

ANALYSIS OF FORM 4: SEC ELECTRONIC DELIVERY SYSTEM AND
INFORMATION CONTENT OF FOOTNOTE DISCLOSURES

by

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ANALYSIS OF FORM 4: SEC ELECTRONIC DELIVERY SYSTEM AND INFORMATION CONTENT OF FOOTNOTE DISCLOSURES

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University of Nebraska, 2009

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My dissertation investigates the economic importance of Form 4 footnotes, and compares insider information found in Thomson Reuters Insider Data Feed to Form 4 information filed with the Securities and Exchange Commission (SEC). I constructed a database containing disclosures from all Form 4 filings between January 1, 2004 and December 31, 2007. The dissertation is divided into three papers.

In the first paper, I examine the information content of voluntary disclosures accompanying open market purchases made by top executives. Analysis of variance indicates that, compared to open market transactions without disclosures, insider trades caused by contractual obligations (a voluntary disclosure) result in significantly smaller abnormal returns on Form 4 filing dates. I also find that disclosures confirming trades' open market nature have no information content. Finally, I find evidence that the insider ownership structure resulting from the transactions has information content.

In the second paper, I investigate whether insider sell-trades filed under Rule 10b5-1 engender a different market response than nonprotected open market sell-trades disclosed by top executives. Contrary to findings in previous studies, I find that 10b5-1 trades have information content. However, the information content of these trades has not increased over time. Finally, my evidence suggests that trades must be previously planned under Rule 10b5-1 for their information content to be affected by other disclosures.

In the third paper, I compare Form 4 submissions with insider data provided by Thomson Reuters (TFN). I find that the TFN cleansing process improves the accuracy of a small number of transactions and that cleansed values cannot be

inferred from data submitted in Form 4. I also find that supplementary disclosures associated with nonderivative acquisitions provide clues for classifying these transactions equivalently to TFN data. Finally, I find that mandatory disclosures are reflected in the TFN dataset. In general, my results suggest that users who access the electronically filed Form 4 from the SEC website potentially are exposed to a richer dataset than are TFN users.

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	iii
LIST OF TABLES	vii
LIST OF FIGURES	viii
CHAPTER	
1. INTRODUCTION	1
1.1. Changes in Beneficial Ownership and Section 403 of the Sarbanes-Oxley Act OF 2002	1
1.2. XML and Electronic Data	2
1.3. Form 4 Footnotes vs. Form 4 Tables	4
1.4. The Form 4 Database	5
1.5. Research Issues Analyzed in this Work	5
2. PAPER I: Information Content of Voluntary Disclosures Accompanying Insiders' Open Market Purchases	7
2.1. Introduction	
2.2. Literature Review and Hypotheses Development	9
2.2.1. Information Content of Increases in Ownership Resulting from Contractual Obligations	10
2.2.2. Information Content of the Ownership Structure Held after Transaction Executions	12
2.2.3. Information Content of Open Market Disclosure Confirmations	16
2.3. Research Design	18
2.4. Sample and Preliminary Statistics	23
2.5. Results	24

	v
2.5.1. Main Results	24
2.5.2. Regression Results	27
2.6. Conclusions and Implications	27
2.7. Limitations and Future Research	30
3. PAPER II: Information Content of Rule 10b5-1 and Other Form 4 Voluntary Disclosures	31
3.1. Introduction	31
3.2. Rule 10b5-1	34
3.3. Hypotheses Development	36
3.3.1. Information Content of Rule 10b5-1 Transactions	36
3.3.2. Information Content of Rule 10b5-1 Plan Initiation Dates	41
3.3.3. Information Content of Voluntary Disclosures other than Rule 10b5-1	43
3.4. Methods and Variables Definition	45
3.5. Sample and Preliminary Statistics	47
3.6. Results	50
3.7. Conclusions and Future Research	53
4. PAPER III: Can Electronic Disclosures Replace Third Party Data Vendors?	56
4.1. Introduction	56
4.2. Background	59
4.2.1. Form 4	59
4.2.2. The TFN Cleansing Process	61
4.3. Test 1: TFN Cleansing Process	62
4.3.1. Methodology	62

	vi
4.3.2. Sample and Results	64
4.4. Test 2: Voluntary Footnote Disclosures	66
4.4.1. Methodology	66
4.4.2. Sample and Results	68
4.5. Test 3: Mandatory Footnote Disclosures	69
4.5.1. Methodology	69
4.5.2. Sample and Results	71
4.6. Conclusions and Future Research	73
REFERENCES	75
TABLES	81
FIGURES	96
APPENDIX A – The XML-Based Form 4	101
APPENDIX B – The Form 4 Database	108

LIST OF TABLES

Table 1: Number of firms and firm-day observations by disclosure	81
Table 2: No. of firms and firm-day observations per industry	82
Table 3: Means and medians across variables by subsamples	83
Table 4: Analysis of variance for $CAR_{0,2}$ observed on Form 4 filing dates	83
Table 5: Abnormal returns across subsamples	84
Table 6: Summary statistics from the regression analysis.....	85
Table 7: No. of firms and firm-day observations per category of sales	85
Table 8: No. of firms and firm-day observations per industry	86
Table 9: Number of firms within classification groups and year	87
Table 10: Firm attributes per category	88
Table 11: Cumulative abnormal returns surrounding the Form 4 filing date of plan and non-plan sales.....	89
Table 12: Cumulative abnormal returns surrounding Form 4 filing dates of plan sales with and without plan initiation dates.....	90
Table 13: Abnormal Returns for plan and non-plan sales	91
Table 14: No. of open market transactions with discrepancies between as reported and cleansed values	92
Table 15: Trades and firm characteristics across trades with and without differences	93
Table 16: Transactions with voluntary footnote disclosures	94
Table 17: No of transactions where mandatory items are linked to footnote disclosures	94
Table 18: Number of disclosures by category and transaction code	95

LIST OF FIGURES

Figure 1: List of Available Transaction Codes	96
Figure 2: Examples of mandatory disclosures by transaction code and Table II column	97
Figure A. 1. Example of a Form 4	102
Figure A. 2. Excerpt taken from an XML-based Form 4 submission.....	103
Figure A. 3. Excerpt from the ownershipDocumentCommon.xsd Schema file. Taken from the EDGAR Ownership XML Technical Specification.	106
Figure A. 4. Section of an XML-based Form 4 that conforms to the Schema definition given in Figure A.3. Taken from the EDGAR Ownership XML Technical Specification.	106
Figure B. 1. A relational database table.....	108
Figure B. 2. Set of relational tables for storing footnote disclosures submitted with Form 4.	109
Figure B. 3. List of entities required to capture information submitted in Form 4.	111
Figure B. 4. Aggregated version of the E-R diagram developed for the database that I implemented to capture Form 4 data.....	113
Figure B. 5. E-R diagram developed to capture Form 4 nonderivative transactions and nonderivative holdings data.....	114
Figure B. 6. E-R diagram developed to capture Form 4 derivative transactions and derivative holdings data.....	115
Figure B. 7. Two entities and their relationship.....	116

Chapter 1

Introduction

1.1. Changes in Beneficial Ownership and Section 403 of the Sarbanes-Oxley Act of 2002

Securities law defines insiders as officers, directors, and stockholders who own more than 10 percent of an issuer's securities. Since 1971 insiders report trades in their own securities to the SEC using one of three forms. The initial filing is made in Form 3, changes in ownership are reported in Form 4, and any transactions that should have been reported earlier in a Form 4 or that were eligible for deferred reporting are reported using Form 5.

Historically, changes of beneficial ownership have been reported using a paper-based Form 4 within 10 days following the month in which the trade has taken place. In 2002 the Sarbanes-Oxley Act (SOX) was enacted in an effort “to protect investors by improving the accuracy and reliability of corporate disclosures made pursuant to the securities laws.” Toward this end, SOX Section 403 (Disclosures of transactions involving management and principal stockholders) dictates that beginning on August 29, 2002 changes of beneficial ownership be reported before the end of the second business day following the day on which transactions have been executed. If the SEC determines that the two days period is not feasible, it must establish, by rule, other time for the changes to be filed. Section 403 also mandates that insider submissions be filed electronically beginning no later than July 30, 2003. The SEC and issuers with a corporate website must make available these submissions

on the internet no later than at the end of the business day that follows the date in which filings are made.

Although Section 403 only affects filings made using Forms 3, 4, and 5, the mandate fits well with the long term objectives of the SEC requiring domestic issuers to file most documents electronically. Following the conclusion of a successful electronic filing voluntary pilot program,¹ in February 1993, the Commission adopted interim rules (Regulation S-T: General Rules and Regulations for Electronic Filings) governing mandated electronic submissions. Regulation S-T begins the implementation of the operational EDGAR system. Forms 3, 4, and 5 were initially exempted from electronic filing. However, in 1995 the Commission revised Regulation S-T to permit voluntary electronic submission of these Forms.² In 1996, the Commission asked for comment on whether to require EDGAR filing of any documents allowed, at the time, to be filed electronically on a voluntary basis.³ In 2000,⁴ the Commission announced consideration of Forms 3, 4, and 5 for future electronic disclosure and asked for comment. On April 24, 2000⁵ the SEC acknowledged its intentions to require electronic filing of Forms 3, 4 and 5.

1.2. XML and Electronic Data

The SEC enforces the electronic filing of Forms 3, 4 and 5 for all submissions filed on or after June 30, 2003. Electronic filing must be made using Extensible

¹ The Electronic Data Gathering, Analysis, and Retrieval (EDGAR) system was officially opened for testing on May 1, 1991.

² Release No. 33-7241: Adoption of Revised EDGAR Filer Manual and Technical Rule Changes. Dec. 18, 1995.

³ Release No. 33-7369: Proposed Rule: Rule Making for the EDGAR System. Dec. 6, 1996.

⁴ Release No. 34-42462: Rulemaking for EDGAR system. February 25, 2000

⁵ Release No. 33-7855: Final Rule: Rulemaking for EDGAR System. April 24, 2000.

Markup Language (XML).^{6,7} By requesting filings in XML format the SEC seeks to deliver interactive data to users. The Commission expects interactive data to facilitate the use and analysis of information. The Commission also expects interactive data to create new ways for investors, analysts and others to retrieve and use financial information.⁸ Users can download interactive financial data directly into spreadsheets, analyze it using commercial off-the-shelf software, or use it within investment models in other software formats. Through interactive data text-based information can be dynamically searched and analyzed, facilitating comparison of data across companies, periods and industries. Also, to the extent that investors are required to pay for access to disclosure that a third-party vendor has extracted and reformatted into an interactive data format, the availability of interactive data in Commission filings allows investors to avoid such costs.

XML is a flexible, nonproprietary set of standards concerned with the description and structuring of data. In XML, tags are used to identify the specific roles and relationships of data within electronic documents (Hunter et al., 2004). The extensible nature of XML enables users to define their own tags. Using different tags users can mark up data in documents in different ways. Upon agreement on standard vocabularies (tags) XML gives the flexibility to interchange data across programs or companies through the internet. XML-based forms enable users not only to navigate

⁶ Release No. 33-8230: Mandated Electronic Filing and Website Posting for Forms 3, 4 and 5. May 7, 2003.

⁷ Predecessor electronic filing formats processed by EDGAR were ASCII, HTML, and PDF.

⁸ Release No. 33-9002: Interactive Data to Improve Financial Reporting. January 30, 2009.

and access their tagged data more easily but also to read, comprehend and analyze the data with reduced effort.

To enable interchange of the information contained in the XML-based Form 4, the SEC has created the **EDGAR Ownership XML Technical Specification**. This specification defines the valid structure and content of Ownership submissions⁹. The specification is a well defined vocabulary that determines the elements, attributes and other document pieces that provide filers with a basis for creating XML Ownership submissions that can be shared with other users.

For a description of the XML-based Form 4 reporting system see Appendix A.

1.3. Form 4 Footnotes vs. Form 4 Tables

Form 4 is divided into four sections. Each section has its own data elements and attributes: (1) a header, reserved for general information, (2) Table I, reserved for information regarding the acquisition, disposition or beneficially owned non-derivative securities; (3) Table II reserved for information regarding derivative securities acquired, disposed of, or beneficially Owned (e.g., puts, calls, warrants, options, convertible securities) by insiders; and (4) a footer, which is limited to footnotes, remarks, and signatures.

Contrary to Table I and Table II fields, which are the reporting items that insiders must disclose when filling the Form 4, the use of footnotes in Form 4 submissions is mostly voluntary. Whether a footnote represents additional information or a mandatory disclosure depends on its relationship with the fields in Table I and Table II. It is mandatory to disclose the corresponding information in the

⁹ Together, Forms 3, 4, and 5 constitute the Ownership submissions.

footnotes when a submission reports a non-derivative transaction and the “price of the securities acquired or disposed of” is missing from Table I. In addition, if a submission reports a derivative transaction and the fields “Conversion or Exercise Price of Derivative Security”, “Date Exercisable”, “Expiration Date”, “Amount or Number of Shares” underlying the derivative security, and “Price of Derivative Security” are missing from Table II, it is mandatory to disclose the corresponding information in the footnotes. In all other circumstances the requested information must be on the appropriate table and footnote disclosures constitute supplementary voluntary disclosures.

1.4. The Form 4 Database

In this study I collect data for all insider transactions submitted in Form 4 from January 01, 2004 to December 31, 2007. To host the data used to perform the analyses described later in this study, I create a database following the **EDGAR Ownership XML Technical Specification**. Description of the structure and implementation of this database is in Appendix B.

1.5. Research Issues Analyzed in this Work

The primary focus of this study is to investigate the information content of disclosures found in the footnotes of the XML filed Form 4. The body of this work is divided into three papers. In the first paper, I examine the information content of voluntary disclosures accompanying open market purchases made by top executives using Form 4 filings. The disclosures of interest are the nature of transactions and insider ownership structure after transactions are executed. In the second paper, I examine the information content of 10b5-1 and other disclosures accompanying Form

4 filings. I investigate whether trades filed under the protection of Rule 10b5-1 engender a different market response than other nonprotected open market trades filed by top executives. I also investigate whether the information content of 10b5-1 trades has increased over time. Finally, I analyze if the market reaction to Form 4 filing is affected by other voluntary disclosures. In the third paper, I compare Form 4 submissions with insider data provided by Thomson Reuters (TFN). My investigation is divided into three parts: (1) the effectiveness of the cleansing process applied by TFN to ensure data accuracy; (2) the importance of insiders' nonderivative voluntary disclosures and their impact on TFN data; and, (3) whether mandatory disclosures accompanying derivative transactions improve TFN transactions' presentation.

Chapter 2

Paper I: Information Content of Voluntary Disclosures Accompanying Insiders' Open Market Purchases

2.1. Introduction

In this paper I examine the information content of voluntary disclosures made by top executives in the footnotes of Form 4. Executives acquiring equity securities from their employers may choose to disclose footnote information that allows investors to identify their motivations to trade. Executives also may choose to disclose details about their ownership of their employers' securities in the footnotes after transactions are executed. The focus of my study is the association between these disclosures and abnormal returns¹⁰ surrounding the filing dates of Form 4.

Researchers often indicate that the main reason that insiders purchase their employers' shares is to make money (Seyhun, 1998; Lakonishok and Lee, 2001; Fidrmuc et al., 2006). Past research documents that insider trading activity generates abnormal returns (Jaffe, 1974; Finnerty, 1976, Givoly and Palmon, 1985; Seyhun, 1986 and 1998; Rozeff and Zaman, 1988; Lin and Howe, 1990; Lakonishok and Lee, 2001; Jeng, Metrick and Zeckhauser, 2003). This research is consistent with investor beliefs that reports of trades made by directors and executive officers in company equity securities provide useful information about the future potential of their firms.¹¹

¹⁰ A return is the change in the total value of an investment in a security over some period of time per dollar of initial investment. The abnormal rate of return of a security refers to the difference between the realized rate of return and the expected rate of return.

¹¹ "Mandated Electronic Filing and Website Posting for Forms 3, 4 and 5." SEC Release No. 33-8230. May 7, 2003.

In spite of the apparent relevance of insider trades, research documenting Form 4 footnote factors affecting the information content is limited.¹² No one has systematically explored the importance of Form 4 voluntary disclosures in explaining price changes around filing dates because most researchers use insider trading data from the Thompson Financial Insider Trading Database that contains only partial footnote information. The limited Form 4 voluntary disclosure research to date (Bettis et al., 2001; Jagolinzer et al., 2007) has focused on private transactions used by insiders to hedge firms' downturn risk. Jagolinzer (2009) and Brochet (2008) investigate the information content of 10b5-1 transactions.¹³

My study makes several contributions to the academic literature by using complete Form 4 footnote information.¹⁴ These footnote data are important for several reasons. First, early evidence investigating the information content of Form 4 purchase transactions is mixed. Some authors find that abnormal returns around Form 4 filings are statistically, but not economically, significant (Lakonishok and Lee, 2001).

Others suggest that finding information content of insider filings depends on isolating the sources of private information that lead to information asymmetry (Aboody and Lev, 2000). Further, Brochet (2008) finds that the information content

¹² Insiders—officers, directors and stockholders who own more than 10 percent of an issuer's securities—are required to use Form 4 to report to the Securities and Exchange Commission (SEC) any changes in their beneficial ownership of their employers' securities.

¹³ Insiders report if a transaction is filed under the 10b5-1 Rule in the footnotes of Form 4.

¹⁴ A database was created after the Securities and Exchange Commission implemented mandatory electronic requirements on June 30, 2003. The electronic Form 4 submission must be filed using XML. XML labels every individual item in Form 4 separately.

of Form 4 insider purchases is affected by reporting timeliness. Fidrmuc et al. (2006) finds similar results for a sample of director filings in the United Kingdom.

Some evidence exists that information content can be improved by controlling for firms' prior risk of litigation (Ke et al., 2003; Huddart et al., 2007). I contribute to this literature by investigating whether additional factors found in Form 4 footnotes affect the information content of Form 4.

Second, this study is important to those who set public policy and to government regulators. Most disclosures made in the footnotes of Form 4 are voluntary. The results in my study show that when insider filings are supplemented with information about these disclosures, investors are better able to determine the usefulness of insider trading activity. Given that most insiders do not provide disclosures with their Form 4 filings, this study provides evidence suggesting that these disclosures should be mandatory.

In the next section I review the literature and formulate hypotheses that link the information content of Form 4 to insider trading profitability. Section 2.3 describes the research design. Sample and preliminary statistics are presented in Section 2.4. Section 2.5 shows the results. Conclusions and implications are contained in Section 2.6. Limitations and future research are in Section 2.7.

2.2. Literature Review and Hypotheses Development

Not all insider-trading activity disclosures are equally informative to investors. In this study I concentrate on the disclosure of insider purchase transactions. The information content of Form 4 should depend on factors that investors believe are related to insider motivations for purchasing company common

equity. These factors are expected to impact the profitability of insider trades. Form 4 disclosures potentially provide investors with a window for discerning asymmetric insider knowledge about company risk or future cash flows. In this section I develop hypotheses for investigating the information content of different categories of insider purchase transactions.

2.2.1. Information Content of Increases in Ownership Resulting from Contractual Obligations

Little evidence exists about investor interpretations of different categories of stock purchases by officers. Past research has assumed that when insiders voluntarily choose to purchase their firms' stock, they do so anticipating that they will make money based on material nonpublic information. Several studies document evidence of abnormal returns up to two years following voluntary insider acquisitions (Seyhun, 1998; Lakonishok and Lee, 2001). Past researchers have not differentiated the types of insider purchases—it has been difficult to identify categories of insider purchases (such as open market stock purchases and those resulting from contractual obligations).¹⁵

It is possible that all officer purchases are viewed by investors as equally important; differentiation is not economically significant to investors. Officer purchases are deemed of equal importance because the shares of common stock purchased provide officers with the same increases in ownership. More importantly,

¹⁵ As described later in the paper, contractual claims provide several venues for ownership increases. For example, insiders could receive shares of stock from their employers as part of their compensation package. Insiders also could participate in their employers' stock purchase programs and add the shares to their retirement accounts. Finally, it is possible for insiders, who already own shares, to receive additional shares resulting from dividends related to the company's reinvestment plan.

the transactions may be viewed as equally important because investors share researchers' difficulty in differentiating purchase motivations.

