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Faculty of Economics and Social Sciences

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D I S C L O S U R E A N D T H E C O S T O F
E Q U I T Y C A P I T A L**

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Abbreviations and Symbols

ADR	American Depository Receipts
AICPA	American Institute of Certified Public Accountants
AIMR	Association for Investment Management and Research
a.k.a.	also known as
ANALYST	Number of Analysts following a Company
ASSC	Accounting Standards Steering Committee
BETA	Beta factor
BP	Basis Points
BVDMVE	Book Value of Debt to Market Value of Equity
CAPM	Capital Asset Pricing Model
CEO	Chief Executive Officer
CF	Cash Flow
CFO	Chief Financial Officer
CICA	Canadian Institute of Chartered Accountants
Consumer	Sample companies in the consumer discretionary industry
CR	Current Ratio
D&A	Depreciation and Amortization
DAX	Deutscher Aktien Index
DCF	Discounted Cash Flow
DDM	Dividend Discount Model
DFCF	Discounted Free Cash Flow
EDGAR	Electronic Data Gathering, Analysis and Retrieval System of the SEC
e.g.	for example
EPS	Earnings Per Share
et al.	and others
etc.	etcetera
FAQ	Frequently Asked Questions
FASB	Financial Accounting Standard Board
FCF	Free Cash Flow
FCFE	Free Cash Flow to Equity
FD	Fair Disclosure
FTSE	Financial Times Stock Exchange Index
Full Sample	Sample of large and small firms together
GAAP	Generally Accepted Accounting Principles
GDP	Gross Domestic Product
H	Hypothesis
Healthcare	Sample companies in the healthcare industry

HTML	Hyper Text Markup Language
I/B/E/S	Institutional Brokers Estimate System
IAS	International Accounting Standard(s)
IASC	International Accounting Standards Committee
ICAEW	Institute of Chartered Accountants in England and Wales
IDR	Implied Discount Rate
INDUM	Industry Membership
Industrial	Sample companies in the industrial goods and services industry
INTDISC	Internet disclosure score
INTDISC1	Internet disclosure score of the Corporate Information category
INTDISC2	Internet disclosure score of the Financial and Stock Information category
INTDISC3	Internet disclosure score of the Management and Board of Directors category
INTDISCC	Internet disclosure score for companies in the Consumer Discretionary industry
INTDISCH	Internet disclosure score for companies in the healthcare industry
INTDISCI	Internet disclosure score for companies in the industrial Goods and Services industry
INTDISCIT	Internet disclosure score for companies in the information technology industry
INTDISCMOD	Internet disclosure score modified to measure below/ above average disclosure level
INTDISCRANK	Internet disclosure rank
IPO	Initial Public Offering
IR	Investor Relation
IT	Information Technology
k	Discount rate or cost of equity capital
Max	Maximum
MD&A	Management Discussion and Analysis
Min	Minimum
MVAL	Market Value
n	number of observations
NASDAQ	National Association of Securities Dealers Automated Quotations
NO.	Number
NYSE	New York Stock Exchange
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square regression
P	Price
PBR	Price-to-Book value Ratio
PER	Price-to-Earnings Ratio

VIII

Reg. FD	Regulation Fair Disclosure
RIM	Residual Income Model
ROE	Return on Equity
RSQ	Multiple coefficient of determination
SALES	Sales
SEC	Securities and Exchange Commission
UK	United Kingdom
US	United States (of America)

Abstract

This dissertation contributes to the academic literature by examining two issues in relation to corporate Internet disclosure. First, we make a detailed content analysis of the investor relation section on the Web sites of US companies to gain insight into the type and amount of information provided to investors on corporate Web sites and to establish a measure of the Internet disclosure level. We find that companies are not exploiting the full potential of this disclosure medium. In a second study, we examine the relation between the cost of equity capital and the disclosure level of information in the investor relation section of corporate Web sites. We regress the cost of equity capital, obtained from a comprehensive discounted cash flow model, on the disclosure measure from the content analysis study to examine the relationship between these two variables. For a cross-sectional sample of 141 non-financial US companies, we find a negative and highly significant association between the cost of equity capital and level of Internet investor relation disclosure. The results remain significant after controlling for potentially influential variables such as different risk characteristics and firm size. The results indicate thus that Internet disclosure is useful to investors.

1. Introduction

In this dissertation, we examine two issues related to corporate Internet disclosure in two different studies. In the first study, we want to gain insight into the type and amount of information available to investors on corporate Web sites. In a second study, we examine the potential relationship between the cost of equity capital and the disclosure level of the investor relation section. According to Verrecchia (2001), FASB (2000) and AICPA (1994) there still is a demand for empirical work examining the economical consequences of disclosure. Even though many studies on disclosure already exist, there is “limited evidence regarding the market impact of broadly disseminating disclosures” (Bushee et al., 2003) and to our knowledge no prior published study examines the relationship between disclosure in the investor relation section on corporate Web sites and the cost of equity capital. Empirical research on the subject is still focused on the traditional ways of disclosure such as the annual report (Hossain, Tan, and Adams 1994; Botosan, 1997; Hail, 2002). The modern way of disclosure to investors over the Internet is still relatively little researched but increasingly important. The IASC (1999) even states that: “... in our view, it is likely that in the next five years or so, business reporting to stakeholders will move almost entirely from the current primarily print-based mode to using the Web as the primary information dissemination channel, with the print-based mode as secondary channel.”

With this thesis, we contribute in two ways to the academic empirical disclosure literature. First, we make an investor relation Web site content analysis to examine the type and amount of information that companies provide to investors on their Web sites. In a second research, we examine the usefulness of this information by empirically testing the impact of the investor relation Web site disclosure level on a company’s cost of equity capital. Only when investor relation Web site disclosure is useful in some way to investors, we should find a significant relationship between the cost of equity capital and the investor relation Web site disclosure level.

Economic theory suggests a negative association between disclosure level and the cost of equity capital. Empirical work however is confronted with major methodological difficulties: neither the disclosure level nor the cost of equity capital can be observed easily and finding a reliable measure for both variables is difficult. The results of many prior studies on the subject are therefore mixed, depending on the different disclosure metrics and various ways of estimating the cost of equity capital.

In this dissertation, we adopt a comprehensive version of the discounted cash flow (DCF) valuation model to estimate the cost of equity capital and create our own disclosure measure based on disclosure in the investor relation section of corporate Web sites. Using a regression model, we provide evidence on the nature and magnitude of the relationship between a firm's investor relation Web sites disclosure level and its cost of equity capital. For a cross-sectional sample of 141 non-financial US firms, we find a negative and highly significant association between the two variables. These results indicate that information on corporate Web sites is indeed useful to investors. Companies that have higher Internet disclosure levels in our sample, have significantly lower cost of equity capital.

The remainder of this dissertation is organized as follows. In chapter two, we present a comprehensive review of the theoretical and empirical disclosure literature to show the complex role of disclosure in financial markets. In the third chapter, we conduct an investor relation Web site content analysis of 154 non-financial companies to gain insight into the type and amount of disclosure on corporate Web sites and to establish a measure of Internet disclosure level. In chapter four, we estimate the cost of equity capital for the same sample using a comprehensive version of the discounted cash flow model and regress it on our disclosure measure to examine the empirical relationship between the cost of equity capital and the Internet disclosure level. Finally, in chapter five we summarize the results and provide explanations as well as recommendations for future research.

2. Comprehensive Review of the Disclosure Literature

Disclosure or corporate reporting is the process of providing information from the reporting company to the financial markets.¹ In its simplest form, disclosure is a method of communication between the reporting company and the interested users of the reported information. Users include current and potential small and institutional investors, financial analysts and other capital market participants who have an interest in the value of a firm. In an efficient market, firm value is defined as the present value of expected future net cash flows, discounted at the appropriate risk-adjusted rate of return (Kothari, 2001). The objective of disclosure is therefore to provide information useful to investors in “assessing the amounts, timing, and uncertainty” of future cash flows.² Useful information improves decision making by investors and other users of a firm’s disclosure leading to a better allocation of resources in the economy. Disclosure is therefore essential for the well prospering of financial markets (Watts and Zimmerman, 1986) and for the optimal allocation of savings to investment opportunities in the economy (Healy and Palepu, 2001).

Today, firms inform investors by providing regulated financial reports, including the financial statements, footnotes, management discussions and analysis (MD&A) and other regulatory filings. Additionally, some firms provide voluntary disclosure such as release of earnings forecasts by management, conference calls, press releases, investor presentations, Internet Web sites, and other information such as voluntary disclosure in annual reports and required SEC filings. Finally, also information intermediaries such as financial analysts, industry experts and the financial press provide information to investors.

Investors need information from the company because management has superior knowledge compared to outside investors on their firm’s current and future performance (Jensen and Meckling, 1976; Fama and Jensen, 1983a,b). This superior information arises from the separation of ownership and control in modern corporations (Berle and Means, 1932). The separation of ownership and control is the basis for agency theory and, derived from that, information asymmetry. Both are very important issues in relation to disclosure.

¹ The Accounting Standards Steering Committee (ASSC) defines Corporate Reporting as the process of communicating information (both financial and non-financial) about the resources and performance of the reporting entity (ASSC, 1975)

² FASB Statement of Financial Accounting Concepts, No. 1, 1978

Agency theory argues that there is a potential conflict of interest between managers and investors due to the separation of ownership from control (Brealey and Myers, 2000). Investors (the principals) typically do not take part in the daily operations of the firm; they leave this responsibility to management (the agents). The different roles of principals and agents create an agency problem when both management and investors maximize their own utility and have conflicting incentives. Such conflicting incentives can induce management to act against the interest of investors and therefore falsifying or withholding information. This leads to an information problem between insiders and outsiders of the firm known as information asymmetry.

Information asymmetry is a serious problem that may disturb the functioning of the capital markets leading even to their partial or complete breakdown (Akerlof, 1970). In lack of proper information, investors will provide only economically suboptimal financial resources, if anything, to an investment opportunity. This distorts the optimal allocation of savings to investment opportunities.

The information problem cannot be solved completely by privately collecting and analyzing data since the private gathering of additional information is costly, it is undertaken only by investors that have the required resources (time, money and knowledge) and that expect a positive payoff (benefits > costs). The existence of better-informed investors leads furthermore to an adverse selection problem in transactions between stock buyers and sellers. The recognition of this problem could move away uninformed investors from the stock market because they would trade at a disadvantage compared to the informed investors. The result is lower trading volume, higher transaction costs, and market illiquidity or even complete market breakdowns (Lev, 1988).

For these reasons, the reduction of information asymmetry is in the interest of the firm to ensure continuous access to capital from financial markets. According to Myers and Majluf (1984) firms' public equity or debt offers would be too expensive for existing shareholders if firms would not reduce the information asymmetry problem. This would result in a suboptimal allocation of capital and lower economic growth.

Corporations as well as the government have therefore adopted various mechanisms to diminish the economic effects of information asymmetry. The main solutions to the information asymmetry problem proposed in the literature are (1) optimal contracts between management and investors and (2) disclosure (mandatory and voluntary).

Optimal contracts between managers and investors help to reduce the agency problem and therefore indirectly the information asymmetry problem. Healy and Palepu (2001) review the optimal contracts literature, so we refrain from reviewing this issue and will focus on the second solution, disclosure.

Disclosure, whether mandated or voluntary, reduces information asymmetry by equalizing not only the knowledge between investors and management but also between different groups of investors. Disclosure however reduces information asymmetry only when it is useful. In the accounting literature five main characteristics are viewed as desirable for the fulfillment of the usefulness of information: relevance, reliability, comparability, timeliness and understandability.³

First, to be useful, information must be *relevant* to investors. Information is relevant when it influences the economic decisions investors make by helping them to evaluate the past, present and future of the business and its environment (IASB, 2000). Second, information must be *reliable* to be useful. To be reliable, information must be *complete* within the bounds of materiality and cost. Omitting important facts can cause information to be false or misleading and therefore unreliable (IASB, 2000). Furthermore, to be reliable information must be *credible* and *objective*, that is, free from bias. Information is not objective if, by selection or presentation of information, management influences investors in order to achieve a desirable outcome (IASB, 2000). Third, to be useful information must be *comparable*. Information is comparable when it allows comparison over time (intra-company comparability) and between companies (inter-company comparability). Fourth, information must be *timely*, delivered to the users as quickly as possible. In a fast changing business environment, the timeliest information has the most value and information should therefore be distributed to all users in the fastest possible way to reduce information asymmetry. Relevance, reliability, comparability and timeliness of information are still not enough to fulfill the criteria of usefulness. Information must be also presented in an *understandable* way to be useful (IASB, 2000). The presentation of information must be understandable for the users and thus reflect substance over form. In other words, it is not enough only to present numbers. The numbers itself, of course, are important but the meaning of numbers must be clear. Therefore, explanations or methods of calculations are needed as well.

³ e.g. ICAEW (1975), FASB (1980), AICPA (1994), IAS (2000).

Even though all criteria of usefulness are important, the two most important criteria are relevance and reliability (IASB, 2000 and AICPA, 1994). Relevance and reliability indirectly include the other criteria mentioned above. Timeliness and comparability, for example, could be viewed as a sub-criterion for relevance. This means that information in order to be useful for investors in estimating a company's future cash flows must first of all be relevant and reliable.

Several studies, as well as the recent accounting scandals show that this is however not always the case. DiPiazza and Eccles (2002) find for example that corporate information is not complete and Watts and Zimmerman (1981) that information is not always objective and thus not necessarily reliable. Furthermore, Ball and Brown (1968) already showed in 1968 that information is not always timely and therefore might not be very relevant to investors; Aboody and Kasznik (2000) conclude the same in a more recent study.

Empirical research suggests however not only that financial disclosure is not very relevant, but that the relevance of accounting numbers has decreased significantly over time (Chang, 1998, Lev and Zarowin, 1999). These studies show that in the US the relations between stock prices, earnings and book values have deteriorated so that today earnings explain only about 5% of stock returns (Lev and Zarowin, 1999). Chang (1998) argues that the partial explanation of the decline in value relevance of financial statement information is the change of the economic environment. Economically relevant items such as research and development costs, brands, and other intangible assets are often expensed or ignored because their measurement is not sufficiently reliable. Also the reliability of estimates and other relevant forward-looking information in financial reports is a big concern. The former SEC Chairman Levitt expressed concerns that companies use different accounting methods to manage earnings (Levitt, 1998). The solution that he proposed was to further reduce the discretion companies have in accounting choices. However, according to Lundholm (1999) reducing accounting discretion may improve the reliability of estimates and other forward-looking information but could further reduce the relevance of financial reports by hindering management's ability to communicate private information through accounting choices.

Furthermore, practitioners observed in recent years an increasing gap between information disclosed by companies and the information needs of investors. In response have AICPA (1994), FASB (2001) and others been looking for ways to improve the quality of disclosure by making it more useful to investors. Their recommendations are consistent with each other. In particular, these studies conclude that users of financial information need (1) more

disclosure of non-financial information, (2) more forward-looking information and (3) more information about intangible assets.

These suggested improvements would increase the relevance of current information. The higher relevance must however be weighted against a possible decrease in reliability. Generally, there are three ways to increase reliability of disclosure: (1) ethics, (2) corporate governance and (3) regulations.

Ethics

One important way to increase reliability of information is the enforcement of ethical behavior within the reporting corporation. Webster's dictionary defines ethics as “the study of standards of conduct and moral judgment; the systematic study of the principles and methods for distinguishing right from wrong, and good from bad” (Webster, 1970). Ethics is a fundamental business concept and every profession develops a body of such principles and standards (Greenwood, 1978) which assist individuals when they face ethical dilemmas and problems of ‘weakness of will’.

The recent accounting scandals and fraud convictions putting several executives behind bars showed that ethical behavior is not self-evident. Ethics is a personal matter and personal values may influence decision making in organizations. The potential link between personal values and managerial decision making has been recognized for many years (e.g. Learned et al., 1959; England, 1967). However, several recent studies have failed to provide support for the effects of personal values on ethical decisions in business (e.g. Akaah and Lund, 1994). This suggests that even people with strong personal values may act unethical because of improper incentives and the pressure of others. For this reason, rules and regulations must be established. Such rules are manifested in corporate governance principles.

Corporate Governance

According to the Cadbury report (Cadbury Committee, 1992) corporate governance is “the system by which companies are directed and controlled”. Shleifer and Vishny (1997) write that “corporate governance deals with the way in which suppliers of finance to corporations assure themselves of getting a return on their investment”. Without going further into the role of corporate governance, it could be said that corporate governance is an important mechanism to enforce management to act in interest of shareholders and to solve the

problems arising from the separation of ownership and control, e.g. the agency problem and information asymmetry.

There are two organs of corporate governance that help to solve these problems: the board of directors as representatives of the shareholders, and auditors as external controllers of management. One of the responsibilities of the board of directors is supervising management to ensure shareholder value maximization and fair reporting to shareholders about the actual corporate situation.

The second organ to mitigate the separation of ownership and control is the audit. Before financial information is disclosed, independent auditors provide an external and objective check of the financial statements. Investors require an independent auditor because they mistrust management when it comes down to disclosing truthful reports on their own. An independent audit increases therefore the reliability of the disclosed information to investors. According to Leftwich (1983) even when it is not required by regulation, investors demand an independent auditor as a condition of financing. This finding shows that having an independent auditor is important to investors in enhancing disclosure credibility.

Another mechanism build into the audit function to increase the credibility of disclosures, especially if the audit fails, is the possibility of litigation (Verrecchia, 2001). If audit disclosure turns out to be false, the investor can sue the auditor to reclaim losses. Large audit firms are perceived to have "deep pockets" (Kothari et al., 1988) and therefore are their audit opinions like insurance guarantees that the financial statements are not falsified (Skinner, 1994). Theoretically, the risk of litigation should be a motivation to the audit firm to require truthful corporate information and thus making it more reliable.

On the other hand, Watts and Zimmerman (1981) hypothesize that auditors act in the interest of the managers that hire them, rather than in the interest of the investors and Healy and Palepu (2001) find little empirical evidence that auditors enhance the credibility of financial reports and question the advantages of having audits. According to Dechow, Sloan and Sweeney (1996) are large audit firms only slightly successful in discovering illegal earnings management and auditors in the year 2000 were less likely to issue warnings about possible bankruptcy situations than they were in 1992 (Geiger and Raghunandan, 2002). Considering the recent huge audit failures, the collapse of the Arthur Andersen, one of the Big Five audit firms, and the independence problems of accountants who provide both audit and consulting services to the same client indicate that accountants may have lost the moral right to conduct

audits (Dunn and Adamson, 2003). This development recently led to an increased use of the third possible solution to increase the reliability of information: regulation.

Regulation

Agency theory suggests that management acts in its own interest rather than in the interest of investors as the legal owners of the company. This creates a demand for the protection of shareholder and creditor interests against dishonest actions of management. By creating minimum disclosure requirements, regulators reduce the information asymmetry between informed and uninformed investors and therefore create this protection (Healy and Palepu, 2001).

New corporate disclosure rules are usually suggested after large stock market declines and broadly viewed corporate scandals (Watts and Zimmerman, 1979). Although many advocate this kind of behavior, the economic consequences of required disclosures are not obvious. Sunder (2002) suggests that competition and private incentives might be more efficient in their outcomes than regulation. Theoretically, firms have incentives to provide information voluntarily because they eventually suffer cost of withholding it. On the other hand, disclosure is costly and therefore corporations may withhold some information (Verrecchia, 1983; Darrough and Stoughton, 1990). Verrecchia (1983) relates to the cost of disclosing information as “proprietary” costs. Proprietary costs include the direct cost of preparing and disseminating information and the costs associated with disclosing information that may be proprietary meaning potentially harmful to the firm if reported. Such costs are the costs of litigation due to disclosure and the costs of competitive disadvantage including adverse actions by competing firms, the entry of new firms into the industry or political costs arising from possible threat of regulation and antitrust investigations.

Even though the issue is of great importance, there is still little empirical evidence on the possible costs and benefits of disclosure regulation in the academic literature. The basic questions about the demand for and effectiveness of disclosure regulation remain unanswered (Healy and Palepu, 2001). Nevertheless always new regulations are being passed. In 2000, the SEC introduced Regulation FD aimed at ensuring “fair disclosure” and later in 2002 the Sarbanes-Oxley Act was passed by the Congress of the United States.

Regulation Fair Disclosure or simply Reg. FD was introduced on October 23, 2000. It requires firms to provide all material information to all investors at the same time. The goal of the SEC for Reg. FD was the elimination of selective disclosure to certain preferred

analysts and institutional shareholders before disclosing the same information to the general public.

The introduction of regulation FD provided also an interesting field for academic research on the effects of disclosure regulation on the stock market. One result of these studies is that managements' concern of higher stock return volatility due to Reg. FD could not be empirically verified. For example, there has been no change in returns volatility around earnings announcements post Reg. FD (Bailey et al., 2003; Eleswarapu et al., 2003). There are mixed findings regarding analyst forecast dispersion and accuracy post-FD with e.g. Heflin et al., (2003) finding no evidence of lower analyst accuracy and increased dispersion while Irani and Karamanou (2003) document an increase in forecast dispersion and a decrease in analyst following after the passage of Reg FD. Mohanram and Sunder (2002) find lower analyst accuracy and increased dispersion. Furthermore, they find that analysts with superior forecast accuracy in the pre-FD period were unable to maintain their advantage post-FD. This indicates a convergence in performance among analysts and suggests an increase in fairness post-FD.

Those results support the SEC's stated objectives for Reg. FD to level the playing field among analysts and to enhance analyst independence. The fears expressed by the analyst industry association that Reg. FD would negatively impact analysts' information gathering or the fear that companies might disclose less are not supported empirically. There has even been an increase in some types of disclosure. Both Heflin et al. (2003) and Cotter et al., (2002) find that the frequency of management earnings forecasts have increased and Straser (2002) finds increases in various disclosure types including SEC filings and press releases.

Another major change after Reg. FD was the introduction of the *Sarbanes-Oxley Act* in 2002. The goal of the Sarbanes-Oxley Act is to "protect investors by improving the accuracy and reliability of corporate disclosures" (U.S. House, 2002). The act also contains some important sections referring to internal control of public corporations. Sarbanes-Oxley introduced among others new responsibilities for the CEO and CFO and the audit committee. For example, a company's CEO and CFO are now required to certify each quarterly and annual report. In case of false certifications, major criminal penalties are foreseen to keep disclosure controls and procedures sufficient in order to secure the financial and non-financial information required to be disclosed in SEC reports. From now on management will not only be asked to admit its responsibility for having an adequate inner control structure, but also

needs to evaluate the effectiveness of that structure and publicly report on that evaluation. The company's independent auditors are required to attest and report on management's evaluation.

While ethics, corporate governance and regulations all seem to contribute to the usefulness of reported information, companies can further enhance the quality of their disclosure with voluntary information.

Voluntary Disclosure

Voluntary disclosure includes the release of earnings forecasts by management, presentations to the public, investor relation disclosure, Internet Web sites, press releases, conference calls, voluntary information in the annual report and required SEC filings, as well as corporate finance policies that can be used for signaling purposes.

The theoretical literature shows that voluntary disclosure reduces information asymmetry among informed and uninformed market participants (Diamond and Verrecchia, 1991). The extent to which voluntary disclosure decreases information asymmetry depends on the degree of usefulness of this information. Credibility and thus reliability is the major concern in the usefulness of voluntary provided information. Due to the fact that managers have incentives to make self-serving voluntary disclosures, it is unclear whether voluntary disclosure is credible (Healy and Palepu, 2001). Concerns expressed by the SEC show that voluntary disclosure may not be credible. Before 1973, the disclosure of forecasts in SEC filings was prohibited due to concerns that forecasts were manipulated by management and thus not credible (How and Yeo, 2000).

Hutton et al. (2003) argue that managers can increase the credibility of their earnings forecasts by providing additional information like qualitative "soft talk" disclosures or verifiable forward-looking statements about earnings. Credibility also increases by attracting analyst coverage because analysts indirectly certify voluntary disclosures and pass the information on to investors.

