Stock Return Performance around Earnings Announcements

Empirical Evidence from Nordic Stock Market

Authors:  Chenxi Wang
           Gerky King Phet

Supervisor:  Janne Äijö

Student
Umeå School of Business and Economics
Spring semester 2012
Master thesis, one-year, 15 hp
Thesis information

University: Umeå School of Business and Economics, Umeå University

Department: Finance

Course: Master thesis one year

Degree program: Master programme in Financial Management

Supervisor: Janne Äijö

Authors: Chenxi WANG and Gerky KING PHET

Thesis topic: Stock return performance around earnings announcements

Thesis Defense Date: 8th June 2012

Thesis submitted in partial fulfillment of the requirement of the Master programme in Financial Management (first year) from the Umeå School of Business and Economics at Umeå University.
Abstract

This thesis examines the impact of earnings announcements on the stock return performance. Most literature regarding this topic is related to the US market. We follow 40 of the largest and most liquid stocks on the virtual OMX Nordic Exchange from 2010 to 2012. In this research paper, we present the theoretical framework that gives an overview of the possible research areas, and provide empirical evidence of the repercussion of the earnings announcements on stock returns.

We use the event study methodology to conduct this thesis. It is a standard approach established by Fama et al. (1969). It has been used in a variety of researches for gauging the effect of new information on the market value of a security. As we expected good news and bad news to have different reactions on the stock return performances, we have split our data in good news and bad news. To differentiate good news from bad news, we measure analysts’ forecast error. It consists in subtracting the earnings per share (EPS) of the analysts’ consensus forecast from the reported EPS of the same year. The analysis is composed of three different subdivisions: the study of the abnormal return during an event window of 17 days, the cumulative abnormal return during this event window, stock price behavior from growth stocks and from value stocks.

Our findings show that stock behavior gradually responds to the earnings announcement. The stock reactions that appear within pre-event window may indicate information leakage. Our results describe most average abnormal returns as statistically insignificant during the event window. Earnings information has a lower impact on the stock market. We also find that the effect of positive earnings surprise on stock price lasts longer than that of negative earnings surprise. Stocks from OMX Nordic 40 index have a stable reaction on negative earnings surprise.

As a conclusion, we highlight three points. Earning interim and annual earning information disclosure were unable to influence the stock market effectively, and therefore could not fully reflect the changes on the stock price. Investors can get the abnormal returns by using this earnings information during the whole event window.

Keywords:

Financial disclosure, earnings announcements, abnormal return, earning forecasts, forecast dispersion, forecast error, forward-looking information, price-sensitive disclosure, earnings performance, disclosure credibility, earnings announcement delay, earnings surprises
Acknowledgements

We would like to thank our supervisor Janne Äijö for his commitment to the role of supervisor. We are grateful for his guidance and recommendations throughout the process of the writing. He has always looked at our thesis with attention, and commented our work. We thank in advance the opponent and the side-opponents for their comments and suggestions on further improving our thesis.

Umeå, 31st May 2012
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1. Introduction

The introduction chapter provides a brief review of the past researches on the topic of earnings announcements and stock return performances prior to and before a financial disclosure. This chapter dwells upon the problem background, the research question and the research purpose: why is this problematic topical? The specificity of this research paper is here highlighted, and a preview of the expected results is exposed in this section. The limits of the research are also mentioned in this part, what is not achievable and why. The choices of compromises are explained.
1.1 Problem background

In the 1960s, Eugene Fama, recognized as the “father of modern” finance, introduced the Efficient Market Hypothesis in his doctoral thesis. He put forward three hypothesis of the efficient market:

1. The **weak-form efficiency**, the security’s price reflects its historical prices, which means that future prices cannot be predicted by analyzing prices from the past.
2. The **semi strong-form efficiency**, the security’s price reflects all publicly available information: no excess return can be earned by trading on this information. But profit can be made via not publicly available information.
3. The **strong-form efficiency**, the security’s price reflects all information, this is the case where the abnormal returns equal zero.

His paper provoked thousands of debates and empirical studies that attempted to determine what degree of efficiency a specific market was. The security and the issuer’s proprieties, the market characteristics, and the technology available (Ogden et al., 2003, p. 273) are so many delimitations acting upon the efficiency of the market. Today’s studies grant an ever stronger interest in behavioral finance and investors’ psychology, either in the academic circle or in business.

By acknowledging different efficiently level of the capital market, Fama acknowledged the imperfection of the market. In a firm, the management can indeed voluntarily decide not to disclose information because some information can concern competitive or commercial issues, because it can shrink the flexibility of the company and so forth. Holland (2005) illustrated the different situation where the management would face a choice on the degree of transparency of the disclosure:

![Diagram](image)

**Figure 1** Model in one period (Holland, 2005)
As expressed in Figure 1, Holland (2005) presented four distinctive strategies about communicating financial information in the model in one period. The public mandatory disclosure and the public voluntary disclosure, also known as the public disclosure, can be the obligation to meet regulatory requirements (financial accounting standards board or accounting standards board), but it can be a choice of the management as well. True, as Holland puts it the aim of voluntary public disclosure behavior was to satisfy ‘voluntary’ good practice guidance and market benchmark. Semi-private disclosures discuss public information in private. For example corporate actions, forecasts, and economic events can be considered as semi-private disclosures. Private information is based on the idea of “relationship or implicit contracting between the company managers and the financial managers, where the parties exchange capital, information and influences” (Holland, 1997). Secrecy and confidentiality has for objective the creation of strategic flexibility.