Disclosure of motivation for the insider trade often is found in Form 4 footnotes. Investors usually receive insider trading information from a secondary source such as the Thompson Financial Insider Trading Database or the Wall Street Journal web page—they may lack the insights available from Form 4 footnotes.

Alternatively, investors may be able to discern the different motivations for insider open market versus insider contractual purchases even though past researchers could not separately identify these transactions. Research reviewed by Fama and McBeth (1973) and Fama and French (1992) suggests that publicly available information will contribute to investors' decisions. The decision of an executive to voluntarily purchase stock is endogenously determined by his or her undisclosed knowledge about the future. Investors, for example, may interpret increases in ownership interest resulting from voluntary open market purchases to represent active conscious officer efforts to increase their ownership shares.

In contrast, contractual acquisitions occur with the expectation that incentives of corporate managers and stockholders will be more aligned if managers hold stock in the firms they manage (Jensen and Meckling, 1976). Given that contractual acquisitions imply greater uncertainty about firms' expected performance, such acquisitions increase investors' estimation risk. Estimation risk arises because investors are uncertain about the parameters of a security's return or payoff distribution (Klein and Bawa, 1976; Barry and Brown, 1985; Coles and Lowenstein, 1988; Handa and Linn, 1993; Coles et al., 1995; Clarkson et al., 1996). Parameter

uncertainty affects prices at a given point in time through its impact on investors' beliefs (Lewellen and Shanken, 2002). Greater uncertainty about the parameters of a security's returns decreases investors' confidence in their predictions (Botosan, 2006).

The literature cited above suggests that investors predict positive associations between a firm's future performance and current insider acquisitions. Contractual acquisitions have a weaker association with firm performance than do voluntary purchases. If investors have lower confidence in predictions based on contractual acquisitions, a negative association will be observed on the date these transactions are filed using Form 4. The market reaction to the filing of contractual acquisitions will be lower than the market reaction to the filing of voluntary obligations. Formally, these predictions can be summarized in the following hypothesis:

H1: Abnormal returns on the filing dates of Form 4 including contractual acquisitions are smaller than abnormal returns on the filing dates of Form 4 including voluntary acquisitions.

Failing to reject the null hypothesis for H1 implies that abnormal returns in response to filings of contractual acquisitions are not significantly different than abnormal returns in response to open market acquisitions. The information content of both contractual and voluntary transactions is equivalent. Contractual and voluntary acquisitions do not affect differently the uncertainty surrounding firms' expected performance.

2.2.2. Information Content of the Ownership Structure Held after Transaction Executions

Agency theory (i.e., Jensen and Meckling, 1976) indicates agency costs decrease as the proportion of ownership by insiders increases. This suggests that insider ownership information is useful to investors. In this study, *ownership structure* refers to details of the composition of insiders' ownership in firm equity after Form 4 transactions are executed.

When insiders provide this voluntary disclosure, they often disaggregate the total number (value) of shares owned according to type. For example, insiders often disclose that all or part of their ownership is composed of one or more of the following: restricted stock, stock options, stock appreciation rights, phantom stock, and performance rights.

To investors, the usefulness of knowing this information lies in the different expected benefits and costs that these instruments convey. For example, restricted stock is composed of shares of common stock subject to restrictions on sale. Typically these restrictions are removed if the executive remains with the company for a specified period of time. Until the restrictions are removed, the shares usually are subject to forfeiture if the manager terminates employment. Stock options are a privilege granted by employers to executives that gives the executive the right, but not the obligation, to buy (call) the employer's stock at an agreed-upon price, usually within a certain period.

Stock appreciation rights (SARs) often are granted with options. These are rights to receive a bonus equal to the appreciation in the company's stock over a specified period. Like stock options, SARs benefit the holder with an increase in stock price; the difference is that the executive is not required to pay the exercise

price, but rather receives the amount of the increase in cash or stock. Phantom stock is essentially a cash bonus plan based on the value of a stated number of shares, to be paid at the end of a specified period of time. Phantom stock is favored by companies who want to provide incentives to executives without granting them equity. Generally, phantom stock agreements require the employee to become vested, either through seniority or meeting a performance target. Finally, unlike the above instruments, performance rights reward managers based on accounting measures. Performance goals often are expressed in terms of earnings per share growth at the beginning of an award period that normally ranges from three to six years.

Executives who disclose owning these types of long-term compensation plan instruments signal investors that their wealth is tied to the firm's stock price or earnings even under difficult times. The message is even stronger for instruments with vesting¹⁶ and/or forfeiture provisions. These arrangements help firms retain executives (Kole, 1997; Balsam and Miharjo, 2007), an especially important characteristic given that executives resigning in anticipation of difficult times might not be able to exercise their compensation rights.

The vesting schedule also illustrates differences between short-term incentives (vested) and long-term incentives (unvested). Absent vesting restrictions, the incentive power of securities is lost if executives exercise options and sell stock shortly after the granting date.

The influence on the risk-taking behavior of managers also is affected differently by these instruments. While equity holding can decrease in value, stock

¹⁶ The vesting period is the period of time before shares are owned unconditionally by an employee.

option value is determined at the time of exercise. While both equity incentives and stock options provide upside potential, only stock options pose limited downside risk. For example, managers with equity-based compensation have incentives to maximize their wealth through accounting choices that result in restatements of financial statements. The likelihood is not equally granted, however, for all forms of equity instruments. Burns and Kedia (2006) find that relative to other equity-based incentives, stock options are associated with stronger incentives to misreport because convexity in CEO wealth introduced by stock options limits the downside risk on detection of the misreporting.

In contrast to stock options, which are exercisable in the future, equity represents real wealth. As the ownership of equity in a firm increases, the wealth of the firm's CEO becomes more dependent on the firm's stock performance. Greater dependence on stock performance can result in executives trying to minimize firm risk and, thus, the riskiness of his or her personal portfolio (Amihud and Lev, 1981; Wright et al., 1996; Mehran et al., 1999). In an attempt to reduce their nondiversifiable risk, top officers may reject projects with positive net present value if those projects are too risky (Smith and Stulz, 1985).

The previous discussion supports the contention that details of insider ownership interests affect investors' expectations about company valuation changes following insider purchases. Given the common favorable potential impact of these instruments on firm performance and their adverse unintended consequences on managerial behavior, however, it is unlikely that all investors see these instruments as

equally beneficial or detrimental. In light of this evidence, I establish the next nondirectional hypothesis:

H2: Abnormal returns on the filing dates of Form 4 including ownership details are different than abnormal returns on the filing dates of Form 4 that do not include ownership details.

Failing to reject the null hypothesis for H2 means that abnormal returns in response to acquisitions filed with ownership details are not significantly different than abnormal returns in response to acquisitions filed without ownership details.

2.2.3. Information Content of Open Market Disclosure Confirmations

Although most insiders make no disclosures about why they purchase their firm's stock, some explicitly make use of the footnotes to report that their trades are open market. Arguably, these disclosures confirm what is assumed by investors: this is a voluntary purchase likely made in anticipation of news or events that will have a positive impact on firm performance.

There is limited evidence of the information content of confirming disclosures. Clement et al. (2003) use the dividend discount model valuation framework to show that confirming disclosures can affect equity prices by reducing uncertainty.¹⁷ This model shows that a change in price may result from a change in the discount rate applied to future earnings. Prior studies show that voluntary disclosures theoretically affect the discount rate. Merton (1987) shows that disclosures can reduce required rates of return if they reduce the information costs to

¹⁷

$$P_t = k * \sum_{t=1}^{\infty} \frac{E_t}{(1+r)^t}$$

where P is price; k is the dividend payout rate; E_t is expected earnings; and r is the cost of capital.

uninformed investors, thus increasing the proportion of investors holding a company's securities. Barry and Brown (1985) demonstrate that when estimation risk varies across firms, securities with higher levels of information have smaller betas and, therefore, smaller costs of capital. More recently, Easley and O'Hara (2004) demonstrate that quantity and quality of information cause differences in a firm's required returns. They show that when information is more widely available, stock prices increase while the cost of capital decreases. Lang and Lundholm (1996) document positive valuation effects resulting from higher levels of disclosure. Using measures of corporate disclosure from the **Reports of the Financial Analysts Federation Corporate Information Committee** (FAF Reports), they show that higher levels of disclosure are associated with greater analyst following, more accurate market expectations, and reduced information asymmetry. Similarly, Clement et al. (2003) find results consistent with a reduction in the discount rate that investors use to value earnings expectations. They find a positive market reaction to confirming disclosures that are caused by a reduction in uncertainty, as proxied by analyst forecast dispersion.

Taken together, this literature suggests that if there is information content in confirming open market disclosures, the market reaction to their filing is higher than the market reaction to Form 4 where insiders are mute about their reasons to purchase. If confirming disclosures have no information content, their use has no effect on the market reaction to the Form 4 filing. Therefore, expressed in alternative form, the next hypothesis is:

H3: Abnormal returns on the filing dates of Form 4 including confirming open market disclosures are larger than abnormal returns on the filing dates of Form 4 that do not include confirming open market disclosures.

2.3. Research Design

To test my hypotheses, I use analysis of variance to obtain mean differences in market reaction to Form 4 filings on the days surrounding insider purchases. Market reaction is measured using abnormal returns. Tests are performed across submissions with and without disclosures related to contractual acquisitions, ownership structure after execution of transactions, and open market confirmations.

Theoretical (Kim and Verrecchia, 1991) and empirical (Beaver, 1968) studies document the role of abnormal returns in measuring information content. Stock returns capture changes in consensus belief about stock prices. If as stipulated in H1, Form 4 submissions filed with voluntary transactions have greater information content than Form 4 submissions filed with contractual acquisitions, the former cause a change in stock prices greater than the change caused by the later. Similarly, if ownership structure and confirmation disclosures add information content to insider purchases, stock returns in their presence are larger than stock returns observed when transactions are filed without these disclosures.

Abnormal returns are calculated by summing daily abnormal returns over the three-day period starting on the dates insiders file Form 4 with the SEC. Daily abnormal returns are calculated by subtracting the daily equally weighted NYSE/AMEX/NASDAQ CRSP index return from the daily return of each company. There are three reasons why I use equally weighted returns in this study. First, researchers seeking to measure gains obtained from insider trades most often select

equally or market weighted returns as measures. I am not aware of any study in which results calculated using one measure over the other leads to qualitatively different results. Second, there is no consensus about which variable should be used to study the information content of insider trades. Aboody and Lev (2000) measures the strength of investor reaction to insider trades in firms with R&D expenditures using cumulative raw returns. Fidrmuc et al. (2006) calculates market response by means of the market model over a period of 41 days centered on the filing date. Brochet (2008) calculates expected returns using daily returns on the Fama-French 5x5 portfolios based on market capitalization and book-to-market ratio. Third, Lakonishok and Lee (2001) use equally weighted returns to measure the information content of insider trades. Given that this paper seeks to understand not only insider gains, but also information content, I believe following their variable definition makes the results obtained in this paper better suited for comparison with results obtained in prior studies.

Although the SEC makes transactions available as soon as insiders file Form 4, the window of interest includes two days after the filing date to ensure that investors have had enough time to access that information. Access to Form 4 is delayed because some filers make their submissions after the markets are closed. Access also is delayed if investors access this information from a third party source instead of from the SEC website. In each of these cases it is likely that the market reaction would be observed on the day following the transaction date.

The required disclosures are identified from a content analysis performed on all Form 4 footnotes filed electronically with the SEC beginning in 2003. This

analysis allows me to identify keywords that I use to classify the Form 4s according to three variables of interest. Specifically, on each filing date I search for disclosures referring to motivations to trade and ownership structures across all open market purchases submitted by all officers. If one of the disclosures of interest is found, the corresponding variable is set to one; otherwise the variable is set to zero. The three variables of interest are *Contract*, *OwnStruct*, and *Confirm*.

Within the context of this study, a contractual acquisition (*Contract*) is a purchase that occurs as a consequence of prior binding obligations between the firm and the officer. Once obligations are established, insiders have no direct influence over subsequent purchases derived from these obligations. I include three types of purchases in this category. Purchases that result from dividend reinvestment plans, granting of stock resulting from compensation contracts, and purchases that result from agreements to fund retirement accounts using stock. I define voluntary acquisitions to be all purchase transactions that insiders file without presenting additional information that puts forth reasons to purchase. As argued in past research (Seyhun, 1998; Lackohishock and Lee, 2001; Fidrmuc et al., 2006), it is unlikely that insiders have motivations other than to increase their wealth when making these acquisitions. Investors believe that these trades are based on material nonpublic disclosures. The difference between abnormal returns observed in response to Form 4 filings where *Contractual* is equal to one and Form 4 filings where this variable is equal to zero (voluntary acquisition) is the effect obtained from disclosing contractual acquisitions.

OwnStruct indicates that a transaction contains disclosures providing the type (e.g., nonderivatives and derivatives) and/or the vesting requirements (e.g., performance) of insider ownership following transaction executions. The information content of these disclosures is measured by the difference between abnormal returns observed in response to Form 4 filings where *OwnStruct* is equal to one (where the transaction contains such disclosures) and Form 4 filings where this variable is equal to zero (where such disclosures are absent). As stated in H2, I expect that abnormal returns in response to Form 4 filings where this variable is equal to one will be different than abnormal returns in response to Form 4 submissions where this variable is equal to zero.

Confirm is a variable indicating whether a transaction has additional information corroborating its open market nature (*Confirm*=1) or not (*Confirm*=0). In other words, officers have decided to make these purchases without prior planning and do not provide further justification for their trades. The information content of these disclosures is measured by the difference between abnormal returns observed in response to Form 4 filings where *Confirm* is equal to one and Form 4 filings where this variable is equal to zero. If there is evidence supporting H3, I expect that abnormal returns in response to filing Form 4 where this variable is equal to one will be larger than abnormal returns in response to Form 4 filings where this variable is equal to zero.

I supplement the main analysis by examining whether the information content of these disclosures is incremental to the information content of factors previously shown to affect the market reaction to the filing of insider open market purchases. To

accomplish this goal, I use the following cross-sectional regression, where individual observations are firm-day Form 4 filing dates:

$$\begin{aligned} Car_{0,2} = & \alpha_0 + \alpha_1 Contract + \alpha_2 OwnStruct + \alpha_3 Confirm + \alpha_4 Loss \\ & + \alpha_5 Tsize + \alpha_6 Fsize + \alpha_7 Btm + \alpha_8 Replag + \alpha_8 R\&D + \epsilon \end{aligned}$$

Abnormal returns ($CAR_{0,2}$), *Contract*, *OwnStruct*, and *Confirm* are as previously defined. Following the prediction in H1, I expect the regression coefficient of *Contract* to be negative. I make no predictions regarding the coefficient of *OwnStruct*, as stated in H2. In line with H3, I predict the coefficient of *Confirm* to be positive.

Loss is an indicator variable equal to one if the firm reported a loss in the year prior to the transaction and zero otherwise. *Tsize* is the size of the total purchases made by a firm's insiders on a given date deflated by the number of shares outstanding. *Fsize* is the natural logarithm of the market capitalization of the firm, as of the last day of the prior fiscal quarter. Market capitalization of the firm is calculated by multiplying common shares outstanding (COMPUSTAT DATA61) by security price (DATA14). *Btm* is the book value of common stockholder equity (COMPUSTAT DATA59) divided by market capitalization of the firm as of the end of the most recent fiscal quarter. *Replag* is a firm-specific measure that accounts for the number of days that exist between the first transaction execution by any of a firm's officers and the filing date. Finally, *R&D* is an indicator variable that equals

one if at the end of the prior fiscal year a firm has reported a positive research and development expenditure and zero otherwise.

2.4. Sample and Preliminary Statistics

The initial sample consists of all nonderivative open market and private purchases (codes A and P on Form 4) filed with the SEC by officers from January 2004 to December 2007. From the initial 68,013 transactions, I eliminate all transactions that have not been filed by the CEO of the company and that do not have the necessary data on COMPUSTAT and CRSP. The remaining transactions are grouped by firm and file date. The resulting sample is formed of 11,345 firm-day observations from 2,367 firms. Table 1 shows the final sample of unique firms and firm-day observations. Table 1 also shows the sample breakdown by variables of interest.

The number of observations across groups does not match the unique totals because some firms make multiple disclosures.¹⁸ The partition shows that most firms do not make disclosures; the most popular of the disclosures made are those measured with the variable *Contract*. The popularity of this category suggests that insiders are interested in letting investors know when their purchases are beyond their control. Executives also seem to be interested in letting investors know their ownership structure, probably in an effort to signal their commitment to shareholder interest. The number of confirming disclosures is limited. Given the Form 4 codes initially picked, insiders might see this disclosure to be redundant or incriminating.

¹⁸ However, companies in the no disclosure group never issue disclosures.

Participation of firms and firm-day observations by industry and disclosure are presented in Table 2. The classifications are made using Fama and French's 17 industry classifications. Financial institutions account for 40 percent of the total number of firm-day observations, followed by other industries (26 percent), machinery and business equipment (8 percent), and drug, soap, perfume, and tobacco (4.9 percent). No major differences exist in the distribution of disclosure and nondisclosure firm-day observations across industries. In certain sectors, however, the number of firms making voluntary disclosures is limited. In more than half of the 17 industries, voluntary disclosures are made by fewer than ten firms.

Table 3 shows mean and median values for firm size (*Fsize*), book-to-market (*Btm*) ratio, trade size (*Tsize*), and reporting lag (*Replag*) across the two major groups being investigated: firm-days with disclosures and firm-days without disclosures. All variables differ across groups, except for *Tsize*. Firms providing disclosures are larger, but have lower book-to-market ratios than firms providing no disclosures. On average, executives who make disclosures take more days to file their transactions (25 days) than executives who do not make disclosures (14 days).

2.5. Results

2.5.1. Main Results

Table 4 presents the results of the analysis of variance using three day cumulative abnormal returns ($CAR_{0,2}$)¹⁹. The total sum of squares has been partitioned into two parts, one representing the experimental error and the other

¹⁹ As explained earlier, I used this interval for the analysis because I expect that by the second day following the Form 4 filing most investors will have gathered its information.

representing variation among the treatment means. Since the F test is significant ($F = 5.18, p = <0.0001$) I reject the null hypothesis of no differences among the types of disclosures used in Form 4 filings. Overall, types of disclosures differ across companies with respect to cumulative abnormal returns observed on Form 4 filing dates. To investigate which means are significantly different from which other means, Table 5 presents mean and median cumulative abnormal returns observed on days of Form 4 filings with *Contract*, *OwnStruct* and *Confirm* disclosures. The table also presents the significance level of mean abnormal return differences between each of these groups and filings without disclosures.

Hypothesis H1 predicts that filings of contractual acquisitions engender a smaller market reaction than do filings of voluntary acquisitions. Consistent with this hypothesis, Panel A shows that differences in mean abnormal returns between contractual and voluntary acquisitions are significant at a 0.05 level or higher. The mean (median) abnormal return is 0.0029 (-0.0001) on the day contractual acquisitions are filed and 0.0064 (0.0024) on the day voluntary acquisitions are filed. Similarly, the mean (median) abnormal return is 0.0037 (0.0008) on the day following filing of contractual acquisitions and 0.0071 (0.0027) on the day following filing of voluntary acquisitions. The increase in abnormal returns observed on the day following submissions may be the result of Form 4 information being more widely available to investors. On the second day following Form 4 filing, the mean (median) abnormal return is 0.0002 (-0.0004) and 0.0019 (0.0001) for contractual and voluntary acquisitions, respectively. Results are even stronger when differences are calculated using cumulative abnormal returns over two and three days beginning on

the filing date. Differences in abnormal returns in this case are significant at less than 0.0001 level. These findings show strong support for H1.