Whether voluntary disclosure is indeed credible and therefore useful is an empirical question. Existing studies suggest that managers voluntarily disclose information to (1) reduce agency costs and lower information asymmetry, (2) improve stock liquidity, (3) increase information intermediation, (4) reduce the cost of capital and enhance the value of the firm, and (5) manipulate the markets.

(1) Voluntary disclosure, information asymmetry and agency costs

Some studies have investigated the role of voluntary disclosure in reducing information asymmetries. Leuz and Verrecchia (2000), Welker (1995) and Healy, Hutton and Palepu (1999) find that information asymmetry, as measured by the bid-ask spread, is reduced as the level of disclosure rises. Other studies examine the behavior of trading volume and stock volatility (e.g. Auer, 1998; Frankel et al., 1999) to determine whether voluntary information is informative for investors and thus capable of reducing information asymmetry. Auer (1998), for example, examines changes in share price volatility and the firm's beta factor for Swiss firms that have switched to international accounting standards (IAS) and finds a small, but insignificant reduction in volatility and no change in beta factor. Froidevaux (2001) examining also Swiss firms finds that a higher level of disclosure and a better investor relation policy reduces price volatility. Frankel, Johnson, and Skinner (1999) and Bushee, Matsumoto, and Miller (2003) find that conference calls provide important information as shown by abnormally high trading volume and return volatility during the conference call.

Lang and Lundholm (1993) report that disclosure levels are higher for firms with weaker earnings-return relations. They use the correlation between earnings and returns as a measure of information asymmetry; a weak correlation between earnings and returns indicates that little information about firm value is captured by the mandatory earnings disclosure, so that information asymmetry is high for these firms. Managers reduce this information asymmetry by increasing voluntary disclosure.

The above studies show that voluntary disclosure reduces information asymmetry between management and investors. A decrease in information asymmetry helps to reduce the agency costs because if everyone would have similar information, the principal-agent problem would be easier to resolve (Brealey and Myers, 2000).

Theory suggests that disclosure increases with increasing agency costs (Jensen and Meckling, 1976). Empirical studies on voluntary disclosure and the agency framework show however mixed results. Chow and Wong-Boren (1987) find no significant relationship between leverage (a proxy for agency costs) and financial disclosure in annual reports while Malone, Fries and Jones (1993) find a significant relationship between the two variables. Low (1996) finds a negative relationship between disclosure and agency cost proxies such as managerial ownership and investment opportunities and a positive relationship between disclosure and leverage.

(2) Voluntary disclosure and liquidity

A general finding of the above studies is that disclosure reduces information asymmetries between management and investors. This in theory should increase the liquidity of the stock (Diamond and Verrecchia, 1991). Firms with high levels of disclosure are likely to attract more investors because they can be confident that stock transactions occur at “fair” prices. Welker (1995) and Leuz and Verrecchia (2000) provide empirical evidence consistent with this theory. Their findings reveal that market liquidity, measured by trading volume, increases as the level of disclosure is increased. Other studies also show that greater disclosure enhances stock market liquidity (e.g. Glosten and Milgton, 1985; Diamond and Verrecchia, 1991; Healy, Hutton and Palepu, 1999).

Frost et al. (2002) examine the association between disclosure and market liquidity at different stock exchanges. They find strong confirmation of the hypothesis that the strength of the disclosure system (disclosure rules, monitoring and enforcement, information dissemination) is positively associated with market liquidity, after controlling for stock exchange size, legal system and several other proxies for the extent of market development and the information environment.

(3) Voluntary disclosure and information intermediation

The studies reviewed until now show that increased voluntary disclosure reduces information asymmetries between management and investors what, in turn, improves liquidity of a firm’s stock. Increased liquidity should make the stock more attractive to institutional investors what should lead to increased information intermediation.

The effect of voluntary disclosure on information intermediation is however not obvious. On one hand, voluntary disclosure makes it possible for financial analysts to create valuable new information, such as superior forecasts and investment recommendations, thereby increasing demand for their services. Voluntary disclosure should furthermore lower the cost of information acquisition for analysts and thus increase their supply (Bhushan, 1989). On the other hand, public voluntary disclosure prevents analysts from distributing managers’ private information to investors. This could lead to a decline in demand for analysts’ services. The effect of disclosure on information intermediation, especially analysts following, should be therefore answered empirically.

Healy et al. (1999) find empirically that increases in disclosure come with increases in institutional ownership and analyst following. Lang and Lundholm (1993, 1996) find that firms with more informative disclosures (higher AIMR rating) have larger analyst following and Francis et al. (1998) find an increase in analyst coverage for firms making conference calls. These studies show that expanded disclosure can improve intermediation for a firm's stock in the capital market.

There are also studies, which show not only that the quantity of information intermediation increases but also its quality. Lang and Lundholm (1996) provide empirical evidence that firms with more informative disclosure policies have more accurate analyst earnings forecasts, less dispersion among individual analyst forecasts and less volatility in forecast revisions. Additionally, Bowen, Davis, and Matsumoto (2002) find that analyst forecast accuracy is higher for firms that regularly hold earnings-related conference calls. Hope (2001) finds that analysts' earnings forecast accuracy is positively related to annual report disclosure in the US what suggests that increased amount of information in annual reports helps analysts in forecasting earnings. Ashbaugh and Pincus (1999) investigate the accuracy of analysts' forecast errors before and after the adoption of the higher IAS disclosure standard by non-US firms. They find that the change in forecast errors is weakly negative.

(4) Voluntary disclosure, cost of capital and the value of the firm

The above studies show that disclosure reduces information asymmetry what increases the liquidity of the stock and attracts increased demand from institutional investors that need liquidity and require or cause higher analyst coverage. This in turn should reduce the firm's cost of equity financing and increase firm value.

This theory has been confirmed by several studies showing that greater disclosure enhances stock market liquidity and thereby reduces cost of equity capital through reduced transaction costs or increased demand for a firms securities (e.g. Demsetz, 1968; Amihud and Mendelson, 1986; Baiman and Verrecchia, 1996).

More recently, several studies have examined the link between disclosure and the firm's cost of capital more directly. The results are mixed and dependent on the disclosure metric and research design used. Most studies indicate that increased disclosure indeed reduces the cost of capital (Botosan, 1997; Sengupta, 1998; Botosan and Plumlee 2000; Hail 2002; Kothari and Short, 2003).

Botosan (1997) finds a negative association between the cost of equity capital and the level of voluntary disclosures in the annual report for firms with low analyst following. She finds however no association between these variables for firms with a high analyst following. In a similar study, Hail finds (2002) a negative and highly significant association between disclosure and cost of equity capital for Swiss companies. Botosan and Plumlee (2000) and Kothari and Short (2003) examine the relationship between the cost of equity capital and different aspects of disclosure. They find mixed results depending on either the type of disclosure (annual report, quarterly and IR disclosure) or the implication of the disclosure (favorable, unfavorable information). These studies are reviewed in greater detail in chapter 4.

While most studies examined the cost of equity capital, Sengupta (2000) examines whether voluntary disclosure reduces the interest rate a firm pays on its private debt contracts. He finds a negative relationship between the two variables.

Evidence on the relationship between disclosure and cost of capital is an important research subject, but the real challenge is to estimate the effect of increased disclosure on firm value. Empirical testing of the relationship between disclosure and firm value is very difficult and would require long term testing periods. However, given the importance and sensitivity of the discount rate and the presumably low cost of additional disclosure for most firms, the net effect of increased disclosure could be expected to be positive. So find Healy, Hutton and Palepu (1999) that firms expanding disclosure experience a significant simultaneous increase in stock price that are unrelated to current earnings performance. They find a 7% improvement in the first year of the disclosure increase and 8% in the following year. Similarly, results in Froidevaux (2002) for Switzerland also indicate that an increase in disclosure is followed by higher subsequent stock returns.

(5) Voluntary disclosure and manipulation of financial markets

According to Bushee and Leuz (2003) disclosure reduces the firm's cost of capital only if it is credible and not self-serving. Given a possible relationship between voluntary disclosure and firm value there is however a strong incentive for management to manipulate firm value through self-serving disclosure. Security regulators and the financial press often claim that firms engage in voluntary disclosure to artificially increase a firm's stock price. Indeed, a number of papers find that such disclosure appear to temporarily increase stock prices (e.g.,

Teoh, Welch and Wong, 1998a,b; Lang and Lundholm, 2000). Lang and Lundholm (2000), for example, examine corporate disclosure activity around seasoned equity offerings. They find that six months before the offering, firms dramatically increase their disclosure and therefore experience price increases prior to the offering. After the announcement of their intent to issue equity, they however suffer much larger price declines. This suggests that they might have used the disclosure increase to ‘hype the stock’.

Other research demonstrates a relationship between information asymmetry and earnings management (e.g., Imhoff and Thomas, 1994; Richardson, 1998; Lobo and Zhou, 2001). Managers who want to engage in earnings management have incentives to reduce disclosure because the effectiveness of their earnings management efforts depends on the level of information asymmetry between themselves and investors. Lobo and Zhou (2001) find, consistent with the theoretical prediction, a statistically significant negative relationship between corporate disclosure and earnings management. These results hold for all three components of corporate disclosure: annual disclosure, quarterly disclosure, and investor relation’s disclosure. Richardson (1998) finds that the level of information asymmetry, as measured by the bid-ask spread and the dispersion in analysts’ forecasts, is positively related to the degree of earnings management. Imhoff and Thomas (1994) provide evidence that analysts’ disclosure quality ratings are positively related to the conservatism of accounting methods and to the amount of detail underlying reported numbers.

These results suggest that firms engaging in less earnings management disclose more information and firms disclosing more information engage in less earnings management. It seems that managers of firms that disclose more information have less flexibility to manage earnings. An alternative way of stating this is that shareholders of firms that have more informative disclosure policies can more easily detect earnings management and management is therefore less likely to engage in such behavior. These results are consistent with one of the SEC’s objectives to encourage companies to disclose more information in order to reduce earnings management.

Determinants of voluntary disclosure

After examining the economic consequences of voluntary disclosure, it is important to examine its determinants. Studies indicate that the extent of corporate disclosure is a function of:

- *firm size*: Singhvi and Desai (1971), Buzby (1974), Firth (1979), Chow and Wong-Boren (1987), Susanto (1992), McKinnon and Dalimunthe (1993), Hossain, Tan, and Adams (1994);
- *the need for capital*: Malone, Fries and Jones (1993); Lang and Lundhom (2000), Schrand and Verrecchia (2002);
- *agency and proprietary costs*: Verrecchia (1983), Gibbins, Richardson, and Waterhouse (1992);
- *listing status*: Singhvi and Desai (1971), Meek and Gray (1989), and Hossain et al. (1994); Saudagaran and Biddle (1995);
- *profitability*: Singhvi and Desai (1971);
- *ownership status*: McKinnon and Dalimunthe (1993); Hossain et al. (1994);
- *industry type*: AIMR (1997).

Some relationships are however weak and not verified by other research. The most important and consistent determinants of disclosure appear to be size, the need for capital, the level of agency and proprietary cost, and listing status.

Size seems to be the most important determinant of the disclosure level. Large firms generally disclose more information than small firms. Firth (1979) and Chow and Wong-Boren (1987) hypothesize that larger companies have higher information asymmetry between managers and shareholders. Such asymmetry therefore arises higher agency costs and to reduce these agency costs, larger firms disclose more information than smaller firms. Furthermore, larger companies have stronger incentives to improve their corporate reputation and public image by disclosing more information, as they are better known in the public. McKinnon and Dalimunthe (1993) state that nondisclosure of large firms may be interpreted as bad news that could have a negative effect on the companies stock price. Large firms also attract the attention of governmental institutions and increased disclosure may reduce government intervention (Firth, 1979; Chow and Wong-Boren, 1987).

Another determinant of disclosure in relation to size is pointed out by Hong and Huang (2001). In contrast to existing theories, they suggest that small companies' management may decide on costly investment in investor relations such as voluntary disclosures not to improve the share price but to enhance the liquidity of their block of shares in case they have to sell large portion of their equity holdings. Mostly management and large shareholders benefit

from this disclosure investments while all shareholders carry its' costs. The characteristics of insiders such as liquidity needs, size of equity stakes may therefore also be determinants of the extent of voluntary disclosure across firms.

The need for capital is another important determinant of voluntary disclosure. Lang and Lundholm (2000) find that corporations increase their disclosure activity six months before an equity offering. However, they find no change in the frequency of forward-looking statements prior to the offering, what is discouraged by the securities law.

Underpricing in IPO's is a significant cost of raising capital that arises from information asymmetry at the IPO date. This cost can be potentially lowered by disclosure. Schrand and Verrecchia (2002) show that greater disclosure frequency in the pre-IPO period is associated with lower underpricing. The percentage of ownership retained by insiders and firm size positively affects a firm's disclosure frequency.

According to Verrecchia (1983) and Gibbins, Richardson, and Waterhouse (1992) the disclosure level can be explained by the *interaction of agency and proprietary costs*. Companies disclose information to reduce agency costs but by increasing the level of disclosure a firm may at the same time incur proprietary costs. Analytical research by Verrecchia (1983) and Feltham and Xie (1992) indicate that firms for which the benefit from the reduction of agency costs is less than the proprietary cost will withhold private information. Also Low (1996) provides evidence that disclosure is increasing with agency costs and decreasing with proprietary costs of disclosure.

Listing status is another major determinant of disclosure. Ball (1995) and Nobes (1998) demonstrate that the disclosure level is generally higher in 'equity' financed countries than in 'debt' financed countries. A listing, for example, by foreign companies on a US stock exchange leads to lower cost of capital for such companies (Saudagaran and Biddle, 1995). Ball et al. (2000) argue that firms in common law countries tend to use more equity financing and have therefore usually more extensive accounting standards and better financial disclosure than firms in code law countries.

Disclosure methods

After examining the need for disclosure, the market consequences of disclosure and the determinants of disclosure, we now examine the methods used to disclose information from the company to the investors.

Traditionally, firms disclose information on the general assembly and through the printed annual or quarterly reports. With the development of IT in recent years, companies started to report via the Internet. Managers are now faced with decisions about the costs and benefits of the different disclosure methods. Traditional paper-based disclosure has its limitations; due to the increase in global investments and investors, the paper form has become more expensive and limited in capacity to reach in a timely manner investors (Portes and Rey, 2000). Internet reporting can increase the usefulness of information in terms of comprehensiveness, accuracy, timeliness, frequency and relevance. It is more cost effective, fast, flexible in format, and accessible to all types of users worldwide (Debreceeny et al., 2002). The increased use of IT can thus reduce information asymmetry by its immediate dissemination and global reach of users.

On the other hand, Xiao (1996) points out that the increased use of IT could create a disclosure problem. He states that the increased amount of information provided for internal users due to greater use of IT is not likely to be incorporated on the same scale for communication with external users. This could result in increased and not reduced information asymmetry by the greater use of IT in corporations. To prevent further increase in the information asymmetry between internal and external users, companies should make greater use of IT for communication with external users. The SEC already stated that it would encourage the use of the Internet as a prime dissemination tool (SEC, 2001).

The optimal disclosure level

Concluding the above review, it seems that a generally applicable optimal level of disclosure does not exist. The optimal disclosure level depends on the costs and benefits for a specific company.

The *benefits* of increased disclosure include increased liquidity that leads to higher institutional ownership and higher analyst following, all contributing to lower cost of capital. Weighting against these benefits are three primary *costs of* increased disclosure, namely the

cost of preparing and disseminating the information, the cost of competitive disadvantage attributable to disclosure, and the potential cost of litigation caused by disclosure.

The cost of preparation and dissemination are generally not very high, especially for large companies. These costs are furthermore paid by the company, but a great number of users benefit from it. It thus makes sense economically that the company prepares the information users need to avoid multiple private collection of the same information. More important for most companies is the cost of competitive disadvantage from their disclosure. One must however consider that every company that suffers competitive disadvantage from disclosure could gain competitive advantage from comparable disclosure by competitors. This creates the concept of *net* competitive disadvantage from disclosure. According to FASB (2001) three factors appear to determine whether information creates competitive advantage or disadvantage: the type of information, the level of detail, and the timing of disclosure.

Finally, litigation costs include the cost of meritless suits attributable to disclosure. The effect of disclosure on litigation costs is however not obvious. Theoretically, more disclosure should lead to smaller claims because the stock market could form more realistic expectations of the company's future cash flows. The smaller the difference between the market price and the intrinsic value, the smaller will the share price decline from disappointed expectations. This smaller decline reduces the motivation for suits in court. Defending companies would also have better defenses because they provide adequate information of the firm's situation. For these reasons, we believe that litigation costs caused by meritless suits might actually decrease, rather than increase with increasing disclosure. Field et al. (2003) shows empirically that disclosure reduces litigation risk.

In determining the optimal level of disclosure, management must weight the specific cost components against the potential benefits of more disclosure for their company. An optimal disclosure level is not observed in practice because of differences in costs and benefits of disclosure for each individual company. Costs as well as benefits appear to be different depending on the method of disclosure and on the company characteristics identified earlier (size, need for capital, level of agency and proprietary cost, listing status, etc).

3. Investor Relation Web site Content Analysis of US firms

*“If I can’t find what I’m looking for on an IR Web site,
I’m on to the next company.”
Buy-side investor*

Investor relation is a traditional discipline of corporate communication and is defined as “the management of the relationship between a company with publicly traded securities and the holders or potential holders of such securities” (Investor Relations Society, 1997). Investor relation via Internet results in an investor relation Web site. On the corporate investor relations Web sites, all information assumed to be relevant to investors such as financial information, press releases or share price information can be pooled and hyperlinked.

Furthermore, direct communication between investors and the investor relations department via e-mail, mailing lists or Web casts can be provided. The company’s Web site is also often referred to for further information in traditional press releases and company reports (Ettredge, Richardson and Scholz, 2000). The Internet has thus become increasingly integrated into the investor relation activities of a firm. Internet reporting also gained on importance for analysts, who after the introduction of Reg. FD lost their advantage towards other investors in gaining information from companies’ management. A study conducted by Kraker & Company in 2001 finds that 44% of the analysts surveyed said they use corporate Web sites daily and 81% said they use them at least weekly. Increasingly also individual investors trading online rely on information presented on corporate Web sites (IASC, 1999). According to an IR Magazine report, 59% of individual investors use the Internet as their primary source for company news.

In this study, we extend the prior research on Internet disclosure by providing insights into the current dissemination of information in the investor relation section on corporate Web sites. Based on the content analysis, we establish a measure of Internet investor relation disclosure level, which will be further used in the fourth chapter to examine the relationship between investor relation Internet disclosure and the cost of equity capital. The relationship between the two variables will ultimately prove whether Internet disclosure is useful to investors.

This chapter consists of a short review of related research, the research design with sample selection and sample description, our methodology in analyzing the content of the investor relation Web sites, and finally the results of the content analysis.

3.1 Review of Related Research

The most common form of corporate disclosure examined in empirical accounting research is the annual report (e.g. Chow and Wong-Boren, 1987; Lang and Lundholm, 1993; Botosan, 1997; Hail, 2002). Even though the annual report is the main method of corporate communication, other types of disclosure, such as quarterly reports, press releases, conference calls, investor relation disclosure and increasingly Internet reporting, exist. In this study, we examine the most modern way of disclosure to investors: Internet reporting. We therefore review the literature of empirical studies concerning the practice of Internet-based corporate reporting.

Internet reporting is a recent phenomenon tied to the development of this medium in the mid 1990's. The early studies on Internet reporting from 1996 until 1998 mostly focus on the existence or non-existence of Web sites and also on financial information presented on the Web sites. Among these studies are e.g. Petravick and Gillett (1996), Louwers, Pasewark and Typo (1996), Lymer (1997), Gray and Debreceeny (1997), and Deller, Stubenrath and Weber (1998). These researches are of limited use for the current state of Internet reporting due to the rapid development of the Internet in recent years. As a representative example, we shortly present the results of the study of Deller et al. (1998). They analyze the Web sites of 100 US, 100 UK and 100 German firms representing each country's relevant stock market 100 index (S&P, FTSE and DAX). The study shows that 95% of the US, 85% of the UK and 76% of the German companies had Web sites. From that 91% of US companies, 72% of UK and 71% of German companies use the Web site for the investor relation section. Balance sheet data was supplied by 86% of the US, by 53% of the UK and by 46% of the German corporations. Other annual report items such as 'profit and loss account data' similarly varied across these three countries.

In a more recent study Ettredge, Richardson and Scholz (2002) examine the dissemination of information for investors on corporate Web sites based on a list of 4 required items and 12 voluntary information items. The most common item on a company's Web site is the

financial news releases found on 81% of the sites. Other voluntary items are transfer agent information⁴ (56%) and stock price links to other Web sites (50%). Required items include quarterly reports (57%), annual reports (53%) and links to SEC-EDGAR⁵ (51%). The authors find that three out of four required items are found on more than half of the sites, compared to only three out of 12 voluntary items. Therefore, there is greater uniformity in the presentation of required information relative to voluntary disclosures and, on average, more required items were found on each Web site than voluntary items.

There are also studies conducted by professional bodies such as the Association for Investment Management and Research (AIMR, 1998), the Canadian Institute of Chartered Accountants (CICA, 1999), the International Accounting Standards Committee (IASC, 1999) or the Financial Accounting Standards Board (FASB, 2000).

The IASC (1999) report, for example, examines 660 corporations in 22 countries around the world. The results show that 86% of the corporations were presented on the Internet and 62% of companies publish some form of financial reporting on their Web sites.

The FASB study (2000) surveys the Fortune 100 companies. They find that 99 companies have Web sites of which 93 have some form of investor relation section. Within this section more than 80% of the companies provide general corporate information and 73% provide financial summaries, fewer provide detailed financial reports such as an income statement (65%), MD&A (57%) or segmental reporting (28%). They find that 34 of the 292 possible items appear on more than 50 percent of the Web sites. The most popular financial and business reporting attribute is the chairman's message, which appears on 74% of the 99 Web sites.

There is also a number of studies focusing on firm characteristics rather than the content of disclosure on the Internet. Marston and Leow (1998) as well as Ashbaugh, Johnstone, and Warfield (1999) find that large and profitable firms are more likely to disclose their financial information on the Internet than other firms. Ashbaugh et al. further find that firm size is the only significant variable explaining the dissemination of either a comprehensive set of financial statements, a link to the annual report elsewhere on the Internet, or a link to the

⁴ The transfer agent is usually a commercial bank, appointed by a corporation, to maintain records of stock and bond owners (Dictionary of Finance and Investment Terms, 1998)

⁵ A link to the US Security and Exchange Commission's (SEC) Electronic Data Gathering, Analysis and Retrieval (EDGAR) system

SEC's EDGAR site. Ettredge, Richardson, and Scholz (1999) find that the amount of financial disclosure on corporate Web sites is positively related to firm size, to the need for new external equity capital and the quality of the firm's traditional corporate reporting practices. They also find that higher level of analyst following is associated with objective, extensive financial information, while a higher level of retail ownership is associated with more subjective, abbreviated financial data.

In a later study Ettredge, Richardson, and Scholz (2002) distinguish between voluntary and required information items and find that the presence of required items is significantly associated only with size and a proxy for information asymmetry, while voluntary information item disclosure is associated with size, information asymmetry, demand for external capital, and firms' traditional disclosures. They also find that Web site disclosure is not associated with firm performance, measured as returns for the preceding year, and that Web site disclosure is negatively associated with the correlation of earnings and returns, consistent with the traditional disclosure study from Lang and Lundholm (1993).

Debreceeny, Gray and Rahman (2002) examine financial reporting on the Internet in 22 countries and find that firm size, a listing of non-US companies on US securities markets and the level of technology are positively related to Internet financial disclosure. Growth prospects, intangibles and listing on foreign securities markets are negatively associated with Internet financial reporting.

In conclusion, even though there are many studies that examine Internet disclosure in one way or another, we have not found a study that provides a recent detailed comprehensive Internet disclosure content analysis. In the following study, we try to close this gap in the literature by examining the investor relation disclosure practices on corporate Web sites of 160 US companies in four different industries in 2003.

