Michigan Law Review

Volume 102 | Issue 3

2003

Law, Share Price Accuracy, and Economic Performance: The New Evidence

Merritt B. Fox
Columbia Law School

Randall Morck
University of Alberta

Bernard Yeung
New York University

Artyom Durnev
University of Miami

LAW, SHARE PRICE ACCURACY, AND ECONOMIC PERFORMANCE: THE NEW EVIDENCE

Merritt B. Fox, Randall Morck,***
*Bernard Yeung,*** and Artyom Durnev*****

TABLE OF CONTENTS

---

* Michael E. Patterson Professor of Law, Columbia Law School. B.A. 1968, Yale; J.D. 1971, Yale; Ph.D. (Economics) 1980, Yale. — Ed.

Thanks for valuable comments from workshop participants at the American Law and Economics Association 11th Annual Meeting, 6th Annual Meeting on Transition Economics in Portoroz, Slovenia, Harvard Law School Reading Group on the Development and Future of Securities Law, Columbia Law School Faculty Workshop, NYU-Columbia Workshop in Law and Finance, Conference on Regulatory Competition and EU Economic Integration, Tilburg University, Netherlands, and the University of Michigan Law and Economics Workshop. Thanks to Blake Dunlap for valuable research assistance.

** Stephen A. Jarislowsky Professor of Finance, Faculty of Business, University of Alberta. B.Sc. 1979, Yale; M.A. (Economics) 1979, Yale; Ph.D. (Economics) 1986, Harvard. — Ed.

*** Abraham Krasnoff Professor of Global Business, Professor of Economics and Professor of Management, Stern School of Business, New York University. B.A. 1979, University of Western Ontario; M.B.A. 1981, University of Chicago; Ph.D. (Business) 1984, University of Chicago. — Ed.

**** Assistant Professor of Finance, University of Miami. M.A. (Economics) 1996, New Economic School, Moscow; M.A. (Economics) 1998, Penn State; Ph.D. (Business Administration) 2003, University of Michigan. — Ed.

INTRODUCTION

Mandatory disclosure has been at the core of U.S. securities regulation since its adoption in the early 1930s. For many decades, this fixture of our financial system was accepted with little examination. Over the last twenty years, however, mandatory disclosure has been subject to intensifying intellectual crosscurrents. Some commentators hold out the U.S. system as the standard for the world. They argue that adoption by other countries of a U.S.-styled system, with its greater corporate transparency, would enhance their economic performance.[1] Other commentators, in contrast, insist that the U.S. mandatory disclosure regime represents a mistake, not a model.[2] These crosscurrents are reflected as well in the actions and words of policymakers. On the one hand, Congress, responding to the recent spate of corporate scandals, enacted the Sarbanes-Oxley Act,[3] which amended the U.S. securities laws to require what is probably the greatest increase in disclosure since their inception. On the other hand, the Council of Economic Advisors, in its discussion of these reforms in the 2003 *Economic Report of the President*, agnostically stated that "whether SEC-enforced disclosure rules actually improve the quality of information that investors receive remains a subject of debate among researchers almost 70 years after the SEC's creation."[4]

Most debate between these contending positions has been at the level of theory.[5] The surprisingly small amount of empirical research brought to bear on the issues involved is relatively equivocal in its implications.[6] This Article introduces to the legal debate important

1. *See, e.g.*, Bernard S. Black, *The Legal and Institutional Preconditions for Strong Securities Markets*, 48 UCLA L. REV. 781, 787 (2001); John C. Coffee, Jr., *The Future as History: The Prospects for Global Convergence in Corporate Governance and Its Implications*, 93 NW. U. L. REV. 641 (1999); James D. Cox, *Symposium: Regulatory Duopoly in U.S. Securities Markets*, 99 COLUM. L. REV. 1200 (1999).

2. *See, e.g.*, George Benston, *Required Disclosure and the Stock Market: An Evaluation of the Securities Exchange Act of 1934*, 63 AM. ECON. REV. 132 (1973); Stephen J. Choi & Andrew T. Guzman, *Portable Reciprocity: Rethinking the International Reach of Securities Regulation*, 71 S. CAL. L. REV. 903, 907 (1998); Jonathan R. Macey, *Administrative Agency Obsolescence and Interest Group Formation: A Case Study of the SEC at Sixty*, 15 CARDOZO L. REV. 909, 928 (1994); Roberta Romano, *Empowering Investors: A Market Approach to Securities Regulation*, 107 YALE L.J. 2359 (1998) [hereinafter Romano, *Empowering Investors*]; George Stigler, *Public Regulation of the Securities Markets*, 37 J. BUS. 117 (1964).

3. Sarbanes-Oxley Act of 2002, Pub. L. No. 107-204, 116 Stat. 745 (codified in scattered sections of 15 U.S.C.).

4. ECONOMIC REPORT OF THE PRESIDENT 95-97 (2003).

5. *See infra* Part I.

6. Two prominent financial accounting commentators recently stated, "Whether there is a market failure for disclosure and whether it is corrected through regulation are empirical questions. However, *empirical research on these questions is virtually non-existent*." Paul M. Healy

new empirical evidence based on recent research of the authors and others that, while not definitively settling the overall question of mandatory disclosure's desirability, helps resolve two central, highly disputed questions:

> — Is the efficiency of the real economy (the actual production of goods and services) enhanced when share prices become more accurate?
>
> — Do rules mandating that issuers make public disclosures actually increase share price accuracy?[7]

Contrary to the arguments advanced by opponents of mandatory disclosure, the empirical evidence presented here suggests that both of these questions should be answered in the affirmative.

Part I of this Article briefly reviews the debate in the existing legal literature concerning these two questions. Part II sets out the basic concepts needed to understand the new empirical evidence: the ideas of share price accuracy and share price informedness, and the relatively new technique called the R^2 methodology, which we use to measure share price accuracy. Part III discusses studies utilizing the R^2 methodology recently published in the finance literature by authors of this Article and others, which strongly suggest that greater share price accuracy does lead to enhanced efficiency in the real economy. Part IV presents the results of a new study that we have conducted utilizing the R^2 methodology that suggest that mandatory disclosure does in fact increase the amount of meaningful information reflected in share prices. The study examines the effects of the change in disclosure rules, adopted in December 1980, that enhanced the requirements concerning management discussion and analysis of issuer financial condition and operating results (the "MD&A" requirements). This

---

& Krishna G. Palepu, *Information Asymmetry, Corporate Disclosure, and the Capital Markets: A Review of the Empirical Disclosure Literature*, 31 J. ACCT. & ECON. 405, 412 (2001) (emphasis added).

The empirical literature that does exist primarily addresses the initial impact of the imposition of the U.S. mandatory disclosure securities laws in the 1930s. For a critical review of the existing empirical literature, see Merritt B. Fox, *The Issuer Choice Debate*, 2 THEORETICAL INQUIRIES L. 563, 602-07 (2001) [hereinafter Fox, *Issuer Choice*]; Merritt B. Fox, *Retaining Mandatory Disclosure: Why Issuer Choice is Not Investor Empowerment*, 85 VA. L. REV. 1334, 1369-95 (1999) [hereinafter Fox, *Retaining Mandatory Disclosure*].

7. The question of the link between mandatory disclosure and share price accuracy subsumes two more specific operational questions. One is whether mandatory disclosure rules succeed in promoting an increase in meaningful public disclosure. The other is whether issuer public disclosure plays an important role in enhancing share price accuracy, or whether the other routes by which information is gathered, analyzed and acted upon (insider trading, selective disclosure, independent research by analysts, etc.) predominate in the setting of share prices. Opponents to mandatory disclosure raise both of these more specific operational questions. *See infra* Part I.C. An affirmative answer to the larger question of the link between mandatory disclosure and share price accuracy would imply an affirmative answer to both of these more specific operational questions as well. A negative answer to the larger question would suggest a negative answer to one or both of the two more specific operational questions.

change for the first time effectively requires managers to disclose any material information that suggests that the issuer's most recent results are not necessarily indicative of future operating results or future financial condition. Our study suggests that share prices did in fact become more informed as a result of the enhanced MD&A requirements.

I. THE EXISTING LEGAL DEBATE

A. *The Traditional Consensus and Its Collapse*

For the first three decades following passage of the Securities Act of 1933 ("Securities Act") and the Securities Exchange Act of 1934 ("Exchange Act"), most securities law commentators took the desirability of mandatory disclosure as a given. These commentators believed that the primary purpose of the securities laws is to promote fairness.[8] In their view, price accuracy promotes fairness because it is unfair for a purchaser to pay more for a share than it is really worth. To them, mandatory disclosure is beneficial because it clarifies the value of the share and therefore makes such unfair overpayment less likely.[9]

This consensus began to break down as discussion of securities law started to be infused with financial economics. Financial economics suggests that disclosure is not necessary to protect investors against unfair prices. The efficient market hypothesis ("EMH")[10] holds that the price of a thickly traded stock is unbiased — i.e., on average equal to the stock's actual value[11] — and this is true whether there is a great deal of information available about the issuer or only a little.[12] Thus, a law requiring issuers to disclose more information than they would otherwise voluntarily disclose is unnecessary to protect ordinary

8. *See* John A. C. Hetherington, *Insider Trading and the Logic of the Law*, 1967 WIS. L. REV. 720; Homer Kripke, *Manne's Insider Trading Thesis and Other Failures of Conservative Economics*, 4 CATO J. 945 (1985); Roy A. Schotland, *Unsafe at Any Price: A Reply to Manne, Insider Trading and the Stock Market*, 53 VA. L. REV. 1425 (1967).

9. Mandatory periodic disclosure would also make less likely the reciprocal unfairness where an investor sells a share in the secondary market for less than it is worth.

10. *See infra* note 41 and accompanying text.

11. The term "actual value" is discussed *infra* in Part II.A.1.

12. This conclusion stems from empirical work showing unbiased reactions to announcements of corporate information, *see infra* note 41, and from the proposition that there is no reason to believe that the market will not also be unbiased in its reactions to issuer absences of comment about certain matters. For a more complete discussion of this point with citations to the literature, as well as consideration of why the noise-theory critique of the EMH does not undermine this argument in ways that create a strong fairness argument for mandatory disclosure, see Merritt B. Fox, *Securities Disclosure in a Globalizing Market: Who Should Regulate Whom*, 95 MICH. L. REV. 2498, 2533-39 (1997) [hereinafter Fox, *Disclosure in a Globalizing Market*].

investors from buying shares at prices that are unfair in the sense of being on average greater than their actual values.[13]

Attention thus shifted from the effects of mandatory disclosure on fairness to its effects on economic efficiency. Here opinions among financial economists have varied.[14] Mandatory disclosure's effect on efficiency has also been a matter of intense debate among the economics-oriented members of the legal academy. As the discussion below indicates, the two questions this Article addresses empirically — whether an increase in share price accuracy enhances the

13. This ex ante approach to the question of price fairness is, in our view, the appropriate one. The focus is on the point in time at which the investor purchases her share. This is the point at which the investor makes the decision that puts her in a position to be affected by the future disclosure practices of the issuer. There is a broad consensus that the effect of these future disclosure practices on the expected future cash flow to holders of the issuer's shares is reflected in the price. *See* Choi & Guzman, *supra* note 2, at 925; Fox, *Disclosure in a Globalizing Market*, *supra* note 12, at 2533-39; Romano, *Empowering Investors*, *supra* note 2, at 2366-67. From the perspective of the shareholder at the time of purchase, the fact that share price is unbiased regardless of the issuer's disclosure practices means that the possibility that the investor will end up ex post worse off as a result of the issuer's disclosure practices by paying too much for the share is no greater than the possibility that she will end up better off ex post by paying too little as a result of these practices. It may be that an issuer's disclosure level affects the riskiness of the purchase, but which way is a complex question discussed *infra* in Part II. Moreover, even if for the time horizon relevant to the investor the effect of low disclosure is to increase the riskiness of the purchase, it would not be appropriate to label that effect "unfair." Since issuer disclosure relates only to revelation of firm-specific information (as opposed to information relevant to the returns on all issuers in the market), the risk here is unsystematic and can be diversified away. This means that it is not even clear that most investors incur any additional risk from a low level of issuer disclosure, at least over the longer run. Most investors are at least somewhat diversified. *See* Marshall E. Blume & Irwin Friend, *The Asset Structure of Individual Portfolios and Some Implications for Utility Functions*, 30 J. FIN. 585, 585-87 (1975) (indicating that, while investors are not as diversified as is often assumed in the literature, most investors appear to be at least somewhat diversified). Moreover, casual empiricism suggests that many investors are buying and selling in the market over a considerable portion of their lifetime. Their ex post losses from paying too much for some shares should therefore approximately average out to their ex post gains from paying too little for others. As for helping investors who are not diversified, it is probably better public policy to engage in an educational campaign urging them to start diversifying than to mandate a costly disclosure rule that at best can only protect those who choose not to diversify their holdings.

14. The opening attack on the proposition that there were efficiency benefits from mandatory disclosure came in the 1960s in the form of empirical work by economists studying the effects of the imposition of the U.S. mandatory disclosure laws in the 1930s. *See, e.g.*, Benston, *supra* note 2, at 132; Stigler, *supra* note 2, at 122-24. For a more detailed discussion of this work and the work of other economists who come to opposing conclusions, see Fox, *Retaining Mandatory Disclosure*, *supra* note 6, at 1369-95. Signaling theory — the idea that issuers with good news will want to disclose it and that the market will infer from the silence of the rest that they do not have good news — added a theoretical component to this case against mandatory disclosure. *See* Steven A. Ross, *Disclosure Regulation in Financial Markets: Implications of Modern Finance Theory and Signaling Theory*, *in* ISSUES IN FINANCIAL REGULATION 177 (Franklin R. Edwards ed., 1979). For a critical review of signaling theory with citations to the literature, see Fox, *Retaining Mandatory Disclosure*, *supra* note 6, at 1369-95; *see also infra* note 37 and accompanying text.

performance of the real economy and whether mandatory disclosure increases share price accuracy — are at the center of this debate.[15]

B. *Share Price Accuracy and Economic Efficiency*

Do more accurate share prices enhance economic efficiency? Some legal scholars think not and embrace what we call the "irrelevance position." Others think the level of share price accuracy is relevant to economic efficiency.

