PARTITIONING MARKET EFFICIENCIES BY ANALYST ATTENTION: THE CASE OF ANNUAL EARNINGS ANNOUNCEMENTS

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(ABSTRACT)

This study addresses the empirical question of heterogeneous market efficiency characteristics, specifically as they are attributable to divergent levels of professional securities analyst attention. As a significant group of information intermediaries, analyst institutions conceivably influence, in a profound manner, the efficiency with which security prices respond to new information. Consistent with this notion is the hypothesis that the securities of firms which are neglected in terms of analyst coverage exhibit price inefficiencies relative to their closely followed counterparts.

Two market efficiency constructs with respect to annual earnings announcements are examined in this study. Preannouncement information efficiency is guaged by the

degree to which security prices appear to lead or anticipate the information content of subsequent public earnings releases. Such price behavior is indicative of the market's ability to acquire and process interim signals that are relevant to the determination of proper and timely security valuations. Postannouncement, or semi-strong-form, efficiency is in turn referenced by the relative absence of anomalous "drifting" patterns in postdisclosure returns. The presence of significant drifts is inconsistent with a market that adjusts quickly and unbiasedly to signals that are transmitted publicly.

Sample firms taken from the NYSE are ranked into three groups according to their relative following by the professional securities analyst community. Analyst attention is surrogated by the number of investment houses providing annual earnings per share forecasts for companies listed in the Institutional Brokers Estimate System (IBES) computer file. The delineation of the three attention concentration groups' relative efficiency profiles is accomplished by means of two uniquely derived metrics that restate cumulative abnormal returns (CAR's) into an ordered domain of pre- and postannouncement efficiency structures. The CAR's are derived from daily price data immediately surrounding annual earnings announcement dates for the

calendar years ended 1976 through 1982. Owing to the non-normal distributional properties of the inefficiency metrics, two nonparametric procedures are employed to detect group mean differences.

The results overwhelmingly indicate that both pre- and postannouncement efficiency are positively associated with professional analyst attention. Moreover, the detected efficiency differences cannot be attributed to firm size effects or to the extent of the market's forecast error -- two factors that have previously been established in the empirical literature to be associated with event period CAR magnitudes.

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my parents, , and my in-laws, . Their unconditional love will never be forgotten.

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THE PROBLEM STATEMENT

1.1 INTRODUCTION

While various definitions of market efficiency have been proposed -- and some contention still exists concerning a precise meaning[1] -- there appears to be a consensus on two criteria that are salient to the construct. First, security prices should act as though they reflect fully and accurately all currently available information; and second, those prices should respond rapidly to new information in an unbiased manner. The general conclusion that emerges from nearly two decades of empirical research on the subject is that, as a first approximation, the U.S. equity securities markets are "public information" efficient.[2] That is, only those trading on privileged or "inside" information can

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[1] Beaver, W., "Market Efficiency," The Accounting Review (January 1981a), p. 23.

[2] Efficiency studies have been replicated in numerous domestic and foreign market contexts and have, for the most part, yielded positive results. May [1971] looked at AMEX quarterly earnings; Hagerman [1973], OTC bank stocks; Foster [1975], OTC insurance companies; Brown [1970], the Australian stock market; Firth [1976], British stocks; Forsgardh and Hertzen [1975], the Stockholm exchange; and Deakin, Norwood and Smith [1974], the Tokyo exchange. An exception to efficiency was found by Lev and Yahalomi [1972] for the Israeli stock exchange. This exception was attributed to unique capital market imperfections.

expect to outperform the market on a risk-adjusted basis.

There are two potential implications of this general conclusion that are worth noting. The first is the conveyance of a subtle, yet possibly deleterious, extension that positive results (i.e., findings consistent with market efficiency) apply uniformly to the entire market investigated. Positive results on the efficiency of securities sampled from the NYSE, for example, have perhaps been prematurely interpreted as being equivalently applicable to all cross-sections of the NYSE. If, in fact, systematic efficiency aberrations exist for certain market segments, however, this would render "blanket" statements of market efficiency nebulous and therefore inappropriate.

The second implication of the above conclusion is that its cursory acceptance tends to obscure the significance of more current (and often more powerful) research that calls into question an unequivocal message of empirical efficiency. Anomalous results, if not altogether ignored, are frequently impugned for methodological impropriety.[3]

[3] A case in point is the rather persistent postannouncement "drift" pattern that exists with respect to studies conducted on quarterly earnings announcements. Joy and Jones [1979], who review this research in some detail, state: "...several studies have presented evidence that purports to be inconsistent with the semi-strong-form of the efficient market hypothesis, but they have received little attention of either a favorable or unfavorable nature. It is perhaps surprising that, in the main, they have gone unchallenged since their results are contrary to

Consequently, meritorious alternative hypotheses often receive inadequate attention. In the area of market-based research, for example, the disparate results that have surfaced in recent years may be due largely to jointly testing -- within the confines of the sample definition selected by the researcher -- efficiently-priced and relatively inefficiently-priced securities. A heterogeneous efficiency condition would seem to be a more tenable hypothesis for these so-called anomalies than the continued utilization of deficient research methods.

It is generally unassailable from a theoretical standpoint that security price efficiency in imperfect markets is a matter of degree.[4] Indeed, Verrecchia argues that, in a rational expectations economy, the only efficiency issues to resolve are those that relate to the level of noise which pervades the system.[5] Hence, a test of efficiency "...is a test of the level of friction in a

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one of the most important hypotheses in finance (p.51)." Interestingly, as the Joy and Jones [1979] article was being prepared for press, the now widely-cited Ball [1978] paper appeared in which many of these studies' conclusions are seriously challenged for methodological weaknesses.

[4] Fama, E., "Efficient Capital Markets: A Review of Theory and Empirical Work," Journal of Finance (May 1970), pp.383-417.

[5] Verrecchia, R., "The Use of Mathematical Models in Financial Accounting," Journal of Accounting Research (1982 Supplement), pp.1-42.

market, since in the absence of friction there is nothing to test...."[6] Unfortunately, for most tests of empirical market efficiency the assumption is (implicitly) made that frictions operate equivalently over all securities in the sample isolated for analysis. In practice this is evidenced by an aggregate focus in which the efficiency level of an entire exchange is examined. Sparse attention has been directed to the potential for "systematic" cross-sectional imbalances within an exchange,[7] or to the results of one exchange relative to another.[8]

Justification for an aggregate focus may be found in two related explanations. First, without any prior expectation to the contrary, it is reasonable to assume that market

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[6] Ibid., p.28.

[7] The inadequacy of research in this area is intimated by Lev and Ohlson [1982] in their summary of market-based accounting research. They write: "Why do some stocks react to earnings disclosures more than others? Is this due to the existence of more information prior to the earnings announcements? If so, what are the economic circumstances triggering differential effects? Is it related to the exchange in which stocks are traded and/or to insiders' market activities? (p.263)." Some initial attention has been given to these differential price reactions to earnings and other announcements by Grant [1980], Atiase [1980], Finnerty [1976a;1976b], and Penman [1982]. Penman and Finnerty view these differences from the standpoint of insider activity, whereas Atiase and Grant attribute these anomalies to differential disclosure patterns. Additionally, recent evidence by Givoly and Palmon [1982] indicates that the timeliness of earnings announcements significantly affects their information content.

[8] One of the few researchers who isolated and compared the

noise is, in fact, uniform. Second, to the extent that frictions are idiosyncratic rather than systematic, they simply inject random constant-mean error into the experiment. Consequently, it is not surprising that empirical exploration into the possibility of systematic contemporaneous differences among exchange constituents' efficiency characteristics has been lacking.

One potential source of enduring friction imbalance, and the one to which this research is directed, is a significant asymmetry in the amount of attention paid individual firms by the professional analyst community.[9] Bernstein argues on a priori grounds that the efficiency of the U.S. securities markets owes much of its credit to the enormous research efforts undertaken by this group of information intermediaries.[10] Beaver, though apparently reluctant to

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effects of different markets is Grant [1980]. He finds significantly greater price adjustments associated with the earnings announcements for unlisted (OTC) firms than for listed (NYSE) firms.

[9] Another potential source is firm size. Sandretto [1979] addressed this possibility but was unable to support his hypothesis that smaller firms (on the NYSE) are less efficient than larger firms. This negative result may be attributable to a lack of statistical power in his tests (e.g., monthly rather than daily return information was utilized). The firm size issue is discussed more fully in a later section.

[10] Bernstein, L., "In Defense of Fundamental Investment Analysis," Financial Analysts Journal, (January-February 1975), pp.57-61.

readily concede to this viewpoint, appropriately notes that the lack of a formal theory specifying the role played by analysts in the efficiency mechanism effectively precludes resolute statements to the contrary.[11] The empirical record is unfortunately silent on the issue. As discussed later, however, it does suggest that the differential information flow engendered by the institutional framework significantly affects equilibrium asset pricing.

This dissertation is twofold in purpose and involves a theoretical and empirical examination of the above question. More specifically, the stated objectives are (i) to formulate, in response to its need, a positive theory of market efficiency vis-a-vis the U.S. analyst institutional framework, and (ii) to empirically address the testable implications of the theory. Of particular interest in (i) is the manner in which the institutional framework might provide information cost economies and fortuitous risk transfers for a privileged contingent of analyst patrons. The empirical tests conducted in (ii) are designed to investigate whether differences in two market efficiency constructs can be distinguished among three broad groups of analyst attention recipients. Informally, the major hypothesis is that a lower level of efficiency is associated

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[11] Beaver, W., op. cit., 1981a, p.32.

with firms that are neglected in terms of analyst coverage.

The balance of this chapter is structured as follows. Section 1.2 presents some background material that is relevant to the questions probed by this research. Evidence testifying to the value of the analyst community's output is discussed first, followed by some initial results that have been provided in the general area of differential information flow. In Section 1.3 the motivation underlying this study is developed at length. The present study is contrasted with previous efforts of others and the expected contributions are delineated. Section 1.4 briefly describes the nature of the empirical analysis. Finally, Section 1.5 closes with the chapter content of the dissertation.

1.2 BACKGROUND

1.2.1 The Product of the Security Analyst Industry

Prevalent since the dawn of the efficient market hypothesis (EMH) have been those who sharply disagree with its commonly stated implications. The vexing issue central to these concerns stems from the argument frequently advanced by efficient market theorists that, consequent to a valid EMH, fundamental or "intrinsic value" investment analysis is a fruitless undertaking. According to the argument, inasmuch as security prices fully and instantly

reflect all available information, the attempts by some to gain an informational advantage by rigorous analysis are devoid of economic rationale. Indicative of this viewpoint is the comment made by Lorie and Hamilton that "...the most general implication of the efficient market hypothesis is that most security analysis is logically incomplete and valueless."[12]

The fundamental paradox, however, is that without a large and influential group of market participants who actively engage in data collection, processing, and arbitrage activities -- i.e., who assume inefficiency exploitation possibilities -- efficient markets cannot obtain. Simply stated, market efficiency is conditional upon the existence of individuals who choose to disbelieve it, at least in isolated instances. Thus, while most adherents to the EMH would not suggest that security analysis is worthless from an overall market perspective, they would argue that concomitant rewards cannot be expected by individuals who choose to engage in these pursuits.

A host of provocative questions emanates from this discussion, not the least of which concerns the very existence of a thriving industry deriving its support by

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[12] Lorie, J. and M. Hamilton, The Stock Market: Theories and Evidence. Homewood, Illinois: Richard D. Irwin (1973), p.100.

conducting just such analyses. Why, in the face of all the evidence, does the financial-analyst community continue to be so well supported by a subscribing public? Is it plausible that this phenomenon is attributable entirely to naivete?

A more appealing, though, perhaps controversial answer to this question is that the work of this community does indeed generate abnormal returns for a privileged group. Some have argued that those who have first-hand access to the rich information set generated by intensive formal analysis are expected to enjoy after-transaction-cost excess returns.[13] Anecdotal support of such a proposition is provided by reports citing the existence of a large, active, informal communications network between analyst institutions and researched firms.[14] Consistent with economic theory, securities analysts search for inside information up to the point where their expected marginal revenue equals their marginal searching costs.[15] The marginal information costs

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[13] See, for example, Burton, J., "Forecasts: A Changing View From the Securities and Exchange Commission," in Public Reporting of Corporate Financial Financial Forecasts, edited by P. Prakash and A. Rappaport, Commerce Clearing House (1974), pp.81-98.

[14] Axelson, K., "A Businessman's Views on Disclosure," The Journal of Accountancy (July 1975), pp.42-46. For example, JC Penney accommodated over 1,000 interviews with analysts in a single year.

[15] Examples of literature that discuss the calculus of costs

to investors who purchase analyst services may in turn be less than to those who seek out information privately.[16]

Unfortunately, direct verification of these abnormal returns is difficult to carry out empirically. To do so would require knowledge of (i) the analyst-generated privileged information set, and (ii) the net of search and transactions cost risk-adjusted returns resulting from its utilization. Nonetheless, several insightful contributions in this area have been made.

Traditional arguments questioning the value of analysts' services use as their basis a number of studies conducted on the performance of professionally managed portfolios (e.g., mutual funds).[17] The common interpretation is that if any single group of investors were to enjoy beneficial insider contacts and possess superior information processing capabilities it would be the managers of these portfolios. The bulk of research, however, fails to bear this out. A frequently-cited study by Jensen into the performance of 115 mutual funds over the 1955-1964 period reveals that these

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and benefits to information search are Jensen and Meckling [1976], Hakansson [1977], and Goldman and Sosin [1979].

[16] This contention is discussed fully in Chapter 3.

[17] Examples of such studies include Friend, et al. [1962], Sharpe [1966], Jensen [1968], Friend, Blume, and Crockett [1970], and Williamson [1972].

funds, on average, provided a return of 14.6% below that which would have been earned on a naive buy-and-hold strategy.[18] The general finding of inferior performance is relatively robust to alternative assumptions regarding management fees and transactions costs. The results of other studies are remarkably similar, and have since been used by some[19] to conclude that analyst groups are of dubious instrumentality in efficiency attainment.

In a somewhat controversial article, Bernstein severely criticizes such conclusions.[20] His retort to researchers who find only marginal performance associated with professionally managed portfolios invokes the law of averages:

> [It] should not surprise us that all investment companies taken together achieve only average results, for even the spectacular results achieved by a few brilliant security analysts are likely to be diluted and masked in the aggregate by the performance of hordes of average and mediocre practitioners in this field. Moreover, as Benjamin Graham expressed it: "It may be that the professionally managed funds are too large a part of the total picture to be able to outperform the

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[18] Jensen, M., "The Performance of Mutual Funds in the Period 1955-64," Journal of Finance, (May 1968), pp.389-416.

[19] See, for instance, W. Beaver, "The Behavior of Security Prices and its Implications For Accounting Research (Methods)," The Accounting Review (1972 Supplement), pp.407-437.

[20] Bernstein, L., op. cit., 1975.

market as a whole."[21]

The substance of Bernstein's response to the EMH result that investors cannot expect to outperform the market is that such reasoning is tautological: the market is the expectation of investors. Furthermore, those expectations may be in error, causing prices to digress from value. It is the work of the analyst community, he argues, that corrects for these disparities.

More recent research gives greater credence to such a viewpoint. The scope of the mutual fund studies may have been unduly confined to only a small portion of the analyst community's output, that being their portfolio management services. Another, perhaps more important, service provided by these institutions is information processing. Examples include earnings forecasts and direct investment recommendations.

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[21] Ibid., p.58.

[22] Givoly, D. and J. Lakonishok, "The Information Content of Financial Analysts' Forecasts of Earnings: Some Evidence of Semi-Strong Inefficiency," Journal of Accounting & Economics (December 1979), pp.165-185.

[23] Abdel-khalik, A. and B. Ajinkya, "Returns to Informational Advantages: The Case of Analysts' Forecast Revisions," The Accounting Review (October 1982), pp.661-680.

Givoly and Lakonishok[22] and Abdel-khalik and Ajinkya[23] report significant abnormal returns prior to the public dissemination of analyst forecast revisions. The latter infer from the findings of both studies that analysts and their clients do profit from the privileged information but apparently fail to exploit fully its return potential. As they and others have suggested, these unexploited opportunities might be attributable to limited arbitrage strategies available to the relatively small group of informed investors.[24] Of course, due to the practical difficulties associated with explicitly controlling for search and transactions costs, it is not known whether or not the observed gross abnormal returns would necessarily pay off in net gains to a privileged investor clientele. The evidence remains, however, that an informational advantage is held by analysts prior to the public dissemination of their forecasts -- prima facie indication that they profit from its exploitation.

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[24] On this, Lloyd-Davies and Canes [1978, pp.44-45] state: "As an analyst's clients buy a particular stock on his recommendation, their portfolios become more and more unbalanced; that is, they begin to assume increasing amounts of diversifiable risk. This increasing risk can bring their arbitrage operation to a halt before the abnormal returns are eliminated, since at some point the abnormal returns become fair returns for an abnormal risk." An alternative (complementary) explanation for the existence of these unexploited returns is provided in Chapter 3.

With respect to the value of analyst-supplied information following its public release (i.e., tests of semi-strong efficiency), the literature is inconclusive. In their study of analysts' direct buy/sell recommendations published in The Wall Street Journal, Lloyd-Davies and Canes find substantial price reaction surrounding the publication date of a recommendation, but no apparent abnormal price fluctuations thereafter.[25] By contrast, the aforementioned Givoly and Lakonishok study reports significant abnormal returns during the two-month period following the month of analyst forecast revisions.[26] The apparent inconsistency between these two findings might be resolved somewhat by noting the differences in the two types of information disclosure. Direct buy/sell recommendations may need little further interpretation before inducing positions to be taken (that is, of course, if the investor community deems them to emanate from a credible source). The time period in which abnormal returns are realized may, as a consequence, be reduced to a day or so. Forecast revisions, on the other hand, may be characteristically more difficult to process, and, consequently, slower at finding their way into security

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[25] Lloyd-Davies, P. and M. Canes, "Stock Prices and the Publication of Second-Hand Information," The Journal of Business (February 1978), pp.43-56.

[26] Givoly, D. and J. Lakonishok, op. cit., 1979.

prices.

Owing to some rather curious results reported by Black,[27] this rationale may have to be tempered. He finds that a trading strategy based on Value Line's direct recommendations yields a portfolio that earns superior risk-adjusted returns. For this finding to be consistent with the above interpretation, the assumption must be made that, during the period researched by Black, the investment community did not fully appreciate the superiority of the Value Line recommendations relative to alternative sources. As the result, "privileged" subscribers with the investment magnitude necessary to drive the returns to equilibrium levels would not have existed. More precisely, the entire investor community was indeed so privileged, yet ostensibly remained ignorant of the fact.

These inconsistencies aside, the more current research testifies to the value of the analyst community's information output. The observed abnormal return behavior surrounding the public release of analyst-supplied information supports rather convincingly the hypothesis that this industry sells a bona fide economic product. This conclusion offers some comfort; had the findings suggested

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[27] Black, W., "Yes Virginia, There is Hope: Tests of the Value Line Ranking System," Financial Analysts Journal (September-October 1973),pp.10-14.

otherwise, the continued existence of analysts as employed agents in the economy would itself constitute a fundamental market inefficiency.

1.2.2 Analyst Attention Concentration and Asset Pricing

Research directly bearing on the effects of differential analyst attention has recently been conducted by Arbel and Strebel (AS)[28] and Arbel, Carvell and Strebel (ACS).[29] Using data compiled from the S&P Earnings Forecaster to surrogate the degree of analyst attention paid individual firms, AS find, in their words, a "neglected firm effect." This effect is evidenced by superior risk-adjusted return performance -- as measured by the empirical (ex post) Capital Asset Pricing Model -- for companies less followed by professional analysts. Particularly striking is the fact that the studied firms were taken from the S&P 500, an index representing comparatively larger firms that would be thought to attract wide market scrutiny.

In a subsequent study, ACS extend their analysis to include firms traded on the NYSE, the AMEX, and over-the counter markets. Although neglect is measured in terms of

[28] Arbel, A. and P. Strebel, "The Neglected and Small Firm Effects," Financial Review (November 1982), pp.201-218.

[29] Arbel, A., S. Carvell and P. Srebel, "Giraffes, Institutions and Neglected Firms," Financial Analyst Journal (May-June 1983), pp.57-63.

actual institutional holdings rather than by their previous surrogate for analyst coverage, the same relationship emerges; namely, higher risk-adjusted returns to holders of neglected securities.

Intuitively, one would expect some association to exist between the degree of analyst attention and the size of researched firms. The comment has been made, for example, that analyst houses choose first to cater to the information needs of institutional investors.[30] As a group, institutional investors generally seek large holdings in sizable companies.[31] This implies the possibility that the neglected firm effect is nothing more than the "small firm effect" found to exist by previous researchers.[32]

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[30] Forbes, "The Money Men: Mario Gabelli's Orphan Asylum," (15 July 1977), p.69.

[31] The relationship between firm size and attention level is not necessarily monotonic, however. At least one analyst firm -- Equity Research Associates -- specializes in companies having smaller capitalizations for the precise objective of exploiting potential inefficiencies among this group.

[32] The small firm effect is an empirical condition wherein companies of small capitalizations exhibit systematic positive abnormal returns. Examples of research documenting the phenomenon are Banz [1979, 1981], Reinganum [1981], Reinganum and Smith [1983], and Keim [1983]. Banz [1981] and Reinganum [1981] independently conclude that the effect is most likely to be a result of a misspecification of the CAPM. Roll [1981] counters that it is more likely attributable to ex post beta misspecification caused by nonsynchronous trading. Current research has focused on the possibility that the effect is due to asymmetric information availability

To control against this possibility, both AS and ACS factored into their design the degree of market capitalization. The results from this control procedure indicate that the surrogates for neglect do not merely serve as a proxy for firm size. In fact, the authors convincingly argue that the small firm effect is actually subsumed by the neglected firm effect. This conclusion stems from an observed persistence of the neglected firm effect when size is held constant, but an absence of a persistent size effect when neglect is held constant. Furthermore, whereas size is a relatively enduring characteristic of organizations, such is apparently not the case for analyst coverage. A high degree of intertemporal "switching" takes place whereby firms in some years receive intensive analyst coverage, and are neglected in others. Hence, the composition of attention recipients is not immutable. Finally, the sampled firms are among the largest in the world, a fact which alone suggests that much, if not all, of the small firm effect was controlled for ab initio.

Offering a possible explanation for this phenomenon, AS posit that published analyst forecasts diminish the uncertainties surrounding investor expectations. Intensive

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(e.g., Barry and Brown [1983] and Neustel [1984]). There is consensus agreement in the literature that the effect is not attributable to market inefficiency.

security research, they argue, might serve to tighten investors' subjective probability distributions via better mean forecasts. Through their frequent publications, analyst houses may therefore reduce considerably the noise that plagues stock investment decisions.

This interpretation enjoys subsidiary support from the findings of Barefield and Comiskey[33] and Brown and Rozeff.[34] These authors report that analysts' earnings forecasts are superior to those generated by naive time-series forecasting methods. Moreover, the aforementioned studies of Givoly and Lakonishok[35] and Abdel-khalik and Ajinkya[36] demonstrate that analysts' forecasts convey information that influences stock prices. Given the voluminous body of research pointing to the information content of earnings announcements, prudent investors might rationally weigh analyst-supplied forecasts more heavily than their own when making investment decisions.

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[33] Barefield, R. and E. Comiskey, "The Accuracy of Analysts Forecasts of Earnings Per Share," Journal of Business Research (July 1975).

[34] Brown, L. and M. Rozeff, "The Superiority of Analyst Forecasts as Measures of Expectations: Evidence From Earnings," Journal of Finance (March 1978), pp.1-16.

[35] Givoly, D. and J. Lakonishok, op. cit., 1979.

[36] Abdel-khalik, A. and B. Ajinkya, op. cit., 1982.

After considering various hypotheses, AS conclude that the CAPM is misspecified: the traditional mean-variance framework does not adequately compensate investors for the greater informational uncertainty surrounding neglected assets. This, they argue, results in a demand by investors for a positive premium for investing in these securities. Accordingly, the CAPM should be augmented to include a third factor reflecting this added uncertainty.

A parallel conceptualization has been advanced by Reinganum and Smith[37] as an explanation for the small-firm effect. According to their argument, the greater informational uncertainty surrounding small firms induced by a lesser following compels investors to price these securities commensurately lower. They suggest, however, that, insofar as this risk is unsystematic, it is diversifiable.

Barry and Brown are reluctant to attribute the anomalous excess returns to an ill-defined CAPM. They base their explanation instead on methodological problems associated with tests employing ex post estimates of ex ante CAPM parameters (i.e., tests of the AS genre).[38] In an analytical

[37] Reinganum, M. and J. Smith, "Investor Preference for Large Firms: New Evidence on Economies of Size," Journal of Industrial Economics (December 1983), pp.213-227.

[38] Barry, C. and S. Brown, "Differential Information and Security Market Equilibrium," Working Paper 83-904, Edwin

derivation of the effects of differential information uncertainty, they temper previous results[39] that (CAPM) ex ante parameter estimation risk is inconsequential to empirical testing of equilibrium pricing using ex post parameter estimates. To the extent that there exist cross-sectional disparities in information availability, parameter estimation risk yields non-traditional CAPM predictions. Thus, in a setting where differential information prevails, the effect is that observed betas (based on historical time-series returns) are biased upward for high-information securities and downward for low-information securities. The authors summarize the implications as follows:

> In an equilibrium asset pricing scenario, portfolios of relatively low information securities will appear to earn positive abnormal returns if their betas are measured without regard for differential information and if their returns are consistent with a CAPM in which investors properly account for differential information....A researcher ignoring these risk perceptions will conclude that there are excess returns when in fact the returns are commensurate with risk.[40]

L. Cox School of Business, Southern Methodist University (1983).

[39] Bawa, V., S. Brown and R. Klein, Estimation Risk and Optimal Portfolio Choice. Amsterdam: North Holland (1979).

[40] Barry, C. and S. Brown, op. cit., 1983, pp.7-8.

In an indirect test utilizing ordinary least squares regression analysis, Neustel subjected the analytical results obtained by Barry and Brown to empirical investigation.[41] A preliminary regression revealed that, while abnormal returns are inversely related to firm size, the level of market capitalization does not adequately explain the relationship.[42] The errors from this model were then regressed against two alternative surrogates for information uncertainty: (i) the number of analysts providing EPS forecasts (as obtained from the IBES[43] tape), and (ii) the inverse of the coefficient of variation of earnings projections. The disturbances from the latter two regressions were insignificant at all reasonable alpha-levels, which led Neustel to conclude that his surrogates for information uncertainty, along with the market capitalization factor, appropriately explain the observed abnormal returns.

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[41] Neustel, A., "Differential Information Expectations and the Small Firm Effect," Unpublished Ph.D. dissertation, Virginia Polytechnic Institute and State University (1984).

[42] The inverse relationship is such that firms with small capitalizations experience positive abnormal returns, and larger firms experience negative abnormal returns. Note that this result is consistent with the beta bias hypothesized by Barry and Brown [1983].

[43] Acronym for Institutional Brokers Estimate System. The details of this tape, insofar as they relate to the present research, are discussed in Chapter 4.

