Market Efficiency and Accounting Research

A Discussion of "Capital Market Research in Accounting" by S. P. Kothari

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Abstract

Much of capital market research in accounting over the past 20 years has assumed that the price adjustment process to information is instantaneous and/or trivial. This basic assumption has had an enormous influence on the way we select research topics, design empirical tests, and interpret research findings. In this discussion, I argue that price discovery is a complex process, deserving of more attention. I highlight significant problems associated with a naïve view of market efficiency, and advocate a more general model involving noise traders. Finally, I discuss the implications of recent evidence against market efficiency for future capital market research in accounting.

Introduction

In his excellent review paper on capital market research, S. P. Kothari surveys a vast collection of work that spans 30+ years. This lucid chronology will no doubt find its place among the more influential review studies in the literature. Like all useful survey papers, his article offers sufficient structure for young researchers to become acquainted with the main themes in this literature. At the same time, the paper provides seasoned researchers with a useful reference source on a broad spectrum of market related topics in accounting. I readily recommend it to anyone interested in capital market related research in accounting.

In this article, I focus on what I regard as the *watershed* issue in the body of literature covered by Kothari (2000). Specifically, I offer some reflections on market efficiency and the role of accounting research in the price discovery process. Implicitly or explicitly, each capital market researcher must come to terms with this issue. The degree to which markets are efficient affects the demand for accounting research in investment decisions, regulatory standard-setting decisions, performance evaluation, and corporate disclosure decisions. One's belief about market efficiency also dictates one's research design. Perhaps more importantly, given the intended audience of this volume, one's view about market efficiency will have a profound effect on one's research agenda. In fact, I believe that what a researcher chooses to study in the capital market area is largely a function of her level of faith in the informational efficiency of these markets.

On this subject, S. P. and I clearly have some differences of opinion. Reading his review, one senses that S. P. finds aspects of the evidence against market efficiency disturbing. In contrast, I find them liberating. He speaks earnestly about potential sampling errors and econometric concerns. He also raises legitimate concerns about the formative nature of behavioral theories. I share these concerns, and would encourage readers to think carefully about them. At the same time, I hope readers will regard them primarily as opportunities. In fact, these unresolved issues are the very reason I believe capital market research is an exciting place to be at the moment.

As S. P. observes, the evidence against market efficiency is mounting. This evidence is changing both the research focus and the research design in the capital market area. The terms of engagement are being redefined, and future researchers need to consider the implications of this evidence as they chart a course of action. S. P. makes a number of good suggestions. My purpose is to augment his suggestions, and offer a somewhat different perspective on the market efficiency issue. In particular, I think the behavioral finance literature deserves a more spirited presentation.

My thesis is that a naïve view of market efficiency, in which price is assumed to equal fundamental value, is an inadequate conceptual starting point for future market-related research.[1] In my mind, it is an over simplification that fails to capture the richness of market pricing dynamics and the process of price discovery. Prices do not adjust to fundamental value instantly by fiat. Price convergence toward fundamental value is better characterized as a process, which is accomplished through the interplay between noise traders and information arbitrageurs. This process requires time and effort, and is only achieved at substantial cost to society.

Herein lies the opportunity. Given noisy prices and costly arbitrage, accounting research can add value by improving the cost-effectiveness of the arbitrage mechanism.[2] Some of our research I believe will lead to superior techniques for identifying arbitrage opportunities. Other research, such as on fundamental analysis, valuation, or risk measurement, helps to narrow the plausibility bounds around fundamental value estimates of traded securities. Much of this research has a utilitarian focus. It is decision driven, interdisciplinary in nature, and prospective in focus. It assumes a user, rather than a preparer, orientation towards accounting information. Its end goal is to improve the allocation efficiency of markets through more cost-effective usage of accounting information in solving significant problems in financial economics.

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[1] Throughout this discourse, fundamental value is defined as the expected value of future dividends, conditional on currently available information. See Section 2.1 for a more detailed definition of the efficient market hypothesis (EMH).

[2] I define arbitrage as information trading aimed at exploiting market imperfections. As discussed in later, this definition is broader than the definition found in some finance textbooks.

In the next section, I revisit the theoretical foundations of the efficient market hypothesis, and discuss some of the limitations this paradigm introduces. In section 3, I discuss a simple behavioral model and argue for the existence and survival of noise traders. Finally, I discuss some specific implications of these developments for future research in accounting.

2. Market Efficiency Revisited

2.1 What do we mean by market efficiency?

The view that price represents the present value of expected future dividends ($P_t = V_t, \forall t$) underpins much of modern finance and accounting research. Notationally, this view is often expressed in the following form:

$$P_t = V_t \quad \sum_{i=1}^{\infty} \frac{E_t(D_{t+i})}{(1+r)^i} \quad , \qquad (1)$$

where V_t is defined as the stock's fundamental value at time t, $E_t(D_{t+i})$ is the expected future dividend for period t+i based on information available at time t, and r is the appropriate risk-adjusted discount rate for the expected dividend stream. Equation (1) asserts that P_t, the stock price at time t, is equivalent to the expected value of future dividends, V_t.