1. *The Irrelevance Position*

Some scholars embrace the irrelevance position based on a simple application of first principles derived from the widely accepted theories forming the foundations of the capital asset pricing model ("CAPM") and the EMH. These commentators believe that these principles can be used to demonstrate the impossibility of more informed prices enhancing efficiency.[16] The view of these theoretical skeptics, including Professors Barbara Banoff and Roberta Romano, starts with the proposition that the EMH assures that prices will be unbiased and hence fair. They then go on to argue that any improvements in share price accuracy resulting from increased disclosure affect only firm-specific risk, which can be diversified away. Under CAPM, a change in the level of firm-specific risk has no effect on the market value of its shares. This is because a security with higher firm-specific risk will not be priced in the market to produce a higher expected return since there is no need to provide an extra reward to induce the holding of risks that can be diversified away. These scholars

15. As noted, the empirical findings presented here suggest, contrary to the positions of opponents of mandatory disclosure, that more accurate share prices enhance the performance of the real economy and that mandatory disclosure increases share price accuracy. A third question remains, however, before the question of the desirability of mandatory disclosure can be resolved definitively: are the benefits to the real economy as great as the costs of mandatory disclosure?

Affirmative empirical evidence is lacking for the proposition that the benefits are greater than the costs. Affirmative evidence is similarly lacking, however, for the proposition that the costs are greater than the benefits. This void is going to be difficult to fill. Given the amount of background noise and the limited power of the statistical tests currently available to test these propositions, mandatory disclosure would have to have an extraordinarily large positive or negative net effect on social welfare for the effect to be detected at a statistically significant level. Fox, *Retaining Mandatory Disclosure, supra* note 6, at 1383-90. Thus, for now at least, the answer to this third question is probably going to have to be decided on the basis of theory.

16. Barbara Ann Banoff, *Regulatory Subsidies, Efficient Markets, and Shelf Registration: An Analysis of Rule 415*, 70 VA. L. REV. 135, 176-84 (1984) (claiming that improvements in share price accuracy resulting from the underwriter due diligence prompted by the due diligence liability defense in Section 11(b) of the 1933 Act are not worthwhile); Roberta Romano, *The Need for Competition in International Securities Regulation*, 2 THEORETICAL INQUIRIES L. 387, 482 (2001) [hereinafter Romano, *Need for Competition*].

thus believe that any improvement in share price accuracy that mandatory disclosure may bring about cannot justify its cost, since improved share price accuracy will not increase the market value of the shares involved. As a result, they oppose mandatory disclosure.

Other scholars embracing the irrelevance position, including Professor Lynn Stout, acknowledge the theoretical argument that share price accuracy could enhance economic efficiency by helping to better guide capital to the most promising proposed investment projects, but dismiss the importance of this effect in the real world.[17] These writers point to the institutional reality that the vast majority of new real investment is not funded by public offerings of equity. These institutional skeptics believe, therefore, that share prices can have at most only a small effect on the functioning of the real economy.[18] As a result, they believe in the inherent weakness of any argument that favors mandatory disclosure based on the real economy efficiency effects of improved share price accuracy.

2. *The Relevance Position*

The adherents of the relevance position, among whom we include ourselves, believe that the effects of share price accuracy on economic efficiency are much more important than do either the theoretical or institutional skeptics.[19] The theoretical skeptics seem to take as a given the cash flows generated by firms, with equity ownership simply representing a method for investors to store wealth and the stock market simply providing a facility for the trading of financial assets, hedging, diversification, and pooling of risk. In contrast, the relevance adherents see the prices established in the stock market as affecting the efficiency of the real economy.[20] More accurate prices can increase

17. Lynn A. Stout, *The Unimportance of Being Efficient: An Economic Analysis of Stock Market Pricing and Securities Regulation*, 87 MICH. L. REV. 613, 645-47 (1988); *see also* HOMER KRIPKE, THE SEC AND CORPORATE DISCLOSURE 135-39 (1979); Adolf A. Berle, *Modern Functions of the Corporate System*, 62 COLUM. L. REV. 433, 445-47 (1962).

18. The term "real economy" refers to the production of goods and services in ways that provide for present and future consumption. The term "real investment" means investment, such as buildings, machinery, or research and development, that enhances the capacity of the economy to produce goods and services. Both real economy and real investment are distinguished from finance, which relates to the allocation of future cash flows and their associated risks.

19. *See, e.g.*, John C. Coffee, Jr., *Market Failure and the Economic Case for a Mandatory Disclosure System*, 70 VA. L. REV. 717, 751 (1984) [hereinafter Coffee, *Market Failure*]; Fox, *Disclosure in a Globalizing Market*, *supra* note 12; Merritt B. Fox, *Shelf Registration, Integrated Disclosure, and Underwriter Due Diligence: An Economic Analysis*, 70 VA. L. REV. 1005, 1015-25 (1984); Marcel Kahan, *Securities Laws and the Social Costs of "Inaccurate" Stock Prices*, 41 DUKE L.J. 977 (1992); Paul G. Mahoney, *Mandatory Disclosure as a Solution to Agency Problems*, 62 U. CHI. L. REV. 1047 (1995).

20. In ignoring disclosure's effects on the real economy, the theoretical skeptics follow the bulk of theoretical literature in the area of economics of disclosure. Most of this literature focuses on the effects of disclosure on the efficiency with which securities are

the amount of value added by firms as they use society's scarce resources for the production of goods and services. In a competitive economy, this increase in value added will generally increase both the level of firm cash flows, which the theoretical skeptics take as given, and returns to other factors of production.[21] Greater disclosure and share price accuracy perform this function both by improving the quality of choice among proposed investment projects in the economy and by improving the operation of existing real assets.

As the relevance adherents see it, improved price accuracy in the *primary* market for shares produces these social benefits directly. Greater share price accuracy at a time when an issuer contemplates implementing a new project by means of a share offering will bring the issuer's cost of capital more in line with the social cost of investing society's scarce savings in the contemplated project. As a result, these savings are allocated more efficiently, going more to the most promising proposed projects in the economy.[22]

Improved price accuracy in the *secondary* market, and the disclosure that induces it, create social benefits as well, though less directly. Disclosure and more accurate secondary market share prices enhance the effectiveness of the social devices that limit the extent to which managers of public corporations place their own interests above those of their shareholders (the agency costs of management). To start, additional disclosure and increased share price accuracy, by signaling when there are problems, assist in both the effective exercise of the shareholder franchise and shareholder enforcement of

---

exchanged in the market. The fact that this is the focus of most disclosure economists might appear to give the position of the theoretical skeptics a certain authority, but, in this case, appearances are deceiving. In a comprehensive survey article concerning this literature, Robert Verrecchia sees the focus on the efficiency with which securities are exchanged as reflecting a desire by disclosure economists to take on an intellectual challenge: to show, contrary to the earliest articles in the field, that disclosure can promote efficiency *even* in a pure exchange economy. Robert E. Verrecchia, *Essays on Disclosure*, 32 J. ACCT. & ECON. 97, 160-164 (2001). Verrecchia states:

> Researchers had long recognized that production militates against all potential debilitating effects of disclosure, including adverse risk sharing. Consequently, the path that promoted disclosure as a device to yield social value in production and exchange economies was deemed insufficiently provocative. Alternatively, paths that promoted a utility for disclosure in (exclusively) pure exchange settings remained popular because they appeared to be addressing the "disclosure paradox": that is, explaining why it was *not* the case that more disclosure was bad, and not good.

Id. at 163 (footnotes omitted); *see also* J. Gregory Kunkel, *Sufficient Conditions for Public Information to Have Social Value in a Production Economy*, 37 J. FIN. 1005 (1982) (maintaining that the problem with the early literature showing that disclosure reduced efficiency is that it focused solely on the exchange of securities and did not account for the disclosure's beneficial effects on the allocation of real resources in the economy).

21. *See* Fox, *Disclosure in a Globalizing Market*, *supra* note 12, at 2561-69.

22. *See* Fox, *Retaining Mandatory Disclosure*, *supra* note 6, at 1358-63.

management's fiduciary duties.[23] Additional disclosure and more accurate share prices also increase the threat of hostile takeover when managers engage in non-share-value-maximizing behavior. They make a takeover less risky for potential acquirers and reduce the chance that a value-enhancing acquisition will be deterred by the target having an inaccurately high share price.[24]

The institutional skeptics accept as a theoretical matter the portion of this story concerning the role of accurate share prices in improving capital allocation when issuers offer new shares.[25] As noted above, however, they dismiss the importance of this phenomenon because of the relatively small percentage of all capital projects that are funded by new issues of shares.[26] There are two responses to this. First, the institutional skeptics ignore the role that ongoing disclosure and improved price accuracy in secondary trading markets play in the reduction of the agency costs of management. The reduction in agency costs not only improves how existing projects are operated; it also improves capital allocations because misuse of most firms' primary source of capital funds — internal cash flow — is probably the single greatest agency cost of management.[27]

---

23. *See* Merritt B. Fox, *Required Disclosure and Corporate Governance*, LAW & CONTEMP. PROBS., Summer 1999, at 113. This is obvious when disclosures themselves suggest the possible existence of such a problem. Signaling also can occur when a share price declines, indicating, if the price has a relatively high level of accuracy, that something is amiss.

24. The market for corporate control is a well-recognized device for limiting the agency costs of management where ownership is separated from control, as in the typical publicly held corporation. More information and the resulting increase in price accuracy improves the control market's effectiveness in performing this role. A potential acquirer, in deciding whether it is worth the price to acquire a target that the acquirer feels is mismanaged, must make an assessment of what the target would be worth in the acquirer's hands. This assessment is inherently risky and acquirer management is likely to be risk averse. Greater disclosure, however, reduces the riskiness of this assessment. Hence, with greater disclosure, a smaller apparent deviation between incumbent management decisionmaking and what would maximize share value is needed to impel a potential acquirer into action.

Additionally, when share price is inaccurately high, even a potential acquirer who is certain that it can run the target better than can the incumbent management may find the target not worth the cost of acquisition. The increase in share price accuracy that results from greater disclosure reduces the chance that a socially worthwhile takeover will be thwarted in this fashion.

Greater disclosure thus makes the hostile takeover threat more real. Incumbent managers will be less tempted to implement negative net present value projects in order to maintain or enlarge their empires, or to operate existing projects in ways that sacrifice profits to satisfy their personal aims. Those that nevertheless act in this manner are more likely to be replaced. *See* MERRITT B. FOX, FINANCE AND INDUSTRIAL PERFORMANCE IN A DYNAMIC ECONOMY 84-91 (1987).

25. Stout, *supra* note 17, at 643.

26. *Id.* at 645-47.

27. FOX, *supra* note 24, at 121-50; Michael C. Jensen, *The Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers*, 76 AM. ECON. REV. 323 (1986).

Second, more accurate share prices in the secondary market also improve capital allocation when the firm uses nonequity external sources of capital such as debt offerings or institutional borrowings. On the supply side, share price can affect the financial cost of a proposed investment project by affecting the terms at which intermediaries are willing to extend the firm these alternative forms of external financing.[28] On the demand side, share price can affect management's willingness to use funds to implement a new project. Share price can affect management's willingness to use debt financing because of the prospect that the firm will subsequently want to counterbalance any new debt with new equity financing in order to maintain its optimal debt/equity ratio.[29] More generally, because of concern with public perceptions, low share price can constrain use of both external and internal funds.[30] Putting these supply and demand factors together, if share price is inaccurately low, management may decide not to pursue relatively promising proposed investment projects, while if it is inaccurately high, management may implement relatively unpromising proposed projects. Greater share price accuracy limits this problem.

3. *Empirical Studies*

These contending views are based primarily on theory. Until now, there has been little empirical evidence brought to bear on the question of whether more accurate share prices do or do not in fact significantly enhance the efficiency of the real economy.

C. *Mandatory Disclosure and Share Price Accuracy*

Does mandatory disclosure enhance share price accuracy? Some legal scholars who oppose mandatory disclosure believe not. Legal scholars who favor mandatory disclosure inherently believe that it does.

---

28. KRIPKE, *supra* note 17, at 123.

29. Some financial theorists suggest that there is no optimal debt/equity ratio. For the classic statement of this view, see Franco Modigliani & Merton H. Miller, *The Cost of Capital, Corporation Finance and the Theory of Investment*, 48 AM. ECON. REV. 261 (1958). The more orthodox view today is, however, that there are factors weighing against both too little debt and too much. Too little debt deprives a firm of its tax-deductible interest payments. Too much debt leads to increased agency costs because of the resulting increased divergence between the interests of debt and equity. It also increases the likelihood of bankruptcy, which would involve real costs. For an overview of these points and the responses of the adherents of financial structure irrelevance, see RICHARD A. BREALEY & STEWART C. MEYERS, PRINCIPLES OF CORPORATE FINANCE 447-66 (5th ed. 1996).

30. *See* FOX, *supra* note 24, at 282-87.

1. The Ineffectiveness Position

Scholars such as Professors Jonathan Macey, Roberta Romano, Homer Kripke and Ed Kitch maintain that mandatory disclosure is relatively ineffective. They believe that most information gets incorporated into share prices via other routes — including voluntary public disclosure by issuers, selective disclosure by issuers to analysts and major investors, insider trading, and independent research by analysts and the news media.[31]

The skepticism of these scholars concerning the effectiveness of mandatory disclosure comes in substantial part from the belief that, compared to the incentives of the private actors involved in these other routes, "monopolist" government bureaucrats do not have adequate incentives to ask the right questions.[32] The result, the argument runs, has been an undue emphasis on historical data, which is of much less value in moving share price toward actual value than would be management's projections of future cash flows.[33] Moreover, the ineffectiveness adherents suggest that most responses to the government-mandated questions are either banal boilerplate or have already been revealed voluntarily prior to their appearance in SEC filings.[34] In addition, at least one such adherent, Ed Kitch, maintains that where the government does ask questions that are both of real relevance and the answers to which would not have been produced voluntarily, the proper response would typically involve the release of proprietary information.[35] In these situations, Kitch argues, issuers figure out how to avoid giving meaningful answers.[36]

2. *The Effectiveness Position*

Legal scholars who favor mandatory disclosure generally argue that, in the absence of regulation, the existence of externalities will result in a market failure whereby too little information will be

31. Macey, *supra* note 2, at 928; Romano, *Empowering Investors*, *supra* note 2, at 2373-80; Romano, *Need for Competition*, *supra* note 16, at 446-64.

32. Romano, *Empowering Investors*, *supra* note 2, at 2374, 2378-80. Some economists share this view. *See* ROSS L. WATTS & JEROLD L. ZIMMERMAN, POSITIVE ACCOUNTING THEORY 173-76 (1986) (stating that disclosure regulators act to maximize their own interests).

33. Homer Kripke, *The SEC, the Accountants, Some Myths and Some Realities*, 45 N.Y.U. L. REV. 1151, 1197-1201 (1970).

34. Romano, *Need for Competition*, *supra* note 16, at 458.

35. Edmund W. Kitch, *The Theory and Practice of Securities Disclosure*, 61 BROOK. L. REV. 763, 846-57 (1995).

36. *Id.*

incorporated into share prices.[37] Implicit in this position is the belief that mandatory disclosure results in meaningful issuer disclosures that would otherwise not be forthcoming and that these disclosures add to share price accuracy.