Beyond the purely technical part of finance, businesses have to understand that finance can be tightly linked to communication strategy. A Chief Financial Officer is not only concerned about the performance of his company; he also has to maintain a good relationship with the investors, and a good relationship with the investors begins with a good communication.

- How to communicate: is the information reliable and credible? Do investors interpret correctly the message? How should bad news be disclosed? What are the consequences on stock prices?
- When to disclose information, what are the relationships between date of disclosure and stock return performances?

It is pertinent to have a closer look at what makes the capital market not efficient. There has been much discussion about what drive public corporate disclosure: time, information content, volume, quality of the disclosure.

Researchers devoted a large quantity of literature to earnings announcements. The moments when information is made public are often subjected to lots of speculation and require extra attention. It is important to accentuate the fact that financial analysts play a critical role in financial market by interpreting, processing and forecasting accounting information. On that subject, Chen et al. (2009) raised the issue of the relationship between analyst research and corporate earnings announcements to oppose information discovery to the interpretation of previously released information. The authors emphasized on the interpretation role that increases in importance with the difficulty of financial accounting information. Financial analysts are indeed important intermediaries in capital market; they discover private information and interpret public information. The authors found out that financial analyst mainly interpret just released earnings announcements when the complexity level of the operations is higher. However depending on the timing of a disclosure relative to the other, a financial analyst can either interpret or discover
information. If the disclosed information is a higher quality disclosure, it will consequently lead to a lesser market reaction.

To enrich this research topic, Asthana and Mishra (2001) examined the effect of the sizes of the announcing and nonannouncing firms on information transfers. They highlighted the fact that there were more pre-announcement earnings in large firms; and that the abnormal returns of the large firms may contain information that is useful for other firms in the same industry. Francis et al. (2002) on the other hand revealed throughout that primarily analyst reports and competing information reduce the usefulness of earnings announcements. Ball R. and Shivakumar L. (2008) study show that earnings announcements do not always incorporate considerable new information because of its relative frequency, and because the managers can decide not to provide all the information (issue earning forecasts only when they have substantial private information to make public. Furthermore, accounting income is based on backward-looking information (sales, costs). Langberg and Sivaramakrishnan (2010) reinforced the idea of completeness of information: capital market participants “collectively” possess information that the managers do not. How is it possible? Traders, through the aggregation of information, through the market feedbacks, can interpret information in a manner the managers do not (Goldstein & Guembel, 2008). For example, bad news and good news disclosures have different price responses. Managers can disclose bad information that would reduce the stock price, and what is more has a bigger impact that good news. It can be for strategic reason such as bargaining with labor union, discourage competition, reduce the exercise price of the given options, and signal future good news (Langberg & Sivaramakrishnan, 2010)

As far as information is concerned, Grace Pownall and Paul J. Simko (2005) shed the light on short selling activities. Throughout a rigorous research of overvalued firms, short sellers bet on their future performances of a stock. In doing so, they constitute a complement of information to analysts for smaller firms (where analyst coverage is too low or when analysts tend not to provide forecasts because their expectations are not favorable). This hypothesis is also an acknowledgement of the Securities and Exchange Commission (SEC, 1999).

In addition to Pownall and Simko’s study, Christophe et al. (2004) brought a nuance to short selling activities by distinguishing short selling prior to an announcement and a short selling where the announcements are not impending. They exhibited the evidence that short selling around announcement dates and short selling when no announcements are imminent are radically different. The authors have compared the distribution of average daily shorted shares as a percentage of a firm’s total outstanding shares. What is to be remembered is that the majority of stocks experience lower amount of short-selling prior to a financial disclosure than the day of nonannouncement period; and a minority of stocks is subjected to large increases in short-selling in the days leading-up the announcement. By examining short-sales transactions in the five days prior to earnings announcements, and the authors
noted that “short-sellers typically are more active in stocks with low book-to-market valuations or low standardize expected earnings, and that the levels of pre-announcement short-selling mostly appear to reflect firm-specific information rather than these fundamental financial characteristics.” Even if investors manage to do security analysis to reduce the information asymmetry, this process is costly, and the only benefit on doing this analysis is to obtain superior returns by identifying mispriced securities.

Ho and Michaely (1988) focused on the costs of information and conducted a research on information quality and market efficiency and pointed out that the market is not required to disclose all information because it would lead to a higher price in interpreting all the information. According to them, there is a contradiction between the providing full information and the costs of interpretation it engenders. It is by lowering the amount of information; the cost of interpretation would decrease. Bearing in mind the two antagonistic variables, it is difficult to reach the level of an efficient market. The second assessment is that when a stock is mispriced, there is an opportunity for some market participant to manipulate the market, which is disruptive to the price formation process.