The original efficient market hypothesis (EMH) literature is careful to condition this statement on a particular set of available information (e.g., Fama (1965, 1991)). Different forms of the EMH (strong, semi-strong, and weak) are then defined in terms of the rapidity and accuracy of price adjustment to news within different information sets. Early applications of the EMH in accounting also acknowledged that the speed and accuracy of price adjustment to new information is a continuous process, and do not occur instantaneously (e.g., Dyckman and Morse (1986; page 2)).

However, as capital market research in accounting has evolved over time, this relation has acquired the status of an operating assumption, with no reference to the original caveat. For example, in the information content literature (including both short-window event studies and long-window association studies), price is commonly interpreted as a de facto proxy for the expected value of future dividends, and stock returns are deemed to reflect changes in the present value of expected future dividends. In the extensive value relevance literature (see Holthausen and Watts (2000)), price is deemed to be a normative benchmark for firm value. In these studies, the EMH is invoked with little regard for the speed and accuracy of the price adjustment process.

The assumption that price is equivalent to the present value of expected future dividends appears more explicitly in valuation studies, typically as the first assumption in the paper (e.g., Feltham and Ohlson (1999), Zhang (2000), Dechow et al. (1999)). In fact, Ou and Penman (1992) refers to this equality as a "non-controversial" starting point for their analysis. In short, although we recognize the conceptual impossibility of instantaneous price adjustments, much of the capital market literature in accounting over the past 20 years has assumed that the adjustment process is trivial. This basic assumption has had an enormous influence on the way we select research topics, design empirical tests, and interpret research findings.

2.2 Why do we believe markets are efficient?

Why do we believe markets are efficient? The answer boils down to a visceral faith in the mechanism of arbitrage.[3] We believe markets are efficient because we believe arbitrage forces are constantly at work. If a particular piece of value-relevant information is not incorporated in price, there will be powerful economic incentives to uncover it, and to trade on it. As a result of these arbitrage forces, price will adjust until it fully reflects the

[3] Some finance textbooks define arbitrage as "the simultaneous purchase and sale of the same, or essentially similar, security in two different markets for advantageously different prices" (e.g., Sharpe and Alexander (1990)). This definition is too narrow for our purposes, because it implies an undertaking that requires no capital and entails no risk. In reality, almost all arbitrage requires capital, and is risky (see Shleifer and Vishny (1997) for a good discussion). Therefore, throughout this discourse, I define arbitrage as information trading aimed at profiting from imperfections in the current price. Under this definition, arbitrage is costly and typically involves some risk.

information. Individual agents within the economy may behave irrationally, but we expect arbitrage forces to keep prices in line. Faith in the efficacy of this mechanism is a cornerstone of modern financial economics.

I submit that moving from the mechanics of arbitrage to the efficient market hypothesis involves an enormous leap of faith. It is akin to believing that the ocean is flat, simply because we have observed the forces of gravity at work on a glass of water. No one questions the effect of gravity, or the fact that water is always seeking its own level. But it is a stretch to infer from this observation that oceans should look like millponds on a still summer night. If oceans were flat, how do we explain predictable patterns, such as tides and currents? How can we account for the existence of waves, and of surfers? More to the point, if we are in the business of training surfers, does it make sense to begin by assuming that waves, in theory, do not exist?

A more measured, and more descriptive, statement is that the ocean is constantly trying to become flat. In reality, market prices are buffeted by a continuous flow of information, or rumors and innuendos disguised as information. Individuals reacting to these signals, or pseudo-signals,[4] cannot fully calibrate the extent to which their own signal is already reflected in price. Prices move as they trade on the basis of their imperfect informational endowments. Eventually, through trial and error, the aggregation process is completed and prices adjust to fully reveal the impact of a particular signal. But by that time, many new signals have arrived, causing new turbulence. As a result, the ocean is in a constant state of restlessness. The market is in a continuous state of adjustment.

In this analogy, market efficiency is a journey, not a destination. Therefore, the pertinent questions on the matter of market efficiency are not yes or no, because strictly speaking the answer is always no. Price discovery is an on-going process and the current price of a security is best regarded as a noisy (or incomplete) proxy for a security's true fundamental value. In this context, the research focus should be on deriving an

[4] Pseudo signals have the appearance, but not the substance, of news. Trading on the basis of pseudo

independent measure of fundamental value, and on understanding the dynamics of market price discovery. Rather than assume market efficiency, our research efforts are better focused on how, when, and why prices adjust (or fail to adjust) to information.

2.3 Can mispricing exist in equilibrium?

The descriptive validity of the above analogy depends on the continued existence of mispricings. Is it possible for mispricing to exist in equilibrium? Certainly. In fact, it strikes me as self-evident that arbitrage cannot exist in the absence of mispricing. Arbitrageurs are creatures of the very gap created by mispricing. Therefore, either both exist in equilibrium, or neither will. Arbitrage cannot take place without *some* amount of mispricing. If by some mystical force prices always adjust instantly to the right value, we would have no arbitrageurs. Therefore, if we believe that arbitrage is an equilibrium phenomenon, we must necessarily believe that *some* amount of mispricing is also an equilibrium phenomenon.