The ineffectiveness adherents' complaint concerning mandated disclosure's emphasis on historical data, rather than on management projections, has a "glass is half empty" quality. While access to management's particular view of the future is useful, no one — management or outsider — can predict the future except on the basis of facts concerning the world past and present. SEC-mandated historical data provides significant raw material for this kind of analysis. The complaint that much SEC-induced disclosure appears to be boilerplate overlooks the important information that is revealed by a minority of issuers when answering the same questions that result in banal, boilerplate answers by the majority of issuers. The minority is prompted to provide significant detail because for them, unlike for the majority, a banal answer alone would be misleading without more disclosure.[38] As to the ineffectiveness adherents' complaint that much of what does appear to be significant in SEC-induced disclosures has been previously revealed to the public voluntarily by issuers, the effectiveness adherents reply that these earlier "voluntary" disclosures may well have occurred only because the issuer knew that it would be required to reveal the information in an SEC filing anyway and decided that it might as well get credit for disclosing the information sooner.[39] Furthermore, without this SEC requirement, the earlier announcement, if it occurred at all, might well not have been as full or as accurate.

These rebuttals to the arguments of the ineffectiveness adherents have merit. We nevertheless recognize that behind this debate among

37. *See, e.g.*, Lucian A. Bebchuk, *Federalism and the Corporation: The Desirable Limits on State Competition in Corporate Law*, 105 HARV. L. REV. 1435, 1490-91 (1992); Coffee, *Market Failure*, *supra* note 19; Frank H. Easterbrook & Daniel R. Fischel, *Mandatory Disclosure and the Protection of Investors*, 70 VA. L. REV. 669, 673-77 (1984); Fox, *Issuer Choice*, *supra* note 6, at 569-98; Fox, *Retaining Mandatory Disclosure*, *supra* note 6, at 1346. Many economics of disclosure theorists use models in which management discloses less because of concerns that disclosure can hurt their firms' competitive positions. For surveys of these models, see Verrecchia, *supra* note 20, at 141-60, and Healy & Palepu, *supra* note 6, at 424-25. There is some empirical evidence supporting this theoretical proposition. Joseph Piotroski finds that a firm is more likely to add financial reporting about one of its individual business segments where it has declining profitability (a condition suggesting that the issuer will suffer less from competitors and potential competitors learning of the issuer's segment profits) or less variability in profitability among its business segments (a condition suggesting that providing only company-wide financial reporting obscures less so that the competitive harm from providing segment reporting is less). Joseph David Piotroski, The Impact of Discretionary Segment Reporting Behavior on Investor Beliefs and Stock Prices 5-47 (1999) (unpublished Ph.D. dissertation, University of Michigan) (on file with author).

38. Fox, *Issuer Choice*, *supra* note 6, at 594.

39. *Id.* at 595.

legal scholars, there is a complex theoretical debate in economics concerning the contribution, if any, of mandatory disclosure to enhancing share price accuracy. The literature constituting this theoretical debate, discussed briefly below,[40] focuses on the economic incentives to gather, share, and trade on information in a world where there is also, depending on the particular study, voluntary public disclosure, selective disclosure by issuers to analysts and major investors, insider trading, or independent research by analysts and news media. To us, the contradictory conclusions of the different theoretical studies concerning the effectiveness of public disclosure in general, or mandatory public disclosure in particular, often seem to be artifacts of the particular assumptions that the authors of the respective studies employ. Ultimately, the issue of the effectiveness of mandatory disclosure is one that can only be settled empirically. The study set out in Part IV concerning the enhanced MD&A requirements is a contribution to this empirical effort and suggests that mandatory disclosure can effectively enhance share price accuracy.

II. SHARE PRICE ACCURACY, SHARE PRICE INFORMEDNESS, AND THE R^2 METHODOLOGY

Before we can talk about whether more accurate share prices lead to greater economic efficiency and whether mandatory disclosure leads to more accurate share prices, we need to discuss with greater precision what it means to say that prices are more accurate. We then need to relate the concept of share price accuracy, which is the term that has traditionally been used in the debate concerning the relationship between the quality of share prices and economic efficiency, to the closely related, newer concept of share price informedness. We also need to discuss R^2, our empirical measure of share price accuracy.

A. *Share Price Accuracy*

The concept of share price accuracy relates to how good a share's price is as a predictor of the future cash flows (dividends and any other distributions) that will be received by whoever holds the share over the rest of the life of the issuing firm. The roles that share prices can play in the functioning of the real economy relate to their capacity to signal which firms' proposed investment projects promise the highest returns and which firms' managers are doing a good job at operating

40. *See infra* Part II.A.2.b.

existing facilities. The better share prices predict future firm cash flows, the better they perform these roles.

1. *Precise Definitions of "Actual Value" and "Share Price Accuracy"*

The first step in understanding share price accuracy is to define a share's "actual value," which at any point in time is the aggregate future stream of income — dividends and other distributions — paid out from then on to whoever holds the share over the lifetime of the firm (discounted to present value). This definition requires an ex post view to be operative. The actual value of a share at t_0, a point during the ongoing life of the firm, cannot be determined until the moment of the firm's liquidation, t_{liq}. The moment of liquidation is the end of the firm's life, by which time the issuer has paid out its last distribution. Until t_{liq}, the amounts, if any, of the remaining distribution or distributions are uncertain. Thus, at t_0, which is prior to t_{liq}, even the best informed real-world investor can only make an estimate of the share's actual value.

What can we say about the relationship at t_0 between the market price of a publicly traded share and its actual value? As noted earlier, the EMH suggests that the market price of a share at t_0 is an unbiased estimate of the share's actual value at t_0.[41] In other words, the price at t_0 is equally likely to ultimately turn out to have been below the share's actual value at t_0 as it is to have been above it. By itself, however, the conclusion that a share price is unbiased says nothing about how close the price is likely to be — one way or the other — to actual value. Share price is relatively "accurate" if it is likely to be relatively close, whether above or below, to the share's actual value.[42]

---

41. There is a large body of financial economics literature evaluating market reactions to affirmative public announcements of various kinds of events affecting particular issuers. For a classic review, see KENNETH GARBADE, SECURITIES MARKETS 249-59 (1982). An "event study" involves a large number of issuers, each of which has experienced at one time or another the announcement of a particular kind of event, for example a stock split. The typical study shows that the shares of the affected firms as a group experience statistically significant abnormal returns at the time of the announcement, and, starting almost immediately thereafter, normal returns for the duration of the study, which is sometimes as long as several years. Thus, while some issuers' share prices go up in the periods following the immediate reaction to the announcement and others go down (each compared with the market as a whole), the average change is near zero. Assuming that longer-term prices are themselves unbiased measures of actual value, the results of the studies are thus consistent with the concept that the market's evaluation of the significance of the event on the actual value of each issuer's shares, while it may sometimes have been too high and sometimes too low, was unbiased.

42. Put in statistical terms, price can be considered a random variable generated by a distribution function that, because price is unbiased, has a mean equal to the share's actual value and a variance that can be considered a measure of the expected accuracy of the price. Throughout this article, when we refer to price accuracy, we are referring to this concept of *expected* price accuracy.

When a price has a high expected accuracy, the deviation of the price from actual value is, on average, relatively small.

2. *The Core Determinants of Share Price Accuracy: The Existence of Information and Its Reflection in Price*

Share price accuracy is a function of two core determinants. One is the amount of information concerning a firm's future distributions that exists in the hands of one or more persons in the world. The other is the extent to which price reflects this information. A number of considerations influence these two core determinants of share price accuracy.

a. Length of time before liquidation. The closer in time an issuer is to its liquidation, the more accurate, everything else being equal, is its share price. This proposition becomes obvious by looking at an issuer's share price when the issuer is taking its last breaths immediately prior to liquidation (i.e., when t_0 is at a moment immediately prior to t_{liq}). The market price is likely to be very close to the amount of the liquidating distribution paid to the holder of each of its shares (whether zero or some positive amount). This is because of the way both determinants of share price accuracy work at this point. As for the amount of information, it is relatively easy for at least some people to be highly informed concerning the size of the final distribution. This information is then very likely to become fully, or nearly fully, reflected in price, either through public disclosure of what the liquidating distribution will be, or, unless prevented by effective rules imposed by the legal system or norm structure applicable to the holders of the information, through trading by insiders or others informed via tipping or selective disclosure.[43]

b. Economic and legal incentives to gather, share, and trade on information and their interaction. When a possible cash distribution by an issuer to its shareholders is further in the future, share price accuracy is affected by the fact that it inherently becomes increasingly difficult for persons to gather and analyze information about the factors determining the amount of the distribution. How much information is in fact gathered and analyzed by anyone depends both on the economic incentives to do so, and, to the extent they exist, on laws that effectively require such collection and analysis (such as a rule requiring a public company to undergo an audit certified by an independent accountant). The extent to which such information is then reflected in price depends on the economic and legal incentives,

43. Because the information provides a near-certain prediction of the amount of the distribution, the economic risk associated with trading on the information is very low. Absent effective legal or normative restraints on such trading, the volume of trades by insiders, tipees, and selective disclosure recipients is therefore likely to be high.

both positive and negative, for persons who have gathered and analyzed such information to disclose it to others (publicly or selectively). It also depends on the economic and legal incentives, both positive and negative, of anyone possessing such information — whether a generator or a receiver — to trade on it.

Assessing the effect of existing economic and legal incentives on price accuracy is made more complex by the fact that there is an interaction between the considerations determining how much information is gathered and analyzed and the considerations determining how much of what is gathered and analyzed gets reflected in price. On the one hand, the opportunity to trade on information that is not required to be disclosed to others creates incentives to gather and analyze such information. On the other hand, the more widely held information is by persons who can trade on it, the more likely it is to be reflected in price.[44] Moreover, when someone receives, whether by selective or public disclosure, information gathered by someone else, the recipient may find it more worthwhile herself to gather and analyze yet additional information. This is because the information that is received may constitute a valuable input to the process of further discovery. Thus, for example, it may be more worthwhile for an investor to gather and analyze information (not yet gathered and analyzed by others) concerning the market for the product of an issuer that has disclosed basic financial information about itself, than to gather and analyze information concerning the market for the product of a firm that has not engaged in such

---

44. *See* Eugene F. Fama, *Random Walks in Stock Market Prices*, FIN. ANALYSTS J., Sept.-Oct. 1965, at 55 (describing how information is incorporated into price); Ronald J. Gilson & Reinier H. Kraakman, *The Mechanisms of Market Efficiency*, 70 VA. L. REV. 549, 568-69 (1984). The simplest models of price formation suggest that price is the product of the weighted average of expectations of all investors. *See, e.g.*, John Lintner, *The Aggregation of Investor's Diverse Judgments and Preferences in a Purely Competitive Economy*, 4 J. FIN. & QUANTITATIVE ANALYSIS 347, 348 (1969). This would mean that the trading of a small number of arbitrageurs acting on a piece of information could not by itself move price sufficiently to fully reflect the import of the piece of information. Indeed, contrary to the EMH, in such a model, the price would not fully reflect the information until all active investors knew the information. FOX, *supra* note 24, at 36-43 (demonstrating the inadequacy of arbitrage to fully correct prices due to the risk that purchases or short sales of arbitraged shares add to an arbitrageur's portfolio because of the dediversification they involve). More sophisticated models recognize that investors are aware that price may reflect information known by other investors. Hence price is not just a constraint, it can affect investors' demand for securities and, as a result, information known by only some traders can influence price as if more investors knew it. Sanford Grossman, *On the Efficiency of Competitive Stock Markets Where Investors Have Diverse Information*, 31 J. FIN. 573, 573-74 (1976). This is not a complete substitute for broader distribution of the information, however, because the existence of noise — other things affecting price — makes it impossible for investors not possessing the information to "decode" share price so effectively that they are in the same position as if they knew the information themselves. Sanford J. Grossman & Joseph E. Stiglitz, *On the Impossibility of Informationally Efficient Markets*, 70 AM. ECON. REV. 393, 394-95 (1980).

disclosure.[45] In addition, when a small number of people are able to trade regularly on relatively precise material information, it becomes less profitable for persons outside that circle to gather and analyze information for trading purposes.[46] The complexities of these interactions are what make it difficult to determine at a theoretical level whether share price accuracy is enhanced or diminished by any of the standard tools of securities regulation such as insider trading regulation, the regulation of selective disclosure, or — our concern here — mandatory disclosure.

3. *"Speculative Noise" Versus "Fundamental Information"*

Share price accuracy will be diminished if the price is affected by what financial economists refer to as "speculative noise." The model of share pricing described so far excludes this kind of noise. It assumes that whatever information share prices do reflect, it is of a kind that will help in predicting future distributions more precisely, i.e., it is "fundamental information." Thus the model implicitly assumes that the arbitrage activities of "smart money" speculators, who focus exclusively on future distributions, fully counteract any trading by "naïve" speculators, whose trading is activated by fads, fashions, or

45. There are good theoretical reasons for thinking this to be true. The discovery of information not yet discovered by others and hence not reflected in market price is likely to hold the promise of greater arbitrage profits in the case of a firm that has disclosed basic financial information about itself than in the case of one that has not. The firm that has not disclosed the basic financial information is likely to have, for the relevant time period, more risk associated with it than does the firm that has disclosed this information. The risk is firm specific, though, and so it will not affect the riskiness of a fully diversified portfolio. Each purchase, based on the difference between current price and what is indicated by the newly discovered information, is, however, an inherently dediverisfying transaction. Taking on an additional share of the firm that has not disclosed will add more to the riskiness of the investor's portfolio than taking on an additional share of the issuer that has disclosed. Thus, compared with the firm that has disclosed, fewer shares of the firm that has not disclosed will be added to the investor's portfolio before the additional arbitrage gain from purchasing an additional share is not worth the added risk. *See* FOX, *supra* note 24, at 36-43. This prospect of smaller arbitrage profits will reduce the incentive to gather and analyze information about the firm that does not disclose. More generally, John Coffee has made the argument that mandatory disclosure constitutes a subsidy to the investment-analyst industry that increases the amount of analyst activity. Coffee, *supra* note 19, at 728-29. Coffee's point is consistent with the theoretical point made by Grossman and Stiglitz that if the cost of gathering and analyzing private information is lower (which it would be with more free, publicly available information to use as feedstock for research) there will be a higher intensity of trading by the smart money speculators, which will lead to more informed prices. Grossman & Stiglitz, *supra* note 44, at 405. There is some empirical support for the theory that more disclosure leads to more gathering and analysis of yet additional information. Lang and Lundholm find that a firm that discloses more is followed by more analysts and that the analysts' forecasts are more accurate. Mark Lang & Russell Lundholm, *Cross Sectional Determinants of Analyst Ratings of Corporate Disclosure*, 31 J. ACCT. RES. 246 (1993).