The short selling activities reveal intriguing information for the companies themselves: the timeliness of disclosing. What are the possible consequences of disclosing information at different date? Annaert et al. (2002) investigated the timeliness of financial statements in Belgium, and three points were raised: (1) the evolution of the size of the reporting lags of Belgian interim reports, (2) is the information content (bad or good) news is related to the timing of the disclosure, (3) the value relevant of disclosure timing. They observed that, in relation to the first interrogation, the absolute reporting lags decrease significantly over time. Regarding the second subject, Annaert et al. questioned the fact that late news was not generally synonymous of bad news. At last, regarding disclosure timing, after considering in detail the relationship between the content and the timeliness of earnings announcement, the authors drew two conclusions: first there were no immediate link between the content of the news and its timing. A company has no incentive to publish earlier its report if the company is performing well. Second, the content of the news itself is more important that the time the news has been issued. “Short term timeliness is value irrelevant” (Annaert et al., 2002).

By questioning the timeliness of a disclosure, Annaert et al. (2002)’s paper guided the researches towards the quality and the credibility of disclosing information. Disclosure quality and credibility are at the heart of financial disclosures’ imperfection. Indeed, asymmetrical information subsists between insiders and outsiders. A good or a bad news is not necessarily well reflected in the stock price. A positive event is often well reflected by the firm’s management; but an unexpected decrease in earnings or dividends is generally poorly reflected. As far as the quality of disclosures is concerned, studies came to the conclusion that “no news, good news”. However although the quantity of disclosure is to take into account, Sergio Beretta and Saverio Bozzolan (2004) centered their research on
the quality of disclosure by the richness of the content from a semantic standpoint. “The semantic properties help outside investors to appreciate the expected impact of disclosed risks on the firm’s capability to create value” (Beretta & Bozzolan, 2004, pp. 266-285). Fair enough, according to this research paper, the quantity of disclosure is not a proxy of the quality of disclosure. Ester Ortiz Martinez and David Crowther (2008) also mention the semantic issue of financial disclosures, and took the example of Shell where nobody noticed the problem with oil reserve through the mere analysis of the company disclosure during 1998-2003. Their methodology was lexical analyze, they made statistics on the corpus of disclosure: repeated segments, pairs of forms in relation of co-occurrence and so forth. It has been found that there was a communication issue between the management and the shareholders. The management has hidden important questions behind the quantity of information. Although throughout the study, they managed to detect the implicit messages, Martinez and Crowther underlined the fact that in case of a lack of information, the company in question has the incentive either to hide the truth or twist the result in order to camouflage advantages to shareholders or managers. Investors are unlikely to lead a lexical study to find out information in financial disclosures (Martinez & Crowther, 2008).

Beyond the disclosure itself, DeFond et al. (2006) put the finger on the context in which the information is released. A large body of research examines cross-country differences, this being said, DeFond et al. (2006) emphasized more on two specific aspects of it: cross-country differences in investors’ reactions to annual earnings announcements and country-level differences in the financial reporting environment. In relation to the earnings quality, Healy and Wahlen (1999) argue that “managers in strong investor protection countries are less likely to manage earnings because they have limited ability to accumulate private benefits of control, and hence have fewer incentives to mask firm performance. As predicted, they find less earnings management in countries with stronger investor protection institutions.” DeFond et al. (2006) finding highlighted the fact that countries with higher quality earnings have more informative annual earnings announcements, while in countries with more frequent interim financial reporting, annual earnings announcements were less informative.

1.2 Problematization and research question

Stock performance around earnings announcements is not a new topic and lots of literature has been issued on this subject. Benos and Rockinger (2008) have conducted a research on the market response to earnings announcements and interim reports, with a focus on the CAC40’s companies. They analyzed investors’ behavior after a positive or a negative announcement. In order to make their research more detailed, they separated positive announcements and very positive announcements; negative announcements and very negative announcements.
Battalio and Mendenhall (2011) focused their research and raised the question of “did investors attempting to exploit the information in earnings surprises leave any money on the table, if so, in terms of potential returns, how much?” They drew four scenarios regarding trading, but the most conservative one is the following: “investors initiate their positions at the first market close following the earnings announcements, pay one-half of the stock’s normal bid-ask spread when terminated their positions about three months later.”

Isakov and Pérignon (2001) investigated the dynamics of implied volatility around announcement dates. By examining the evolution of the average implied standard deviation (ISD), they found out that there was a “slight increase in the average ISD before the information disclosure, revealing that the market expect some uncertainties on the event day. On the announcement day, the average ISD decreases and continues to decrease during the next 4 days, indicating some persistence in the instantaneous volatility and also the presence of events containing bad news” (Isakov & Pérignon, 2001, p. 1780). About good and bad news, they came to the conclusion that the ISD drops in case of good news and remain stable in case of bad news. To end up, they explained that it several days are required for the ISD to return to its long-term level after an earnings announcements. After analyzing the behavior of the volatility, their conclusion confirms the existence of volatility shock. It indeed takes several days for the implied standard deviation to return to its long-term level after an earnings announcement.

Stock performance around earnings announcements was mainly studied in the US stock markets. We would like to center our research in the OMX Nordic 40 stock index, where no researches have been realized so far.