It may be useful to frame this discussion in terms of Hayek (1945). Hayek addresses the vital role of markets in aggregating information across heterogeneously informed traders. The present discussion focuses on the incentives for information acquisition and arbitrage. I argue that sufficient incentives must exist to ensure that the price discovery process featured in Hayek (1945) operates effectively. In effect, the very reliability of the price in Hayek's tin market depends on a sufficient level of mispricing to ensure arbitrage continues to function.

I do not disagree with the main thrust of Hayek's argument: that markets aggregate knowledge across diverse investors more efficiently than a central planner. But we can agree that the market knows better than the government, without claiming that the market price is always right. In fact, because sustained arbitrage depends on the continued existence of exploitable opportunities, a free and competitive market is almost necessarily

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signals is one source noise trading, as described by Black (1986).

inefficient to some degree. This is part of the price we pay for the benefits offered by the market mechanism.[5]

Much is made of the evolutionary argument that noise traders (naïve investors) cannot survive in a competitive market place.[6] To me, the best evidence in favor of the long-term viability of noise traders is the continued existence of active professional arbitrageurs. Ecologists coming upon the African Safari encountered large prides of lions. From the abundance of these predators, they inferred an abundance of gazelles, zebras, and other forms of lion prey. In the same spirit, the massive arbitrage apparatus we observe today attests powerfully to the continuing presence of substantial market imperfections. We cannot at once believe in the existence of lions, and reject the existence of the creatures that are essential to their survival.

Some believe that active asset managers are merely clever marketers, shysters who play no role in making markets more efficient (e.g., Rubinstein (2000)). But we would then be hard pressed to explain the billions of dollars spent, year after year, in this futile pursuit. Index funds are not a new idea. Why should it take so long for investment money to flow to these funds? The same evolutionary forces that are used to argue for the extinction of noise traders, argue also for the extinction of active money managers. Both strike me as equally puzzling. Either our financial markets have a persistent need to be corrected every year, the magnitude of which runs into the billions of dollars, or the labor market for investment talent is absurdly inefficient.

The fact that active managers do not beat their benchmarks after management fees is often cited as evidence in favor of the efficiency of financial markets. But this evidence has little bearing on the market efficiency debate. The average performance of active managers

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[5] Shleifer (2000) makes this argument, and contains a good discussion of the origins of the efficient market hypothesis.

[6] See Friedman (1953) for the original argument. DeLong, Shleifer, Summers, and Waldmann (1990a)

tells us more about the state of labor markets than about the efficiency of financial markets. If active managers consistently under (over) perform their benchmarks after management fees, capital would flow to passive (active) investment instruments. In equilibrium, the fees they charge should equal the amount of mispricing they remove through their arbitrage activities. We should therefore expect the *after-fee* performance of active managers to approximately equal their benchmark.

2.4 The limits of arbitrage

A more important lesson to take away from this analysis is the substantial costs associated with professional arbitrage. Even if *part* of what we spend on active management (and research in general) is excessive, it's unlikely that *all* of this expenditure is non-productive. If a significant proportion of active fund managers earn their keep (i.e., match their benchmark *after* expenses), their continued survival implies that arbitrage costs are huge. And as a society, we pay dearly for the current level of informational efficiency in our financial markets – whatever you perceive this level to be. We might argue about the speed and precision with which prices incorporate information, but we should not forget the price we pay to achieve it.

Herein lies the opportunity. Professional arbitrage involves careful monitoring of an evolving set of information sources, and on-going evaluation of their effect on market pricing dynamics. Accounting researchers can contribute to this process by developing lower cost techniques for market arbitrage. For example, our research might lead to better techniques for spotting arbitrage opportunities, thus allowing prices to assimilate the information faster or in a more unbiased manner. Our work might also help to deliver the same level of arbitrage service at a reduced cost. In either case, we improve the efficiency of financial markets by enhancing the cost-effectiveness of the arbitrage mechanism.

My point is that to improve the informational efficiency of financial markets, we do not need to beat the market *before* active management fees. We can also contribute to the

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offers a defense for the survival of noise traders in equilibrium.

process by reducing the costs of arbitrage. For example, I am aware of a number of recent academic studies in accounting that have affected the trading behavior of professional arbitrageurs. Some of this research relates to the predictability of expected returns, others pertain to improved cost of capital or valuation metrics. Perhaps market prices are adjusting more quickly and in a more unbiased fashion as a result of this research. But even if this research has not resulted in more efficient prices, it has almost certainly reduced search costs for arbitrageurs. In this sense, it has contributed to the allocation efficiency of financial markets.

Less directly, our educational endeavors also help facilitate this process. Through our classroom efforts, we supply the market with a group of more informed investors. As the level of sophistication improves among market participants, prices also become more efficient. Traditionally, we have in mind the notion that prices are set by the mystical "marginal investor." We do not know who this marginal investor is, but we presume she is quite sophisticated. Yet the evidence on noise trading (discussed in the next section) suggests that relatively unsophisticated investors can also affect returns in market segments they dominate. If we regard price as a value-weighted consensus of investor opinions, an improvement in the overall sophistication of the investing public results in better markets.