It should be stressed that Neustel's test is an indirect one. It does not clearly identify the source of the abnormal returns, i.e., whether they derive from ex ante beta mismeasurements or from a misspecification of the CAPM itself. It is entirely plausible, in other words, that the information uncertainty surrogates employed by Neustel proxy for the effects of the premium coefficient asserted by AS and not parameter estimation risk associated with the extant model.[44]

In summary, it is safe to conclude that the differential information flow engendered by the institutional framework significantly affects asset pricing. The precise functional specification of equilibrium asset pricing in settings characterized by asymmetric information availability, however, cannot be made. This renders research methods that attempt to isolate legitimate abnormal returns highly suspect. On balance, because Barry and Brown's interpretation is grounded in a formal analytic development, it is perhaps a more credible hypothesis than that offered by AS. Unfortunately, owing to the necessity of estimating

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[44] A more direct test would require an analysis that contrasts results from up-markets (i.e., positive overall risk premiums) with those from down-markets (negative overall risk premiums). This comparison would afford a determination of whether the positive abnormal returns require a slope versus a third factor/intercept adjustment to the CAPM.

ex ante parameter assessments by their ex post realizations, the Barry and Brown construct defies empirical validation. This type of problem has plagued validation tests of the CAPM since its inception.

1.3 MOTIVATION FOR THE STUDY

The above-cited research does not directly bear upon the efficiency question; instead, it deals with equilibrium asset pricing -- an empirically related, though conceptually distinct, issue. Efficiency refers not only to the extent (propriety) to which information is reflected in security prices, but also the alacrity with which it is impounded. As a test of equilibrium asset pricing, the AS methodology is capable of addressing (albeit only partially) the first characteristic and not the second. That is, by studying asset return characteristics without reference to a particular item of information disclosure, it is impossible to ascertain the relative velocity with which information is reflected in security prices. Speed, of course, must be measured with reference to particular time points. Thus, while excess returns may or may not be observable for neglected assets in general, this says nothing about price behavior relative to information arrival.

In their first article, AS discounted the possibility of inefficiency as a sole or complementary explanatory factor for the observed neglected asset excess returns. Reciting their remarks on this point:

> Traders could have beaten the market...by utilizing the following trading rule: use the S&P Earnings Forecaster as a guide to select a portfolio of neglected stocks in research category three; each year revise the portfolio to reflect changes in the focus of security research and repeat. This trading rule would have beaten the market in each of the five years studied, assuming, of course, that the capital asset pricing model provides valid risk-adjusted returns over the period. Excluding transaction costs, the cumulative excess return relative to the market would have been 63.1 percent. Such inefficiency implies, of course, that analysts consistently selected securities of lower performance, which begs the question of why they didn't correct their apparent error. In our opinion, the explanation is unlikely to be found in a market inefficiency, owing to the self-correcting nature of inefficiencies. [Emphasis added.][45]

The obvious premise behind such comments is that market inefficiencies prevail independently of analyst attention concentration. However, if a causal relationship exists between information efficiency and the potency of analyst following -- the hypothesis of this research -- then the above argument is clearly invalid. Shifts in information structure would result in more efficient performance by attention recipients and correspondingly less efficient performance by those from whom attention has been usurped.

[45] Arbel, A. and P. Strebel, op. cit., 1982, p. 212.

This follows from the fact that analyst attention is a scarce resource relative to a fairly monolithic set of potential attention subjects. Hence, whether or not market efficiency is an increasing function of analyst attention remains an open question at this point.[46]

The item of information disclosure chosen for this research is the annual earnings announcement. The theoretical and empirical connection between earnings changes and share prices was first addressed by Ball and Brown.[47] This seminal work has served as the precursor to a host of other studies which have since substantiated the empirical relationship. Beaver calls the association between earnings and security prices the single most important in

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[46] Greater concession was given to the inefficiency possibility by ACS [1983]. The caveat remained, however, that these inefficiencies are likely to be transient and therefore unexploitable. Implicit in this argument again is that inefficiencies prevail independently of research concentration. If this were not the case, then the caveat is specious in the sense that investors would be able to exploit the neglected firm effect with public information (e.g., both analyst concentration and institutional holdings are either directly or indirectly available in Standard & Poor's frequent publications). In other words, a "free-rider" problem would be indicated. For the free-rider to enjoy positive abnormal returns, he need only consider whether or not the asset falls into the neglected class. He could then profit at the expense of the bona fide risk bearers who price the securities commensurate with their added uncertainty.

[47] Ball, R. and P. Brown, "An Empirical Investigation of Accounting Income Numbers," Journal of Accounting Research (Autumn 1968), pp.159-178.

security analysis.[48] Given the established significance of the earnings number to the investment community, as well as its documented, well-defined impact on security prices, the choice of the earnings announcement date as a focal point from which to guage relative efficiency is appropriate.

1.4 NATURE OF THE EMPIRICAL ANALYSIS

The primary analysis of this research utilizes the familiar event study methodology first developed by Ball and Brown.[49] The salient feature of the present study, however, is that although it employs a research method typically utilized in information content research, it addresses an efficiency question. By focusing on the relative velocities of price adjustments to information for cross-sections of the market, observable evidence is provided about the market's information acquisition and processing activities. Therefore, rather than assuming uniform efficiency levels as a given to ascertain information content, the slant of this study is to make comparative statements about efficiencies for select market segments given the established empirical pattern of returns to information.

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[48] Beaver, W. Financial Reporting: An Accounting Revolution. Englewocd Cliffs, New Jersey: Prentice-Hall (1981b).

[49] Ball, R. and P. Brown, op. cit., 1968.

The indicated "contrasting analysis" is significant because it answers to the inability to measure market efficiency in terms of absolutes. Such a measurement objective would require a ratio scale of empirical efficiency which, unfortunately, does not avail itself.[50] Consider, for example, the following reservation offered by Lev and Olsen:

> One cannot conclude from the presence of pre- (or contemporaneous) announcement effects and the absence of postannouncement effects that the market is informationally efficient. The standard jargon often suggests that such evidence is "consistent with" informational efficiency; even so, "consistent with" is certainly not equivalent to the much stronger "implies." The test designs for informational efficiency are more demanding....[51]

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[50] At least two factors account for this deficiency. The first is the absence of a descriptive model that specifies normative asset pricing in an admittedly imperfect market setting. Certain capital market realities, such as heterogeneous investor expectations and nonzero transactions and information processing costs, have not been adequately embraced by extant return generating models. The second factor concerns pragmatic difficulties imposed on the researcher. Even if a normative asset pricing model were unanimously agreed upon by financial theorists, it could not appropriately describe all short-run price fluctuations that occur in response to unsystematic externalities impinging upon firm value. Hence, a researcher would not only have to have knowledge of these externalities, but he would also have to be able to ascertain the "correct" adjustments to price arising thereto. These issues are discussed fully in Chapter 2.

[51] Lev, B. and J. Ohlson, "Market-Based Empirical Research in Accounting: A Review, Interpretation, and Extension," Journal of Accounting Research (1982 Supplement), p. 262.

Statements about relative efficiency, however, are tenable and require only that uncontrolled factors operate equivalently across, and randomly within, the studied groups. As such, an ordered domain of efficiency structures is capable of development without the need for invoking normative concerns. To restate an important point, the intent is not to measure market efficiency directly; it is to contrast potentially distinct efficiency characteristics of the market stratified on the basis of analyst coverage.

Two market efficiency constructs with respect to annual earnings announcements are examined in this study. Preannouncement information efficiency is guaged by the degree to which security prices appear to lead or "anticipate" the information content of subsequent public earnings releases. Such price behavior is indicative of the market's ability to acquire and process interim signals that are relevant to the determination of proper and timely security valuations. Postannouncement, or semi-strong-form, efficiency is in turn referenced by the relative absence of anomalous "drifting" patterns in postdisclosure returns. The presence of significant drifts is inconsistent with a market that adjusts quickly and unbiasedly to signals that are transmitted publicly (i.e., efficient in a semi-strong-form sense).

Strictly speaking, as developed here, preannouncement efficiency relates principally to the dynamics of the market for information[52] and not directly to issues concerning investor rationality. The fact that prices may exhibit relatively slower preannouncement adjustments for certain security segments is not necessarily an indictment of flawed market behavior. The cost of interim signals to those segments may be of such a magnitude as to preclude the opportunity for arbitrage profits. Thus, rather than being interpreted as a measure of efficiency in a rational expectations sense, preannouncement efficiency should be viewed as a barometer of information efficiency, or equivalently, of the degree to which information is a free-flowing commodity for use by capital market agents. Of course, inasmuch as capital market efficiency is conditional upon the existence of an efficient information market, preannouncement efficiency plays a prominent role in the broader market efficiency construct.

In regard to postannouncement efficiency, the relevant issues are fortunately more clearly defined by prevailing theory. Information, for all intents and purposes, is freely available upon public release. Any residual information not

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[52] The operative characteristics of the market for information are formally modeled by Gonedes [1975] and Gonedes and Dopuch [1974]. Their model is extended to accomodate institutional factors in Chapter 3.

yet fully capitalized prior to the announcement should be imparted to price upon the signal's release to the general public. Significant information processing and transactions costs notwithstanding, the adjustment should be (nearly) instantaneous and total.[53] As the result, comparative assessments of investor rationality are less ambiguous in the postannouncment case than in the preannouncement case. Comparative assessments are appropriate so long as the assumption holds that frictions other than those pertaining to information are equivalent across the studied segments.

In summary, preannouncement efficiency refers to prerelease information efficiency, while postannouncement efficiency refers to securities market efficiency given freely available information.

Abnormal return analysis is employed to operationalize these two efficiency concepts. Although numerous researchers have inferred from anomalous price reactions to published signals a degree of semi-strong inefficiency for the market as a whole, an examination of the unique attributes of firms driving this overall result is seldom undertaken.[54] Hence,

[53] Foster, Olsen and Shevlin [1984] argue that, at least with respect to earnings announcements, information processing costs should be trivial.

[54] A recent exception is Foster, Olsen and Shevlin [1984]. They find that postannouncement drifting is particularly prevalent among smaller firms. The specifics of their research are discussed in Chapter 4.

this study provides valuable insight about a plausible source of the drifting paradox -- analyst neglect. Moreover, the use of abnormal return analysis to delineate specific prerelease information asymmetries is, to this researcher's knowledge, a novel approach. It is demonstrated in Chapter 4, however, that the contour of the preannouncement cumulative abnormal return profiles yields indirect evidence about the timeliness of the market's prerelease information investment activities.[55]

1.5 CONCLUSION

This chapter has discussed some conceptual and initial empirical evidence indicating a vital role potentially played by professional analyst groups in the market infrastructure. The motivation for the study was tied to an important question that, to date, remains unanswered; namely, whether securities market efficiency is an increasing function of analyst attention concentration. Finally, a brief overview of the nature of the empirical analysis was provided.

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[55] An extensive discussion of the relationship between information investment and contemporaneous price adjustment is supplied in Chapter 3.

The order and content of the subsequent chapters are as follows. Chapter 2 contains a review of the literature on the subject of market efficiency. Both theoretical and empirical linkages are considered in this review. Particular emphasis is given to proper interpretations of its meaning when the perfect market assumptions are stripped away. The chapter concludes with the formal development of the pre- and postannouncement efficiency constructs introduced in this chapter.

A positive theory of analyst institutions and market efficiency is provided in Chapter 3. The objective of this chapter is to address the manner in which professional analyst attention may influence the efficiency with which security prices respond to new economic events. A study of U.S. institutional factors (which considers both legal and economic issues) gives rise to the hypothesis that higher marginal information costs and risks are associated with neglected assets. Given this result, familiar tools of economic analysis are then utilized to show that neglected assets are not only expected to be priced lower, ceteris paribus, but also that equilibrium price adjustments to new economic events for these securities are slower in coming about.

Chapter 4 delineates the research methods employed to test the hypotheses formally developed in Chapter 3. An analysis and interpretation of the results is contained in Chapter 5. Chapter 6 concludes with the implications and limitations of the findings, as well as suggested avenues for future research.

II

MARKET EFFICIENCY: LITERATURE REVIEW, SYNTHESIS, AND EXTENSION

2.1 INTRODUCTION

The purpose of this chapter is to give more thorough attention to the meaning comprehended by the term "market efficiency." This discussion is of considerable importance for the establishment of some necessary linkages that will be fundamental to the subsequent research effort, as well as for rendering "realistic" interpretations of the term. Accordingly, the following sections are devoted to extant definitions of the efficiency construct, with considerable emphasis being given to the effects engendered by the relaxation of the traditional assumptions invoked on behalf of perfect capital markets. A mix of both theoretical and empirical research is considered in this review. The chapter concludes with the development of the empirically-based definition of efficiency introduced in the previous chapter.

2.2 MARKET EFFICIENCY DEFINED

The definition of market efficiency is by no means a settled issue. Partial blame for diffuse notions of the concept can be attributed to a lack of agreement on the situational boundaries to be employed in its specification (e.g., perfect vs. imperfect markets, complete vs. incomplete markets, etc.). Further frustrating the development of a mutually agreeable definition has been the advent of numerous theoretical constructs in the disciplines of finance and economics. These theories offer several avenues by which one could proceed.[56] In order to give focus to the more salient concerns, however, attention is confined to those definitional attributes that appear to be most prevalent in the literature.

2.2.1 The Fama Definition

In a frequently cited work, Fama defines market efficiency as a state wherein security prices

> ...at any time fully reflect all available information.[57]

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[56] Examples of theories having potential relevance in the area are portfolio theory, agency theory, the theory of rational expectations, the theory of Pareto optimality, the various theories of risk, and theories embodied in the discipline of information economics.

[57] Fama, E. "Efficient Capital Markets: A Review of Theory and Empirical Work," Journal of Finance (May 1970), p.383.

There are two important attributes of this definition worth noting. First, it suggests that at any moment the configuration of prices in an efficient market reflect unbiased assessments of future economic flows -- value-conditioned for time and risk -- given the current information matrix facing the market. Second, and this is implied by the first, prices respond instantaneously to new messages having relevance.

Though Fama only intended for this to be a general definition of the term, critics subsequently assailed it as being conceptually and operationally ambiguous.[58] Points of contention surround the meanings embraced by the terms "fully reflect" and "all available information." More precisely: (i) What constitutes the set of relevant information fully reflected in an efficient market's prices? and (ii) What degree of information scarcity can a market tolerate before being characterized as inefficient? A proper understanding of market efficiency hinges upon the answers to these two questions.

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[58] A notable criticism is found in Rubinstein [1975, p. 812].

2.2.1.1 "Fully Reflect"

Some of the earliest discussions regarding security prices and the process by which they are generated relate to the concept of "intrinsic value."[59] Under this view, the relevant data matrix for analysis is comprised of all signals pertinent to the introspective assessment of the economic rights conveyed by share ownership. The propriety of this "fundamental analysis" derives from the belief that one can determine a stock's intrinsic value and therewith delineate strategies for trade. Significant departures of security prices from their "true" values motivate investors to capitalize on this condition, thereby driving prices back into equilibrium alignment. Efficiency is thus deemed to be a consequence of painstaking analysis by knowledgable individuals who continuously monitor the market for price (value) aberrations.

Unfortunately, value is a subjective term that connotes different things to different individuals; hence, investors are likely to assign different intrinsic values to a given share of stock. Because of this deficiency, the intrinsic worth notion is viewed by theorists as a somewhat inadequate description of the price-setting process. Contemporary financial economics (in particular, portfolio theory) posits

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[59] See, for example, Graham, Dodd and Cottle [1962].

a more simplistic relationship between information and share prices. Insofar as investors are able to diversify their endowments across a wide range of assets, product differentiation dissolves as a concern. In other words, the only attributes investors need concern themselves with are nondiversifiable risk and expected return.[60] This takes the price-setting process out of a subjective, personalistic framework and puts it into a relatively objective setting that allows for equilibrium attainment in the presence of heterogeneous beliefs.[61]

Fortunately, this ameliorated view of the price-generation process has been descriptively approximated through empirical investigation, and thus affords a more convenient, better-defined perspective from which to conduct security-price research. This is not to say that there is

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[60] Markowitz [1952] provided the seminal work defining the relevant security attributes for consideration in a portfolio context. From this foundation, equilibrium conditions were specified by Sharpe [1964], Lintner [1965], and Mossin [1966] utilizing the traditional perfect market assumptions and single-period contracting. The collective result of these efforts is now referred to as the Capital Asset Pricing Model (CAPM). Subsequent efforts have concentrated on the relaxation of the stylized assumptions underlying the model.

[61] Beaver, W., "Market Efficiency," The Accounting Review (January 1981a), pp.23-37. See also Linter, J. "The Aggregation of Investors' Diverse Judgments and Preferences in Purely Competitive Security Markets," Journal of Financial and Quantitative Analysis, 4 (1969), pp.347-400.

little value in the fundamentalist's strategy; it merely shifts the focus of analysis from firm-specific factors to factors relevant to the determination of a firm's systematic risk. Under this interpretation, the rational aim of the market is to price securities properly in relation to each other, not so much to assign values.

Absolute acceptance of this process requires the market to be perfectly diversified at all times, a characteristic that as yet eludes empirical validation.[62] Reason suggests, however, that full diversification is unlikely, particularly when the effects of transactions costs are considered. A more realistic position would therefore admit to an instrumental role played by unsystematic risk in investors' decision making.[63] Returns may then be a function of the two modes of analysis working in concert. A mutual constraint of sorts may be established that acts as a reasonableness

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[62] Levy, H., "Equilibrium in an Imperfect Market: A Constraint on the Number of Securities in the Portfolio," American Economic Review (September 1978), pp.643-657.

[63] In a CAPM validity study, Douglas [1969] reports that for his large cross-sectional sample of common stocks, average realized returns are significantly positively related to variance but not covariance of returns. However, because this study orients to individual securities rather than portfolios, nontrivial criticisms may render its conclusions tenuous. See Douglas, G., "Risk in the Equity Markets: An Empirical Appraisal of Market Efficiency," Yale Economic Essays (Spring 1969), pp.3-45.

check on security prices.[64] Unfortunately, equilibrium conditions under this interpretation are difficult, if not impossible, to define in a tractable manner.

2.2.1.2 "All Available Information"

As a partial, though inadequate, response to the ambiguity associated with the phrase "all available information," the financial literature has drawn on the classifications "strong-, semistrong-, and weak-form" efficiency to depict variant levels of market efficiency as a function of information availability.[65] Strong-form efficiency describes a market that is capable of processing all information, both public and private; semistrong efficiency implies that market prices fully reflect only public information; and weak-form efficiency states that

[64] Casual justification for this rationale may be found in the existence of market segments customarily referred to as "glamor stocks." Psychologically motivated valuations by some investors serve to inflate the prices of these securities, which the more sophisticated may view as an opportunity for arbitrage profits. Unfortunately, the "psychology of the market," though clearly a factor in real world economies, is a subject virtually ignored by academics. An important exception is Dreman, who discusses the topic at length. See Dreman, D., Psychology of the Stock Market. New York: AMACOM (1977).

[65] These levels were first proposed by H.V. Roberts in "Statistical Versus Clinical Prediction of the Stock Market," Unpublished paper presented to the Seminar on the Analysis of Security Prices, University of Chicago (May 1967). Fama [1970] later incorporated them in his analysis of EMH studies.

security prices merely incorporate all historical price and volume information. This familiar classification scheme has since been the predominant mode from which to discuss efficiency levels. It has also served to underscore the importance of information availability in a well-functioning market.

The problem with the above taxonomy is that information cannot be viewed as being wholly public or private. While diffuse signals or subsets of signals may be publicly available, their assimilation into a potent information matrix may involve a rather convoluted mosaic, the construction of which necessitates costly expertise. The existence of such a situation effectively obscures the information from public view, transferring the information set into a privileged domain available only to experts (e.g., industry specialists).[66] Categorizing information as either public or private is therefore an inappropriate partitioning owing to the divergent levels of availability within these classifications. In a phrase, some items of

[66] For example, prior to the issuance of SFAS 14, which requires the inclusion of certain segment information in consolidated financial statements, it is likely that only a small minority of investors had ready access to these data. Some evidence of the effect of limited line-of-business data is reported by Kochanek [1975]. He finds that the adjustment to earnings releases is faster for those NYSE firms which publish extensive segment information than for those whose published line-of-business information is limited.

information are "more public" than others.

2.2.2 The Beaver Definition

Giving recognition to the impropriety of the traditional three-form taxonomy, Beaver has stressed the need to adopt a definition that considers efficiency with respect to particular information signals and/or information systems.[67] He formalizes Sharpe's unpublished concept in the following price-oriented definition of efficiency:

> ...market efficiency with respect to an information item means that prices act as if everyone knows that information (p.28, emphasis in original).

Accordingly, a market is efficient with respect to a particular information system if the prices the system generates are identical to those that would be generated in an otherwise identical economy in which the system accurately describes the information available to all market participants. In this regard, it is important to point out that the construct does not require universal knowledge to hold literally; it merely demands price configurations to match those that would exist in such an economy. The means by which such price behavior might obtain are discussed in the subsequent section.

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[67] Beaver, W., op. cit., 1981a.

As Beaver notes, some important attributes of the definition are that it (i) permits the presence of efficiency in a world of heterogeneous beliefs, (ii) focuses on prices as opposed to beliefs or actions (e.g., rational vs. irrational portfolio definition and balancing), (iii) logically distinguishes the definition from any particular equilibrium model, and (iv) permits a more finely partitioned concept than that offered by the traditional strong/semi-strong/weak classifications.

Most important to the present research effort, however, is that it suggests a scheme by which relative efficiency may be operationalized. A salient feature of Beaver's definition, yet not included in his list of attributes, is that it enables the researcher to revise the focus of inquiry from a binary efficiency classification (i.e., whether a security is or is not efficient) to an ordinal efficiency measurement (i.e., how efficient a security is relative to others in the market). Because Beaver apparently retains the dichotomy with respect to particular signals, his attempt to remove the coarse partitioning from the efficieny concept is deemed here to be incomplete. A more polished refinement would allow for gradations of efficiency to be present without imbuing an "all or nothing" classification to a particular security. Because prices in

the "otherwise identical economy" referred to above are not observable, this refinement is of considerable importance. The import of the refinement is highlighted still further in view of our ignorance of normative pricing concerns in imperfect market settings. These issues are taken up in the following section.

2.3 INEFFICIENCY VERSUS IMPERFECTION

A substantive question arises as to whether the observance of differential efficiency profiles (structures) necessarily implies the existence of capital market imperfections in a rational expectations sense. In other words, to what extent, if any, does the presence of efficiency asymmetries indicate faulty pricing behavior on the part of the market? As demonstrated in the following discussion, the answer to this question requires some tradeoff to be made between theory and practice.

The traditional mode of analysis attacks the efficiency question from the standpoint of perfect capital markets, namely, markets in which (i) there is free mobility of resources (i.e., no transactions costs), (ii) there is costless access to all available information, and (iii) homogeneous beliefs prevail. This setting allows for a purist's definition that is amenable to a fairly complete

yet unconfounded analysis. Unfortunately, as rather acute abstractions these classical assumptions constrain our ability to fathom situations embodying real world intricacies. Furthermore, as Fama and others have observed, such a setting in no way challenges the efficiency construct; market efficiency would obtain trivially.[68] Central to an undersanding of "realistic" market efficiency, then, is a comprehension of the frictions posed by the relaxation of these assumptions.

2.3.1 Homogeneous Expectations

Several authors have formally analyzed the homogeneous expectations condition and have concluded that it is needlessly restrictive. Following the lead of Lintner, who demonstrates that prices reflect a type of geometric averaging of heterogeneous expectations,[69] Rubinstein introduces the notion of "consensus beliefs."[70] According to his definition, consensus beliefs are those beliefs which, if held by all individuals in an otherwise similar economy,

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[68] Fama, E., op. cit., 1970, p.387.

[69] Lintner, J., "The Aggregation of Investors' Diverse Judgments and Preferences in Purely Competitive Security Markets," Journal of Financial and Quantitative Analysis 4(1969), pp.347-400.

[70] Rubinstein, M., "Securities Market Efficiency in an Arrow-Debreu Economy," The American Economic Review (December 1975) pp.812-824.

would generate the same equilibrium prices as in the actual heterogeneous economy. That is, the impact of aggregation takes what may otherwise be relatively wide belief dispersions and forms them into the best expectation of the market as a whole. This property of the price generation process is therefore consistent with -- and was in fact the forerunner to -- the previously mentioned definition of market efficiency offered by Beaver.

Interestingly, as Verrecchia points out, consensus-belief prices are at least as good as what any particular investor could individually establish. He illustrates the process with the following vignette:

> [S]uppose that a market consisted of two investors, the first of whom had as his sole source of information a set O, say, which contained only optimistic bits and pieces of data about a security , and which consequently induced him to regard the future return of the security as "abnormally high." Alternatively, the second investor had as his sole source of information a set P, say, which contained only pessimistic bits and pieces of data about the security, and which consequently induced him to regard the future return of the security as "abnormally low." Suppose further that trading against one another in the market resulted in a price that appeared to reflect the fact that the future return for the security would be "average"; this is a natural supposition if both traders have equal weight in the market with regard to the supply and demand of the security. Now if in an otherwise identical market the set of information A, where A is the union of O and P, is substituted for both traders' original private sources, O and P, respectively, and if this knowledge induces them to regard the future return of the security as average, then this will likely cause no price change since

> prices have already averaged out their diverse opinions. Thus, the market will be efficient with respect to A, where A is the union of O and P.[71]

While highly simplified, this illustration implies that a fully informed investor (i.e., one who knows A, the union of O and P) cannot earn excess returns by trading on his superior information because the price he encounters reflects A already. In more general terms, the biases engendered by pessimists and optimists tend to cancel each other out so long as neither viewpoint has a dominating influence on price. The importance of this property of market efficiency is found in Beaver's remarks:

> The crux of a theory of market efficiency which does not rely upon the existence of a set of "experts" is that the level of knowledge reflected in prices is greater than merely the average level of knowledge among investors in the market...the quality of the knowledge reflected in prices is considerably higher than the average quality of knowledge across the individuals who comprise the market.[72]

The consensus belief notion, however, is not without its opponents. Hirshleifer, for example, prefers his concept of "concordant beliefs" because, as he states, it is impossible to find a consensus or representative probability

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[71] Verrecchia, R., "Consensus Beliefs, Information Acquisition, and Market Information Efficiency," The American Economic Review (December 1980), pp.874-884.

[72] Beaver, W., Financial Reporting: An Accounting Revolution. Englewood Cliffs, New Jersey: Prentice-Hall (1981b), pp.160-161.

distribution as an average of individual beliefs.[73] Concordant beliefs, according to him, are those that are shared by a dominant group of traders having identical prior probability expectations about future states of the world. The presence of this dominant group tends to cancel out the potential price influences of the minority group.

Digressing still further from the consensus belief idea is the argument presented by Miller that the prices at which the market clears do not reflect an average at all; rather, they represent the valuations of only the most optimistic minority.[74] Simply stated, trades go to the highest bidder. Consequently, the greater the divergence of opinion -- even holding constant the average expectation -- the higher the clearing price. This belief variance is thus viewed by Miller as an intrinsic risk component of a stock's beta.

The above differences in opinion regarding the impact of heterogeneous beliefs on prices are likely to persist for some time to come. Most, however, seem to subscribe to some form of belief averaging irrespective of the persuasiveness of Miller's logic. Within this school of thought,

[73] Hirshleifer, J., "The Theory of Speculation Under Alternative Regimes of Markets," Journal of Finance (September 1977), pp.975-999. Verrecchia [1982, p.19] shares a similar concern.

[74] Miller, E., "Risk, Uncertainty and Divergence of Opinion," Journal of Finance (September 1977), pp.1151-1168.

Hirshleifer's concordant beliefs notion appears on the surface to be the most appealing.

2.3.2 Costless Information

With regard to the relaxation of the costless information assumption, the implications are unfortunately far more severe. Suppose, for example, that the information set O is more costly to obtain than the information set P. While both sets are available, they are not equivalently accessible.[75] This implies that prices will be somewhat less than perfectly efficient with respect to A, the union of O and P, and will in fact be biased against the subset O. A barrier to market efficiency arises because investors would be induced to pay for O only to the extent that the marginal returns from acquisition exceed the higher marginal costs from doing so. As Stigler appropriately remarks, however:

> There is no imperfection in a market possessing incomplete knowledge if it would not be remunerative to acquire (produce) complete knowledge; information costs are the costs of transportation from ignorance to omniscience, and seldom can a trader afford to take the entire trip [emphasis added].[76]

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[75] In the Verrechia [1980] analysis it was assumed that investors face a common cost function, which precluded him from formally addressing this point.