In order to fill a gap in this area of interest, we formulated our research question as follow:

**How does stock return behave around earnings announcements in the OMX Nordic 40 stock index?**

We will also try to answer the question whether the stock return behave the same if we are dealing with growth or value stocks.

### 1.3 Research purpose

Earnings announcements together with new project announcements such as mergers and acquisitions announce and dividend announce constitute public information for an individual firm. They can be analyzed throughout the same event study methodology. The impact of earnings announcements on stock prices in US market has been reviewed in many studies. Ball and Brown (1968) and Beaver (1968) were the first to study stock prices around earnings announcements. Their studies present the evidence that the information
contained in quarterly earnings do not fully reflect stock prices when they are announced. However, it still remains largely unknown how earnings announcements influence the stock prices in Nordic market. In this thesis, we examine the stock reaction to earnings announcement in Nordic countries, and partially answer this interrogation.

According to the semi-strong form of Efficient Market Hypothesis (EMH), any public information should be reflected in the price, and earnings announcement as one type of information. The market price should immediately and in an unbiased manner reflect this information. In the real world, considering information asymmetry, investors have no reliable information about firm and individual investors cannot get information at the same time, therefore they cannot determine a true value of its securities. The presence of large amount of information at the same time makes investors difficult to target the most useful information which can maximally influence the stock price. Joy et al. find that price adjustments to the information concerning security valuations that are contained in unexpected "highly favorable" quarterly earnings reports are gradual, rather than instantaneous (Joy et al., 1977). Market prices to the announcement of unanticipated changes in quarterly earnings are an empirical question. The key to solve this problem is to find out how these financial disclosures influence market.

This empirical research on stock reaction to earnings announcement is important for both investors and managers. By examining the stock reactions to earnings announcement, investors can judge the efficacy of earning preannouncement. At the same time, managers can better understand how to design earnings announcement strategies and manage the firm to maximize its stock price.

1.4 Delimitation

Theories might not reflect reality for a matter of understandability and a matter of complexity. A precise work is generally dense and costly, and to a broader extent difficult to comprehend. An over simplified research on the other hand might not encompass the whole problematic. In spite of the delimitations, the trends have to be visible: understanding the major variables that affect an equation. In a company, it is more relevant to know how to prioritize the operation than knowing the exact percentage variation. If theories cannot give exact figures, at least it can provide directive lines. Identifying an ideal situation can help researchers to position their findings in terms of objective accomplishment. When writing a thesis, it is important to be aware that not every concepts and variables can be taken into account. This section is a listing of all the elements that were not able to be included in the analysis.

First, the choice of an index (OMX Nordic 40) constitutes delimitation in itself. This index has been picked because Scandinavian countries are the object of our study. At the same
time this index only counts 40 companies and the results out of 40 companies might not be generalizable to a broader context.

Second, the choice of an index does not take into account the specificities of an industry. Two industries can be for example anti-correlated: when petroleum industry is getting a better health due to the increase of the price of the barrel, it has an impact on the industries that depends on that raw material.

Finally, there is question of the historical beta we are using. Beta is a controversial coefficient, some consider it as a good indicator, other believe that beta has a too low degree of precision (Penman, 2010). As the research does no forecasts, and as a matter of simplification, the beta used here is the historical beta.

1.5 Definitions

Arbitrage

“With no overall outlay of funds or assumption of risk (in theory, at least!), arbitrage involves combining several transactions that ultimately yield a profit.” (Vernimmen et al., 2005)

Asymmetric information

“A situation in which one party to a transaction has information about the transaction to which the other party is not privy. Asymmetric information may result in a bad deal for one party (often but not always the buyer).” (financial-dictionary.thefreedictionary.com)

Fundamental analysis

“The fundamental analysis is the method of analyzing information, forecasting payoffs from that information, and arriving at a valuation based on those forecasts.” (Penman, 2010, p.98)

Growth stock

“Organization shares that are widely held and favorably viewed by the financial press. Sold at high price-earnings ratios, this type of stock is popular due to the high earnings growth rate represented by a price believed to rise faster than the rest of the market. Also known as glamour stock” (businessdictionary.com)
Insider trading

“Inside information is information that is not publicly known. Inside information is economically significant if the current prices of securities do not reflect that information.” “Most editorialists, columnists, and member of the public appear to agree that insider trader is wrong because it is unfair” (Bradfield, 2007, P. 357)

Rumors

Investors are inclined to tell friends and acquaintances to follow their actions to gain reputation. This rumormongers’ reputation is not only psychological as Jos Van Bommel (2003) puts it; it is also a way to justify its own past actions. The author decomposes three rumors strategy: spreading honest rumor only, bluffing rumors when they have no information, and cheating by spreading false rumors. All these show that “spreading rumors can increase demand for a security and drive its price beyond the price that the rumormongers privately knows” (Bommel, 2003, p. 1513)

Short selling

With a short sale, the investor anticipates a stock price fall and sells the stock; then buy the shares back when the share is at a lower price. It allows investors to profit from a decline in a security’s price. This is called covering the short position. Table 1 shows the processes of purchasing a stock, and Table 2 shows the processes of the short sale of a stock (Bodie et al., 2009).

