Book Review

Market Efficiency: Stock Market Behaviour in Theory and Practice. Andrew W. Lo. Lyme, N.H.: Edward Elgar Publishing Inc., 1997. 1,224 pp., $400.00 (two volume set—hardback). ISBN 1-85898-161-1.

In *Market Efficiency: Stock Market Behaviour in Theory and Practice,* Andrew W. Lo has collected the major papers, both theoretical and empirical, that have defined the development of the theory of efficient capital markets. The first volume has an introduction by the editor and a foreword by Richard Roll. Both are brief—too brief, in my opinion—but excellent.

The papers are grouped into five parts. In Volume I, Part I is "Theoretical Foundations." The included articles are by Black (1986), Fama (1970), Grossman (1976), Grossman and Stiglitz (1980), LeRoy (1973), Lucas (1978), and Samuelson (1965).

Part II is "The Random Walk Hypothesis." The articles are by Cootner (1962), Cowles and Jones (1937), Fama (1965), Fama and Blume (1966), Fama and French (1988), French and Roll (1986), Jegadeesh (1990), Kim, Nelson, and Startz (1991), Lo (1991), Lo and MacKinlay (1988), Osborne (1959), Porterba and Summers (1988), and Richardson (1993).

In Volume II, Part I is "Variance Bounds Tests." Included articles are by Campbell and Shiller (1989), Flavin (1983), Gilles and LeRoy (1991), Grossman and Shiller (1981), Kleidon (1986), LeRoy and Porter (1981), Marsh and Merton (1986), Merton (1987), Michener (1982), Shiller (1981), and West (1988).

Part II is "Overreaction and Underreaction." Articles here are by Ball and Brown (1968), Bernard and Thomas (1990), Chan (1988), Chopra, Lakonishok, and Ritter (1992), De Bondt and Thaler (1985), Lehmann (1990), and Lo and MacKinlay (1990).

Part III is "Anomalies." The articles in this part are by Banz (1981), Basu (1977), Brown, Goetzmann, Ibbotson, and Ross (1992), Copeland and Mayers (1982), Keim (1983), Lakonishok and Smidt (1988), Lo and MacKinlay (1990), Roll (1983, 1984), and Rosenberg, Reid, and Lanstein (1985), and Rozeff and Kinney (1976).

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In each part the articles are arranged alphabetically by the last name of the (first) author. It is difficult to understand why Lo chose this ordering. It is true that no one will mechanically read these articles in the order that they appear in the book, but readers often scan the table of contents of such collections to get an overview of how a particular line of research has developed. A chronological order would have been more useful.

This is a minor criticism, but it is the best I can do. Almost without exception Lo included the same articles that I would have chosen. For the serious reader, this collection of articles gives the best single overview of capital market efficiency that I am aware of. It may be unrealistic to advise graduate students in finance and financial economics to put these volumes in a backpack, hike into the mountains and read them (as I once did with Samuelson's *Collected Scientific Papers*), but they could do worse.

The organization of these volumes is excellent. In particular, including a group of articles under the rubric of the random walk hypothesis is a good idea. Articles in this section fall in two classes: in the early articles interest in the random walk model stemmed from the presumption that efficiency required that price changes be random. The later articles, in contrast, reveal a clear understanding that this opinion is incorrect. In these the random walk model is studied not because there is any theoretical presumption in its favor, but because it provides a natural benchmark: behavior of security prices is most easily characterized by whether and in what respects it deviates systematically from the random walk.

Many financial economists will question Lo's decision to devote an entire section to the variance bounds tests. Studying the determinants of unconditional price and return variances is no longer an active research area, having been almost entirely supplanted by research on the behavior of conditional variances. The main reason financial economists have turned away from the variance bounds tests is that these tests assume a constant discount rate, at least in the usual formulation. In contrast, for proponents of the theory of consumption-based asset pricing, understanding security pricing consists of characterizing stochastic discount factors. On this view, variance-bounds tests define the central problem out of existence.

The consumption-based asset pricing paradigm is not the only way to approach the problem of security pricing. As readers of this journal are well aware, empirical attempts to relate expected security returns to the covariance between returns and the marginal utility of consumption have been a near-complete failure, particularly if adequate allowance is made for data mining. Some argue from this that we just have to look harder for stochastic discount factors that work better; doing anything else is unscientific.

On the contrary, scientific method would seem to imply that we eventually take seriously the overwhelming empirical evidence that consumption-based asset pricing simply does not work. Along these lines, specification of a constant discount factor could be justified on grounds of parsimony. If the

link between security returns and the marginal utility of consumption were shut down, financial economists could concentrate their modeling efforts on other areas, such as nonrational expectations, cognitive biases, or group behavior. In such investigations a natural point of reference would be to explain the excess volatility of security prices and returns.

Looking over the econometric articles on variance bounds included in these volumes, one cannot escape the conclusion that by and large they miss the mark. Their focus is almost exclusively on establishing that point estimates of various volatility measures are biased, and therefore that the comparison of these is meaningless. However, the relevant econometric issue has to do with how rejection regions and alternative hypotheses are to be specified, and therefore on how the probabilities of type I and type II error are to be determined. None of the collected articles addresses this issue, and few of the variance bounds articles published elsewhere do so.

The view is frequently expressed that variance-bounds tests are inferior to conventional efficiency tests because the former have lower power. However, such discussions typically contain no explicit discussion of sampling theory or alternative hypotheses. Therefore one must conclude that in such discussions the term "power" is used in some metaphorical sense rather than with its literal econometric meaning.

LeRoy and Steigerwald (1995), using simulations, compared the size and power of variance bounds and conventional market efficiency tests. They found that variance-bounds tests in fact have higher power than conventional efficiency tests. It is not clear why this occurs or how robust the conclusion is. If research on variance bounds were for some reason to resume, this would be a natural place to begin.

In his introduction Lo expresses general satisfaction with the efficient capital markets literature: "[D]espite the continuing lack of consensus in academia and industry, the ongoing dialogue [on market efficiency] has given us many new insights into the economic structure of financial markets. If, as Paul Samuelson has suggested, financial economics is the crown jewel of the social sciences, then the [efficient markets hypothesis] must account for half the facets."

Perhaps. To me it is far from clear that the efficient market literature reflects as well on financial economists as such topics as, for example, derivatives pricing. The formulation of market efficiency that dominated finance journals for many years was tautologous (LeRoy 1976). Further, financial economists had a schizophrenic view of the risk-return trade-off: when discussing the capital asset pricing model the risk-return trade-off was front and center. However, when discussing market efficiency the risk-return trade-off disappeared: the obvious idea that past information would be expected to influence equilibrium expected returns if it affected perceived risk was very slow in entering the mainstream.

Even more seriously, the incorporation of information in security prices

is central in efficient capital markets theory, yet the theory proceeded as if information were free and therefore economically inconsequential. It was not until the classic articles of Grossman (1976) and Grossman-Stiglitz (1980) (reproduced in the volumes under review) that financial economists realized that financial markets would not be informationally efficient unless information were free. One could conclude from such considerations that in the 1970s, when finance was making such strides in other areas, the theory of efficient capital markets was still in an essentially preanalytical state.

As good a job as Lo did with these volumes, one wonders what purpose such collections serve. Almost without exception the collected articles are easily available in journals. Any library that buys this collection also subscribes to the journals, and most readers who want their own copies of the articles will reproduce them directly from journals (or, increasingly, download them from the Web) rather than buy these volumes. Nonetheless, I am happy to have them on my shelves.

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References

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