[76] Stigler, J., "Imperfections in the Capital Markets," Journal of Political Economy (June 1967), pp.287-292.

A fundamental difference must therefore be stressed between classical perfection and perfection in a pragmatic sense. As an artifact, classical perfection is not a just standard by which to render a verdict of investor irrationality.

Recent analytical work by Grossman and Stiglitz[77] demonstrates that prices incorporate the knowledge base of those with access to "superior information," but only insofar as they are compensated for expending resources to obtain that information. This work supports an intuitively appealing yet heretofore overlooked aspect of a market's price structure: prices cannot be in perpetual equilibrium (i.e., absent arbitrage profits), for if they were, there would be no rational reason for arbitragers to engage in their data gathering efforts. Equilibrium interruptions provide the catalyst for trading; hence, the claim by some that prices in an efficient market must at all times reflect all available information is specious.

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[77] Grossman, S. and J. Stiglitz, "On the Impossibility of Informationally Efficient Markets," The American Economic Review (June 1980), pp.393-408.

2.3.3 Zero Transactions Costs

Turning finally to the zero transactions costs assumption, it is worth noting that whereas empirical studies frequently mention their presumed effects, the theoretical literature is curiously silent. This is perhaps because transactions costs are observable, rendering their impact less open to conjecture. Furthermore, investors for the most part face the same transactions cost function, implying that the effects are uniform across all market participants. This, of course, is not to say that the effects are equivalent across all investment strategies, for "active" portfolio strategies are clearly at a disadvantage. Moreover, the ramifications for investment choice are obviously different for those in higher marginal tax brackets than for those in lower tax brackets. What is implied, however, is that in the long-run, over all markets, transactions costs pose relatively insignificant frictions on equilibrium adjustments. Consequently, they are not expected to interfere in a material way with investigations of the efficiency construct.

Formalizing this conclusion, Brennan examined the effects of taxes in an otherwise perfect market.[78] He concludes that

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[78] Brennan, M., "Taxes, Market Valuation and Corporate Financial Policy," National Tax Journal (December 1970), pp.417-427.

the CAPM continues to hold, but on an after-tax basis. The spread between pre- and post-tax returns is determined by a weighted average of investors' tax rates. Similar conclusions would no doubt hold for broker fees and opportunity costs associated with portfolio revision. This being the case, researchers might feel that the inclusion of transactions costs in their paradigms would only serve to obfuscate their analyses.

For purposes of the present research, a similar argument is invoked. A comparative study such as this needs only to assume that transactions costs are minor relative to transacted values, and further, that these costs are sustained uniformly across all market strata. Markets conforming to this description are referred to as internally, or operationally, efficient.[79]

Summarizing the previous discussion, an important distinction must be made between capital market efficiency and capital market perfection for the purpose of conducting descriptive market research. Whereas efficiency is viewed here as a property of the market's pricing process vis-a-vis information availability, given the imperfections of the markets as they exist, perfection is a normative, or ideal

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[79] Neave, E. and J. Wiginton, Financial Management: Theory and Strategies. Enlgewood-Cliffs, New Jersey: Prentice-Hall (1981), p.152.

state that is unattainable in the real world. It is "realistic" efficiency, not "theoretical" efficiency, with which empirical inquiry should be primarily concerned.

2.4 A SUGGESTED EMPIRICAL DEFINITION OF MARKET EFFICIENCY

As previously noted, the Fama definition implicitly requires prices to respond instantaneously to new messages having relevance. Unfortunately, the literature is replete with examples where reaction has been somewhat less than instantaneous.[80] Moreover, it is well-documented that price reactions are not uniformly calibrated; i.e., some firms exhibit more pronounced reactions than do others.[81] The concern of this section is not to individually address these instances, but rather, to use their existence to clarify a point and to introduce the descriptive definition of efficiency that will be used throughout the remainder of this research.

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[80] Examples with respect to earnings announcements alone include: Jones and Litzenberger [1970]; Brown and Kennelly [1972]; Latane and Jones [1977]; Joy, Litzenberger, and McEnally [1977]; Watts [1978]; Brown [1978]; and Joy and Jones [1979].

[81] Ball and Brown were perhaps the first to make this discovery. See Ball, R. and P. Brown, "An Empirical Evaluation of Accounting Income Numbers," Journal of Accounting Research (Autumn 1968), pp.159-178.

Define an economic event as one that has an effect on a firm's current or future cash flow position and an information event as one in which a message is publicly transmitted about a presumed economic event. It is of course the economic event that investors seek to impart to price. The instrumentality of an information event for conveying insight about an economic event is a function of two attributes of the former: (i) its quality, where quality is referenced by how closely the information event aligns itself with ex post economic reality, and (ii) its timeliness, where the latter is guaged by the release's dated-distance from the economic event. Information economics further states that these two attributes of information are inextricably, usually inversely, related. Thus, for example, while information may precede (anticipate) an economic event, its quality as a signal is diminished due to ex ante uncertainty.

The importance of these two characteristics of information may explain, in part, the observance of differential price reactions to a given information event. In the case where markets fail to respond instantaneously and uniformly to a new signal, a reasonable interpretation is that this in some measure reflects investors' efforts to ascertain the quality, relevance, and implications of the

data item. To blindly construe the existence of such anomalous price behavior as evidence of market inefficiency -- even transitory inefficiency -- is therefore a presumptuous designation.

Unfortunatley, traditional inquiry somewhat tacitly eschews costly cognitive processing, presumably because of the elusive nature of these frictions. Classical economic theory does not admit to the concept of "bounded rationality" because there is no viable behavioral alternative to rational economic man. As a result, capital market studies typically make the assumption that market reaction to new information is, or should be, instantaneous and total.

Research by Verrecchia[82] and Holthausen and Verrecchia[83] has, however, begun to treat costly information processing as a considered factor. These models are cast in a setting wherein information processing follows a Bayesian revision of beliefs about firm-value in light of new information signals. The rapidity of price adjustments is a function of the precision of the information signal, where precision

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[82] Verrecchia, R., "The Rapidity of Price Adjustments to Information," Journal of Accounting and Economics (March 1980), pp.63-92.

[83] Holthausen, R. and R. Verrecchia, "The Change in Price Resulting From a Sequence of Information Releases," Working Paper, University of Chicago (March 1983).

refers to the signal's ability to reduce the uncertainty surrounding prior knowledge about the firm. (Precision might then be thought of as the quality of the information event.[84]) Before the public announcement is made, investors face a decision as to the amount to expend on information processing once the information has arrived. The more incurred on information processing, the more rapidly the information is processed. This results in more immediate price adjustments; however, at the same time, these expenditures reduce the amount available for actual investment in securities. The optimal amount to spend on information processing is shown to increase as the expected precision of the information event increases.

In an empirical test of the Verrecchia models, Pincus compares the equilibrium adjustment intervals for firms classified according to the predictability of their earnings.[85] The rationale for his classification is that earnings announcements for firms with difficult-to-predict earnings (as operationalized by Value Line's Earnings Predictability Index) would be expected to have greater news

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[84] Verrecchia, R., "The Use of Mathematical Models in Financial Accounting," Journal of Accounting Research (1982 Supplement), p.31.

[85] Pincus, M., "Information Characteristics of Earnings Announcements and Stock Market Behavior," Journal of Accounting Research (Spring 1983), pp.155-183.

content (precision) than announcements for firms with easy-to-predict earnings. The primary hypothesis tested is drawn from Verrecchia's modeled results that prices of difficult-to-predict earnings announcement firms would have more rapid adjustments than announcements ranked as easy to predict. Employing a maximum likelihood technique to isolate an adjustment period that is most unlike all other possible adjustment periods, Pincus finds evidence that contradicts his primary hypothesis. That is, longer rather than shorter adjustment periods are associated with the difficult-to-predict earnings firms. Pincus concludes from his findings that the Verrecchia models embody several "troublesome abstractions" that preclude them from being descriptively valid.[86]

The timeliness attribute of information has more clearly defined implications for empirical testing. Consequently, conclusions may be more readily advanced. In a study by Givoly and Palmon,[87] the return reaction to earnings announcements for a sample of NYSE securities was examined in relation to the timeliness with which these disclosures

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[86] Pincus also offers the possibility that his operationalization of the precision concept was incorrect.

[87] Givoly, D. and D. Palmon, "Timeliness of Annual Earnings Announcements: Some Empirical Evidence," Accounting Review (July 1982), pp.486-508.

are provided in the Wall Street Journal relative to fiscal year end. Two definitions of timeliness were employed: (i) the chronological order of the announcements relative to other firms in the sample, and (ii) the timeliness of the announcements relative to a historical norm established by each company. Under both definitions, the price reactions associated with the "early" announcement portfolio are significantly more pronounced than those for the "late" portfolio. As to the source of differential reporting delay, the authors find that it is more likely to be a function of industry pattern and tradition than of individual company attributes, such as size and complexity of operations. Furthermore, there is some slight indication that "bad news" firms have associated with them greater reporting lags than their "good news" counterparts. These results clearly suggest that the market considers the timeliness of announcements to be an important determinant of their informativeness.

Notwithstanding the general associations either suggested or corroborated by the above studies, there presently remains substantial uncertainty as to the precise functional relationships specifying the nature and extent of cross-sectional price-adjustment differences to information announcements. In the limit, pronounced lags may be viewed

as evidence of inefficiency, but again, a dilemma arises as to how large disparities have to be relative to the "optimal" solution before concluding inefficiency. The answer cannot be found in a ratio measurement because the normative solution in an imperfect market setting is unavailable: the relevant issues for consideration (which include firm-specific factors) are, as a practical matter, beyond the researcher's scope of access.[88]

To counteract the inability to make required allowances for such factors, empirical efforts to guage efficiency must resort to ordinal scales of measurement. Ordinal measurements require no knowledge of an absolute reference point; instead, the reference point is established empirically by relating quantities to each other. This in turn motivates a shift in the traditional focus of inquiry from (i) a determination of whether a security (or market)

[88] To expound on this point, consider an example documented by Smidt where, at its 1968 annual shareholder's meeting, Control Data Corporation announced substantially lower quarterly earnings. For two days the share price remained stable and then plunged by 11%. Is such an instance necessarily an indication of inefficiency? No, for as Smidt argues, the expected value of new information available at shareholder meetings is low, which may rationally dissuade attendance. That investors subsequently learn that their presence at the meeting would have been beneficial is no violation of the EMH. Instances such as these are simply a reminder of the fact that unique factors must be allowed for before concluding inefficiency. See S. Smidt, "A New Look at the Random-Walk Hypothesis," Journal of Financial and Quantitative Analysis (September 1968), pp.235-261.

is or is not efficient with respect to a particular information signal to (ii) a determination of how efficient a security is with respect to a particular information signal relative to others in the market. Not only is such a revision of focus an intrinsically interesting one, it is a necessary one. Before performing tests of efficiency on a market as a whole, researchers must first be satisfied that there are no significant systematic ("standard") differences among the market constituents' efficiency characteristics. An understanding of the market microstructure is therefore vital to tests of aggregate market efficiency.

To facilitate this goal, the following distinction is introduced.

Preannouncement efficiency (hereafter PRE) refers to the rapidity with which prices reflect an economic event prior to its respective information event. A security is fully efficient with respect to an information signal in a preannouncement sense if the entire impact of the economic event is imparted to price before the signal's public release.

Postannouncement efficiency (hereafter POST) refers to the rapidity with which prices reflect an economic event subsequent to its respective information event. A security is fully efficient with respect to an information signal in a postannouncement sense if no residual information remains to be imparted to price immediately following the signal's public release.

This distinction enables one to discriminate among various degrees of market efficiency by observing the relative velocity with which security prices attain new equilibrium

levels, using as the focal point the date of the information event. The reason for concentrating on the speed of market adjustment in lieu of the extent of market adjustment is, admittedly, partly for methodological practicality. More importantly, however, this focus deals directly with concerns voiced about the efficacy of traditional definitions of efficiency in a rational, or self-fulfilling, expectations setting. Verrecchia, for instance, makes the following comments:

> Regardless of the level of informedness of price, rational expectations competitive equilibria operate "efficiently": traders make conjectures about the behavior of price and their conjectures are fulfilled through their own competitive price-taking behavior. Independent of the level of noise which pervades the economy, traders are never fooled by the behavior of price because their conjectures are fulfilled in equilibrium. Thus, the market is efficient.[89]

In the absence of noise (imperfections), the market is strong-form efficient. But as Verrecchia points out, the presence of noise does not render the market inefficient, it merely clouds the informedness of price, or equivalently, investor uncertainty as to the extent to which the market has adjusted to new information. It is therefore deemed appropriate to concentrate on price-adjustment velocity since this is, in substance, a test of the friction level at play in the market.

[89] Verrecchia, R., op. cit., 1982, p.27.

Moreover, definitions of market efficiency such as those offered by Beaver and Rubinstein do not lend themselves to operationalization for the simple reason that a homogeneous market reference does not exist. In this regard, recall that a strict test of efficiency per Beaver's definition would necessitate a comparison to be made between price behavior in prevailing markets to price behavior in a fully informed market. The best surrogate for the latter is that which may be inferred from prices that are conditioned by the information event. In other words, prices that prevail subsequent to the information event and which exhibit equilibrium tendencies are the best observable proxy for prices that would obtain in a fully informed economy. Therefore, a sufficient, though cruder, test of market efficiency is one of price invariance to the information release. This provides the rationale for centering the analysis on the date of the information event.

By definition, PRE implies POST. If the full effect of an economic event is incorporated into price prior to the public release of information describing the economic event, then price will retain its content (informedness) following the information release. This sans attrition property is the traditional idea behind semistrong efficiency; i.e., gains cannot be made from publicly released information on PRE

securities because there is no "news" conveyed by the information event that is not yet embodied in price.[90] On the other hand, POST does not necessarily imply PRE. Indeed, POST in the absence of PRE implies that the information event is fully revealing and relevant to the determination of a new equilibrium price (i.e., the release is "newsworthy"). As a form of market efficiency, then, PRE is superior to POST for the straightforward reason that in the case of the former, the economic event is reflected in price more rapidly. Again, it should not be underemphasized that it is the economic event, not the information event, that is the central underpinning of the efficiency construct.

Justification for PRE may be found in several well-known explanations. The most obvious is the existence of various sources of publicized interim information. Common examples of these disseminations include interim financial reports, news items appearing in the financial press, and forecasts provided by management, securities analysts and governmental agencies. Second is the presence of insider activity and information leakage. Prior to the formal announcement date, the economic event finds its way into price through informal

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[90] More formally, from Gonedes [1976]: if I_t is the available information set at time t, then $I_t \varepsilon I_{t-1} \varepsilon I_{t-2} \ldots \varepsilon I_{t-n}$. Gonedes, N., "The Capital Market, The Market for Information, and External Accounting," The Journal of Finance (May 1976), pp.611-630.

(sometimes illicit) communications channels, leaving little if any impact remaining on the report date. Finally, and less obvious, is the existence of structural information interdependencies. This is a true anticipatory condition wherein a timely announcement made by one firm alters expectations about another firm's value. Such a situation might occur, for example, when an earnings announcement by one firm is inferred by investors to reveal something about the yet-to-be-released earnings figure of a similar firm in the same industry.[91] These phenomena may be broadly classified as interim revelations of economic events of interest.

As a test of the impact of differential interim information availability, Grant compares the information content of earnings announcements for listed (NYSE) and unlisted (OTC) securities.[92] Motivating this comparison is the hypothesis that the quantity of interim information available on OTC firms is systematically less than that available on NYSE firms. This would be expected to result in correspondingly greater OTC security price adjustments

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[91] Foster, G., "Intra-Industry Information Transfers Associated With Earnings Releases," Journal of Accounting and Economics (December 1981), pp.201-232.

[92] Grant, E., "Market Implications of Differential Amounts of Interim Information," Journal of Accounting Research (Spring 1980), pp.255-268.

surrounding earnings announcement dates. Using an information content measure developed by Beaver[93] in which the magnitude of price changes in the weeks surrounding the announcement date are related to price changes in other weeks during the year, Grant finds evidence to support his hypothesis. The mean and median information content measures for the OTC sample are both significantly greater than the respective measures obtained for the NYSE sample. Further analysis reveals a statistically significant inverse relationship between the interim information content measure and the number of interim news items appearing in the Wall Street Journal.

2.5 CONCLUSION

There is thus convincing evidence that PRE functions on the predisclosure availability of interim information. Yet to be resolved, however, is whether it is availability alone that drives this result. As remarked in the previous chapter, some authors (e.g., Bernstein[94]) exhibit a desire to attribute heightened efficiency states to a sophisticated group of information intermediaries who process available

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[93] Beaver, W., "The Information Content of Annual Earnings Announcements," Journal of Accounting Research (1968 Supplement), pp.67-92.

[94] Berstein, L., op. cit., 1975.

interim information (i.e., professional securities analysts), whereas others (e.g., Beaver[95]) appear unwilling to concede to this viewpoint. In essence, the question is tantamount to the determination of whether an equivalent degree of market informedness would exist in the absence of these groups. The next chapter is devoted to the development of a theory that challenges an affirmative response to this question.

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[95] Beaver, W., op. cit., 1972.

III

A POSITIVE THEORY OF ANALYST INSTITUTIONS AND MARKET EFFICIENCY

3.1 INTRODUCTION

A dynamic economy offers few opportunities for analysis that are as challenging and intriguing as those associated with the investment in information. Unfortunately, notably few exceptions are found in the theoretical literature that treat information acquisition as a costly undertaking, let alone consider it as an investment in and of itself. The assumptions typically underlying theoretical inquiry are that information is (i) costless, (ii) perfectly revealing, (iii) fully understood by all market agents, and (iv) acted on at zero risk. Though few would argue that these are in fact realistic characteristics of information, the attendant complications arising from this simplistic treatment are nonetheless assumed away in an effort to yield answers to the more "vital" issues at hand.

In an economy where information frictions are either uniform or randomly exhibited across all objects (securities) for analysis, the above assumptions are not likely to distort the major conclusions made by efficient market theorists. Indeed, the theorist in essence "controls"

for information frictions by assuming uniformity or unbiased randomness. It is a damaging oversight, however, to invoke the perfect market assumptions if the researcher has no a priori reason to believe that one of these qualifying conditions is present. Intuition suggests that if there are systematic differences between the information characteristics of two securities -- e.g., information acquisition is less costly and/or risky for one security than for another -- there would be some disparity in pricing efficiency between them. Similarly, on a more grand dimension, if the market must incur greater costs and risks to become informed about the return prospects of the constitutent securities in one segment than to become equivalently informed about the constituent securities in another, then a heterogeneous efficiency condition is suggested.

This chapter provides a detailed analysis for the reasons why a heterogeneous efficiency is expected to persist in the U.S. capital markets given the nature and structure of the analyst institutional framework. The purpose of this chapter, then, is to provide a more rigorous foundation for the issues raised in Chapter 1 regarding the role of professional analyst groups in enhancing market efficiency. This development is necessarily restricted in scope and is

offered not so much as a stand-alone, all-encompassing, theory as it is a catalyst for further analytical inquiry by those better equipped to construct such a model. Nonetheless, the issues raised are sufficiently rich to potentially fill a good deal of the void that presently exists in the theoretical literature regarding this issue.[96]

The chapter begins with a series of conjectural statements about the institutional framework. These statements borrow heavily from existing constructs in the disciplines of finance and information economics. The aim is to provide some unification to these diverse ideas. With the conjectural statements serving as the postulated assumptions, the analysis proceeds with a detailed examination of security pricing issues. Familiar diagrammatic tools are employed to demonstrate two important results: (i) at any point in time the prices of securities

[96] At present, a formal theory of analyst institutions does not exist (Beaver [1981a]; Verrecchia [1982]). While the financial intermediation literature is both large and multi-faceted, Stillson [1974] is one of the few studies that explicitly considers the role of information and transactions costs in the security analysis industry. Bernstein [1975] and Boudreaux [1975] offer some conceptual arguments with respect to the relationship, but these are neither rigorously developed from the standpoint of traditional economic inquiry, nor are they grounded in a satisfactorily convincing base of logic. Moreover, Boudreaux's analysis is primarily concerned with the manner in which alternative institutional fee structures (competitive versus fixed) might impact on market efficiency, and not with the association between divergent attention levels and efficiency per se.

neglected by the analyst community are lower vis-a-vis the prices of their closely followed counterparts, and (ii) the prices of neglected securities are slower to respond to economic events. The chapter concludes with a discussion of an empirical anomaly that is capable of being accounted for by the theory.

3.2 CONJECTURAL STATEMENTS

1. Analyst institutions arise in response to failures in the market for information.

The dynamics of the market for information have been formally modeled in a single-period setting by Gonedes[97] and extended to the multi-period case by Gonedes and Dopuch.[98] These stylized models require, among other things, a complete contracting market wherein all possible combinations of signals pertaining to all possible attributes are offered for sale. In more realistic scenarios where the availability of such contracts is less than exhaustive, however, a market failure known as

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[97] Gonedes, N., "Information-Production and Capital Market Equilibrium," Journal of Finance 30 (1975), pp.841-864.

[98] Gonedes, N. and N. Dopuch, "Capital Market Equilibrium, Information-Production and Selecting Accounting Techniques: Theoretical Framework and Review of Empirical Work," Journal of Accounting Research (1974 Supplement), pp.48-169.

incompleteness exists.[99] The markets and hierarchies literature predicts that organizations ("hierarchies") arise to mediate exchange in such markets.[100] The core factors that lead to an internalization of transactions within a firm that would otherwise be individually transacted in external markets are (i) bounded rationality, (ii) opportunism, (iii) uncertainty, (iv) complexity, and (v) information impactedness.[101] Collectively, these five failures appear to be characteristic of the market for information and would account for the appointment of information intermediaries hierarchically organized.

2. Analyst institutions enjoy significant production and scale economies relative to individual investors.

The potential economies to analyst institutions are numerous and varied. Some that readily lend themselves to discussion are the following:

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[99] From the works of Arrow [1964] and Debreu [1959]. See Arrow, K., "The Role of Securities in the Optimal Allocation of Risk Bearing," Review of Economic Studies Vol. 86 (1964), pp.91-96.; Debreu, G., Theory of Value. New York: John Wiley (1959).

[100] Williamson, O., Markets and Hierarchies: Analysis and Antitrust Implications. New York: Free Press (1975).

[101] ibid., Chapter 2.

a) Wherewithall to Extract Imbedded Data Items. The presumed existence of established informal communications networks between analyst firms and corporate concerns was noted in Chapter 1. From the insights provided by Axelson,[102] analysts are extremely active via interviews and other means in the private search for firm-specific information. These communications channels, though likely extensive, are for the most part unavailable to the proverbial "average investor." Furthermore, the mere size of institutional organizations suggests the availability of resources necessary to extract impacted information.

b) Task Specialization. As organizations, analyst firms are able to synthesize labor capital in such a manner as to benefit from diverse abilities, education, experience, and synergistic methods of analysis. The observation that most of the larger firms employ specialists who devote full time to the analysis of a particular industry or even company lends anecdotal support to this proposition. Theoretical support is provided by Stillson who shows that the potential economies of

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[102] Axelson, K., "A Businessman's Views on Disclosure," The Journal of Accountancy (July 1975), pp.42-46.

size from analyst specialization are significant.[103] The joint efforts of a large staff of specialists is likely to result in an information package that is superior -- at least in terms of quantity and cost -- to what an individual investor, who is constrained by time, bounded rationality and concerns for a diversified portfolio, could alone produce. Of course, investors are not limited to contract exclusively with a single analyst firm; they may therefore enjoy further task specialization economies by contracting with several firms, each of which concentrates in a particular area or mode of analysis.

c) Methods of Market Entry. It is relevant that the larger analyst firms also serve as brokerage houses. (More precisely, analyst services perhaps constitute ancillary activities to these institutions' more significant brokerage line of operations.) Because brokers have a comparative advantage in executing trades on a timely and cost-effective basis, the more sophisticated

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[103] Stillson, R., "An Analysis of Information and Transaction Services in Financial Institutions," Money, Credit, and Banking (November 1974), pp.517-535.

contracts may provide for the analyst firm to act in the dual role as purchasing agent for the investor principal. The economies resulting from these contracts are discussed in Statement 4 below.

3. Analyst institutions choose to sell information rather than exploit it through trading on their own accounts.

Hirshleifer[104] and Fama and Laffer[105] independently conclude that the potential profits from selling privileged information outweigh those from privately exploiting it through securities trading. Interestingly, however, the conclusion is made for different, though complementary, reasons. Hirshleifer's rationale is that, whereas gains from taking investment positions on information are constrained by one's endowment level, the gains from its resale are not. Consequently, "the potential gain enormous...(p.565)." Fama and Laffer, on the other hand, reason that the information producer could sell for not only the potential gains to the purchaser from trading on the information, but also the

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[104] Hirshleifer, J., "The Private and Social Value of Information and the Reward to Inventive Activity," The American Economic Review (September 1971), pp.561-574.

[105] Fama, E. and A. Laffer, "Information and Capital Markets," The Journal of Business (July 1971)

potential losses the purchaser would suffer if the producer were to sell the information to others. Together, these rationales imply that analysts would choose to sell rather than trade on information, given the choice to do so.

4. Analyst institutions employ tie-in arrangements to counter the free-rider problems that are an inherent aspect of their information product.

In a formal analysis of the private production opportunities for public goods, Demsetz arrives at two important conclusions.[106] First, as long as producers of public goods can exclude nonpurchasers from the free-rider use of their product, the production process can be undertaken efficiently. Second, the payment of different prices for the same good is not inconsistent with a competitive equilibrium. The latter arises because once a unit is sold to a purchaser, there is no further production cost incurred by selling to others. The economies of scale are not perfect, however, because the value of the product declines as more individuals make purchases.

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[106] Demsetz, H., "The Private Production of Public Goods," Journal of Law and Economics (October 1970), pp.293-306.

These results are directly applicable to the securities analyst industry. The exclusion-of-nonpurchasers rule creates incentives for the analyst firm to sequester a clientele and to warrant its privileged status.[107] In order to skirt the potential illegality of these privileged associations, institutions would be expected to employ "tie-in" arrangements whereby information production is assembled with other services (e.g., brokerage services) and sold as a package. Under a present interpretation of the Investment Advisors Act of 1940 and general trust law, such associations would not likely be regarded by the SEC as discriminatory.[108] The privileged clientele is likely to be a well-endowed group consisting of financial intermediaries

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[107] This response to the public good problem parallels the incentives for collusion arguments raised by Gonedes. See Gonedes, N., "The Capital Market, The Market for Information, and External Accounting," The Journal of Finance 31 (1976), pp.611-630.

[108] In Herman and Safanda's [1973] review of analyst litigation cases, virtually all suits against investment advisors have involved situations where analysts benefited either personally or institutionally from their information without first making the information known to their clients. The authors note that the allocation of information to various clients is seldom, if ever, a subject of litigation. Furthermore, beyond diligence and fair dealing, "...the standard of conduct to be observed by advisors in making allocations has not been specified (p.24)."

and wealthy individuals who are capable of bearing the high gross cost of these premium contracts as well as the greater transactions fees associated with frequent portfolio revisions.[109] The survival principal would require the marginal information costs to this privileged group to economically justify the contracts.

5. Analyst institutions utilize media outputs to publicize the information after their privileged clients have taken positions.