<table>
<thead>
<tr>
<th>Time</th>
<th>Action</th>
<th>Cash Flow</th>
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<tbody>
<tr>
<td>0</td>
<td>Buy share</td>
<td>- initial price</td>
</tr>
<tr>
<td>1</td>
<td>Receive dividend, sell share</td>
<td>ending price + dividend</td>
</tr>
</tbody>
</table>

Profit = (ending price + dividend) – initial price

Table 1 Purchase of stock

<table>
<thead>
<tr>
<th>Time</th>
<th>Action</th>
<th>Cash Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Borrow share; sell it</td>
<td>+ initial price</td>
</tr>
<tr>
<td>1</td>
<td>Repay dividend and buy share to replace the share originally borrowed</td>
<td>- (ending price + dividend)</td>
</tr>
</tbody>
</table>

Profit = initial price – (ending price + dividend)

Table 2 Short sale of stock

Value stock

“A type of stock having characteristics of high dividend yields and low price-earnings ratios that tends to be considered as undervalued because of its tendency to trade at a lower price in comparison to its actual fundamentals (i.e. dividends, earnings, sales, etc.).” (businessdictionary.com)
1.6 Disposition

- **Introduction**
  The introduction chapter provides a brief review of the past researches on the topic of earnings announcements and stock return performances prior to and before a financial disclosure. The introduction dwells upon the problem background, the research question and the research purpose: why is this problematic topical? The specificity of this research paper is here highlighted, and a preview of the expected results is exposed in this section. The limits of the research are also mentioned in this part, what is not achievable and why. The choices of compromises are explained.

- **Theoretical framework**
  The theoretical framework exposes grand theories that lead and serve as basis to our thesis. The main keywords and major key concepts are highlighted and explained so that the topic would be accessible to a broader audience. The key concepts might not be all re-used in the analysis, yet they might be required for the general understanding of the problematic.

- **Method**
  The methodology part is a focus on the research methodology that is leading this thesis: how is the research conducted? What are the objectives of the thesis? This methodology part, relatively large, is important as it has to demonstrate that this research paper is reliable, replicable and valid. This section is composed of three subdivisions: the scientific approach, the practical methods, and the data collection and processing.

- **Results and analysis**
  Throughout the event window methodology, the theories expressed in the theoretical framework are tested and analyzed with empirical findings. The data collection and the interpretation of information gathered throughout analysis are categorized in results and analysis. We have divided our findings in positive news and negative news, growth stocks and value stocks to be more accurate in our conclusions.

- **Conclusion**
  In this chapter, the findings are summarized on the first part of the conclusion. The results will provide an answer for the research question: How does stock return behave prior to good and bad earnings announcements? The second part of the paragraph is dedicated to further researches that can complement this research paper.
2. Theoretical framework

The theoretical framework exposes grand theories that lead and serve as basis to our thesis. The main keywords and major key concepts are highlighted and explained so that the topic would be accessible to a broader audience. The key concepts might not be all re-used in the analysis, yet they might be required for the general understanding of the problematic.
2.1 Efficient market hypothesis

According to the Efficient Market Hypothesis, a security’s market price reflects the true price of the security as the security market price reflects all available value-relevant information. So rational investors can determine the expected future cash flows of the security, its riskiness, the appropriate discount rate to apply to the security’s expected cash flows (EMH; Fama, 1970, 1991). In spite of the EMH, Fama distinguish three different degrees of efficiency in the market:

1. The weak-form efficiency, the security’s price reflects its historical prices, which means that future prices cannot be predicted by analyzing prices from the past.
2. The semi strong-form efficiency, the security’s price reflects all publicly available information, so no excess return can be earned by trading on this information. But profit can be made via not publicly available information.
3. The strong-form efficiency, the security’s price reflects all information, this is the case where the abnormal returns equal zero.

Three different degrees of market efficiency because, according to Eugene Fama’s article on the Journal of Finance publish in 1977, several factors can modify the market’s efficiency, among which we can count: the characteristics of the security and the issuer, the characteristics of the market in which the security trades, and the efficiency of technology available to analysts to gather and process information (Ogden et al., 2003, pp. 271-273).

2.1.1 Efficient change in prices when there is new information

If the market is perfectly efficient, the abnormal returns equal zero, except when investors learn new information.

Figure 2 Efficient adjustment to new information (Bradfield, 2007, p. 267)
In Figure 2, James Bradfield (2007) gives the following example of ES&D Railroad, a fictional firm. The rate of return is on the vertical axis, time is on the horizontal axis. In this example, the earning per share increases at time 0. Since the market is perfectly efficient, only at time 0 the rate of returns will equal 0.22. After the announcement of the new information, the price is perfectly adjusted. Thus at time 1, no more adjustment is required. An investor that invests at time zero would not benefit from the price variation as the stock price is immediately at its optimal level. The residual returns equal zero until the next new information is being disclosed. “In an informationally efficient market, there is no opportunity to obtain an excess rate of return by watching the pattern of the residual” (Bradfield, 2007, p. 268). If the security is purchased before event time 0, if an investor anticipated that a positive residual will occur at time zero, he will earn more than his opportunity costs. But in a perfectly efficient market, all information is transparent. The investor knows it, all investors know it.