H2 predicts that filing acquisitions including insider ownership details cause the market to react differently than if acquisitions are filed without such information. Results of tests of this hypothesis are presented in Table 5, Panel B. An interesting finding illustrated in this panel is that if abnormal returns are measured on each of the three days separately they are insignificantly different from those observed when Form 4s without disclosures are filed ($p = 0.1916, 0.1816, \text{ and } 0.5292$, respectively). Differences in abnormal returns are only significant if cumulative abnormal returns are used. The one- and two-day market reaction differences are statistically smaller for Form 4s filed with ownership details at the 0.0547 and 0.0487 levels, respectively. Overall, these results support H2.

H3 predicts that abnormal returns on the Form 4 filing dates in which insiders state that their acquisitions are open market are larger than otherwise. Results for the test of this hypothesis are presented in Table 5, Panel C. This panel shows that differences in abnormal returns are insignificant on all the days under consideration. The same result is obtained if cumulative abnormal returns are used. In light of these findings, there is no evidence to reject the null hypothesis of H3. The information content of transactions when their open market nature is disclosed over the information content of transactions presumed to be open market. These transactions do not cause a market reaction larger than that caused by transactions without disclosures.

2.5.2. Regression Results

The results of the regression analysis are presented in Table 6. To perform this test I eliminate *Confirm* from the original model, given its lack of information content. As stated before, the regression includes control variables previously known to influence the market reaction to Form 4 filing. As in previous studies, most of these variables are statistically significant and have the expected sign. Exception is the book-to-market ratio, which has the expected sign but is marginally significant ($t = 1.49$). Contrary to findings in Brochet (2008) trade size has a significant effect on abnormal returns ($t = 3.32$).

As expected, *Contract* has a negative sign, thus confirming the results of the univariate analysis. The coefficient is statistically significant, which indicates that this variable has information content that is incremental to other previously documented factors affecting the information content of Form 4. The results suggest that investors acknowledge that insiders' contractual trades are riskier to follow than are insiders' voluntary open market trades.

In contrast, *OwnStruct* is statistically insignificant. Investors do not seem to consider this information when other factors are available.

2.6. Conclusions and Implications

This study investigates the information content of voluntary disclosures made by top executives in Form 4. I analyze disclosures indicating that open market purchases are the result of contractual obligations or voluntary choices. I also investigate disclosures detailing insider ownership structures following transaction executions. Insider acquisitions accompanied by these disclosures provide additional

information to investors to assess the uncertainty and timing of future cash flows. I argue that investors assume that voluntary acquisitions by officers are made with inside knowledge regarding firm performance. When voluntary acquisitions are confirmed by insider disclosures, investors' confidence in performance predictions increases. Investors predict greater uncertainty when confronting contractual acquisitions. These are intended to align investors and officers interests without certain outcome. Finally, disclosure of insider ownership structure following transaction executions provides additional information that signals officers' commitment to the organization.

My findings indicate that investors view contractual purchases as a weaker predictor of future firm performance than they view transactions that occur voluntarily. Moreover, my findings indicate that investors value this information incrementally to other factors that explain the profitability of insider trades. In contrast, I fail to find evidence that disclosures confirming the open market nature of transactions have information content incremental to the information content of Form 4s assumed by investors to be voluntary (filed without disclosures). Finally, although my study finds that insider ownership structures following trades negatively affect the perceived profitability of insider trades, other factors are considered more important by investors in determining the information content of Form 4. My findings highlight the importance that investors assign to specific disclosures in evaluating firm performance. Contrary to findings in prior studies, location of these disclosures in the footnotes of Form 4 does not seem to constraint investors ability to perform

evaluation analysis. However, lack of disclosures in most Form 4 filings prompts investors to make assumptions regarding officer acquisitions that may not be correct.

These findings suggest that some disclosures found in the footnotes of the Form 4 should be mandatory. Rather than all insider trades being subject to equal level of scrutiny by policy makers and investors, motivations to trade can potentially affect how insider trading activity is regulated. For example, Form 4 submissions are likely to demand different amounts of resources from investors and policy makers whether they include transactions with reasons to trade that can be corroborated (e.g. contractual obligations), advancing no reasons justifying their origin (e.g. assumed voluntary and in possession of material nonpublic information), or including transactions with reasons that cannot be corroborated (e.g. insider estate planning). Current reporting requirements indicate that insiders must report the amount of securities beneficially owned following reported transactions. It seems unlikely that insiders with different levels of ownership would behave identically when they trade. Consistent with this observation, my results reveal that investors are interested in knowing more about insiders' ownership structure after transactions have been executed. Therefore, regulators might also want to pay attention to these voluntary disclosures when spending resources to evaluate insider trading activity.

My experimental setting cannot provide information about what specific items cause the observed relation between these disclosures and abnormal returns. Future work could examine in more detail the content of ownership structures following trade executions.

2.7. Limitations and Future Research

This study's limitations leave several unanswered questions for future research. Overall, although contractual purchases are perceived to be riskier bets than are open market purchases, there is no evidence that these trades underperform open market trades. A fruitful extension of the present study would be to investigate the long-term effects of these trades on firm performance. In addition, future research is needed to answer the question of why some insiders provide these voluntary disclosures while others do not.

Chapter 3

Paper II: Information Content of Rule 10b5-1 and Other Form 4 Voluntary Disclosures

3.1. Introduction

My primary objective in this study is to assess the information content of sell trades made by top executives under the 10b5-1 Rule. To this end, I focus on three tasks. I compare the information content of 10b5-1 trades (plan trades) against the information content of other open market and private transactions (non-plan trades) made by top executives. I analyze the effect of plan initiation dates on the information content of 10b5-1 transactions. I investigate whether the information content of plan and non-plan transactions is affected differently by other voluntary disclosures found in the footnotes of Form 4.

Form 4 is used by directors, officers, and owners of more than ten percent of a class of equity securities registered under Section 12 of the Securities Exchange Act of 1934. This form is used by filers to disclose changes in beneficial ownership of the issuer's securities. Rule 10b5-1 was enacted on October 23, 2000. Rule 10b5-1 provides an affirmative legal defense against civil and criminal penalties to insiders who, at a time when they do not possess material nonpublic information, make a plan with instructions for trade executions in the future. Rule 10b5-1 was intended to give executives opportunities to liquidate their stock holdings without inadvertently facing frivolous class action lawsuits. Rule 10b5-1 does not prevent someone from initiating a lawsuit against insiders, but provides a defense that is available only if insiders enter a plan in good faith.

The information content of insider trades is measured by their contribution in predicting the firm's future cash flows. Many investors believe that reports of trades made by directors and executive officers in company equity securities provide useful information regarding the future potential of firms.²⁰ Ample empirical evidence documents that insiders profit by trading based on foreknowledge of material nonpublic information.²¹ If, as suggested by results in prior studies, investors believe Rule 10b5-1 is used as envisioned, trades made under its protection would possess no information content. Nevertheless, since its inception Rule 10b5-1 has been criticized in the business press. Therefore, prior results seem contradictory. It is likely that over time the information content of trades made under the 10b5-1 Rule has increased.

My study contributes to this discussion in several ways. First, errors in the methodologies of prior studies cause researchers to make spurious inferences. These prior studies do not consider that different types of insiders hold information of different quality. These studies also do not control for changes in the regulatory environment over the period under investigation. Finally, these studies ignore the information content of other additional disclosures made in Form 4. 10b5-1 disclosures are one of many voluntary disclosures rendered within the footnotes of

²⁰ "Mandated Electronic Filing and Website Posting for Forms 3, 4 and 5." SEC Release No. 33-8230. May 7, 2003.

²¹ Prior research shows that insider trading activity generates abnormal returns (Jaffe, 1974; Finnerty, 1976, Givoly and Palmon, 1985; Seyhun, 1986 and 1998; Rozeff and Zaman, 1988; Lin and Howe, 1990; Jeng, Metrick and Zeckhauser, 2003). In addition, insider activity also has been linked to management's foreknowledge of corporate events such as bankruptcy (Seyhun and Bradley, 1997), dividend initiations (John and Lang, 1991), seasoned equity offerings (Karpoff and Lee, 1991), stock repurchases (Lee et al., 1992), and takeover bids (Seyhun, 1990).

Form 4.²² Other voluntary disclosures in these footnotes reveal information regarding a trade's nature and the structure of insider ownership following each transaction execution.

Second, the information content of insider trades has been disputed in prior studies using samples taken prior to the enactment of the Sarbanes-Oxley Act of 2002 (SOX) (Lakonishok and Lee, 2001; Aboody and Lev, 2000). These pre-SOX results show that the information content of insider sales is low. Researchers often argue that there is a variety of reasons other than avoiding losses for insiders to sell their ownership. A different perspective is that the information content of these trades is sensitive to reporting timeliness (Brochet, 2008). My study adds to this literature by providing evidence that voluntary disclosures in the footnotes of Form 4 may affect the information content of post-SOX Form 4 filings. Lack of attention to footnote material may have contributed to the lack of information content found in pre-SOX studies.

This study also should be of interest to those who establish public policy and to regulators pursuing improvements in disclosure transparency. Past research that uses Thompson Reuters Insiders Data Feed (TFN) may not use information found in Form 4 footnotes because TFN does not include said data. The TFN database only includes information that is mandatory in the tables of Form 4.²³ My study contributes

²² The SEC does not require disclosures concerning Rule 10b5-1. Some companies provide this information as an additional disclosure in Form 4. On April 12, 2002 the SEC, in an effort to make this information mandatory, tabled the proposed rule: "Form 8-K Disclosure of Certain Management Transactions," SEC Release No. 33-8090. To date the status of this proposal has not changed.

²³ In conversations with TFN representatives, they acknowledge that unless the information in Form 4 refers to the footnotes, this information is not used.

to this effort by providing evidence that Form 4 footnotes contain relevant additional information that the SEC should consider for a more structured disclosure format.

The remainder of the paper is organized as follows: Section 3.2 provides background information about Rule 10b5–1. Section 3.3 presents the hypotheses. Section 3.4 describes the methods and variables definition. Section 3.5 contains the sample. Section 3.6 presents the results. Conclusions and suggestions for further research are presented in Section 3.7.

3.2. Rule 10b5-1

Enacted by the SEC in 2000, Rule 10b5-1 clarifies “when insider trading liability arises in connection with a trader’s ‘use’ or ‘knowing possession’ of material nonpublic information.” Rule 10b5-1 indicates that a person trades on the basis of material nonpublic information if he or she purchases or sells securities while aware (or in possession) of the information. Although prior to Rule 10b5-1 SEC enforcement actions already supported this argument, the conclusion reached by some courts was that liability arises only if the trader uses the information to trade.²⁴ Contrary to these rulings, the SEC’s view is that it is highly doubtful that a person can disregard knowledge of nonpublic information pertinent to the value of a security when making the decision to purchase or sell that security. Even if the trader could establish purported reasons for trading other than the inside information, other traders in the marketplace would perceive him or her to possess an unfair advantage.

Rule 10b5-1 also advances affirmative defenses against liability. A safe harbor is granted to insiders who, prior to becoming aware of nonpublic information,

²⁴ Proposed Rule: “Selective Disclosure and Insider Trading,” Release No. 34-42259, Dec. 20, 1999.

initiate a binding contract, adopt and adhere to a written plan, or provide instructions to another person to trade on their behalf. Safe harbor is granted only given that the amount, price, and date of trade executions are expressly specified or a written formula or algorithm for their determination is provided. The person also must demonstrate that the alleged transaction is part of an agreement in which he or she is not allowed to exercise posterior influence over how, when, or whether to purchase or sell. Overall, Rule 10b5-1 is intended to give executives opportunities to liquidate their stock holdings without risk of inadvertently facing an insider trading inquiry. The affirmative defenses are only available as long as they are entered into in good faith and are not part of a scheme to evade the prohibitions of Rule 10b5-1.

Several loopholes in Rule 10b5-1 are advanced by Jagolinzer (2009) and echoed by the media. First, for trades executed within a plan, Rule 10b5-1 applies the possession test on the date the plan is initiated instead of on the date a trade is executed. Shifting the possession test effectively reduces trade litigation risk. The shift makes it potentially more difficult for the SEC and shareholders to link possession of information to execution of abnormally profitable trades.

Second, Jagolinzer (2009) hypothesizes that if Rule 10b5-1 effectively reduces the risk of litigation, some insiders might trade under Rule 10b5-1 within otherwise forbidden trading periods (e.g., prior to earnings announcements). He finds that on the 20-day period preceding an earnings quarter announcement, plan participants are more prone to trade than are non-plan participants. These findings suggest that Rule 10b5-1 may provide insiders with opportunities to execute trades when they expect to possess a distinct information advantage.

Third, Rule 10b5-1 does not require an insider to abstain from trading if material nonpublic information is obtained after the trading plan has been initiated. Absent this requirement, insiders are provided opportunities to manipulate the timing or content of disclosures related to material information obtained subsequent to faithful plan initiation. Insiders with existing plans can disclose subsequently-obtained material nonpublic information when it maximizes planned trade profits. Consistent with this hypothesis, on a sample of 60 plan initiations, Jagolinzer (2009) finds evidence suggesting that initiation dates precede adverse news events.

Last, trading plans under Rule 10b5-1 can be terminated at any time, enabling participants to selectively trade at times when they possess material nonpublic information. On a sample of 54 firms, Jagolinzer (2009) finds that on plans terminated early, the termination date is preceded by negative returns that reverse in the days that follow. Forty-six percent of plans terminated early are followed by positive news events.

3.3. Hypotheses Development

3.3.1. Information Content of Rule 10b5-1 Transactions

In this section I describe academic and anecdotal evidence underlying a negative market reaction on the filing date of plan transactions. I also point to changes in the information environment that have caused the information content of plan trades to increase over time. Finally, I argue that findings documenting lack of information content of 10b5-1 trades result from researchers overlooking the identity of insiders executing the trades and changes in the regulatory environment.

Since its enactment, Rule 10b5-1 has been the focus of negative publicity. In 2006 anecdotal evidence pointing to potential 10b5-1 abuses seemed to intensify. A December 2001 article published in Chicagobusiness.com reads: “The truth is that Rule 10b5-1 is just bad law.” The article targets potential loopholes that insiders could abuse. The article also cites cases in which Rule 10b5-1 seems to have been manipulated by several high profile executives (Lane, 2001). In late 2006, BusinessWeek exposed the potential unpredicted negative effects that Rule 10b5-1 could have caused. In a series of articles BusinessWeek cited several high-profile insiders who had been lucky in the timing of their trades.²⁵ BusinessWeek performed its own empirical analysis exposing the potential generalized gaming of insiders utilizing Rule 10b5-1. BusinessWeek also cited, for the first time, preliminary results found in Jagolinzer (2009). As a result of this exposure, in the second half of 2007 the SEC acknowledged that it was examining possible abuses of Rule 10b5-1 and that, if necessary, actions would be taken to curtail its inappropriate use.²⁶

It remains largely an open question whether insiders selling stock under Rule 10b5-1’s protection are earning abnormal returns that are different from those earned by non-plan sellers. Although signs of Rule 10b5-1 abuse have been observed in

²⁵ Examples are Midway CEO David Zucker and SPX Corp. CEO John Blystone. The former created a plan in late 2005 to sell off some of his Midway shares. A week after the plan was created, the Midway board of directors approved charges of \$20 million and cutting the workforce by 11 percent (Sasseen, 2006). The latter not only told investors in late 2003 and early 2004 to expect strong earnings and an increase in free cash flows, but also that the trading plan he had initiated in January was for diversification purposes. The events were followed by a sharp stock price increase with Blystone selling shares worth \$45 million over the period leading to the announcement of SPX Corp. results. Earnings and cash flows were the result of a one-time gain, causing the stock price to dramatically drop (Sasseen et al., 2006).

²⁶ Speech by SEC Staff: Remarks at the 2007 Corporate Counsel Institute.
<http://www.sec.gov/news/speech/2007/spch030807lct2.htm>

Jagolinzer (2009), Sen (2008) finds no evidence of such abuse. Jagolinzer (2009) compares the returns of plan trades against the returns of non-plan trades executed by insiders within the same firm. He finds that over one-, three-, and six-month periods following insider trades the mean market-adjusted buy-and-hold returns are statistically more negative for plan participants than for non-plan participants. Sen (2008) questions the methodology followed by Jagolinzer (2009). He indicates that Jagolinzer's (2008) estimates of abnormal returns following plan sales are downwardly biased. Sen (2008) analyses a sample gathered from a cross section of US public firms. He not only shows that abnormal returns following sales are statistically indistinguishable from zero, but also that there is no difference in abnormal returns following plan and non-plan sales.

Recent studies also have shown that investors seem to neglect the importance of transactions filed under Rule 10b5-1 over short market return window periods. Jagolinzer (2009) concludes that investors do not respond negatively to plan sales, given that he observes a mean three-day cumulative abnormal return of 0.21 percent in response to the filing of plan transactions. Similar findings are documented by Brochet (2008). On a regression of abnormal returns, he observes evidence that a 10b5-1 indicator variable, although negative, is statistically insignificant. I investigate whether two important omissions explain the lack of results found in these past studies: insider identity and SOX.

Both Brochet (2008) and Jagolinzer (2009) include trades executed by a wide variety of insiders. While the former includes transactions filed by officers, the chairman of the board, and president, the latter includes transactions filed by all

insiders regardless of their status. The information hierarchy hypothesis introduced by Seyhun (1986) postulates that the information content of insider trades depends on the type of insider. According to this hypothesis, insiders who are familiar with the day-to-day operations of the company trade on more valuable information.

This proposition is supported by several studies. Seyhun (1986) shows that cumulative average abnormal returns following the transactions of officers are significantly higher than those of nonexecutive directors. Lin and Howe (1990) demonstrate that trades of chairpersons, directors, officer-directors, and officers contain more information than do those of large shareholders. Seyhun (1998) documents that top officers earn higher abnormal returns than do other officers, directors, and large shareholders. Therefore, I expect that limiting the sample to trades filed by CEOs will make the information content of 10b5-1 disclosures evident.

Brochet (2008) and Jagolinzer (2009) analyze the information content of 10b5-1 disclosures using samples that include observations taken before and after the enactment of SOX. Prior to SOX, Section 16(a) of the Exchange Act prescribed that changes in beneficial ownership had to be filed by the reporting person within ten days of the close of each calendar month in which a transaction had been executed. SOX Section 403 reduces the filing deadline to two days following a trade for all transactions for which the date of execution was on or after August 29, 2002. Section 403 also mandates electronic filing as of June 30, 2003. Results in Brochet (2008) indicate that both of these dates have incremental value in explaining the information content of Form 4.

Periods with different regulatory environments likely affect prior studies' results. Prior to SOX, insider filings lack information regardless of the type of disclosure being made in Form 4. By limiting my study to observations obtained in the post-June 30, 2003 period I expect to find 10b5-1 disclosures to be informative.

In summary, tests in prior studies find no results because of research design problems. In this study I collect data for a single type of insider and a unique regulatory period. Given the negative publicity granted in the business press to Rule 10b5-1, I expect to find that investors react negatively to plan trades. Yet the academic literature shows no clear evidence of the extent to which Rule 10b5-1 is being abused. Therefore, I predict that the market reaction to plan sales is less negative than is the market reaction to non-plan sales.

I also anticipate that investor familiarity with Rule 10b5-1 has grown over the years. Familiarity increasingly has been paired with negative expectations regarding insider trading under Rule 10b5-1's protection. I posit that the information content of Rule 10b5-1 has increased over time. My formal first two hypotheses stated in alternative form are:

H1a: Abnormal returns on the filing dates of Form 4 including Rule 10b5-1 transactions are less negative than are abnormal returns on the filing dates of Form 4 including only non-plan transactions.

