

New Methods in Financial Modeling: Explorations and Applications

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Publisher: **Quorum Books**¹

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This book documents cutting-edge research in the area of financial modeling. In particular, the book provides several in-depth studies on the determinants of, and relationships among, stock and bond prices and returns. Generally speaking, the authors' presentation of the material is very advanced and the econometrics are extremely technical. However, both the beginning and end of each chapter contains readable insights and explanations that are useful to both financial planning practitioners and researchers. The book contains seven chapters, but they are essentially independent and can be read in any order.

Chapter one provides an introduction to financial data analysis. It begins with a brief description of the progress that has been made in financial market modeling over the last thirty years. Particular attention is paid to the efficient markets hypothesis and how asset markets process and react to new information very quickly. This first chapter also questions some of the major assumptions that are often made in financial modeling research regarding the linearity and normality of the data processes, as well as the stability of the models used in this type of research. In this way, the chapter sets the stage for the rest of the book and for the research contributions of the authors. The remainder of the book is mainly focused on testing for parameter stability of various models, examining nonlinearities in the data, and the role that volatility plays in bond and stock markets. The authors do a good job of challenging the standard assumptions of linearity and parameter stability, and the chapter, while containing a number of equations, is actually very intuitive.

The second chapter considers the appropriateness of statistical methods used in financial research and is based on previously published work by the authors. The goal is to find structure in returns so that investment professionals can use this information when managing the money of clients. The authors undertake two approaches in this regard. First, they study the stability of monthly bond and stock returns using historical data.

They determine that these returns have dynamic patterns that have changed over time. Their methods are very technical and concentrate on testing higher-order serial correlation. Essentially, what they find is that these patterns change occasionally; however, their approach does not choose the sub-periods endogenously. A more meaningful technique would let the data choose the breakpoints since the authors *a priori* choice of sub-sample periods may be correlated with the data and therefore give cause for concern. A key point of this part of the chapter is that whatever the sample period studied, one needs to test for normality and linearity in order to properly interpret the data and, thus, give good advice to investors. Second, The authors consider the capital asset pricing model (CAPM) and the assumption that a stock's beta is stable over time. The major finding is that betas have and do change over time. The implication of this finding is important for financial planners who advise their clients about diversification and suggests that what constitutes a well-diversified portfolio in one time period may not necessarily remain that way forever. Thus, periodic evaluation of an investors portfolio is necessary in order to ensure a proper risk-return tradeoff.

A short, but informative, chapter on the relationship between stock returns and economic activity is provided and fits in well with the previous chapter. Here, the authors focus on testing implications of the efficient markets hypothesis. The chapter contains the results of a large number of regression models aimed at determining if stock prices anticipate changes in real output and interest rates or if stock prices simply react to them. The authors conclude that stock prices are relatively efficient with respect to macroeconomic variables. The major criticism of this chapter would have to be in the lack of more formal tests of the efficient markets hypothesis, which, given the extent of the econometric techniques used in other parts of the book is quite surprising. For example, the authors do not examine long run (i.e., cointegrating) relationships between macroeconomic variables and stock prices. Clearly, there is much work that still needs to be done in

1. 1998, Hardcover, ISBN: 1567201253

this area, but overall, the authors do provide a good starting point for future research.

The fourth chapter in the book is really on the cutting edge of financial modeling. While only the most proficient of statisticians will be able to follow some of the specifics about how the tests are performed, Stokes and Neuburger do a fantastic job of putting into words the intuition behind modeling volatility in stock returns. Traditional financial modelers have described variability in stock returns as excessive returns; however, the authors argue that this is not the case and that volatility should itself be modeled. Through a series of vector autoregressions and a new technique (called MARS), they find evidence of incomplete adjustment to new information and the presence of what they call threshold memory in stock returns. Their findings are consistent with the idea that stocks tend to overreact to news.

The next chapter changes gears and looks at modeling episodic nonlinearity in bond returns. The authors discuss how bond investors often look to the commodity markets for signals about future inflation since changes in expected inflation will affect real bond returns. The relationship between changes in commodity prices and bond returns is examined with specific attention paid to modeling the nonlinearity in the residuals. One of the strong points of this analysis is the extensive use of plots to illustrate the findings. These plots make it easy for the reader to grasp the findings and to identify the periods of nonlinearity without having to grapple with a bunch of numbers. Their findings confirm the notion that commodity price inflation does affect bond returns as predicted. Several techniques are introduced in this chapter such as ARCH models and a rather unique variation of the portmanteau Q statistic. They document greater than usual nonlinearity in bond returns 45 days prior to the 1987 stock market crash. This finding is promising for investors as it may allow researchers to detect major market drawbacks ahead of time since mounting tensions and uncertainty in the financial markets may lead to large swings in asset values.

The possibility of international transmission of conditional volatility is considered in the sixth chapter. Twenty one national stock indices are examined in regional groupings to determine if fluctuations in one market can help to predict volatility in other markets. The ARCH model is used to estimate the variability of stock prices and then these estimates are entered into vector autoregressions to check for significant relationships via Granger-causality tests. For each of the

markets they contend that volatility is, at least to some extent, predictable. The chapter's major finding is that stock markets within regions (defined by time zone) do transmit their volatility to other markets, but that this effect diminished somewhat after the worldwide stock market crash of 1987. The authors attribute these findings to the markets becoming more efficient – information arising in one market is more quickly reflected in other markets. If true, this could help financial planners to quell client fears about such events as the recent “Asian crisis.”

The final chapter examines the dynamic linkages between a large cap index (Russell 1000) and a small cap index (Russell 2000). The question addressed is “are these series related?” While a number of studies have been published on the long and short term relationships between national stock market indices, I believe this is the first study to consider indices within the same country in such a fashion. Of course, with the proliferation in recent years of index investing, this chapter is considerably important. In an examination of percentage changes in the two indices, the authors do not detect any long run relationship – good news for those investors saving for retirement that diversify using large cap and small cap index stock funds. However, while examining the volatility of the indices, it is found that volatility moves from the Russell 1000 to the Russell 2000. The authors attribute this finding to large capitalization stocks being more liquid than small capitalization stocks, and the former having relatively lower transactions costs.

The book provides a good reference guide for financial planners who want quick access to new empirical findings. While quite technical, readers should be able to garner a number of insights from each chapter. The book is well written, and provides a good set of references on earlier related studies. Additionally, for the financial researcher, the book provides an overview of some of the newer techniques that are sure to be more common in the future.