2.1.2 Inefficient changes in prices when there is new information

If the information is not perfect, it implies delay in change of stock prices. If there is a delay, adjustments are to be done, and investors can benefit from it.

![Figure 3](image-url)

**Figure 3** Delayed adjustment to new information, (a) behavior of the price, (b) behavior of the residual (Bradfield, 2007, p. 269)

In Figure 3-a, we can observe that the stock price takes three periods to reach its optimum. In Figure 3-b, we observe the residuals that correspond to the adjustments of the price.

Along with delays, in an imperfect market, there is also the problem of overreaction, which translates in a bad adjustment of the stock price.
Figure 4 Overadjustment, followed by a delayed correction (a) behavior of the price, (b) behavior of the residual (Bradfield, 2007, P. 270)

In Figure 4, we observe an overreaction of the market, which requires correction. In the two cases, delayed adjustments or overadjustments, the stock price volatility gives space for speculations.

2.2 Perfect competition

In the real world, the EMH does not always apply. The Enron case, financial crises are examples that prove it. By going through journals, we can find numerous articles that explain the existence of abnormal returns. An ideal capital market is defined by five assumptions:

- **Zero transaction costs.** Firms face no transaction costs (taxes, costs)
- **Homogeneous expectations**, value-relevant information is available at no cost to everyone, and all participants are rational.
- **Infinite buyers and sellers**, a firm cannot influence the market price of a security.
- **Transparency**, perfect information.
- **Firm’s financing is fixed**, once chosen, the firm’s capital structure is fixed (Ogden et al., 2003, pp. 30-31).

Perfect competition is described as an idyllic and completely hypothetical world. The five assumptions are never fully established, and lots of researchers have tried to deconstruct one by one the hypothesis without generating too much complexity. Although they focused on improving the drawbacks of perfect competitions, some principles of the perfect competitions are clear advantages:

- Perfect competition provide an efficient production (no wastes)
- The prices are at their lowest rate, a lower price would be not viable for a firm
• No commercial policies are required as the expectations are homogeneous.

2.3 Market abuse

“Market abuse is a general term to describe actions by investors that unfairly take advantage of other investors […] Stock market has to be fair, and must be seen fair, and there by encourage investments” (Barnes, 2009, p.9).

A morally wrong action is when there is a winner and a loser (Barnes, 2009). An investor who has inside information can generate profit either by selling or buying before the release of the new information depending on whether the new is good or bad. An action is morally wrong when two rational investors act differently because they do not possess the same amount of information.

Figure 5 Insider dealing prior to a rise in a share price arising from the announcement of good news (Barnes, 2009, p.10).

To explain Figure 5, Barnes gives the following example. If investor B has inside information, and knows when the information will be made public, and when the stock price is will increase. Thus, investor B buys shares before the announcement. Investor A, on the other hand, decides to sell because he does not have inside information. Investor A would make a profit while investor B would make a loss. If both had the information of B, investor A would not have sold to be at that price.
Figure 6 Insider dealing prior to a fall in a share price arising from the announcement of bad news (Barnes, 2009, p.10).

It is a reversed process for bad news disclosure. Regarding Figure 6, Barnes takes the following example. If investor B knows that the price is going to drop after the disclosure, investor B would sell short (sell now and buy later).

Figure 7 Pump and dump or share ramping (Barnes, 2009, p.13).

In the stock market, it is not so important if information is true or not. What counts is if individuals believe the information. If information is false, the market would realize it with time and correct its action. The share price would revert to what it was originally. If it is true, the price would not fall back. This is what is illustrated in Figure 7. An investor may be tempted to influence the price by inflating the share price, it is known as “share ramping” or “pump and dump” in the US. This is when an individual broadcast new information (true or not) that will affect the share price throughout emailing, notice board, chat room. Nevertheless, it is worth mentioning that is rare that an individual itself manage to influence the stock price as it usually lacks credibility.
Figure 8 Trash and cash (Barnes, 2009, p.13).

Figure 8 shows the contrary, when an investor tries to benefit from the bad news (called “trash and cash”). It is the inverse of dump and pump, where the objective is to influence downward the price. When the price is low, the investor buys the share, and when the market realizes that the stock price was misadjusted, the market would equilibrate itself. It is at this moment that our investor, profiting from the regain in price of the stock, would sell its shares.

2.4 Capital Asset Pricing Model

The asset pricing model supplies the technology to calculate required returns, also known as the cost of capital. The required returned is equal to the risk-free return plus the risk premium. It is meant to compensate the risk an investor undergoes to make his investment.

\[ R_i = R_f + (\beta_i \times Market \ risk \ premium) \]

Where

\( R_i = \text{required return of stock } i \)

\( R_f = \text{risk free rate} \)

2.4.1 Historical beta

We are talking about the CAPM because in order to calculate the return, we need to calculate the beta, which is a controversial technology. The beta is the expected sensitivity of a return to the return on the market:
In our research, we decided to take the historical beta, that is to say calculated after the fact, as we do not forecast but look backward and study what happened.