3.2 Research Design

The review of previous research showed that there is still a need for studies that examine the modern ways of disclosure such as Internet reporting. The purpose of our study is to examine in detail, which information US companies provide to investors on their Web sites. For that reason, we make a detailed content analysis of the information disclosed in the investor relation section of corporate Web sites.

Sample Selection and Descriptive Statistics for the Sample

Sample Selection

The sample chosen for the study covers 160 non-financial US companies in the year 2003. We had to limit our sample to this one year horizon because historical Web sites are generally unavailable.

Our sampling procedure takes into consideration that the researched companies would be in a country with relatively high use of Internet and well-established, developed, active, and well-regulated stock markets. For that reason, we chose the US market. We also consider that disclosure is size specific (e.g. Ashbaugh et al., 1999) and industry specific (AIMR, 1997) and distinguish explicitly between size and industry membership in our sample selection process. In this process, companies have been first selected based on their industry membership and second, within each industry, furthermore based on size. This sample selection procedure allows us not only to separate the effect of disclosure better from firm size but also to examine Internet disclosure differences across industries.

Companies in our sample are taken from the four main industries in the US; namely the healthcare, industrial goods and services, consumer discretionary, and the information technology industry. We limit our sample to these four industries because they seem to provide a representative sample of general Internet disclosure practices in the US including dynamic companies, stable companies, cyclical companies and non-cyclical companies.

Within each industry, we separate the sample into large and small companies based on market capitalization and sales. Market capitalization is an objective and commonly accepted criterion for size as it is based on the market value of the company. Sales corrects size as measured by market capitalization for highly priced growth companies that are fundamentally still rather small companies. For the exact size criteria for each industry see table 2 in the appendix.

Furthermore, all companies chosen for the sample are classified by Research Insight as non-bankrupt and non-ADR with their fiscal year ending in December. Each company must also be followed by a minimum of two analysts.

It proved however difficult to find an adequate number of companies comparable in both of these size measures in each industry. To conserve comparability, we therefore limited our sample in each of the four industries to 20 large and 20 small companies. The total number of

160 companies is conventional and adequate for this kind of research and represents a representative picture of the current state of investor relation Internet disclosure among large and small companies in the US market.⁶ As shown in table 1 in the appendix, six from these 160 companies had to be later excluded due to technological problems in the process of saving their Web sites.⁷ This reduces the sample to 154 US companies.

Descriptive Statistics for the Sample

Descriptive statistics for the sample firms is provided in table 3 in the appendix. To ensure consistency with our goal of isolating firm size from disclosure level, we present descriptive statistics for the full sample consisting of large and small companies together as well as for the two sub-samples of small and large companies. We also provide descriptive statistics for each of the four industries (table 3 in the appendix).

Consistent with our sample selection procedure the descriptive statistics shows that the two size measures, market value and sales, exhibit substantial cross-sectional variation in firm size between the large and small companies. Market capitalization (MVAL) for the full sample ranges from \$517 million at the first percentile to \$208 billion at the 99th percentile of the distribution. Mean market capitalization for the full sample is \$18.9 billion. Sales (SALES) for the full sample range from \$459 million at the first percentile to \$74 billion at the 99th percentile. Mean sales are about \$9.5 billion.

Within the sample of small and large companies the two size measures are comparable. Large companies have a market capitalization that ranges from slightly more than \$5 billion at the first percentile up to \$273 billion at the 99th percentile with a mean of \$36 billion (table 3 in the appendix). For sales the differences are smaller. These figures show that in the large sub-sample we are indeed examining large companies. Furthermore, we do believe that whether a large company has a market value of \$5 billion or \$200 billion makes little difference in relation to their level of Internet disclosure. Although it would be preferable to examine more narrow ranges of the size measures, this is not possible because not enough comparable large companies exist in the examined industries.

⁶ The IASC (1999) covered 30 companies in each of the 22 countries of their study. The FASB (2000) study examined only 100 US companies.

⁷ The companies excluded were one small company in the healthcare and the industrial goods and services industry, two large and two small companies in the consumer discretionary industry. No company had to be excluded in the IT industry.

The companies in the small companies sub-sample are more comparable in terms of both market value and sales as more comparable companies in each industry could be found. Market values (sales) range from \$503 (\$451) million at the first percentile to \$1733 (\$1675) million at the 99th percentile. We thus avoid micro caps with market capitalizations below \$500 million.

Methodology

In our study, first the Web sites have been located and saved for each company in the sample, then the information from the investor relation section was collected and finally the content of the investor relation section was analyzed.

Finding Web Sites

In order to find the Web sites of the companies in our sample, the search engine at 'www.google.com' was used. Only when a company could not be found in this way, we used the search engine at the respective stock exchange (www.NYSE.com or www.NASDAQ.com). As these exchanges provide hyperlinks to the companies' Web sites, all Web sites could be located in one way or the other.

Collection of Information

Over a period of three days, from the 9th to 11th August 2003, the investor relation Web sites of each company in the sample have been saved using the 'Web Archive, single file (*.mht)' featured in the Web browser. This procedure takes the risk that companies could have changed their Web sites over the data collection period and the collected data would not be perfectly comparable across companies. To mitigate this potential problem, the data was collected over a weekend, starting on Friday after the close of the New York stock exchange and ending on Sunday evening. Furthermore, the collection window was chosen not to interfere with the earnings season on Wall Street.

Before collecting information from the investor relation section of corporate Web sites, we established a list with different criteria based on findings of AICPA (1994), Botosan (1997), OECD (1999), Global Reporting Initiative (2002), FASB (2000), Ernst & Young (2000), Hail (2002) and Ettredge et al. (2002). We complemented the criteria from their research with items identified on several corporate Web sites in a first review, so that in fact we collected

all major information items available on a company's investor relation Web site. This procedure extends previous research and provides a comprehensive measure for the actual information content of the investor relation section. Our collection of items does not however include information in the annual report, quarterly report, the SEC statements, or the sustainability report because the purpose of the study is the content analysis of the investor Web site and not the content analysis of the above reports.

The item collection was based on visible information as presented on the Web sites in the investor relation section using a basic Web browser (Microsoft Internet Explorer Version 6.0).

Content Analysis

After we collected all major items from the investor relation section of each company's Web site, we categorized them into general items and information items. In the *general items* category we collected service or help items for investors such as whether the Web site has a visible link to the investor relation Web site, a site map, a search box, or contact information etc.

Information items refer to corporate information for investors. They are further divided into three information categories: the corporate information category, the financial and stock information category, and the management and board of directors' information category. This division not only simplifies the process of collecting information but also facilitates the analysis of the different information provided in the investor relation section.

The corporate information category contains information about the company such as company overview, products and services, operation's information, news etc. The financial and stock information category summarizes stock information, main financial information such as the annual or quarterly report, other financial information like financial ratios or dividend information, and also information in relation to analysts. The management and board of directors' information category contains besides the management and board of directors' biographies also corporate governance information and management discussion and outlook information.

In the content analysis, we collected information on a total of 94 information items and 8 general items. A detailed list of all 102 items is provided in table 4 in the appendix.

In the process of the content analysis, we checked whether or not each item from the list exists in the investor relation section of a company's Web site. For each item that could be found a one ('1') was assigned and if the information could not be found a zero ('0') was assigned. Similar approaches have been used in previous studies of Internet disclosure (e.g. FASB, 2000).

The general item 'IR Link' had to be investigated on a different basis. For this item a ('1') is assigned if the link to the investor relation section is visible on the first or second Web site without additionally opening other sections, a ('0') otherwise. We also include a link to the Web site of the SEC as a separate characteristic, because it includes many required filings, such as proxy information or insider transactions, which are not captured in the annual or quarterly SEC reports and are not always posted at the investor relation section. The direct link to the SEC web site also increases the reliability of the information. Here again the points are assigned based on existence or non-existence of the link to the SEC in the investor relation section.

Using the above rules, a company can score a maximum of 94 points if it provides all items in the three information items categories and a maximum of 8 points in the general item category and a minimum of zero if no items are provided. The score for each company in each of the four item categories is created by adding the scores of the individual items within that category. The final disclosure score, which captures the corporate Internet disclosure level, is the sum of the score in the three information item categories. The general item category is analyzed separately because it includes items such as help for investors and service items not directly related to the information itself.

This methodology allows and facilitates the comparison between companies within different information categories or even information items as well as the examination of the Internet disclosure level of a particular company or industry.

3.3 Empirical Results of the Content Analysis

In the following, we present the results of the categories of items we collected on the investor relation Web site distinguishing between size and industry. For a detailed list of collected items within each category see table 4 in appendix. We also present the twenty-five most and

least provided information items by large and small companies on their investor relation Web sites.

Internet disclosure in relation to size: Large versus small companies

Table 3.1 presents how many percent of the total items collected in each of the four categories, large and small firms provide on average on their Web sites.

The results of the *General Items* category show that large (small) firms provide on average 75.2% (61.3%) of all collected general items in the investor relation section. These high scores show that there should be enough ‘service’ or ‘help’ items for investors on the companies’ Web sites. So provide e.g. 86% of the large and small firms a separate link to the investor relation section (see table 4 in the appendix). The remaining 14% of all companies provide this link in other Web site sections such as ‘Company information’ or ‘About us’. The information for investors can therefore be rather easily found. This fact also shows that every company in our sample provides a link to the investor relation section on its Web site implying that every company has an investor relation section under the title ‘Investor Relations’ or under another equivalent name such as ‘Financials’, ‘Financial Information’, ‘Shareholder Information’ or ‘Investor Resources’. This clearly indicates the importance perceived by companies for the need to make investor relations information available on the Internet. One company in the consumer industry even designed the entire home page exclusively for investors.

Table 3.1: Results for the General and Information Items categories for large and small firms and the full sample

Category	Large Firms	Small Firms	Full Sample
General Items Category	75.2%	61.3%	68.3%
I. Corporate Information Category	19.7%	13.3%	16.6%
II. Financial and Stock Category	42.2%	38.9%	40.6%
III. Management and Board of Directors Category	26.8%	15.8%	21.3%
Total Average of I, II and III Categories	31.7%	25.6%	28.7%

For the detailed list of items in each category, see table 4 in the appendix.

Another interesting fact is that the correlation coefficient between the scores of the general items and the information items is positive and above 50% (table 4 in the appendix) indicating that companies providing more information also better facilitate the finding of the information and provide more service for the investors such as e-mail alert, information request, contact information etc.

In respect to the *information items*, table 3.1. shows that large firms provide on average more information than small firms in each category. This confirms previous findings that disclosure in general as well as Internet disclosure is size specific. From 94 possible information items examined on a company's Web site, large companies provide on average 31.7% of these items compared to small companies that provide only 25.6% of all the information items examined.

In general, most information is provided in the financial and stock category, where from the 43 information items examined, large (small) companies provide on average 42.2% (38.9%) of these items on their Web sites. However, large companies provide only 19.7% of the information items in the Corporate Information category and only 26.8% in the Management and Board of Directors category. Small companies do even worse in that respect. This is rather a poor result and indicates that investors might sometimes have problems with finding information within the latter two categories.

In the following, we present the results within each of the three information items categories.

Table 3.2: Corporate Information category results for large and small firms and the full sample

I. Corporate Information Category	Large Firms	Small Firms	Full Sample
1. Company Overview	20%	14.5%	17.3%
2. Products and Services	8.6%	3.9%	6.3%
3. Operations	3.8%	1.6%	2.7%
4. News	58.7%	45.8%	52.3%
5. Sustainability Information	9.9%	1.6%	5.8%
Average	19.7%	13.3%	16.6%

For the detailed list of items in each category, see table 4 in the appendix.

Table 3.2 shows that ‘News’ is the most provided information item (large firms 58.7%; small firms 45.8%) within the Corporate Information category followed by the ‘Company Overview’ (large firms 20%; small firms 14.5%). Sustainability, products and services information or information about operations is difficult to find on companies Web sites. Thus, companies make the impression to provide few company specific information that is usually difficult to obtain from other sources. This is a major obstacle for investors who base their investment decisions on fundamental analysis. It seems that companies orient their investor Web sites more towards institutional investors than individual investors. Institutional investors generally already own and know the stock and simply want to update their view about the company. This would explain why ‘News’ is besides the required SEC filings one of the most provided information item on the Web sites.

The information in the Financial and Stock Information category is better provided by companies as visible from table 3.3. Besides the SEC filings with 81%, companies in this category provide a large amount of financial information (large firms 41.2%; small firms 37.2%) such as the balance sheet, income statements, cash flow statements or the annual report. Companies, which do not provide their annual report in the investor relation section usually provide it in another section such as ‘Corporate Information’ or in ‘About Us’.

Table 3.3: Financial and Stock Information category results for large and small firms and the full sample

II. Financial and Stock Information Category	Large Firms	Small Firms	Full Sample
1. Main Financial Information	41.2%	37.2%	39.2%
2. SEC Filings	81%	81.1%	81%
3. Other Financial Information	25.1%	16.1%	20.6%
4. Analysts Information	37.9%	38%	38%
5. Stock Information	42.8%	40.2%	41.6%
Average	42.2%	38.9%	40.6%

For the detailed list of items in each category, see table 4 in the appendix.

Table 3.3 shows that analysts' information such as conference calls, presentations or event calendar and stock information such as stock quotes or charts, ticker symbol, stock exchanges on which company is quoted and historical price look up are widely available on the companies' Web sites (large firms 37.9%; small firms 38%). Most of this information can however also be found in other places on the Internet such as www.Yahoo.com or www.moneycentral.com. Again it seems that companies do best in providing information that is available elsewhere and do much worse in providing company specific information such as e.g. the management discussion of past data and outlook (see table 3.4).

In the Management and Board of Directors category, only 21.3% of the examined information is on average provided by the companies in our sample. Especially the small companies provide very little information in this category.

Table 3.4: Management and Board of Directors Information category results for large and small firms and the full sample

III. Management and Board of Directors Category	Large Firms	Small Firms	Full Sample
1. Management Discussion of Past Data and Outlook	5.8%	1.3%	3.6%
2. Executives and Management Information	27.7%	26.8%	27.3%
3. Board of Directors Information	26.9%	21.9%	24.5%
4. Corporate Governance	30.4%	9.5%	20.1%
Average	26.8%	15.8%	21.3%

For the detailed list of items in each category, see table 4 in the appendix.

Problematic for both institutional and individual investors is the fact that almost no forward looking information (see 'Management Forecast or Outlook' table 4, panel C in the appendix) is provided. This might be explained by a company's fear to voluntarily disclose such information to a wide range of users.⁸ Another reason could be that forward looking information is already discussed in the MD&A section of the annual report or the SEC filings and companies do not see the need to provide it separately on the Web sites.

⁸ Some companies show legal disclaimers for the person entering the Web site others even require prior registration or allow only registered analysts to retrieve certain information such as forward looking information.

Table 3.4 shows that the differences between large and small companies in the Management and Board of Directors category are on average not large except for 'Corporate Governance' information. Large companies provide 30.4% of the examined corporate governance items such as committee and charter information, governance guidelines, code of conduct and ethics, while small companies provide on average only a meager 9.5% of these information items. Large companies might have more quickly adapted their disclosure practices in relation to corporate governance after the recent accounting scandals.

Even though large (small) companies provide 26.8% (15.8%) of all examined items in the Management and Board of Directors category, information about 'Management Discussion of Past Financial Data and Outlook' are only rarely provided by both large (5.8%) and small companies (1.3%). This is very poor result indicating that investors might have problems finding this important information on corporate Web sites while analyzing the future prospects of a company.

In the tables 3.5 and 3.6, we present the results of the 25 most and least provided information items on a corporate Web site by large and small companies. The complete list of collected items from the investor relation Web site ordered based on its popularity on the corporate Web sites is provided in table 6, 7 and 8 in the appendix.

The tables show that SEC filings such as form 10K, 10Q or Section 16 and also archived SEC filings are among the most provided information items by large as well as by small companies. The same applies to the annual report, news or archived news. Historical annual reports are more often provided by large companies (82%) than by small companies (68%). Financial information such as stock quote, stock exchange on which the company is traded, the ticker symbol, and charts are often provided on the Web sites of both large and small companies.

Interesting is that in the 25 most provided items only large companies provide such items as corporate governance guidelines and earnings releases. On the other hand, small companies provide more financial items like financial ratios and the market capitalization. These information items are furthermore mostly presented by third party investor relation providers. The least provided information items by both large and small companies are transactions and relations among related parties, compensation of executives and management and director's compensation. Management forecasts and management discussion of past financial data,

historical segment data, stock repurchase information or debt information can also rarely be found on a company's Web site.

Table 3.5: Twenty-five most and least provided information items (large firm sub-sample)

Form 10K	97%	Management forecast or outlook	9%
Form 10Q	96%	Historical segment data	8%
Annual report	94%	Company investments (e.g. acquisitions)	8%
Archived SEC filings	92%	Directors independence standards	8%
Section 16 or link to it	91%	Commitment to stakeholders, mission	6%
News	90%	Debt information	6%
Stock quotes	87%	Age of executives and management	6%
Ticker symbol	86%	Company broad goal or objectives	5%
Historical annual report	82%	Industry specific information	5%
Stock exchanges on which company is registered	82%	Historical financial statements	5%
Charts	79%	Discription of the users of the products	4%
Archived news	74%	List of principle brands, registered trademarks	4%
Calender of events	74%	New products	4%
Proxy statement	74%	Partners	4%
Historical price lookup or link to it	67%	Stock repurchase information	4%
List of executives and management	60%	List of major shareholders	4%
Frequently Asked Question (FAQ)	59%	Description of property, plants and equipment	3%
List of Board of Directors members	59%	Number of shares held by management	3%
General description of the companys' business	56%	Management discussion of past financial data	3%
Analysts' presentations	56%	Compensation of executives and management	3%
Dividend information	53%	List of suppliers	1%
Corporate governance guidelines	51%	Distribution channels	1%
Dividend history	47%	Manufacturing or service production	1%
List of analysts	47%	Directors compensation	1%
Earnings releases	46%	Transactions or/and relations among related parties	1%

Table 3.6: Twenty-five most and least provided information items (small firm sub-sample)

Form 10K	97%	Partners	3%
Form 10Q	96%	Historical segment data	3%
Archived SEC filings	95%	Stock repurchase information	3%
Annual report	91%	Management forecast or outlook	3%
Section 16 or link to it	91%	Compensation of executives and management	3%
News	84%	Age of Board of Directors members	3%
Stock exchanges on which company is registered	84%	By-law	3%
Ticker symbol	82%	Description of property, plants and equipment	1%
Stock quotes	79%	Age of executives and management	1%
Archived news	75%	Certification of incorporation	1%
General description of the companys' business	68%	Industry specific information	0%
Historical annual report	68%	Discription of the users of the products	0%
Charts	67%	List of principle brands, registered trademarks	0%
List of analysts	63%	New products	0%
Conference calls	61%	List of suppliers	0%
List of executives and management	55%	Distribution channels	0%
Calender of events	53%	Manufacturing or service production	0%
List of Board of Directors members	50%	Economic sustainability information (wages, job creation, etc)	0%
Historical price lookup or link to it	49%	Environmental information	0%
Experience of executives and management	42%	Social information (health and safety, contributions)	0%
Important financial ratios	41%	Historical financial statements	0%
Market capitalization	41%	Debt information	0%
Frequently Asked Question (FAQ)	39%	Management discussion of past financial data	0%
Analysts' presentations	39%	Directors compensation	0%
Contact to analysts	38%	Transactions or/and relations among related parties	0%

Disclosure in relation to industries

The results within each of the four examined industries presented in table 3.7 show that IT companies provide on average the most information on their Web sites. This is not surprising given the fact that we are examining Internet disclosure; previous research showed that Internet disclosure is positively related to the level of a company's technology (Debrecey et al., 2002). IT companies also operate in a more difficult to understand and more dynamic environment and thus should benefit the most by disclosing information to reduce information asymmetry. Out of the 94 maximum points a company can score in all information items categories IT companies provide 31.1%, healthcare 30.9%, consumer companies 26.8% and industrial companies 26% of the total information items examined. This industry ranking holds also almost true, with one exception, in the different size sub-samples: large IT companies provide as much information as large healthcare companies, followed by industrial and consumer companies; small IT firms provide more information than small healthcare, consumer and industrial companies (table 3.8).

Table 3.7: Results of all item categories in relation to industries

Categories	Healthcare	Industrial	Consumer	IT	Average
General Items	71.2%	67.3%	60.8%	73.4%	68.3%
I. Corporate Information Category	17.4%	16%	14.2%	18.4%	16.6%
II. Financial and Stock Category	45%	35.3%	39%	43%	40.6%
III. Management and Board of Directors Category	20.7%	20.8%	19.4%	24.1%	21.3%
Total Average of Category I, II and III	30.9%	26%	26.8%	31.1%	28.7%

For the detailed list of items in each category, see table 5 in the appendix.

Comparing the results in each category in table 3.7, we find that also in the General Items category the IT companies score the highest. By looking at the information items categories in greater detail, it can be seen that the companies in the IT industry provide more corporate information than the companies in the other three industries. The reason for this might be that the more specialized and complicated a company's business, the more explanations for investors' are needed. Also in the management and board of directors' category the IT companies score the highest mainly because they provide more information in relation to

executives and management but also more management discussion of past data and outlook (see table 5 in the appendix). This could be explained by a more uncertain future of IT companies compared to other, more stable companies in the sample. In such an environment, the management and board of directors are relatively more important. IT companies are furthermore valued not based on their current financial performance but rather based on the future growth of the business and consequently more information about the future should be provided. This explains the high scores in the outlook category and the rather average disclosure score in the financial and stock category. IT companies do not need to highlight their current financial performance but more their future outlook. Furthermore, for most IT companies the financial situation in 2003 was not something that companies were proud to present to investors on their Web sites.

Healthcare companies are on average not far behind the IT companies in terms of Internet disclosure to investors. They perform even better than IT companies in the financial and stock information category. This might be explained by the fact that healthcare companies are on average more profitable and therefore pleased to present their financial information to investors.

After the healthcare industry, there is already a rather large disclosure gap to the next industries, the consumer discretionary and the industrial goods and services industry. The consumer discretionary companies provide in all categories more information than industrial companies except for the corporate information category. This could be because the Web sites of the companies in the consumer discretionary industry are more oriented towards customers than investors. There is a lot of information about products on the Web site but not especially prepared for investors and therefore usually not presented in the investor relation section. This indicates that the main goal of such a Web site is to inform customers and to sell products.

Table 3.8 confirms the previous findings that large companies disclose more information than small companies (with the exception of the financial and stock information category in the consumer discretionary industry). It is much easier for small companies to provide a lot of information in this category than in other categories, because small companies outsource almost all information in the financial and stock category to third party investor relation providers such as e.g. Thomson Financial.

Table 3.8: Results of all items categories in relation to industry and size

Categories	Healthcare		Industrial		Consumer		IT	
	Large	Small	Large	Small	Large	Small	Large	Small
General Items	79.4%	62.5%	80%	53.9%	63.2%	58.3%	76.9%	70%
I. Corporate Information Category	20%	14.7%	20.4%	11.5%	15.9%	12.5%	22.3%	14.5%
II. Financial and Stock Category	47.4%	42.5%	38.5%	31.9%	38.6%	39.4%	44.4%	41.6%
III. Management and Board of Directors Category	27.2%	14%	27.6%	13.7%	22%	16.9%	29.8%	18.5%
Total Average of I, II, III	34.3%	27.2%	30.4%	21.4%	27.8%	25.9%	34.3%	27.9%

For the detailed list of items in each category, see table 5 in the appendix.

Table 3.8. also shows that small companies generally provide less General Items such as a site map or a search box than large companies. This however can be partly explained by the fact that they also have smaller Web sites and thus less information to navigate through. They however also provide less e-mail alert service, information request or other shareholders service such as investment calculator or glossary than large companies.