H1b: Abnormal returns on the filing dates of Form 4 including Rule 10b5-1 transactions have become more negative over time.

Failing to reject the null hypothesis for H1a implies that abnormal returns in response to Rule 10b5-1 trade filings are negative but not significantly less negative than abnormal returns in response to non-plan transactions. Results failing to reject

the null hypothesis for H1b suggest that the market reaction to 10b5-1 trade filings has not changed over the sample period.

3.3.2. Information Content of Rule 10b5-1 Plan Initiation Dates

To ascertain the legality of trades made under Rule 10b5-1, courts and regulators apply the possession-of-material-information standard to plan initiation dates. The legal defense of Rule 10b5-1 holds for executives demonstrating that its provisions have been entered into in good faith. To insiders, materially profitable trades executed in close proximity to plan initiation dates potentially can increase the probability of litigation. Severing the link between these trades—abnormal returns and awareness of inside information—could be difficult. To investors, proving executive awareness of material nonpublic information becomes more difficult as trade execution dates move away from plan initiation dates. Consistent with these arguments, Jagolinzer (2009) finds that executives initiate plans well in advance of profitable trades.

Executives seem to be concerned about trade executions that investors could perceive to be the result of exploitation of short-term private information. Jagolinzer (2009) uses a subsample of plans with five or more transactions executed over a 350-day period following plan initiation dates. Results show abnormal returns that are increasing in the number of days that exist between the plan initiation and the trade execution dates.

The preceding discussion and results demonstrate the importance of plan initiation dates in predicting firm performance. It is an empirical question whether investors are aware of the behavioral consequences instilled by Rule 10b5-1 on

executive trading behavior. I extend Jagolinzer's (2008) test of abnormal returns relative to plan initiation dates. I predict that if investors bear in mind differences in abnormal returns reported across plan execution dates, the distance between plan initiation dates and trade execution dates has information content.

Following the pattern of abnormal returns observed in Jagolinzer's study, I expect that trade executions on dates further away from plan initiation dates have greater information content than do trade executions on dates close to plan initiation dates. In contrast, if investors do not pay attention to the differences in abnormal returns reported across plan execution dates, the distance between plan initiation dates and plan execution dates will not have information content. Under this scenario, the information content of 10b5-1 transactions executed in close proximity to plan initiation dates is not significantly different from the information content of 10b5-1 transactions executed away from plan initiation dates. I formulate the following hypothesis stated in alternative form:

H2a: Abnormal returns on the filing dates of Rule 10b5-1 transactions are larger for Rule 10b5-1 transactions executed further away from plan initiation dates.

Kim and Verrecchia (1991) find that the price reaction to the unexpected portion of a disclosure is an increasing function of its relative importance across the posterior beliefs of traders. Kim and Verrecchia's findings imply that the informativeness of the unexpected component of a disclosure increases with disclosure precision. Rule 10b5-1 trades disclosed with plan initiation dates are more precise than are 10b5-1 disclosures without plan initiation dates. Although plan initiation dates do not provide direct evidence regarding insider privileged

knowledge, these dates do inform investors about the proximity of potential stock price rundowns. Absent plan initiation dates, investors are forced to make general assessments about the opportunistic behavior of insiders and its consequences.

If investors are conscious that insider trading strategies under Rule 10b5-1 depend on the number of dates that exist between the plan initiation date and the trade execution date, they are more likely to accurately identify irrelevant trades. In this case, plan initiation dates induce market consensus regarding how firm performance will be affected, given the proximity of 10b5-1 trades to plan initiation dates. If investors are not aware of the importance that the relative distance between plan initiation dates and trade execution dates posit, 10b5-1 disclosures with and without plan initiation dates are equally informative. The next hypothesis, in alternative form, follows from these arguments:

H2b: Abnormal returns on the filing dates of Rule 10b5-1 transactions without plan initiation dates are smaller than are abnormal returns on the filing dates of Rule 10b5-1 transactions with plan initiation dates.

3.3.3. Information Content of Voluntary Disclosures other than Rule 10b5-1

In addition to Rule 10b5-1 disclosures, the footnotes of Form 4 contain information about the nature of insider sales and the resulting insider ownership structure. There can be a variety of reasons for insiders to sell stock. Insiders routinely trade their firm's own stock to realize stock-based compensation, shed firm-specific risk, meet liquidity needs and portfolio rebalancing objectives, manage taxes, acquire influence over firm affairs, and plan their estates. Information regarding the nature of insider trades reduces the uncertainty surrounding the exploitation of inside knowledge. This information provides investors with a reasonable explanation for

insider trades (other than the insiders' desire to exploit insider information about the firm). When insiders disclose their reasons for trading in Form 4 footnotes, investors are better equipped to pick among those transactions that are likely to be made in possession of material nonpublic information and those that are not.

All insiders filing a Form 4 must disclose a running total of their equity ownership following each transaction. Some insiders voluntarily disaggregate this total in the footnotes of Form 4. To date, there is no direct evidence on the importance of such disaggregation. Theoretically, ownership is predicted to align managerial and shareholder interests (Jensen and Meckling, 1976). Details such as ownership structure and contractual obligations regarding forfeiture and vesting periods allow investors to infer the level of commitment of top executives to firm performance. For example, the combination of short-term incentives (bonus plans) and long-term incentives (restricted stock, stock appreciation rights, phantom stock, performance rights and/or stock options) signals to investors the probability that an insider will be able or willing to sell his or her ownership stake in anticipation of difficult times. Vesting restrictions prevent an executive from receiving a payoff by exercising options or selling stocks until after a specified period. Absent vesting restrictions, the incentive power of securities is lost if executives exercise options and sell stock shortly after the granting date.

Additionally, vesting restrictions and forfeiture provisions help firms retain executives (Kole, 1997; Balsam and Miharjo, 2007). The vesting schedule also illustrates differences between short-term incentives (vested) and long-term

incentives (unvested) that allow investors to assess the potential risk-taking behavior of managers.

In sum, similar to the effect caused by Rule 10b5-1 disclosures, other voluntary disclosures found in the Form 4 footnotes reduce investor uncertainty regarding the reasons that insiders have to trade. Voluntary disclosures allow investors to assess top executive commitment to firm performance. Disclosures allow investors to better predict when transactions are likely to be filed in the presence of material nonpublic information. Lack of disclosures increases uncertainty and suspicion that trades are made in anticipation of a change in firm performance. In light of these arguments, I formally state the following hypothesis:

H3a: Abnormal returns on the filing dates of Rule 10b5-1 transactions with additional disclosures are smaller than are abnormal returns on the filing dates of Rule 10b5-1 transactions without additional disclosures.

The effectiveness of voluntary disclosures of insider trades depends on their usefulness to investors. The greater the uncertainty surrounding trades, the greater is the usefulness of additional disclosures. Arguably, trade executions planned under Rule 10b5-1 are more certain than are transactions executed without anticipation. Hence, my last hypothesis posits that the impact of other additional disclosures on information content is stronger when submitted with non-plan transactions:

H3b: The difference in abnormal returns between transactions with additional disclosures and transactions without additional disclosures is greater for non-plan transactions.

3.4. Methods and Variables Definition

With exception of H2a, I test all my hypotheses using analysis of variance to determine significance across differences between means. The variable of interest is

cumulative abnormal returns (CAR)²⁷ calculated based on Fama-French's 5 × 5 size and book-to-market portfolios. For each firm on each date a Form 4 is filed, I subtract from the observed return the estimated return corresponding to the firm size and book-to-market portfolio. I obtain cumulative abnormal returns for the two days following the filing date by adding the abnormal returns obtained for each day. Like in previous studies, the window of interest includes two days after the filing date to ensure that tests cover participation of most interested investors. Access to Form 4 is delayed because some filers make their submissions after the markets are closed and/or investors access this information from a third party source instead of from the SEC website.

To test hypotheses H2a and H2b I define plan initiation dates as the combination of months and years in which plans are initiated.²⁸ To test hypothesis H2a I use the following cross-sectional regression:

$$CAR_{ij} = \alpha_0 + \alpha_1 fsize_{ij} + \alpha_2 btm_{ij} + \alpha_3 reldate_{ij} + \epsilon_{ij}$$

where *CAR* is abnormal returns as previously defined and *reldate* is the variable of interest representing the natural logarithm of one plus the number of days between a 10b5-1 plan initiation date and the 10b5-1 transaction date. Prior literature has

²⁷ The abnormal rate of return of a security refers to the difference between the realized rate of return and the expected rate of return. The cumulative abnormal rate of return of a security is the cumulative change in the abnormal rate of return of the security over some period of time per dollar of initial investment.

²⁸ Although the actual initiation date is given in most circumstances, there are considerable numbers of firms that only indicate month and year.

shown that firm size and book-to-market ratios are important in determining abnormal return differences when analyzing insider trades (Seyhun, 1998). Firm size (*fsize*) is the natural logarithm of the market capitalization of the firm. Market capitalization of the firm is calculated by multiplying common shares outstanding (COMPUSTAT DATA61) by security price (DATA14), as of the end of the most recent fiscal quarter. Book-to-market ratio (*btm*) is the book value of common stockholder equity (COMPUSTAT DATA59) divided by market capitalization of the firm as of the end of the most recent fiscal quarter.

3.5. Sample and Preliminary Statistics

All analyses in this paper are performed on firm-day observations created by grouping, on each date all transactions executed by all insiders within a firm. Transactions initially included in the sample are those submitted electronically by officers using Form 4 between January 2004 and December 2007. Beginning on June 30, 2003 the SEC mandated that all insiders file Form 4 using XML. Beginning in January 2004 the original schema describing the data contained in Form 4 was changed. For this reason, I omit data from the second half of 2003.²⁹

From this initial sample, I select all nonderivative open market and private sales filed by CEOs under transaction code S.³⁰ The initial sample contains 881,789

²⁹ Attempting to collect data from the second half of 2003 requires modification of the application I have written to collect the information. Given that the sample has four complete years of information I do not expect that omitting this initial period would affect any of the results.

³⁰ Transaction codes describe the nature of transactions. S stands for "Open market or private sale of non-derivative or derivative security."

sales transactions³¹ of which 456,492 are transactions reported without voluntary disclosures³² and 425,297 transactions are footnoted. I divide the sample into transactions without other voluntary disclosures, with 10b5-1 disclosures,³³ and with other voluntary disclosures. After eliminating all transactions contained in Form 4 that overlap across groups,³⁴ with the exception of Form 4s with 10b5-1 transactions having other voluntary disclosures, 802,904 transactions are left to calculate the firm-day observations: 389,523 are transactions without disclosures, 101,174 are transactions with other voluntary disclosures, 201,029 are 10b5-1 transactions without additional disclosures, and 111,178 are 10b5-1 transactions with other additional disclosures. Because I need to obtain stock market data from CRSP, I limit the sample to Form 4s filed by CEOs of firms with daily returns in CRSP. In addition, I screen firms with missing COMPUSTAT data necessary to calculate the firm size and the book-to-market ratio.

Table 7 shows the distribution of firm-day observations as well as the number of firms with Form 4 submissions across the different groups under investigation. The

³¹ If a Form 4 is filed on behalf of several insiders, transactions are repeated as many times as insiders are named on the form. For example, if three insiders file a Form 4 with a single transaction, this transaction is included three times in the sample.

³² Following Sen (2008), these are transactions assumed not to be reported under Rule 10b5-1.

³³ I use regular expressions to search for sales made under Rule 10b5-1 within the footnotes of this subsample. The search not only includes the most popular term 10b5-1 but also exotic writings such as: 10-b-5-1, 10(b) (5-1)(c), 10b5- 1(c), etc. My search captures more than 40 different variations of this expression.

³⁴ A Form 4 may have up to 30 nonderivative transactions. There is no obligation for all of them to be linked to footnotes. Thus, to obtain a clearer measure of the market reaction to the footnotes in a Form 4, I only sample Form 4s that have one or more of a single type of transaction: non-plan without footnote disclosures, non-plan with footnote disclosures other than 10b5-1, plan without additional footnotes, and plan with additional footnotes other than 10b5-1.

final sample contains 81,216 firm-day observations from 3,828 firms.³⁵ Overall, as expected, the number of firms and firm-day observations is greater for non-plan sales. Also, the sample is dominated by firms and firm-day observations without disclosures. Twenty-nine percent of firm-day observations fall in my definition of a 10b5-1 transaction.

Table 8 reports the distribution of the number of firms and firm-day observations according to the Fama-French 17 industries classification. Total number of firms in the sample is 3,828. Seventy two percent of these firms have insiders who make plan or non-plan sales submissions, but not both. The remaining 28 percent have insiders who submit both plan and non-plan transactions. Thirty-one percent of firms submitted at least one 10b5-1 transaction between 2004 and 2007. Plan and non-plan sales follow similar distributional patterns with 77 (84) percent of non-(plan) firms classified under five industries: 1) others; 2) Banks, Insurance Companies, and Other Financials; 3) Machinery and Business Equipment; 4) Retail Stores; and 5) Drugs, Soap, Perfumes and Tobacco. When broken down across plan and non-plan sales, these industries represent 26 percent and 52 percent of firm-day observations, respectively.

Number of firms by classification groups and years is presented in Table 9. Companies are allowed to appear in more than one year. The table shows that between 2004 and 2007 the number of companies where insiders submit non-plan sales has been steadily decreasing. The table also shows that the number of

³⁵ The total number of firms per group adds to more than the total number of unique firms because firms are allowed to repeat across categories (e.g., a firm might appear as having submissions in as few as one category and in as many as all categories).

companies where insiders use the 10b5-1 rule increased between 2004 and 2006 but decreased in 2007. These reductions in number of companies are likely to be related to the increased negative publicity of insider trading in general and the 10b5-1 rule in particular. It is also possible that these reductions are linked to a smaller number of companies granting equity compensation to executives.

Table 10 lists the mean and median size and book-to-market ratio for each group. Panel A shows data for firms for which insiders voluntarily present other disclosures. In this group, firms at which insiders use Rule 10b5-1 have larger market capitalization and smaller book-to-market ratios. Panel B presents identical information for firms at which insiders do not present other voluntary disclosures. Again, firms for which insiders use Rule 10b5-1 have larger market capitalization and smaller book-to-market ratios. Panel C shows mean differences for size and book-to-market ratios across these groups. Panel C indicates that firm size is significantly smaller for firms at which insiders submit non-plan sales without additional disclosures than for firms classified in the other three groups. In addition, Panel C confirms that firms at which insiders submit non-plan transactions have significantly larger book-to-market ratios than firms at which insiders file transactions under a plan. Book-to-market ratios are not significantly different between firms at which insiders use additional disclosures and firms at which insiders do not use additional disclosures.

3.6. Results

Hypothesis H1a predicts that abnormal returns on the filing date of plan transactions are smaller than abnormal returns on the filing date of non-plan

transactions. Table 11, Panel A, presents the results of the analysis of variance testing this hypothesis. Mean and median abnormal returns on the date that plan sales are filed are -0.049 percent (-0.096 percent). On the date non-plan sales are filed, mean and median abnormal returns are -0.069 percent (-0.107 percent). Mean and median cumulative abnormal returns on the three-day window beginning on the filing date of Form 4 are -0.114 percent (-0.231 percent) and -0.166 percent (-0.275 percent) for plan sales and non-plan sales, respectively. As expected, the signs of the mean cumulative abnormal returns are negative. The differences across means on any of the days under investigation are all significant at the 0.01 level. These results present strong support for hypothesis H1a. These results are also consistent with the conclusion that the choice of sample selection criteria has been an important factor affecting the results of prior studies.³⁶

Hypothesis H1b predicts that abnormal returns on filing dates of plan sales are an increasing function of the sustained negative publicity that Rule 10b5-1 has experienced. This hypothesis is generally not supported by the data. Table 11, Panel B, shows that the mean cumulative abnormal return on the three-day window beginning on the Form 4 filing date falls from 2004 to 2005; it increases in 2006 and in 2007. However, for the one- and two-day windows, abnormal returns decrease from 2004 to 2005, increase in 2006 and decrease again in 2007. Panel C shows that significant changes in cumulative abnormal returns occur between 2004 and 2005. Abnormal returns also changed significantly between 2005 and 2006 on the filing

³⁶ Although Brochet (2008) and Jagolinzer (2009) examine the information content of 10b5-1 transactions, this analysis was not the primary focus of their studies.

date. No significant differences exist between abnormal returns in 2004 and abnormal returns in 2007.

Table 12 shows the results of the analysis used to test the importance of plan initiation dates. Using regular expressions to search the Form 4 footnotes, I find 770 firms disclosing this date. I am able to gather a total of 14,062 firm-day observations. Hypothesis H2a anticipates that abnormal returns on the filing dates of plan transactions are an increasing function of the number of days between plan initiation dates and plan transaction dates. The results of the regression analysis used to test this hypothesis are presented in Panel A. Contrary to expectations, the coefficient on *reldate* is negative for all three days. This means that as the number of days between plan initiation dates and plan transaction dates becomes larger, the size of abnormal returns is smaller. Consequently, this hypothesis is not supported by my test.

Hypothesis H2b predicts that plan trades without plan initiation dates produce smaller abnormal returns on Form 4 filing dates than do plan trades with plan initiation dates. Table 12, Panel B presents evidence showing that within any of the three days under investigation my test fails to reject the null hypothesis. Abnormal returns are not statistically different between plan sales with and without plan initiation dates.

Hypothesis H3a predicts that abnormal returns on the filing dates of plan transactions with other additional disclosures are smaller than are abnormal returns on the filing dates of plan transactions without other additional disclosures. Results of this test are provided in Panel A of Table 13. Consistent with the general analysis presented in Table 11, Panel A, abnormal returns on the Form 4 filing dates are

negative for both subgroups. Although mean and median abnormal returns are smaller for plan transactions filed with additional disclosures the difference is not statistically significant in the three-day window. These results do not support the thesis that voluntary disclosures other than 10b5-1 disclosures have incremental value to investors.

To test hypothesis H3b, I duplicate the previous tests using non-plan transactions. In H3b I propose that voluntary disclosures other than 10b5-1 have a greater effect on the information content of non-plan transactions than on the information content of plan transactions. Table 13, Panel B, shows mean differences in abnormal returns between non-plan sales with and without additional disclosures. Following the pattern found in Panel A, additional disclosures accompanying non-plan sales have no effect on the abnormal returns observed on the Form 4 filing dates. In addition, on any of the two days following the Form 4 filing date, the difference in abnormal returns is also statistically insignificant. Given this results, hypothesis H3b is not supported for my sample.

3.7. Conclusions and Future Research

This study analyzes the information content of voluntary disclosures submitted with Form 4. The primary objective of this paper is to analyze whether voluntary disclosures affect the market response to Form 4 filings. In addition, the paper seeks to uncover whether prior results regarding plan and non-plan open market transactions have been affected by the information content of these disclosures and by methodology mistakes. Finally, in this study I analyze whether reactions to Rule 10b5-1 have changed over time.

Form 4 voluntary disclosures embrace a variety of topics; the nature of transactions and insider ownership structure are the most prevalent. I argue that the voluntary disclosures placed in Form 4 reduce the information asymmetry between insiders and outsiders, allowing investors to more accurately recognize transactions that are made using material nonpublic information. I predict that, absent voluntary disclosures, investors will assume open market transactions to be more likely based on insiders' foreknowledge of firm future performance. I find that this is not the case for my sample. The market reaction surrounding the filing date of transactions with and without other voluntary disclosures is not statistically significantly different.

When the subsample of 10b5-1 transactions is divided into transactions with plan initiation dates and transactions without initiation dates, I find that initiation dates are not significant. Investors seem unaware of this information, even though prior research documents differences in abnormal returns following variations in the length of time between plan initiation and transaction execution.

Finally, I find that even though Rule 10b5-1 has received increasingly negative publicity in the media, no changes in market response have occurred over the life of the Rule.