46. Michael J. Fishman & Kathleen M. Hagerty, *Insider Trading and the Efficiency of Stock Prices*, 23 RAND J. ECON. 106, 110 (1992); Zohar Goshen & Gideon Parchomovsky, *On Insider Trading, Markets, and "Negative" Property Rights in Information*, 87 VA. L. REV. 1229, 1238-43 (2001).

irrational psychological predispositions toward behaviors such as chasing trends. Many financial economists (including ourselves), believe, however, that the arbitrage activities of the smart money speculators ("risk arbitrageurs") do not always fully counteract the actions of these naïve speculators. As a result, share prices will be further from actual value than they would have been absent the trading by the naïve speculators, the difference being speculative noise.[47] The more speculative noise in the market, the less accurate are share prices.

There are reasons to believe that if less fundamental information is gathered and reflected in share price, the attention of speculative traders will turn more in the direction of speculative noise. If, relative to fundamental information, this noise plays a larger role in determining future share prices, speculators will get more reward for trying to figure out future noise and less reward for trying to figure out future cash distributions to shareholders.[48] This reward structure makes the effort to design social institutions that encourage the gathering and analyzing of fundamental information and its reflection

47. *See, e.g.*, Fisher Black, *Noise*, 41 J. FIN. 529 (1986). Speculative noise can occur in the view of these economists, even if there are smart money speculators in the market who trade knowing a stock's fundamental value. Fundamental value is the price that would prevail if the market consisted entirely of rational investors who possessed all available information (i.e., the price that would prevail in a truly efficient market). The smart money speculators are limited in their ability to arbitrage away the difference between what the share's market price would be based on the trades of the noise traders and the share's fundamental value. To start, unless the smart money speculators have an infinite time horizon, the uncertainty created by the possibility of continued noise trading makes taking such a position inherently risky even if the smart money speculators know for certain a stock's actual value. This is because they know at the time they are contemplating a purchase that because of noise, price at the end of their time horizon may still deviate from actual value. J. Bradford De Long et al., *Noise Trader Risk in Financial Markets*, 98 J. POL. ECON. 703 (1990). Furthermore, smart money speculators in fact do not know a stock's actual value with certainty, they only know its fundamental value, which is the value implied by the available fundamental information. Thus, fundamental value is just a more accurate guess concerning actual value than is the noise-trade-influenced market price. This uncertainty as to the stock's actual value adds to the smart money speculators' risk of arbitrage. *See* Andrei Schliefer & Lawrence Summers, *The Noise Trader Approach to Finance*, 4 J. ECON. PERSP. 19 (1990); *see also* FOX, *supra* note 24, at 36-43, 55-59. It should also be noted that the very fact that gathering and analyzing information privately is costly means that despite the existence of smart-money speculators, space exists for noise trading to occur. This is because of the "efficient-market paradox" noted by Grossman and Stiglitz, who observe that "because [acquiring private] information is costly, prices cannot perfectly reflect the information which is available, since if it did, those who spent resources to obtain it would receive no compensation." Grossman & Stiglitz, *supra* note 44, at 405. An excellent survey in the legal literature of the work of the noise theorists, together with an analysis of its legal implications, is found in Donald Langevoort, *Theories, Assumptions, and Securities Regulation: Market Efficiency Revisited*, 140 U. PA. L. REV. 851 (1992).

48. JOHN MAYNARD KEYNES, THE GENERAL THEORY OF EMPLOYMENT, INTEREST AND MONEY 157 (1936). Grossman and Stiglitz make the inverse of this point, suggesting that if the cost of gathering and analyzing private information is lower, there will be a higher intensity of trading by the smart money speculators, which will lead to "more informative pricing." Grossman & Stiglitz, *supra* note 44, at 404.

in price doubly important in terms of share price accuracy. Accordingly, it makes the determination of the effectiveness of mandatory disclosure that much more important.

B. *Share Price Informedness*

1. *The Concept*

"Share price informedness" is closely related to share price accuracy. A share price is more informed at a given time if it reflects a larger portion of all the fundamental information known, or, through sufficient effort, knowable, by one or more persons in the world. Thus, a fully informed price would reflect all knowable information at a given point in time. Any fact that is at a given time unknowable will by definition unpredictably (i.e., randomly) affect future shareholder distributions. Because of this, a fully informed price, while not perfectly accurate, would be both unbiased and the most accurate price possible at the time. Therefore, all of the factors discussed above that make a share price more accurate make it more informed as well.[49]

While the concept of share price accuracy allows a simpler, more direct story concerning the relationship between share prices and the real economy, the concept of share price informedness serves two useful functions in fully understanding this relationship. First, it avoids the discomfort that some may feel about the deterministic nature of the model behind the concept of share price accuracy. More importantly, as will become clear when we discuss immediately below the use of the R^2 methodology to measure share price accuracy, the concept of price informedness highlights the fact that price movement can be a sign of share price accuracy rather than inaccuracy. This is

49. Share price accuracy and informedness can be pictured as follows. Consider an analogy between the process by which bits of information are incorporated into share price and sampling from a large urn containing one thousand balls. Assume that somewhere between zero and one thousand of the balls are red and the rest are green. Prior to any sampling of the urn, nothing is known about the ratio of red to green balls in the urn. A share's actual value is analogous to the actual ratio of the red to green balls. A random sample of the urn's balls is equivalent to the bits of information that are incorporated in price. Even a small sample of balls provides an unbiased estimate of the actual ratio of red to green balls. Similarly, in an efficient market, share price is an unbiased estimate of a share's actual value even if there is not a great deal of information available. The impact on the estimate of drawing another ball from the urn is unknowable — it could increase or decrease the estimate of the actual ratio — but the more balls that are drawn from the urn — i.e., the larger the sample — the greater the expected accuracy of the estimate. Similarly, the impact of a new bit of information on share price is unknowable prior to its availability — it could increase or decrease price — but its incorporation in price will increase the price's expected accuracy as an estimate of the share's actual value. The ratio of red to green balls in the largest sample possible at any point in time will provide the most accurate possible estimate of the actual ratio in the urn. Similarly, a fully informed price at a given point in time is the most accurate estimate possible at that time of the actual value of the share.

because price movement may indicate, at least in part, an ongoing process by which new fundamental information is being reflected in price.

2. *Relationship of Share Price Accuracy to Price Movement*

In essence, there are two countervailing considerations at work in terms of the relationship between price accuracy and price movement. This can be seen most easily in the case of a firm that in its lifetime makes only a single distribution, at the time of its liquidation, although the points made here are generalizable to a firm that makes multiple distributions over time. The first force relates to the expectation discussed above, that, for all issuers, the deviation between share price and actual value will tend to decrease as the length of time before final distribution decreases.[50] Taking account of just this first consideration, at any given point in time relative to the moment of final distribution, the more accurate the price is, the less share price movement we would expect to see thereafter as price eventually approaches actual value. This is because where the price is more accurate, it is already closer to actual value and hence has less further distance to travel. Consequently, if only this consideration were at work, where we observe over a period of time relatively little movement in the price of an issuer's shares, we would assume that on average its share price would be more accurate than the share price of an issuer displaying more movement.

The second consideration is the amount of new information relevant to an issuer's future cash distributions that on an ongoing basis is being gathered, analyzed, and reflected in price. This second consideration can potentially work in the other direction. Just taking account of the second consideration, more movement may suggest greater accuracy. Consider firms A and B. Assume that A and B will each make a single distribution of the same amount, at liquidation, on the same date sometime in the future. At any point in time, therefore, the shares of the two firms have the same actual value. To control for the first consideration, assume that at the beginning of the period of observation, the prices of A's and B's shares are equally distant from the shares' actual values. After this, substantial amounts of new information about firm A are, on an ongoing basis, being gathered, analyzed and reflected in its share price. Each newly arriving bit of information will on average move price closer to actual value but will, as appears to be the case in the real world, include a significant amount of random noise.[51] Thus, bit by bit, price may move one way

50. *See supra* Part II.A.2.a.

51. The random noise being referred to here is not the speculative noise referred to in Part II.A.3, *supra*. It simply reflects the idea that any new piece of information is not perfect.

or the other, but the total effect of the cumulating bits will on average be moving A's price closer and closer toward the share's actual value. Less of this updating is occurring with respect to firm B. We would expect firm A to have, during the period of observation, a more informed, and hence more accurate, price than firm B because the updating information is on average moving its share price closer to actual value. If the random-noise element of each bit is sufficiently large, however, A's share price will display more price movement on average than B's, since new bits of information arrive more frequently, and with the arrival of each new bit comes random noise that causes price movement.[52] So, where there is a significant random-noise

---

While, on an expected basis, each bit of information moves price toward actual value, it contains a random element that in any given case may move price in the opposite direction. In terms of the analogy in note 49, *supra*, comparing the incorporation of information into securities prices with sampling from an urn containing one thousand red and green balls in an undetermined proportion, the new bit of information is like a collection of balls some of which are from the urn and the rest of which are randomly added from a side collection which is half red balls and half green balls. The person doing the sampling knows the average number of balls drawn from the side collection but no more. Each sample adds to the accuracy of the estimate of the ratio of red to green balls in the urn despite the noise from the balls drawn from the side collection.

52. Consider the following example to demonstrate the plausibility of the proposition that firm A, whose price is more frequently updated by new information than firm B's, will have on average a more accurate price but will have price changes displaying a greater variance than do firm B's price changes. Suppose that firms A and B will each pay out a single shareholder distribution, which will occur at liquidation. Both will liquidate at t_5, and each will pay out $10 per share at that time. Assuming for simplicity a discount rate of zero (i.e., pricing is in accordance with CAPM and there is no time value of money or systematic risk), each firm's shares will have an actual value of $10 throughout the life of the firm. Suppose also that at t_0 a share of each firm's stock has a price of $15 and so each starts out with an equally inaccurate price.

Firm A's price is updated in each of the five periods by a new bit of information. The bit of new information in each of periods t_1, t_2, t_3 and t_4 contains two elements. One element is like an accurate missing piece in the puzzle and moves the price $1 closer toward actual value. The other element is noise: it is random and has an expected value of 0. Investors can only observe the aggregate implications of the two elements combined. Thus, on an expected basis, A's price becomes more accurate after the receipt of each bit of information, but the observable aggregate implication of the bit involves variation around what would be implied by the accurate-piece-of-the-puzzle element alone. The bit of new information at t_5 is the announcement of the liquidating distribution. The price at t_5 is therefore $10 and is perfectly accurate. This model, in which new information, on the one hand, helps to bring price toward actual value but, on the other hand, is less than perfect, follows in the tradition of R.W. Holthausen & R.E. Verrecchia, *The Effect of Sequential Information Releases on the Variance of Price Changes in an Intertemporal Multi-Asset Market*, 26 J. ACCT. RES. 82 (1988), and K.R. Subramanyam, *Uncertain Precision and Price Reactions to Information*, 71 ACCT. REV. 207 (1996).

Firm B's price is not updated at all until t_5 but, for it too, the bit of information at t_5 is the announcement of the liquidating distribution. Its price at t_5 is therefore also a perfectly accurate $10.

The following prices provide an example consistent with this story. Firm A has a price at t_0 of $15. At t_1, the price is $12.50 (the result of a noise element of -$1.50, which, when combined with the accurate-piece-of-the-picture element, moves the price in aggregate down by 2.50). At t_2, the price is $14.50 (the result of a noise element of +$3.00, which, when combined with the accurate-piece-of-the-picture element, moves the price in aggregate up by $2.00). At t_3, the price is $10.50 (the result of a noise element of -$3.00, which, when

combined with the accurate-piece-of-the-picture element, moves the price in aggregate down by \$4.00). At t_4, the price is \$11.00 (the result of a noise element of +\$1.50, which, when combined with accurate piece of the picture element, moves the price in aggregate up by \$.50). At t_5, the price equals the share's actual value of \$10 (the result of the noiseless announcement of the liquidating distribution, providing the last missing piece of the picture). Thus the noise element in this example has a mean of 0 and a standard deviation of 2.37. Firm B's price stays at \$15 for periods t_1, t_2, t_3 and t_4 and drops to \$10 in period t_5, when the liquidating dividend is announced. The paths of the share prices of A and B are depicted in Figures 1 and 2 below.

As shown in Table I below, firm A's price changes display a greater variance than firm B's (5.5 versus 5.0) even though firm A's share price is on average closer to its actual value of $10 — i.e., more accurate — than firm B's share price. This greater accuracy can be observed simply from looking at Figures 1 and 2. A more precise measure of average share price accuracy would be the average of the squared deviations of share price from actual value in periods t_1, t_2, t_3, t_4, and t_5 (the smaller the figure, the more accurate the price). As shown in Table I below, the average of these squared deviations for firm A is 5.55 and for firm B is 20.

TABLE I
Firm A

	(1)	(2)	(3)	(4)	(5)	(6)
	Accurate-piece-of-the-puzzle element	Random noise element	Total effect	Price	Square of price change	Square of deviation of price from actual value of $10
t_0				15		
t_1	-1	-1.5	-2.5	12.50	6.25	6.25
t_2	-1	+3.0	+2.0	14.50	4	20.25
t_3	-1	-3.0	-4.0	10.50	16	.25
t_4	-1	+1.5	+.5	11.00	.25	1
t_5	-1	0	-1	10.00	1	0
Total	-5	0	-5		27.5	27.75
Variance or average square of deviation					5.5	5.55

element to new information, taking account of just this second consideration, the more accurate the share price is at a given time, the more share price movement we would expect to see.

Firm B

	(1) Accurate-piece-of-the-puzzle element	(2) Random-noise element	(3) Total effect	(4) Price	(5) Square of price change	(6) Square of deviation of price from actual value of $10
t_0				15		
t_1	0	0	0	15	0	25
t_2	0	0	0	15	0	25
t_3	0	0	0	15	0	25
t_4	0	0	0	15	0	25
t_5	-5	0	-5	10	25	0
Total	-5	0	-5		25	100
Variance or average square of deviation					5	20

This example is generalizable to ongoing firms not facing immediate liquidation. Specifically, the result that firm A will have on average a more accurate share price and will display a higher price variance is replicable under the following changed assumptions. Imagine a five period cycle in which once every fifth time period the prices of firm A and B are equally accurate. Firm A is updated every period. Firm B is updated only every fifth period, but with a bigger piece of information so that, after the updating, its price is for the moment as accurate as firm A's. The example above now illustrates one such cycle with each firm starting at an equally inaccurate $15 at t_0 and each ending up at an equally more accurate $10 in t_5, but with firm A making adjustments along the way. The same calculations as in the example above show that in this case too, firm A has on average greater share price accuracy and greater price variance.

