and Malkiel [1982] provide theoretical support for dispersion of analysts' forecasts of earnings growth as a risk measure. Cragg and Malkiel begin by assuming

that firm value is a function of expectations of current and future earnings. Uncertainty over earnings therefore implies uncertainty about firm value, and hence is a measure of the risk of investing in the firm. Cragg and Malkiel's insight goes further than this however.

Expectations about each firm's earnings are modeled using a multi-factor model where a number of systematic factors determine the expectations of earnings for each firm. Disagreement among analysts about each firm's earnings can be generated by two sources: 1) disagreement about the future levels of the macroeconomic (systematic) variables, or; 2) by disagreement about the extent to which each firm's earnings are sensitive to the macroeconomic factor(s). If divergent earnings forecasts come about primarily because analysts disagree in their forecasts of the macro factors, then forecast dispersion can be a measure of the systematic risk facing the firm. Cragg and Malkiel provide the following example to illustrate how disagreement among analysts can indicate that a firm is sensitive to one or more systematic factors:

> "Suppose we had two companies, one a steel company that is extremely sensitive to systematic influences in the economy, the other a pharmaceutical firm that is quite insensitive to economic conditions. It may be that Wall Street analysts agree completely on how economic conditions will affect the