The results in this study raise several questions for future research. Concluding that additional disclosures do not reduce the information content of insider transactions could be misleading. My study identifies disclosures about the nature of transactions and the structure of insider ownership, but it does not disaggregate specific items within these disclosures. Likewise, my study does not attempt to identify differences in disclosures across plan and non-plan transactions.

Future research can focus not only on classifying these disclosures more accurately, but also on controlling the presence of other disclosures not identified here.

I find that plan initiation dates seem to be unimportant to investors. Limited access of investors to this information does not seem to be the reason behind the lack of significance observed. Future studies could explore whether the market pre-empts insider behavior by generating abnormal returns on the day the plan is initiated instead of on the date transactions are executed.

Chapter 4

Paper III: Can Electronic Disclosures Replace Third Party Data Vendors?

4.1. Introduction

Most insider trading research is based on samples drawn from Thomson Reuters Insider Data Feed (TFN), which is a proprietary electronic database sold by Thomson Reuters. In recent years, the Securities and Exchange Commission (SEC) has focused increasing attention on electronic data filings. In particular, beginning on June 30, 2003, insiders must submit their changes in beneficial ownership using an electronic Form 4. The increasing attention to information filed in electronic format leads one to question the comparability of electronic data filed directly with the SEC and data obtained from private vendors. The purpose of this study is to compare as-reported data found in Form 4 and data provided by TFN.

Differences between Form 4 and TFN data lie in their capacities to communicate insider trades accurately and completely. For example, researchers relying on data from TFN can benefit from a proprietary process designed to ascertain the accuracy of the data. According to TFN, this process “adds value by making systematic interpretations on the accuracy of as-reported data and inserting ‘cleansed’ fields for comparison.” Researchers using the data provided by the SEC’s electronic initiative must use their own means to ensure the accuracy of insider filings. Whether insider submissions are materially inaccurate is an empirical question.

An example where Form 4 information may be more accurate and complete involves the Form 4 footnotes. Form 4 delivers insider transactions including footnote

disclosures, while TFN does not directly provide this content.³⁷ Although evidence exists supporting the importance of a subset of specific footnote disclosures (Jagolinzer et al., 2007; Jagolinzer, 2008; Brochet, 2008), no comprehensive analysis of Form 4 footnotes has been made. How users of Form 4 can benefit from these disclosures and how TFN deals with them are unknown.

To investigate these issues I perform three separate tests. In Test 1, I assess the potential importance of the TFN cleansing process on the results of studies using TFN data. My analysis concentrates on a sample of insider transactions where cleansed data differ from data reported to the SEC in Form 4 (as-reported data). In Test 2, I investigate the value of voluntary Form 4 footnote disclosures for helping researchers to classify transactions consistently with the TFN cleansing process. I choose a sample of insider transactions where cleansed data differ from as-reported data for my first two tests because TFN indicates that insiders frequently report incorrect or erroneous codes and researchers make extensive use of transaction codes to identify samples of insider trades with homogeneous natures. In Test 3, I examine whether mandatory data items disclosed exclusively in the footnotes of Form 4 are incorporated into TFN reports of insider transactions.

This study is important for several reasons. First, it is commonly believed that information filed in electronic format not only facilitates research and data analysis,³⁸ but also allows investors to avoid additional costs associated with obtaining these data

³⁷ In written conversations with representatives from TFN, they acknowledge the data collection group does refer to footnotes and make corrections if needed. This is not part of the data cleansing process. It is not possible to provide a specific example. Cases include where human intervention in the data collection process is needed, e.g., insiders referring to the footnote section for a deeper explanation.

³⁸ Release No. 33-8230. Final Rule: Mandated Electronic Filing and Website Posting for Forms 3, 4 and 5. May 7, 2003.

from third party sources.³⁹ For example the SEC suggests that quicker access granted by electronic filings should facilitate review of insider data that “enhances the Commission’s ability to study and address issues that relate to this information.”⁴⁰

The current study should be of interest to regulators because it provides evidence supporting the need for a life cycle perspective to information management (Wang et al., 1998). Information life cycle management seeks to take into account information’s changing value, given changes in users’ information needs.⁴¹

Second, my study should be of interest to the academic community and to all those using electronic financial information for research and analysis. Data accuracy is a basic premise upon which any empirical investigation rests. To date, third party vendors ensure this accuracy by implementing systematic controls on data used for archival research. It is well accepted in the academic community that assurance of data accuracy and dataset completeness is less than perfect. Nevertheless, researchers can still conclude with reasonable certainty that, for example, insider trading activity generates abnormal returns (Jaffe, 1974; Givoly and Palmon, 1985; Rozeff and Zaman, 1988; Seyhun, 1998). When private vendors apply reliability controls on the data, errors are expected to be consistently treated across firms. This process allows researchers to use procedures to control for material systematic deviations. My study

³⁹ Release No. 33-8924. Proposed Rule: “Interactive Data to Improve Financial Reporting.” May 30, 2008.

⁴⁰ See footnote 38.

⁴¹ The SEC electronic data efforts focus on the technologies that deliver the information. The goal of delivering electronic data, however, is to improve the information’s usefulness. Technological changes need to be paired with changes in the way data are electronically gathered and delivered. Electronic forms must be continuously reviewed for changes in transaction complexity. Fields in electronic forms must be eliminated as needed, and new ones should be added as transaction requirements evolve. My study provides evidence that would help revise Form 4.

shows that the raw data offered by the SEC could affect research results in unpredictable ways if researchers do not carefully and systematically review these data. It also highlights the importance that controls and greater amount of disclosures in study methodologies will play in this new electronic environment.

The remainder of the paper is organized as follows: Section 4.2 presents background information regarding Form 4 and the TFN cleansing process. Sections 4.3, 4.4, and 4.5 present methods and results for each of my three tests. I conclude the paper and present suggestions for further research in Section 4.6.

4.2. Background

4.2.1. Form 4

Insiders—officers, directors, and stockholders who own more than 10 percent of an issuer’s securities—are required to use Form 4 to report to the Securities and Exchange Commission (SEC) any changes in their beneficial ownership of employer securities. Prior to June 30, 2003, researchers were bound to draw their samples from data offered by TFN.⁴² Beginning on June 30, 2003, the SEC mandated electronic filing of Form 4 using XML. In XML, tags are used to identify the specific roles and relationships of data within electronic documents (Hunter et al., 2004). The use of appropriate tags enables automation of the data-capturing process. This format allows anyone interested in writing an application to directly and automatically gather insider data from the SEC website. This information can be incorporated into analytical models without having to retype the original information or having to request data from private providers.

⁴² In the academic literature, Thomson Reuters’s Insider Data Feed is the most cited third party dataset.

As depicted in Figure A.1, Form 4 divides insider submissions in four sections: (1) a header, reserved for general information; (2) Table I, reserved for information regarding the acquisition, disposition, or beneficially owned nonderivative securities; (3) Table II, reserved for information regarding derivative securities acquired, disposed of, or beneficially owned (e.g., puts, calls, warrants, options, convertible securities) by insiders; and (4) the footer, which is limited to footnotes, remarks, and signatures. Information reported in Table I and Table II is mandatory. These tables hold the minimum amount of information required from insiders every time changes in their beneficial ownerships occur. Although insiders are never excused from reporting this information, some data can be submitted in footnote disclosures. These footnote disclosures are conditionally mandatory because they are demanded if the information is not provided in the tables; otherwise they are not required. One item in Table I and four items in Table II are subject to this rule. In Table I, insiders can choose table or footnote disclosure to deliver the acquisition or disposition price of a security (column 4). Similarly, if not reported on Table II, footnote disclosures must include information regarding a derivative's conversion or exercise price (column 2), a derivative's exercise and expiration dates (column 6), either the number of the derivative's underlying securities shares or underlying securities value (column 7), and derivative's purchase or sales price (column 8). All other information must be reported in the Form 4 tables. Any additional information found in the footnotes is made voluntarily and is considered to be a supplementary disclosure.

4.2.2. The TFN Cleansing Process

TFN cleanses four Form 4 items for greater accuracy. According to TFN’s “Insider Filing Data Feed Documentation,” the original data always are reported in a separate as-reported field for comparison purposes. First, each transaction reported in Form 4 must disclose whether it involves an acquisition (A) or a disposition (D) of securities (column 4 in Table I; column 5 in Table II). If the necessary acquisition/disposition code is not provided or is inconsistent with the transaction code, TFN makes appropriate changes.⁴³

Second, for each transaction reported in Form 4, insiders must disclose a transaction code (column 3 on Table I; column 4 on Table II). Transaction codes are used to identify the nature of transactions. The purpose of these codes is to provide a classification scheme so that groups of instruments with similar characteristics can be easily identified. The list of valid transaction codes is available in Figure 1. When a transaction is reported with an incorrect code, TFN assigns a corrected code. If the transaction code is not provided by the insider, however, TFN does not provide it unless there is clear evidence of the appropriate code.⁴⁴

Third, insiders must report the date on which reported transactions occur on Form 4 (column 2 on Table I; column 3 on Table II). TFN evaluates transaction dates for accuracy using records of valid market dates.

⁴³ Technically, it is not possible for insiders to omit this code in their submissions. It is not possible either to include other than A and D codes. The cleansing process can only switch these two codes when incorrect.

⁴⁴ It is not possible for insiders to omit this code in their submissions. It is not possible either to include other codes than those shown in Figure 2. The cleansing process can only switch these codes when incorrect.

Fourth, TFN also cleanses transaction prices reported on Table I, column 4. If, by reference to an external pricing source, the reported price falls outside a reasonable range, the cleansing process substitutes the security's closing price on the reported transaction date for the disclosed transaction price on Form 4.

4.3. Test 1: TFN Cleansing Process

4.3.1. Methodology

To review the importance of the TFN cleansing process I take three steps. First, I divide insider trades into cleansed transactions and as-reported transactions. A transaction is considered cleansed if the acquisition/disposition code, the transaction code, the transaction date, and/or the transaction price are different from their as-reported values; otherwise, transactions are considered as-reported. Second, I evaluate cleansed and as-reported transactions across several variables shown in prior research to affect the information content and profitability of insider trades. Third, I draw a random sample of cleansed transactions which I divide into groups according to cleansed fields. For each of these groups I examine whether cleansed values can be inferred from other information contained in Form 4.

Evidence in previous articles shows that insider trading patterns vary with firm size and book-to-market ratio (Lakonishok and Lee, 2001). Therefore, I define firm size (*fsize*) as the natural logarithm of the market capitalization of the firm. Market capitalization of the firm is calculated by multiplying common shares outstanding (COMPUSTAT DATA61) by security price (DATA14), as of the end of the most recent fiscal quarter. I define book-to-market ratio (*btm*) as the book value of

common stockholder equity (COMPUSTAT DATA59) divided by market capitalization of the firm as of the end of the most recent fiscal quarter.

Research and development activities have a large impact on the performance potential of technology and science-based firms. Given the relative scarcity of public information about research and development, these expenses contribute to the information asymmetry between insiders and outsiders. Evidence suggesting that some of the former are willing to exploit this asymmetry is found in Aboody and Lev (2000). Consequently, I define *R&D* as an indicator variable that equals one if at the end of the prior fiscal year a firm has reported a positive research and development expenditure and zero otherwise.

Fidrmuc et al. (2006) and Brochet (2008) find that the market reaction to Form 4 filings at firms that are poorly performing or financially distressed is stronger than otherwise. In line with this finding, I define *Loss* as an indicator variable equal to one if the firm reported a negative net income before extraordinary items in the year prior to the transaction and zero otherwise. Prior research also finds that trade size and reporting lag impact the market reaction to Form 4 filing (Brochet, 2008). In this study, trade size (*Tsize*) is the size of the trade under consideration and reporting lag (*Replag*) is a firm-specific measure that accounts for the number of days that exist between the transaction execution and its filing date.

4.3.2. Sample and Results

I search the TFN dataset using as-reported values to obtain all nonderivative acquisitions⁴⁵ with transaction code P made by all insiders between January 01, 2004 and December 31, 2007. The total number of nonderivative acquisitions is 207,973. Some 5,785 (2.78 percent) transactions are cleansed. As shown in Table 14, acquisition/disposition codes are never filed erroneously. The overwhelming majority of cleansed transactions (4,863) are submitted with transaction prices that need correction. Transaction dates are subject to misreporting in 912 trades. Transaction codes show discrepancies in only eleven transactions. Trades misreporting multiple values are rare. Only one transaction is submitted with incorrect transaction code and transaction date.

Table 15 shows the results from the comparative analysis made between cleansed and as-reported transactions. The sample size varies across tests. Limitations are imposed by the availability of data on COMPUSTAT. I eliminate observations lacking data about book value of common equity, shares outstanding, security prices, net income before extraordinary items, and research and development expenses.

Table 15 shows that all firm characteristics are significantly different between cleansed and as-reported transactions. Firms submitting cleansed transactions have smaller market capitalization and book-to-market ratio than do firms of as-reported transactions ($p < 0.0001$). Firms filing cleansed transactions are also more likely to report a loss in the previous fiscal year and are more likely to have research and development expenditures. Transaction characteristics also differ across these two

⁴⁵ Acquisition/disposition code = A

groups. The mean (median) reporting lag of cleansed transactions is 44 (four) days while the mean (median) reporting lag of as-reported transactions is ten (two) days. The number of shares traded as a proportion of total number of shares outstanding is larger for cleansed transactions than for as-reported transactions. Overall, these findings could be the result of the less-intensive oversight to which smaller firms are subject.

To investigate whether cleansed values can be inferred from the Form 4 original submissions, I randomly select 30 observations from each of the transaction date and transaction price groups. I review all transactions in the transaction code group. Nontabulated results reveal that all transactions included in the transaction date group are set to one day before the as-reported transaction date. In all but four cases, this date is also one day before the earliest transaction date disclosed in Form 4. Only two of these transactions are filed with additional disclosures, but transaction dates cannot be inferred from this information. Given that at the time of cleansing TFN refers to valid market dates, I compare the as-reported transaction dates with the NYSE historical closing dates. I find that none of the sampled observations has an as-reported transaction date set to a NYSE closing date. These findings suggest that if as-reported transaction dates are mistakenly submitted, it is not possible for investors using the original Form 4 to correct this insider oversight.

My analysis also reveals that for the 30 transactions randomly selected from the transaction price group, eight transactions have attached additional disclosures revealing information regarding transaction prices. This information, however, does not explain the cleansed value. One transaction indicates that the acquisition is a gift.

All others indicate that the transaction represents several transactions executed on that date at different prices that have been reported as an average price. These findings show that using the security's closing price might not always be a reasonable method to set the price of a transaction.

Cleansed fields also reveal that all eleven transactions in the transaction code group are considered holding records by TFN. Instead, my examination shows that as-reported transaction codes fit the transaction information in most cases. Notably, these transactions involve a specific number of shares being acquired. When transactions are preceded by other transactions in the same Form 4, the number of shares owned following the transaction takes into consideration the number of shares being acquired.

4.4. Test 2: Voluntary Footnote Disclosures

4.4.1. Methodology

I perform three tests on a sample of nonderivative open market acquisitions filed with the SEC by officers between January 2004 and December 2007 to investigate the information value of voluntary footnote disclosures. First, I manually examine and classify the voluntary footnote disclosures into five broad categories: (1) *Nature*, (2) *Ownership*, (3) *OwnStruct*, (4), *Price*, and (5) *Others*. Second, I investigate and further classify all voluntary disclosures assigned to the *Nature* group. From this analysis six new categories emerge: (1) *Contract*, (2) *10b5-1*, (3) *Open market*, (4) *Public offering*, (5) *Private*, and (6) *Exercise*. Third, I draw a sample of 60 transactions known to have *Nature* disclosures and search for them on TFN. I examine whether cleansed transaction codes differ from as-reported transaction

codes. I also observe whether the voluntary disclosures with which these transactions are associated could be used to cleanse transaction codes by researchers using the raw Form 4.

Nature involves disclosures reporting information that clarifies the motives behind a transaction execution. Disclosures in the *Ownership* category supplement submissions where insiders report indirect ownerships. These disclosures indicate how indirect ownerships occur (e.g., through spouse, children, partnerships in other entities). Disclosures classified under *Ownership Structure* convey information about the composition of insiders' equity stakes (e.g., type and number of securities, vesting requirements and schedules). *Price* contains disclosures making explicit information regarding transaction prices. Usually, in this category insiders disclose that transactions have been executed in different currencies and are subject to exchange rates. In this category insiders also disclose that the price on record is the addition of several transactions for which the disclosed price is an average. Disclosures in the *Others* category contain nonsystematic information difficult to classify.

The *Nature* category is further divided into six additional categories. *Contract* involves all disclosures indicating that an acquisition has been executed to fulfill a dividend reinvestment plan, a stock option plan, a payment of services, or repayment of a loan. This category also includes disclosures indicating that securities have been acquired as part of a retirement account. *10b5-1* includes all pre-planned acquisitions made as part of an agreement in which insiders are not allowed to exercise posterior influence over how, when, or whether to purchase. *Open market* includes transactions whose disclosures confirm they are open market acquisitions. *Public offering* includes

trades made as part of initial or secondary public offerings. *Private* includes trades made privately between insiders and other shareholders. *Exercise* includes all trades made as a result of the exercise of any derivative security.

4.4.2. Sample and Results

The initial sample includes 68,520 transactions obtained directly from Form 4 submissions. Of these transactions, 47,826 are transactions without voluntary disclosures. The remaining transactions have at least one voluntary disclosure. Table 16, Panel A, shows the number of transactions accompanied by disclosures in this classification. Most transactions (48.61 percent) reveal additional information regarding the nature of trades. The table also shows that 36.50 percent of the transactions provide information that supplements the type of insider ownership. Few transactions (13.55 percent) include disclosures about the structure of insider ownership following transaction executions. Transactions with *Price* disclosures represent only 2.2 percent of the sample.

Table 16, Panel B, shows the results from further separating the *Nature* category into six subcomponents. I find that 70.21 percent of the transactions classified under the label open market and private (P) are the result of contractual obligations. Twenty-three percent are filed under Rule 10b5-1, and almost four percent confirm their open nature. Initial and secondary public offerings, private transactions, and exercise of derivative securities represent less than 2 percent each.

Results of the analysis performed on the sample of *Nature* disclosures are described next. The nonderivative acquisitions under investigation must be reported with code P (See Figure 1 for details). I find that only 36 transactions have as-

reported transaction codes on TFN that match transaction codes on Form 4. On TFN, the remaining transactions have matching cleansed and as-reported codes, but neither is P. This finding contradicts TFN's policy of always disclosing the as-reported value for comparison purposes. I also observe that in spite of this oversight, TFN transaction codes tend to be more precise than are insider reported transaction codes. For example, TFN reclassifies as J transactions acquired through 401k plans, stock investment plans, employee stock purchase plans, or pursuant to cancellation of debt. TFN also reclassifies as R all acquisitions conforming to reinvestment of dividends or interest.⁴⁶ Exercise of derivative securities is reclassified as M or X depending on whether the acquisition is pursuant to an employee stock option plan or made in the open market. (There is no clear evidence on how this decision is made.) Last, TFN transaction codes appear to have the same limitations as SEC codes. Because the TFN and SEC codification schemes mirror each other, no codes exist on TFN to represent transactions that have become more frequent in recent years (i.e., pursuant to Rule 10b5-1). Further, given this restriction, TFN fails to disclose multiple transaction codes when applicable.

Overall these findings suggest that by looking at the footnotes in Form 4, researchers could cleanse the transaction codes presented by insiders.

⁴⁶These reclassifications are notable given that the R code was eliminated by the SEC in August 1996 along with the Q code used to represent transfers pursuant to a qualified domestic relations order.