We are not claiming that more frequent updating inevitably results in the combination of greater share price variance and greater share price accuracy. Whether or not it does depends on the amount of noise in the updating bits of information. The example only illustrates that greater share price accuracy *can* plausibly be accompanied by greater share price variance. There are other possibilities as well. If the random-noise element is sufficiently small, firm A could, compared with firm B, have a combination of smaller price variance and greater share price accuracy. If the random-noise element is sufficiently large, firm A could, compared with firm B, have a combination of larger price variance and less share price accuracy. It is an empirical question whether the example in fact illustrates the typical situation. Studies discussed below in Part II.C suggest, however, that the example *is* typical, which means that where we observe greater variance, prices are more accurate.

In the real world, both considerations are at work. The first consideration is working so that greater price movement suggests less share price accuracy and the second is working,, at least if information bits contain sufficient noise, so that greater price movement suggests greater share price accuracy. We can say as a theoretical matter that the second consideration would be more important relative to the first in the case of relatively short-term (e.g., day-to-day or week-to-week) price changes compared to longer-term (quarter-to-quarter, year-to-year, or decade-to-decade) price changes, because with the longer-term price changes the noise elements of the day-to-day updates tend to cancel each other out. But this observation does not tell us, for any given term's price changes, which consideration predominates. Whether greater price movement indicates greater or lesser price accuracy is ultimately an empirical question. We will discuss immediately below strong empirical support for the conclusion that in the case of relatively short-term price changes, more movement indicates greater share price accuracy.[53]

C. *The R^2 Methodology*

1. *Overview*

The methodology that we use to determine the informedness of share prices and hence their accuracy involves a measure, which we call R^2, of the extent to which share prices of an economy's issuers move together.[54] For the reasons discussed below, R^2 appears to be a good inverse proxy for how much fundamental information concerning future shareholder distributions is impounded in share prices: the lower the R^2, the more accurate the share price.

2. *Indirect Evidence That R^2 Is a Good Inverse Proxy for Share Price Accuracy*

The idea that R^2 is a good inverse proxy for share price accuracy initially arose from the observation by Morck, Yeung, and Yu ("MYY") that countries vary a great deal in the extent to which share prices of their firms tend to move together, the phenomenon

53. *See infra* Parts II.C.2-3.

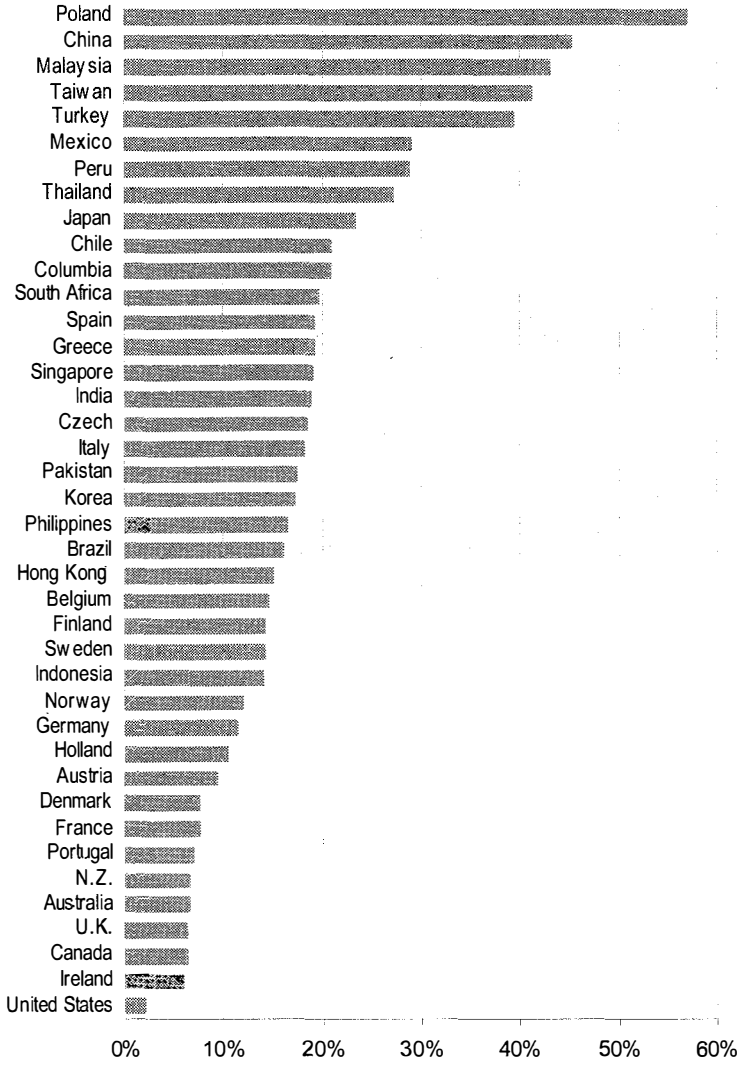
54. The R^2 measure for an individual country is computed as follows. For each individual issuer j in the country, run a regression using time series data on the issuer's share rate of return whereby $r_{j,t} = \beta_{j,0} + \beta_{j,m}r_{m,t} + \beta_{j,i}r_{i,t} + \varepsilon_{j,t}$, with r_m = market return; r_i = industry return. Then decompose the total variance of the issuer's return as follows: $\sigma_r = \sigma_m + \sigma_\varepsilon$. R^2 for firm j is then defined as $(\sigma_r^2 + \sigma_m^2)$. R^2 for the country is an average of the R^2s for its individual issuers, weighted by the total variation of each stock's return. From this formula, one can see that there is more firm-specific variation when R^2 is low.

measured by R^2.[55] This difference among countries is shown dramatically in Figure 3. For example, for most weeks during the first half of 1995, in each of China, Malaysia, and Poland, over 80% of stocks moved in the same direction; for the same period in each of Denmark, Ireland, and the United States, there was not a single week in which as many as 58% of firms moved in the same direction (despite, in the case of the United States, the then ongoing bull market).[56] These startling differences cry out for explanation.

55. Randall Morck et al., *The Information Content of Stock Markets: Why Do Emerging Markets Have Synchronous Stock Price Movements?*, 58 J. FIN. ECON. 215, 217-19 (2000).

56. *Id.* Data from other periods in the 1990s behave similarly. *Id.*

Figure 3
Average Fraction of Firm-Level Return Variation
Explained By Market Indexes



a. *The link between R^2, poor quality government, and risk arbitrage*

MYY try to explain these national differences by exploring the factors that seem to be associated with low and high R^2 scores. They observe, as illustrated in Figure 3, that developed countries, with high per capita GDP, tend to have low R^2s, and emerging countries, with low per capita GDP, tend to have high R^2s. There is no obvious reason why low per capita GDP would lead directly to a greater tendency for

share prices to move together. More likely, MYY reason, low per capita GDP is associated with other national characteristics that lead to this result.[57] MYY try to identify what these other characteristics might be, and in the process find evidence that R^2 is a good inverse proxy for how much fundamental information is impounded in share prices.

MYY first consider a number of obvious *structural* characteristics that appear likely, a priori, to affect a country's R^2.[58] One is country size.[59] Firms in a small country might be more uniformly subject to environmental influences such as bad weather or nearby geopolitical instability. Small countries also tend to have more uniform factor endowments, making their overall economies more sensitive to changes in relative factor prices such as the price of oil. A second structural characteristic is the extent of the diversity of a country's firms across industries: the less the diversity of the industries, the more likely that the fortunes of all firms will move together.[60] A third structural characteristic, which serves as a kind of catchall, is the extent to which the earnings of a country's firms tend to move together.[61]

MYY run a regression with a log transformation of country R^2s as the dependent variable (the variable to be explained) and with per capita GDP and measures of each of these three structural characteristics as the independent variables (the variables that potentially explain the dependent variable). The coefficient for per capita GDP remains statistically significant. Continuing with the proposition that there is no reason why low per capita GDP would lead directly to share prices moving together, the continued significance of the per capita GDP coefficient suggests it is a proxy for yet additional country characteristics, *institutional* rather than structural, that help explain the variation in R^2.[62] MYY add to the regression one additional independent variable, a measure for "good government."[63] This measure consists of the sum of the scores for each country on indexes created by La Porta et al.[64] relating to government corruption, risk of government expropriation, and risk of governmental contract repudiation. With the addition of this factor,

57. *Id.* at 227-28.

58. *Id.* at 230-41.

59. *Id.* at 231.

60. *Id.* at 231-32.

61. *Id.* at 232-33.

62. *Id.* at 241.

63. *Id.*

64. Rafael La Porta et al., *Law and Finance*, 106 J. POL. ECON. 1113, 1140 (1998) [hereinafter La Porta et al., *Law and Finance*].

the coefficient for per capita GDP becomes insignificant.[65] In sum, the reasons that countries vary in their R^2s are not just differences in their structural characteristics such as country size and diversity of industry. An institutional factor — the quality of government — appears to play an important role as well.

The discovery that governmental quality plays an important role in explaining differences among countries leads MYY to hypothesize that R^2 might be a good inverse proxy for price informedness.[66] We believe this is a plausible hypothesis. Our reasoning begins with the observation that the predictability of future cash distributions to a firm's outside shareholders depends on two factors: one is the predictability of the level of the firm's underlying cash flows; the second is the predictability of the division of these underlying cash flows between the outside shareholders on the one hand and inside shareholders and other firm stakeholders on the other.

In countries with low good-government scores, extralegal governmental influence will play a larger role in determining both the level of firm cash flows and the division of these cash flows. In low good-government score countries, a firm's profitability can be dramatically affected by whether or not it has close relationships with governmental officials — the persons who grant government contracts, issue licenses, and determine when to enforce regulations. Also, in such countries the division of a firm's cash flows will deviate from the standard corporate law model of pro-rata distribution among all shareholders. Instead, inside shareholders receive, in one form or another, more than a pro-rata share of the wealth generated by a firm's activities, and other stakeholders receive more than a market return for their contributions to the firm.[67] These deviations come at the expense of outside shareholders. The closer a firm's inside shareholders and other stakeholders are to governmental officials, the greater the governmental tolerance of such deviations.

This larger extralegal governmental influence on the amount of distributions ultimately reaching outside shareholders makes these distributions harder to predict. To start, in low-score countries, the cash flow levels of firms themselves are harder to predict. This is because the impact of extralegal governmental influences on cash flows from one firm to the next is harder to predict than the purely market factors that would determine firm cash flows in the absence of such influence. The problem of predicting the impact of such influence

65. Morck et al., *supra* note 55, at 241.

66. *Id.* at 242-43.

67. Russia provides an excellent case study of this problem. *See* Bernard Black et al., *Russian Privatization and Corporate Governance: What Went Wrong?*, 52 STAN. L. REV. 1731 (2000); Merritt B. Fox & Michael A. Heller, *Corporate Governance Lessons from Russian Enterprise Fiascoes*, 75 N.Y.U. L. REV. 1720, 1740-45, 1762-71 (2000).

on the cash flows of any one particular firm is aggravated by the opaque, erratic nature of political regimes prevalent in many emerging countries.[68] In addition, the proportion of this cash flow that will ultimately be paid to outside shareholders of a firm in a low-score country is itself less predictable. In such a country, outside shareholders are, as noted, relatively unprotected legally.[69] The total amount of distributions that these shareholders receive over the life of the firm is arbitrary. Outsiders receive what is left over, if anything, after the inside shareholders and other stakeholders have taken what their positions of political power allow them to get, plus, perhaps, the occasional distribution to outsiders made for strategic reasons.

The last step in our reasoning concerns the effect of these less predictable distributions to outside shareholders on the process of share pricing. When future distributions to outside shareholders are harder to predict, naïve speculators — the "noise traders" — are more likely to become confused. This confusion on the part of the noise traders adds to the risk undertaken by rational smart money speculators — the risk arbitrageurs — who bet against such noise traders.[70] This added risk makes it less attractive to be a risk arbitrageur, which means less such activity occurs in the economy. Less information about fundamentals (both firm-specific and market-wide) is incorporated into share price because fewer risk arbitrageurs find it worthwhile to gather, analyze, and act on such information. As a result, the trading of the naïve speculators ("noise trading") has a greater impact on price and share prices will less accurately reflect what the distributions to outside shareholders will ultimately turn out to be.[71] This problem of a low level of risk arbitrage in countries with low good-government measures may be accentuated by the fact that in such countries, risk arbitrageurs may be less confident that they will be able to retain the profits that they do manage to make due to the possibility of confiscation.[72] This lower level of risk arbitrage, with its consequent lower level of price informedness and hence price accuracy and higher level of noise trading, can be expected to be accompanied by the higher R^2s that we observe in the low good-government score countries. This is because the fads and fashions that motivate naïve speculative traders tend to have uniform impact across the market.

---

68. Morck et al., *supra* note 55, at 242-44. The idea that there will be more noise trading when future distributions to outside shareholders are less predictable is consistent with the idea that when less information is publicly available, less trading based on privately acquired and analyzed information will occur. *See supra* notes 45-48 and accompanying text.

69. *See supra* note 67 and accompanying text.

70. De Long et al., *supra* note 47, at 733; *see also supra* Part II.A.3.

71. Morck et al., *supra* note 55, at 244-47.

72. *Id.* at 243.