Disclosure Scores

In the following table, we present the disclosure score that captures the corporate Internet disclosure level to investors. It is the sum of the scores in the three information item categories. This score does not include the general items but only the information items as the former only facilitate navigation, service or help investors whereas the latter contains true information.

In general, we find that there are large differences in the level of Internet disclosure across companies in the full sample and in both size sub-samples of large and small companies. The Internet disclosure score ranges in the full sample from a minimum of 6 points to a maximum of 56 points, in the sub-sample of large companies from 10 points to 56 points and in the sub-sample of small companies from 6 points to 45 points (table 3.9). The mean score for the full sample is 27 points showing that an average company scores about half the points of the best company. This again is also true for both size sub-samples. The mean scores for the small companies are lower than for the large companies in all three disclosure categories showing

that the lower disclosure level by small companies is consistent across different information items.

Table 3.9: Disclosure scores for the full sample, large and small companies and the different industries

	n	Mean	Min	Percentile			Max	Standard Deviation
				25%	50%	75%		
Full Sample								
Disclosure Score	154	26.99	6.00	19.25	27.50	33.00	56.00	10.33
Disclosure Category 1	154	4.64	0.00	3.00	4.00	6.00	19.00	3.01
Disclosure Category 2	154	17.45	4.00	13.00	17.00	22.00	30.00	6.05
Disclosure Category 3	154	4.91	0.00	1.00	4.00	8.00	15.00	4.12
Large Companies								
Disclosure Score	78	29.83	10.00	24.00	30.00	36.00	56.00	10.61
Disclosure Category 1	78	5.53	0.00	3.00	5.00	6.75	19.00	3.56
Disclosure Category 2	78	18.15	6.00	14.00	18.00	23.00	29.00	5.66
Disclosure Category 3	78	6.15	0.00	2.00	5.50	10.00	15.00	4.38
Small Companies								
Disclosure Score	76	24.08	6.00	17.00	24.00	31.25	45.00	9.24
Disclosure Category 1	76	3.72	0.00	2.00	4.00	5.00	9.00	1.96
Disclosure Category 2	76	16.72	4.00	12.50	16.00	22.00	30.00	6.38
Disclosure Category 3	76	3.63	0.00	1.00	3.00	6.25	12.00	3.41
Industries								
Score Healthcare	39	29.00	7.00	21.50	29.00	36.00	48.00	11.15
Score Industrial	39	24.46	6.00	16.00	24.00	32.00	52.00	10.91
Score Consumer	36	25.22	9.00	20.50	25.50	30.25	46.00	8.24
Score IT	40	29.20	11.00	24.75	30.00	35.25	56.00	10.28

Disclosure Category 1 refers to the Corporate Information category, Disclosure Category 2 is the Financial and Stock Information category and Disclosure Category 3 is the Management and Board of Directors category.

Disclosure score refers to the total disclosure score of all three disclosure categories. Scores of industries refer to the average disclosure scores of the companies in each industry.

The industry disclosure score ranking remains stable as previously described. Differences in disclosure levels are large in all categories and in all examined industries. The consumer industry shows the least level of difference in disclosure level followed by the healthcare industry, the IT industry and the industrial goods and services industry. The standard deviation of the disclosure score is lower for the small companies indicating less dispersion around the mean disclosure score for small companies. This can also be seen in the smaller difference between the minimal and maximal disclosure score in the small company sub-sample.

Conclusion

After examining the current stage of corporate Internet disclosure, we conclude that companies provide on their Web site for investors mostly financial information also available from other sources. Company specific information such as forward looking information or management discussion of past data are difficult to find on the Web sites. We find that only 6% (table 5 panel C in the appendix) of all 154 companies in our sample provide some kind of management forecast information and only 1% of companies provide some kind of management discussion of past financial data. There is also very little information about strategy, goals or objectives, description of properties or the company's industry.

These findings confirm the weaknesses of corporate disclosure identified already in 1994 by the Jenkins report or by AIMR (2000). Overall, it seems that the companies' management did not take serious the recommendations made in the Jenkins report to improve the usefulness of business reporting. Companies thus do not exploit the full potential of the Internet as a fast and cheap medium to disclose useful information to investors. Our results confirm a practical test of the Nielson Norman Group, a user-experience research firm, which shows that investors were unable to find much of the information they need on corporate IR Web sites. Only 21%, for example, were able to find the latest quarterly report, and 50% found the date for the next shareholder meeting.

In the next chapter, we examine whether the differences in the disclosure level do have an influence on the cost of equity capital and thus an economic consequence.

4. Investor Relation Internet Disclosure Level and the Cost of Equity Capital

In this study, we investigate the relationship between the disclosure level in the investor relation section on corporate Web sites and the cost of equity capital. This is at the same time an indirect test of the usefulness of the information in the investor relation Web site for investors. Only if the information is useful, and thus both relevant and reliable, we should find a negative relationship between the Internet disclosure level and the cost of equity capital.

We know of no previous research examining this relationship. With this paper, we contribute to the academic literature by evaluating the relation between the cost of equity capital and a modern way of disclosure. We choose investor relation Internet disclosure because Internet communication with investors is gaining more and more on importance, particularly after the passage of Reg. FD requiring companies to disclose all material information to all investors at the same time. The Internet is the only medium suited for that kind of requirement.

Theoretical evidence suggests a negative relationship between disclosure level and the cost of equity capital (Diamond and Verrecchia, 1991). Empirical research is however confronted with major methodological difficulties in developing a measure for the disclosure level and the cost of equity capital. Our approach is to estimate the implied cost of capital from market prices and analyst earnings forecasts using a comprehensive discounted cash flow model. For the disclosure level, we develop our own measure of investor relation Internet disclosure based on the content analysis from the previous chapter because no such measure is available from professional sources. We then regress the implied cost of equity capital on the disclosure level and correct for other potentially influential variables such as firm size and different risk factors.

The remainder of this chapter is organized as follows. First, we review previous research on the topic, then present the research design with the sample selection, develop our hypothesis, and describe the independent and dependent variables. Finally, we describe the empirical implementation of the methodology and show the results.

4.1 Review of Previous Research

As discussed earlier, economic theory suggests a negative relationship between the cost of equity capital and the level of corporate disclosure. Empirically, the relation is however still open for discussion because of not always consistent results of prior research examining the subject. Empirical studies are confronted with two major methodological problems: both the disclosure level and the cost of equity capital are difficult to observe and estimate. Given these methodological difficulties, the empirical disclosure literature generally examines the relationship between the cost of capital and disclosure in two different ways, a direct and an indirect way.

In the *indirect way* researchers look at the relationship between disclosure level and variables that affect the information asymmetry component of the cost of equity capital. As explained in the disclosure literature review in chapter 2, the cost of capital includes theoretically a component for the information risk for investors; the higher the information asymmetry between managers and investors, the higher is this risk component and the higher the cost of equity capital. Disclosure should reduce the information asymmetry component of the cost of capital and therefore also the cost of capital itself. The information asymmetry component of the cost of capital is usually measured with proxies such as the bid-ask spread, trading volume, analyst forecast dispersion or share price volatility (Welker, 1995; Healy, Hutton and Palepu, 1999; Leuz and Verrecchia, 2000). These studies, in overall, do support the theory that a higher disclosure level reduces information asymmetry.

The problematic of such an indirect measurement of the relationship between disclosure and the cost of capital is that besides the information asymmetry component, there are many other factors influencing the cost of capital. These other factors may also be influenced by disclosure and are difficult to separately identify and measure. The indirect studies can therefore not conclude that the cost of capital is lowered by better disclosure but rather only that information asymmetry is reduced which theoretically should lead to lower cost of capital. Nevertheless did most authors of prior research adopt the indirect way because appropriate cost of equity capital estimates are difficult to obtain.

The *direct way* does not examine the factors that are positively correlated with the cost of capital but rather the cost of capital itself. Examination of the relationship between disclosure level and directly estimated cost of equity capital offers the advantage that not only the effect but also the magnitude of the effect of disclosure level on the cost of equity capital can be

measured. It however requires a quantitative estimate of the difficult to observe cost of equity capital. Prior research has measured the cost of equity capital using either ex post or ex ante estimates. Using ex post estimates like past returns or the CAPM for the cost of capital is however conceptually problematic because they are not forward looking and consequently also yielded only disappointing empirical results (Fama and French, 1997; Elton, 1999).

Advances in model development in recent years allowed the use of the theoretically correct ex ante or market implied estimates of the cost of capital. Especially the development of the residual income model (RIM) by Ohlson (1995) built the base for a number of different research papers examining disclosure and the cost of capital (e.g. Botosan, 1997; Botosan and Plumlee, 2000; Hail, 2002; Chen et al., 2003).

Botosan (1997) was the first to overcome the difficulties of investigating the relationship between the cost of capital and disclosure level. She uses a complex version of the residual income model to estimate the cost of equity capital and builds her own measure of disclosure level based on the amount of voluntary information provided in the annual reports. She finds a significant negative relationship between the cost of equity capital and the disclosure level. Her results, for a sample of 122 firms from the machinery industry in the year 1990, hold however only for firms with low analysts' following, whereas for firms with high analysts' following she finds no such relation.

In a comprehensive extension of the research of Botosan (1997), Botosan and Plumlee (2000) investigate further the relationship between the cost of capital and three different types of disclosure provided by AIMR (annual report, quarterly and other published reports, and investor relation disclosure) for a larger sample over several years in different industries. For the estimation of the cost of equity capital, they use four alternative methods: (1) the classical dividend discount model, (2) the residual income valuation model used in Botosan (1997), (3) a finite horizon specification of the Gordon growth model (Gordon, 1997), and (4) the residual income model described in Gebhardt, Lee and Swaminathan (2001).

The results of the study are however mixed. The authors find that the cost of equity capital is decreasing in annual report disclosure level at the 5 to 8% level of statistical significance after controlling for firm size and market beta. The magnitude of the difference in cost of equity capital between the most and least forthcoming firms is approximately 0.5-1%. Surprisingly, they find a positive association between the cost of equity capital and the level of more timely disclosures such as in the quarterly report. They explain this contrary result with the opinion of managers' claiming that more timely disclosure increase cost of equity

capital, possibly through increased stock price volatility. Finally, they find no association between the cost of equity capital and the level of investor relations activities. They conclude additionally that aggregating across different disclosure types to a measure of total disclosure leads to no association with the cost of capital because the relationship depends on the type of disclosure.

Richardson and Welker (2001) examine the relationship between financial and social disclosure in Canada. They find that financial disclosure is significant negatively related to the cost of equity capital for firms with low analyst following. Contrary to expectations, the cost of equity capital is significant positive related to social disclosures.

Kothari and Short (2003) examine the impact of disclosure on the cost of equity capital estimated with the Fama and French three factor model (an ex post proxy for the cost of equity capital) in two ways: separating favorable and unfavorable disclosure and segregating disclosure by sources (corporate, analysts and business press disclosure). Overall, they find that favorable disclosure reduces the cost of capital, while the unfavorable increases it. In detail, they find that positive corporate and business press news do not materially affect cost of capital while negative news do. The impact of both positive and negative news by analysts on the cost of capital was less significant than for the other disclosure sources. Intuitively the results suggest that analysts have a credibility problem or are responding to market changes after they have taken place.

Hail (2002) examines the relationship between the cost of equity capital estimated with the residual income model proposed by Gebhardt et al. (2001) and the quality of voluntary disclosure provided in the annual report. For a cross-sectional sample of 73 non-financial Swiss companies, he finds a negative and highly significant association between the cost of equity capital and annual report disclosure. The magnitude is such that the most forthcoming firms enjoy about a 1.8% to 2.4% cost advantage over the least forthcoming firms. The findings persist after controlling for other potentially influential variables like risk characteristics and firm size. Hail concludes that one reason for the stronger relationship in Switzerland compared to the US might be the lower overall disclosure level in Switzerland.

Chen et al. (2003) also examine the relationship between disclosure level and the cost of equity capital in a relatively lower disclosure environment compared to the US. They examine 545 firm-year observations across Asia's nine emerging markets in the years 2000 and 2001. They again find that higher disclosure scores are associated with lower cost of equity capital after controlling for factors such as beta or size.

We have found no previous study that investigates the relationship between the more modern ways of disclosure such as Internet disclosure and the cost of equity capital.

4.2 Research Design and Hypothesis Development

In this empirical research, we examine the relationship between the disclosure level in the investor relation section on a company's Web site and the cost of equity capital. The restriction to this single source of corporate information is because prior research mostly evaluated traditional disclosure methods like annual report or financial disclosure and the cost of equity capital and found as expected a negative relationship (e.g. Botosan, 1997; Hail, 2002). The relationship between other disclosure methods and the cost of equity capital is however not so clear (Botosan and Plumlee, 2000; Richardson and Welker, 2001).

To evaluate the modern type of disclosure, we use our own measure of Internet disclosure level based on the previous comprehensive content analysis of corporate investor relation Web sites of US firms. Our study is also different in respect to estimating the cost of equity capital. We use a discounted cash flow (DCF) model as presented in Froidevaux (2004) to estimate an ex ante or market implied measure for the cost of equity capital. We choose this model because it makes less restrictive assumptions than the standard residual income models used in prior research (e.g. Gebhardt, 2001; Hail, 2002).

Like in most previous research, we use an OLS regression model to examine the relationship between the disclosure level and the implied cost of equity capital. We also correct in the regression for other potentially influential variables, e.g. risk characteristics and firm size, and correct for self-selection bias. In addition, we provide some preliminary evidence on the type of disclosure that seems to play an important role in reducing the cost of capital as well as on the magnitude of the effect.

Sample Selection and Descriptive Statistics for the Sample

Sample Selection

The researched sample is the one for which we obtained in the content analysis a disclosure measure. It consists of 154 non-financial US companies in the following four industries: the consumer discretionary, healthcare, industrial goods and services and information technology industries. Due to missing data or negative stock prices indicated by the DCF model, the cost

of equity capital could not be estimated for 13 companies.⁹ This reduces our sample to a total of 141 companies as presented in table 9 in the appendix.

The sample is limited to the year 2003 because historical corporate Web sites are not available. Prior research however indicates that disclosure policies appear to remain stable over time (Botosan, 1997) and thus the one year period is representative for the effect of disclosure on the cost of capital.

Prior research indicates that size is the dominant variable affecting both disclosure and the cost of capital. Compared to other studies (e.g. Botosan, 1997 or Hail, 2002), we selected our sample as comparable as possible in relation to size and separated in each industry large companies from small companies. The differentiation between large and small companies in the sample selection process allows us additionally to look at the relationship between the cost of capital and disclosure level for large and small company sub-samples separately. We believe that it is crucial to correct for size not only in the multiple regression model like most of the previous studies, but also already in the sample selection process. The total sample size represents a compromise so that the sample would be as large as possible but still comparable in terms of size.

Descriptive statistics for the sample

Descriptive statistics for sample firms is provided in table 10 in the appendix. To ensure consistency with our goal of isolating firm size from disclosure level and the cost of capital, we present descriptive statistics for the full sample and the two sub-samples of small and large companies separately.

The descriptive statistics show that the two size measures, market value (MVAL) and sales (SALES), indicate a substantial cross-sectional variation in firm size between the large and small companies. Market value of equity for the full sample ranges from \$513 million at the first percentile to \$223 billion at the 99th percentile of the distribution. Mean market value of equity for full sample is \$20 billion. Sales for the full sample ranges from \$458 million at the first percentile compared to \$149.8 billion at the 99th percentile of the distribution. Mean sales is \$12.5 billion.

⁹ The excluded companies are one small company in industrial goods and services, three small companies in the consumer discretionary industry, and four large and five small companies in the IT industry.

Consistent with our research design are the two size measures comparable within the small and large companies sub-samples. Large companies have all a market value above \$5 billion at the 1st percentile and small companies above \$500 million. The mean value for market capitalization (sales) is \$37.5 billion (\$23 billion) for large and \$856 million (\$925 million) for small companies.

Risk is another important characteristic for our sample. We use four different risk measures: beta, financial leverage, the current ratio and the price-to-earnings ratio. Market beta of the stock (BETA) is a measure for systematic risk used in many previous studies investigating the cost of equity capital and disclosure level (e.g Botosan, 1997; Chen et al., 2003).

Financial leverage is defined as the ratio of book value of debt to market value of outstanding equity (BVDMVE) because Modigliani and Miller (1958) nominate market leverage, not book leverage. The higher a company's relative debt position, the more likely it will face financial distress from defaulting on interest and principal payments and therefore the riskier the stock is. The current ratio (CR) is defined as the ratio of current assets to current liabilities and is a measure of short-term solvency. The lower the ratio, the higher is a company's short-term debt position compared to its short-term assets and therefore the higher is the probability of bankruptcy. The price-to-earnings ratio (PER) shows how much investors are willing to pay for one dollar of expected future earnings. Many studies have shown that PER is an important risk measure as stocks with low P/E ratios had historically higher average returns. The lower the ratio, the higher is therefore the risk.

The descriptive statistics for these measures are provided in table 10 in the appendix. The table shows that PER and BETA are comparable in both size sub-samples. The normally higher business risk of small companies is thus not reflected in beta; maybe because small companies compensate their higher business risk with lower financial risk (lower CR and BVDMVE ratios) than large companies. Overall, this makes the large and small sub-samples comparable in terms of risk.

The other variables describing our sample are the number of analysts following a specific firm (ANALYST) and our measure of Internet disclosure level (INTDISC). Table 10 in the appendix shows that the average company in our sample is followed by 14 analysts. An average small company is followed by 7 analysts and a large company by 19 analysts. The first percentile for analysts following is 2 for small and 6 for large companies.

The level of Internet disclosure (INTDISC) is obtained from the content analysis in the previous chapter. It ranges for the full sample from a minimum of 6 points to a maximum 56 points (table 11 in the appendix) showing substantial differences in disclosure across companies. The differences in the disclosure are also large in both size sub-samples. For large (small) companies the disclosure scores ranges from a minimum of 10 points (6 points) to maximum 56 points (45 points). Considering the different disclosure categories in the full sample, companies provide on average the most information in the financial and stock information category (18 points). The mean disclosure score is much lower at only 5 points in the company information and management and board of directors' category. The companies differ also substantially in their disclosure level within the three information categories. The scores in the company information category range from a minimum of 0 to maximum 19 points. The results are similar for the management and board of directors' category and range from 4 to 30 points in the financial and stock category. Complete descriptive statistics for the disclosure score is presented in the appendix in table 11.

Finally, our estimate of the cost of equity capital (IDR) ranges in the full sample from 8.42% at the first percentile to 17.95% at the 99th percentile (table 10 in the appendix). This range does change for the small respective large companies in such a way that small companies have about a one percentage point higher cost of capital in each percentile than the large companies. The absolute level of this range seems to be reasonable given historical size return premiums considering the fact that the sub-samples are rather comparable in terms of risk (see descriptive statistic). The mean (median) value for the full sample is 12.48% (12.31%). Given a risk free rate of 4.5% (20 year government bond yield on June 30th 2003), this translates into a risk premium of about 8%. This premium lies in line with the historical risk premium over the long-term, which is between 7% and 9% (Ibbotson, 2003).

More detailed descriptive statistics pertaining to the cost of capital is provided in table 12 in the appendix.

Hypothesis Development

As outlined in the review of previous research, economic theory as well as empirical studies suggest that higher disclosure levels should be accompanied by lower cost of equity capital. We examine this relationship with one special type of disclosure: the information in the investor relation section on the companies' Web sites. This modern type of disclosure needs to be examined because the investor relation Web site has become a major tool in

communication between the company and its investors. A higher investor relation Internet disclosure level should therefore lower the cost of equity capital. Consequently, we test empirically the following hypothesis:

H: There is a negative association between the level of disclosure in the investor relation section of a company's Web site and the implied cost of equity capital.

Methodology

There are two major methodological difficulties in empirically testing the above hypothesis. The first difficulty is the measurement and evaluation of the level of investor relation disclosure on the companies' Web sites. We establish our own Internet disclosure level measure (INTDISC) based on the content analysis of the investor relation section on companies' Web sites described in the previous chapter. The second major difficulty is to estimate the cost of equity capital. We use a comprehensive DCF valuation model as presented in Froidevaux (2004) for this purpose.

Considering previous research, we test our hypothesis by regressing the implied cost of equity capital (IDR) on market beta (BETA), the market value of outstanding equity (MVAL) and the disclosure score (INTDISC). This leads to the following multiple regression model to test our hypothesis:

$$IDR_i = \gamma_0 + \gamma_1 BETA_i + \gamma_2 MVAL_i + \gamma_3 INTDISC_i + \varepsilon_i$$

MVAL is included in the analysis because prior research documents a significant association between market value and both the cost of equity capital and the disclosure level (Botosan, 1997; Hail, 2002). It is included to control for the richness of a firm's information environment. BETA is included into the regression model to control for systematic risk. Systematic risk is an essential determinant of the cost of capital and disclosure is one way of mitigating such risk. Even though prior empirical research raises doubt about beta as a valid risk measure (e.g. Fama and French, 1992; Gebhardt et al. 2001), it is still the most accepted systematic risk measure used in the literature. In absence of a better risk-return model, we use consistent with all prior research papers on the subject, beta to control for risk¹⁰. INTDISC

¹⁰ In a specification test (table 18, panel A in the appendix) we replace beta with other risk proxies such as price-earnings-ratio (PER) and the ratio of book value of debt to market value of outstanding equity (BVD MVE).

refers to the total disclosure score obtained from the content analysis developed in the previous chapter. We do not include in the regression analysis following, an important proxy for information intermediation, to avoid possible multi-collinearity effects in the multiple regressions between analysts following and MVAL (see table 15 in the appendix).

Our regression could suffer from one more problem pointed out by Hail (2002): Lang and Lundholm (1993) showed that firms with the highest disclosure ratings tend also to show the highest contemporaneous earnings performance. Disclosure is thus not an isolated act but a management decision. The management of companies with currently higher performance might be more inclined to disclose more information as shown in Marston and Leow (1998) and Ashbaugh, Johnstone and Warfield (1999). This fact might result in a self-selection bias as firms increase disclosure when they are performing well. Consequently, the association between capital market variables such as the cost of equity capital and disclosure may be driven by firm performance rather than disclosure per se. We control for firm performance to isolate the impact of disclosure and correct for a potential self-selection bias as suggested in Healy et al. (1999). We control in a specification test of the above regression for a firm's performance by including the average ROE of the past five years into the regression equation. In another specification test of the regression model, we control also for industry membership as both the level of disclosure and the cost of capital are likely to be industry dependent (AIMR, 1997; Fama and French, 1997).

Variable Measurement

Two main variables have to be estimated in our regression model: as independent variable the disclosure score (INTDISC) and as dependent variable the cost of equity capital (IDR).

To assess a firm's disclosure level we focus on the amount of disclosure provided in the investor relation section on the companies' Web sites. For this reason, we establish our own measure of disclosure (INTDISC) based on the disclosure score as presented in the content analysis in chapter 3 of this dissertation.

We estimate the cost of equity capital (IDR) using the comprehensive DCF valuation model presented in Froidevaux (2004). Using the model, we compute the cost of equity capital as the internal rate of return that equates the intrinsic value of the firm to its current stock price. In other words, we estimate the rate of return that the market implicitly uses to discount the expected future cash flows of the firm. We estimate the implied rate of return for each firm

by substituting the expected cash flows obtained from analysts' forecasts and the current market price into the DCF model and solving the resulting equation using the Excel-solver. The measure obtained in this way is used as a proxy for the ex ante or implied cost of equity capital.

All financial data for the DCF model are of December 2002 and obtained from Research Insight. Earnings forecasts are of the end of July 2003 and obtained from I/B/E/S within the Research Insight database. Beta values as well as market values are both obtained also from Research Insight and represent the latest available numbers (June 2003). Prices are of August 8th 2003 from YAHOOfinance – the day before we started the collection of the information on the corporate Web sites.

4.3 Empirical Implementation

In this chapter, we present in greater detail how we measure empirically the two main variables used in our regression model and test their validity. First, the disclosure score is discussed followed by the cost of equity capital estimates.