Subsequent to its exploitation by the privileged, the information is made known to the public at large through various media channels. This maneuver serves a two-fold purpose: first, it sets in motion a full

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[109] A second rationale for selecting a clientele having these endowment characteristics is that the information may simply not be valuable to the smaller investor. This is a subtle point that on first passing may escape appreciation. An "active" investment strategy, in addition to resulting in high transactions costs, is potentially quite damaging to the desired risk composition of an investor's portfolio. Simply put, the abnormal returns that may accrue to analyst-supplied information may not adequately compensate smaller investors for assuming increasing amounts of diversifiable risk as wealth is transferred from their market portfolio replicas into mispriced securities. Investors with large endowments, on the other hand, are more willing to make these transfers because the proportion of their wealth in "active" status need not be as large. See Lloyd-Davies [1975] for a detailed discussion of the arbitrage limitations engendered by this misbalanced portfolio problem. Treynor and Black [1973] formally explore how this misbalance can be significantly reduced by holding proper wealth proportions in the market portfolio.

equilibrium price adjustment enabling the clientele to profit from its contracts; and second, it provides a by-product revenue to analyst firms in the form of subscription fees for their media outputs. Patrons to these latter services perhaps likewise expect to profit from their expenditures, hence analysts may intentionally restrict their pre-release activity.[110] More likely, however, media outputs are of greater use as inputs to recurring portfolio decisions -- such as the repetitive assessments undertaken by investors to revise beliefs about true portfolio parameters -- than as tools to signal opportunities for abnormal returns. In this context, media use is consistent with research on semi-strong efficiency, the results of which generally fail to admit to abnormal gains on public information.

6. Analyst institutions are capable of reducing information dissemination risks to their privileged clients.

Information dissemination risk refers to an investor's uncertainty about the ability to profitably exploit investment information. Goldman and Sosin have formally analyzed dissemination risk in terms of two intrinsic uncertainties: (i) speed of

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[110] This point is developed further in a later section.

dissemination uncertainty, and (ii) path of dissemination uncertainty.[111] The first pertains to uncertainty about the duration over which others will remain ignorant of an information item, while the second concerns investor insecurity as to the number of other investors who are likewise currently informed. The authors analytically demonstrate that these two sources of uncertainty have polar effects: the first impedes investment activity whereas the second promotes it (i.e., promotes it in the sense that it induces positions to be taken more quickly). Because analyst institutions are able to control, to some extent, the flow of information to the general market through their media outputs, the privileged clientele may enjoy an added source of protection against speed of dissemination risk not afforded the average investor. In regard to path of dissemination risk, if Stillson's[112] specialization hypothesis holds, uncertainty as to the number of other agents who are likely currently informed may also be reduced. This follows because specialization signals

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[111] Goldman, M. and H. Sosin, "Information Dissemination, Market Efficiency and the Frequency of Transactions," Journal of Financial Economics 7 (1979), pp.29-61.

[112] Stillson, R., op. cit., 1974.

a segmented informed situation. The collective result is that information dissemination risks may be significantly lower to those who are privy to the analyst-generated information package.

7. Analyst institutions vie for niches in the market for information.

As with any market-responsive organization, analyst firms are expected to identify segments where their information services are in greatest demand. The joint result of competition among analyst institutions, along with their ability to produce reasonable assessments as to the proper scaler configuration of each security's information matrix, is to induce them to seek out less active market sectors where the demand for their services is highest. Market saturation avoidance is the likely explanation for Arbel and Strebel's finding of intertemporal switching of research concentration among attention recipient firms.[113] These dynamics are made possible by the fact that institutional following is scarce relative to the universe of potential attention subjects.

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[113] Arbel, A. and P. Strebel, "The Neglected and Small Firm Effects," Financial Review (November 1982), pp.201-218.

> Some securities, however, are likely to enjoy a somewhat continuous and concentrated following as would be expected, for example, when a security either represents a relatively large proportion of the market's invested wealth (i.e., firms with sizable capitalizations) or whose underlying fundamentals are extremely volatile and require frequent analysis (e.g., firms in high tech industries).

To summarize the principle elements of the above statements, it is postulated that analyst institutions (i) enjoy significant production and scale economies that result in lower marginal information costs to a privileged clientele, (ii) produce information that is potentially superior to what investors can individually collect and assimilate, (iii) are able to contractually protect their clientele from free-riders through tie-in arrangements and media control, (iv) are capable of reducing information dissemination risks to their clients, and (v) vie for niches in the market for information, thereby ensuring a dynamic process.

3.3 THE ANALYSIS: A SEGMENTATION HYPOTHESIS

3.3.1 Information Investment and Asset Pricing

Consider a capital market comprised of N securities with possible segments satisfying the property $n_1 + n_2 + \ldots + n_n = N$. A manner of segmentation that has particular relevance is $n_f + n_i + n_n = N$, where n_f represents the portion of the market given a wide following by professional analysts, n_n is the segment relatively neglected in terms of analyst coverage, and n_i is an intermediate segment that serves as a buffer against ambiguous classification. The intent of this section is to conceptually demonstrate that the prices in n_n are not only expected at any point in time to be lower relative to those in n_f, but also that price adjustments in n_n are slower in coming about.

The specific price effects expected to emerge from the postulated characteristics of analyst institutions are best viewed in terms of a comparison of two fundamentally identical securities, f and n, say, but which are drawn respectively from the subsets n_f and n_n. To abstract from the knotty issues surrounding the market's appropriate equilibrium asset pricing model, as well as to lend focus to the pure effects arising from neglect, it is helpful to decompose the security investment problem into two distinct facets: (1) a pure security investment whose return

generating function is given by $f(\Psi)$, where Ψ denotes collectively the arguments specifying returns given investor agreement about the true distributions from which returns are drawn,[114] and (2) an investment in information whose return generating function is given by $f(\Phi)$, where Φ is a risk compensation variable representing the nondiversifiable elements of information dissemination risk. Partitioning the security investment in this manner necessarily implies a setting that is characterized by an exchange market for securities and an ancillary market for information, a regime not inconsistent with that previously envisaged by Gonedes.[115] The required single-period returns to the aggregate investment are thus given by a weighted average of

[114] Ψ may be consistent with β in the two-moment Sharpe [1964], Lintner [1965], Mossin [1966] CAPM; β and γ in the three-moment Kraus and Litzenberger [1972] CAPM; or factors from a more grand dimension, as in Ross's [1976] Arbitrage Pricing Theory (APT). The dynamical issues raised by the concurrent existence of these models are assumed away by the simplistic $f(\Psi)$. Moreover, it is unnecessary for strict homogeneity of beliefs to prevail. Beliefs may diverge at the individual level yet converge to some consensus that governs the arguments of $f(\Psi)$. One possibility in this regard is Hirshleifer's [1977] concordant distribution of end of period prices.

[115] Gonedes, N., "Information-Production and Capital Market Equilibrium," Journal of Finance (June 1975), pp.841-864. Gonedes and Dopuch [1974] argue that the characteristics of this market for information conform well to the requirements for competitive pricing equilibrium in which Pareto optimality is attainable. Furthermore, this equilibrium is not threatened by the payment of different prices for the same (public) good (p.68). Their analysis, however, invokes the perfect

$f(\Psi)$ and $f(\Phi)$. Because investors would expect appropriate compensation for their information expenditures,[116] this dictates the equilibrium condition:

$$E[P_1] = P_0(1 + f(\Psi)) + I(1 + f(\Phi)) \qquad (1)$$

where: P_1 = random and exogenously determined end-of-period asset price,

$E[\ ]$ = expectation operator,

P_0 = current market clearing price,

I = per share expenditure on information, and

$f(\Psi), f(\Phi)$ = as defined above.

Note that I embodies data input and conversion costs, the equilibrium factor prices of which are determined in the market for information. In a purely competitive regime, these expenditures differ among traders and function on

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market assumptions for the information market, and they therefore do not confront the risks implicit in $f(\Phi)$.

[116] Incidentally, on an aggregate market level, the obvious implication is that costly information acquisition reduces the total wealth invested in securities (See, e.g., Verrecchia [1980]). Most would argue that these expenditures pose an external drain on the system. This view may be unfounded, however, when it is considered that information, too, constitutes a productive market. The drain to the securities market is therefore a flow to an ancillary market, the market for information, where risks and wealth are likewise allocated among its participants.

individual preferences and technical abilities; i.e., each investor chooses I such that his expected utility is maximized. On a macro level, this would converge to some consensus expenditure per share. For the present analysis it is assumed that I is a constant for a given security (i.e., marginal I equals average I), and further, that I is an efficient expenditure ensuring the propriety of the $f(\Psi)$ pure security generating function.[117]

By rearranging (1), the implied current market clearing price is

$$P_0 = \frac{E[P_1] - I(1 + f(\Phi))}{(1 + f(\Psi))} \qquad (2)$$

The result, of course, is that P_0 will be lower in the presence of costly and risky information than in its absence.[118] Moreover, without significant systematic market segmentation, heterogeneous beliefs as to the distribution of P_1 will not severely impede a unique equilibrium.[119] The

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[117] In other words, the equilibrium information expenditure is just sufficient to bring about a consensus distribution of end of period clearing prices. Information expenditures are made until this condition is satisfied.

[118] The effect of costly and risky information on price is similar to the effect engendered by the imposition of a tax on the purchaser of an economic good.

[119] Lintner, J., "The Aggregation of Investors' Diverse

question, however, is the expected impact when segmentation of the genre hypothesized above comes into play.

3.3.2 Asset Pricing in the Neglected and Followed Segments

As before, let I and ϕ represent the cost and systematic risk of information, respectively, but with subscripts f and n denoting the particular values assumed by the identical securities sampled from n_f and n_n. Drawing from the previously conjectured statements about this market regime, the identities $\phi_n > \phi_f$ and $I_n > I_f$ follow. In words, holding other things equal, the marginal cost and risk incurred by non-clientele investors to become informed about P_{1n} are greater than to clientele investors to become equivalently informed about P_{1f}. The compound effect of these misbalances is that $P_{0n} << P_{0f}$. More precisely, the value of the differential is

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Judgments and Preferences in Purely Competitive Security Markets," Journal of Financial and Quantitative Analysis (December 1969), pp.347-400.

$$P_{0f} - P_{0n} \tag{3}$$

$$= \frac{E[P_1] - I_f(1 + f(\Phi_f))}{(1 + f(\Psi))} - \frac{E[P_1] - I_n(1 + f(\Phi_n))}{(1 + f(\Psi))} \tag{4}$$

$$= \frac{I_n(1 + f(\Phi_n)) - I_f(1 + f(\Phi_f))}{(1 + f(\Psi))} \tag{5}$$

which may be interpreted as the excess risk-conditioned cost of information to n_n. If the assumptions underlying this analysis are valid, the result demonstrates that the excess "abnormal returns" to neglected securities observed by Arbel and Strebel cited in Chapter 1 are not, as they imply, solely attributable to the added uncertainty surrounding these securities, but are, in fact, also a function of the additional expenditures necessary to become equivalently informed about single period clearing prices (i.e., P_1). More important, perhaps, is the observation that the uncertainty is <u>not</u> attributable to noise present in the pure

security investment's return generation process $f(\Psi)$ as suggested by A&S. It is instead a reflection of the inherent systematic risks associated with the investment in information, i.e., $f(\Phi)$.

This alone, however, does not raise concerns about pricing inefficiency because, as demonstrated, equilibrium conditions are satisfied. That is, prices are not "improper" simply by virtue of different equilibrium conditions prevailing in the two segments as compensation for differential information characteristics. To render conclusions about efficiency, specifically as it is defined in Chapter 2, requires a study of price adjustment propriety and velocity vis-a-vis economic events. These are the subjects of the next section.

3.3.3 Market Efficiency Issues

3.3.3.1 Propriety of Price Adjustments to New Information

The above analysis implicitly assumes that clientele and non-clientele investors are equally capable of properly conditioning beliefs (therefore, prices) on information. The expenditures on data acquisition and processing and the nondiversifiable risks therefrom were conveniently referenced by I and Φ, respectively. Note, however, that although the incorporation of $I(1 + f(\Phi))$ into the above

pricing model serves as a vehicle permitting equivalent access to information over cross-sections n_f and n_n (i.e., information efficiency),[120] it does not ensure homogeneous expectations about the distributional parameters of P_1, because the latter would require more explicit statements to be made about the cognitive makeups and action choices of the decision makers involved. To this point, then, the study has centered on the production of information, not its subsequent processing (i.e., its use as an input to investors' decision models). Information processing, as contrasted with data processing, maps investors' subjective probability assessments of P_1 into $E[P_1]$ and $f(\Psi)$ in equation (2). A "correctly determined" price is one in which the true distribution of P_1 is specified in the arguments implicit in (2). In contrast, if the consensus distribution is in error, price will be incorrectly

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[120] This equivalence assumption was made purely for analytical convenience; there may in fact be no reason to suspect that such equivalence actually exists (see Conjectural Statement 2). Under this view, non-clientele investors may choose to align I_n so that it is in parity with I_f. This renders difficult a manageable analysis, however, because it suggests that the information matrices for securities in n_n are not as exhaustive and/or finely specified as those in n_f. Gonedes and Dopuch [1974, p.60] suggest that a reasonable property of the information production cost function is that it is increasing over the levels of signal refinement -- i.e., the more extensively one refines the scaler composition of an information matrix, the more costly the undertaking.

conditioned.[121] Consequently, some words are in order about the potential for systematic distortion of non-clientele distributional assessments, and therefore, the misspecification of the functional composition of (2) within the n_n segment.

This conceptualization must in some way be predicated upon the size of n_n relative to the degree of non-clientele activity in the market. Numerous authors have argued, for example, that a positive relationship exists between pricing efficiency -- both the propriety of equation (2)'s specification as well as the speed in which it is modified to reflect current economic events -- and the number of traders vying in the market.[122] Extant theories of $f(\Psi)$, most notably the Sharpe-Lintner-Mossin CAPM, relegate correct functional specification to an auction process whereby traders submit bids for current prices on the

[121] This may be too strict a requirement for "correct prices" to obtain. Gonedes [1976] has defined correctly determined prices as follows: If I_t is the universal set of information and I_t^m is the information set utilized by the market, then a correct price is one in which $I_t^m = I_t$. This definition, however, may be too lax because the issue remains as to whether the market's use of information is in fact correct. The definition above follows that in Verrecchia [1979, p.79].

[122] This point is alluded to in Fama, E., "Efficient Capital Markets: A Review of Theory and Empirical Work," Journal of Finance, (May 1970), p.388, and formally addressed in Verrecchia, R., "On the Theory of Market Information Efficiency," Journal of Accounting and Economics 1 (1979), pp.77-90.

universe of available assets conditioned on expectations of P_1. The interplay among homogeneous ex ante distributions (covariance with the market portfolio) is implicitly considered and is the forthright result. As analytically demonstrated by Verrecchia, and as intuition would suggest, when heterogeneous beliefs prevail, the auctioned prices become increasingly seasoned as the number of bidders increases. However, because bidding is not entirely democratic, numbers alone are not the driving determinant; also important is the magnitude of bidden wealth behind the numbers.

While conclusive arguments about the wealth levels and number of informed traders operating in the neglected segment cannot be made, a very plausible supposition is that these magnitudes are (arbitrarily) small. Several reasons for this can be delineated. First, the level of n_n expenditures on information (I_n) and the attendant n_n risks necessary to become a fair-game competitor in the auction contest (Φ_n) may serve as a barrier to neglected segment participation. Many may therefore feel more secure in their positions if they confine themselves to n_f activity.

Second, the circumstances are very likely to be such that most investors find the prospects in n_f sufficient for their non-speculation portfolio needs. This follows because

sufficient information not only exists in n_f, but can also be observed at a lower cost (e.g., through analysts' media channels).

Third, it is doubtful that many in the investor community can be characterized as speculators, whose risk dispositions are such that they are willing to expend significant resources on data and thenceforth conjecture on their information content. In deference to Lintner's comment:

> [I]n actuality, most investors simply have no judgments whatsoever with respect to most of the stocks available in the market. Even major institutional investors with large staffs [professionals] only attempt to "follow" two or three hundred stocks out of the many thousands available, and "small" investors are entirely ignorant of all but very small [sic] subset of stocks (Emphasis in the original).[123]

If this statement hold in general, its message is even more convincing with regard to the neglected segment.

The reasonableness of these arguments notwithstanding, they are capable neither of an empirical nor analytical defense. The intent has merely been to identify some issues that are worthy of consideration. Paradigms that address heterogeneous beliefs in general, let alone systematic belief variance, are still in an embryonic stage.[124]

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[123] Lintner, J., "The Aggregation of Investors' Diverse Judgments and Preferences in Purely Competitive Security Markets," Journal of Financial and Quantitative Analysis 4 (1969), p.398.

[124] Ross, S., "The Current Status of the Capital Asset

Consequently, what remain provocative questions at this juncture must await a more formal treatment.

3.3.3.2 Velocity of Price Adjustments to New Information

Tangential to the above discussion, and carrying even greater import for the testable implications of the theory, is the contemporaneous relationship between price adjustments and economic events. As indicated in Chapter 2, the propriety of price specification is for the most part an unobservable phenomenon; normative pricing models for admittedly imperfect markets have not yet been developed. It was offered in that chapter that in response to this inadequacy, efficient market empiricists are forced to concentrate on the speed of price adjustments in lieu of price adjustment propriety. The following analysis answers to this need by laying the necessary theoretical groundwork for the primary hypothesis of this dissertation.

Consider the supply/demand relationships for a hypothetical security depicted in Figure 1. In this figure Q_0 represents the total short-term inelastic supply of shares, D_U is the uninformed investors' convex demand curve generated by isoelastic utility functions, and D_I is the demand for shares given knowledge of a favorable economic

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Pricing Model (CAPM)," Journal of Finance (June 1978), pp.885-901.

event (i.e., the informed investors' demand curve). Following the general scenario provided in Goldman and Sosin,[125] it is assumed that at the outset only the uninformed hold positions in the security (i.e., the Q_0 supply) at price P_0. As a small contingent acquire knowledge about the favorable event they bid away shares from the uninformed. This has no direct effect on the positioning of the active demand curve because the consensus of the market still reflects ignorance of the event. Moreover, it is assumed that sufficient noise exists in the system such that the uninformed do not infer knowledge of the event from price itself.[126]

If information could be costlessly acquired and acted on at zero risk, the informed would bid away shares in the amount of $Q_0 - Q_2$ by working up the D_U demand curve, thus establishing equilibrium price P*. Because these are not the circumstances, however, they will purchase somewhat less than this quantity, $Q_0 - Q_1$ in the diagram, from which P_1

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[125] Goldman, M. and H. Sosin, op. cit., 1979.

[126] Grossman and Stiglitz [1980] argue that in a noise-free rational expectations setting, the uninformed become informed simply by observing price. In other words, because prices are assumed to fully reflect all available information, the uninformed will condition their deficient beliefs on the information transmitted by price. The authors point out, however, that if noise pervades the system, information is imperfectly signaled by price, and this in turn promotes incentives for investment in information.

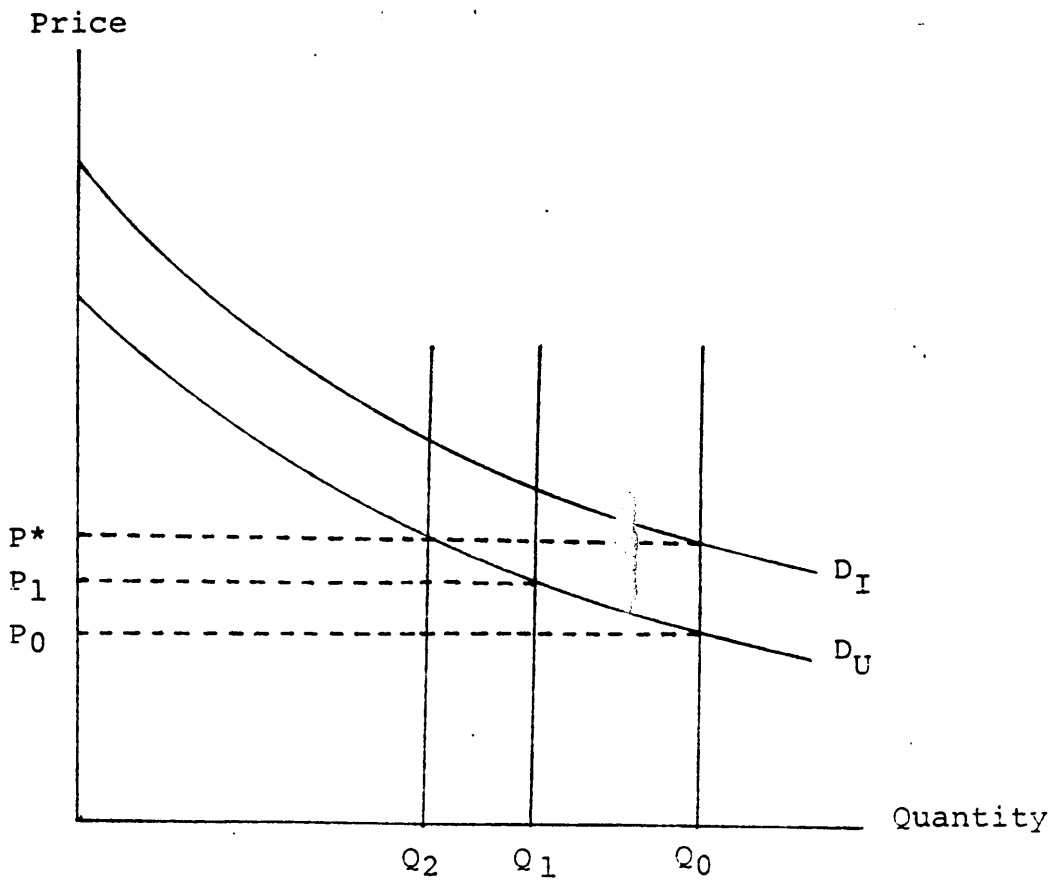

Figure 1: Informed and Uninformed Demand Relationships

emerges. When the uninformed eventually acquire knowledge of the favorable event, their demand curve shifts upward from D_U to D_I. The prior-informed then liquidate their positions $Q_0 - Q_1$ by selling back to the newly-informed. From these trades P* finally resolves.

Assuming for this analysis that markets are not continuously traded, but occur at tantonnements with negligible contracting intervals,[127] the price differential $(P^* - P_1)$ appropriated by the informed for purchasing $Q_0 - Q_1$ rather than $Q_0 - Q_2$ is their gross per share return to information. As a group, the informed will therefore not exploit the uninformed condition unless $E(P^* - P_1) > I(1 + f(\Phi))/(1 + f(\Psi))$ -- i.e., they will ignore the situation if their expected net return is negative. In a perfectly competitive regime under tantonnements this value will be

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[127] Tantonnement or call markets, which are characteristic of the Paris Bourse Exchange, are frequently used in analytical inquiry for ease of exposition. In such markets, trading does not occur continuously, but instead takes place at discrete designated periods. Supply and demand are equated at a single market clearing price, thus eliminating the exploitation of consumer surpluses by the traders. In continuous markets such transfers of consumer surpluses constitute substantial abnormal returns to those who are able to buy low on D_U and sell high on D_I.

The assumption that contracting intervals are of negligible duration enables the analysis to focus on price effects attributable solely to information, thus excluding "normal" fluctuations and appreciation due to the passage of time.

zero; in a perfectly competitive regime under continuous trading, however, this value will be zero only for the marginal share traded. Hence, the value $I(1 + f(\Phi))/(1 + f(\Psi))$ is the marginal cost of information capital to the informed.[128]

This is not to imply, of course, that an individual cannot sustain losses, for as discussed by Goldman and Sosin, these can be substantial if "overshooting" beyond Q_1 occurs. Such overshooting is a nontrivial possibility when dissemination risk is present; hence the motivation for this risk in the risk-factor Φ.

Turning now to the price adjustment velocities in n_n relative to n_f, consider Figure 2. In this figure three markets are depicted: (1) a perfect market where information is riskless (fully revealing) and costlessly available, and in which demand D_1 prevails, (2) a market where perfect information can be observed and acted on at a risk-adjusted cost of $I_f(1 + f(\Phi_f))/(1 + f(\Psi))$ and in which D_2 specifies

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[128] This differs significantly from Goldman and Sosin's cost of capital to speculators. They do not explicitly consider the cost of information (I), nor do they view information as having an inherent risk in and of itself. A further difference is found in their inclusion of the diversifiable risks assumed by an individual for transferring wealth out of the mean-variance efficient portfolio (p.57, Appendix 2). My justification for their exclusion from $f(\Phi)$ is provided in footnote 109. In regard to the latter, misspecification either way is largely innoccuous to the general results presented here.

informed demand, and (3) a market where perfect information can also be obtained and acted on, but at the higher risk-adjusted cost of $I_n(1 + f(\Phi_n))/(1 + f(\Psi))$. In this latter market the lower informed demand curve D_3 is generated. These three informed situations are representative of the conditions that would obtain if a particular security resided in one of either (a) a perfect capital market, (b) an analyst clientele market, or (c) a non-clientele market, respectively. All three markets are assumed to be capable of properly conditioning beliefs on information, and therefore, systematic distortions of equation (2) arising from a systematically reduced cognitive effort level on n_n securities discussed in the previous section are not an issue. The verticle distances between the demand curves in the imperfect market regimes (D_2 and D_3) and the perfect market demand curve (D_1) are thus limited to the per share risk-adjusted costs of information within the respective markets.

Overlaid on top of these informed demand curves are three hypothetical "active" demand curves, each depicting an uninformed condition about a favorable economic event (represented by the broken lines U_1, U_2, and U_3). The analysis considers individually the actions taken by the informed in all three markets when confronted by each of these active demand curves.

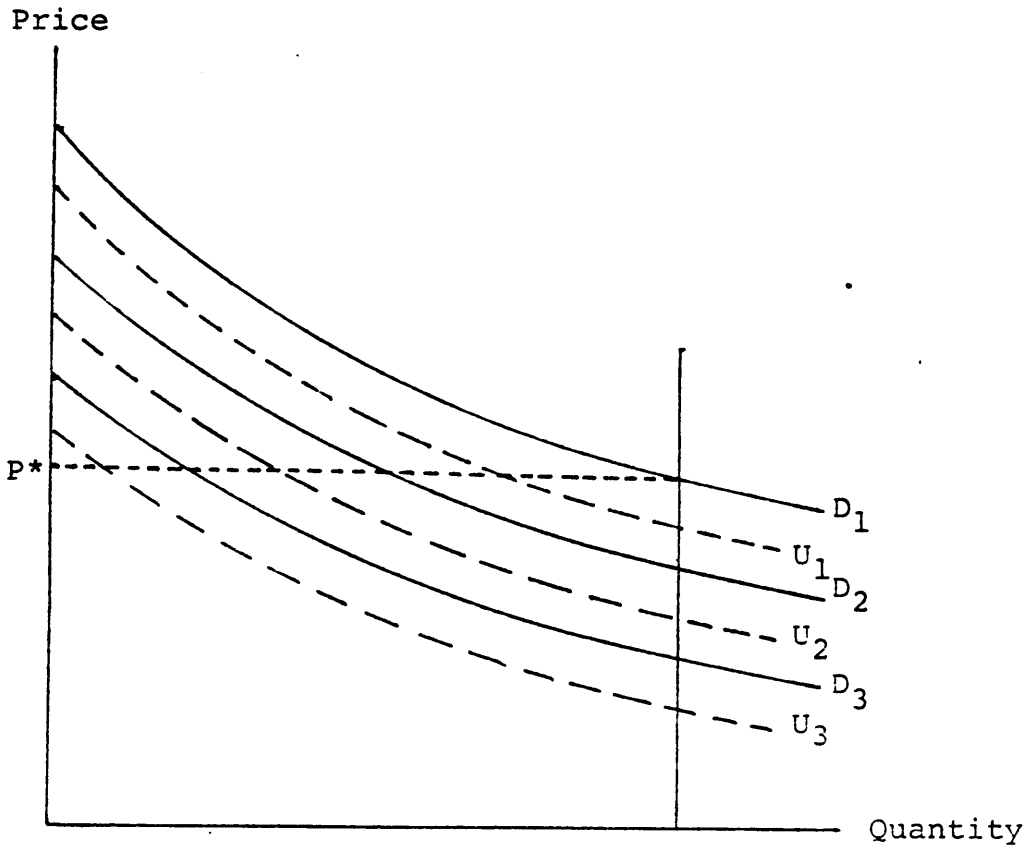

Figure 2: Supply and Demand Relationships for Three Market Regimes

If U_1 is in force, no long positions are indicated in either of the imperfect markets because to exploit the situation would not recover the costs of doing so. Only the perfect market would respond. (Dismiss for the purpose of inquiry the question of how U_1 might arise in a perfect market initially.) Though it may appear as if paradoxical short positions might be taken in the imperfect markets, this is an unlikely reaction because price will eventually gravitate to P* as information about the event loses its timeliness attribute. That is, at some point in time the information will be freely available at no cost -- presumably when the information event takes place.