In sum, the link between high R^2s and low price informedness is established as follows. High R^2s are observed to be associated with low good-government scores.[73] Low good-government scores suggest that extralegal governmental influence will play a substantial role in determining future distributions to outside shareholders. The impact of this influence is harder to predict than the market forces that would otherwise determine the level of such distributions, thereby making the distributions themselves less predictable. This unpredictability confuses naïve speculative traders, causing them to act in ways that add to the risk of smart money speculation. This added risk depresses the level of risk-arbitrage activity, which has two consequences: one is that less information is impounded in prices, the other is that the naïve speculative traders have a larger role in setting prices. The fads and fashions that motivate the naïve speculative traders tend to have impacts across the market, and hence the larger role in the market played by the naïve speculative traders results in prices of different firms tending to move together more. As a consequence, country R^2s will be higher. Thus, everything else being equal, a high R^2 is indicative of a low level of risk arbitrage, which will result in a low level of price informedness.

b. *Further implications of the link between R^2 and poor-quality government*

The implications of our analysis for share price informedness, however, go even deeper than this. It is true that the mechanisms of real economic efficiency promoted by share price accuracy still work to some extent even when prices are relatively less accurate. The greater extralegal governmental influence that drives up R^2, however, not only leads to a lower level of share price accuracy, it also makes this lower level of price accuracy even less effective than it would otherwise be in promoting the functioning of these mechanisms of real economic efficiency. To see why, recall that a share price is less accurate when it is less likely to be close to the share's actual value, which is the discounted present value of what the future distributions to outside shareholders will ultimately turn out to be. In low good-government score countries, a significant factor in this lower level of share price accuracy is the underlying unpredictability concerning the *proportion* of a firm's underlying overall cash flow that will ultimately reach outside shareholders. Thus, share price is doubly less informed in terms of being an estimate of the firm's underlying overall cash flows. This result is critical because the theory suggesting that accurate share prices enhance real economic efficiency assumes that accurate

73. *See supra* note 65 and accompanying text.

share prices are good estimates of future underlying overall firm cash flow.[74] A firm's residuals are, under this theory, assumed reliably to go largely to its shareholders, and every shareholder, whether inside or outside, is assumed to receive a pro-rata distribution of these residuals. In short, share prices in a country with a low quality government are doubly disabled in their capacity to promote efficiency in the real economy. First, because there is less risk arbitrage, share prices are poorer predictors of future distributions to outside shareholders. Second, future distributions to outside shareholders are themselves less reliable indicators of a firm's underlying cash flow. It is the accuracy of prices as predictors of firm cash flows that promotes the effectiveness of the mechanisms of efficiency in the real economy.[75]

c. *Other indirect evidence that R^2 is a good inverse proxy for price informedness*

Two other pieces of indirect evidence help support the hypothesis that R^2 is an inverse proxy for price informedness. First, the average R^2 for U.S. firms has decreased significantly over the twentieth century, particularly since World War II.[76] This corresponds to a period in which, for both technological and institutional reasons, more information has become available for risk arbitrageurs to use, even putting mandatory disclosure aside.

Second, MYY examined a subsample consisting of R^2s of all the developed countries in their study. In the regressions they ran to try to explain the differences in R^2s among these countries, they included, as an additional independent variable, another La Porta et al.[77] index, one purporting to measure the protection of outside shareholders through rights that help them control directors. MYY found that the coefficient for this index was negative and statistically significant, thus suggesting an inverse relationship between the level of such protections and country R^2.[78]

MYY's explanation for this result starts with the assumption that in a country with weak protection for outside shareholders, managers will find it easier to divert a larger portion of the firm's cash flow to themselves.[79] These managers are more likely to divert extra cash flow generated by favorable firm-specific developments than extra cash

74. *See supra* Part II.B.2.

75. *See supra* Part I.B.2.

76. Morck et al., *supra* note 55, at 220-22.

77. La Porta et al., *Law and Finance*, *supra* note 64, at 1126-28.

78. Morck et al., *supra* note 55, at 255.

79. *Id.* at 216-17.

flow generated by favorable developments in the economy as a whole.[80] This is because a diversion of the firm-specific, development-generated income is less likely to be detected since outsiders know more about changes in economy-wide factors than about changes in firm-specific factors. Thus changes in firm cash flow due to changes in economy-wide factors are more likely to be passed on to outside shareholders. As a consequence, these changes in economy-wide factors are likely to affect distributions to outside shareholders more than they affect the underlying cash flow of the firm. The result will be the higher R^2s that are observed in the data for countries with a lower level of protection for outside shareholders. This effect will be accentuated by the fact that, relative to countries with more protection, risk arbitrageurs in low-protection countries will rationally devote more of their attention to predicting economy-wide factors and less to predicting firm-specific factors. They will allocate their attention in this fashion because these economy-wide factors play a larger role in determining distributions to outside shareholders.[81] In conclusion, while the higher R^2s in such countries do not necessarily indicate that share prices are less accurate predictors of future distributions to outside shareholders, they will be less accurate predictors of underlying firm cash flows and thus will not perform their real economy efficiency-enhancing functions as well as do share prices in countries with greater shareholder protections.[82]

3. *Direct Test of R^2 as a Proxy for Share Price Accuracy*

Durnev, Morck, Yeung, and Zarowin ("DMYZ") examine more directly the usefulness of R^2 as an inverse proxy for share price accuracy by examining the relationship between a firm's R^2 and the extent to which its share price reflects future versus current earnings.[83] For a set of U.S. firms, DMYZ go back in time and regress each firm's then-current stock price on its then-current and -future earnings. They find that future earnings explain more of the share prices of low R^2 firms than firms with high R^2. In other words, share prices of lower R^2 firms are better predictors of their future earnings than share prices of high R^2 firms.

This finding provides much more direct evidence that low R^2 firms have more accurate share prices. Remember that a more accurate share price is one that better predicts future shareholder distributions. Future distributions can only come from presently known existing

80. *Id.* at 254.

81. *Id.*

82. *See supra* Part II.A.2.

83. Artyom Durnev et al., *Does More Firm Specific Stock Price Variation Mean More or Less Informed Pricing?*, 41 J. ACCT. RES. 797 (2003).

assets or future cash flows; and future earnings are, on average, a reasonably good proxy for future cash flows.

III. SHARE PRICE ACCURACY AND EFFICIENCY IN THE REAL ECONOMY

The adherents of the position that share price accuracy is relevant to efficiency believe, based primarily on theory, that share price accuracy improves the quality of choice among new proposed investment projects in the economy and improves the operation of existing firm assets.[84] Two recent studies that examine the relationship of R^2 and measures of the efficiency of capital allocation help to confirm empirically the existence of at least the first of these two effects.

A. *Cross-Country Comparisons*

The first study, conducted by Professor Jeffrey Wurgler, involves cross-country comparisons.[85] Wurgler constructs a measure of the efficiency of capital allocation that posits that capital is well allocated when there is more investment in industries that are growing rapidly and less investment in declining industries. Using a data set that spans twenty-eight manufacturing industries across sixty-five countries and over thirty-three years, Wurgler finds a significant negative relationship between this measure of capital allocation efficiency and highly synchronized stock price returns.[86] Thus, capital appears more likely to be allocated to the most promising investment opportunities in countries with low synchronized stock returns than in countries with high ones.

---

84. *See supra* Part I.B.2.

85. Jeffrey Wurgler, *Financial Markets and the Allocation of Capital*, 58 J. FIN. ECON. 187 (2000).

86. Wurgler's measure is an elasticity of capital expenditure with respect to value added, i.e.,

$$\ln \frac{I_{i,c,t}}{I_{i,c,t-1}} = \alpha_c + \eta_c \ln \frac{V_{i,c,t}}{V_{i,c,t-1}} + \varepsilon_{i,c,t}$$

where I is gross fixed capital formation, V is value added (sales minus cost of intermediate goods), and i, c, and t are subscripts for manufacturing industry, country, and time, respectively. Wurgler's results, when combined with our results reported *infra* in Part IV suggesting that mandatory disclosure can lower R^2, are consistent with findings by La Porta et al. that laws that protect outside investors, including mandatory disclosure laws, improve the efficiency of investment allocation. Rafael La Porta et. al., *Investor Protection and Corporate Governance*, 58 J. FIN. ECON. 3, 4 (2003).

B. *Cross-Industry Comparisons*

The second study, conducted by Durnev, Morck, and Yeung, involves cross-industry comparisons within the United States.[87] This study uses a somewhat different measure of the efficiency of investment allocation, looking at each firm's marginal Tobin's Q ratio, which measures a firm's increase in market value relative to its increase in the book value of its capital stock.[88] In a tax-free world, the optimal level of this measure is one. A value greater than one suggests that positive net present value ("NPV") projects are being missed, and thus the firm is passing up projects that would cost less than their expected future returns discounted to present value. A value less than one suggests that negative NPV projects are being implemented, and thus that the firm is investing in projects that cost more than the present value of future expected returns. An economy is making the most efficient use of its scarce savings when it implements all proposed investment projects with positive NPVs and no proposed projects with negative NPVs. Durnev, Morck, and Yeung find that the closeness of this measure to its optimal level is inversely related to the industry's average R^2. This result holds up after controlling for differences among industries in the extent to which their earnings are sensitive to economy-wide factors. Importantly for adherents to the share price relevance position, the result also holds whether or not firms in the industry engage in extensive external financing. This finding is contrary to what would have been predicted by the institutional skeptics among the share price irrelevance adherents, who doubt the relevance of share price accuracy to the real economy because of the small percentage of new investment that is funded by public offerings of equity.[89]

C. *An Answer to the First Big Question*

These cross-country and cross-industry studies demonstrate that low R^2 is associated with high measures of investment allocation efficiency. This finding, combined with the findings reported above that low R^2 is associated with greater share price accuracy, leads to the important conclusion that more accurate share prices improve the quality of choice among new proposed investment projects in the economy. Thus, we have an affirmative answer to the first big

87. Artyom Durnev et al., *Value Enhancing Capital Budgeting and Firm-specific Stock Return Variation*, 59 J. FIN. 65 (2004).

88. Tobin's Q is the ratio of the market value of a company's debt and equity to the current replacement cost of its assets. *See* James Tobin, *A General Equilibrium Approach to Monetary Theory*, 1 J. MONEY, CREDIT & BANKING 15 (1969).

89. *See supra* note 17 and accompanying text.

question. Contrary to the position of the irrelevance adherents, the empirical evidence suggests that the efficiency of the real economy (the actual production of goods and services) *is* enhanced when share prices become more accurate.

IV. MANDATORY DISCLOSURE AND SHARE PRICE ACCURACY

We still need to address the second big question: do mandatory disclosure requirements in fact result in the revelation of useful information, as adherents of the mandatory disclosure effectiveness position believe, or does most of the information impounded in share prices come via routes other than mandatory disclosure, as the ineffectiveness adherents believe?

Prior empirical research relating to this question has focused primarily on the effect on share price and on price variance from the imposition in the 1930s of the Securities Act's and Exchange Act's mandatory disclosure provisions. The overall conclusion is that there was no statistically significant price change as a result of these requirements, but that there was a reduction in variance. As indicated in Part II, the implications of the reduction in firm-specific variance are ambiguous.[90]

In this Part of the Article, we present the results of a study that uses the R^2 methodology to examine more directly the price-accuracy effects of mandatory disclosure. The study concerns the effects of a change in disclosure rules in December 1980 that enhanced requirements concerning management's discussion and analysis of issuer financial condition and operating results (MD&A). This change for the first time in effect required managers to disclose any material information suggesting that the issuer's most recent results are not necessarily indicative of future operating results or future financial condition. In the study, we observe a statistically significant reduction in R^2 after imposition of the new requirements. This suggests that share prices did in fact become more informed as a result of the enhanced MD&A requirements. Such a result is strong evidence that mandatory disclosure can in fact increase the amount of meaningful information reflected in share prices and increase share price accuracy.

A. *History of the Enhanced MD&A Requirements*

The SEC historically prohibited disclosure of forward-looking information in SEC filings with the stated purpose of protecting

90. *See supra* Part II.B.

unsophisticated investors.[91] This prohibition was much criticized since share valuations depend on future cash flows and management has significant insight concerning the factors that will determine these cash flows.[92] Starting in the 1970s, the SEC began to soften and then ultimately reverse its stance. In 1974, the SEC's Division of Corporation Finance issued the *Guides for the Preparation and Filing of Reports and Registration under the Securities Exchange Act of 1934* that included a new Guide 1 (Summary of Operations).[93] Taking the position that issuer disclosure, in addition to the "columnar presentation of financial data," required information of "material significance to investors in appraising the results shown," the 1974 *Guides* called for "the type of supplementary information needed to explain periodic changes in financial data included in the summary of earnings."[94]

In the 1974 *Guides*, the SEC also added a requirement for a separate section in issuer disclosure documents entitled "Management's Discussion and Analysis," to be placed after the summary of earnings. In stating what it wanted, the SEC gave its first highly tentative bow toward requiring forward-looking information:

> The purpose of this statement is to provide investors with management's analysis of the financial data included in the summary through a discussion of the causes of material changes in the items of the summary and of disclosure of the dollar amount of each such change and the effect of each such change on the reported results for the applicable periods. This discussion is necessary to enable investors to compare periodic results of operations and to assess the source and probability of recurrence of earnings (losses).[95]

Issuers, however, tended to read these requirements narrowly and in December 1980, the SEC adopted, through revisions of Item 303(a)

---

91. *See* Disclosure to Investors — A Reappraisal of Administrative Policies Under the '33 and '34 Acts, Fed. Sec. L. Rep. (CCH) ¶ 74,601, at 74,603 (Feb. 2, 1973) [hereinafter *Wheat Report*] ("[P]rojections in filed documents might become traps for the unsophisticated who would be prone to attach more significance to such projections than they deserve."); *see also* Harry Heller, *Disclosure Requirements Under Federal Securities Regulation*, 16 BUS. LAW. 300, 307 (1971) (noting that the SEC considered the investor as good as anyone at predicting the future and that having companies attempt to predict future earnings would be misleading because it would suggest a competence and authority in predicting that did not exist). For one example of the SEC's policy prohibiting projections because they would be misleading, see 17 C.F.R. § 270.14a-9 (1976) (withdrawn in 1976) (proscribing predictions of specific future market values, earnings, or dividends in proxy statements); *see also* Joel Seligman, *The SEC's Unfinished Soft Information Revolution*, 63 FORDHAM L. REV. 1956 (1995).

92. *See, e.g.*, Kripke, *supra* note 33, at 1151.

93. *See* Securities Act Release No. 5520, 39 Fed. Reg. 31,894 (Sept. 3, 1974) [hereinafter *the 1974 Guides*].

94. *Id.* at 31,895-96.

95. *Id.* at 31,895.

of Regulation S-K, the much more explicit set of requirements in its MD&A rules that are the subject of this study.[96] These rules have been essentially unchanged since.[97] Specifically, Item 303(a)(3)(ii) requires the issuer to "describe any trends or uncertainties that have had or that the registrant reasonably expects will have a material favorable or unfavorable impact on net sales or revenues or income"[98] and to report on "events that will cause a material change in the relationship between costs and revenues."[99] Most significantly, instruction 3 to paragraph 303(a) tells issuers to "focus specifically on material events and uncertainties known to management that would cause reported financial information not to be necessarily indicative of future operating results or future financial condition."[100] This instruction in essence means that if there is no disclosure, investors are entitled to view current results as a management projection of future results.