Historical betas are estimated from stock returns by running a regression for returns over past periods:

\[
R_i = \alpha + \beta_i \ast \text{return on the market} + e_i
\]

Where

\[
\alpha + e_i = \text{residual return}
\]

The residual return is not explained by movements in the market. The firm’s beta here is the sensitivity of its return to movements in the market.

As Penman states it “no one knows the true beta and inevitably betas are measured with error. Cisco system evaluates the market premium at 5% with estimates range from 3% to 9.2%” (Penman, 2010, p. 112). The level of uncertainty makes the beta technology unreliable. In spite of the efforts, it is still difficult to evaluate the cost of capital for most firms.

### 2.4.2 Fundamental beta

The historical betas can be adjusted as follows:

\[
\text{adjusted historical } \beta_i = 0.35 + 0.65 \ast \text{Historical } \beta_i
\]

“This adjustment pulls the historical beta toward 1.0, the average beta for all firms. Another way to proceed is to predict future betas from fundamentals. If betas reflect firm’s characteristics, then they can be predicted from those characteristics.” (Penman, 2010, p. 678).

The predictive beta is built in two steps. First one, we draw a relationship between historical betas and past fundamentals.

\[
\text{Historical } \beta_i = b_0 + b_1 FLEV(i) + b_2 OLEV(i) + \mu(i)
\]

Where

\[
FLEV = \text{financial leverage}
\]
OLEV = operating leverage

$b_0, b_1, b_2$ are used to predict future betas from the most recent fundamentals:

\[
\text{Predicted } \beta_i = b_0 + b_1 \text{FLEV}(i) + b_2 \text{OLEV}(i)
\]

This way of calculating the beta by understanding the fundamental determinants assess the risk with a better quality. However, even though it is more notify, it is important to emphasize on the fact that this method is still not precise enough to calculate the cost of capital.

### 2.5 Valuation of shares

There are three main ways to value shares:

1. Price-earning ratio, commonly used by merchant banks when advising companies (Barnes, 2009, p.26).
2. Discount present value, more accurate but also more theoretical
3. Estimate the net asset value per share, not appropriate in most situations (Barnes, 2009, p.26).

The value and price of share should be based on three main factors (Barnes, 2009, p.26):

1. Its future returns
2. Its dividends per share
3. Sales value and the certainty of these

#### 2.5.1 The price-earnings approach

The price-earning ratio’s variables are difficult to forecast. Throughout this calculation, the investor wants to estimate future returns from the data he has in hand. A company’s price-earnings ratio provides the investor an indication of how the market rates the company. A high price-earnings ratio can mean that the company is overvalued. The higher the price-earning ration, the more the investor is ready to pay for the company’s earnings (growth stock). The market has high expectation of the company in term of profits. A low price-earnings ratio indicates that the company is undervalued. There is no good or bad price-earnings ratios because they depend on the riskiness of the industry. All things equal, a riskier company would be a company with a lower price-earnings ratio (Barnes, 2009, p.26).

#### 2.5.2 The present-value approach
The present-value approach is calculating the present value of the future income. The dividend the investor is getting in period n has to be updated with the rate of return of the share. Yet several elements made this equation unrealistic, but correctible (Barnes, 2009, p.30):

- Dividend stream is not constant
- Growth rate is not constant
- How can the rate of return be estimated
- How accurate is the risk-free indicator

To begin with, we calculate the present value of the future income:

$$V_0 = \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \ldots + \frac{D_n}{(1+r)^n}$$

Where

- $V_0 = \text{intrinsic value of the share at time 0}$
- $D_i = \text{dividend}$
- $r = \text{rate of return of the share}$
- $n = \text{time period}$

In this model, the income stream continues to infinity. The first error we can notice in this equation is the constant dividend. It is not the case in real. Gordon growth model (Gordon, 1962) makes that equation more accurate by making the dividend function of the growth rate:

$$P_0 = \frac{D_0(1+g)}{1+r} + \frac{D_0(1+g)^2}{(1+r)^2} + \frac{D_0(1+g)^3}{(1+r)^3} + \ldots + \frac{D_0(1+g)^n}{(1+r)^n}$$

Yet, in Gordon growth model, it is assumed that the growth rate is constant, and this equation can be adjusted as presented below:

$$P_0 = \frac{D_0(1+g_1)}{1+r} + \frac{D_0(1+g_1)^2}{(1+r)^2} + \ldots + \frac{D_0(1+g_1)^n}{(1+r)^n} + \left[ \frac{1}{1+g_2} + \frac{D_{n+1}(1+g_1)}{r-g_2} \right]$$

The first part of the equation $P_0$ is the present value of dividends during initial growth period ($g_1$). The part in the brackets is the present value of stock relating to second growth period ($g_2$).
The rate of return depends on the interest rate and the riskiness of the investment. The rate of return can be estimated with the variance and the standard deviation as measure of dispersion. The risk-free rate is also problematic but it is possible to get a reasonable risk-free rate by examining the government securities (Barnes, 2009, pp.30-34).

2.5.3 Net asset per share method

The net asset per share method consists in calculating the realizable value of the company’s net assets and dividing that total by the number of shares. This method is usually not appropriate because it assumes that a company that is going through a difficult situation still plans to keep trading, and because it undervalues the company’s worth if its assets are valued at their disposal value (Barnes, 2009, p.38).