4.5. Test 3: Mandatory Footnote Disclosures

4.5.1. Methodology

To investigate the content and effect of mandatory disclosures, I gather a sample of derivative transactions for which the conversion or exercise price, transaction price per share, exercise date, expiration date, underlying securities shares, and/or underlying securities value is not completed in Table II of Form 4 (shown only as a footnote number). Based on the firm's CUSIP number, transaction filing date, as-reported transaction execution date, and acquisition/disposition code,⁴⁷ I merge these observations with observations obtained from TFN. Because none of these values is unique to a transaction, I randomly select from this dataset a sample of 60 observations. I manually verify that for each observation obtained from Form 4 filings the correct match is made by TFN. I use these transactions to classify the different disclosures made by insiders and investigate how they are incorporated into TFN insider data.

After reading all disclosures pertaining to the 60 transactions, I create six categories: *Replace*, reserved for disclosures that signal the information that should have been shown in a Table II column; *Redundant*, reserved for disclosures found to add no information beyond what Table II presents; *Retroactive*, reserved for disclosures relative to dates in which derivatives being exercised became exercisable; *Separate*, reserved for disclosures making explicit the exercise dates of derivatives being granted (acquisitions); *Nature*, reserved for disclosures used by insiders to

⁴⁷ I choose to use these fields to merge the datasets because no single unique identification number is shared between the Form 4 filings received by the SEC and those obtained from TFN.

indicate the motivation behind their transactions; and *Other*, used to classify disclosures whose information may or may not be useful (but that, given the complexity of the disclosure, could not have been used to add information to the transaction outside the footnote). Examples of disclosures in each category are shown in Figure 3.

4.5.2. Sample and Results

I obtain derivative transactions filed with the SEC by officers between January 2004 and December 2007. The initial sample includes 220,671 transactions. After eliminating transactions without CUSIP numbers on COMPUSTAT, 214,640 observations are left to be merged with the TFN dataset. From this group I randomly select 60 observations for investigation. I find that only one observation is missing from TFN.

The number of transactions across transaction codes and mandatory disclosures are shown in Table 17. Most transactions in the sample are derivative exercises (M, 32) and derivative acquisitions (A, 21). Not surprisingly, most footnotes are found to be linked to these groups (39 and 35, respectively). On average, each transaction is linked to 1.5 footnotes. Footnotes about exercise dates (50) dominate the sample. Footnotes linked to conversion or exercise price, transaction price per share, and expiration date are evenly distributed (12, 14, and 16, respectively). No mandatory footnote disclosures linked to derivatives' underlying number of shares or underlying total transaction value are found.

Table 17 also shows that insiders feel compelled to disclose information that is not required. Section 4(c)(iii) of the General Instructions to Form 4 indicate that if

the transaction reported is a purchase or a sale of a derivative security, Table II must report the purchase or sales price (column 8). In addition, if the transaction is the exercise or conversion of a derivative security, column 8 must be left blank, and the exercise or conversion price must be reported (column 2). Insiders reporting acquisitions use footnotes to disclose conversion or exercise prices (seven transactions). Insiders reporting exercises use footnotes to disclose transaction price per shares (ten transactions).

Analysis of these disclosures reveals that exercise prices disclosed with derivative acquisitions is one-for-one in all seven cases. This means that upon exercise, insiders are able to exchange one unit of a derivative for one unit of the underlying security. Given that the underlying number of securities or total value also must be disclosed, this information is redundant. Further, if no exercise price is given, it can be assumed that the exercise price is the acquisition price of the derivative security. When investigating the disclosures accompanying the exercise transactions, I find that all derivatives are granted as part of compensation agreements and, as expected, no cash is paid for the exercise. Again, these disclosures are redundant.

Table 18 shows the number of transactions allocated to each type of disclosure and how it affects the transaction presentation on TFN. I find that in general TFN does not replace or complement the information supplied in Table II of Form 4. When an item on Table II is missing, TFN does not fill in the void even if the information is found in the footnotes. If insiders report details about how securities being granted or acquired will be exercised in the future, however, TFN details transactions according to exercise dates and number or proportion of derivatives to be exercised. When

information disclosed by insiders reflects on the transactions' nature, TFN adjusts the transaction code accordingly. Overall, other disclosures are ignored by TFN. One exception was found on a prepaid variable forward in which the expiration date of the transaction was mentioned in the footnotes, and TFN made the appropriate disclosure on Table II of the form.

4.6. Conclusions and Future Research

In this study I investigate the cleansing process that TFN applies to ensure the accuracy of Form 4 data. I find that data in a small number of nonderivative acquisitions need to be cleansed to ensure their accuracy. I also find that there are significant differences in company and transaction characteristics between groups of as-reported and cleansed submissions. In general, cleansed submissions belong to smaller companies. Cleansed transactions are larger and reported with greater delay. My tests also reveal that most cleansed values could not be inferred by users searching the data rendered in Form 4.

In this study I also examine and classify voluntary disclosures. I find that disclosures tend to repeat, and I observe that several categories can be formed. In addition, I analyze a subsample of transactions with additional disclosures referring to the nature of the transaction. I find that supplementary disclosures are sufficiently informative to enable users to correct transaction codes without the need to access third party data vendors.

Finally, I examine mandatory disclosures using a selection of derivative securities. Contrary to expectations based on communication with TFN representatives, my analysis shows that TFN does use the information found in the

footnotes of Form 4 to make certain adjustments to transaction presentation. I find that these disclosures affect TFN's data when exercise dates are disclosed with derivative acquisitions. I also find that TFN considers disclosures affecting the nature of transactions and makes appropriate modifications to transaction codes when needed.

Electronic disclosures potentially could eliminate the need for third party data vendors that collect insider data. Insider data tend to be more accurate on TFN, but footnote disclosures are sufficiently informative to allow users of Form 4 to reach a similar level of accuracy. Original Form 4 data are more complete than data on TFN; however, users must constantly search for additional disclosures made in the footnotes to become aware of new trends in transactions.

I observe that many insiders use footnotes linked to mandatory columns to provide supplementary disclosures. Certain insiders provide supplementary disclosures but neglect mandatory information. I find that the vagueness of the instructions to Form 4 impairs insiders' understanding of their meaning (e.g., retroactive disclosures). Future research should study the possibility of developing a theoretically driven user-oriented form to deliver insider changes in ownership. Measuring its impact on users' assessment of insider trades should be considered.

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Table 1: Number of firms and firm-day observations by disclosure

	Firms	Daily Observations
No disclosure	1,970	9,335
<i>Contract</i>	281	1,553
<i>OwnStruct</i>	118	486
<i>Confirm</i>	28	83
Total	3,397	11,458
Unique Totals	2,367	11,345

Table 2: No. of firms and firm-day observations per industry

Industry	No. of Firms			No. of Firm-Day Observations		
	Without Disclosures	With Disclosures	Total	Without Disclosures	With Disclosures	Total
Food	53	8	61	211	25	236
Mining and Minerals	13	2	15	63	5	68
Oil and Petroleum Products	52	11	63	279	62	341
Textiles, Apparel & Footwear	26	4	30	90	6	96
Consumer Durables	48	5	53	172	9	181
Chemicals	28	3	31	108	14	122
Drugs, Soap, Perfumes, Tobacco	116	20	136	489	71	560
Construction and Construction Materials	43	10	53	144	42	186
Steel Works Etc	14	1	15	49	11	60
Fabricated Products	12	5	17	45	17	62
Machinery and Business Equipment	208	52	260	692	220	912
Automobiles	30	6	36	110	26	136
Transportation	47	6	53	144	26	170
Utilities	40	12	52	164	98	262
Retail Stores	98	22	120	379	38	417
Banks, Insurance Companies, and Other Financials	553	120	673	3,809	743	4,552
Other	589	110	699	2,387	597	2,984
Total	1,970	397	2,367	9,335	2,010	11,345

Table 3: Means and medians across variables by subsamples

Panel A: Firm variables					
	Without disclosures		With disclosures		<i>p</i> -value for mean diff.
	Mean	Median	Mean	Median	
<i>Fsize</i>	5.69	5.50	6.30	6.19	<.0001
<i>Btm</i>	0.54	0.49	0.49	0.45	<.0021
N	1,970		397		
Panel B: Firm-day variables*					
<i>Tsize</i>	17,179	2,000	17,883	1,000	0.8492
<i>Replag</i>	14.13	1.00	29.04	2.00	<.0001
N	9,335		2,010		

Fsize is the natural logarithm of the market capitalization as of the last day of the prior fiscal quarter. *Btm* is the ratio of book value to market value of equity calculated as of the end of the prior fiscal quarter. *Tsize* is the size of the total purchases made by a firm's insiders on a given date. *Replag* is a firm-specific measure that accounts for the number of days that exist between the first transaction execution by any of a firm's officers and the filing date.

*Unlike the main results, the variables here are not standardized.

Table 4: Analysis of variance for $CAR_{0,2}$ observed on Form 4 filing dates

Source of variation	DF	SS	MS	F	<i>p</i> -value
Disclosures*	7**	0.1033	0.0148	5.18	<.0001
Residual	11,337	32.3065	0.0028		
Total	11,344	32.4098			

* Disclosures is the between disclosure classifications variance.

** The disclosure groups formed are Contract, Confirm, OwnStruct and no disclosure. In addition, some Form 4 filings contain disclosures that fit in more than one category. In total, eight combinations are formed.

Table 5: Abnormal returns across subsamples

Panel A: Mean differences between voluntary acquisitions without disclosures and contractual acquisitions					
Days relative to filing date	Without disclosures		<i>Contract</i>		p-value Mean Diff.
	Mean	Median	Mean	Median	
0	0.0064	0.0024	0.0029	-0.0001	0.0001
+1	0.0071	0.0027	0.0037	0.0008	0.0004
+2	0.0019	0.0001	0.0002	-0.0004	0.0338
0, +1	0.0135	0.0061	0.0067	0.0023	<.0001
0, +2	0.0154	0.0068	0.0069	0.0020	<.0001
N	9,335		1,553		
Panel B: Mean differences between voluntary acquisitions without disclosures and acquisitions with disclosures about the structure of insider ownership after transaction executions					
Days relative to filing date	Without disclosures		<i>OwnStruct</i>		p-value Mean Diff.
	Mean	Median	Mean	Median	
0	0.0064	0.0024	0.0044	0.0009	0.1916
+1	0.0071	0.0027	0.0050	0.0036	0.1816
+2	0.0019	0.0001	0.0011	-0.0005	0.5292
0, +1	0.0134	0.0061	0.0093	0.0066	0.0557
0, +2	0.0154	0.0068	0.0104	0.0066	0.0487
N	9,335		486		
Panel C: Mean differences between voluntary acquisitions without disclosures and voluntary acquisitions with confirming disclosures					
Days relative to filing date	Without disclosures		<i>Confirm</i>		p-value Mean Diff.
	Mean	Median	Mean	Median	
0	0.0064	0.0024	0.0062	0.0048	0.9601
+1	0.0071	0.0027	0.0081	0.0033	0.7825
+2	0.0019	0.0001	-0.0005	-0.0007	0.4611
0, +1	0.0134	0.0061	0.0143	0.0105	0.8654
0, +2	0.0154	0.0068	0.0138	0.0099	0.7917
N	9,335		83		

Table 6: Summary statistics from the regression analysis

$$Car_{0,2} = \alpha_0 + \alpha_1 Contract + \alpha_2 OwnStruct + \alpha_3 Loss + \alpha_4 Tsize + \alpha_5 Fsize + \alpha_6 Btm + \alpha_7 Replag + \alpha_8 R\&D + \epsilon$$

Variable	Prediction	Coefficient	SE	t-statistic
<i>Intercept</i>		0.0172	0.002618	6.57***
<i>Contract</i>	-	-0.006051	0.001565	-3.87***
<i>OwnStruct</i>	?	-0.002079	0.002548	-0.82
<i>Loss</i>	+	0.0121	0.001407	8.58***
<i>Tsize</i>	+	0.1601	0.0482	3.32***
<i>Fsize</i>	-	-0.001568	0.000351	-4.47***
<i>Btm</i>	+	0.002392	0.001607	1.49*
<i>Replag</i>	-	-0.000953	0.000480	-1.99**
<i>R&D</i>	+	0.009769	0.001299	7.52***
N	11,345			
R-Square	0.0560			

***, **, * indicate significance at the 0.01, 0.05, and 0.10 levels

Table 7: No. of firms and firm-day observations per category of sales

Sales Type	With other disclosures		Without other disclosures		Totals
	Firms	Firm-day obs.	Firms	Firm-day obs.	Firm-day obs.
Plan sales	520	6,218	1,042	17,733	23,951
Non-plan sales	1,968	11,189	3,488	46,076	57,265
Totals	2,488	17,407	4,530	63,809	81,216

Table 8: No. of firms and firm-day observations per industry

Industry	No. of firms			No. of firm-day obs.		Totals
	Unique	Non-plan sales	Plan sales	Non-plan sales	Plan sales	
	91	90	16	2,013	173	2,186
Mining and Minerals	32	32	8	407	119	526
Oil and Petroleum Products	130	130	28	2,466	410	2,876
Textiles, Apparel & Footwear	58	58	16	1,061	295	1,356
Consumer Durables	79	78	14	1,085	300	1,385
Chemicals	52	52	14	792	172	964
Drugs, Soap, Perfumes, Tobacco	175	159	81	2,037	1,717	3,754
Construction and Construction Materials	101	100	15	1,768	169	1,937
Steel Works Etc	43	43	11	806	154	960
Fabricated Products	25	25	5	489	77	566
Machinery and Business Equipment	508	489	198	8,148	4,584	12,732
Automobiles	57	57	9	858	67	925
Transportation	111	109	28	1,921	559	2,480
Utilities	100	98	24	1,478	333	1,811
Retail Stores	225	223	79	3,970	1,595	5,565
Banks, Insurance Companies, and Other Financials	844	841	130	11,168	2,409	13,577
Other	1,197	1,153	493	16,798	10,818	27,616
Total	3,828	3,737	1,169	57,265	23,951	81,216

Table 9: Number of firms within classification groups and year

Year	With other disclosures		Without other disclosures	
	Plan sales	Non-plan sales	Plan sales	Non-plan sales
2004	223	1,122	507	2,608
2005	246	990	547	2,348
2006	280	967	603	2,199
2007	212	614	491	1,530

Table 10: Firm attributes per category

Panel A: Firm size and book-to-market ratio for observations with footnotes other than 10b5-1 disclosures					
	Non-plan sales	N	Mean	Median	Std Dev
Firm Size		1,968	5.73	5.70	1.79
Book-to-market			0.46	0.42	0.30
	Plan sales				
Firm Size		520	5.92	5.76	1.64
Book-to-market			0.39	0.35	0.23
Panel B: Firm size and book-to-market ratio for observations without footnotes					
	Non-plan sales	N	Mean	Median	Std Dev
Firm Size		3,488	5.33	5.29	1.84
Book-to-market			0.48	0.43	0.30
	Plan sales				
Firm Size		1,042	5.71	5.61	1.75
Book-to-market			0.41	0.37	0.25
Panel C: Differences across groups					
	Firm size	Estimate	Std. Error	<i>t-stat</i>	Pr > <i>t</i>
Non-plan sales: no additional disclosures vs. additional disclosures		-0.4023	0.05070	-7.94	<.0001
Plan sales: no additional disclosures vs. additional disclosures		-0.2148	0.09655	-2.22	0.1168
non-plan vs. plan sales (without additional disclosures)		-0.3744	0.06349	-5.90	<.0001
non-plan vs. plan sales (with additional disclosures)		-0.1869	0.08867	-2.11	0.1508
	Book-to-market				
Non-plan sales: no additional disclosures vs. additional disclosures		0.01617	0.00815	1.98	0.1938
Plan sales: no additional disclosures vs. additional disclosures		0.02353	0.01552	1.52	0.4275
non-plan vs. plan sales (without additional disclosures)		0.06940	0.01020	6.80	<.0001
non-plan vs. plan sales (with additional disclosures)		0.07676	0.01425	5.39	<.0001

Table 11: Cumulative abnormal returns surrounding the Form 4 filing date of plan and non-plan sales.

Panel A: Cumulative abnormal returns surrounding the filing date of Form 4s containing insider plan and non-plan sales					
Days relative to filing date	Means (%)		Medians (%)		Mean differences (t-stat)
	Plan sales	Non-plan sales	Plan sales	Non-plan sales	
0	-0.049	-0.069	-0.096	-0.107	-3.22***
+1	-0.083	-0.123	-0.161	-0.210	-4.45***
+2	-0.114	-0.166	-0.231	-0.275	-4.66***
N	23,951	57,265	23,951	57,265	

Panel B: Cumulative abnormal returns surrounding the filing date of Form 4s containing insider plan sales across years								
Days relative to filing date	Means (%)				Medians (%)			
	2004	2005	2006	2007	2004	2005	2006	2007
0	-0.073	-0.011	-0.060	-0.051	-0.125	-0.060	-0.069	-0.146
+1	-0.127	-0.039	-0.084	-0.081	-0.264	-0.088	-0.110	-0.213
+2	-0.171	-0.070	-0.091	-0.130	-0.357	-0.243	-0.113	-0.250
N	6,724	6,578	6,861	3,788	6,724	6,578	6,861	3,788

Panel C: Differences among mean cumulative abnormal returns across years						
Years	CAR 0		CAR 1		CAR 2	
	Estimates	t-stat	Estimates	t-stat	Estimates	t-stat
2004 - 2005	-0.06219	-4.34***	-0.08835	-4.27***	-0.10180	-3.99***
2005 - 2006	0.04881	3.43***	0.04545	2.21	0.02190	0.86
2006 - 2007	-0.00821	-0.49	-0.00316	-0.13	0.03881	1.30
2004 - 2007	-0.02159	-1.29	-0.04606	-1.90	-0.04107	-1.37

***, **, * indicate significance at the 0.01, 0.05, and 0.10 levels

Table 12: Cumulative abnormal returns surrounding Form 4 filing dates of plan sales with and without plan initiation dates

Panel A: Regression of abnormal returns around 10b5-1 sales with plan initiation dates on plan initiation relative date									
	CAR 0			CAR 1			CAR 2		
	Coeff.	SE	t-stat	Coeff.	SE	t-stat	Coeff.	SE	t-stat
Intercept	0.03091	0.040	0.08	0.03305	0.058	0.57	0.03350	0.071	0.47
fsize	-0.04486	0.006	-1.33	-0.00872	0.006	-1.47	-0.00999	0.007	-0.38
btm	-0.00652	0.004	-1.60	-0.08614	0.049	-1.77	-0.13255	0.060	-2.22
reldate	-0.00575	0.034	-0.89	-0.00734	0.009	-0.79	-0.00882	0.011	-0.77
N					14,062				
Adjusted R2		0.0003			0.0004			0.0005	

Panel B: Cumulative abnormal returns surrounding the filing date of Form 4s containing insider plan sales with and without plan initiation dates					
Days relative to filing date	Means (%)		Medians (%)		Mean differences (t-stat)
	Sales without plan initiation date	Sales with plan initiation date	Sales without plan initiation date	Sales with plan initiation date	
0	-0.042	-0.053	-0.089	-0.099	1.04
+1	-0.077	-0.088	-0.153	-0.168	0.71
+2	-0.106	-0.112	-0.222	-0.238	0.71
N	9,889	14,062	9,889	14,062	

fsize is the natural logarithm of the market capitalization of the firm; btm is the book value of common stockholder equity divided by market capitalization of the firm; reldate is the natural logarithm of one plus the number of days between a 10b5-1 plan initiation date and the 10b5-1 transaction date

Table 13: Abnormal Returns for plan and non-plan sales

Panel A: Cumulative abnormal returns surrounding the filing date of Form 4s containing insider plan sales

Days relative to filing date	Means (%)		Medians (%)		Mean differences (t-stat)
	Sales w/o additional disclosures	Sales with additional disclosures	Sales w/o additional disclosures	Sales with additional disclosures	
0	-0.055	-0.031	-0.101	-0.080	-1.98
+1	-0.092	-0.059	-0.167	-0.133	-1.93
+2	-0.121	-0.093	-0.241	-0.202	-1.33
N	17,733	6,218	17,733	6,218	

Panel B: Cumulative abnormal returns surrounding the filing date of Form 4s containing insider non-plan sales

Days relative to filing date	Means (%)		Medians (%)		Mean differences (t-stat)
	Sales w/o additional disclosures	Sales with additional disclosures	Sales w/o additional disclosures	Sales with additional disclosures	
0	-0.066	-0.080	-0.107	-0.108	1.71
+1	-0.122	-0.130	-0.209	-0.216	0.72
+2	-0.166	-0.167	-0.276	-0.274	0.06
N	46,076	11,189	46,076	11,189	

*** **, * indicate significance at the 0.01, 0.05, and 0.10 levels

Table 14: No. of open market transactions with discrepancies between as reported and cleansed values

Form 4 data	Obs. No.
Acquisition/disposition code	0
Transaction price	4,863
Transaction date	912*
Transaction code	11*
Total	5,786

* Include one observation that has cleansed values in both fields

Table 15: Trades and firm characteristics across trades with and without differences

Variable	Cleansed				As-reported				Mean differences (t-stat)
	N	Mean	Median	Std. Dev.	N	Mean	Median	Std. Dev.	
<i>Fsize</i>	2,409	4.8639	4.9575	1.9590	120,750	5.7454	5.7516	1.7568	24.33**
<i>Btm</i>	2,409	0.4485	0.3584	0.4265	120,750	0.4988	0.4449	0.3744	6.52**
<i>Loss</i> [†]	2,372	0.3752	0	0.4843	120,212	0.3528	0	0.4779	-2.26*
<i>R&D</i> [†]	1,095	0.8384	1	0.3683	56,234	0.8043	1	0.3968	-2.82*
<i>RepLag</i>	2,409	44	4	119	120,750	10	2	49	-33.14**
<i>Tsize</i> ^{††}	2,409	0.1746	0.0022	3.4100	120,750	0.0070	0.0005	0.1255	-16.52**

** , * indicate significance at the 0.01 and 0.05 levels.

[†] The number of observations varies due to missing data on COMPUSTAT.