Disclosure Score (INTDISC)

The purpose of our disclosure score is to measure the level of investor relation Internet disclosure. We base the score on all collected information items from the investor relation section on corporate Web sites obtained from the content analysis in chapter 3.2. The collected items are based on our own criteria found on the Web sites and on criteria suggested by previous research (e.g. AICPA, 1994; Botosan, 1997; FASB, 2000; Hail, 2002 or Ettredge et al., 2002). In order to establish this disclosure measure we analyze the saved Web sites from each of the 154 companies in our sample. The disclosure score is computed for each of the companies by awarding points to each information item disclosed in the investor relation section. The list of the information items is presented in the appendix table 4. We assigned a one ('1') if the information item was present in the investor relation section and a zero ('0') otherwise. The disclosure score is the sum of all points given for each information item from the three information categories. General items are excluded from the score because those are 'help' or 'service' items that facilitate finding information and do not represent information per se. The score is the sum of a total 96 information items divided into three information

item categories (see table 4 in the appendix for a detailed list of the categories and items). To avoid subjectivity we use no weighting so that every item is equally important. We are not using disclosure rank like the previous studies (e.g. Botosan, 1997 or Hail, 2002), but take the actual disclosure score as a more sensitive measure of disclosure level.

Descriptive statistics for disclosure score is provided in the appendix (table 11).

Validity of INTDISC

Disclosure level is not easily assessed because the development of a disclosure measure relies heavily on a person's subjective perception. In our case, we mitigate this problem by including in our disclosure score as much information as possible available in the investor relation section on the corporate Web site.

We assess the validity of our measure of disclosure level (INTDISC) in two different ways: (1) since reporting strategies are a management decision and coordinated within the company, the components of our different three disclosure categories should exhibit a positive relationship with one another (Lang and Lundholm, 1993), and (2) the disclosure score should be associated with other firm characteristics identified in prior research that proxy for disclosure level. We use the results of a Pearson correlation coefficient analysis and different regressions presented in table 4.1 and 4.2 to address these issues.

First, we examine the relationship between the overall company disclosure score INTDISC and its three disclosure components (INTDISC1, INTDISC2 and INTDISC3).¹¹ Each correlation coefficient is positive showing that the information categories are indeed highly correlated with each other. The significance is tested in regressions using the three categories as independent variables and the total measure of the three categories as dependent variable. Table 4.1 shows that the categories are not only positively related to each other but the relationship is also highly significant at more than the 1% level of statistical significance. This first test thus confirms the validity of our disclosure score.

In the second test, we examine several other variables where a relationship with disclosure level has already been shown empirically. Like Debreceny, Gray and Rahman (2002), we find a significant positive relationship between our Internet disclosure measure (INTDISC)

¹¹ INTDISC1 refers to the Corporate Information category, INTDISC2 to the Financial and Stock category and INTDISC3 to the Management and Board of Directors category.

and market value (MVAL) (see table 4.2) and no relationship between INTDISC and the price-to-book value ratio, firm's beta and book value of debts to market value of equity. As shown in table 4.2, we however find a significant positive relationship between INTDISC and return on equity (ROE). Lang and Lundholm (1993) show that firm performance and disclosure are positively related. Trading volume and analysts following are also significantly related to INTDISC but could not be included into the multiple regression because of multicollinearity with market value.

The level of statistical significance of the ROE variable can be increased to 1% in the simple regression and to 2.5% in the multiple regression by substituting disclosure score with disclosure rank used in previous studies (table 13 panel B in the appendix).

Therefore, the results of the two tests confirm that our measure of disclosure is valid and that it can be used in the regression model to test our hypothesis.

Table 4.1: Internal consistency of the disclosure score: Pearson correlation coefficients and p-values

Variable	INTDISC	INTDISC1	INTDISC2	INTDISC3
INTDISC	1	0.673	0.851	0.782
<i>p-value</i>	0	0.000 ***	0.000 ***	0.000 ***
INTDISC1		1	0.342	0.453
<i>p-value</i>		0	0.000 ***	0.000 ***
INTDISC2			1	0.437
<i>p-value</i>			0	0.000 ***
INTDISC3				1
<i>p-value</i>				0

*** indicates 1% statistical significance in the direction predicted. For description and measurement of INTDISC, INTDISC1, INTDISC2 and INTDISC3 see pages 91-92.

Table 4.2: Disclosure score and firm characteristics related to disclosure

	Intercept	MVAL (+)	ROE (+)	Adj. RSQ
<i>Panel A: Simple Regression (OLS)</i>				
Coefficient	9.290	4.929		0.130
<i>P-Value</i>	0.019	0.000 ***		
Coefficient	25.252		9.746	0.029
<i>P-Value</i>	0.000		0.023 **	
<i>Panel B: Multiple Regression (OLS)</i>				
Coefficient	8.911	4.639	6.875	0.142
<i>P-Value</i>	0.024	0.000 ***	0.092 *	

***, **, *, indicates 1%, 5%, and 10% statistical significance in the direction predicted. For description and measurement of MVAL and ROE see pages 91-92.

Implied cost of equity capital (IDR)

The cost of equity capital may be viewed as a summary measure of risk as perceived by equity investors (Gode and Mohanram, 2001) and is therefore the critical link between stock prices and risk. The theoretical best method to estimate the cost of equity capital is consequently a market-based ex ante measure. Consistent with most prior research, we therefore use a model that allows the determination of a market implied cost of equity capital.

Only a discounted cash flow (DCF) model can provide us with such an estimate. DCF models define the intrinsic value of common stock as the present value of its expected future cash flows. The value of common stock is therefore determined by the stream of expected cash flows in the nominator and the required rate of return or discount rate in the denominator of the DCF model. The DCF model is expressed mathematically as follows:

$$V_0 = \sum_{t=1}^n \frac{CF_t}{(1+k)^t}$$

V_0 = Value of the stock in $t=0$

CF = cash flow generated by the asset for the owner of the asset in period t ,

k = discount rate or cost of equity capital

n = number of years over which the asset will generate cash flows to investors

The implied cost of capital can be calculated by substituting cash flow forecasts and the current stock price into the above equation and then by solving for the discount rate. The result is an estimate for the cost of equity capital implied in current market prices.

The valuation literature (e.g. Stowe et al., 2002) proposes three different specifications of DCF models: dividend discount models (DDM), discounted free cash flow models (DFCF) and residual income models (RIM). They are all equivalent from a theoretical point of view and differ only in the definition of the relevant cash flow to discount (Lundholm and O'Keefe, 2001a, b).

Theoretically, the *dividend discount model* is often considered the most correct valuation model (Miller and Modigliani, 1961) but it is difficult to use in praxis because dividend forecasts are not directly available as analysts provide only earnings forecasts. Thus, one needs to introduce difficult assumptions about payout policies to forecast dividends. This is not attractive for two reasons. First, such payout assumptions are rarely empirically

descriptive, and second, given the Modigliani-Miller theorem, dividend policies should not affect market values.

Even though the dividend discount model and *discounted free cash flow models (DFCF)* are mathematically equivalent, DFCF models are more appealing than the dividend discounting models because they relate cash flows to stock prices with less restrictive assumptions. Although dividends are the cash flows actually paid out to stockholders, the free cash flow models are based on the cash flow available for distribution but not actually distributed to shareholders. Free cash flow (FCF) is the cash flow available to the company's owners after all operating expenses (including taxes), interest, and principal payments have been paid and the necessary investments in working capital and fixed capital have been made (Damodaran, 2001). It is called 'free' cash flow to signal that it is the amount of money free to distribute to equity investors without cannibalizing the future of the business.

Recently much of the research into the relation between market values and accounting numbers has used the *residual income model (RIM)* of Ohlson (1995) or its different versions based on the same principle. This is not different in the cost of capital literature. Many researchers (e.g. Botosan, 1997; Claus and Thomas, 1998; Botosan and Plumlee, 2000; Gebhardt et al., 2001; Gode and Mohanram, 2001) used RIM to estimate the implied cost of capital. At its theoretical core, residual income models relate market values to current book values plus the net present value of expected future residual income. Residual income is net income less a charge for common shareholder's opportunity cost in generating this net income (the cost of capital). It is based on the premise that in order to create value for its owners a firm must earn more on its total invested capital than the total cost for that capital.

With the increasing popularity of the concept, a lot of empirical research has been done on the relative attractiveness of the various DCF models. The models are conceptually equivalent but empirical studies that examine the relative superiority show mixed results on what model is practically the most valid. Bernard (1995), Penman and Sougiannis (1998), Francis et al. (2000) and Frankel and Lee (1998) show that the residual income models predict and explain stock prices better than the models based on discounting dividends or cash flows. On the other hand, empirical studies by Dechow, Hutton and Sloan (1999), Morel (1999), Myers (1999), Callen and Morel (2001) provide evidence that the residual income approach is of limited empirical validity. Plenborg (2000) concludes that in some cases the residual income approach yields more accurate firm value estimates while in others the

discounted cash flow approach is better depending on the degree of simplifying assumptions introduced into the various models.

In relation to estimating the cost of capital with the residual income model, most studies show that the model produces too low estimates for the cost of capital. Gebhardt et al. (2001) find for example a market implied risk premium that is around 2.5% compared to the historical average of 8% (Ibbotson, 2003). Other authors find even lower values (e.g. Claus and Thomas, 2001) and some even values close to zero (Fama and French, 2001; Jagannathan et al., 2001). The biggest problematic however is that the Gebhardt et al., (2001) paper representing “the state of the art in the literature” (Gode, 2001) in estimating the implied cost of equity capital with a RI model fails to document the validity of the RI model. They find for example in the multivariate analysis a positive (and not negative) but insignificant relationship between the cost of capital and size. The dispersion of analysts’ earnings forecasts, a measure of business risk, is significant but also with the intuitively wrong sign. This raises doubts about the ability of the model to provide a valid ex ante estimate for the cost of equity capital.

Although conceptually superior in relation to financial market based research, little evidence exists on the empirical performance of DFCF models. It was used only very recently in serious tests. Froidevaux (2004) shows that a comprehensive DFCF model can explain stock prices within a 10% range of market values and that it can be used in an investment strategy to generate substantial abnormal returns in the US stock market. Furthermore Lee, Ng and Swaminathan (2003) find DFCF model to be a valid method to estimate the ex ante cost of capital.

Considering the mixed empirical evidence on the relative superiority of the different valuation models, Rappaport and Mauboussin (2001) conclude that the long-term discounted free cash flow model captures the pricing mechanism of the stock market best because it directly reflects the cash flow available for distribution. Residual income models, on the other hand, rely on transformations of the original principle of discounted cash flow what makes it less useful in praxis. Residual income models are indeed not used very often in praxis. A survey of Demirakos, Strong, and Walker (2002) shows that 36% of all analysts’ reports they analyzed used DFCF model and only 2% of the analyzed reports used RIM.

Given the conceptual advantages of the DFCF model and the rather mixed empirical evidence regarding the RIM, we use in our study the discounted free cash flow approach. To estimate

the implied cost of equity capital, we adopt a version of the DFCF model presented in Froidevaux (2004). It is a spreadsheet-based comprehensive three-stage DFCF model that requires a lot of input data. It might therefore not be useful for large sample tests but for our sample of 141 companies it is well suited. That the degree of detail of a valuation model is important is shown in Sorensen and Williams (1985). They find that the intrinsic value estimates, and therefore also the cost of capital estimates, obtained from a valuation model improves considerably as the complexity of the valuation model used increases. Botosan and Plumlee (2000) find already a much simpler discounted dividend model to be useful in estimating the cost of capital. We believe therefore that the comprehensive model presented in Froidevaux (2004) provides even better estimates. The model we use is shortly described below. For a more detailed discussion of the model see Froidevaux (2004).

The DFCF model of Froidevaux (2004)

The DFCF model presented in Froidevaux (2004) assumes three stages based on findings of Sharpe, Alexander and Baily (1999) showing that economic growth falls generally into three stages: an initial growth period, a transition growth period and a long term mature growth period.

In the model, the initial growth period ranges between five and 15 years and requires a specific earnings forecast in the first two years and then a growth rate for earnings and other variables such as depreciation and amortization, capital expenditure and change in working capital for the remainder of the period.

After this initial period, the company's growth rate is expected to revert to the average growth rate of the economy. The economic law of diminishing returns and many empirical studies such as Little (1962) or Lev (1983) showed that a company cannot grow for extended periods of time faster than the industry in which it operates. This indicates that for most companies sales growth will eventually decelerate to the nominal GDP growth level what is captured in the intermediate fading period in the second stage of the model. Growth rates are faded from the forecasted first stage level to the stable long-term growth stage level.

The third and final long-term growth stage assumes that the company has reached its maturity stage and will grow only as fast as the general economy from there on until infinity, assuming though a going concern.

The sum of the discounted cash flows in all three stages equals the fair value of the stock.

Mathematically the model of Froidevaux (2004) looks as follows¹²; a graphical overview of the model is presented in the appendix, table 14.

$$P_0 = \frac{FCFE_1}{(1+k)} + \frac{FCFE_2}{(1+k)^2} + \sum_{t=3}^n \frac{FCFE_t}{(1+k)^t} + \sum_{t=n+1}^N \frac{FCFE_t}{(1+k)^t} + \sum_{t=N+1}^M \frac{FCFE_t}{(1+k)^t}$$

where

P_0 = Value of the stock in $t=0$

$FCFE_1$ = Free cash flow to equity in year 1

$FCFE_2$ = Free cash flow to equity in year 2

$FCFE_t$ = Free cash flow to equity in year t

k = Discount rate

n = Year ending stage 1

N = Year ending stage 2; $(N-n)$ is the length of stage 2

M = Year ending stage 3; $(M-N)$ is the length of stage 3

Implementing such a comprehensive DCF valuation model is accompanied by three major difficulties: (1) the relevant cash flow has to be defined, (2) cash flow growth rates need to be estimated, and (3) the length of each growth stage (the cash flow growth duration) has to be determined.

1. The relevant cash flow

As discussed earlier, the free cash flow is the relevant cash flow to discount in a DCF model. More specifically are we using the free cash flow to equity (FCFE) measured in the way proposed in Damodaran (2004):

Earnings per share

+/- Change in working capital * (1-debt financing proportion of working capital)

+ Depreciation & amortization * (1-debt financing proportion of depreciation
& amortization)

- Capital expenditures * (1-debt financing proportion of capital expenditure)

= **Free Cash Flow to Equity**

¹² The model presented in Froidevaux (2004) uses actually different discount rates in the three different stages. As we later solve for the discount rate we must assume only one discount rate for all stages.

For calculating FCFE, the earnings are very important as they account usually for the biggest portion of the final FCFE estimate and are the starting base for the earnings growth rate. We use an average of the realized earnings per share (EPS) from Research Insight and the consensus EPS forecast for one year ahead discounted for the forecasted earnings growth rate to better reflect repeatable rather than transitory EPS.

To these earnings, the change in working capital must be added or subtracted. This depends on whether more or less capital must be tied in the business to be used for future economic growth. Only the part financed by equity investors (1-debt financing proportion of working capital) will affect the free cash flow available for shareholders. In case the company finances the increase in working capital with more debt, no additional equity capital is needed and nothing will be subtracted.

To obtain free cash flow to equity, we further need to add back the non-cash expenses such as depreciation and amortization and subtract future capital expenditure needs. The difference between capital expenditure and depreciation and amortization is the amount of net investment needed to continue or grow the operations of the business. Like before only the part financed by equity investors will reduce the free cash flow to equity.

2. The growth rate of FCFE

We use analysts' forecasts of long-term earnings growth obtained from I/B/E/S as our earnings growth rate estimate for the high growth phase. Many researchers (e.g. Collins and Hopwood, 1980; Fried and Givoly, 1982; Brown and Rozeff, 1978) looked at analysts earnings forecasting capabilities compared to mechanical models and the results of their studies confirm that analysts are better forecasters than mechanical models, particularly in the short term. In the second phase of the model, earnings growth is not estimated anymore directly as no such forecasts are usually available from analysts. Instead a sustainable profit margin is estimated based on the average profit margin in the high growth phase. The profit margin from the end of the high growth phase is faded linearly to the sustainable profit margin over the length of the fading period. The growth rate for the stable third phase is assumed to be the average of the historic GDP growth and the historic earnings growth rate, both obtained from the bureau of economic activity.

The growth rates of the other components of FCFE, such as depreciation and amortization, capital expenditure and working capital are estimated based on averages of the latest five year

historical data and extrapolation of historical relationships between sales, capital expenditure, depreciation and working capital.

3. Cash flow growth duration

Another very important issue is the time horizon of expected growth. We use the same approaches as in Froidevaux (2004). He uses in his model three different methods to determine the duration of the first growth stage: (1) a relative growth duration approach, (2), an absolute growth duration approach, and (3) an economical growth duration approach. The first two approaches are derived from market prices and the third from fundamental variables.

The *relative growth duration* approach answers the question of how long the earnings of a growth company must grow at the expected high rate relative to a stock in the stable growth period (usually an index like the S&P500) to justify its prevailing P/E ratio. The relative growth duration concept was suggested by Holt (1962). He showed that if equal risk between a given security and a market security is assumed, the differences in P/E ratios can be explained by differential growth rates. Given the growth rates, the method of Holt allows the quantification of the length of the growth phase the market implies in the growth stock.

The *absolute growth duration approach* is suggested in Damodaran (2004) and calculates the cash flow growth duration as the number of years the company needs to grow free cash flow at the higher rate until the present value of all future cash flows equals the current market price of the stock.

The *economical growth duration approach* is conceptually based on Porter's (1980) work on competitive advantage. This approach uses economic factors that indicate in what life cycle the firm currently is, to find out how long it can be expected to continue growing at a higher rate. The economic factors used in Froidevaux (2004) are firm size, current earnings growth rate, ROE, P/E and PBR ratios etc. The approach assumes that the further away a company's economic factors are from the norm (in our case the S&P 500), the more time the factors need to approach this norm and the longer the company can grow at a higher rate.

The total length of the high growth phase has been fixed at a minimum of five years and a maximum of 15 years based on findings of Dechow (2001). The length of the second stage is determined in relation to the length of the first growth stage adjusted with ratios that proxy for the competitive situation of the company (e.g. sales growth, ROE, PBR). The minimum

fading period length is three years, the maximum 10 years. The length of the third stage has been fixed by Froidevaux (2004) at 150 years. He argues that this time period is a valid proxy for the theoretical infinite life of a company because in the third stage the discount rate is always higher than the FCFE growth rate. This leads to present values of future cash flows that are approaching zero before the end of the 150 years.

Validity of the Implied Cost of Equity Capital Estimates

To test the validity of our estimates of the implied cost of equity capital measure obtained from the model presented in Froidevaux (2004), we examine the relationship between the cost of capital and different firm characteristics related to the cost of capital. We test several firm characteristics and find that market capitalization (MVAL), book value of debt to market value of equity (BVDMVE), the current ratio (CR) and the price-to-earnings ratio (PER) are all significantly related to our measure of cost of capital.¹³ However only MVAL, CR and PER are statistically significant also in the multiple regression (see table 4.3). Pearson correlation coefficients for the variables examined are provided in table 15 in the appendix.

Table 4.3: Implied cost of equity capital and firm characteristics

	Intercept	MVAL (-)	BVDMVE (+)	CR (-)	PER (-)	Adj. RSQ
<i>Panel A: Simple Regression (OLS)</i>						
Coefficient	0.1074	-0.0076				0.0628
<i>P-Value</i>	<i>0.0000</i>	<i>0.0016 ***</i>				
Coefficient	0.0774		0.0065			0.0231
<i>P-Value</i>	<i>0.0000</i>		<i>0.0397 **</i>			
Coefficient	0.0860			-0.0041		0.0230
<i>P-Value</i>	<i>0.0000</i>			<i>0.0399 **</i>		
Coefficient	0.0910				-0.0006	0.0599
<i>P-Value</i>	<i>0.0000</i>				<i>0.0020 ***</i>	
<i>Panel B: Multiple Regression (OLS)</i>						
Coefficient	0.1235	-0.0088	0.0046	-0.0041	-0.0004	0.1472
<i>P-Value</i>	<i>0.0000</i>	<i>0.0004 ***</i>	<i>0.1310</i>	<i>0.0642 *</i>	<i>0.0710 *</i>	

***, **, * indicates 1%, 5%, and 10% significance in the direction predicted. For description and measurement of MVAL, BVDMVE, CR and PER see pages 91-92.

¹³ To minimize the influence of outliers when examining the relationship between these variables and the cost of capital, the book value of debt to market value of equity ratio and the current ratio is winsorized at the upper and lower 1% of observations and the price-to-earnings ratio at 5%.

Market capitalization (MVAL) is a measure of size and size has been shown to be one of the strongest determinants of the cost of equity capital (Gebhardt et al., 2001); small companies have higher cost of capital than large companies. Book value of debt to market value of equity (BVDMVE) is a measure for financial leverage. The higher the leverage, the higher is the risk and thus the higher the discount rate should be (Modigliani and Miller, 1958). Bhandari (1988) and Fama and French (1992) document empirically a positive relationship between leverage and stock returns. Similarly, the current ratio (CR) is a measure for short-term solvency. The higher the ratio, the higher is the financial risk of the company and the higher the discount rate should be. The price-to-earnings ratio (PER) has been shown for many years to be related to stock market returns. Lakonishok, Shleifer and Vishny (1994), and Dreman (1998) show that low P/E stocks earn positive abnormal returns relative to the market and high P/E stocks negative abnormal returns. Many authors (e.g. Fama and French, 1992) hypothesize therefore that PER is a risk proxy; the lower the ratio the higher the returns and therefore theoretically the higher the risk.

The results of our regression analysis thus validate our cost of capital measure.

We also test the relationship between beta and the cost of capital as beta is considered an important measure of systematic risk. We find that beta is not related to the cost of capital and does not even behave as predicted in the simple regression. Prior research papers however also had difficulties documenting this relationship empirically. Our results are comparable to those of Gebhardt et al. (2001) who also find a negative relationship between cost of capital and market beta even though the CAPM suggests an opposite relationship. Gebhardt et al. (2001) conclude that beta is only of limited importance in the market's assessment of a stock's systematic risk. In our case, the relationship between beta and cost of capital might be explained in part by the large number of small companies in the sample. The beta of small companies has long been viewed with skepticism by practitioners. Jegadeesh (1992) however finds a negative relationship between beta and realized returns even after adjusting for size.

Another explanation is related to deficiencies in the beta measure itself. Already in 1992 Fama and French (1992) conclude about beta that: "our tests do not support the most basic prediction of the SLB [Sharp-Lintner-Black CAPM] that average stock returns are positively related to market betas". The authors examine the relationship between betas and realized returns between 1963 and 1990 and find, like we, a negative but not significant relationship.

Another indicator for the validity of our cost of capital measure is the magnitude of the risk premium obtained from the cost of capital measure. Assuming a risk free rate of 4.5% (the 20 year US government bond at the end of June 2003), our average cost of capital measure of 12.5% indicates a risk premium of 8%. This is comparable to historical risk premium estimates. Ibbotson (2003) suggests that the historic equity risk premium lies in the region of 7-9% per year, depending on the specific data series examined. Being objective, the strength of this historic evidence has convinced many that the Ibbotson estimate is the best available proxy for the equity premium (Welch, 2000).

Prior researchers had much more difficulties finding a valid cost of capital measure. For example, the mean value of the cost of capital in Hail (2002) is only 6.18% while in Botosan (1997) it is 20.1%. Compared to those estimates our cost of capital appears to be reasonable which confirms the validity of our cost of capital measure.

4.4 Empirical Results

The results of our study for a sample of 141 non-financial US companies in four different industries in 2003 show a negative and highly significant relation between the implied cost of equity capital and the level of investor relation Internet disclosure. The results hold after taking into account other firm characteristics such as firm size and different risk measures. After correcting for self-selection bias, the relationship remains stable at the same level of statistical significance.

In more detail, we now first present the results of the regression model for the full sample of large and small companies together, followed by the results for the large and small companies separately, and the results in relation to each disclosure category as well as to each industry.