Skipping for the moment the situation intimated by the presence of U_2, if U_3 is in force, the informed in all three markets would take long positions and recover their respective $I(1 + f(\$))/(1 + f(\Psi))$ costs accordingly. Price would likewise gravitate towards P* as the information permeated the market at a monotonically decreasing cost over time. But note, however, that the speed in which P* resolves will be slower if market (c) predominates than if market (b) prevails. The situation is analogous to the physical law of motion: U_3 poses a greater mass to informed demand curve D_3 than it does to D_2. This is because the risk-adjusted profits to the informed in market (b) would be greater than

to those in market (c). The result is that the positioning of D_2 induces a more immediate and directed embarkation of price towards its terminal value P*.[129]

The situation portrayed by U_2 poses an intriguing dilemma to the informed in market (c). Given their position on the informed demand curve D_3, these investors have already incurred information costs, yet they find from their purchased knowledge that they are unable to recover their cost of information capital. Furthermore, the solution is not so simplistic as to imply a "mitigation of loss" strategy by taking positions on the information regardless. At the individual level, given constrained endowments, the informed would first compare this recovery alternative to others available to them, including the opportunity loss from transferring funds out of their fully diversified market portfolios. While these costs are not embodied in $f(\Phi)$, they represent a significant concern to the individual investor. The upshot of this and other diminishing factors to possible recovery alternatives is that some economic events will simply be ignored until it is cost-beneficial to do otherwise.

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[129] An alternative, though equivalent, way of viewing this is that as information becomes less and less costly, informed demand curves rise at graduated increments until they eventually become superimposed on top of D_1. Because D_2 is closer to D_1 than D_3 is, D_2 will clearly effect a more immediate adjustment in price to P*.

Why do the clientele investors not face a similar dilemma when confronted with U_1? The answer follows from the marketing policies likely enacted by analyst institutions. As information intermediaries, they would make assessments as to their product's value prior to its sale to the privileged. The tie-in arrangements spoken of earlier would require these prior evaluations to be made. If the expected value of the information is perceived to be negative, the ill-conceived information expenditures would then be borne by the institutions as an unrecoverable cost of operations. This, however, does not leave unopen to them the alternative of marketing these items as by-products in the form of media outputs.

To summarize these results, two important conclusions are reached. First, ceteris paribus, at any point in time the informed demand curves in the neglected segment are lower than those in the segment attended to by analysts. Second, and more important, shifts in the neglected segment's demand curves to reflect current economic events are not as preannouncement efficient. Unfortunately, only the latter has implications for empirical testing.

Bear in mind that these conclusions are in no way affected by the potential for systematic price misspecifications within n_n. The analysis concentrated

solely on pricing differentials due to the greater costs and risks to information within this segment.

3.3.4 The Resolution of an Empirical Anomaly

Motivating this ancillary analysis is the observation by Lloyd-Davies and Canes (LC),[130] Givoly and Lakonishok (GL),[131] and Abdel-khalik and Ajinkya (AA)[132] that analysts and their clients apparently fail to capitalize on the full content of their privileged information prior to its media release. All three studies document a price reaction on and immediately following the media release. Only GL find these reactions to be so significant in magnitude and duration as to imply abnormal returns to public information (i.e., evidence contrary to semi-strong efficiency).

Without the benefit of the above theory, LC and AA subscribe to the notion that these unexploited opportunities are likely to be attributable to the constraint imposed on

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[130] Lloyd-Davies, P. and M. Canes, "Stock Prices and the Publication of Second-Hand Information," The Journal of Business (February 1978), pp.43-56.

[131] Givoly, D. and J. Lakonishok, "The Information Content of Financial Analysts' Forecasts of Earnings: Some Evidence of Semi-Strong Inefficiency," Journal of Accounting & Economics (December 1979), pp.165-185.

[132] Abdel-khalik, A. and B. Ajinkya, "Returns to Informational Advantages: The Case of Analysts' Forecast Revisions," The Accounting Review (October 1982), pp.661-680.

the small privileged clientele group to hold mean-variance efficient portfolios; i.e., the potential abnormal returns from exploiting the privileged information eventually pale compared to the returns required as compensation for assuming increasing amounts of diversifiable risk. This view may be unfounded, however, owing to the postulated endowment levels of the privileged group. Such "active" portfolio risks, recall, only plague the smaller investor. If the investor holds sufficient wealth properly proportioned in the market portfolio, these risks become negligible and are fairly easily recovered (see footnote 109).

The theory accomodates two other (perhaps complementary) possibilities that appear on the surface to be more reasonable. The first is the straightforward explanation that the privileged clientele would demand abnormal returns from their contracts. If there were no buffer in the form of restricted trading prior to the media release, the entire clientele (in the case of a block purchase) or the marginal client (in the case of a graduated purchase) would not expect fair returns on the contract. Indeed, it is likely that shares will be traded by blocks in the institution's "street name" and then apportioned among the various client's accounts. These block trades, while saving

transactions costs to the institution, would preclude fair returns to the privileged if it were not for restricted prior-release purchases.

To see this, consider Figure 3. Suppose U is the active demand curve at the time the analyst institution begins trading for its clients, and D_1 and D_2 are as defined before for Figure 2. The institution purchases shares by moving upward on the uninformed ("active") demand curve but faces some choices as to the quantity actually purchased. It could proceed up U until $Q_0 - Q_3$ is purchased at price P*, the equilibrium price, and then release the information to the public. Because media outputs are practically costless to their purchasers, the shift of D_2 to D_1 is virtually immediate. The public will then repurchase the shares (again assumed traded at block) from the privileged -- but at P*, the price paid for the initial purchase! The net clientele returns would be negative. This illustrates clearly that price fluctuations immediately following the information release cannot be construed as an absence of prior-release exploitation.

The second alternative, of course, is for the institution to purchase sufficient quantities to ensure a fair payoff to the clientele -- $Q_0 - Q_2$ in the figure. This block is purchased at P_1 and then resold at P* upon the information

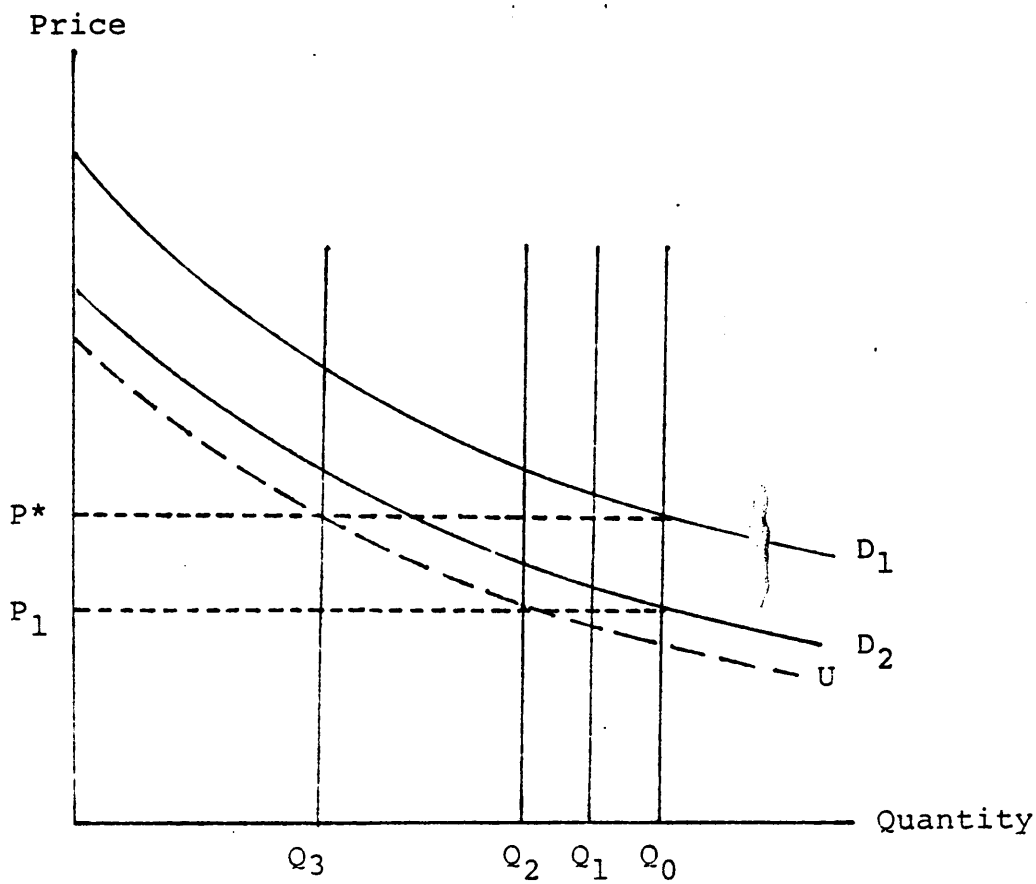

Figure 3: Returns to the Privileged Clientele

release to the public. Note, however, that while the gross returns to this strategy are positive, the net (abnormal) returns are zero. This is due to the fact that the vertical distance between D_1 and D_2 is equal to the cost of information capital to the clientele, and in this case, also equal to the gross returns to the contract ($P^* - P_1$).

A third strategy is more favorable still. The institution could purchase somewhat less than $Q_0 - Q_2$ -- perhaps $Q_0 - Q_1$ -- thus locking in fair returns to the contract, but in addition, providing a buffer for uncertainties and potential net (abnormal) returns. The entire analysis thus far has assumed that institutions have perfect knowledge of the underlying demand curves in question. While conducive to a facile analysis, this assumption is unrealistic. In response, analysts would hedge against demand uncertainties through a cushion; if their expectations pan out, the cushion would then accrue to the clientele in the form of abnormal returns.

A subsidiary benefit to purchasing the smaller $Q_0 - Q_1$ is that large block-trading is potentially revealing to the market. Small block purchases accommodate more covert maneuvers and are less susceptible to being elicited by the market as signaling an informed situation.

The second possible rationale for the observed price fluctuations following media releases is even more straightforward. The survivor principle dictates that these products should have a value. If analysts were to effect a full price response through their pre-release trading, this value would obviously be negated. Owing to the importance of these media channels as a vital organ of their operations, analysts cannot be denied the rational behavior of enforcing their value.

3.4 CONCLUSION

This chapter has discussed some intricate interrelationships among capital market agents engendered by the institutional framework. Some reasonable assumptions were made about the market participants and their motivations, which gave rise to the supply and demand for the the analysts' product. From these postulated characteristics, a model was developed specifying possible equilibria conditions in the analyst attended (n_f) and neglected (n_n) segments. The most noteworthy conclusion emerging from the analysis is that, due to the higher cost and risk of becoming equivalently informed about single-period clearing prices in the neglected segment, demand shifts to a given economic event are slower in their

response. To what extent these lagged price responses persist is the empirical question that is addressed in the two chapters that follow.

In regard to the assumptions underlying the foregoing analysis, the most restrictive is that agents in the neglected segment choose a per-share information expenditure level that enables them to become as informed about single-period clearing prices as their counterparts in the followed segment. However, relaxing this assumption to accommodate lower levels of informedness in the n_n segment -- the most plausible alternative -- makes statements about n_n inefficiency even more convincing, particularly after considering that this modification would increase further still the risk associated with the investment in n_n information, i.e., ϕ_n.

Some issues worthy of further consideration that have not been formally addressed here are (i) the impact on n_f dissemination risk arising from analysts competing among themselves, (ii) the possible arbitrage opportunities and "free rider" problems that may serve to smoothe out the segmentation effects, (iii) the reasons giving rise to inferior risk-adjusted returns to mutual funds (perhaps best analyzed from the standpoint of the agency theory paradigm), (iv) a precise functional specification of $f(\phi)$, including.

the inversely-related risk relationships between the timeliness and quality of information, and (v) reasons for the relatively scarce supply of analyst attention vis-a'-vis the universe of available assets. An exploration of the barriers to market entry would be relevant in this regard.

IV

METHODOLOGY

4.1 INTRODUCTION

This chapter and the one which follows constitute the empirical stage of the dissertation. The present chapter outlines the research design and statistical methods utilized to test the hypotheses motivated by the discussion in the previous chapter. The results of these tests are presented in Chapter 5.

The following discussion of the methodology is partitioned into four sections. Section 4.2 operationally defines the pre- and postannouncement efficiency constructs formally developed in Chapter 2. The sample and data are described in section 4.3. Section 4.4 states the research hypotheses and delineates the statistical tests used to assess the association between analyst following and empirical market efficiency.

4.2 OPERATIONAL DEFINITIONS

4.2.1 Operationalizing Preannouncement Efficiency

Preannouncement efficiency was defined in previous chapters as the degree to which security prices appear to lead or "anticipate" the information content of subsequent public information events. It was pointed out that such price behavior is indicative of the market's ability to acquire and process interim signals that are relevant to proper and timely security valuations.

The empirical connection that permits a mapping of the preannouncement efficiency construct into an observable measure for this study is the well-documented structure of abnormal returns prior to earnings releases. Specifically, the direction in which cumulative abnormal returns (CAR's) contour from zero is consistent with the direction of the market's forecasting error. Positively sloped contours are associated with positive unexpected earnings ("good news"), whereas negatively sloped contours are associated with negative unexpected earnings ("bad news").[133] Under the interpretation offered here, abnormal returns accumulated during the preannouncement period represent an operational

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[133] For a partial list of studies supporting this result, see footnote 2. See also the initial Ball and Brown [1968], Beaver and Dukes [1972], and Brown and Kennelly [1972] studies from which the former derived their methodological approaches.

index of the aggregate effects of investor speculation in interim signals. After appropriate control is made for systematic excess returns to neglected securities,[134] the emerging CAR profiles convey an ordered set of information efficiency structures that may be related to institutional following in a test of association.

Figure 4 facilitates a graphical depiction of this interpretation. In this figure hypothetical CAR's are mapped against time (t) relative to the information announcement date (t=0) for two sets of two fundamentally identical firms. For purposes of exposition only, it is assumed that all four firms are characterized by a stable no-growth earnings generating process in the period subsequent to the one to which the the earnings announcement pertains.[135]

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[134] Arbel, A. and P. Strebel, "The Neglected and Small Firm Effects," Financial Review (November 1982), pp.201-218.

[135] At an individual firm level, this assumption permits an unambiguous interpretation of window period CAR behavior. Differential CAR patterns would then be attributable solely to information assymetries and not subsequent earnings activity. At a multi-firm level, the implicit assumption in event studies is that subsequent positive and negative earnings changes cancel each other out, leaving the identity E[CAR] = 0 under the null hypothesis of no information content. This assumption continues to to be made for the present study; however, Section 4.3.3 discusses an implemented control in the event the assumption is unrealistic.

The total window period is defined by the event time interval (-m,n), with partitions (-m,-1) and (0,n) defining the pre- and postannouncement periods, respectively. The general tenor of the anticipatory good and bad news preannouncement reactions are portrayed by the CAR profiles that lie, respectively, above and below the horizontal axis during the interval (-m,-1). Thus, as implied by the sign of the CAR's, firms A and B are "good news" announcers, whereas X and Y are "bad news" announcers. (The postannouncement (0,n) profiles should be construed as vague for the moment because of some inconsistency in the literature regarding their general pattern. This issue will be taken up in the next section.)

Consider as the economic phenomenon of interest earnings of the firm. Earnings activity is a continuous undertaking that, for accounting purposes, arbitrarily culminates at discrete points in time (e.g., quarterly, annually, etc.). Due to the processing, accumulation, and attestation of the accounting data, the periodic earnings report is necessarily delayed for some time after the period to which the earnings relate. Prior to the release of the earnings number, however, diffuse signals pertaining to the firm's earnings activity are transmitted to the market. The availability of these signals, coupled with the market's predisclosure

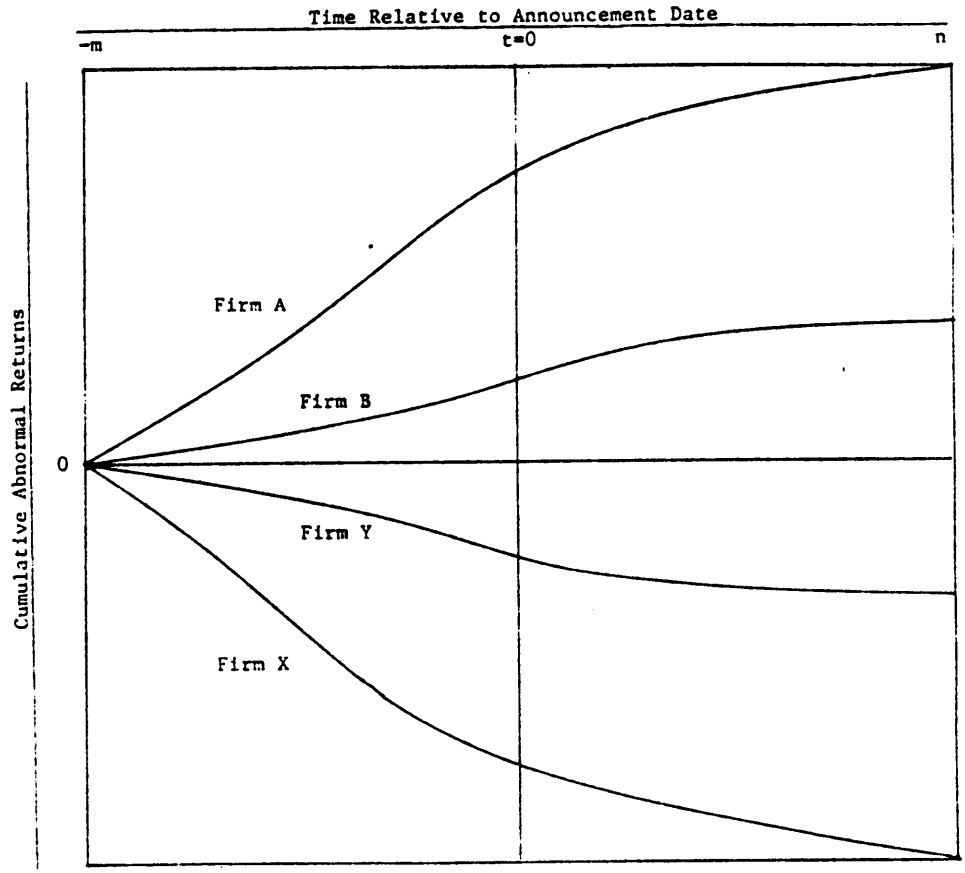

Figure 4: Hypothetical Cumulative Abnormal Return Profiles

speculation activities, accounts for the anticipatory nature of the predisclosure price movements.[136]

Economic theory states that it is contemporaneous and future earnings activity that investors seek to capitalize into price.[137] Reports of past earnings activity are relevant only insofar as they modify investor expectations about their receipt of future cash flows. Therefore, if the market for a particular firm's securities is able to acquire and correctly process interim signals that eventually render the ultimate public earnings announcement by that firm superfluous, such a market is said to be informationally efficient with respect to the announcement.

Extended reasoning leads to the logically compelling conclusion that the degree of preannouncement efficiency may be referenced by the alacrity with which security prices exhibit this anticipatory behavior. That is, the sooner investors are able to correctly anticipate, through various alternative message sources, the information replicated in the subsequent public announcement, the sooner price will reflect the economic fundamentals underlying the firm's

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[136] Beaver [1981b], among others, expounds on this interpretation. See Beaver, W., Financial Reporting: An Accounting Revolution. Englewood Cliffs, New Jersey: Prentice-Hall (1981b), p.130.

[137] Working, H. "A Theory of Anticipatory Prices," American Economic Review (May 1958), pp.188-199.

valuation. This in turn implies a more efficient pricing structure.

Translating this line of reasoning in terms of Figure 4, Firm B (Y) exhibits a superior degree of preannouncement information efficiency in comparison to Firm A (X) because the price of Firm B (Y) reflects earnings activity more rapidly. Ostensibly, most of the information carried in B's (Y's) earnings announcement was reflected in its price prior to the window period, perhaps concurrent with actual earnings activity.[138] Firm A (X), on the other hand, apparently suffers from relative interim signal deficiency. Most of the information content of Firm A's (X's) earnings is capitalized during the period immediately surrounding the date of the earnings release, some time after actual earnings activity has taken place.

If Firm A (X) is fundamentally identical to Firm B (Y), then this conclusion may be made without equivocation. In the absence of fundamental homogeneity, though, the evidence is only suggestive, and any conclusions about relative

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[138] A perfectly information efficient firm would be suggested by a CAR profile that has a zero slope throughout. This result obtains because, under the null hypothesis of no information content, E[CAR] = 0. Of course, in theory, such price behavior could also signal a grossly inefficient condition. From a practical standpoint, however, the sophistication of the U.S. securities markets suggests that this is an unlikely possibility.

preannouncement efficiency must then be made in view of a large sample wherein uncontrolled firm differences have been compensated for via aggregation. The important point nonetheless remains: given appropriate experimental control, relative preannouncement efficiency may be inferred from the contour of firm CAR profiles. Graphically, under ceteris paribus conditions, the more prompt, directed and complete the response of preannouncement CAR's toward their terminal equilibrium values, the higher the indicated level of preannouncement efficiency.

Prevalent notions of market efficiency, most notably Fama's familiar three-form taxonomy,[139] do not afford this classificatory flexibility. Semi-strong-form efficiency merely precludes postannouncement reactions to the information event. This would imply flat CAR profiles to the right of time zero. Strong form efficiency, on the other hand, disallows all reactions whatsoever. This would in turn imply flat CAR profiles throughout -- a condition which runs counter to most, if not all, available evidence. The operational definition offered here ameliorates the inflexibility of this taxonomy by admitting to any number of intermediate possibilities. Thus, in addition to facilitating measurements of relative efficiency, the

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[139] Fama, E., op. cit., 1970.

preannouncement efficiency concept is more compatible than most with observed empiricism.[140]

The appraisal of relative preannouncement information efficiency is best facilitated by a guage that measures deviations from an established norm. The metric chosen for the present research is an error measurement of sorts that takes on as the reference quantity the CAR prevailing at t = n. The assumption underlying this reference is that equilibrium with respect to annual earnings is attained by the last day of the postannouncement period. Preannouncement efficiency levels are thus assessed by the comparative absence of inefficiency, where the latter is defined here as:

$$\Omega_{pre} = \Sigma_{t=-m}^{-1} | CAR_t - CAR_n | \qquad (1)$$

where

Ω_{pre} = preannouncement inefficiency,
CAR_t = CAR at time t (t = -m,...,-1),
CAR_n = CAR on the final day of the postannouncement period.

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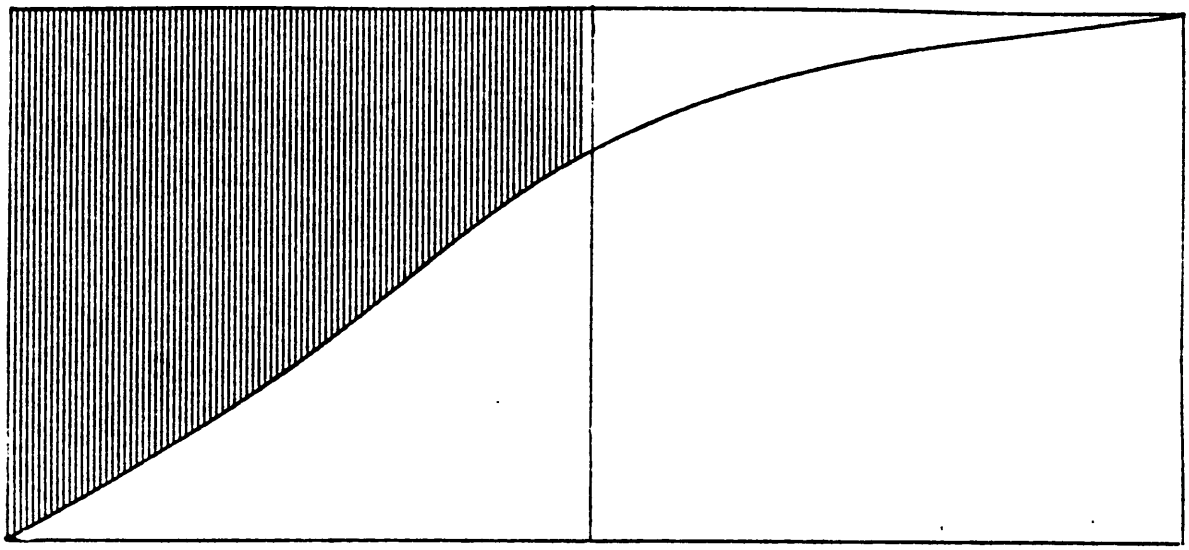
[140] Other notions of market efficiency were explored in depth in Chapter 2. The preannouncement efficiency construct was developed there in response to the inability of these alternative concepts to hold up under admittedly imperfect market settings.

To appreciate the substance of this statistic, Figure 5 is provided. In this figure, the shaded areas represent the inefficient preannouncement space computed via (1) for the two good news firms. Visual inspection of these areas indicates that Firm A is less preannouncement efficient than Firm B.

Interestingly, the Ω_{pre} metric is consistent with measuring inefficiency per Beaver's price-based definition of market efficiency discussed in Chapter 2. To restate his definition, "...market efficiency with respect to an information item means that prices act as if everyone knows that information (emphasis in original)."[141] Because equilibrium with respect to the annual earnings release is presumed to be established by t = n, the aggregate information content ascertainable during the total window period under study is embodied in CAR_n. Hence, CAR_n represents an estimate of what the CAR immediately following t = -m would have been had the market become fully and instantaneously informed at that time about the remaining information content yet to be reflected in price. CAR_t (for t = -m,...,-1) deviations from CAR_n may accordingly be interpreted as a measure of the aggregate market ignorance, during the preannouncement period, of the latent information

[141] Beaver, W., "Market Efficiency," The Accounting Review (January 1981a), p.28.