Dean Joel Seligman underscores the importance of these new provisions, especially for troubled companies:

> This Item is of particular significance for "troubled companies" and is a key part of the evolution of the Commission's approach to accounting from an emphasis on "hard facts" to its emphasis on "soft" or forward-looking information. It is a comprehensive disclosure item. In effect, the Commission staff has employed the concepts of liquidity and capital resources to require managers to comment on material changes that may occur in a registrant's balance sheet. The Commission has used the concept of results of operations to require similar disclosures concerning a registrant's income statement.[101]

B. *Test Design and Procedures: Hypothesis H1*

The enhanced MD&A requirements imposed in December 1980 present an excellent opportunity to test the effectiveness of mandatory disclosure in promoting share price accuracy. The changed regulations on their face call for disclosure of significant information that was not previously required to be disclosed. We seek to determine whether share price accuracy, as measured by R^2, in fact improved as a result of the changed regulations. We set up the test in a way that attempts to

96. Proposed Revision of Regulation S-K, Exchange Act Release No. 17,399, 21 SEC DOCKET 1052 (Dec. 23, 1980).

97. *Compare* Regulation of Transfer Agents, Exchange Act Release No. 17,114, 20 SEC DOCKET 1277 (Sept. 2, 1980), *and* Amendments to Annual Report Form, 45 Fed. Reg. 63,630 (Sept. 25, 1980), *with* 17 C.F.R. § 229.303 (2003).

98. 17 C.F.R. § 229.303.

99. *Id.*

100. *Id.*

101. Seligman, *supra* note 91, at 1968 (citing 17 C.F.R. § 229.303 (2003) and Exchange Act Release No. 34,831, Fed. Sec. L. Rep. (CCH) ¶ 85,436, at 85,783 n.39 (Oct. 13, 1994) (safe harbor for forward-looking statements)).

best control for any other events occurring at the same time that might also influence R^2. We do this by comparing the change in R^2 of two groups of firms — high-return firms and middle-return firms — after adoption of the regulation. As explained below, we have reason to believe that the changed regulations, if effective, will promote more additional disclosure by the middle-return firms than by the high-return firms and hence lead to a greater reduction in the R^2s of the middle-return firms relative to those of the high-return firms. We find that the middle-return group indeed did have a greater reduction in R^2.

1. Assumption Driving Test Design

Our test design assumes that issuer managers will be more likely, other things being equal, to reveal *voluntarily* in a timely fashion good news than bad news. In addition to the tendency to put off unpleasant tasks that seems part of human nature, managers of bad-news firms often have incentives to defer revelation of the negative information. They may hope, for example, that subsequent, chance good news will obscure the effects of past, unrevealed mistakes. Also, their time horizons may be shortened by their compensation schemes or pending retirements and so an immediate price drop would hurt them while one at some point in the future would not. This assumption that bad news is disclosed more slowly is in accordance with both theoretical and empirical findings on the matter.[102] Thus, a smaller portion of

102. *See* HARRISON HONG ET AL., BAD NEWS TRAVELS SLOWLY 16 (Nat'l Bureau of Econ. Research, Working Paper No. 6553, 1998) (discussing the momentum strategy, which, based on findings that for some stocks past share price changes predict future ones, works much better for firms with low analyst coverage than high; this effect of low analyst coverage is much more pronounced, however, where the firms are past losers than past winners because firms release good news more freely than bad news and so the marginal contribution of analysts in getting bad news out is greater than in getting good news out); Anne E. Chambers & Stephen H. Penman, *Timeliness of Reporting and the Stock Price Reaction to Earnings Announcements*, 22 J. ACCT. RES. 21, 39 (1984) (stating that interim and annual earnings reports reported later than average, relative to their history, are accompanied by negative share price reaction); William Kross & Douglas A. Schroeder, *An Empirical Investigation of the Effect of Quarterly Earnings Announcement Timing on Stock Returns*, 22 J. ACCT. RES. 153, 173 (1984) (same finding for quarterly earnings announcements); Lang & Lundholm, *supra* note 45, at 269 (finding in an examination of cross-sectional variation of published analysts' evaluations of firms' disclosure practices, that firms rated as having more forthcoming disclosure have, after controlling for other factors, higher earnings and returns); Donald C. Langevoort, *Organized Illusions: A Behavioral Theory of Why Corporations Mislead Stock Market Investors (and Cause Other Social Harms)*, 146 U. PA. L. REV. 101, 107-09 (1997) (stating that corporations do not disclose bad news for a variety of reasons: one is the fear of high level management that doing so will have a negative effect on employees or customers, two, there is a tendency for lower level employees to be less likely to report bad news than good news up the line, and, three, there is a tendency for top managers to have "perceptual filters" that cut out bad news, the filters being functional and hence persistent because the optimism they reflect aids morale); Ranga Narayanan, *Insider Trading and the Voluntary Disclosure of Information by Firms*, 24 J. BANKING & FIN. 395 (2000) (outlining a theoretical model where bad news is less likely to be disclosed quickly

firms experiencing bad news will voluntarily disclose it in the period in which it is experienced compared to the portion of firms experiencing good news.

2. *Implications*

This difference in the timing of *voluntary* disclosure for firms with good and bad news creates the opportunity to test whether an increase in *required* disclosure results in greater share price accuracy. To the extent that disclosure is voluntary, in a given year a firm experiencing good news relative to other firms in its industry should have a better return than the industry average that year because the firm is likely to get its good news out quickly. A firm experiencing bad news relative to other firms in its industry in a given year should, in contrast, have a return (i) below its industry average for that year where the bad news is revealed during the year, or, (ii) equal to the industry average for that year where the bad news is not revealed during the year, with share price instead being marked down in the subsequent year when the bad news eventually does become revealed.

With this in mind, consider, for any given period and for any given industry, three groups of firms:

1. The first group — *the good-return group* — are firms that have market returns above the industry average by some threshold percentage, for example 10% or more. These firms have good news that occurred during this period.
2. The second group — *the bad-return group* — are firms that have market returns below the industry average by the threshold percentage or more. These firms have bad

than good news because, with good news, managers trade off the positive effects of speedy disclosure on their performance-based compensation with the ability to make insider trading profits afforded by delayed disclosure, but with bad news, there is no tradeoff, and only delay provides an opportunity for profit); Marc I. Steinberg & Robin M. Goldman, *Issuer Affirmative Disclosure Obligations — An Analytical Framework for Merger Negotiations, Soft Information, and Bad News*, 46 MD. L. REV. 923, 948-49 (1987) (noting that "[i]ssuers understandably wish to delay disclosure of adverse news as long as possible" out of fear, for example, that immediate release of the bad news could cause a "snowball" effect in terms of losing customers, which might not happen if release is delayed and better news intervenes to soften it); Mark Lang & Russell Lundholm, Voluntary Disclosure and Equity Offerings: Reducing Information Asymmetry of Hyping the Stock (2000) (unpublished manuscript, on file with authors) (finding that, on average, six months before issuing new equity, firms increase their level of disclosure and much more of it is positive than negative information; for firms that do this, price goes up during the period leading up to the offer and down afterwards); Russell Lundholm & Linda Meyers, Bringing the Future Forward (2000) (unpublished manuscript, on file with authors) (finding that firms with more forthcoming disclosure policies have, after controlling for other factors, higher earnings and returns). There are some dissenters to this view. For example, Douglas Skinner suggests that firms who are expecting to announce a bad earnings report will disclose earlier in order to reduce the risk of legal liability. Douglas Skinner, *Why Firms Voluntarily Disclose Bad News*, 32 J. ACCT. RES. 38, 38-39 (1994).

news that is revealed during this period but that occurred either in this period or in some prior period.

3. The third group — *the middle-return group* — are firms that have market returns in between the other two groups. These firms either have no news or have unrevealed bad news.

This analysis of the relationship between each of the three groups of firms and the kinds of news that they are experiencing has an important testable implication. A regulatory reform that effectively increases firm disclosure over what would be revealed voluntarily will have a differential effect on the composition of these three groups of firms in terms of the kinds of news they are currently experiencing. Firms with current or past unrevealed bad news that they would, but for the reform, have kept unrevealed will be in the bad-return group instead of in the middle-return group. As a consequence, the middle-return group will now be composed of a less mixed set of firms: a larger proportion will have no news and a smaller proportion will have unrevealed bad news. Thus, a larger portion of middle-return group firms will have prices that reasonably reflect their actual values. The high-return group would not experience a similar change in composition and thus for this group there would not be as great a change, if any, in the portion whose prices reasonably reflect their actual values.

3. *Testable Hypothesis*

These implications suggest a testable hypothesis with respect to the effect on share price accuracy of the enhanced MD&A requirements:

H1: If the enhanced requirements increase share price accuracy, the decrease in the R^2 of the middle-return group should exceed the decrease in the R^2 of the good-return group.

4. *Advantages of the Test Design*

This test design has a distinct advantage over a simple time series comparison of the average R^2 of all firms before and after imposition of the enhanced MD&A requirements. R^2 is affected by macroeconomic and industry environmental factors that change from one period to the next. In a simple time series comparison, these changes would create noise that would make it harder to detect any shift in the amount of information impounded in price as a result of the enhanced MD&A requirements. Instead, we examine, by industry, the change in R^2 from before to after imposition of enhanced MD&A requirements for the middle-return group *relative to* the parallel

changes for the good-return group. This procedure washes out the effects on R^2 over this period of time from changes in industry and macroeconomic factors. This is because there is little reason to think that any changes in these factors would have a different impact on R^2s of the good-return group than on those of the middle-return group in any given industry. The impact of the enhanced MD&A requirements is thereby singled out.

5. *The Sample*

We used the following sets of firms for our sample. For 1980, the year before implementation of the enhanced MD&A requirements, we selected a sample of 2690 firms from 130 three-digit SIC code industries.[103] For 1982, the year after implementation of the enhanced MD&A requirements, we selected a sample of 2988 firms from the same 130 three-digit industries. We calculated the R^2s and annual returns of all the firms in each year's sample.[104] We sorted each year's samples into the 130 different industries and, for each firm in each industry, placed it into one of these groups:

G (good-return firms), each of which have a market return for the year, $r > r_{i3} * (1+T)$

B (bad-return firms), each of which have $r < r_{i3} * (1-T)$

M (middle-return firms), each of which have r such that $r_{i3} * (1-T) < r < r_{i3} * (1+T)$

where r is the firm's return for the year, T is a fraction, and r_{i3} is the average return in the firm's industry for the year. In our initial calculations, we chose a threshold T of 10% or 0.10. Thus, for each year, we had 390 observations: three return groups from each of 130 industries. We can then observe the change in the average R^2 from 1980 to 1982 for each of the 390 industry return groups.

6. *The Calculations*

We started our calculations, as indicated, by determining the R^2 for all the firms in each year's sample. We did this by running for each year and for each firm a modified market model regression, with both market and industry betas,[105] using weekly returns for each firm. The

103. The reform was adopted in December of 1980, too late to affect any significant amount of disclosure in that year. We view 1981 as a transition year and thus use 1982 as the postimplementation comparison year.

104. The sources of data about these firms were the CRSP and COMPUSTAT tapes.

105. The market and industry betas that come out of the regression form a measure of the extent to which, respectively, market and industry-wide factors can be expected to move each individual firm's returns.

purpose of this calculation was to establish the amount of firm-specific variation in the returns of each firm (i.e., the portion of the return that does not co-move with the market). This firm-specific variation was then used to calculate its R^2. A weighted average R^2 was then calculated for each of the three groups of firms, G, B and M, for each of the 130 industries, for each of the two years. To make the data more tractable to statistical analysis, each of these R^2s was then transformed to create a natural log based index, $\Psi_{g,i3,t}$ (*g = the return group, i3 = the industry, t = the year*), that increases as the R^2 decreases. Ψ is therefore a direct, not an inverse, proxy for informedness. These calculations are set out in detail in Table I in the Appendix.

7. *The Basic Statistical Test of Hypothesis H1*

Remember that in testing hypothesis H1 we are examining whether, after adoption of the enhanced MD&A requirements, the middle-return group's share prices became better informed relative to those of the good-return group's prices. To determine this, we look at the mean change in Ψ, the informedness measure, for each of the two groups. We see whether, consistent with hypothesis H1, the mean change for the middle-return group is positive relative to the mean change for the good-return group. If so, we calculate the likelihood that the difference is due only to chance because of the ordinary underlying year-to-year variation in firm R^2s. This calculation is made in order to see how confidently we can rule out mere chance as the explanation for the difference in R^2s between the two groups.

More precisely, define for each group, G (good) or M (middle), $\Delta\Psi_{g,i3} = \Psi_{g,i3,82} - \Psi_{g,i3,80}$, i.e., the change in our informedness measure for return group g (= G or M) in industry i3 from 1980 to 1982. The null hypothesis to be tested is that $\Delta\Psi_{M,i3} = \Delta\Psi_{G,i3}$, i.e., that the change in the informedness measure is the same for the middle-return groups as for the good-return groups. The alternative hypothesis H1 is $\Delta\Psi_{Mi3} > \Delta\Psi_{G,i3}$, i.e., that the change in informedness for the middle-return group is greater than for the high-return group. The summary results of the test are as follows:[106]

SUMMARY RESULTS: HYPOTHESIS H1

	variable	Mean	std	min	max
Panel A: Stock return variation measures					
Differential log transformation of relative	$\Delta\Psi_G$	-0.070	0.708	-2.493	2.056

106. A more complete report of these test results is set out in Tables II and III.

firm-specific variation of G firms					
Differential log transformation of relative firm-specific variation of M firms	$\Delta\Psi_M$	0.451	0.995	-1.046	7.690

Null Hypothesis	Alternative Hypothesis	Test Statistic	Probability Value
$\Delta\Psi_M = \Delta\Psi_G$	$\Delta\Psi_M > \Delta\Psi_G$	5.149	(0.00)

These results show that, consistent with hypothesis H1, the middle-return group's mean improvement in the informedness measure, $\Delta\Psi$, is 1.985 greater than that of the good-return group (which actually declined slightly). Given a *t* statistic of 5.149, it is extremely unlikely that there was no actual change in the informedness of the prices of the two groups and that the observed difference in our measure of informedness is due simply to chance. Thus we can reject with a high degree of statistical confidence the null hypothesis in favor of the alternative hypothesis that after imposition of the enhanced MD&A requirements, the middle-return group experienced a greater increase in price informedness than did the good-return group. *This strongly suggests that the enhanced MD&A requirements did prompt the disclosure of additional meaningful information.*

8. *Multivariate Regression Analysis of Hypothesis H1*

As a check on these results, we also did a multivariate regression analysis of hypothesis H1 in order to see whether changes between 1980 and 1982 in other factors that influence firm R^2 could explain the difference between the two groups in the amount of change of their R^2s. We found that they could not. A firm's R^2 may be affected by the size of the industry to which it belongs and the structure of that industry. As a way to control for the possibility that changes between 1980 and 1982 in one or both of these industry factors accounted for the differences in the changes in R^2 for the two groups, we ran a multivariate regression with the change of each return group from each industry as the dependent variable (i.e., 390 observations, consisting of the change in R^2 from 1980 to 1982 for each of the three return groups for each of the 130 industries). As independent variables, we paired against each of these 390 observations changes between 1980 and 1982 in measures of these two industry factors for the industry into which the observation fell, plus dummies for whether or not the observation was in the good-return group, d_G, and for whether or not it was in the bad-return group, d_B. Each dummy equaled 1 if the observation was in its group and 0 if it

was not.