Empirical Results of the Regression Model of the Main Hypothesis

In our study, we examine the relationship between the implied cost of the equity capital and the investor relation section disclosure level. For this purpose, we formulated the following hypothesis (see chapter 4.2):

H: There is a negative association between the level of disclosure in the investor relation section of a company's Web site and the implied cost of equity capital.

We conducted a simple and multiple regression analysis to test this hypothesis empirically. In both regressions, we find a highly significant negative relationship between the cost of equity capital and the investor relation section disclosure level. The results of the simple regression in table 4.4 panel A suggest that for all 141 companies in the sample, the cost of capital is negatively associated with the Internet disclosure level at the 1% level of statistical significance.

The simple regression results should however be interpreted cautiously as we do not correct for differences in firm characteristics. To correct for these, we test our hypothesis also by regressing the implied cost of equity capital (IDR) on market beta (BETA), the market value of equity (MVAL) and the Internet disclosure score (INTDISC). This leads to the following multiple regression model:

$$IDR_i = \gamma_0 + \gamma_1 BETA_i + \gamma_2 MVAL_i + \gamma_3 INTDISC_i + \varepsilon_i$$

The results of this multiple regression are presented in table 4.4 panel B confirm the result of the simple regression that the cost of capital is negatively related to the investor relation section disclosure level. The results are only slightly less significant at the 1.6% level of statistical significance.

Table 4.4: Simple and multiple regression results of the implied cost of equity capital on disclosure score (full sample)¹⁴

	Intercept	INTDISC (-)	MVAL (-)	BETA (+)	Adj. RSQ
<i>Panel A: Simple Regression (OLS)</i>					
Coefficient	0.094433431	-0.000545295			0.056368
P-Value	1.67233E-38	0.002657664 ***			
<i>Panel B: Multiple Regression (OLS)</i>					
Coefficient	0.093902928	-0.000464253	-5.87155E-08	-0.000604	0.053981
P-Value	9.28979E-34	0.015549486 **	0.204494944	0.861026	

***, **, indicates 1%, and 5% significance in the direction predicted. For description and measurement of MVAL, BETA, and INTDISC see pages 91-92.

Table 4.4 shows that the coefficients of INTDISC and MVAL behave as predicted. We note however that our size adjustment variable MVAL is not significant in the multiple regression.

¹⁴ Technically, the intercept coefficients relate in all results to the risk premium and not to the cost of equity capital.

We attribute this to other omitted variables in the regression and to the fact that market value is correlated with the cost of capital as well with disclosure (table 15 and 13 in the appendix). By examining a less sensitive disclosure measure such as INTDISCMOD in a specification test (see table 18, panel E), we find that size becomes significant at 5% while increasing the statistical significance of the disclosure score.

Again, beta is not significant in the regression and does not behave as predicted. This is however not surprising because we did not find a significant relationship between beta and the cost of capital previously. Our result is consistent with prior research, which raised doubt about the validity of beta as a risk measure (e.g. Gebhardt et al., 2001). In a later specification test, we substitute beta with leverage (BVDMVE) and the price-to-earnings ratio (PER) to control for risk and find these variables to be significant (table 18, panel A in the appendix).

The coefficient on our disclosure score indicates the presence of about a 46 basis point (BP) cost difference for a disclosure score difference of 10 points. The 50 disclosure point difference between the most and the least forthcoming firms¹⁵ would thus translate into a difference in the cost of equity capital of 2.32%. These findings are not only statistically significant but also economically relevant.

According to Bushee and Leuz (2003) “disclosures reduce the firm’s cost of capital only if it is useful and not self-serving”. Our results thus implicitly show that the information in the investor relation section is useful and thus reliable and relevant for investors. The results indicate that a company could possibly reduce its cost of equity capital by 0.5% by, for example, providing a detailed biography of the executives and the board of directors.

By looking at the individual information categories, we can further see what kind of information is the most useful and has the strongest relationship with the cost of capital.

Empirical Results for the Individual Disclosure Categories

In the following, we provide some evidence on the type of Internet disclosure that seems to play an important role in reducing the cost of equity capital.

The INTDISC1, INTDISC2 and INTDISC3 coefficient values in table 4.5 indicate that the Company Information category (represented by the variable INTDISC1) reduces the cost of

¹⁵ See the difference between the minimum and maximum disclosure score (full sample) in table 3.9 in chapter 3.3

capital the most, followed by the Management and Board of Directors category (variable INTDISC3). The difference in the disclosure level between the most and least forthcoming firms in the Company Information category results in a difference in the cost of capital of 2.64%. In the Management and Board of Directors category, the same cost reduction would be 1.65%. The results of the relationship between the Financial and Stock Information category (variable INTDISC2) and the cost of equity capital are negative but not significant, showing that this kind of information provided in the investor relation section is the least useful to investors. One explanation here could be that financial and stock information are easily available from other sources while company and management information is more difficult to find anywhere else. Problematic is this fact because we find in the content analysis of the previous chapter that both large and small companies do best in providing information in exactly the Financial and Stock Information category having now the least influence on the cost of capital. In other words, companies provide the most information in the category that is the least useful to investors.

Table 4.5: Regression of the implied cost of equity capital on market value, beta and the three different disclosure category scores

	Intercept	MVAL (-)	BETA (+)	INTDISC1 (-)	INTDISC2 (-)	INTDISC3 (-)	Adj. RSQ
<i>Panel A: Simple Regression (OLS)</i>							
Coefficient	0.08759			-0.00169			0.04631
P-Value	0.00000			0.00597 ***			
Coefficient	0.08964				-0.00058		0.01641
P-Value	0.00000				0.06994 *		
Coefficient	0.08613					-0.00131	0.05038
P-Value	0.00000					0.00430 ***	
<i>Panel B: Multiple Regression (OLS)</i>							
Coefficient	0.08823	-6.16E-08	-0.00098	-0.00139			0.04516
P-Value	0.00000	0.18711	0.77793	0.03222 **			
Coefficient	0.09076	-8.46E-08	-0.00136		-0.00048		0.02864
P-Value	0.00000	0.06076 *	0.69542		0.13406		
Coefficient	0.08624	-5.99E-08	0.00007			-0.00110	0.04811
P-Value	0.00000	0.19950	0.98450			0.02521 **	

***, **, * indicates 1%, 5% and 10% statistical significance in the direction predicted. For description and measurement of MVAL, BETA, INTDISC1, INTDISC2 and INTDISC3 see pages 91-92.

Considering these results, companies should provide more information from the Corporate Information category and Management and Board of Directors Information category (listed in table 4, panel A and C in the appendix) in the investor relation section to lower their cost of capital. As an example, a company could lower its cost of capital by as much as 1% by providing a general description of the business including its business units together with its objectives and strategy and a list with description of its products and services.

Empirical Results of the Regression Model for the Sub-Samples of Large and Small Companies

After having found a significant relationship between the cost of equity capital and the level of Internet disclosure for the full sample, we now look at this relationship for large and small companies separately.

For the *large company sub-sample* the simple regression indicates a negative relationship between disclosure level and the cost of capital, significant at the 5% level (table 4.6 panel A). In the multiple regression that adjusts for size (MVAL) and beta (BETA), the results are negative as well but significant only at 7.6%. That the relationship is less significant than for the full sample could be partly explained by the fact that the size of the sample is reduced by half. The significance level could however be increased to 4% by simply excluding the three auto companies from our large company sub-sample (table 16 in the appendix). These companies have all high disclosure scores but due to the cyclical nature of their businesses very high cost of capital and are thus distorting the relationship between the two variables in the sample.

The coefficient of the disclosure variable INTDISC are similar to the ones from the full sample and thus the magnitude of the relationship is comparable to the magnitude of the full sample.

The results of the *sub-sample of small companies* are negative but not significant in the simple and multiple regression (table 4.6 panel B). Those weaker results might explain why small companies provide less information; for them the benefit in terms of lower cost of capital might not outweigh the cost of disclosure (including the proprietary costs). The cost of capital of such firms is determined more by other factors such as business or financial risk or the quality of management rather than their level of Internet disclosure.

Not surprisingly is the magnitude of the effect lower as well. A 10 point increase in disclosure would only result in a 25 BP reduction in the cost of capital. Given the already higher cost of capital for small firms, this effect is rather neglectable.

It might however also be that for small companies a similar relationship between the disclosure level and the cost of capital exists as for large companies but that our cost of capital measure is less valid for small companies. It proved to be difficult to estimate the cost of capital for small and volatile companies.

Table 4.6: Multiple regression of implied cost of capital on market value, beta and disclosure score for the large and small company sub-samples

Panel A: Sub-sample of large companies

	Intercept	INTDISC (-)	MVAL (-)	BETA (+)	Adj. RSQ
<i>Simple Regression (OLS)</i>					
Coefficient	0.091093543	-0.000517231			0.043831
P-Value	6.79617E-18	0.04063629 **			
<i>Multiple Regression (OLS)</i>					
Coefficient	0.088936282	-0.000471727	-3.61504E-08	0.002566	0.026604
P-Value	4.26158E-15	0.07636725 *	0.486293543	0.625562	

Panel B: Sub-sample of small companies

	Intercept	INTDISC (-)	MVAL (-)	BETA (+)	Adj. RSQ
<i>Simple Regression (OLS)</i>					
Coefficient	0.093205778	-0.000379364			0.011521
P-Value	2.57909E-19	0.188119576			
<i>Multiple Regression (OLS)</i>					
Coefficient	0.106851271	-0.0002514	-1.58551E-05	-0.003767	0.038437
P-Value	1.06512E-15	0.387925823	0.077683707 *	0.406833	

**, * indicates 5% and 10% statistical significance in the direction predicted. For description and measurement of MVAL, BETA and INTDISC see pages 91-92.

Overall, our findings are surprising considering the results in Botosan (1997). She actually finds the opposite disclosure effect: small companies (companies with low analysts following) show a significant relationship between the cost of capital and the disclosure level while large companies do not. This contradiction could be partly explained by the different type of disclosure examined. Botosan focused on disclosure in annual reports while we examined information in investor relation sections of corporate Web sites. For small companies the annual report could be the best and most reliable source of information while for large companies additional information on the Web site seems to be more important for investors.

These explanations are however rather hypothetical and our results are based on rather small samples. The importance of sample size is also illustrated by the fact that when the entire industrial goods and services industry is excluded from the small firm sub-sample, the results become again statistically significant at 5% (see appendix, table 17). This industry was the only one showing a positive relationship between the cost of equity capital and the disclosure

level. We can partly explain this fact with a double outlier in this industry: the company with the second highest disclosure score has also the second highest risk premium. Excluding only this company would again confirm our previous negative relationship between the Internet disclosure level and the cost of capital in the industrial industry (although not at an acceptable level of statistical significance). This fact highlights the importance of large sample tests to show a reliable relationship between two sensitive variables such as the cost of capital and disclosure.

Specification Tests

Having noticed the sensitivity of the examined relationship between the disclosure level and the cost of equity capital, we make different specification tests to determine the stability and thus the quality of the previous results for the full sample. To do this, we modify our previous regression model in five different ways: (1) by replacing BETA with different risk measures in the multiple regression, (2) by including industry membership (INDUM) in the regression, (3) by including return on equity (ROE) into the multiple regression to adjust for self selection bias, (4) by using disclosure rank (INTDISCRANK) instead of disclosure score, (5) by looking at above/below average disclosure (INTDISCMOD) rather than the disclosure score.

In the *first specification test*, we examine the effect of the risk adjustment factor. We find in the validity test of the cost of capital estimates that beta is not statistically significant related to our measure of the cost of equity capital (IDR); the coefficient does not even have the right direction. Even though there are explanations for that fact, we examine the effect of replacing BETA with risk variables that have shown a significant relationship to our cost of capital measure: financial leverage (BVDMVE) and the price-to-earnings ratio (PER). The results are insensitive to these changes in the multiple regression and remain statistically significant at around the 1.5% level with a very similar coefficient for INTDISC (table 18 in the appendix, panel A).

In the *second specification test*, we test the effect of industry membership (INDUM) on the relationship between cost of capital and disclosure level. Prior research (e.g. AIMR, 1997; Gebhardt, 2001) shows that both disclosure level and the cost of capital is industry dependent. As in Gode et al. (2001), we thus include the average risk premium for each industry into the original multiple regression model to correct for industry membership. The

additional adjustment for industry membership does not affect the coefficient or the level of statistical significance of the main hypothesis test (table 18 in the appendix, panel B). The *third specification test* corrects the relationship for self-selection bias. Companies that have currently good financial results might be tempted to disclose them more openly while companies with currently bad financial results tend to hide them more than disclose them creating a selection bias in the data. We correct for self-selection bias as indicated in Healy and Palepu (2001) by including ROE into the regression model. The results are however again not impacted by the adjustment in a meaningful way (appendix table 18, panel C).

In the *fourth specification test*, we measure the level of disclosure differently. Like in previous research (e.g. Botosan, 1997 and Hail, 2002) we rank the disclosure score and regress the cost of equity capital on the disclosure rank (INTDISCRANK) rather than the score itself. Measuring disclosure level with rank instead of score reduces the sensitivity of the disclosure measure. The results improve in both the simple and the multiple regression and become significant at the 1% level (table 18 in the appendix, panel D). We can however now only conclude that by improving its disclosure rank, a company can reduce the cost of capital.

In the *fifth and final specification test*, we replace the disclosure score with an even less sensitive measure of disclosure level than disclosure rank, determining only whether a company has above or below average disclosure (INTDISCMOD). It therefore shows whether above (below) average disclosure results in lower (higher) cost of equity capital. This measure is rather insensitive to outliers and thus examines whether the good results found in the main hypothesis test are caused by only a few outliers. The results do not confirm this. The direction remains the same and the level of statistical significance increases to 1% (table 18 in the appendix, panel E). Now even our size measure (MVAL) is significant in the multiple regression. In addition, by replacing beta (BETA) with the price-to-earnings ratio (PER) also our risk adjustment variable becomes significant (table 18 in the appendix, panel E) so that all variables in the multiple regression are now significant at 5% or better.

Overall, the specification tests show a remarkable stability of the results. The first three tests show that the relationship remains stable for different specifications of the adjusting variables in the regression model. The last two specification tests indicate that the relationship between the cost of equity capital and Internet disclosure level is also robust for changes in the disclosure measure. For these reasons, the Internet disclosure level should be considered to be statistically negative significant related to the implied cost of equity capital for the companies in our sample.

Industry Results

The main objective of this study was to examine the relationship between disclosure level and the cost of equity capital for the whole sample and not necessarily for the industry specific sub-samples. The industry samples are too small (between 31-39 companies, see table 9 panel B in the appendix) to show any level of significant relationship.

Nevertheless, we examine the relationship between the cost of equity capital and disclosure in the four different industries. Interesting is the fact that for each industry, the relationship between cost of capital and disclosure level is indeed negative in both simple and multiple regression models (table 4.7). Few results are however significant at a scientifically acceptable level.

Table 4.7 Regression of the implied cost of capital on market value, beta and the industry disclosure scores

	Intercept	MVAL (-)	BETA (+)	INTDISCH (-)	INTDISCC (-)	INTDISCI (-)	INTDISCIT (-)	Adj. RSQ
<i>Panel A: Simple Regression (OLS)</i>								
Coefficient	0.0935			-0.0004				0.0508
P-Value	0.0000			0.0898 *				
Coefficient	0.1055				-0.0008			0.0457
P-Value	0.0000				0.1216			
Coefficient	0.0862					-0.0006		0.0408
P-Value	0.0000					0.1174		
Coefficient	0.1019						-0.0008	0.0731
P-Value	0.0000						0.0768 *	
<i>Panel B: Multiple Regression (OLS)</i>								
Coefficient	0.0991	-3.41E-08	-0.0118	-0.0004				0.0624
P-Value	0.0000	0.5251	0.1602	0.1278				
Coefficient	0.1042	-8.02E-08	0.0033		-0.0008			-0.0156
P-Value	0.0000	0.8019	0.7869		0.1266			
Coefficient	0.0779	-8.02E-08	0.0096			-0.0004		0.0436
P-Value	0.0000	0.3905	0.2526			0.2926		
Coefficient	0.1090	-1.19E-07	-0.0063				-0.0006	0.0652
P-Value	0.0000	0.3190	0.3984				0.1999	

* indicates 10% statistical significance in the direction predicted. For description and measurement of the MVAL, BETA, INTDISCH, INTDISCC, INTDISCI and INTDISCIT see pages 91-92.

Table 4.7 shows that disclosure has the most influence on the cost of equity capital in the consumer discretionary and IT industry. This fact indicates that especially companies in the consumer discretionary industry should improve their disclosure. Currently their disclosure level is among the lowest of the industries examined while they would profit the most by increasing it. The relatively high coefficient of the IT industry helps explain why IT companies provide the most information as found in our content analysis study. The reward of disclosing more in that industry is above average.

5. Results, Implications and Limitations

Empirical research into the relation between disclosure level and the cost of equity capital is limited because the disclosure level and the cost of equity capital are difficult to measure reliably. Nevertheless, we find our measures for both, the disclosure level of the investor relation section and the cost of equity capital to be valid. The results also make sense conceptually and economically: as hypothesized, we find a highly significant negative relationship between our estimation of the cost of equity capital and the level of investor relation Internet disclosure. These results indicate that the information in the investor relation section on the corporate Web sites are on average useful to investors.

5.1 Summary and Interpretation of Results

In this dissertation, we examine investor relation Internet disclosure. For that purpose, two studies were made: the content analysis to examine what kind of information companies make available on their Web sites, and the cost of capital study where we regress the cost of equity capital on a disclosure measure based on the content analysis.

In the content analysis study, we investigated which information large and small US companies, representing four different industries, provide on their Web sites to investors. The results show a rather disappointing level of disclosure as only about 31.7% (25.6%) of the examined information is provided on average by large (small) firms. Furthermore, companies provide more information that is easily available from other sources such as stock related or financial information and neglect company specific information such as management discussion and outlook information where they are the best and sometimes the only information source. Company overview, products and services and operations are other poorly provided information sub-categories in the investor relation section despite the fact that this kind of information is important to investors (AICPA, 1994).

On the defense of the companies must be said that we only examined information in the investor relation section of corporate Web sites. Some companies provide more information in other sections of their Web sites that could also be useful to investors. It would be however better to prepare information especially for investors as they are interested in more specific corporate disclosure than other users of corporate Web sites.

The fact that almost all companies provide the annual report and SEC filings in the investor relation section of their Web sites furthermore shows that more information is actually available than we examined. Companies could however with only a little more effort enhance their Internet disclosure by using the available technological tools (like an annual report in HTML) to link the information in the annual report onto their investor relation Web site and thus facilitate the accessibility of the information.

From the content analysis, we conclude that companies provide some useful information to investors on the Web sites. More effort on providing information and an increased use of available technology would however further enhance the usefulness of Internet reporting.

The disclosure score from our content analysis allows us to build a disclosure measure for the level of Internet disclosure to investors (INTDISC). This measure is used in a second study to empirically test the relationship between the cost of equity capital and the Internet disclosure level. The results of such a test ultimately determine whether Internet disclosure is useful to investors; only if disclosure is reliable and relevant, it will have an economic impact on the firms cost of equity capital.

Using simple and multiple regression models we find as expected a negative and highly significant association between the two variables for a cross-sectional sample of 141 non-financial US firms. The magnitude is such that the most forthcoming firms enjoy about a 2.32% cost advantage over the least forthcoming firms. The findings persist even after controlling for other potentially influential variables such as risk characteristics and firm size. Furthermore, after adjusting for self-selection bias the results remain stable.

The results are surprisingly strong in both statistical significance and magnitude considering that US companies are not especially suited for an analysis of this kind because US firms operate in an already rich disclosure environment making it harder to document such a relationship empirically (Hail, 2002; Botosan, 1997, Leuz and Verrecchia, 2000). We explain the better results with the quality of our measure of disclosure level. Internet disclosure is still not regulated and companies are free to provide on their Web site whatever information they believe is useful to investors. This seems to make the information more user focused and therefore more useful for investors and furthermore results in large differences in disclosure across companies. Another reason for the stronger relationship in our study could be that professional investors and analysts rely more on the information on the investor relation Web sites than on annual report disclosure. So finds a survey by Kraker & Company in 2001 that

81% of analysts visit a company's Web site at least weekly. This may contribute to the stronger relationship of internet disclosure and the cost of equity capital.

Even though the goal of this dissertation was to examine the relationship between disclosure quantity and the cost of equity capital, our results show that the disclosed information is also of some quality for investors, otherwise it would not lower the cost of capital. The content analysis study however showed that there is still much room for improvement in corporate Internet disclosure.

5.2 Limitations and Suggestions for Future Research

The content analysis is subject to two limitations. First, the data collected from Web sites is to a certain degree dependent on our own browsing experience. Some Web sites are large and contain many interlinked sections so that it proved difficult to distinguish exactly which information belongs to the investor relation section. To solve this problem, we collected all visible information and information for which existed a visible link to this information in the investor relation section. Some companies provide links to entirely new Web sites for subsidiaries or certain products and services. In this case, we assumed that the Web site contains all our information items in the product category such as the list or description of products and services. Although we did our best to include all information for investors, we may have inadvertently missed some data. However, where omissions appeared significant, the Web sites were rechecked and reviewed again.

The second limitation is the list of researched items from the investor relation section, which could be a subject to a selection bias. We mitigated this problem by including as many items in our list as was possible to collect. Even though some companies provide information that is difficult to classify, we partly corrected for that limitation by including summary measures into our list of information items such as 'industry specific information'. We believe that our disclosure measure is comprehensive enough to reflect the current state of corporate Internet reporting for investors in the US.

Although the study is a subject to these limitations, we have empirically shown in this dissertation that our disclosure measure is valid.

There are also some limitations pertaining to the second study examining the empirical relationship between investor relation Internet disclosure level and the cost of equity capital that needs to be discussed. The first limitation is related to the DCF model that is used to estimate the market implied cost of equity capital. The model is detailed and therefore requires many historical and forward looking input factors. At the time of our study, the US economy was about to recover from a recession and going out from a severe bear market. This led to problems in the consistency of the inputs to the DCF model; it proved very difficult to correctly determine the normal level of earnings, sales or level of profit margins in this economic transition period.

A further limitation is the sensitivity of the results of the regression to extreme values of the cost of equity capital. We retested our main hypothesis by modifying the sample size and find in some cases much lower significance levels. Specifically, we excluded from the sample the 10 companies with the highest and the 10 companies with the lowest cost of capital. Although the lower significance level is to some degree normal, our results should be interpreted with a certain degree of caution as the sample size may be too small.

Another reason why the results should be interpreted with caution is the low adjusted R-square in the regression results. The R-square values of 5-12% show that there is still substantial portion of the variation in the cost of capital unexplained by the explanatory variables of our regression. This could be a sign of noise in the cost of capital measure or caused by omitted variables in the regression. The magnitude of the R-squares is however comparable to previous studies examining disclosure and the cost of capital (e.g. Botosan, 1997).

The examination of a single market and an only one-year research period is a further limitation. Although we believe, based on previous research, that the relationship between the cost of equity capital and the disclosure level is rather stable across space and time, we cannot generalize our results for other markets and other time horizons.

A fourth limitation is the way we weighed the information items to obtain our disclosure score. All items are equally weighted meaning that all information items are assumed to be of the same degree of importance for investors. Even though a chart is not of equal importance to an investor as an annual report, disclosing every smallest detail indicates an overall attitude of management to disclosure which we capture with this research design.

A related limitation of our study is that we examine the relation between the cost of equity capital and disclosure quantity and not disclosure quality. Evaluating the quality of

information for investors is however problematic in absence of a reliable disclosure quality measure. For example, only an expert who follows the company and its industry can evaluate the relevance of the provided information for the specific company. Beattie and Pratt (2002) conducted a survey of the perceived usefulness of 130 information items by four groups of experts. They find that “the four groups’ overall level of agreement on the usefulness of the 130 items varied considerably”. It is therefore difficult to correctly determine the usefulness of information. In relation to the reliability of the information would even auditors have difficulties in evaluating certain qualitative information. It is however likely that the quality and quantity of information are positively related (Ettredge, Richardson and Scholz, 1999) because of the importance of managers’ reporting reputation and the possibility of legal liability. Examining disclosure quality should furthermore only strengthen the negative relationship between cost of capital and disclosure.