2.5 What is wrong with the traditional model?

A common assertion is that even if the EMH is not strictly true, it is sufficient to serve as a starting point for research purposes. Like Newtonian physics, it is more than good enough for everyday usage. Unfortunately, it has becoming increasingly more difficult to accommodate what we know about the behavior of prices and returns within this traditional framework. In this subsection, I discuss some of the problems with assuming that price is always equal to fundamental value.

One immediate problem is trading volume. If we assume price fully reflects all information about future dividends (i.e., if equilibrium price is fully revealing), the rational expectation literature suggests that we should have no trading in individual stocks (e.g., Grossman and Stiglitz (1980)). Black (1986, page 531) observes:

A person with information or insights about individual firms will want to trade, but will realize that only another person with information or insights will take the other side of the trade. Taking the other side's information into account, is it still worth trading? From the point of view of someone who knows what both traders know, one side or the other must be making a mistake. If the one who is making a mistake declines to trade, there must be no trading on information. In other words, I do not believe it makes sense to create a model with information trading but no noise trading…

On a typical day, over one billion shares exchange hands at the New York Stock Exchange. The average daily volume for Nasdaq stocks is more than double that number. This enormous appetite for trading individual securities is a challenge for the traditional model, in which price fully reflects information about future dividends.

If volume is difficult to explain, volatility is even more problematic. In the classical framework, it is impossible for events that have no information content to affect prices. Yet empirically, we find that news about fundamentals explains only a fraction of the volatility in returns (e.g., see Roll (1986), Cutler, Poterba and Summers (1989); for anecdotal evidence, witness the October 1987 crash or the daily volatility in internet stocks). In Cutler et al. (1989), for example, macro-economic news variables from past, present, and future periods (e.g., innovations in production, consumption, interest rates, etc.) collectively explain less than 50% of the annual variability in stock returns.[7] The same message is echoed in many studies: stock prices move for reasons that have little to do with fundamental news. The weight of this evidence behooves us to adopt a broader view of asset pricing, and to entertain the possibility that other forces are at work in shaping prices and returns.

[7] Similarly, in accounting, Easton, Harris, and Ohlson (1992) use 10-year windows and find the adjusted r-square between stock returns and accounting measures is only 62%. The correlation at shorter time-intervals is much lower.

Third, the evidence on the predictability of stock returns is increasingly more difficult to reconcile with the efficient market framework.[8] With risk-averse investors, all tests of potential trading strategies are a joint test of an asset-pricing model. If the asset-pricing model is misspecified, it is always possible the abnormal returns are some form of compensation for yet another an unknown risk factor. However, with many of the more recent pricing anomalies, the risk-based explanations are becoming less plausible.

I find particularly compelling the evidence that healthier firms, as measured by various accounting fundamentals, often earn higher subsequent returns (e.g., Dichev (1998), Piotroski (2000), Lakonishok, Shleifer, and Vishny (1992)). If these firms are riskier, it is odd that they should consistently exhibit operating and return characteristics that suggest the opposite. The evidence that a substantial portion of the abnormal returns is earned around subsequent earnings release dates is also extremely difficult to explain in a risk context.[9] Asset pricing models do not predict these short-window price moves. Finally, the so-called momentum studies, that document subsequent price drifts to various corporate news releases (including earnings surprises, dividend announcements, and stock splits), are particularly resilient to risk-based explanations.[10] The fact that these events predict subsequent earnings surprises and the direction of analyst earnings revisions suggests they are related to market misperceptions of earnings rather than risk (e.g., see La Porta (1996), Chan, Jegadeesh, and Lakonishok (1996)).

It might be worthwhile to note the evolving nature of the evidence in this literature over time. Initially, much effort was focused on *documenting* apparent pricing anomalies (e.g., DeBondt and Thaler (1985, 1987)). More recently, efforts have been focused on *explaining* these anomalies and testing various behavioral models (e.g., Lee and Swaminathan (2000), Bloomfield, Libby, and Nelson (2000)). I believe future studies

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[8] Much of this evidence has been discussed in prior survey work (e.g., see Fama (1991), Shleifer (2000), and Kothari (2000)).

[9] Bernard and Thomas (1990) was perhaps the first and best-known study to use this technique in distinguishing between risk and mispricing explanations. Subsequently, it has been used in many other studies, including Piotroski (2000), Sloan (1996), and Lee and Swaminathan (2000).

[10] See Ikenberry and Ramnath (2000) for a good recent summary of the price drift behind these events.

along these lines will not merely document new anomalies, but will also help to explain them. We are indeed at an early stage of development, but what we know is sufficient to convince many that risk-based explanations are not enough.