In this test, hypothesis H1 would be confirmed if we could say with statistical confidence that $d_G < 0$ and $d_B < 0$. Such a result would mean that after accounting for the effects of any changes in these industry factors, changes in the measure of informedness were, for firms in the good and bad-return groups, less than the average change for all firms. This result would show that firms in the middle-return group had a bigger change. In fact, as set out below, the calculations show that we can say with statistical confidence that $d_G < 0$ and $d_B < 0$.[107]

MULTIVARIATE REGRESSION RESULTS: HYPOTHESIS H1

Specification		*5.1*	*5.2*	*5.3*
Dependent variable		*Differential log transformation of relative firm-specific return variation, ΔΨ*		
Good firms industry dummy	Good firm d_G	**-0.521** (0.00)	**-0.416** (0.00)	**-0.429** (0.00)
Bad firms industry dummy	Bad firm d_B	**-0.323** (0.00)	**-0.136** (0.30)	**-0.149** (0.30)
F statistic		**10.670**	**18.780**	**15.110**
Regression R^2		0.052	0.163	0.371
Number of observations			390	

* Numbers in parentheses are p-values

9. *Test of Whether Recession Prompted Bad-News Firms to Disclose Sooner*

The period during which the enhanced MD&A requirements were first taking effect was one marked by recession. This raises the possibility that it was the recession, not the enhanced MD&A requirements, that prompted firms with bad news to disclose it sooner than they otherwise would have. To test for this possibility, we ran the same tests as reported above, comparing the change in the informativeness measure for middle-return firms with that of good-return firms, for two other periods in which a recession intervened: 1989-92 and 2000-2001. For each of these two other periods, we find

107. The control variables, the multivariate regressions, the simple correlations, and a fuller report of the regression results are set out in Tables IV, V, VI, and VII.

no statistically significant difference between the change in the informativeness measure for the middle-return group compared to that of the good-return group. The multivariate regression test for these periods produces the same results. Consequently we reject the possibility that it was the recession, not the enhanced MD&A requirements, that prompted firms with bad news to disclose it sooner than they otherwise would have after the imposition of these requirements in 1980.

10. *Robustness Tests*

As a further check, we looked to be sure that the results reported above are not an artifact of the particular periods that are compared or the threshold percentages used to define the good-, bad-, and middle-return groups. To do so, we ran our tests again using alternative periods and thresholds. We tried 1978-80 vs. 1982-83 and several other combinations of time periods. There was no change in results. We tried as the return threshold level $T = 0.01$, 0.02, 0.05, and 0.15. There was again no change in results.

C. *Test Design and Procedures: Hypothesis H2*

1. *Assumptions and Implications*

The assumption that issuer managers are more likely to report good news in a timely fashion than bad news, combined with the analysis above concerning the three groups of firms — good return, medium return and bad return — and the kinds of news they are experiencing,[108] have a second testable implication. This relates to the number of firms in each return group. While, in each period, the mix of good news and bad news actually experienced by firms in an industry (relative to the average) is presumably steady and symmetrical, a regulatory reform that effectively increases firm disclosure would temporarily increase as well the number of firms in the bad-return group. Think of a pipeline that runs from the experience by a firm of a good or bad event to the event's public revelation. To the extent disclosure is voluntary, the bad news that is revealed in any given period will on average have spent more time in this pipeline than will have the good news revealed in the same period. In a steady state, we would nonetheless expect to see at any point in time the same symmetrical distribution of good and bad news being revealed (and hence of firm returns) that we expect to see in the distribution of good news and bad news actually experienced by firms each period, the bad news simply coming on average from an earlier

108. *See supra* Parts IV.B.1-2.

point in time than the good news. The reform, if effective, would temporarily disrupt this steady state, however, and flush out some of the bad news that, but for the reform, would still have been in the pipeline and hence unrevealed until later. Thus, returns immediately after the reform would be asymmetrically distributed, with more firms having returns below the lower threshold than firms having returns above the upper threshold. The extra firms in the bad-return group would come out of the population that would otherwise have been in the middle-return group.

2. *Testable Hypothesis*

This implication suggests a second testable hypothesis with respect to the effect on share price of the enhanced MD&A requirements:

H2: If the enhanced requirements increase share price accuracy, the population of firms with below-average returns should temporarily increase.

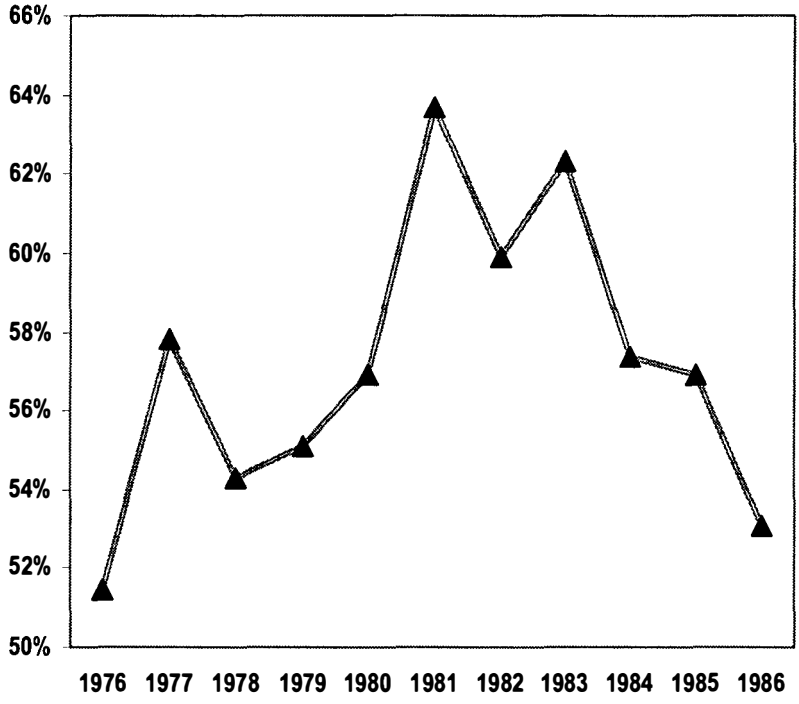
3. *The Test of Hypothesis H2*

Define $N_{B.80}$ as the percentage of firms in the bad-return group in 1980 and $N_{B.82}$ as the percentage of firms in the bad-return group in 1982. The null hypothesis is that $N_{B,80} = N_{B,82}$ and the alternative hypothesis H2 is that $N_{B.80} < N_{B,82}$. The results of the test are as follows:

Null Hypothesis	Alternative Hypothesis	Test Statistic	Probability Value
$N_{B,80} = N_{B,82}$	$N_{B,80} < N_{B,82}$	**-1.860**	(0.03)

Thus we can reject with a high degree of statistical confidence the null hypothesis in favor of the alternative hypothesis H2 that the proportion of firms that are in a bad-return group in 1982 is higher than in 1980. These results tend to confirm that the enhanced MD&A requirements prompted disclosure of meaningful information. The longer-term survey, set out in Figure 4, of the proportion of firms in the bad-return group reinforces this conclusion.

FIGURE 4
Hypothesis H2
The Proportion of B Firms by Year



CONCLUSION

A central feature of debates concerning corporate and securities law reform across the world — the United States, other developed economies, and emerging economies alike — concerns the value of mandatory disclosure. Two big questions occupy much of the attention. Does the accuracy of equity prices really matter to an economy and, even if it does, will mandatory disclosure effectively contribute to share price accuracy? The debate concerning these questions has been largely at the level of theory. This article attempts to shed some empirical light on the matter using the new R^2 methodology.

Given the dearth of useful empirical study of these questions, the findings reported here — that share price accuracy appears to enhance

the efficiency with which capital is allocated and that the management discussion and analysis disclosure requirements adopted by the SEC in late 1980 increased share price accuracy — have real importance. At a minimum, these findings suggest that the enhanced disclosure requirements under the recently adopted Sarbanes-Oxley Act may bear real fruit in terms of the better functioning of the underlying economy. They suggest as well that proposals to eliminate mandatory disclosure with reforms such as issuer choice of regulatory regime should be approached with caution.

The work so far, however, is only a beginning. Many further questions merit investigation. The R^2 methodology itself as a proxy for share price accuracy needs further testing. The relationship between R^2 and other measures of efficiency in the real economy, such as country growth rates, needs to be explored. There needs to be further consideration of the question of whether in less developed countries, disclosure induced improvement in share price accuracy alone would lead to better economic performance. And, within the United States and other developed economies, there need to be further tests of other major disclosure rule changes to see if they too are accompanied by comparable declines in R^2. The work to date shows the promise in these exciting future inquiries.

APPENDIX

TABLE II

Run $r_{j,w,t} = \alpha_{j,t} + \beta_{j,t} r_{m,w,t} + \gamma_{j,t} r_{i3,w,t} + \varepsilon_{j,w,t}$

j = firm; w = week; t = 1980, 1982

r_m = market return

r_{i3} = Three-digit industry return defined as:

$$r_{i3,w,t} = \frac{\Sigma_{k \in i3} \left(W_{k,w,t} r_{k,w,t} - W_{j,w,t} r_{j,w,t} \right)}{J_{i3} - 1}$$

W = market value of company j in industry $i3$

For each group (G, M, B) in each 3 digit industry, calculate:

$$1 - R^2_{g,i3,t} = \frac{\Sigma_{j \in g_{i3}} \Sigma_{w \in t} \varepsilon^2_{j,w,t}}{\Sigma_{j \in g_{i3}} \Sigma_{w \in t} \left(r_{j,w,t} - \bar{r}_{j,w,t} \right)^2}$$

$g = \{G, M, B\}$

Take logistic transformation: $\Psi_{g,i3,t} = ln\left(\frac{1 - R^2_{g,i3,t}}{R^2_{g,i3,t}} \right)$

TABLE III
Summary Results — I

$\Delta\Psi_M > 0$ in 102 out of 140 industries. The proportion of $\Delta\Psi_M > 0$ is significantly greater than 0.5 (*p-value = 0.00*)

	variable	mean	std	min	max
Relative firm-specific return variation of G firms in 1980	$1\text{-}R^2_{G,80}$	0.771	0.093	0.427	0.984
Relative firm-specific return variation of G firms in 1982	$1\text{-}R^2_{G,82}$	0.758	0.096	0.460	0.969
Relative firm-specific return variation of M firms in 1980	$1\text{-}R^2_{M,80}$	0.707	0.113	0.371	0.948
Relative firm-specific return variation of M firms in 1982	$1\text{-}R^2_{M,82}$	0.778	0.102	0.463	0.999
Relative firm-specific return variation of B firms in 1980	$1\text{-}R^2_{B,80}$	0.738	0.096	0.424	0.991
Relative firm-specific return variation of B firms in 1982	$1\text{-}R^2_{B,82}$	0.743	0.123	0.402	0.997
Differential log transformation of relative firm-specific return variation of G firms	$\Delta\Psi_G$	-0.070	0.708	-2.493	2.056
Differential log transformation of relative firm-specific return variation of M firms	$\Delta\Psi_M$	0.451	0.995	-1.046	7.690
Differential log transformation of relative firm-specific return variation of B firms	$\Delta\Psi_B$	0.127	1.016	-3.527	4.825

TABLE IV

Null Hypothesis	Alternative Hypothesis	Test Statistics	Probability Value
$\Delta\Psi_G = 0$	$\Delta\Psi_G > 0$	-1.125	(0.87)
$\Delta\Psi_M = 0$	$\Delta\Psi_G > 0$	**5.162**	(0.00)
$\Delta\Psi_B = 0$	$\Delta\Psi_G > 0$	**1.429**	(0.08)
$\Delta\Psi_M = \Delta\Psi_B$	$\Delta\Psi_G > \Delta\Psi_B$	**2.257**	(0.01)
$\Delta\Psi_M = \Delta\Psi_G$	$\Delta\Psi_M > \Delta\Psi_B$	**5.149**	(0.00)

TABLE V

Control Variables — Variables that Affect the R^2 Estimates

Industry Diversification

$$D_{j,ie,t} = \frac{\Sigma_{k\varepsilon j,i3} A_{k,t} S_{k,t}}{\Sigma_{k\varepsilon j,i3} A_{kt}} \qquad \Delta D_{j,i3} = D_{j,i3,1982} - D_{j,i3,1980}$$

Industry Size

$$S_{j,i3,t} = \frac{\Sigma_{k\varepsilon j,i3} \ln(\pi, A_{k,t})}{n_{j,i3,t}} \qquad \Delta S_{j,i3} = S_{j,i3,1982} - S_{j,i3,1980}$$

Industry Structure

$$I_{j,i3,t} = \sqrt{n_{j,i3,t}} \qquad \Delta I_{j,i3} = I_{j,i3,1982} - I_{j,i3,1980}$$

$n_{j,i3,t}$ = *number of firms in group j in industry i3 in year t*

TABLE VI
Multivariate Regressions

Run

$$\Delta\Psi_{j,i3} = \alpha + d_G + d_B = \sum_K \gamma_k Z_{j,i3,k} + e_{j,i3}$$

where:

$j = \{G, M, G\}$,

d_G and d_B are dummies indicating the above and below middle-return group,

Z_k are control variables

Test $d_G < 0$; $d_B < 0$

Table VII
Simple Correlations

ΔS	ΔI		
-0.368	0.067	ΔΨ	*Differential log transformation of relative firm-specific variation*
(0.00)	(0.19)		
	-0.177	ΔS	*Differential size*
	(0.00)		
		ΔI	*Differential industry structure*

TABLE VIII
Regression Results

Specification		5.1	5.2	5.3
Dependent variable		*Log transformation of relative firm-specific return variation,* $\Delta\Psi$		
Good firms industry dummy	d_G	**-0.521** (0.00)	**-0.416** (0.00)	**-0.429** (0.00)
Bad firms industry dummy	d_B	**-0.323** (0.01)	-0.136 (0.30)	-0.149 (0.30)
Differential size	ΔS		-.0241 (0.00)	-0.243 (0.00)
			-.0541 (0.22)	-0.065) (0.20)
Differential industry structure	ΔI			
Three-digit industry dummies		No	no	yes
F-statistic		**10.670** (0.00)	**18.780** (0.00)	**15.110** (0.03)
Regression R^2		0.052	0.163	0.371
Number of industries		390		