Ω_{pre} Space for Firm A



Ω_{pre} Space for Firm B

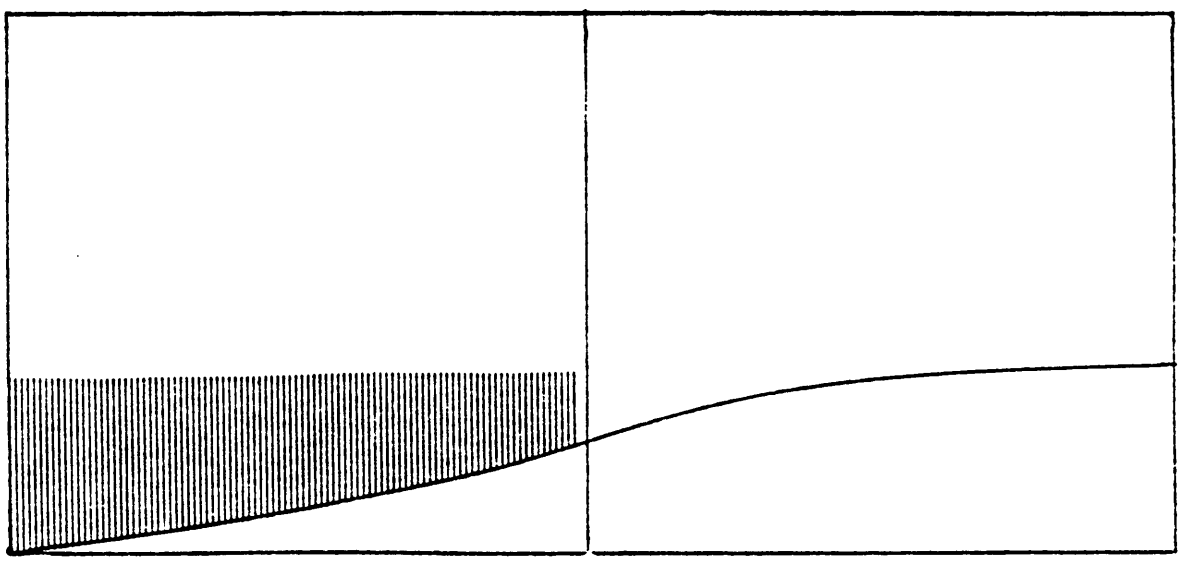


Figure 5: Preannouncement Inefficient Space for Hypothetical Firms A and B

yet to be revealed. From this measure, differential preannouncement efficiency structures may be determined.

4.2.2 Operationalizing Postannouncement Efficiency

In regard to the postannouncement analysis, the relevant CAR profiles for examination are those that obtain concurrent with, and subsequent to, the date of the earnings release. It was pointed out in Chapter 2 that tests of postannouncement efficiency are equivalent to tests of the semi-strong-form of the efficient market hypothesis.

There is considerable inconsistency in the empirical literature regarding the general pattern of postannouncement profiles. A number of studies document positive drifts for positive unexpected earnings firms and negative drifts for negative unexpected earnings firms.[142] Furthermore, the extent of drifting appears to be related to the magnitude of the market's forecasting error.[143] Significant drifting constitutes a particularly troublesome paradox because it suggests that the market is less than rational in processing

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[142] For a review of this literature, see Joy and Jones [1979].

[143] Beaver, W., R. Clarke, and W. Wright, "The Association Between Unsystematic Security Returns and the Magnitude of Earnings Forecast Errors," Journal of Accounting Research (Autumn 1979), pp.316-340; Patell, J., "Corporate Forecasts of Earnings Per Share and Stock Price Behavior: Empirical Tests," Journal of Accounting Research (Autumn 1976), pp.246-276.

information that is freely and publicly available. Though the finding is by no means conclusive, it appears to be more characteristic of studies conducted on quarterly earnings announcements than on annual earnings announcements. Moreover, studies using shorter (e.g., daily) price differencing intervals are more likely than those using longer intervals (e.g., monthly) to detect the anomaly.

As discussed in Chapter 2, some of the drifting behavior may be a rational consequence of costly cognitive processing. However, some argue that, at least with respect to earnings announcements, information processing costs should be minimal.[144] In any event, of interest in this study is whether post-release drifting functions on analyst institutional following. The postannouncement inefficiency metric chosen for this analysis is similar to the preannouncement inefficiency measure and is defined as follows:

$$\Omega_{post} = \Sigma_{t=0}^{n} | CAR_t - CAR_n | \qquad (2)$$

where

Ω_{post} = postannouncement inefficiency,
CAR_t = CAR at time t (t = 0,...,n).

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[144] Foster, G., C. Olsen and T. Shevlin, "Earnings Releases, Anomalies, and the Behavior of Security Returns," The Accounting Review (October 1984), pp.574-603. These authors offer another possible explanation for the anomaly which is discussed in Section 4.2.3.

Again, the assumption in (2) is that equilibrium with respect to current period earnings is established by time t = n. Cumulative abnormal returns at that time embody the aggregate earnings information content ascertainable during the total window period under study (-m,n). The Ω_{post} statisic therefore measures the residual portion imparted to price subsequent to the announcement date. Using the example firms, Figure 6 illustrates that a lower level of postannouncement efficiency is associated with Firm A than Firm B.

Because the pre- and postannouncement inefficiency measures are additive, total window period inefficiency may be defined as the sum of its pre and post components; i.e., $\Omega_{tot} = \Omega_{pre} + \Omega_{post}$. This measure is employed in the subsidiary analyses described in Section 4.4.2.

4.3 SAMPLE AND DATA

4.3.1 Sample Definition

The sample for this study consists of all NYSE firms for the 1976-1982 period that met the following criteria in any single year:

1. included on the Institutional Brokers Estimate System (IBES) computer tape (discussed in Section 4.3.2),
2. annual earnings announcement dates available on the Compustat Industrial Quarterly Tape,

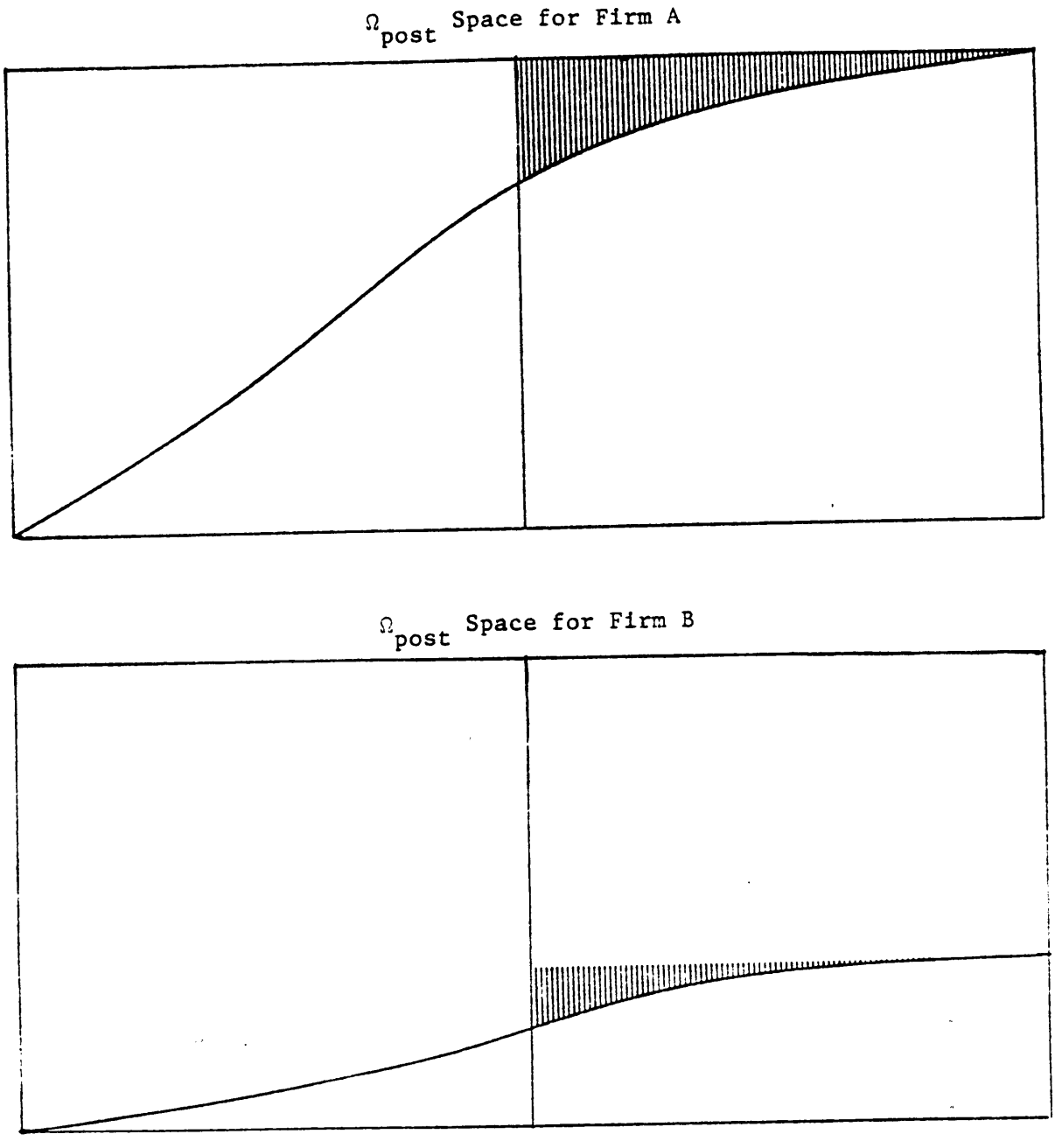

Figure 6: Postannouncement Inefficient Space for Hypothetical Firms A and B

3. annual primary earnings per share available on the Compustat Industrial Annual Tape,[145]

4. daily abnormal return data available on the CRSP Excess Returns Tape for at least 40 trading days prior to and 40 days subsequent to the announcement date of interest,

5. had a December 31 fiscal year-end,

6. reported earnings within 50 days of calendar year-end, and

7. reported earnings on a trading day.

IBES tape availability begins in 1976 and updated Compustat availability ends in 1982. Annual earnings announcement dates isolated for analysis are therefore restricted to those made for the years ended December 31, 1976 through 1982.

A calendar fiscal year limitation is imposed to maintain necessary "treatment" consistency. It is reasonable to suspect that analyst attention is, to some extent, seasonal. For example, at least with respect to annual earnings estimates, attention is likely to become more concentrated toward fiscal year-ends since analysts would be expected to be more willing at those times to commit themselves. Because the majority of firms close on December 31, a higher proportion of the analyst community would devote its efforts to calendar year firms in the Fall months. A superficial

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[145] This filter only pertains to the analysis using analysts' forecasts for initial market expectations.

investigation of the S&P Earnings Forecaster appears to bear this out.

The screen that firms must report earnings within 50 days after closing is established as a check against stale earnings release information. Givoly and Palmon find that, in 1974, the last year included in their study, only 25% of the sampled firms released their earnings figure after 51 days.[146] The announcements made by this fourth quartile of firms might then be considered "late" and carry relatively negligible information content.

Finally, to ensure as nearly as possible homogeneous conditions on and around the dissemination date, those firms announcing on other than a trading day (e.g., weekends and holidays) are excluded from the sample.

4.3.2 Surrogation of Analyst Attention

Analyst attention is surrogated by an ordinal ranking of the number of analysts providing EPS forecasts for companies listed in the Institutional Brokers Estimate System (IBES) historical computer tapes. These tapes, which are published by Lynch, Jones & Ryan, contain various descriptive statistics on earnings forecast data for over 2000 companies

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[146] Givoly, D. and D. Palmon, "Timeliness of Annual Earnings Announcements: Some Empirical Evidence," The Accounting Review (July 1982), pp.486-508.

of interest to institutional investors. Forecasts are compiled on a weekly basis from the research departments of a large cross-section of Wall Street and regional brokerage houses. The historical tapes contain forecast information that is made public approximately midway through each month.

A particular company listed on the tape may be followed by anywhere from one to thirty-plus forecasting institutions. This is to be contrasted with a maximum of only ten or so forecasters providing earnings forecasts for the most widely-followed firms in the S&P Earnings Forecaster. The composition of analyst attention available from IBES is therefore more extensive in coverage than that available from S&P, and consequently, the surrogate for analyst attention obtained from IBES should be superior to the one employed by Arbel and Strebel.[147]

Analyst attention concentration factor (ACF) groups are determined as follows for each of the seven years studied. A count of the number of analysts contributing current year EPS forecasts for each company is made as of the beginning of each company's particular preannouncement term. For firms announcing within 50 days of December 31, this approximately corresponds to IBES information published in mid November and December. The vector containing the

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[147] Arbel, A. and P. Strebel, op. cit., 1982.

average count of contributing analysts for these two months is then sorted into descending order. From this ordinal ranking three equal fractiles are formed: ACF 1 consists of the least followed firms, ACF 2 is an intermediate classification, and ACF 3 comprises firms receiving the greatest amount of analyst attention.

4.3.3 Proxies for Initial Market Expectations

Foster, Olsen, and Shevlin discuss several competing explanations for systematic drifts in postdisclosure returns.[148] Although substantive evidence is provided in their study that the extent of drifting is strongly associated with firm size (i.e., larger drifts for smaller firms), their major conclusion appears to be that the anomalous behavior is due more to the nature of the earnings expectations models employed by researchers than to the market inefficiency explanation. In particular, significant drifting is found to be present when naive time-series prediction models are used -- the common choice in event studies conducted on quarterly announcements -- whereas insignificant drifting is observed when the Beaver, Lambert, and Morse[149] price-based earnings expectation model is

[148] Foster, Olsen and Shevlin, op. cit., 1984.

[149] Beaver, W., R. Lambert, and D. Morse, "The Information Content of Security Prices," Journal of Accounting and

employed. The latter uses the sign of abnormal returns prior to the announcement date to classify sample firms into good-news/bad-news categories. Thus, whether a particular announcement constitutes good or bad news is inferred directly from price behavior itself, thereby obviating the need for explicit assessments of initial market expectations.

The asserted benefit of the technique is that it better fulfills the independence-over-time assumption regarding annual earnings. That is, if earnings do not follow a pure martingale process, but instead follow a martingale process with drift, then some if not all of the so-called anomalous drifting behavior following earnings releases may be an appropriate response to subsequent earnings activity. In such a situation, large samples would not eliminate the drifts through randomization.[150]

In view of this recent finding, the present study calls for separate analyses to be conducted utilizing two surrogates for initial market expectations: (i) a variation of the Beaver, Lambert, and Morse price-based model, and (ii) explicit forecasts of earnings by the analyst community. For (i), the sign of CAR_0 is used to

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Economics (March 1980), pp.3-28.

[150] An extensive discussion is found in Beaver, Lambert, and Morse [1980].

assign firms into good-news/bad-news categories. For (ii), initial market expectations are proxied by the arithmetic average of the forecasts contained on the IBES computer file.[151] The sign of the difference between these forecasts and announced earnings are then used to classify firms into good-news/bad-news categories.

The Foster, Olsen, and Shevlin study was limited to a comparison between price-based and naive time-series models without any evidence offered about the comparative attributes of explicit earnings forecasts. Presumably this is due to the fact that their study was oriented to quarterly announcements rather than annual announcements. Explicit forecasts of quarterly earnings are rarely published; explicit forecasts of annual earnings, however,

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[151] When numerous forecasts are provided for each company, as is the case on the IBES tape, a problem arises as to the most representative value. Givoly and Lakonishok [1979] faced a similar problem with regard to forecasts published in the S&P Earnings Forecaster. They chose to use the forecast of the "most active" forecaster, defined as the one with the greatest number of forecast revisions. By contrast, the mean value was used by Crichfield, Dyckman, and Lakonishok [1978]. The latter approach appears more reasonable. First, it does not assume, as does the former, that analysts fail to revise their published estimates once their actual expectations change. Second, it implies no bias with regard to the respective forecasters' abilities to generate meaningful forecasts. Because the analysts represented on the IBES tape constitute the larger, more prestigious, segment of the analyst community, it is reasonable to assume that they possess equivalent forecasting capabilities for the firms they choose to follow.

are readily available.[152] Accordingly, the inclusion of price-based expectations in this study supplies needed evidence about heretofore unknown properties of price-based models relative to explicit forecasts of earnings per share.

In regard to the second surrogate, Cragg and Malkiel argue persuasively that analysts' forecasts are indicative of the information available to the market.[153] Empirical substantiation of this argument is provided by numerous studies which demonstrate that analysts' forecasts are at least as accurate as naive time-series prediction models.[154] Further strengthening the case for analysts' forecasts, studies cited in Chapter 1 indicate that analysts' predictions play a vital role in the formation of prevailing market expectations. Consequently, analysts' forecasts likely purvey a superlative surrogate for the predictions held in the marketplace.

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[152] For example, in addition to IBES forecasts, annual earnings forecasts provided my managements appear in issues of The Wall Street Journal and analysts' forecasts are regularly published in Standard and Poor's biweekly Earnings Forecaster.

[153] Cragg, J. and B. Malkiel, Expectations and the Valuation of Shares. Chicago, Illinois: The University of Chicago Press (1982).

[154] See, for example, Barefield and Comiskey [1975], Brown and Rozeff [1978], and Crichfield, Dyckman, and Lakonishok [1978]).

4.3.4 Abnormal Returns Determination

Abnormal returns for this study are obtained directly from the CRSP Excess Returns Tapes. These tapes provide daily abnormal returns computed on the basis of Market Model residuals using the Scholes-Williams aggregated coefficients beta.[155] The latter technique involves a modification of traditional ordinary least squares estimates to control for biases induced by nonsynchronous trading -- a phenomenon that has been found to be particularly problematic for (i) companies with small capitalizations, and (ii) daily interval data in general.

To control for the systematic excess returns that have been found to persist for neglected and/or small-firm securities, an iso-portfolio approach is used.[156] Under this method, two alternative sets of abnormal returns for security i at time t are obtained. The first set adjusts excess returns for the neglected-firm effect (hereafter the NF set), while the second adjusts for the small-firm effect (hereafter the SF set).[157] Computationally, the alternative

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[155] Scholes, M. and J. Williams, "Estimating Betas From Nonsynchronous Data," Journal of Financial Economics, 5 (1977), pp.309-327.

[156] With the exception that Scholes-Williams excess returns, rather than gross returns, are used, the method is similar to that employed by Foster, Olsen and Shevlin [1984] to control for the small-firm effect.

[157] Recall from Chapter 1 that the neglected- and small-firm

abnormal return sets for this study are obtained as follows:

$$u_{i,t} = e_{i,t} - e_{p(i),t} \qquad (3)$$

where

$u_{i,t}$ = scaled abnormal return of security i at time t,

$e_{i,t}$ = Scholes-Williams Market Model residual of security i at time t,

$e_{p(i),t}$ = equally weighted average Scholes-Williams Market Model residual of iso-portfolio p at time t of which security i is a member.

For the NF set, the iso-portfolios comprise securities that are relatively homogeneous with respect to analyst attention concentration. This condition is satisfied by ranking firms by their respective number of IBES contributing analysts and then constructing deciles. Thus, ten iso-attention portfolios are formed, each of which consists of firms in a particular decile coding. For the SF set, a like-set of portfolios are constructed by grouping over the firms' respective market capitalizations as of December 31 of each year.[158] The assumption underlying both sets of scaled returns is that capital asset pricing is homogeneous within

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effects are empirical phenomena whereby the securities of firms in both classifications appear to earn systematic excess returns in a CAPM context.

[158] Market capitalization is computed as the product of outstanding common equivalent shares and the market price per share. These data were obtained from the Compustat Quarterly Industrial Tape.

a portfolio, but may differ across portfolios.[159]

The cumulative abnormal return of security i at time t is accordingly defined as:

$$CAR_{i,t} = \Sigma_{t=-m}^{t} u_{i,t} \qquad (t=-m,\ldots,n). \qquad (4)$$

The effect of the scaled abnormal returns is to center the CAR's for each portfolio on zero, yet preserve the relative pattern of the individual firm CAR profiles themselves. This facilitates direct comparisons of CAR contours which might otherwise be confounded by systematic excess returns due to neglect and/or firm size.

For the preannouncement efficiency analysis, abnormal returns are accumulated over an m=40 trading-day preannouncement period (approximately eight weeks of daily data). An eight week preannouncement period is deemed to be sufficient to capture preannouncement effects, yet short enough to insure that price reactions to third quarter earnings announcements have subsided.[160] The postannouncement analysis utilizes an n=41 trading-day

[159] A discussion of the homogeneity assumption is provided in Foster, Olsen and Shevlin [1984].

[160] Foster [1977] shows that the market's reaction to (quarterly) earnings releases is most pronounced in the two-day period prior to their publication in the Wall Street Journal. However, the reaction does not appear to fully level off until 15 to 20 days after the release. The present study therefore accomodates as much as a 20-day third quarter postannouncement "lag."

period, which includes the report date. Any marked inefficiencies are expected to be ascertainable from a postannouncement period of this duration.

4.4 HYPOTHESES AND STATISTICAL TESTS

4.4.1 Primary Analysis

The specific research hypotheses addressed in the primary analysis are straightforward and are formally stated as follows:

H1: For both favorable and unfavorable earnings releases, a significant inverse relationship exists between preannouncement inefficiency and the level of attention a firm receives from the professional analyst community.

H2: For both favorable and unfavorable earnings releases, a significant inverse relationship exists between postannouncement inefficiency and the level of attention a firm receives from the professional analyst community.

These hypotheses are tested through an analysis of mean differences among the three ACF groups for the Ω_{pre} and Ω_{post} inefficiency measures. Separate analyses are undertaken for the good news and bad news cases under the two alternative proxies for initial market expectations and formulations of abnormal returns. Thus, a total of eight data sets are used in the primary analysis tests for significant differences.

A preliminary investigation into the distributional properties of the Ω_{pre} and Ω_{post} statistics led to a rejection of the hypothesis that they come from a parent population that is Gaussian distributed.[161] Consequently, conventional parametric procedures to detect mean differences, such as the analysis of variance (ANOVA), are inappropriate. The results presented in the next chapter are therefore based on two distribution-free inferential methods. The first is the nonparametric analog to the analysis of variance, the Kruskal-Wallis k-sample test. Essentially, this method involves the application of conventional analyses of variance to the ranks of the dependent variable data. A test statistic is generated that approximately follows a chi-squared distribution.

The second nonparametric procedure employed uses the empirical distribution of the Ω_{pre} and Ω_{post} statistics to detect significant mean differences. The procedure is customarily referred to as the "bootstrap" method,[162] and

[161] The Kolomogorov D statistic was computed as significant at the .01 alpha level for both inefficiency measures under all eight sets of test data. A histogram plot revealed that the inefficiency metrics are unimodal, yet exhibit strong positive skewness. No significant heteroscedasticities were detected among the three ACF groups.

[162] The technique was developed by Efron [1979] and is gaining popularity in the accounting literature (e.g., Marais, Pattel and Wolfson [1984], and Foster, Olsen and Shevlin [1984]). An excellent readable description of

calls for the simulation of sample outcomes from a larger distribution that is observable by the researcher. The technique was developed for null hypotheses that involve a single comparison, and is applied to the present three-group case by focusing on the mean differences for only the two extreme ACF classifications, i.e., ACF 1 versus ACF 3.

The bootstrap technique is applied separately to the Ω_{pre} and Ω_{post} measures under each of the aforementioned data sets as follows. The individual firm/year observations from each data set are assigned a random number from a uniform distribution.[163] The observations are then sorted by the random variate and partitioned into three equal groups to represent three hypothetical ACF classifications. The mean Ω_{pre} and Ω_{post} values are calculated for each hypothetical ACF group and the difference between the means for two arbitrarily chosen ACF groups is tallied. The latter represents a simulated mean difference between ACF 1 and ACF 3 under sampling with replacement.[164] A new random number is then uniquely assigned to each observation and the process

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the technique, along with an application in the market-based accounting research area, is found in Marais [1984].

[163] The Statistical Analysis System (SAS) RANUNI function was used to make these assignments.

[164] Sampling with replacement is a requirement of the technique (Marais [1984]).

is repeated. The number of repetitions depends on the desired level of significance. For example, 1000 repetitions affords a tabulation of "bootstrap p-values" to three decimal places. For the present study, 100 repetitions are made to yield a table of percentile p-values. The table of percentile p-values is constructed by ranking the 100 simulated mean differences from lowest to highest.

Loosely speaking, bootstrap p-values represent the probability that the mean inefficiency measure differences between the two extreme ACF groups could be as large or larger by chance. This interpretation is made in view of the fact that the larger sample from which the subsamples were extracted is taken as a given. As the number of observations in the larger sample approaches infinity, the bootstrap p-values become perfectly specified. For purposes of the present study, the relatively large total sample size reported in Chapter 5 ensures reasonably approximated p-values. Moreover, because these p-values are established from the empirical distributions, the bootstrap technique is, locally, at least as powerful as the Kruskal-Wallis test.

4.4.2 Subsidiary Analyses

In addition to the above primary analysis, subsidiary analyses probe into the effects of two potential intervening variables. These are (i) the magnitude of the market's forecasting error, and (ii) firm size effects separate from those pertaining to equilibrium asset pricing. As mentioned in earlier sections of this chapter, both variables have been established in the literature to be empirically related to the absolute magnitudes of CAR's surrounding earnings announcement dates. Inasmuch as the Ω_{pre} and Ω_{post} measures are both directly influenced by CAR magnitudes, forecast error and firm size are candidate variables for any implied inferences of causality. Because the nature of these tests are, in part, dependent on the results of the primary analysis, however, discussion is reserved for Chapter 5.

V

ANALYSIS AND INTERPRETATION OF THE RESULTS

5.1 INTRODUCTION

This chapter documents the empirical results for the statistical tests described in the previous chapter. The outline of the presentation is as follows. Section 5.2 reports various descriptive statistics for the sample data base. The primary analysis results are presented in section 5.3. Section 5.4 details the tests and related findings for the subsidiary analyses briefly mentioned at the end of Chapter 4. A summary of the results is provided in Section 5.5.

5.2 DESCRIPTIVE SAMPLE STATISTICS

The Compustat Industrial Quarterly Tapes served as the initial data base for the study and consisted of 7,936 NYSE firm/year observations for the 1976-1982 period. The IBES Historical Tapes were tapped for a total of 6,984 firm/year observations. Merging these two data sources yielded 5,460 usable firm/year observations for which data were complete. After applying the remaining filters described in the previous chapter -- the most limiting of which was the 50-day earnings announcement restriction -- the sample sizes

ranged from a low of 3,635 for the analyst-based expectations proxy set in which abnormal returns were adjusted for the NF effect, to a high of 4,002 for the price-based expectations proxy set in which abnormal returns were adjusted for the SF effect.

Tables 1 and 2 provide descriptive statistics for the sample firms decile ranked according to analyst attention concentration and firm size, respectively. In Table 1, the mean number of contributing IBES analysts and mean percentage unadjusted Scholes-Williams abnormal returns for the seven window periods are displayed for each ACF decile. As the table demonstrates, analyst attention concentration is quite variable over the sample firms, and ranges from a low mean of one analyst for the least followed firms (decile 1) to a high mean of approximately 23 for the most widely followed firms (decile 10). Also apparent from the table is the neglected-firm effect documented by Arbel and Strebel.[165] Although the mean abnormal returns are negative for all deciles, the lesser followed firms exhibit systematically higher abnormal returns than do their closely followed counterparts.

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[165] Arbel, A. and P. Strebel, "The Neglected and Small Firm Effects," The Financial Review (November 1982), pp.201-218.

Table 2 presents a similar picture for firms ranked by firm size. Again, notwithstanding predominantly negative abnormal returns, firms with smaller market capitalizations display a superior market model performance.

These data substantiate the importance for the NF and SF iso-portfolio adjustments to raw abnormal returns per equation (3) in the previous chapter. Those adjustments forced the mean excess return to zero for each ACF and firm-size decile depending the data set employed. The CAR's in this study are therefore not affected, in a material way, by differences due to equilibrium asset pricing misspecifications.[166]

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[166] Portfolios crossed on like dimensions of both factors could be formed to simultaneously control for the neglected- and small-firm effects. Assuming decile groupings, however, this would require 100 portfolios. Moreover, the portfolios would not be represented by an equal number of constituents. For example, very small yet widely followed firms number in the range of zero to two, whereas very small and neglected firms number in the hundreds. In any event, the lack of simultaneous control should not have any significant impact on the results.