Finally, one of the most elemental challenges to the efficient market paradigm is spawned by the cost of capital dilemma. Historically, asset-pricing models have been tested using average realized returns to proxy for expected returns. This practice is based on the assumption that market prices are unbiased in large samples. Yet even this weaker form of market efficiency has been questioned in recent times. As Elton (1999) observes in his presidential address to the American Finance Association, "(t)here are periods longer than 10 years during which stock market realized returns are on average less than the risk-free rate (1973 to 1984). There are periods longer than 50 years in which risky long-term bonds on average under perform the risk free rate (1927 to 1981)."

In other words, historical realized returns do not appear to be an appropriate proxy for expected returns, even when averaged over decades. Changing risk premiums and conditional asset pricing theories are likely to explain some time-series variations, but these explanations cannot account for risky assets earning persistently lower returns than the risk-free rate. Indeed, growing discontent with the noisy nature of average realized returns is the main impetus for the recent move toward valuation-based techniques for estimating expected returns (e.g., Claus and Thomas (2000), Gebhardt, Lee and Swaminathan (2000), or Fama and French (2000)). Once again, we find that the "price equals value" assumption fails the Newtonian test of practical usage.[11]

In short, the problems engendered by the naïve view of market efficiency expressed in equation (1) are too pervasive to ignore. These problems include excessive trading volume, excessive return volatility, the evidence on returns predictability, and the cost of capital dilemma. In the next section, I discuss an alternative framework that relaxes the assumption that price must equal fundamental value.

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[11] Kothari (2000) raises a question regarding the market efficiency assumption in Gebhardt et al. (2000). I

3. Rational Behavioral Models

In his articulate defense of market efficiency, Rubinstein (2000) makes reference to what he calls ***The Prime Directive*** for financial economists:

> *Explain asset prices by rational models. Only if all attempts fail, resort to irrational investor behavior.*

He complains that the "burgeoning behavioralist literature…has lost all the constraints of this directive – that whatever anomalies are discovered, illusory or not, behavioralists will come up with an explanation grounded in systematic irrational investor behavior."[12] This is an often-heard complaint against the behavioral camp. But it is an unfair complaint, because behavioral models do not need to violate this prime directive. Most recent models in behavioral finance are based on economic principles of rational arbitrage. I therefore refer to them as rational behavioral models.[13]

My goal in this section is to allay the suspicion that one must obtain a frontal lobotomy to embrace behavioral finance. For illustration, I will discuss a simple model from Shiller (1984). In many respects, this model is overly simplified and restrictive, and it has been supplanted in the literature by more sophisticated models. However, it provides a useful framework for understanding the interaction between fundamental investors, noise traders, and arbitrage costs.

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will address this issue Section 3.

[12] Rubinstein (2000, page 4).

[13] I have in mind a host of recent theoretical studies, including: Barberis, Shleifer, and Vishny (1998), Hong and Stein (1999), Daniel, Hirshleifer, and Subrahmanyam (1999), Barberis and Huang (2000), and Barberis, Huang, and Santos (2001). Earlier works along these lines include Shiller (1984), and DeLong, Shleifer, Summers, and Waldmann (1990a, 1990b).

3.1 Who are noise traders?

A distinguishing feature of rational behavioral models is that they feature noise traders. Fischer Black's influential address to the American Finance Association contains the following definition of noise traders (Black, 1986, page 531):

> *Noise trading is trading on noise as if it were information. People who trade on noise are willing to trade even though from an objective point of view they would be better off not trading. Perhaps they think the noise they are trading on is information. Or perhaps they just like to trade.*

In short, we are a noise trader whenever we act on a signal that ultimately proves to be value-irrelevant. Under this definition, the existence of noise traders strikes me as intuitive and innocuous. With continuous information flows, it is improbable that all traders can instantaneously calibrate the quality of their own signals. In this world, informed investors making ex ante rational trades may nevertheless lose money ex post on any given trade. Even if these investors are right more often than they are wrong, they are frequently engaged in noise trading. The existence of noise traders is therefore not inconsistent with the prime directive. In fact, noise trading is a necessary part of the price discovery process.

As Black (1986) observes, noise trading is the "missing ingredient" in the traditional model. Noise trading helps to explain the enormous volume of trading we observe daily. Noise trading is the driving force behind much of the volatility in realized returns. Noise trading explains the continued existence of arbitrage. Finally, noise trading, in concert with the costly nature of arbitrage, helps to explain why prices can deviate sharply, and for persistent periods of time, away from fundamental value.

3.2 A Simple Example

Shiller's (1984) model features two types of agents: "smart-money" investors and noise traders (whom Shiller refers to as "ordinary investors"). Smart-money investors trade on the basis of fundamental information, subject to wealth constraints. These investors

respond to news about fundamental value quickly and in an unbiased manner. Noise traders, on the other hand, include everyone who does not trade on the basis of an optimal response to news about fundamentals.[14] Notationally, the demands of these two types of traders can be expressed as follows:

Noise Traders (Ordinary Investors)

These investors have time-varying demands, not based on expected returns optimally forecasted. Their demand is denoted: Y_t = total value of the stock (per share) demanded by ordinary investors.