^{††} Shares acquired multiplied by 10, scaled by shares outstanding.

Table 16: Transactions with voluntary footnote disclosures

Panel A: No of transactions with voluntary disclosures by category		
	No of observations	%
Nature	10,060	48.61
<i>Ownership</i>	7,553	36.50
<i>OwnStruct</i>	2,804	13.55
<i>Price</i>	456	2.20
<i>Others</i>	2,153	10.40

Panel B: No of transactions with nature disclosures classified by subcategories		
	No of observations	%
<i>Contract</i>	7,063	70.21
<i>10b5 - 1</i>	2,321	23.07
<i>Open market</i>	372	3.70
<i>Public offering</i>	177	1.76
<i>Private</i>	155	1.54
<i>Exercise</i>	119	1.18

Table 17: No of transactions where mandatory items are linked to footnote disclosures

	Transaction codes (as-reported)							Total
	A	M	C	X	S	J	D	
Conversion or exercise price	7	1	1	-	2	1	-	12
Transaction price per share	1	10	1	-	-	1	1	14
Exercise date	18	26	1	1	2	1	1	50
Expiration date	9	2	2	-	2	1	-	16
Underlying securities shares/value	-	-	-	-	-	-	-	-
Total number of footnotes	35	39	5	1	6	4	2	92
Total number of transactions	21	32	2	1	2	1	1	60

Table 18: Number of disclosures by category and transaction code

	N	Effect on TFN	Description
<i>Replace</i>	14	No	
<i>Redundant</i>	12	No	
<i>Retroactive</i>	13	No	
<i>Separate (TFN)</i>	9	Yes	When found with accompanying derivative acquisitions, TFN breaks the transaction into several transactions according to exercise dates.
<i>Nature (TFN)</i>	6	Yes	Regardless of the type of transaction, TFN changes the as-reported transaction code for the one that is more appropriate. TFN does not keep the as-reported code for comparison purposes.
<i>Other</i>	6	Yes/No	TFN attempts to extract information and place it in the appropriate column in Table II. However, it is not clear whether this operation is rule based or not.

Figure 1: List of Available Transaction Codes

Value	Meaning
A	Grant, award or other acquisition pursuant to Rule 16b-3(d)
C	Conversion of derivative security
D	Disposition to the issuer of issuer equity securities pursuant to Rule 16b-3(e)
E	Expiration of short derivative position
F	Payment of exercise price or tax liability by delivering or withholding securities incident to the receipt, exercise or vesting of a security issued in accordance with Rule 16b-3
G	Bona fide gift
H	Expiration (or cancellation) of long derivative position with value received
I	Discretionary transaction in accordance with Rule 16b-3(f) resulting in acquisition or disposition of issuer securities
J	Other acquisition or disposition (describe transaction)
L	Small acquisition under Rule 16a-6
M	Exercise or conversion of derivative security exempted pursuant to Rule 16b-3
O	Exercise of out-of-the-money derivative security
P	Open market or private purchase of nonderivative or derivative security
S	Open market or private sale of nonderivative or derivative security
U	Disposition pursuant to a tender of shares in a change of control transaction
W	Acquisition or disposition by will or the laws of descent and distribution
X	Exercise of in-the-money or at-the-money derivative security
Z	Deposit into or withdrawal from voting trust

Figure 2: Examples of mandatory disclosures by transaction code and Table II column

Disclosure Type	Transaction Code (as-reported)				
	A	M	C	S	X
Replace	<p>Exercise date</p> <ul style="list-style-type: none"> This security is exercisable immediately Currently at 20 percent Exercisable Pursuant to the 1997 Equity and Performance Incentive Plan, the derivative security granted entitles the reporting person to receive the underlying Class B Common Stock on the first anniversary of the date of grant. 	<p>Exercise date</p> <ul style="list-style-type: none"> Fully vested The option is currently exercisable for 10,000 shares, and the remaining 12,000 shares vest on 8/22/04. <p>Price of derivative security</p> <ul style="list-style-type: none"> Stock option was disposed of in connection with its exercise for no additional consideration beyond the option shares 	<p>Expiration date</p> <ul style="list-style-type: none"> There is no applicable expiration date for the Class B Common stock 	<p>Exercise date and underlying securities</p> <ul style="list-style-type: none"> Class A Preferred Stock is convertible into Common Stock on a 1 for 1 basis on and after the following dates and in the proportionate amounts for each Series: 20 percent allocated to Series A-1 and convertible on January 11, 2007; 20 percent allocated to Series A-2 and convertible on April 11, 2007; 30 percent allocated to Series A-3 and convertible on July 10, 2007; 30 percent allocated to Series A-4 and convertible on October 8, 2007. 2. Class A Preferred Stock has no expiration date. 	
Redundant	<p>Conversion or exercise price</p> <ul style="list-style-type: none"> 1-for-1 Not applicable 	<p>Exercise date</p> <ul style="list-style-type: none"> The options are exercisable immediately 	<p>Conversion or exercise price</p> <ul style="list-style-type: none"> Class B Common stock is convertible at any time by the holder for an equivalent number of shares of Common stock on a one-for-one basis. 		

Figure 1: Examples of mandatory disclosures by transaction code and Table II column (Cont.)

Disclosure Type	Transaction Code (as-reported)				
	A	M	C	S	X
Retroactive		<p>Exercise date</p> <ul style="list-style-type: none"> The option was granted on 1/2/2004 and became fully exercisable upon completion of the issuer's initial public offering. Option was granted on September 14, 2004 and is vesting at a rate of 25 percent on September 14, 2005 and 1/48th thereafter. (I infer from the next footnote [not shown] that this is monthly) This option was granted pursuant to the 1997 Stock Option Plan, as amended, and is exercisable in 25 percent cumulative annual increments beginning November 17, 2004 		<p>Exercise date</p> <ul style="list-style-type: none"> The shares of Class B Common Stock are convertible, at any time, at the option of the holder, into shares of Class A Common Stock on a one-for-one basis. 	<p>Exercise date</p> <ul style="list-style-type: none"> Option granted on 7/18/2003 and becomes exercisable with respect to 25 percent of the shares on each of the first four anniversaries of the date of the grant.
Separate (TFN)	<p>Exercise date</p> <ul style="list-style-type: none"> Stock options granted pursuant to the Exar Corporation 2000 Equity Incentive Plan; the options vest 25 percent per year on the anniversary date of the grant, 7/12/05. The shares subject to the option vest in 48 equal monthly installments from the date of grant (June 22, 2006), such that the option shall be fully vested on June 22, 2010. 				

Figure 1: Examples of mandatory disclosures by transaction code and Table II column (Cont.)

Disclosure Type	Transaction Code (as-reported)				
	A	M	C	S	X
TC Change (TFN)	<p>Shown as mandatory disclosure</p> <ul style="list-style-type: none"> Units are held under the issuer's deferred compensation plan 		<p>Shown as mandatory disclosure</p> <ul style="list-style-type: none"> Reflects action taken to increase the exercise price of any stock option (or portion thereof) that was granted to Mr. Burke prior to his becoming an executive officer of United Health Group Incorporated and is potentially subject to a surtax under Section 409A of the Internal Revenue Code to the closing price of the Company's common stock on the accounting measurement date for that stock option. For Section 16 reporting purposes only, the increases in option exercise prices are deemed to be a cancellation of the old options and the grant of replacement options. The other terms of the outstanding options (including the vesting of the options) remain unchanged. 		

Figure 1: Examples of mandatory disclosures by transaction code and Table II column (Cont.)

Disclosure Type	Transaction Code (as-reported)				
	A	M	C	S	X
Other	<p>Transaction price per share</p> <ul style="list-style-type: none"> Dividends credited to the reporting person's phantom stock account on various dates between February 1, 2004 and January 3, 2005 pursuant to PepsiCo's deferred compensation plan, at prices ranging from \$48.65 to \$53.88 <p>Exercise date</p> <ul style="list-style-type: none"> The phantom stock units are to be settled upon the earlier of 2010, termination, disability or retirement, pursuant to the reporting person's election. 	<p>Exercise date</p> <ul style="list-style-type: none"> Each grant becomes exercisable at various dates <p>Expiration date</p> <ul style="list-style-type: none"> None <p>Shown as mandatory disclosure</p> <ul style="list-style-type: none"> These options were granted pursuant to an employee stock option plan that provides for the grant of options in consideration of services of an employee. 			
<p>"Shown as mandatory disclosures" represent disclosures made to fulfill insiders' obligation when one or more fields in Table II are empty. However these disclosures do not represent information required by a specific column on the table.</p>					

Appendix A

The XML-based Form 4

A.1. Overview

In XML tags act as catalogs of the information content of electronic documents. Pairs of tags set off by angled brackets show where data elements start and end. Tags allow to identify the different structural components of XML documents so that their content can be interchanged across computer applications. To illustrate, a Form 4 is shown in Figure A.1. An XML version of this Form contains a tag for each data element found in the Form. Figure A.2. shows partial tagging of such XML file. For example, in Form 4 filers must report Name and Address of the Reporting Person (Baker W. Randolph, in Figure A.1). To describe this information in an XML document, a pair of tags is used. In the XML-based Form 4 the agreed upon tags are <rptOwnerName> to indicate where the data element 'BAKER W RANDOLPH' begins and </rptOwnerName> to indicate where it ends. Identical procedure follows for each data element found in Form 4.

SEC Form 4

FORM 4

UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

STATEMENT OF CHANGES IN BENEFICIAL OWNERSHIP

OMB APPROVAL	
OMB Number:	3235-0287
Expires:	February 28, 2011
Estimated average burden hours per response	0.5

Check this box if no longer subject to Section 16. Form 4 or Form 5 obligations may continue. See Instruction 1(b).

Filed pursuant to Section 16(a) of the Securities Exchange Act of 1934, Section 17(a) of the Public Utility Holding Company Act of 1935 or Section 30(h) of the Investment Company Act of 1940

1. Name and Address of Reporting Person BAKER W RANDOLPH (Last) (First) (Middle) ONE BUSCH PLACE (Street) ST. LOUIS MO 63118-1852 (City) (State) (Zip)			2. Issuer Name and Ticker or Trading Symbol ANHEUSER-BUSCH COMPANIES, INC. [BUD]			5. Relationship of Reporting Person(s) to Issuer (Check all applicable) Director 10% Owner <input checked="" type="checkbox"/> Officer (give title below) Other (specify below) VP and CFO		
			3. Date of Earliest Transaction (Month/Day/Year) 11/13/2008					
			4. If Amendment, Date of Original Filed (Month/Day/Year)			6. Individual or Joint/Group Filing (Check Applicable Line) <input checked="" type="checkbox"/> Form filed by One Reporting Person <input type="checkbox"/> Form filed by More than One Reporting Person		

Table I - Non-Derivative Securities Acquired, Disposed of, or Beneficially Owned										
1. Title of Security (Instr. 3)	2. Transaction Date (Month/Day/Year)	2A. Deemed Execution Date, if any (Month/Day/Year)	3. Transaction Code (Instr. 8)		4. Securities Acquired (A) or Disposed Of (D) (Instr. 3, 4 and 5)			5. Amount of Securities Beneficially Owned Following Reported Transaction(s) (Instr. 3 and 4)	6. Ownership Form: Direct (D) or Indirect (I) (Instr. 4)	7. Nature of Indirect Beneficial Ownership (Instr. 4)
			Code	V	Amount	(A) or (D)	Price			
Common Stock (\$1 par value)	11/13/2008		M		761	A	\$67.09	376,766	D	
Common Stock (\$1 par value)	11/13/2008		M		1,437	A	\$67.09	378,203	D	
Common Stock (\$1 par value)								41,200	I	TR UA Spouse's trusts FBO daughters
Common Stock (\$1 par value)								5,360	I	By daughters
Common Stock (\$1 par value)								33,818 ⁽¹⁾	I	401(k) plan

Table II - Derivative Securities Acquired, Disposed of, or Beneficially Owned (e.g., puts, calls, warrants, options, convertible securities)															
1. Title of Derivative Security (Instr. 3)	2. Conversion or Exercise Price of Derivative Security	3. Transaction Date (Month/Day/Year)	3A. Deemed Execution Date, if any (Month/Day/Year)	4. Transaction Code (Instr. 8)		5. Number of Derivative Securities Acquired (A) or Disposed of (D) (Instr. 3, 4 and 5)		6. Date Exercisable and Expiration Date (Month/Day/Year)		7. Title and Amount of Securities Underlying Derivative Security (Instr. 3 and 4)		8. Price of Derivative Security (Instr. 5)	9. Number of derivative Securities Beneficially Owned Following Reported Transaction(s) (Instr. 4)	10. Ownership Form: Direct (D) or Indirect (I) (Instr. 4)	11. Nature of Indirect Beneficial Ownership (Instr. 4)
				Code	V	(A)	(D)	Date Exercisable	Expiration Date	Title	Amount or Number of Shares				
Employee Stock Options	\$13.8	11/13/2008		M		761	(2)	11/22/2015	Common Stock	761	\$0	0	D		
Employee Stock Options	\$46.37	11/13/2008		M		1,437	(2)	11/20/2016	Common Stock	1,437	\$0	0	D		
Phantom Stock Units	(3)						(4)	(4)	Common Stock	(4)		8,219 ⁽¹⁾	D		

Explanation of Responses:

- 1. Based on the latest plan statement as of 9/30/08.
- 2. Options vest in three annual installments.
- 3. Each phantom share represents the value of one actual share of Common Stock.
- 4. Represents reporting person's interest in phantom shares of Anheuser-Busch Companies, Inc. resulting from participation in the Anheuser-Busch 401(k) Restoration Plan. Phantom shares have no exercise feature nor any expiration date.

Remarks:

Laura H. Reeves, Attorney-in-Fact for
 W. Randolph Baker 11/17/2008

** Signature of Reporting Person Date

Reminder: Report on a separate line for each class of securities beneficially owned directly or indirectly.

* If the form is filed by more than one reporting person, see Instruction 4 (b)(v).

** Intentional misstatements or omissions of facts constitute Federal Criminal Violations See 18 U.S.C. 1001 and 15 U.S.C. 78ff(a).

Note: File three copies of this Form, one of which must be manually signed. If space is insufficient, see Instruction 6 for procedure.

Persons who respond to the collection of information contained in this form are not required to respond unless the form displays a currently valid OMB Number.

Figure A. 1. Example of a Form 4




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Figure A. 2. Excerpt taken from an XML-based Form 4 submission.

A.2. The EDGAR Ownership XML Technical Specification

This public document⁴⁸ is a detailed description of the EDGAR Ownership Document Taxonomy. This taxonomy involves a collection of XML templates (Schema Definition files) used by the EDGAR system to validate Ownership submissions. Eight Schema Definition files define the structure to which Forms 3, 4, and 5 must conform. One file defines the submission header that is accepted by EDGAR. Another file, defines elements that are common to all ownership primary documents. And, the remaining six files are specific to the Ownership submissions (e.g. Forms 3, 4 and 5) and their amendments (e.g. Forms 3/A, 4/A, and 5/A). Together, these files define the data elements, the hierarchy and sequencing of these elements, data types, valid values, maximum lengths, number of occurrences, etc. that are accepted for a valid Ownership submission.

Figure A.3 lists partial code of the schema definition file that is common to all ownership primary documents. The excerpt refers to the structure to which a submission must conform when reporting underlying securities involved in derivative transactions. Form 4 requires that information regarding derivatives' underlying securities be filed including the title of the underlying security, the number of shares, and/or the total value involved. To enforce reporting of this information, the Schema in Figure A.3 defines the underlying security element as complexType. A complexType specifies the allowable elements and their order as well as any attribute declarations that determine the content of the element defined as complexType. In addition, the listing in Figure A.3 defines the content for each of the allowed elements

⁴⁸ Found at <http://sec.gov/info/edgar/ownershipxmltechspec-v2.htm>

by using global *type* declarations. For example, the content of the data elements underlying security shares and underlying security value must be of type `OPT_NUMBER_WITH_FOOTNOTE`. In turn, this type is defined as a complex data element whose content is an optional number (e.g. number of shares or total value) with or without footnote disclosures.

Figure A.4, shows partial tagging of an XML-based Form 4 that conforms to the Schema definition given in Figure A.3. The submission excerpt shows that underlying security shares is a number (123000) accompanied by three footnotes (F1, F2, F4). It can also be observed that underlying security value is not part of the submission. The reason can be found in Figure A.3, the value in `OPT_NUMBER_WITH_FOOTNOTE` is optional (`minOccurs="0"`). However, because no maximum number of occurrences has been defined, if shown, only one value can be given: shares or total value.

```

<xs:complexType name="UNDERLYING_SECURITY">
  <xs:sequence>
    <xs:element name="underlyingSecurityTitle" type="SECURITY_TITLE"/>
    <xs:choice>
      <xs:element name="underlyingSecurityShares" type="OPT_NUMBER_WITH_
FOOTNOTE"
          minOccurs="0"/>
      <xs:element name="underlyingSecurityValue" type="OPT_NUMBER_WITH_
FOOTNOTE"
          minOccurs="0"/>
    </xs:choice>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="OPT_NUMBER_WITH_FOOTNOTE">
  <xs:sequence>
    <xs:element name="value" type="xs:decimal" minOccurs="0"/>
    <xs:element name="footnoteId" type="FOOTNOTE_ID" minOccurs="0"
maxOccurs="99"/>
  </xs:sequence>
</xs:complexType>

```

Figure A. 3. Excerpt from the ownershipDocumentCommon.xsd Schema file. Taken from the EDGAR Ownership XML Technical Specification.

```

<underlyingSecurity>
  <underlyingSecurityTitle>
    <value>Common Stock</value>
  </underlyingSecurityTitle>
  <underlyingSecurityShares>
    <value>123000</value>
    <footnoteId id="F1"/>
    <footnoteId id="F2"/>
    <footnoteId id="F4"/>
  </underlyingSecurityShares>
</underlyingSecurity>

```

Figure A. 4. Section of an XML-based Form 4 that conforms to the Schema definition given in Figure A.3. Taken from the EDGAR Ownership XML Technical Specification.