TABLE 1

Mean Percentage Abnormal Returns and Number of IBES Contributing Analysts for ACF Deciles

ACF Decile	Mean Number of Analysts	Mean Percentage Abnormal Returns
1	1.0	-.01156
2	2.0	-.03132
3	3.5	-.04476
4	5.4	-.04545
5	7.5	-.05329
6	9.5	-.07518
7	11.5	-.05336
8	14.5	-.07570
9	17.9	-.07384
10	22.8	-.08188

TABLE 2

Mean Percentage Abnormal Returns and Market Capitalization for Firm Size Deciles

Size Decile	Mean Market Capitalization (000's omitted)	Mean Percentage Abnormal Returns
1	$ 42,495	.00530
2	93,368	-.02836
3	167,411	-.03863
4	260,640	-.05025
5	378,476	-.05918
6	543,902	-.05984
7	760,019	-.07093
8	1,071,578	-.08214
9	1,722,191	-.07174
10	6,563,395	-.09272

5.3 PRIMARY ANALYSIS RESULTS

The CAR profiles for each of the four basic data sets are presented in Figures 7 through 10. The underlying data sets for these figures are summarized as follows:

Figure	Market Expectation Proxy	Abnormal Returns Adjustment
7	Analyst-Based	Neglected-Firm
8	Analyst-Based	Small-Firm
9	Price-Based	Neglected-Firm
10	Price-Based	Small-Firm

A cursory examination of the analyst-based proxy set profiles in Figures 7 and 8 indicates that they follow a pattern similar to the hypothetical profiles presented in Chapter 4. Specifically, the CAR_{40} values associated with the neglected asset (ACF 1) portfolios are greater in absolute magnitude than those associated with the other two ACF classifications. Also, a higher degree of postannouncement drift is exhibited for the neglected group.

The profiles for the price-based proxy sets presented in Figures 9 and 10 differ substantially from those in Figures 7 and 8 in two respects. First, there is much less variability in the contours, and second, postannouncement drifts appear to be almost nonexistent.[167] Note, however, that the absolute magnitudes of the neglected portfolio

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[167] The price-based CAR patterns in Figures 9 and 10 are very similar to those presented in the Foster, Olsen and Shevlin [1984] study.

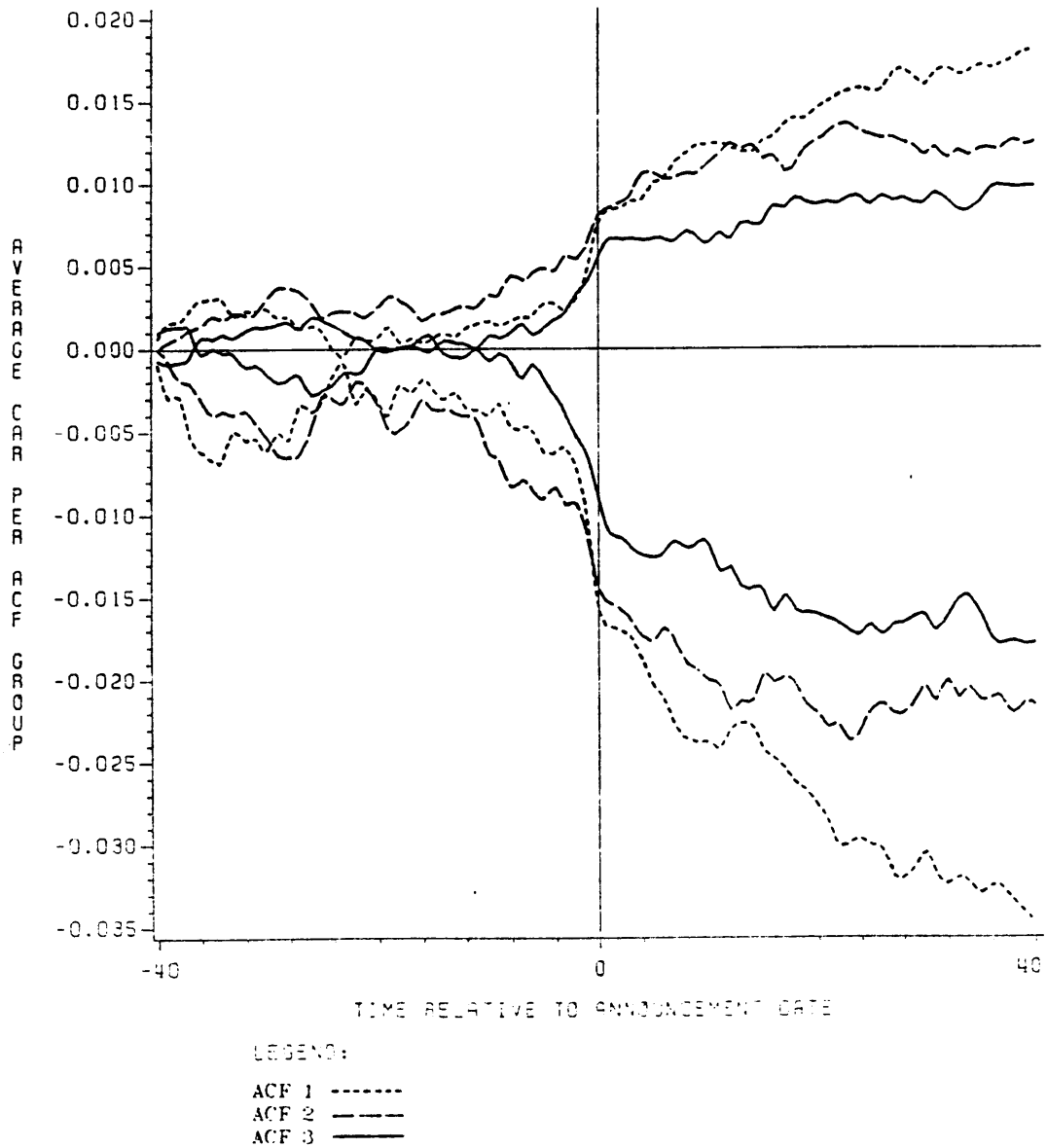

Figure 7: CAR Profiles for Analyst-Based Expectations Proxy Data Set: Abnormal Returns Adjusted for Neglected-Firm Effect

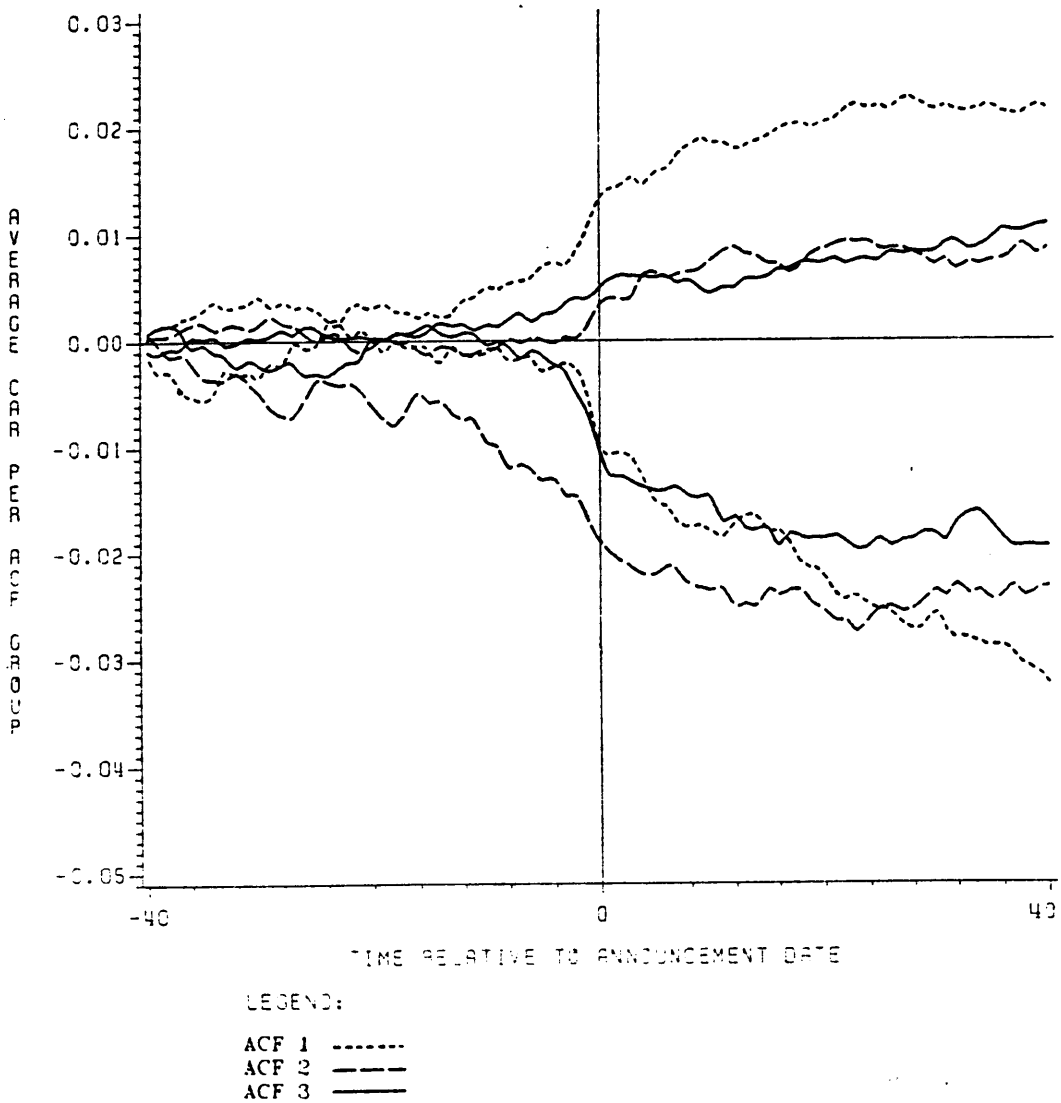

Figure 8: CAR Profiles for Analyst-Based Expectations Proxy Data Set: Abnormal Returns Adjusted for Small-Firm Effect

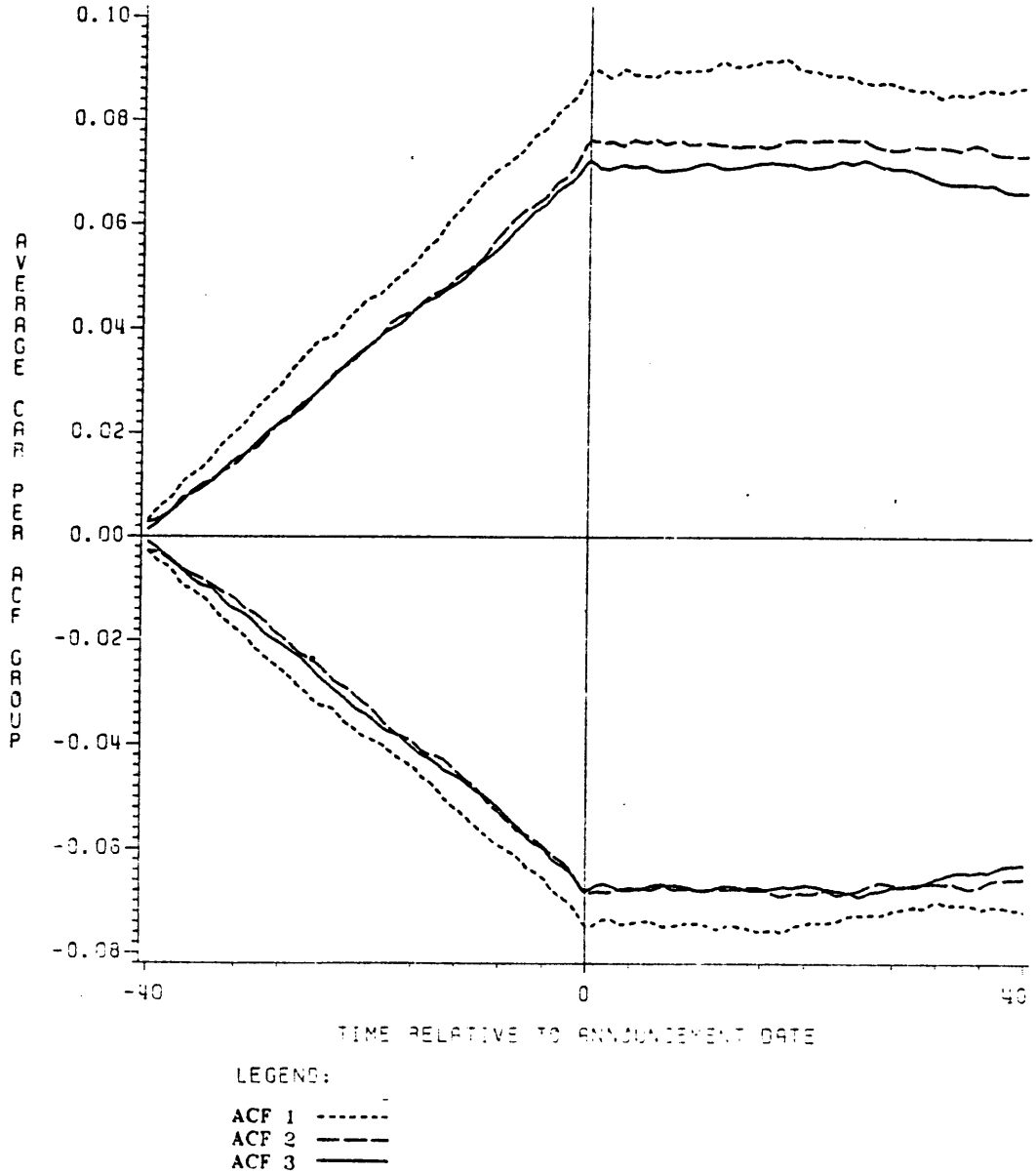

Figure 9: CAR Profiles for Price-Based Expectations Proxy Data Set: Abnormal Returns Adjusted for Neglected-Firm Effect

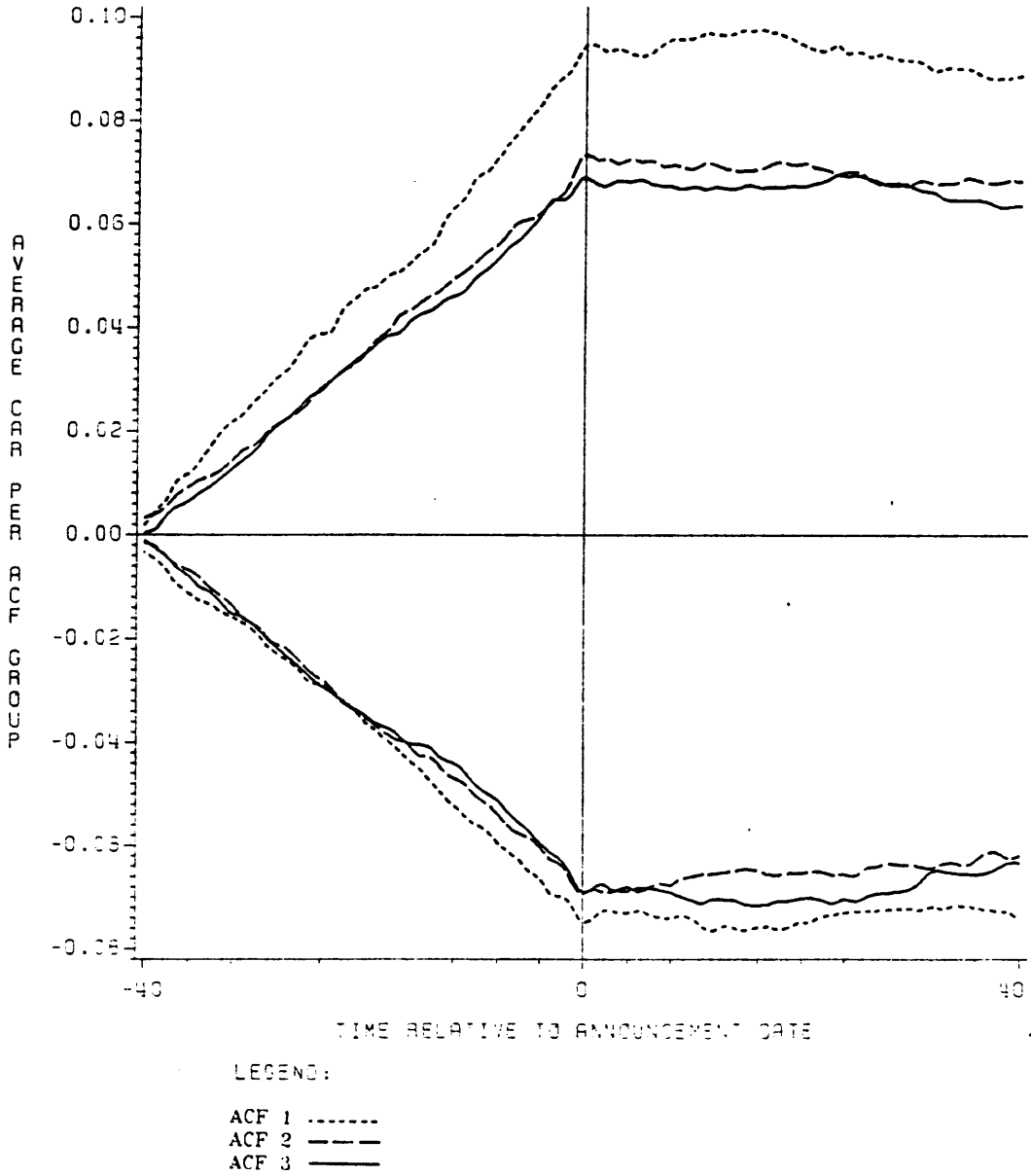

Figure 10: CAR Profiles for Price-Based Expectations Proxy Data Set: Abnormal Returns Adjusted for Small-Firm Effect

CAR's are again consistently larger. Thus, all four figures suggest that the information content of earnings is reflected in neglected security prices at a relatively slower pace (i.e., reflected in price during the window period rather than at an earlier time).

Tables 3 and 4 constitute the focus of the primary analysis and present the nonparametric statistical test results for ACF group differences in the pre- and postannouncement inefficiency measures. Table 3 is based on the data set where analysts' forecasts were used to proxy initial market expecations, while Table 4 is generated from the data set using the price-based market expectations proxy. Both tables outline the mean pre- and postannouncement inefficiency metrics for each ACF group, along with the number of observations contributing to each mean. The tables are partitioned horizontally for the two methods in which abnormal returns are adjusted, and vertically for good and bad news earnings. The Kruskal-Wallis chi-squared statisics and respective unidirectional p-values are presented along with the bootstrap p-values under the associated means.

The results presented in these tables overwhelmingly support the stated hypotheses of this dissertation. Under both favorable and unfavorable earnings, the pre- and

TABLE 3

Nonparametric Test Results: Analyst-Based Expectations Proxy Data Sets

GOOD NEWS FIRMS

	Abnormal Returns Adjusted For					
	NEGLECTED-FIRM EFFECT			SMALL-FIRM EFFECT		
ACF Group	Observations	Ω_{pre}	Ω_{post}	Observations	Ω_{pre}	Ω_{post}
1	778	3.960	2.191	776	3.873	2.184
2	816	3.462	2.003	815	3.458	1.998
3	742	3.293	1.842	745	3.217	1.802
ACF 1 - ACF 3		.667	.367		.656	.382
Significance Tests						
Kruskal-Wallis χ^2		10.38	16.28		9.00	18.64
χ^2 p-value		.0028	.0002		.0056	.0001
Bootstrap p-value*		< .01	< .01		< .01	< .01

BAD NEWS FIRMS

	Abnormal Returns Adjusted For					
	NEGLECTED-FIRM EFFECT			SMALL-FIRM EFFECT		
ACF Group	Observations	Ω_{pre}	Ω_{post}	Observations	Ω_{pre}	Ω_{post}
1	429	3.960	2.209	443	3.951	2.271
2	409	3.574	2.031	410	3.469	2.022
3	461	3.156	1.795	462	3.246	1.798
ACF 1 - ACF 3		.804	.414		.705	.473
Significance Tests						
Kruskal-Wallis χ^2		26.04	26.79		17.31	22.81
χ^2 p-value		.0001	.0001		.0001	.0001
Bootstrap p-value*		< .01	< .01		< .01	< .01

* Bootstrap p-values preceded by a < sign indicate that not one of the 100 simulations resulted in a mean difference as large.

TABLE 4

Nonparametric Test Results: Price-Based Expectations Proxy Data Sets

GOOD NEWS FIRMS

	Abnormal Returns Adjusted For					
	NEGLECTED-FIRM EFFECT			SMALL-FIRM EFFECT		
ACF Group	Observations	Ω_{pre}	Ω_{post}	Observations	Ω_{pre}	Ω_{post}
1	608	4.415	2.296	640	4.231	2.227
2	623	3.669	2.019	599	3.546	2.006
3	635	3.211	1.742	644	3.221	1.736
ACF 1 - ACF 3		1.204	.554		1.010	.491
Significance Tests						
Kruskal-Wallis χ^2		40.90	55.53		25.35	41.77
χ^2 p-value		.0001	.0001		.0001	.0001
Bootstrap p-value*		< .01	< .01		< .01	< .01

BAD NEWS FIRMS

	Abnormal Returns Adjusted For					
	NEGLECTED-FIRM EFFECT			SMALL-FIRM EFFECT		
ACF Group	Observations	Ω_{pre}	Ω_{post}	Observations	Ω_{pre}	Ω_{post}
1	732	3.693	2.119	718	3.706	2.151
2	673	3.358	1.995	698	3.398	2.013
3	690	3.370	1.916	681	3.343	1.892
ACF 1 - ACF 3		.323	.203		.363	.259
Significance Tests						
Kruskal-Wallis χ^2		10.77	3.96		8.27	5.51
χ^2 p-value		.0023	.0692		.0080	.0318
Bootstrap p-value*		< .01	< .01		< .01	< .01

* Bootstrap p-values preceded by a < sign indicate that not one of the 100 simulations resulted in a mean difference as large.

postannouncement inefficiency measures are significantly related with analyst neglect and fall in the hypothesized direction. Taken overall, the Kruskal-Wallis chi-squared significance levels are measured in various multiples of 1/1000 of a percent. The bootstrap p-values indicate that not one of the 100 simulations resulted in ACF 1 - ACF 3 mean differences as large for either of the inefficiency metrics under any of the four data sets. The nature of the association is monotonic (i.e., increasing inefficiency over increasing levels of neglect) in all but one instance -- the bad news case in Table 4 under the Ω_{pre} measure. In this case, the intermediate ACF 2 classification shows a slightly smaller mean value than the widely followed ACF 3 segment.

When analyst forecasts are used to proxy initial market expectations (Table 3), there is some indication that the ACF effect is stronger in the bad news case than in the good news case. The chi-squared statistics are somewhat larger for unfavorable earnings announcements even in view of the substantially smaller sample sizes. However, for the price-based proxy (Table 4), this observation is totally reversed -- the effects appear to be stronger for favorable earnings. In fact, with respect to the Ω_{post} measure, some question may exist regarding an effect at all. Although the chi-squared statistic of 3.96 suggests that the group

differences are not quite significant at the .05 level, the locally more powerful bootstrap method finds these differences to be significant at an alpha level less than .01. The strength of association in this particular instance, however, is clearly weaker.

An explanation for a reversing outcome under the two market expectation proxies is not immediately obvious. The most probable cause is the difference of manner in which the two methods assign firms into good and bad news categories. Note from the "Observations" columns in Table 4 that the price-based expectations proxy assigns approximately an equal number of firms to the good and bad news categories. This is not the case for the analyst-based expectations proxy. Table 3 shows that the latter classifies almost twice as many firms as good news announcers than bad news announcers. Thus, the two methods notably differ in their method of categorization.

Fortunately, this phenomenon is entirely innocuous to the major determination of differential efficiency levels. The pre- and postannouncement inefficiency measures, being absolute value metrics, do not require the sign of the forecast error to be specified. Consequently, little is lost by making no distinction between favorable and unfavorable earnings.

Table 5 adopts such a focus. Provided in this table is a year-by-year analysis of the pre- and postannouncement inefficiency measure differences between ACF 1 and ACF 3 for each of the four data sets. The bootstrap p-values are presented under the associated means. The table shows that the differential efficiency finding is pervasive in all but one year, 1979. Even in that year, insignificance is apparently dependent on the particular data set employed. Only for the first data set are the differences insignificant at the .05 level for both inefficiency measures. For the other three data sets, insignificance relates exclusively to the preannouncement inefficiency measure.

To summarize the primary analysis results, both hypotheses stated in the previous chapter are supported. Differential efficiency levels are observed over the ACF factor without any appreciable differences arising from the manner in which abnormal returns are adjusted. Moreover, the conclusions do not change depending on which earnings expectation proxy is chosen.

There remains the possibility, however, that the ACF variable simply correlates with other factors that are driving the overall results. The subsidiary analyses which follow explore this possibility to the extent that previous research provides clues as to their identity.

TABLE 5

Year-By-Year Analysis: All Data Sets

ANALYST-BASED EXPECTATIONS PROXY DATA SET: ABNORMAL RETURNS ADJUSTED FOR NEGLECTED-FIRM EFFECT

	1976		1977		1978		1979		1980		1981		1982	
ACF	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}
1	3.03	1.66	3.05	1.74	3.26	1.77	3.73	2.34	4.73	2.51	4.83	2.63	4.31	2.35
3	2.36	1.39	2.22	1.32	2.68	1.37	3.62	2.31	3.82	2.07	3.83	1.88	3.40	1.98
Bootstrap p*	<.01	<.01	<.01	<.01	<.01	<.01	.14	.34	<.01	<.01	<.01	<.01	<.01	<.01

ANALYST-BASED EXPECTATIONS PROXY DATA SET: ABNORMAL RETURNS ADJUSTED FOR SMALL-FIRM EFFECT

	1976		1977		1978		1979		1980		1981		1982	
ACF	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}
1	3.00	1.67	2.78	1.64	3.25	1.76	3.73	2.41	4.65	2.48	4.84	2.63	4.28	2.38
3	2.42	1.40	2.16	1.28	2.63	1.32	3.58	2.28	3.79	2.08	3.89	1.90	3.39	1.97
Bootstrap p*	<.01	<.01	<.01	<.01	<.01	<.01	.11	.02	<.01	<.01	<.01	<.01	<.01	<.01

PRICE-BASED EXPECTATIONS PROXY DATA SET: ABNORMAL RETURNS ADJUSTED FOR NEGLECTED-FIRM EFFECT

	1976		1977		1978		1979		1980		1981		1982	
ACF	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}
1	3.11	1.66	3.17	1.78	3.31	1.78	3.85	2.39	4.71	2.50	4.84	2.55	4.35	2.33
3	2.41	1.42	2.30	1.29	2.70	1.42	3.80	2.31	3.81	2.10	3.95	1.93	3.44	2.01
Bootstrap p*	<.01	<.01	<.01	<.01	<.01	<.01	.28	.04	<.01	<.01	<.01	<.01	<.01	<.01

PRICE-BASED EXPECTATIONS PROXY DATA SET: ABNORMAL RETURNS ADJUSTED FOR SMALL-FIRM EFFECT

	1976		1977		1978		1979		1980		1981		1982	
ACF	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}	Ω_{pre}	Ω_{post}
1	3.15	1.67	2.85	1.65	3.30	1.77	3.86	2.45	4.63	2.49	4.83	2.55	4.29	2.34
3	2.52	1.45	2.24	1.27	2.64	1.37	3.71	2.29	3.78	2.06	4.04	1.95	3.41	2.00
Bootstrap p*	<.01	<.01	<.01	<.01	<.01	<.01	.12	<.01	<.01	<.01	<.01	<.01	<.01	<.01

* Bootstrap p-values preceded by a < sign indicate that not one of the 100 simulations resulted in a mean difference as large.