Information Traders (Smart money)

The demand for shares by smart money at time t, expressed as a portion of total shares outstanding (Q_t), is: $Q_t = (E_t(R_t) - \rho) / \phi$, where ρ = the expected real return such that there is no demand for shares by smart money, and ϕ = the risk premium that would induce smart money to hold all the shares.

In equilibrium, the market clears when total shares demanded equals total supplied (i.e., when $Q_t + Y_t / P_t = 1$). Solving the resulting rational expectation model yields the following market-clearing price:

$$P_t = \sum_{k=0}^{\infty} \frac{E_t(D_{t+k}) + \phi E_t(Y_{t+k})}{(1+\rho+\phi)^{k+1}} \qquad (2)$$

Expressed in this form, the market price is the present value, discounted at rate $\rho+\phi$, of the expected future dividend payments at time t ($E_t(D_{t+k})$), plus ϕ times the expected future demand by noise traders ($E_t(Y_{t+k})$). In other words, P_t is jointly determined by a firm's fundamental value (future dividends) and a more capricious factor (future noise

[14] Shiller envisions traders who overreact to news or are vulnerable to fads. However, because the source of the noise trader demand is exogenous, the noise trader group is in fact much broader, and includes those who trade for liquidity or consumption-based reasons.

trader demand). The relative importance of the two factors is determined by ϕ, which can reasonably be interpreted as the cost of arbitrage.

As ϕ approaches zero, price become a function of expected dividends, and the efficient market model (equation (1)) emerges as a special case. Thus, in markets where costs of arbitrage are low, prices behaves much as predicted by the efficient market hypothesis. However, as ϕ increases, so does the relative importance of noise trading. In the extreme, as ϕ approaches infinity, market price is determined solely by noise trader demand, and fundamental valuation plays a trivial role in setting prices.

What factors affect ϕ? Clearly characteristics of smart-money investors, such as their risk aversion and wealth constraint, are important. More generally, arbitrage costs involve: 1.) *trading costs*: costs associated with establishing and closing the position; including brokerage fees, price slippage, bid-ask spreads etc., 2.) *holding costs*: costs associated with sustaining a position; these costs are affected by such factors as the duration of the arbitrage position and the incremental cost of short-selling a stock, and 3.) *information costs*: costs associated with information acquisition, analysis and monitoring.[15]

Markets in which these three types of costs are low feature prices close to fundamentals. For example, the markets for equity options, index futures, and closed-end funds are all characterized by relatively low transaction and information costs. In these markets, valuation is relatively straightforward, transaction costs are minimal, and the traded assets often have close substitutes. As might be expected, the prices for these assets are closely tied to their fundamental values.

In other markets, however, arbitrage costs (ϕ) can be potentially large, so noise traders dominate. For example, the capital markets of many emerging economies feature relatively few fundamental investors, little market depth and therefore high arbitrage costs. In domestic markets, smaller firms, less closely followed and less actively traded stocks, and growth stocks that are difficult to value (including internet stocks) will likely have higher

[15] Shleifer and Vishny (1997) model the limits of arbitrage.

arbitrage costs. The noise trader model predicts that security prices in these markets will display more volatility, and will often seem to bear little relation to their fundamental values.

The main message from this model is that market prices are a product of the interplay between noise traders and rational arbitrageurs, operating under cost constraints. Once we introduce noise traders and costly arbitrage, price is no longer simply a function of future expected dividends. Unless arbitrage cost is zero, P_t will not generally equal V_t. The magnitude of the mispricing is a function of noise trader demand and arbitrage costs. More generally, when arbitrage costs are non-zero, we can expect mispricing to be an equilibrium phenomenon.

Another key insight is that the unpredictability of returns (a "no free lunch" version of the efficient market hypothesis) does not guarantee price equals value (a "the price is right" version of the efficient market hypothesis). Unfortunately, when the efficient market hypothesis is invoked, it is often in the latter form. The fact that returns are largely unpredictable has been widely interpreted as evidence in support of the fact that price equals the present value of expected dividends. However, the model illustrates a conceptual problem with this general approach to testing for market efficiency. In the model, returns may be unpredictable but stock prices can still diverge dramatically from fundamental values.[16]

Finally, the model highlights the difference between fundamental analysis and security analysis. Fundamental analysis is concerned with measuring firm value regardless of market conditions. But in making security selections, smart-money investors need to consider the behavior of noise traders, as well as fundamental valuation, in determining their own strategy. Smart money investors need to consider "fashions" and "fads" in addition to "fundamentals." Moreover, the time-series behavior of Y_t becomes important. If noise trader demand is random, then P_t is still the best forecast of V_t. However, if Y_t is

[16] For example, if arbitrage is costly ($\phi \neq 0$) and noise trader demand (Y_t) follows a random walk, the second term in the numerator can be large, but stock returns are unpredictable.

mean reverting, then fundamental analysis is potentially profitable. I will expand on this point in the next section.