Suggestions for Future Research

Given the large cross-sectional differences in the amount of disclosure in the investor relation section documented in this dissertation, future research should determine what information should be provided for investors in the investor relation section on corporate Web sites. In our opinion, ‘best practices’ would help companies in providing the information investors find useful. Such general and industry specific ‘best practices’ for relevance and reliability of information must however be first established. The Jenkins Report (1994) or the IASC (1999) report are steps in the right direction. We believe that such ‘best practices’ should be based on studies of investment approaches and surveys of investors’ needs for information. Best practices would not only increase the relevance but also the comparability of the information across companies and thus the usefulness of information provided for investors on the Internet would increase.

Another issue that should be addressed in the future is the problem related to the reliability of Internet disclosure. For example, the information provided within annual reports is usually considered more reliable because independent parties have audited it. This is not the case for Internet disclosure as companies provide hyperlinks to mostly unaudited information and even to information from third parties. This provides a potential loophole that could mislead users of information (Hodge, 2001). A first step in this direction is the recently establish Office of Internet Enforcement by the SEC dedicated exclusively to Web surveillance and enforcement.

Our main recommendation for future research on the subject of disclosure and market variables such as the cost of capital is that researchers should make a distinction between the quantity and the quality of disclosure. What actually influences all market variables is not the amount of provided information but its importance to investors. The disclosure quality could be measured for example by weighting the importance of each information item or with an assessment of the actual information content of the disclosed item. This should be done industry specific and be based on investor's perception of the relevance and reliability of each information item.

In summary, companies currently do not exploit the full potential of the Internet as a modern medium for investor relations. Future research should not only give companies the necessary tools for providing the right and reliable information but also a proof that increasing disclosure is actually beneficial not only for the investor, but also for the company. The impact of disclosure on the cost of capital is unfortunately not the end issue. Even though disclosure lowers the cost of capital, it is more important to understand the impact of disclosure on firm value over the long term. Management might assume that lower cost of capital enhances firm value and therefore that more disclosure is beneficial for a company. They should however not ignore the potential cost associated with increased disclosure. In a valuation model the cost of capital increases firm value only if the cash flows until infinity are stable or not decreasing as much to offset the beneficial impact of a lower discount rate. This however cannot be the case because, as discussed earlier, disclosure has its costs and therefore impacts future cash flows. Here future research should test empirically how Internet disclosure or disclosure in general is related to the market value of a company. This is the real and most important test of whether higher disclosure level is actually benefiting current investors. To do this, future research should examine the monetary costs of increased disclosure. Especially the proprietary cost, such as the cost of competitive disadvantage is an important research topic. For management, especially of small companies, improving the content of information included in investor relation section inevitably means facing difficult cost-benefit decisions. They thus need concrete investigation on both the costs and benefits of increased disclosure.

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Appendix

Variable description and measurement:

ANALYST	The number of analysts following a company as of the end of July 2003 obtained from Research Insight
BETA	Market beta as of June 2003 obtained from Research Insight
BVDMVE	The ratio of book value of long-term debt to market value of equity measured by market capitalization obtained from Research Insight for the fiscal year 2002 and winsorized at the upper and lower 1% of observations
CAPEX	Capital expenditure for the fiscal year 2002 obtained from Research Insight
CR	The ratio of current assets to current liabilities obtained from Research Insight for the fiscal year 2002 and winsorized at the upper and lower 1% of observations
D&A	Depreciation and amortization obtained from Research Insight for the fiscal year 2002
DFP	Debt financing proportion; DFP for D&A and capital expenditure is the average debt-to-asset ratio of the past 5 years; DFP for working capital is the average current ratio of the past 5 years. All data are obtained from Research Insight
FCFE	Free cash flow to equity calculated as described in chapter 4.3
IDR	Implied discount rate obtained from the discounted free cash flow to equity model
INDUM	Industry membership: average of the risk premium of the firms in the same industry
INTDISC	Overall Internet disclosure score for a company as of August 11 th 2003 calculated as the sum of all points in the three information categories obtained from the content analysis study
INTDISC1	Internet disclosure score for the Corporate Information category
INTDISC2	Internet disclosure score for the Financial and Stock Information category
INTDISC3	Internet disclosure score for the Management and Board of Directors category
INTDISCC	Internet disclosure score for companies in the consumer discretionary industry
INTDISCH	Internet disclosure score for companies in the healthcare industry
INTDISCI	Internet disclosure score for companies in the industrial goods and services industry
INTDISCIT	Internet disclosure score for companies in the information technology industry
INTDISCMOD	Internet disclosure score modified to measure above/below average disclosure
INTDISCRANK	Internet disclosure rank is the fractional rank of the firms disclosure score
MVAL	Market value of outstanding equity as of June 2003 in \$ millions measured by market capitalization obtained from Research Insights
n	Number of observations

P	Price obtained from Yahoofinance.com as of August 8 th 2003
PER	Price-to-earnings ratio calculated with prices obtained from Yahoofinance.com and forward earnings obtained from IBES and winsorized at the upper and lower 5% of observations
ROE	Return on equity obtained from Research Insight for the fiscal year 2002, winsorized at 1% to correct for outliers.
SALES	Sales obtained from Research Insight for the fiscal year 2002 in \$ millions
VOLUME	Trading volume as of June 2003 obtained from Research Insight

Notes:

1. All disclosure scores are measured from August 9-11, 2003
2. Technically, the intercept coefficients relate in all regression results to the risk premium and not directly to the cost of equity capital.
3. ***, **, * indicates 1%, 5% and 10% statistical significance in the direction predicted using a t-test.

APPENDIX FOR THE INVESTOR RELATION CONTENT ANALYSIS STUDY

Table 1: Companies included in the sample

Panel A: Summary of Sample Selection Process

	Number	Percent
Total Firms at the beginning	160	100%
Firms for which disclosure score could not be calculated	-6	3.75%
Total of Firms Researched in the Study	154	96.25%

Panel B: Number of Companies in Relation to Size and Industry Membership

	Large	Small	Total
Healthcare	20	19	39
Industrial Goods and Services	20	19	39
Consumers Discretionary	18	18	36
Information Technology	20	20	40
All Companies	78	76	154

Table 2: Size criteria for sample selection

Companies	Large (in billion USD)	Small (in million USD)
Healthcare Industry		
MVAL	>\$4	\$500-\$1700
SALES	>\$3	\$400-\$1700
Consumer Discretionary Industry		
MVAL	>\$4.8	\$500-\$1000
SALES	>\$5	\$500-\$1500
Industrial Goods and Services Industry		
MVAL	>\$6	\$500-\$1000
SALES	>\$6	\$500-\$1750
Information Technology Industry		
MVAL	>\$5	\$500-\$1500
SALES	>\$4.3	\$460-\$1700

For variable description and measurement, see pages 91-92

Table 3: Descriptive statistics for sample firms

Variable	n	Mean	Percentile					Standard Deviation
			1%	25%	50%	75%	99%	
Full Sample								
MVAL	154	18852	517	811	5013	18694	208061	40963
SALES	154	9485	459	844	3126	10446	73999	16037
Large Companies								
MVAL	78	36366	5110	10293	18654	30272	273516	52005
SALES	78	17825	3187	8421	10357	19841	92571	19187
Small Companies								
MVAL	76	878	503	651	808	991	1733	315
SALES	76	924	451	610	832	1188	1675	349
Healthcare Industry								
MVAL	39	27833	533	854	5335	21864	225476	54222
SALES	39	9076	447	830	3012	15961	45903	11864
Consumer Discretionary								
MVAL	36	8848	523	705	2995	11731	53940	13163
SALES	36	4623	544	832	4770	8421	8421	3855
Industrial Goods and Services								
MVAL	39	17798	530	748	6431	16731	204826	46649
SALES	39	12208	556	1026	6270	13959	101571	22542
Information Technology								
MVAL	40	20129	549	914	4848	19497	139991	35589
SALES	40	11603	466	862	2993	15294	75897	18149

For variable description and measurement, see pages 91-92

Table 4: Results overview of Information Items and General Items for full sample and sub-samples of all large and all small companies

Panel A: Results General Items and Corporate Information category

CONTENT ANALYSIS				
RESULTS		Average All	Average Large	Average Small
A	All Items Scores	32	36	29
B	General Items Scores	5	6	5
C	Information Items Scores	27	30	24
	<i>Correlation between B and C</i>	50.01%	42.42%	48.13%
TOTAL INFORMATION ITEMS PROVIDED IN (%)		28.7%	31.7%	25.6%
GENERAL ITEMS				
1	Link to IR section	86%	86%	86%
2	Site map	50%	59%	41%
3	Search box	55%	71%	39%
4	Contact (email, telephone, headquarter's address, etc)	92%	92%	92%
5	Email alert service	66%	71%	61%
6	Information request	65%	72%	58%
7	Webcasts	61%	67%	55%
8	Other shareholder services (Dividend reinvestment plan, Investment calculator, Transfer agent, Tax information, Glossary, Electronic dividend deposit etc.)	72%	85%	59%
8	Total	68.3%	75.2%	61.3%

<i>Nr.</i>	INFORMATION ITEMS			
1	Corporate Information Category	16.6%	19.7%	13.3%
1	Company Overview			
1	General description of the companys' business	62%	56%	68%
2	Company's history	14%	23%	4%
3	Company's strategy	8%	12%	5%
4	Company's broad goal or objectives	5%	5%	4%
5	List of business units or organizationalal chart	17%	23%	11%
6	Description of business units	12%	15%	9%
7	Industry specific information	3%	5%	0%
		17.3%	20.0%	14.5%
2	Products & Services			
8	List of principle products and services	16%	18%	13%
9	Description of principle products and services	7%	12%	3%
10	Discription of the users of the products	2%	4%	0%
11	List of principle brands, registered trademarks	2%	4%	0%
12	Principle markets	15%	18%	12%
13	New products	2%	4%	0%
14	List of suppliers	1%	1%	0%
		6.3%	8.6%	3.9%
3	Operations			
15	Description of property, plants and equipment	2%	3%	1%
16	Technology and innovation, (R&D)	7%	10%	4%
17	Partners	3%	4%	3%
18	Distribution channels	1%	1%	0%
19	Manufacturing or service production	1%	1%	0%
		2.7%	3.8%	1.6%
4	News			
20	News	87%	90%	84%
21	Archived news	75%	74%	75%
22	Earnings releases	31%	46%	16%
23	Historical earnings releases	19%	24%	14%
24	Frequently Asked Questions (FAQ)	49%	59%	39%
		52.3%	58.7%	45.8%
5	Sustainability Information			
25	Economic sustainability information (wages, job creation,etc)	5%	10%	0%
26	Environmental information	6%	12%	0%
27	Social information (health and safety, contributions)	6%	12%	0%
28	Commitment to stakeholders, mission	6%	6%	7%
28		5.8%	9.9%	1.6%

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Panel B: Results Financial and Stock category

II Financial and Stock Category		40.6%	42.2%	38.9%
1	Main Financial Information			
29	Balance sheet or highlightst	29%	27%	32%
30	Income statement or hightlights	34%	33%	36%
31	Cash flow statement or hightlights	27%	24%	30%
32	Historical financial statements	3%	5%	0%
33	Annual report	92%	94%	91%
34	Historical annual report	75%	82%	68%
35	Quarterly report or quarterly financial statements	28%	35%	21%
36	Historical quarterly report or quarterly financial statements	25%	29%	20%
		39.2%	41.2%	37.2%
2	SEC Filings			
37	Form 10K	97%	97%	97%
38	Form 10Q	96%	96%	96%
39	Form Section 16 or link to it	91%	91%	91%
40	Link to SEC filings	27%	28%	26%
41	Archived SEC filings	94%	92%	95%
		81.0%	81.0%	81.1%
3	Other Financial Information			
42	Data summary	12%	13%	12%
43	Financial highlights	40%	45%	36%
44	Important financial ratios	34%	27%	41%
45	Segment data	12%	19%	5%
46	Historical segment data	5%	8%	3%
47	Debt information	3%	6%	0%
48	Dividend information	45%	53%	37%
49	Dividend history	27%	47%	7%
50	Company's investments (e.g. acquisitions)	6%	8%	5%
		20.6%	25.1%	16.1%
4	Analysts Information			
51	Analysts' forecast estimates	28%	24%	32%
52	Analysts' recommendations	20%	17%	24%
53	List of analysts	55%	47%	63%
54	Contact to analysts	29%	19%	38%
55	Calender of events	64%	74%	53%
56	Analysts' presentations	48%	56%	39%
57	Archieved analysts' presentations	23%	36%	11%
58	Conference calls	53%	46%	61%
59	Archived conference calls	21%	21%	22%
		38.0%	37.9%	38.0%
5	Stock Information			
60	Ticker symbol	84%	86%	82%
61	Stock exchanges on which company is registered	83%	82%	84%
62	Stock quotes	83%	87%	79%
63	Charts	73%	79%	67%
64	Historical price lookup or link to it	58%	67%	49%
65	Stock split information	23%	41%	5%
66	Stock repurchase information	3%	4%	3%
67	List of major shareholders	4%	4%	4%
68	Number of shares held by institutions	26%	21%	32%
69	Number of shares held by management	6%	3%	11%
70	Market capitalization	32%	24%	41%
71	Insider transactions	22%	17%	28%
43		41.6%	42.8%	40.2%

Continued next page

Panel C: Results Management and Board of Directors category

III	Management and Board of Directors Category	21.3%	26.8%	15.8%
1	Management Discussion of Past Data and Outlook			
72	Management forecast or outlook	6%	9%	3%
73	Management discussion of past financial data	1%	3%	0%
		3.6%	5.8%	1.3%
2	Executives and Management			
74	List of executives and management	58%	60%	55%
75	Age of executives and management	4%	6%	1%
76	Experience of executives and management	40%	37%	42%
77	Education of executives and management	32%	32%	33%
78	Compensation of executives and management	3%	3%	3%
		27.3%	27.7%	26.8%
3	Board of Directors			
79	List of Board of Directors members	55%	59%	50%
80	Age of Board of Directors members	12%	21%	3%
81	Experience of Board of Directors members	34%	33%	36%
82	Education of Board of Directors members	18%	14%	22%
83	Other current jobs of Board of Directors members	27%	33%	21%
84	Directors compensation	1%	1%	0%
		24.5%	26.9%	21.9%
4	Corporate Governance			
85	Committees information	23%	32%	14%
86	Committees charter	24%	36%	12%
87	Corporate governance guidelines	34%	51%	16%
88	Code of conduct and ethics	29%	44%	14%
89	Proxy statement	51%	74%	26%
90	Directors independence standards	6%	8%	4%
91	Transactions or/and relations among related parties	1%	1%	0%
92	Certification (CEO, CFO)	10%	15%	4%
93	Certification of incorporation	10%	19%	1%
94	By-law	13%	23%	3%
23		20.1%	30.4%	9.5%

Table 5: Results overview of Information Items and General Items for all companies, industry averages

Panel A: Results General Items and Corporate Information category

CONTENT ANALYSIS					
RESULTS		Avg Health	Avg Industrial	Avg Consumer	Avg IT
A	All Items Scores	35	30	30	35
B	General Items Scores	6	5	5	6
C	Information Items Scores	29	24	25	29
	<i>Correlation between B and C</i>	42.99%	59.55%	50.61%	41.92%
TOTAL INFORMATION ITEMS PROVIDED IN (%)		30.9%	26.0%	26.8%	31.1%
GENERAL ITEMS					
1	Link to IR section	92%	85%	83%	83%
2	Site map	59%	44%	33%	63%
3	Search box	62%	59%	22%	75%
4	Contact (email, telephone, headquarter's address, etc)	92%	90%	89%	98%
5	Email alert service	72%	67%	56%	68%
6	Information request	59%	72%	67%	63%
7	Webcasts	62%	56%	67%	60%
8	Other shareholder services (Dividend reinvestment plan, Investment calculator, Transfer agent, Tax information, Glossary, Electronic dividend deposit etc.)	72%	67%	69%	80%
8	Total	71.2%	67.3%	60.8%	73.4%
INFORMATION ITEMS					
1	Corporate Information Category	17.4%	16.0%	14.2%	18.4%
1	Company Overview				
1	General description of the companys' business	72%	49%	58%	70%
2	Company's history	8%	15%	14%	18%
3	Company's strategy	8%	8%	11%	8%
4	Company's broad goal or objectives	3%	10%	0%	5%
5	List of business units or organizationalal chart	13%	23%	14%	18%
6	Description of business units	10%	18%	8%	13%
7	Industry specific information	0%	3%	0%	8%
		16.1%	17.9%	15.1%	19.6%
2	Products & Services				
8	List of principle products and services	31%	10%	3%	18%
9	Description of principle products and services	13%	5%	3%	8%
10	Discription of the users of the products	8%	0%	0%	0%
11	List of principle brands, registered trademarks	0%	0%	6%	3%
12	Principle markets	15%	18%	17%	10%
13	New products	8%	0%	0%	0%
14	List of suppliers	0%	0%	0%	3%
		10.6%	4.8%	4.0%	5.7%
3	Operations				
15	Description of property, plants and equipment	3%	3%	3%	0%
16	Technology and innovation, (R&D)	10%	5%	0%	13%
17	Partners	8%	0%	0%	5%
18	Distribution channels	0%	0%	0%	3%
19	Manufacturing or service production	0%	0%	0%	3%
		4.1%	1.5%	0.6%	4.5%
4	News				
20	News	87%	85%	94%	83%
21	Archived news	74%	74%	86%	65%
22	Earnings releases	26%	36%	14%	48%
23	Historical earnings releases	13%	15%	8%	40%
24	Frequently Asked Questions (FAQ)	54%	44%	42%	58%
		50.8%	50.8%	48.9%	58.5%
5	Sustainability Information				
25	Economic sustainability information (wages, job creation, etc)	5%	8%	3%	5%
26	Environmental information	5%	8%	6%	5%
27	Social information (health and safety, contributions)	5%	8%	6%	5%
28	Commitment to stakeholders, mission	10%	5%	3%	8%
28		6.4%	7.1%	4.2%	5.6%

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Panel B: Results Financial and Stock category

II	Financial and Stock Category	45.0%	35.3%	39.0%	43.0%
1	Main Financial Information				
29	Balance sheet or highlightst	36%	21%	25%	35%
30	Income statement or highlights	49%	23%	25%	40%
31	Cash flow statement or highlights	36%	21%	25%	28%
32	Historical financial statements	0%	0%	0%	10%
33	Annual report	95%	85%	92%	98%
34	Historical annual report	77%	72%	81%	73%
35	Quarterly report or quarterly financial statements	26%	26%	28%	33%
36	Historical quarterly report or quarterly financial statements	13%	23%	28%	35%
		41.3%	33.7%	37.8%	43.8%
2	SEC Filings				
37	Form 10K	100%	95%	100%	98%
38	Form 10Q	100%	95%	94%	98%
39	Form Section 16 or link to it	95%	85%	94%	90%
40	Link to SEC filings	28%	33%	22%	28%
41	Archived SEC filings	97%	90%	94%	95%
		84.1%	79.5%	81.1%	81.5%
3	Other Financial Information				
42	Data summary	10%	18%	6%	15%
43	Financial highlights	38%	49%	36%	38%
44	Important financial ratios	49%	28%	31%	28%
45	Segment data	13%	15%	8%	13%
46	Historical segment data	15%	3%	0%	3%
47	Debt information	3%	8%	0%	3%
48	Dividend information	56%	38%	44%	40%
49	Dividend history	25%	30%	22%	30%
50	Company's investments (e.g. acquisitions)	0%	0%	3%	23%
		23.3%	21.0%	16.7%	21.1%
4	Analysts Information				
51	Analysts' forecast estimates	38%	23%	28%	23%
52	Analysts' recommendations	33%	15%	17%	15%
53	List of analysts	59%	41%	56%	65%
54	Contact to analysts	38%	18%	25%	33%
55	Calender of events	69%	49%	67%	70%
56	Analysts' presentations	54%	38%	36%	63%
57	Archieved analysts' presentations	21%	21%	25%	28%
58	Conference calls	54%	56%	58%	45%
59	Archived conference calls	31%	15%	22%	18%
		44.2%	30.8%	37.0%	39.7%
5	Stock Information				
60	Ticker symbol	87%	72%	86%	90%
61	Stock exchanges on which company is registered	87%	67%	89%	90%
62	Stock quotes	87%	64%	94%	88%
63	Charts	79%	54%	75%	85%
64	Historical price lookup or link to it	72%	41%	58%	60%
65	Stock split information	23%	18%	17%	35%
66	Stock repurchase information	5%	0%	0%	8%
67	List of major shareholders	5%	0%	3%	8%
68	Number of shares held by institutions	46%	18%	11%	28%
69	Number of shares held by management	5%	0%	14%	8%
70	Market capitalization	44%	31%	25%	30%
71	Insider transactions	36%	21%	14%	18%
43		48.1%	32.1%	40.5%	45.4%

Continued next page

Panel C: Management and Board of Directors category

III Management and Board of Directors Category		20.7%	20.8%	19.4%	24.1%
1	Management Discussion of Past Data and Outlook				
72	Management forecast or outlook	0%	8%	6%	10%
73	Management discussion of past financial data	0%	0%	3%	3%
		0.0%	3.8%	4.2%	6.3%
2	Executives and Management				
74	List of executives and management	59%	56%	61%	55%
75	Age of executives and management	0%	3%	6%	8%
76	Experience of executives and management	41%	26%	50%	43%
77	Education of executives and management	33%	21%	33%	43%
78	Compensation of executives and management	3%	0%	6%	3%
		27.2%	21.0%	31.1%	30.0%
3	Board of Directors				
79	List of Board of Directors members	56%	54%	47%	60%
80	Age of Board of Directors members	10%	13%	8%	15%
81	Experience of Board of Directors members	31%	33%	36%	38%
82	Education of Board of Directors members	15%	18%	17%	23%
83	Other current jobs of Board of Directors members	28%	15%	25%	40%
84	Directors compensation	0%	0%	0%	3%
		23.5%	22.2%	22.2%	29.6%
4	Corporate Governance				
85	Committees information	23%	26%	22%	23%
86	Committees charter	21%	26%	19%	30%
87	Corporate governance guidelines	33%	41%	17%	43%
88	Code of conduct and ethics	26%	36%	19%	35%
89	Proxy statement	51%	59%	42%	50%
90	Directors independence standards	5%	8%	3%	8%
91	Transactions or/and relations among related parties	0%	3%	0%	0%
92	Certification (CEO, CFO)	10%	8%	8%	13%
93	Certification of incorporation	15%	10%	11%	5%
94	By-law	15%	18%	8%	10%
23		20.0%	23.3%	15.0%	21.5%