5.4 SUBSIDIARY ANALYSES

This section probes into the effects of two variables that could potentially threaten the implied inference of causality between analyst attention and market efficiency. These are: (i) the magnitude of the market's forecasting error, and (ii) firm size effects separate from those pertaining to equilibrium asset pricing. As mentioned in Chapter 4, previous research has established a significant relationship between these variables and the absolute magnitude of CAR's surrounding earnings announcement dates. High correlations between these variables and ACF would raise concern that the associations found to exist between analyst attention concentration and inefficency simply reflect relationships already documented to exist.

For brevity, the ancillary analyses that follow employ the Ω_{tot} metric as the inefficiency measure. This choice is justified on the basis of the above results, which indicate that the statistical conclusions do not differ for the Ω_{tot} measure's Ω_{pre} and Ω_{post} components. In addition, because of the possible ambiguity addressed earlier, no distinction is made with regard to favorable and unfavorable earnings.

5.4.1 Forecast Error Analysis

To explore the possibility that the magnitude of the market's forecast accounts for the reported inefficiency differences, the two data sets using analysts' forecasts as the proxy for initial market expectations are further analyzed.[168] For purposes of this analysis, the absolute value of the market's percentage forecasting error is defined to be:

$$FE = \left| \frac{100(|A| - |E|)}{(|A| + |E|)/2} \right| \qquad (1)$$

where

FE = percentage forecasting error,
A = announced EPS,
E = expected EPS (proxied by the mean IBES forecast).

The denominator is an attempt to approximate the "normal" amount of the variable under study and has the property of rarely equaling zero, which would occur only when both A and E equal zero.[169]

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[168] The price-based expectation proxy model does not yield an unambiguous measure for the magnitude of the market's forecast error. See, however, Foster, Olsen and Shevlin [1984] for two possibilities.

[169] Saftner, D., The Information Content of ASR 190 Replacement Cost Disclosures: An Efficient Market Study, Unpublished Ph.D. dissertation, The Pennsylvania State University (1980), p.50.

To assess the degree of correspondence between FE and ACF, the Spearman rank correlation coefficient is computed. This statistic is -.158 and significant at the .0001 level. Thus, as would be expected, a higher degree of research concentration by the professional analyst community results in lower mean forecast error. However, the correlation is not so large as to imply that the two variables measure the same phenomenon.

In order to extract the independent effects of FE and ACF from the total inefficiency metric, a two-stage test is employed. The first stage removes the monotonic influence of FE from Ω_{tot} via the following simple linear regression model:

$$\Omega_{tot} = \beta_0 + \beta_1 \cdot FE + \xi \qquad (2)$$

where

FE = decile coding for forecast error magnitude,

β_i's = estimated regression parameters, and

ξ = independent error term.

The error term ξ retains the same distributional properties as Ω_{tot}, yet embodies information that is linearly independent of FE.

The rationale for treating FE as a categorical rather than continuous variable is to remove potential biases on

the regression results due to nonlinearity in the raw measurement.[170] It should also be pointed out that the known violation of normality has no bearing on the propriety of the first-stage regression. The normality assumption in classical regression analysis is necessary only when statistical inferences about the regression parameters are desired, which is not the case here. The purpose of the first stage is merely to remove FE's monotonic information from the dependent variable Ω_{tot} measure.

The second stage involves treating ξ as the dependent variable in a Kruskal-Wallis test for mean differences across the ACF groups. As with Ω_{tot}, higher values for ξ imply higher total inefficiency, with the exception that the latter represents a residual measure that is centered on zero. Table 6 details the first and second stage results for each of the two data sets studied.

The first-stage regression parameter for FE is positive for both data sets, indicating that greater mean forecast error is associated with higher total inefficiency. The regression parameter t-statistics are all significant at the .0001 level. While such inferences are not strictly appropriate because of the known normality violation, the suggested degree of linear association is strong enough to

[170] For this subanalysis, however, similar results were obtained by retaining the continuous coding.

TABLE 6

Nonparametric Test Results for Forecast Error Residuals

	Abnormal Returns Adjusted For	
	NEGLECTED-FIRM EFFECT	SMALL-FIRM EFFECT
First Stage Regression Results		
β_0	4.7755	4.7495
β_1	.1776	.1750
t for β_0 ; (p-value)	40.73 ; (.0001)	40.94 ; (.0001)
t for β_1 ; (p-value)	8.08 ; (.0001)	8.05 ; (.0001)
R^2	.018	.018
Second Stage Kruskal-Wallis Results		
First Stage Mean Residuals		
ACF 1	.4843	.4844
ACF 2	-.0637	-.0707
ACF 3	-.4211	-.4115
Kruskal-Wallis χ^2	22.03	17.59
χ^2 p-value	.0001	.0001

ensure that the first stage accomplished what was intended. Note, however, the remarkably low coefficients of determination.

Turning to the second-stage results, it is evident that FE is not the sole explanatory factor for the detected inefficiency differences. The mean residuals are positive for ACF 1 and decrease to negative values as research concentration increases. For both data sets, the Kruskal-Wallis tests show the differences to be significant at the .0001 level. Consequently, the possibility that the effects are purely attributable to the magnitude of the market's forecast error is ruled out.

5.4.2 Firm Size Analysis

To examine whether firm-size effects, separate from those pertaining to equilibrium asset pricing, account for the detected inefficiency differences, a similar analysis is conducted. The motivation underlying this test is that analyst attention concentration may simply proxy for a more enduring characteristic of organizations. Firm size, and not analyst following, may dictate the amount of interim information flow to the market. If this is the case, and individual market agents are able to collectively process information in a manner that is not inferior to professional

analysts, then it would be expected that the ACF factor is eclipsed by the firm size variable.

To examine this possibility, firm size (hereafter, SIZE) is measured in terms of market capitalization. The Spearman rank correlation between ACF and SIZE computes to be .735 and significant at an alpha level of .0001. Thus, as expected, the positive association between the two variables is considerable.

In like manner to the previous analysis, the monotonic effects of firm size is removed from Ω_{tot} through the following first stage regression model:

$$\Omega_{tot} = \beta_0 + \beta_1 \cdot SIZE + \xi \qquad (3)$$

where

SIZE = decile coding for firm size,

β_i's = estimated regression parameters, and

ξ = independent error term.

Again, the decile coding is employed as protection against nonlinearity.[171] Results for the first- and second-stage

[171] Indeed, an examination of residual plots indicated that firm size, without recoding, is not linear over Ω_{tot}. Various transformations were studied, and a base 10 log transformation appeared to satisfy the linearity property better than any other examined. However, to guard against any biases induced by this choice, the results presented are based on the decile categorization. Similar results were obtained for a continuous log transformation and, though not presented here, do not affect the qualitative conclusions of this

tests are presented in Table 7 for all four data sets.

As anticipated, the first-stage regression results indicate that firm size is negatively associated with total inefficiency. The large t-statistics again provide evidence that the linear relationship is likely to be significant in a nonparametric context. But the second stage regression error analysis reveals that firm size is not the sole influence. The mean errors for the neglected ACF 1 group are all positive and significantly greater than the mean errors for the other two ACF classifications. Thus, firm size is also ruled out as the sole influence for the detected inefficiency differences.

A noteworthy finding of the second-stage residual analysis is an anomalous shift in direction of mean errors for ACF 2 and ACF 3. Contrary to expectation, the mean error for ACF 3 is systematically larger than that for ACF 2 for all four data sets. Initially, this was interpreted to imply that, after controlling for firm size, the intermediate group is more efficient than the widely followed segment.

To explore this issue more fully, the mean Ω_{tot} values are partitioned across three firm size groups (1 = smallest, 3 = largest) and the ACF factor. Table 8 presents these

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subanalysis.

TABLE 7

Nonparametric Test Results for Firm Size Residuals

ANALYST-BASED EXPECTATIONS PROXY DATA SET

	Abnormal Returns Adjusted For	
	NEGLECTED-FIRM EFFECT	SMALL-FIRM EFFECT
First Stage Regression Results		
β_0	6.4256	6.4002
β_1	-.1892	-.1931
t for β_0 ; (p-value)	54.87 ; (.0001)	55.38 ; (.0001)
t for β_1 ; (p-value)	-8.62 ; (.0001)	-8.92 ; (.0001)
R^2	.020	.021
Second Stage Kruskal-Wallis Results		
First Stage Mean Residuals		
ACF 1	.0987	.0733
ACF 2	-.0693	-.0638
ACF 3	-.0285	.0036
Kruskal-Wallis χ^2	7.55	13.30
χ^2 p-value	.0115	.0007

PRICE-BASED EXPECTATIONS PROXY DATA SET

	Abnormal Returns Adjusted For	
	NEGLECTED-FIRM EFFECT	SMALL-FIRM EFFECT
First Stage Regression Results		
β_0	6.4870	6.4605
β_1	-.1921	-.1960
t for β_0 ; (p-value)	57.87 ; (.0001)	58.24 ; (.0001)
t for β_1 ; (p-value)	-9.14 ; (.0001)	-9.43 ; (.0001)
R^2	.021	.022
Second Stage Kruskal-Wallis Results		
First Stage Mean Residuals		
ACF 1	.1064	.0681
ACF 2	-.1088	-.0949
ACF 3	-.0012	.0319
Kruskal-Wallis χ^2	7.77	15.61
χ^2 p-value	.0103	.0002

crossed means and number of contributing observations for the analyst-based expectations proxy data set in which abnormal returns were adjusted for the NF effect. The results obtained for the other 3 data sets were essentially identical and are therefore not presented.

Looking down the columns, it is apparent that lower analyst attention levels correspond with higher inefficiency even after firm size is held more or less constant. Interestingly, the relationship is most pronounced for larger firms and appears to dissipate as firm size decreases. In fact, the inefficiency measure for ACF 1 within the largest size group (SIZE = 3) is comparable in magnitude to the corresponding computed value for the smallest size group (SIZE = 1). This is an intriguing finding because it suggests that one cannot safely assume a superlative degree of efficiency attainment even for firms whose market capitalizations measure in the billions of dollars (see Table 2). Analyst attention appreciably enhances market efficiency for larger firms, and, as expected, the lowest inefficiency measure is found in the cell representing widely followed firms with high market values.

Except for the companies represented in the ACF 1 category, a differential efficiency finding also appears to

TABLE 8

Mean Total Inefficiency Measure Crossed on Firm Size and ACF

		SIZE			
	Ω_{tot} (obs.)	1	2	3	ACF Mean
ACF	1	6.345 (889)	5.490 (264)	6.325 (54)	6.157 (1207)
	2	6.363 (300)	5.276 (634)	5.148 (291)	5.512 (1225)
	3	5.971 (23)	5.227 (316)	4.966 (864)	5.053 (1203)
SIZE Mean		6.343 (1212)	5.310 (1214)	5.070 (1209)	

hold for firms classified on the firm size dimension. That is, when attention level is held constant at either an intermediate or high level, the larger the firm, the higher the degree of empirical efficiency. This is to be expected because numerous data sources, including periodical business publications, favor larger firms without any consideration necessarily given to their relative following by the professional analyst community.

As to comparative influence, an examination of the overall SIZE and ACF means (perimeter cells) provides some indication that firm size may have a more pronounced impact than attention level on efficiency attainment. The difference between the smallest and largest firm mean inefficiency measures is 1.273 (= 6.343 - 5.070). The corresponding difference between mean inefficiency for the neglected and widely followed segments is smaller and computes to 1.104 (= 6.157 - 5.053). This, however, does not dilute the significance of the major finding. The size dimension conceivably embraces a host of other factors, including analyst attention concentration, that collectively intervene and drive the SIZE group separation. In other words, there is little, if any, theoretical justification why size per se should influence efficiency levels. A more plausible interpretation is that firm size represents a

reduced, though fairly exhaustive, dimension within which the more relevant factors reside. If this is the case, then the above comparison is not entirely equitable. It does, however, highlight the fact that other factors, in addition to analyst attention concentration, contribute to differential market efficiencies. In time, further research may resolve the identity of these "other" variables.

5.5 SUMMARY OF THE RESULTS

Strong empirical evidence is provided that empirical market efficiency functions on the degree of attention paid firms by the professional analyst community. This conclusion holds equally well for the pre- and postannouncement efficiency constructs under both earnings expectations proxies and methods of adjusting abnormal returns. Quite simply, the interpretation is that neglected firms appear to suffer not only from relative preannouncement interim information deficiency, but also from inferior postannouncement information processing.

Greater inefficiency levels correspond to increasing levels of neglect even after removing or holding constant effects that are empirically correlated with the ACF variable; namely, the magnitude of the market's forecast error and firm size. The finding of differential

inefficiency levels across analyst attention concentration cannot, therefore, be attributed to the two factors that are known from existing literature to be associated with event period CAR magnitudes.

The effects of analyst neglect were found to be most pronounced, both in comparative and absolute terms, for firms characterized by larger market values. This is an important finding because prior expectations would tend toward the opposite; i.e., one would expect the impact of differential attention levels to wash out as firm size increases. Apparently, alternative data sources for large firms do not adequately compensate for the lack of information stemming from neglect by the professional analyst community.

Finally, results were presented that might be taken to imply that numerous other factors, aside from the degree of institutional research, impact upon efficiency levels. Though not individually specified, they are associated with the firm size dimension, and were collectively represented as such. Further research is needed to identify these factors.

VI

RESEARCH IMPLICATIONS, LIMITATIONS AND AVENUES FOR FUTURE STUDY

6.1 INTRODUCTION

This concluding chapter highlights the major contributions of the research findings and capsulizes the limitations associated with the methodological approach. The dissertation closes with some possible areas for future research.

6.2 RESEARCH CONTRIBUTIONS

The results of this research effort are of interest in several areas. Three of these are briefly discussed in the following subsections.

6.2.1 Implications for the Accounting Profession

Some have suggested that acceptance of the EMH has far-reaching implications for the establishment of financial accounting standards, particularly for firms that are nationally traded.[172] Central to these arguments is the notion that it may no longer be appropriate to hold to the SEC's implicit protection of the naive investor. Beaver, for

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[172] Examples include Beaver [1972] and Gonedes [1972].

example, has repeatedly argued (on the basis of the joint result of a valid EMH and portfolio theory) that investors are fair-game price takers, and are therefore shielded from losses they might otherwise suffer in an inefficient economy.[173] According to him, our focus might be more properly directed to the provision of information useful for the determination of firms' systematic risk than for diversifiable risks of a firm-specific nature. He and others also demonstrate empirically that accounting information is potentially quite valuable to this end.[174]

In a series of articles authored or coauthored by Gonedes,[175] it is asserted that mandated disclosure laws lead to suboptimal allocations of resources. This follows directly from the SEC's subscription to the naive investor hypothesis, the most damaging implication of which is the (costly) production of information that would not otherwise be produced in an efficient market setting. A subsidiary implication is that these disclosure requirements may place undue responsibilities on information producers that are less cost-efficient than others.

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[173] Beaver [1972, 1973, 1978].

[174] Beaver, Kettler and Scholes [1970] and Beaver and Manegold [1975].

[175] Gonedes and Dopuch [1974], Gonedes [1975], and Gonedes, Dopuch and Penman [1976].

It is clear that the ambitious conclusions reached during the euphoria of early market-based accounting research have slowly given way to concerns of some "irrationality" on the part of investors.[176] Indeed, the present analysis indicates that such irrationality is systematically related to analyst neglect, and appears to be pervasive over time. Thus, serious questions must be raised regarding the efficacy of the above arguments. Accounting standard setting bodies are apparently doing well to maintain a policy of caution, and not blindly following the ambitious prescriptions set forth by efficient market theorists. There are, however, some policy suggestions that surface from the dissertation results.

In deference to the preannouncement analysis, the findings place us in a better position to advance policy recommendations regarding management-supplied forecasts and other matters pertaining to interim disclosures. Greater frequency and volume of publicly supplied interim accounting data may serve to remove much of the detected differential information efficiencies. Furthermore, inasmuch as the results point to a higher level of efficiency for firms closely followed by professional analysts, this implies that

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[176] Lev, B. and J. Ohlson, "Market-Based Empirical Research in Accounting: A Review, Interpretation, and Extension," Journal of Accounting Research (1982 Supplement), p. 250.

there is profound value in the role played by these intermediaries. Accounting standards might thus be specified to supply information that either supplants analysts' output or is more beneficial for their data inputs than that which is currently provided.[177]

The results of this study are also of potential value to the resolution of such controversial issues as the "big-GAAP, little-GAAP" debate. The existence of differential efficiency levels has rather obvious ramifications in this regard. Specifically, market transactors do not exhibit a uniform level of sophistication in the processing of publicly disclosed accounting data. This being the case, it is inappropriate to specify accounting reports as if a uniform level of sophistication existed.

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[177] Such a pursuit will, of course, necessitate a close working relationship with the analyst community. Efforts towards this end are currently being made by the SEC and the Financial Analysts Federation. See Financial Analysts Federation, Corporate Information Committee, "Response to SEC's Advisory Committee on Corporate Disclosure," Financial Analysts Journal (March-April 1977), p.12. Analyst input thus far has been important to FASB consideration in such areas as segment reporting and management forecasts (Beaver [1981b], p.12).

6.2.2 Implications for Academe

Academicians have a traditional interest in the structures that underly the phenomena they investigate. Ignorance of these underlying structures enhances the probability that their research designs fail to control for important interrelationships. In event studies, for instance, accounting researchers typically assume market efficiency as a given when investigating the information content of the event. Yet, if systematic violations of the EMH exist for certain subsets of the researcher's sample, statistical power is reduced and false inferences are likely to be drawn.

The findings of this research provide additional insight into the propriety of the ex ante assumption of market efficiency. Given that efficiency is apparently not homogeneous across all subject firms, researchers should stratify their samples so as to ensure the highest level of empirical efficiency possible. In the context of the analyses provided here, this would require, at best, sampling from those firms that are characterized by sizable market capitalizations and which receive continuous and concentrated attention by the professional analyst community. Owing to the rather limited availability of analyst attention concentration data, however, sample

selection on the basis of firm size is a reasonable, cost-effective alternative.

6.2.3 Implications for the Investment Community

Investors who trade in informationally efficient markets play a "fair" (zero net present value) game. This, of course, is a desirable property of capital markets since it implies Pareto optimal trading; i.e., gains are not made at the expense of others. If certain segments of the market are relatively inefficient, however, the possibility for arbitrage profits is indicated. The results of the present research may ultimately facilitate an assessment of the extent to which investors can capitalize on these abnormal returns. This, in turn, should improve the structure of capital asset prices for the benefit of society as a whole.

6.3 RESEARCH LIMITATIONS

The major limitation of this study is characteristic of much observational research and relates to the inability to control for extraneous factors that may have a bearing on the results. Although forecast error and firm size influences were explicitly considered in the ancillary analysis, other unforeseen factors could conceivably be the driving explanators if they covary with analyst attention

concentration. Unfortunately, our present knowledge base does not provide any insight about the existence of such alternatives. The results presented herein must therefore be interpreted with this limitation in mind.

A secondary limitation is the absence of randomness in the sample selection process. The sample was necessarily limited to those observations for which data were complete. It was further scaled to meet the filter objectives outlined in Chapter 4. While these screens were established to ensure a desired level of experimental control, they nonetheless constrain the generalizability of the results.

It is noteworthy, however, that the biases thereby induced are, for the most part, conservative in nature. For instance, if the degree of analyst research concentration has a noticeable impact on the pricing efficiency of firms as large as those listed on the NYSE, then surely this conclusion subsumes concerns about firms that are the subject of less scrutiny. Another conservative bias pertains to the 50-day earnings announcement restriction. It is very unlikely that firms announcing later than 50 days could, on the whole, be as information efficient with respect to annual earnings as those announcing within 50 days. In summary, then, the sample was selected in such a manner as to ensure the highest a priori level of market efficiency.

If differential efficiencies prevail within this regime of firms, then it is reasonable, albeit not on statistical grounds, to generalize the results over various sub regimes.

The final limitation that merits discussion relates to the interpretation of the degree of inefficiency differences. The relative inefficiency measures analyzed were uniquely derived, and as such, have no prior basis for comparison. Consequently, what constitutes statistically significant differences may or may not imply differences that are significant from a practical standpoint. Relevant in this context is the question of whether the detected differences are of such a magnitude as to suggest opportunities for investor exploitation, possibly through arbitrage trading. Unfortunately, the answer to this question is beyond the present scope of analysis. Perhaps future research can address this issue.

6.4 AVENUES FOR FUTURE STUDY

The content of this dissertation effort provides the seeds for research in areas that are conceivably endless. Some possibilites include the following:

1. The theoretical issues raised in Chapter 3 may be extended and revised considerably to accomodate a more refined picture of the institutional effects on

capital asset pricing. For example, it was pointed out there that a more rigorous consideration could be given to the explicit functional characteristics of speed and path of dissemination risk on the information return generating function. This function could also be augmented to incorporate the presumed inverse relationship between the timeliness and value of investment information. Related analytical inquiry could possibly supply a more concrete reason for the detected reversal of efficiency levels between ACF 2 and ACF 3 after firm size effects were removed. As suggested in the previous chapter, this could be due to an oversaturation of analyst-supplied information in the segment of firms characterized by large market capitalizations. Further empirical inquiry will also be of value here.

2. In regard to extensions of the empirical stage of the dissertation, similar studies can readily be made for announcements other than annual earnings. An immediate possibility is quarterly earnings reports. As mentioned in Chapter 4, detected violations of semi-strong-form market efficiency are more pronounced for quarterly announcements than for annual announcements. It would therefore be

interesting to compare the results from the present study to those obtained from a study of quarterly earnings per share releases. If the inefficiency measures obtained are comparable in magnitude for the widely followed segment, then perhaps an approximate absolute base inefficiency measure can be empirically ascertained.

The methodology used in this study can also be applied to such controversial areas of market-based accounting research as the FIFO/LIFO switch debate. Of interest is whether the neglected and widely followed segments respond in a similar manner to such accounting changes. If not, then a plausible reason for the continued inconsistencies may be supplied.

3. The propriety of the price-based market expectation proxy was taken as given throughout this study. Even though similar conclusions were arrived at under this proxy as under the analyst-based proxy, some concern regarding its method of forecast error assignment arose during the course of the analysis. Recall that previous research[178] noted that an important result from the use of the price-based proxy is the notable absence of significant postannouncement drifting.

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[178] Foster, Olsen and Shevlin [1984].

Figures 9 and 10 substantiated this finding, though, of course, relative drifting was found to be greater for the neglected segment. The source of concern is the following. The gross presence or absence of postannouncement drifting appears to be a direct function of the date on which the sign of the CAR's is determined. For the present study, as in the Foster, Olsen and Shevlin study, this date was the earnings announcement date. However, consider two arbitrary alternatives: (i) 20 days prior to the announcement, and (ii) 20 days following the announcement. The CAR contours for these two alternatives are presented in Figure 11.

Note that for both alternatives, the contours begin to flatten out following the respective chosen date. Under alternative (i), one would conclude an extremely efficient pre- and postannouncement condition, whereas under (ii) one would be forced to conclude an extremely inefficient pre- and postannouncement condition. In other words, for (ii) the asserted merit of the technique is clearly not in force -- post-release drifting could not be more profound. This vacilation is troublesome because it suggests that the contour of the CAR profiles is more

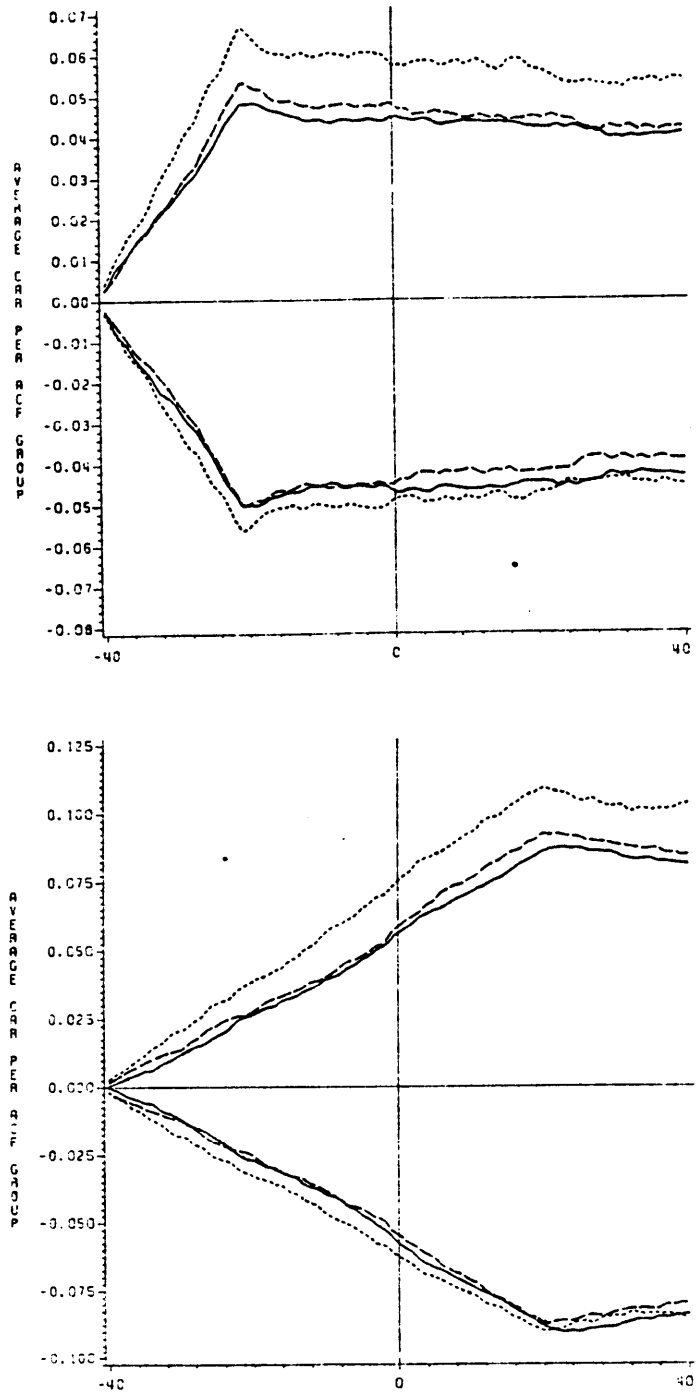

Figure 11: Ambiguity of Price-Based Expectations Proxy Models

an artifact of the statistical properties of the price-based model than a result of prevailing economic expectations. Thus, further research on the use of price-based expectations proxies is called for.

4. Finally, as pointed out in the previous chapter, further research needs to be undertaken in an effort to define those variables that are correlated with firm size and which influence empirical efficiency. Collectively, these unknown variables appear to explain a slightly higher degree of efficiency separation than the analyst attention concentration factor alone. Until they are specified, however, they may be treated in a reduced dimension by a market capitalization measure.

6.5 CONCLUSION

The U.S. securities markets are without question among the most efficient markets in the world. Unfortunately, we are disappointingly separated from a keen understanding of the factors that make them so. The more insight we are able to gain in regard to the interworkings of these markets, the better equipped we will be to advance policy recommendations (accounting and otherwise) aimed at achieving socially desirable objectives.

This dissertation has provided theoretical justification and related empirical support for a partitioning of market efficiencies by the degree of attention paid firms by the professional analyst community. The asymmetries were found to be pervasive over time and persist even after holding the firm size dimension constant. Moreover, the detected effects cannot be attributed to a previously documented relationship between the magnitude of event period abnormal returns and the extent of the market's forecast error.

Insofar as these findings provide a sharper perspective from which to view the capital market's pricing process and institutional framework, we have been drawn closer to our desired level of understanding.

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