A.3. Summary of Rules enforced by the EDGAR Ownership Taxonomy

The following list is a set of major restrictions imposed by the Schema definition files on Form 4 submissions.

- In a Form 4 a maximum of 30 non-derivative transactions (rows) can be reported.
- In a Form 4 a maximum of 30 derivative transactions (rows) can be reported.
- The information content of footnotes is limited to 1,000 characters.
- A Form 4 can be filed with up to 99 footnote disclosures.
- Unless no information is reported in a specific field in Table I and/or Table II, related footnote disclosures are optional.
- Footnotes must be linked to at least one other data element that is not another footnote.

Appendix B

The Form 4 Database

B.1. The Relational Database Model

The Form 4 database I develop in this study follows the relational data model.

In a relational data model everything in a database is stored in the form of tables.

Tables represent entities. An entity is anything about which it is desired to store data.

An example of a table is shown in Figure B.1. The table shown stores data about the entity ownership document.

id	fileDate	Doc Type	periodOfReport	issuerCik	issuerName	issuerTrading Symbol
1	2004-01-09	4	2004-01-08	0000902276	MONDAVI ROBERT CORP	Mond
2	2004-01-09	4	2004-01-08	0001105982	SONIC INNOVATIONS INC	SNCI
3	2004-01-09	4	2004-01-09	0000921082	HIGHWOODS PROPERTIES INC	HIW
4	2004-01-09	4	2004-01-08	0001024795	SUN HYDRAULICS CORP	SNHY

Figure B. 1. A relational database table.

Each row in a table contains data about a specific occurrence of the type of entity represented by that table. In Figure B.1., the table shows four occurrences of ownership document, each belonging to a different issuer. Each column in a table contains information about one specific attribute of that entity. Each column in Figure B.1. represents data about specific ownership document attributes, such as the file date, type of document, issuer name, and issuer trading symbol.

Tables in a relational database have several types of attributes. A primary key is the attribute, or combination of attributes, that uniquely identifies a specific row.

The primary key for the ownership document table in Figure B.1. is id. Each different ownership document can be uniquely identified by its id. A foreign key is an attribute in a table that is a primary key in another table. Foreign keys are used to link rows in one table to rows in another table. An example is the attribute ownershipDocId in Figure B.2.

Ownership document table

id	fileDate	Doc Type	periodOfReport	issuerCik	issuerName	issuerTrading Symbol
1	2004-01-09	4	2004-01-08	0000902276	MONDAVI ROBERT CORP	Mond
2	2004-01-09	4	2004-01-08	0001105982	SONIC INNOVATIONS INC	SNCI
3	2004-01-09	4	2004-01-09	0000921082	HIGHWOODS PROPERTIES INC	HIW
4	2004-01-09	4	2004-01-08	0001024795	SUN HYDRAULICS CORP	SNHY

Footnotes table

id	OwnershipDoc Id	footRef	footText
1	1	F1	3,770 shares owned by filers spouse, which filer disclaims ownership.
2	1	F2	No transaction/reporting balance of Class B shares only.
3	2	F1	Shares held in custodial accounts for reporting person's daughters under the Uniform Gifts to Minors Act.
4	2	F2	Not Applicable

Figure B. 2. Set of relational tables for storing footnote disclosures submitted with Form 4.

OwnershipDocId is the primary key in the ownership document table (id). It is also the foreign key in the footnotes table. This attribute is used to link data about particular footnote disclosures to ownership documents. For example, the footnote disclosures (footText) in the first two rows in the footnotes table have the

ownershipDocId attribute set equal to 1. Looking at the ownership document table we find that these two footnote disclosures were filed in an ownership document that was submitted on 2004-01-09 by Robert Mondavi Corp.

B.2. Data Modeling

Data modeling is the process of defining a database. To this end I use entity-relationship (E-R) diagramming. An E-R diagram is a graphical technique for portraying a database schema. A schema describes the logical structure of a database. My first step in developing the E-R diagram to describe the Form 4 database is to identify the relevant entities to be modeled. A list and definition of these entities is shown in Figure B.3.

My next step is to draw the E-R diagram illustrating the Form 4 database. I develop three interconnected diagrams. The diagrams expand upon the entities shown in Figure B.3. Figure B.4 shows the set of entities and relationships needed to capture general Form 4 information. I consider general information any data disclosed outside of Form 4 Table I and Table II. Figure B.5 shows the set of entities and relationships that capture data about nonderivative transactions and holdings (Form4, Table I). Figure B. 6 shows the set of entities and relationships that capture data about derivative transactions and holdings (Form 4, Table II). These diagrams also expose the necessary attributes for all entities. Right next to the attribute name the attribute type and length is noted followed by a foreign key indicator (FK) when appropriate.

- ownershipDoc: General information pertaining to Form 4. Ex. File date, date of earliest transaction, issuer name, etc.
 - dateOriginalSub: If amendment, original submission date of Form 4.
 - footnotes: Set of disclosures made outside the Tables I and II.
 - remarks: Comments made outside tables I and II.
 - reportingOwner: Person who is filing Form 4.
 - isDirector / isOfficer / isTenPercentOwner / isOther: Relationship between reportingOwner and issuer.
 - nonDerTransLine / nonDerHoldLine: Type of information filed in Table I (derivative transaction or derivative holding)
 - derTransLine / derHoldLine: Type of information filed in Table II (nonderivative transaction or nonderivative holding)
- The following entities collectively describe each transaction and holding submitted in Tables I and II:
- | | |
|--------------------|---------------------|
| • securityTitle | • exerciseDate |
| • convExercPrice | • expirationDate |
| • transDate | • underSecTitle |
| • deemedExecDate | • underSecShares |
| • transCoding | • underSecValue |
| • transTimeliness | • sharesOwnFolTrans |
| • transShares | • valueOwnFolTrans |
| • transTotalValue | • directIndirectOwn |
| • transPriceShare | • natureOwn |
| • transAcqDispCode | |

Figure B. 3. List of entities required to capture information submitted in Form 4.

The final element illustrated in these diagrams is the type of relationship cardinality. Cardinalities describe the nature of the relationship between two entities by indicating how many instances of one entity can be linked to each specific instance of another entity. For this specific design, cardinalities help to enforce the rules imposed by the **EDGAR Ownership XML Technical Specification** and the

EDGAR Ownership Submission Taxonomy. Only three types of relationships are possible between entities. A one-to-one relationship (1:1) exists when the maximum cardinality for each entity in the relationship is one. A one-to-many (1:*) relationship exists when the maximum cardinality on one side is one and the maximum on the other side is many. A many-to-many (*:*) relationship exists when the maximum on both sides is many.

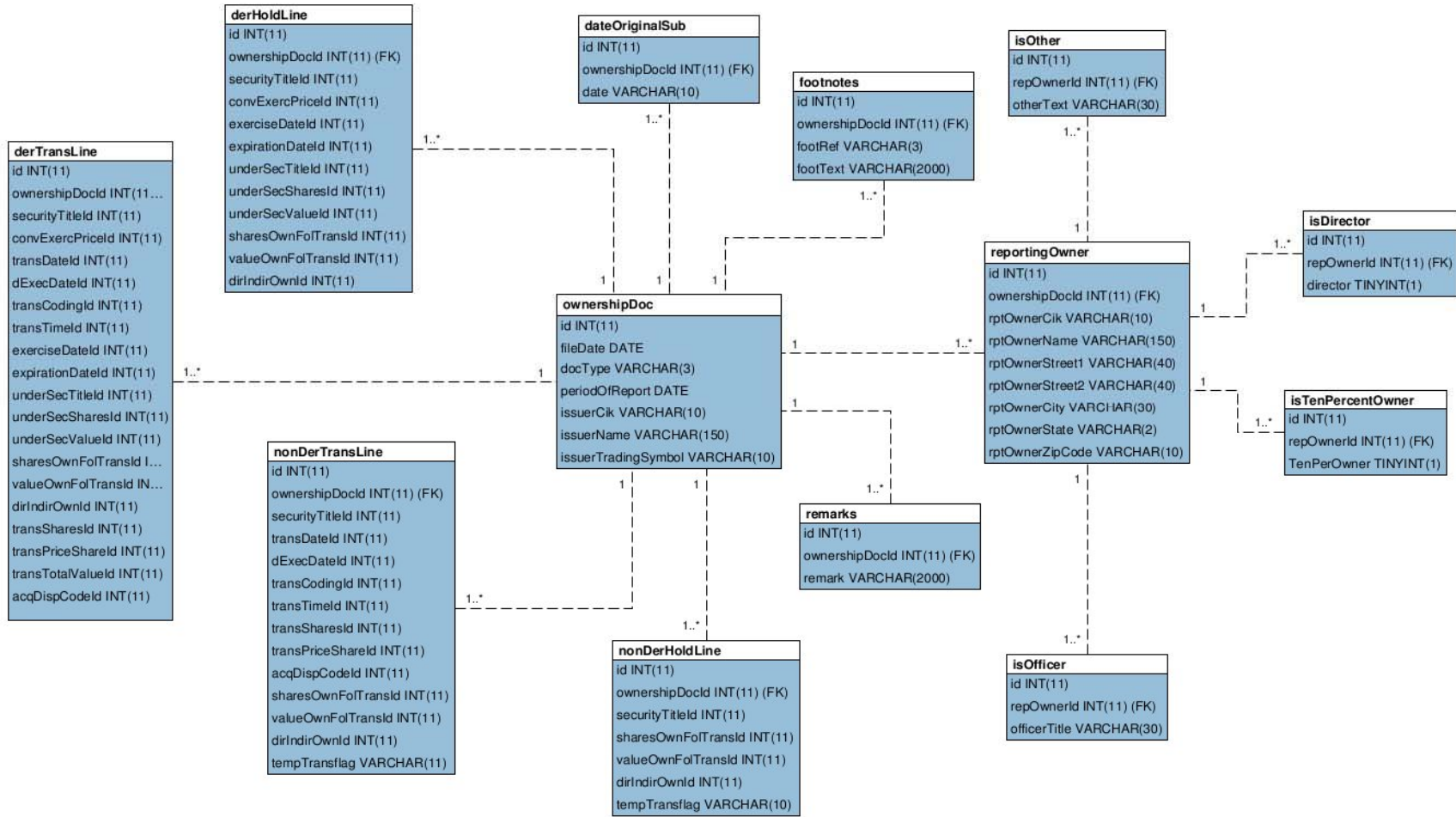


Figure B. 4. Aggregated version of the E-R diagram developed for the database that I implemented to capture Form 4 data.

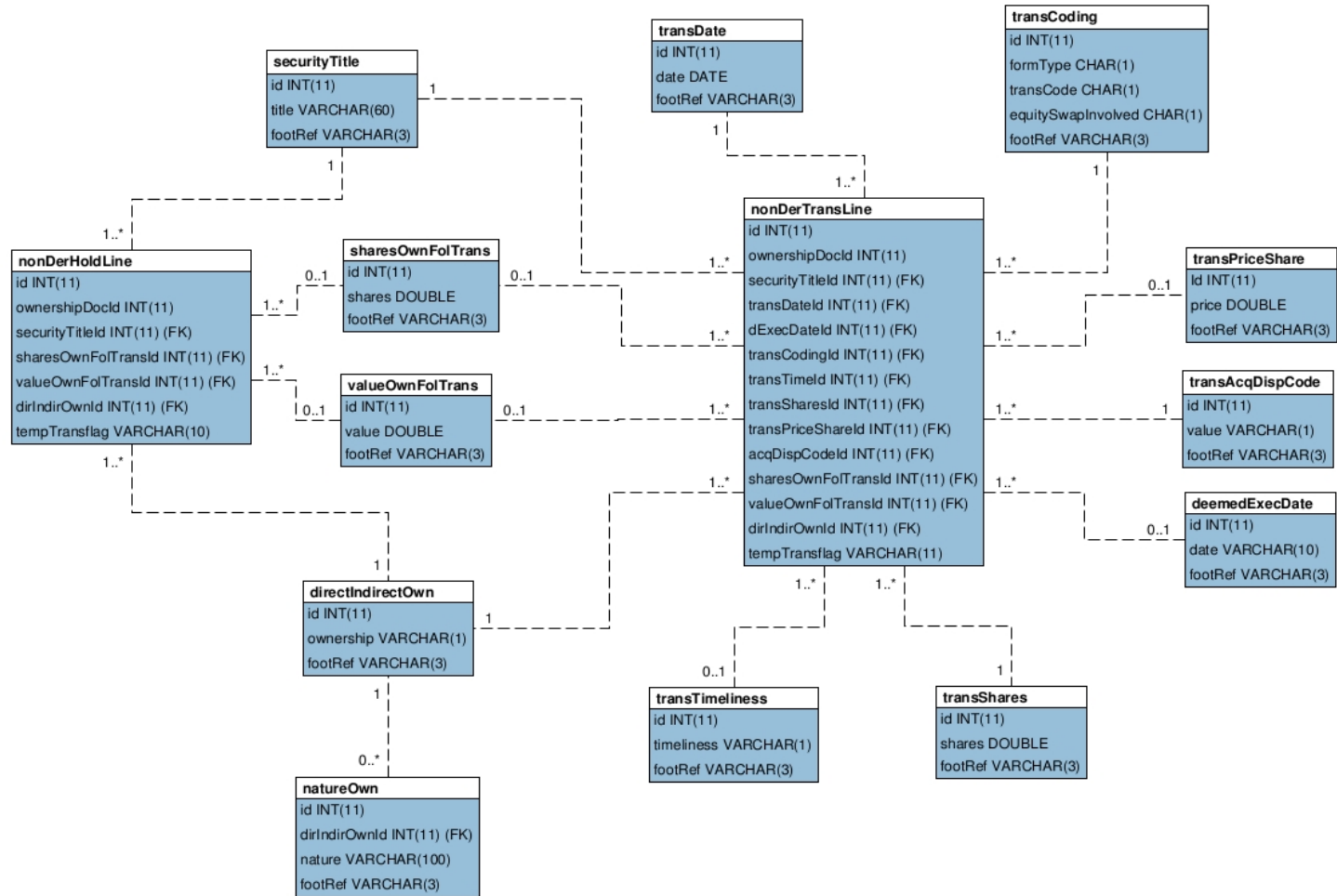


Figure B. 5. E-R diagram developed to capture Form 4 nonderivative transactions and nonderivative holdings data.

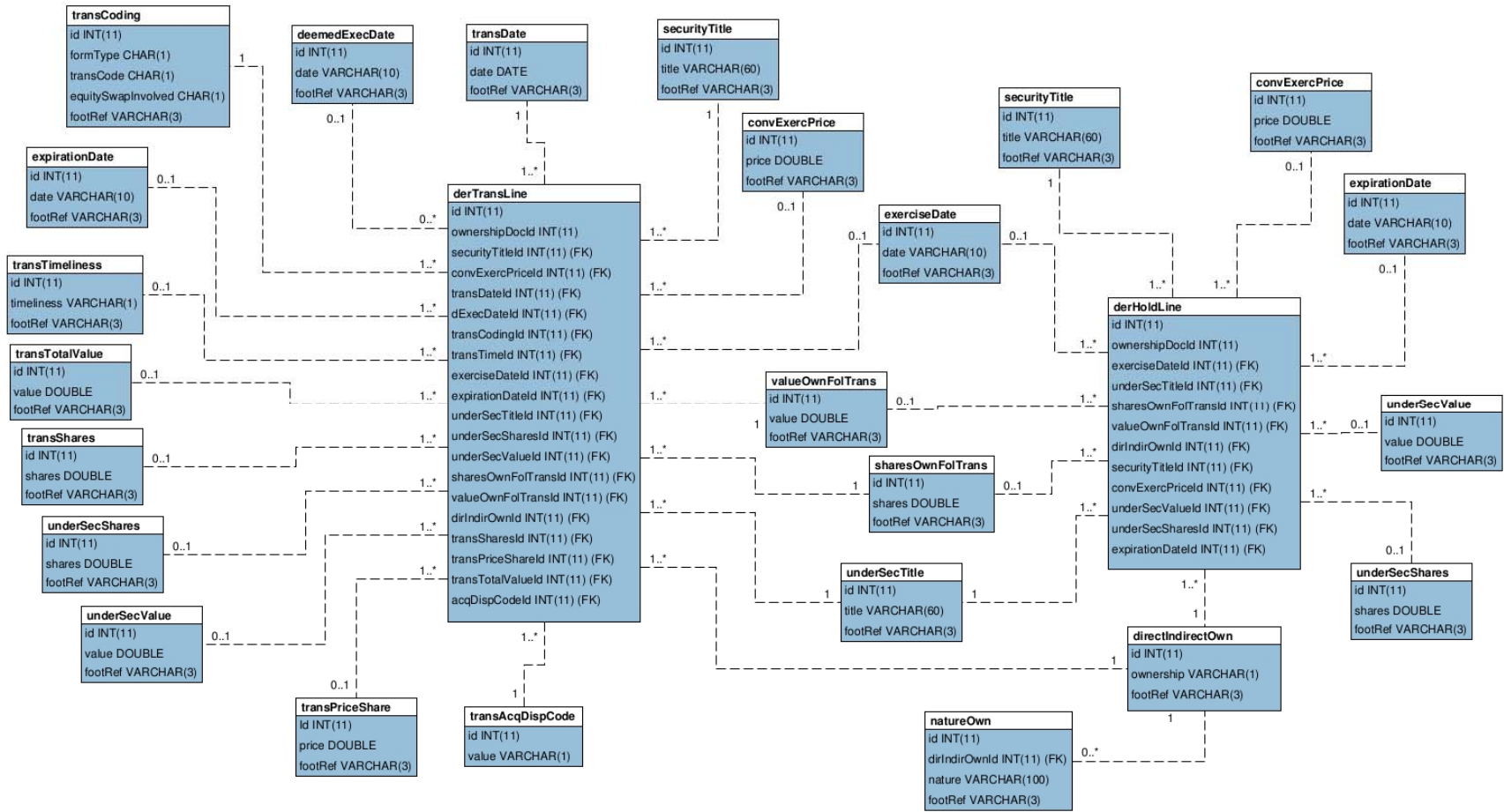


Figure B. 6. E-R diagram developed to capture Form 4 derivative transactions and derivative holdings data.

Figure B.7 illustrates this process using the ownershipDoc and footnotes entities.

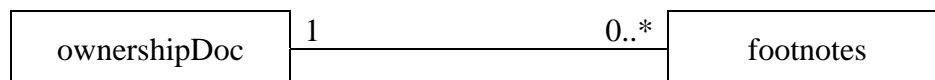


Figure B. 7. Two entities and their relationship

The relationship shown indicates that each ownership document (Form 4) at a minimum has no footnote disclosures and at a maximum it can have many footnote disclosures. On the other hand, each footnote disclosure can be linked to one and only one ownership document.

B.3. Data Loading

The data collection process involves downloading packaged raw daily filings from the SEC site to a local computer using file transfer protocol (ftp)—a protocol used to transmit files between computers on the Internet. To ready the data, a computer application is used to extract the daily filings from the package files into daily folders. These folders contain individual files representing all submissions received by the SEC on any given day. For example, the package downloaded from the SEC website with filings made on January 02, 2004 is named 20040102.nc.tar.gz. The extensions of this file indicate that it has been archived in two different file formats. First using tar (tape archive) and then using gzip (GNU zip). Upon reception, this file is uncompressed. After this operation is performed a new folder 20040102.nc is obtained. This folder contains 2,084 files corresponding to numerous submissions of forms 3, 4, 5, 10-Q, 10-K, 8-K, etc.

Next, an application is developed using Sun Microsystems' Java developing language to identify and separate, from all other submissions, Form 4 and Form 4/A filings. This application is also used to automate the loading of Form 4 information into the Form 4 database. Once all data has been loaded, the data is ready for extraction and analysis.