Table 6: Information items in order of percentage provided by all companies

Form 10K	97%	Company's strategy	8%
Form 10Q	96%	Description of principle products and services	7%
Archived SEC filings	94%	Technology and innovation, (R&D)	7%
Annual report	92%	Commitment to stakeholders, mission	6%
Form Section 16 or link to it	91%	Company's investments (e.g. acquisitions)	6%
News	87%	Number of shares held by management	6%
Ticker symbol	84%	Environmental information	6%
Stock exchanges on which company is registered	83%	Social information (health and safety, contributions)	6%
Stock quotes	83%	Management forecast or outlook	6%
Historical annual report	75%	Directors independence standards	6%
Archived news	75%	Economic sustainability information	5%
Charts	73%	Historical segment data	5%
Calender of events	64%	Company's broad goal or objectives	5%
General description of the companys' business	62%	List of major shareholders	4%
Historical price lookup or link to it	58%	Age of executives and management	4%
List of executives and management	58%	Partners	3%
List of analysts	55%	Debt information	3%
List of Board of Directors members	55%	Stock repurchase information	3%
Conference calls	53%	Industry specific information	3%
Proxy statement	51%	Historical financial statements	3%
Frequently Asked Questions (FAQ)	49%	Compensation of executives and management	3%
Analysts' presentations	48%	Discription of the users of the products	2%
Dividend information	45%	List of principle brands, registered trademarks	2%
Financial highlights	40%	New products	2%
Experience of executives and management	40%	Description of property, plants and equipment	2%
Income statement or hightlights	34%	Management discussion of past financial data	1%
Experience of Board of Directors members	34%	List of suppliers	1%
Important financial ratios	34%	Distribution channels	1%
Corporate governance guidelines	34%	Manufacturing or service production	1%
Market capitalization	32%	Directors compensation	1%
Education of executives and management	32%	Transactions or/and relations among related parties	1%
Earnings releases	31%		
Balance sheet or highlightst	29%		
Code of conduct and ethics	29%		
Contact to analysts	29%		
Quarterly report or quarterly financial statements	28%		
Analysts' forecast estimates	28%		
Cash flow statement or hightlights	27%		
Link to SEC filings	27%		
Dividend history	27%		
Other current jobs of Board of Directors members	27%		
Number of shares held by institutions	26%		
Historical quarterly report / financial statements	25%		
Committees charter	24%		
Archieved analysts' presentations	23%		
Stock split information	23%		
Committees information	23%		
Insider transactions	22%		
Archived conference calls	21%		
Analysts' recommendations	20%		
Historical earnings releases	19%		
Education of Board of Directors members	18%		
List of business units or organizationalal chart	17%		
List of principle products and services	16%		
Principle markets	15%		
Company's history	14%		
By-law	13%		
Description of business units	12%		
Data summary	12%		
Segment data	12%		
Age of Board of Directors members	12%		
Certification of incorporation	10%		
Certification (CEO, CFO)	10%		

Table 7: Information items in order of percentage provided by large companies

Form 10K	97%	Company's strategy	12%
Form 10Q	96%	Description of principle products and services	12%
Annual report	94%	Environmental information	12%
Archived SEC filings	92%	Social information (health and safety, contributions)	12%
Form Section 16 or link to it	91%	Technology and innovation, (R&D)	10%
News	90%	Economic sustainability information	10%
Stock quotes	87%	Management forecast or outlook	9%
Ticker symbol	86%	Historical segment data	8%
Historical annual report	82%	Company's investments (e.g. acquisitions)	8%
Stock exchanges on which company is registered	82%	Directors independence standards	8%
Charts	79%	Commitment to stakeholders, mission	6%
Archived news	74%	Debt information	6%
Calendar of events	74%	Age of executives and management	6%
Proxy statement	74%	Company's broad goal or objectives	5%
Historical price lookup or link to it	67%	Industry specific information	5%
List of executives and management	60%	Historical financial statements	5%
Frequently Asked Questions (FAQ)	59%	Description of the users of the products	4%
List of Board of Directors members	59%	List of principle brands, registered trademarks	4%
General description of the companies' business	56%	New products	4%
Analysts' presentations	56%	Partners	4%
Dividend information	53%	Stock repurchase information	4%
Corporate governance guidelines	51%	List of major shareholders	4%
Dividend history	47%	Description of property, plants and equipment	3%
List of analysts	47%	Number of shares held by management	3%
Earnings releases	46%	Management discussion of past financial data	3%
Conference calls	46%	Compensation of executives and management	3%
Financial highlights	45%	List of suppliers	1%
Code of conduct and ethics	44%	Distribution channels	1%
Stock split information	41%	Manufacturing or service production	1%
Experience of executives and management	37%	Directors compensation	1%
Archived analysts' presentations	36%	Transactions or/and relations among related parties	1%
Committees charter	36%		
Quarterly report or quarterly financial statements	35%		
Income statement or highlights	33%		
Experience of Board of Directors members	33%		
Other current jobs of Board of Directors members	33%		
Education of executives and management	32%		
Committees information	32%		
Historical quarterly report / financial statements	29%		
Link to SEC filings	28%		
Balance sheet or highlightst	27%		
Important financial ratios	27%		
Historical earnings releases	24%		
Cash flow statement or highlights	24%		
Analysts' forecast estimates	24%		
Market capitalization	24%		
Company's history	23%		
List of business units or organizationalal chart	23%		
By-law	23%		
Archived conference calls	21%		
Number of shares held by institutions	21%		
Age of Board of Directors members	21%		
Segment data	19%		
Contact to analysts	19%		
Certification of incorporation	19%		
List of principle products and services	18%		
Principle markets	18%		
Analysts' recommendations	17%		
Insider transactions	17%		
Description of business units	15%		
Certification (CEO, CFO)	15%		
Education of Board of Directors members	14%		
Data summary	13%		

Table 8: Information items in order of percentage provided by small companies

Form 10K	97%	Stock split information	5%
Form 10Q	96%	Company's history	4%
Archived SEC filings	95%	Company's broad goal or objectives	4%
Annual report	91%	Technology and innovation, (R&D)	4%
Form Section 16 or link to it	91%	List of major shareholders	4%
News	84%	Directors independence standards	4%
Stock exchanges on which company is registered	84%	Certification (CEO, CFO)	4%
Ticker symbol	82%	Description of principle products and services	3%
Stock quotes	79%	Partners	3%
Archived news	75%	Historical segment data	3%
General description of the companys' business	68%	Stock repurchase information	3%
Historical annual report	68%	Management forecast or outlook	3%
Charts	67%	Compensation of executives and management	3%
List of analysts	63%	Age of Board of Directors members	3%
Conference calls	61%	By-law	3%
List of executives and management	55%	Description of property, plants and equipment	1%
Calender of events	53%	Age of executives and management	1%
List of Board of Directors members	50%	Certification of incorporation	1%
Historical price lookup or link to it	49%	Industry specific information	0%
Experience of executives and management	42%	Discription of the users of the products	0%
Important financial ratios	41%	List of principle brands, registered trademarks	0%
Market capitalization	41%	New products	0%
Frequently Asked Questions (FAQ)	39%	List of suppliers	0%
Analysts' presentations	39%	Distribution channels	0%
Contact to analysts	38%	Manufacturing or service production	0%
Dividend information	37%	Economic sustainability information	0%
Income statement or highlights	36%	Environmental information	0%
Financial highlights	36%	Social information (health and safety, contributions)	0%
Experience of Board of Directors members	36%	Historical financial statements	0%
Education of executives and management	33%	Debt information	0%
Balance sheet or highlightst	32%	Management discussion of past financial data	0%
Analysts' forecast estimates	32%	Directors compensation	0%
Number of shares held by institutions	32%	Transactions or/and relations among related parties	0%
Cash flow statement or highlights	30%		
Insider transactions	28%		
Link to SEC filings	26%		
Proxy statement	26%		
Analysts' recommendations	24%		
Archived conference calls	22%		
Education of Board of Directors members	22%		
Quarterly report or quarterly financial statements	21%		
Other current jobs of Board of Directors members	21%		
Historical quarterly report / financial statements	20%		
Earnings releases	16%		
Corporate governance guidelines	16%		
Historical earnings releases	14%		
Committees information	14%		
Code of conduct and ethics	14%		
List of principle products and services	13%		
Principle markets	12%		
Data summary	12%		
Committees charter	12%		
List of business units or organizationalal chart	11%		
Archieved analysts' presentations	11%		
Number of shares held by management	11%		
Description of business units	9%		
Commitment to stakeholders, mission	7%		
Dividend history	7%		
Company's strategy	5%		
Segment data	5%		
Company's investments (e.g. acquisitions)	5%		

**APPENDIX FOR THE INVESTOR RELATION INTERNET DISCLOSURE LEVEL
AND THE COST OF EQUITY CAPITAL STUDY**

Table 9: Companies included in the sample

Panel A: Summary of Sample Selection Process

	Number	Percent
Total Firms at the beginning	160	100%
Firms for which disclosure score could not be calculated	-6	3.75%
Firms for which the costs of capital could not be calculated	-13	8.13%
Total of Firms Researched in the Study	141	88.13%

Panel B: Number of Companies in Relation to Size and Industry Membership

	Large	Small	Total
Healthcare	20	19	39
Industrial Goods and Services	20	18	38
Consumers	18	15	33
Information Technology	16	15	31
All Companies	74	67	141

Table 10: Descriptive statistics for sample firms*Panel A: Full Sample*

Variable	n	Mean	Percentile					Standard Deviation
			1%	25%	50%	75%	99%	
Size:								
MVAL	141	20077	513	810	5565	19786	223154	42559
SALES	141	12489	458	873	4356	13829	149826	25636
Risk:								
BETA	141	0.828	-0.121	0.450	0.712	1.104	2.313	0.544
BVDMVE	141	0.339	0.000	0.062	0.181	0.400	3.530	0.605
CR	141	1.549	0.000	0.900	1.410	2.120	3.380	0.898
PER	141	19.719	8.784	13.815	16.754	21.896	51.345	10.019
Disclosure:								
ANALYSTS	141	14	2	7	12	18	35	8
INTDISC	141	27	7	20	28	34	50	10
INTDISC1	141	5	0	3	4	6	16	3
INTDISC2	141	18	5	13	17	22	29	6
INTDISC3	141	5	0	1	4	8	14	4
Implied cost of capital:								
IDR	141	12.48%	8.42%	10.82%	12.31%	13.82%	17.95%	6.77%

For variable description and measurement, see pages 91-92

Panel B: Sample of Large Companies

Variable	n	Mean	Percentile					Standard Deviation
			1%	25%	50%	75%	99%	
Size:								
MVAL	74	37,480	5095	9418	18953	30854	274197	53174
SALES	74	22,958	3178	7814	12673	22602	168426	32038
Risk:								
BETA	74	0.831	-0.042	0.465	0.767	1.079	2.245	0.503
BVDMVE	74	0.456	0.001	0.083	0.211	0.403	6.362	1.060
CR	74	1.261	0.000	0.775	1.205	1.548	3.445	0.808
PER	74	20.064	8.784	14.178	17.467	22.053	51.345	9.980
Disclosure:								
ANALYSTS	74	19	6	14	18	25	37	7
INTDISC	74	30	10	24	30	36	53	10
Implied cost of capital:								
IDR	74	12.06%	8.00%	10.44%	12.05%	13.15%	17.32%	2.27%

For variable description and measurement, see pages 91-92

Panel C: Sample of Small Companies

<i>Variable</i>	n	Mean	<i>Percentile</i>					Standard Deviation
			1%	25%	50%	75%	99%	
Size:								
MVAL	67	856	503	651	802	921	1683	300
SALES	67	925	450	606	830	1185	1683	358
Risk:								
BETA	67	0.832	-0.100	0.455	0.681	1.207	2.471	0.584
BVDMVE	67	0.266	0.000	0.020	0.168	0.351	1.564	0.330
CR	67	1.921	0.000	1.150	1.820	2.525	4.965	1.046
PER	67	19.338	8.784	13.392	15.771	21.750	51.345	10.124
Disclosure:								
ANALYSTS	67	7	2	4	7	10	18	4
INTDISC	67	24	7	17	24	32	40	9
Implied cost of capital:								
IDR	67	12.93%	9.05%	11.39%	12.75%	14.15%	18.42%	2.16%

For variable description and measurement, see pages 91-92

Table 11: Descriptive statistic for disclosure scores

<i>Variable</i>	n	Mean	<i>Percentile</i>				Max	Standard Deviation
			Min	25%	50%	75%		
<i>Full Sample</i>								
INTDISC	141	27.29	6	20	28	34	56	10.39
INTDISC1	141	4.76	0	3	4	6	19	3.08
INTDISC2	141	17.51	4	13	17	22	30	5.99
INTDISC3	141	5.02	0	1	4	8	15	4.11
<i>Large Companies</i>								
INTDISC	74	30.30	10	24	30	36	56	10.49
<i>Small Companies</i>								
INTDISC	67	23.97	6	17	24	32	45	9.27
<i>Industries</i>								
INTDISCH	39	29.00	7	22	29	36	48	11.15
INTDISCI	38	24.92	6	16	25	32	52	10.67
INTDISCC	33	30.24	11	26	30	35	56	9.92
INTDISCIT	31	24.90	9	20	25	30	46	8.63

For variable description and measurement, see pages 91-92

Table 12: Descriptive statistic for the implied cost of capital

<i>Variable</i>	n	Mean	<i>Percentile</i>					Standard Deviation
			1%	25%	50%	75%	99%	
Full Sample								
IDR	141	12.48%	8.42%	10.82%	12.31%	13.82%	17.95%	2.25%
Large Companies								
IDR	74	12.06%	8.00%	10.44%	12.05%	13.15%	17.32%	2.27%
Small Companies								
IDR	67	12.93%	9.05%	11.39%	12.75%	14.15%	18.42%	2.16%
Industries								
IDRH	39	12.66%	9.30%	11.10%	12.85%	13.87%	16.01%	1.86%
IDRI	38	11.76%	7.62%	10.12%	11.67%	13.31%	16.67%	2.29%
IDRC	33	13.11%	9.51%	11.34%	12.58%	14.71%	18.53%	2.39%
IDRIT	31	12.44%	8.70%	10.84%	12.31%	13.46%	17.26%	2.38%

For variable description and measurement, see pages 91-92

Table 13: Validity of the disclosure score

Panel A: Pearson Correlation Coefficient for Disclosure Score and Firm Characteristics related to Disclosure

	INTDISC	MVAL	ROE	VOLUME	ANALYST
INTDISC	1	0.370	0.191	0.340	0.314
MVAL	0.370	1	0.162	0.709	0.812
ROE	0.191	0.162	1	0.113	0.162
VOLUME	0.340	0.709	0.113	1	0.636
ANALYST	0.314	0.812	0.162	0.636	1

For variable description and measurement, see pages 91-92

Panel B: Disclosure Rank and Firm Characteristics related to Disclosure

	Intercept	MVAL (-)	ROE (-)	Adj. RSQ
<i>Panel A: Simple Regression (OLS)</i>				
Coefficient	135.944	-18.295		0.114
P-Value	0.000	0.000 ***		
Coefficient	78.925		-46.812	0.047
P-Value	0.000		0.006 ***	
<i>Panel B: Multiple Regression (OLS)</i>				
Coefficient	137.951	-16.757	-36.443	0.140
P-Value	0.000	0.000 ***	0.025 **	

For variable description and measurement, see pages 91-92

Table 14: An overview of the FCFE model

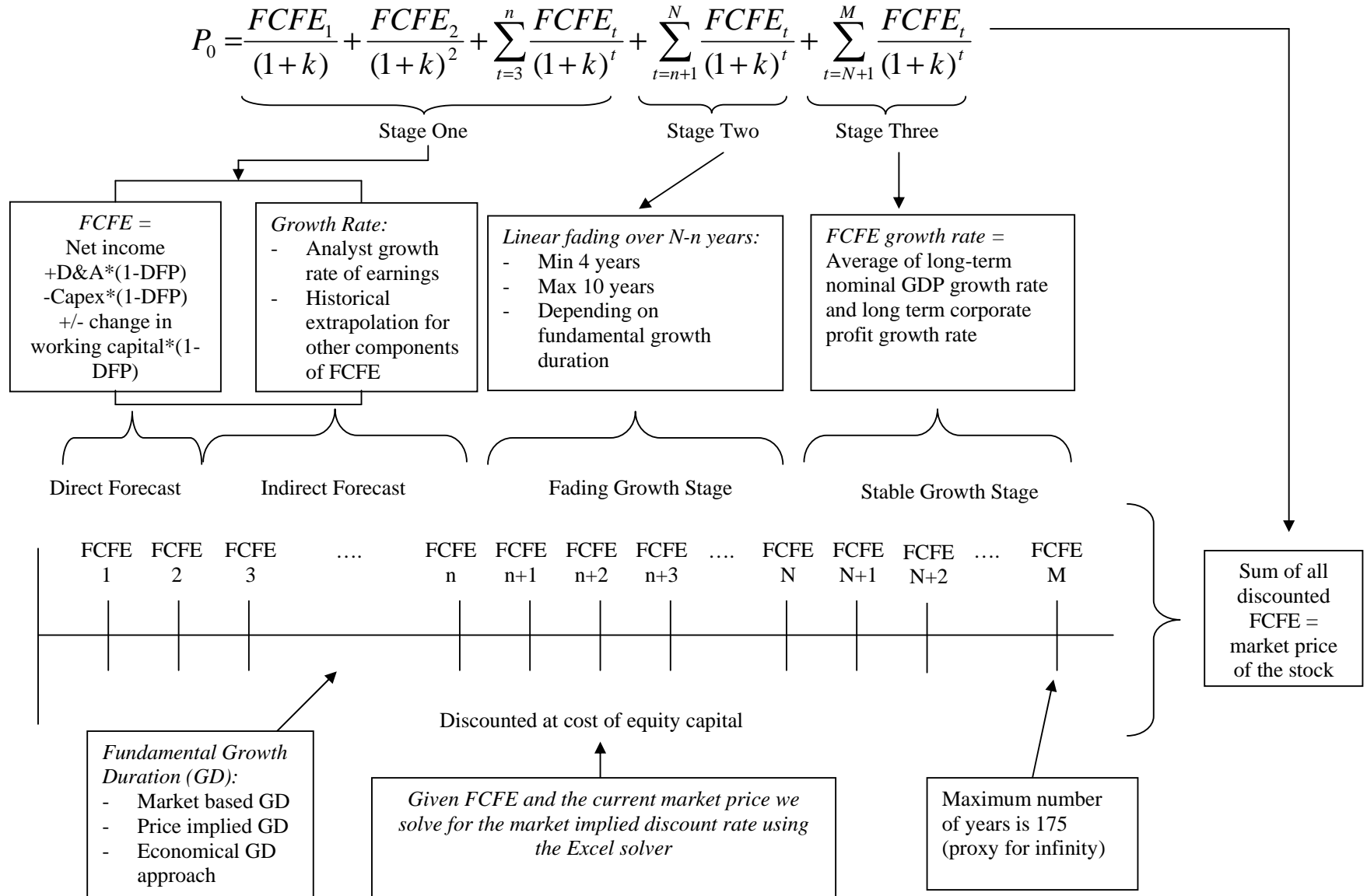


Table 15: Validity of the implied cost of capital: Pearson correlation coefficients for the implied cost of capital and firm characteristics related to the cost of capital

	IDR	MVAL	BVDMVE	CR	PER	BVDBVE	INDUM	BETA	VOLUME	ANALYST
IDR	1	-0.263	0.173	-0.173	-0.258	0.149	0.131	-0.034	-0.174	-0.236
MVAL	-0.263	1	0.049	-0.287	0.089	0.087	0.019	0.029	0.709	0.812
BVDMVE	0.173	0.049	1	-0.275	-0.115	0.908	0.031	0.133	0.132	-0.036
CR	-0.173	-0.287	-0.275	1	0.357	-0.305	0.071	0.134	-0.095	-0.210
PER	-0.258	0.089	-0.115	0.357	1	-0.063	0.215	0.422	0.232	0.210
BVDBVE	0.149	0.087	0.908	-0.305	-0.063	1	0.067	0.124	0.159	-0.002
INDUM	0.131	0.019	0.031	0.071	0.215	0.067	1	0.451	0.157	0.203
BETA	-0.034	0.029	0.133	0.134	0.422	0.124	0.451	1	0.245	0.070
VOLUME	-0.174	0.709	0.132	-0.095	0.232	0.159	0.157	0.245	1	0.636
ANALYST	-0.236	0.812	-0.036	-0.210	0.210	-0.002	0.203	0.070	0.636	1

For variable description and measurement, see pages 91-92

Table 16: Regression results of implied cost of capital on market value, beta and disclosure score (sub-sample of large companies; excluding auto)

	Intercept	INTDISC (-)	MVAL (-)	BETA (+)	Adj. RSQ
<i>Simple Regression (OLS)</i>					
Coefficient	0.090870493	-0.000564122			0.061185
P-Value	2.10447E-18	0.021192055 **			
<i>Multiple Regression (OLS)</i>					
Coefficient	0.090220838	-0.00053549	-1.93317E-08	0.000647	0.035559
P-Value	7.03658E-16	0.039878415 **	0.698449872	0.898133	

For variable description and measurement, see pages 91-92

Table 17: Regression results of implied cost of capital on market value, beta and disclosure score (sub-sample of small companies; excluding industrial goods and services)

	Intercept	INTDISC (-)	MVAL (-)	BETA (+)	Adj. RSQ
<i>Simple Regression (OLS)</i>					
Coefficient	0.103888601	-0.000697327			0.073366
P-Value	3.52097E-16	0.033446146 **			
<i>Multiple Regression (OLS)</i>					
Coefficient	0.1226949	-0.00057702	-1.95399E-05	-0.004804	0.147445
P-Value	2.56704E-14	0.068616933 *	0.028215989	0.295838	

For variable description and measurement, see pages 91-92

Table 18: Specification tests for the full sample

Panel A: Regression of Implied Cost of Capital on Market Value, Leverage, Price-to-Earnings ratio and Disclosure Score

	Intercept	MVAL (-)	BVDMVE (+)	PER (-)	INTDISC (-)	Adj. RSQ
<i>Multiple Regression (OLS)</i>						
Coefficient	0.09139	-5.31798E-08	0.00618		-0.00047	0.08171
P-Value	0.00000	0.24395	0.04310 **		0.01235 **	
<i>Multiple Regression (OLS)</i>						
Coefficient	0.10381	-5.49742E-08		-0.00055	-0.00045	0.11509
P-Value	0.00000	0.21933		0.00249 ***	0.01506 **	

Panel B: Regression of Implied Cost of Capital on Market Value, Beta, Industry Membership and Disclosure Score

	Intercept	MVAL (-)	BETA (+)	INDUM (+)	INTDISC (-)	Adj. RSQ
<i>Multiple Regression (OLS)</i>						
Coefficient	0.04818	-4.97122E-08	-0.00213	0.60461	-0.00046	0.06842
P-Value	0.07118	0.28158	0.54712	0.07940 *	0.01643 **	

Panel C: Regression of Implied Cost of Capital on Market Value, Beta, Return on Equity and Disclosure Score

	Intercept	MVAL (-)	BETA (+)	ROE (-)	INTDISC (-)	Adj. RSQ
<i>Multiple Regression (OLS)</i>						
Coefficient	0.0939	-5.89E-08	-0.0006	0.0005	-0.0005	0.0470
P-Value	0.0000	0.2064	0.8608	0.9591	0.0168 ***	

Continued next page

Panel D: Regression of Implied Cost of Capital on Market Value, Beta and Disclosure Rank (INTDISCRANK)

	Intercept	MVAL (-)	BETA (+)	INTDISC RANK (-)	Adj. RSQ
<i>Simple Regression (OLS)</i>					
Coefficient	0.0694			0.0001	0.0646
P-Value	0.0000			0.0014 ***	
<i>Multiple Regression (OLS)</i>					
Coefficient	0.0724	-6.05E-08	-0.0006	0.0001	0.0711
P-Value	0.0000	0.1827	0.8507	0.0072 ***	

Panel E: Regression of Implied Cost of Capital on Market Value, Price-to-Earnings Ratio, Beta and INTDISCMOD

	Intercept	MVAL (-)	BETA (+)	PER (-)	INTDISC MOD (-)	Adj. RSQ
<i>Simple Regression (OLS)</i>						
Coefficient	0.08502				-0.01029	0.04537
P-Value	0.00000				0.00644 ***	
<i>Multiple Regression (OLS)</i>						
Coefficient	0.08846	-1.0299E-07	-0.00131		-0.01080	0.07111
P-Value	0.00000	0.01861 **	0.69985		0.00386 ***	
<i>Multiple Regression (OLS)</i>						
Coefficient	0.09732	-9.17785E-08		-0.00050	-0.01128	0.12063
P-Value	0.00000	0.03162 **		0.00575 ***	0.00200 ***	

For variable description and measurement, see pages 91-92