4. Implications for market-based research

I have argued that the decoupling of fundamental value from price is an important conceptual step toward a richer research agenda. But, if price is not always equal to value, what role should market prices play in our research design? How do we evaluate alternative value estimates if price is a noisy proxy for fundamental value? What specific areas of research appear particularly promising at the moment? I turn now to these issues.

4.1 Suggestions for Future Research

What type of research will have the greatest impact in the future? Rather than generating a laundry list, I will try to outline important features of research that is likely to be salient. Broadly speaking, I believe the most salient research in this area will be: 1.) Decision-driven, 2.) Interdisciplinary in nature, and 3.) Prospective in focus.

Decision-driven. Many young researchers begin their quest for a research topic by reading recent issues of academic journals. Given the lead time to publication at most of our top academic outlets, these journals are not necessarily the best starting point for new research projects. An alternative, and complementary, approach is to begin by identifying significant economic decisions that utilize accounting data. In terms of ideas generation, practitioner journals can be a good place to begin. The aim is to acquire an independent perspective on topics that matter, in a broader economic context, *before* getting too close to the academic literature itself.

Decision-driven research is not to be confused with product development or consulting. I am not suggesting that we address our research to practitioners. Rather, my call is for more research that is based on careful observation of how decision makers behave, and how information signals are used (or misused). Even basic research aimed at the theoretical foundations of our discipline will benefit from more detailed knowledge of how

important economic decisions are made. Too many academic studies read like chain letters to other academics. To have an enduring impact, our research should matter to a broader ultimate audience.

In the current context, we need to better understand how investors make investment decisions, and how these decisions are affected by accounting information.[17] Some of the most interesting topics in this area have traditionally been regarded as the domain of corporate finance or investments, even though accounting information plays an important role in these decision contexts. In my view, accounting researchers are likely to be better qualified to address many issues that arise in share repurchases, LBOs, IPOs, loan syndications, mergers and acquisitions, than their counterparts in finance. If we are willing to address these issues, I believe accounting researchers have the opportunity to generate some of the most significant research in financial economics over the next few decades.

Interdisciplinary in nature. Few capital allocation decisions of significance involve solely the use of accounting information. That the most important accounting research in the capital market area will be interdisciplinary in nature should surprise no one. As Kothari notes, solid training in finance and economics is essential in these undertakings. In addition, it is important for accounting researchers to be familiar with the literature on behavioral finance. Thaler (1999) predicts the demise of behavioral finance as a separate branch of finance because he believes that, in the future, all of finance will be behavioral. Certainly the trend is unmistakably in this direction.

I believe accountants have a role to play in understanding noise trader demand. Unlike Keynes' animal spirits, Shiller's noise traders are not driven primarily by idiosyncratic impulses or "a spontaneous urge to action" (Keynes (1936, page161)). Instead, the mistakes in investor expectations are correlated across traders. Thus, Shiller does not model individual irrationality so much as mass psychology or clientele effects. A

[17] In this spirit, empirical researchers may find it useful to become more familiar with experimental

common preference or belief, which we might call investor sentiment, affects large groups of investors at the same time.

What gives rise to these common sentiments (i.e., what affects Y_t)? Shiller suggests sentiments arise when investors trade on pseudo-signals, such as price and volume patterns, popular models, or the forecasts of Wall Street gurus. More generally, Y_t captures any price effect other than those arising from the optimal use of dividend-related information. In this sense, noise trader demand can be due either to sub-optimal use of available information, over- and under-reactions to legitimate information signals, or responses to other exogenous liquidity shocks.[18]

The most salient feature of noise trader demand is that it drives price away from a stock's fundamental value. Therefore, as we refine our valuation tools, we simultaneously generate better metrics for measuring noise trader demand. As information economists, accountants can help identify signals (or pseudo-signals) that affect noise trader demand. In fact, prior studies in accounting that investigate the under-utilization of information in financial reports can be viewed as efforts to identify noise trader preferences. Once we recognize that noise traders are not a breed apart (i.e., that we are all noise traders), the reconciliation with current accounting research is not difficult.

Prospective in focus. Much of accounting is historical in nature. A good deal of our research in the capital market area has also tended to be retrospective. Much of the market-based research discussed in Kothari (2000) has been conducted within a framework where stock return (or price) appears as the dependent variable and contemporaneous accounting data appear as independent variables. According to this widely accepted paradigm, accounting data that better explain contemporaneous return (or price) are presumed to be superior in some normative sense.

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research on financial accounting (see Libby, Bloomfield and Nelson (2000) for a review).

[18] In the noisy rational expectation literature, the noise introduced by exogenous liquidity shocks is crucial in inducing trading and in limiting the extent to which price reveals full information. For an example of this type of model, see Grossman and Stiglitz (1980) or Diamond and Verrecchia (1981).

However, as pointed out by Bernard (1995; page 743), this paradigm is limiting because it "precludes *from the outset* the possibility that researchers could ever discover something that was not already known by the market." As our view on market efficiency changes, I believe a greater emphasis will be placed on research that helps to predict the outcome of *future* economic events. This research will have as a primary focus the goal of enhancing capital allocation decisions whose outcomes are not yet known.

4.2 Research Design Issues

If the stock price itself is a noisy measure for a firm's true fundamental value, how should we proceed in designing our research studies? How do we model the relation between value and price? This is a matter of obvious import as we leave the comfortable confines of the efficient market paradigm. Future researchers will need to grapple with this matter more thoroughly, but two recent empirical studies might serve to illustrate the possibilities. Both are what I regard as "hybrid" studies that do not discard the information in market price completely, but rely on weaker assumptions about the price and value relation.

First, Lee, Myers and Swaminathan (1999) (LMS) models price and value as a co-integrated system -- in other words, the observed price and the accountant's estimate of value both measure the true (but unobservable) fundamental value with noise. In this context, they examine the question of how value estimates based on accounting numbers should be evaluated. They show that in this framework, under fairly general conditions, superior value estimates will not only be more correlated with contemporaneous returns, but will also yield better predictions of future returns.

In the LMS model, prices and value are assumed to be long-term convergent due to arbitrage forces. However, in the spirit of the noise trader model discussed in the prior section, at any given point in time market price can diverge from the true (but unobserved) fundamental value. In this context, the role of fundamental analysis is to generate an independent value estimate that helps to discipline the observed price. Their analysis suggests two benchmarks for evaluating the degree to which an accountant's empirical value estimate has been successful in capturing true fundamental value.

Second, Gebhardt, Lee, and Swaminathan (2000) use a discounted residual income model to generate a market implied cost-of-capital. They then examine firm characteristics that are systematically related to this cost-of-capital estimate. They show that a firm's implied cost-of-capital is a function of its industry membership, B/M ratio, forecasted long-term growth rate, and the dispersion in analyst earnings forecasts. Together, these variables explain around 60% of the cross-sectional variation in future (two-year-ahead) implied costs-of-capital. The stability of these long-term relations suggests they can be exploited to estimate future costs-of-capital.

Contrary to Kothari (2000), the research design in GLS is not based on an assumption of market efficiency in the traditional sense (i.e., $P_t = V_t, \forall\ t$). For purposes of stock selection, it would be tautological to estimate the implied cost-of-capital based on current stock prices. In fact, the cost-of-capital estimate recommended in GLS does not rely on a firm's current market price. Rather, GLS relies on long-term relations between the market implied cost-of-capital and various firm characteristics to estimate an "expected" or "warranted" cost-of-capital for each firm. This warranted cost-of-capital is then compared to the "actual implied" cost-of-capital derived from the current price. Trading strategies are based on the "spread" between the warranted and actual measures.[19]

Both studies implicitly assume a weaker form of market efficiency than is commonly found in the literature. Specifically, these studies assume that price and value are locked together in the long run by arbitrage forces. Price contains valuable information about future payoffs that should not be ignored. However, at any given point in time, price also departs from fundamental value due to exogenous forces (or, in the parlance of behavioral finance, noise trader demand).

The authors in these studies exploit the long-term relation between accounting fundamentals and market prices to gauge short-term price deviations. I refer to this as a "hybrid" approach, because it utilizes both accounting fundamentals and past prices to predict future

[19] This approach is analogous to fixed income arbitrageurs who routinely compare the warranted yield on bonds to the actual yield at a given point in time to uncover profit opportunities.

prices. Returning to the ocean analogy, these studies used the *average* level of the ocean (i.e., the long-term market valuation of certain fundamentals) to measure the *current* height of the tides (the current market valuation of the same fundamentals).

5. Summary

Mainstream accounting and economic thought is shaped by classical information economics -- the study of normative behavior under full rationality assumptions. While this powerful paradigm has proved instructive, it has also engendered an unfortunate tendency to attribute unlimited processing ability to decision makers. I regard this tendency as unfortunate, because it inhibits the development of potentially promising avenues of research.

In the area of capital market research, this literature has produced a deep-seated faith in market efficiency that, for many years, detracted from potentially fruitful inquisitions along alternative paths. As economists, we tend to take for granted the efficacy of the arbitrage mechanism, generally assuming that it involves no capital, and little cost or risk. Steeped in equilibrium analysis, mainstream economics offer virtually no guidance on the dynamic process of information aggregation. The market price is assumed to be correct, as if by fiat, and the process by which it becomes correct is trivialized.

I believe accounting academics working in the capital market area should not assume away the process by which price assimilates information. As information economists, accountants have a comparative advantage in dealing with the information signals that engender price movements. To exploit this advantage, we should have a clear view of market efficiency and the dynamic nature of price discovery. We also need to come to grips with the role of stock prices in our research design. My comments have been directed toward these issues.

I have argued that we need to unshackle ourselves from the notion that price is equal to value. That is, we should begin thinking about fundamental value and the current market

price as two distinct measures. Penman's (1992) call to "return to fundamentals," is issued in the same spirit. But perhaps it is time for us to go even further. Rather than remaining agnostic about the role of market prices, I advocate a more proactive approach. Rather than *assuming* market efficiency, we should study how, when, and why price becomes efficient (and why at other times it fails to do so). Rather than *ignoring* the current market price, we should seek to improve it.

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