2.6 Volatility

It is probably impossible to seize all aspects of a financial market. Yet, in order to profitably trade options, it is necessary to know, or at least, understand how to valuate models. Depending on the situation, there are a lot of methods and techniques to approach option measuring and option forecasting in a more or less precise manner. The basics will be presented in this section.

The volatility is a statistical measure of the dispersion of returns. It is equal to the square root of the variance (Sinclair, 2008, pp.15-16):

\[ S^2 = \frac{1}{N} \sum_{i=1}^{N} (x_i - \bar{x})^2 \]

Where

\( x_i = \text{logarithmic return} \)

\( \bar{x} = \text{mean return in the sample} \)

\( N = \text{sample size} \)

To trade volatility, it is required not only to estimate a point of future volatility, but also to know the whole possible range of volatilities. Afterwards, it is relevant to consider completing the analysis with fundamental analysis (i.e. what are we hoping will not happen if we are short? What catalyst will appear to cause the volatility to rise?) A trader looks at numbers of different estimators but also has to reckon their strengths and deficiencies, and determine where each should best be applied (Sinclair, 2008, pp.15-16).
Forecasting volatility is another challenge. Before getting into the mathematical part, one should wonder how the volatility behaves. For example, Figure 9. It is remarkable that

- There are more large moves up than down
- The volatility fluctuates around the mean.

![Figure 9 S&P Volatility (together with average value) (Sinclair, 2008, p.32)](image)

The simplest forecasting method is to assume that what happened N days before will repeat N days after. This forecasting method is called the moving window method. The major issue with this forecasting method is that it does not take into account sudden changes. Mathematically, the moving window method can be written as follow:

\[ \sigma_t^2 = \lambda \sigma_{t-1}^2 + (1 - \lambda) r^2 \]

Where

\( \lambda \) is a parameter between zero and one

“A lower value of \( \lambda \) means less emphasis is placed on the more distant past and more on the most recent observation. Generally values between 0.9 and 0.99 are used” (Sinclair, 2008, p.33).

2.6.1 Time-varying volatility

Volatility is associated with the variance of the rate of return of a stock. “As a casual survey of the media would indicate, the rate of arrival of new information is time varying, and new information may lead investors to revise their assessment to intrinsic value. Consequently, we should expect the variances of the rates of return on stocks (as well as the covariances among them) to be time varying.” (Bodie et al., 2009, p. 433).
Figure 10 shows how important it is to consider time variation in stock variance. When talking about time-varying return distribution, we refer to the conditional mean, variances, and covariance. Condition because they are the conditions that vary over time. Robert F. Engle (1982) measured inflation throughout a model call the autoregressive conditional heteroskedasticity (ARCH). This model is based on a method to update a variance forecast. Basically, he averaged the variance forecast with the most recent squared deviation of the rate of return from its mean. “The most widely used model to estimate the conditional variance of stocks and stock-index returns is the generalized autoregressive conditional heteroskedasticity model (GARCH). GARCH model uses rate-of-return history as the information set used to form the estimates of variance. This model posits that the forecast of market volatility evolves relatively smoothly each period in response to new observations on market returns” (Bodie et al., 2009, p. 433). The GARCH model is

\[ \sigma_t^2 = \gamma V + \alpha r_{t-1}^2 + \beta \sigma_{t-1}^2 \]

Where

\( \sigma_{t-1}^2 \) is the more recent variance forecast
\( r_{t-1}^2 \) is the most recent squared prediction error in market return
\( \gamma, \alpha, \) and \( \beta \) are parameters estimated from past data

“ARCH-type models capture much of the variation in stock market volatility as depicted on Figure 11. Figure 11 compares volatility estimates from an ARCH model to volatility
estimates derived from prices on market-index options, called implied volatility” (Bodie et al., 2009, p. 434)

Figure 11 Implied versus estimated volatility, from S&P 100 index (Bodie et al., 2009)

2.6.2 Implied volatility

The implied volatility is the estimated volatility of a security's price. “In general, implied volatility increases when the market is bearish and decreases when the market is bullish. This is due to the common belief that bearish markets are more risky than bullish markets” (investopedia.com)

Sinclair (2008) stresses on the fact that implied volatility is hard to define in terms of characteristics because there are a number of implied volatilities; put/call pair has its own volatility.

Figure 12 Implied volatility surface for QQQQ on 1st august 2007 (Sinclair, 2008, p.46)
**Figure 12** is a typical volatility surface for a set of index options, the NASDAQ-100 Trust Series 1 exchange-traded fund (QQQQ). Traders are interested in the changes in shapes, and not only the shapes themselves. A way to determine the importance of different types of movement is principal component analysis (PCA). “This is a mathematical technique used to reduce the dimensionality of data sets” (Sinclair, 2008, p.45). Alexander (2001) showed that a parallel shift of the implied volatility smile accounted for between 65 and 80 percent of the total variation of volatility. The dynamics of the overall level of volatility and the slope of the curve are the two most important elements to remember. The level of implied volatility is indeed the dominant risk factor since it is economically more significant, no matter how appealing the dynamic of the smile looks like.

By comparing volatility realized forecast to the implied volatility swap (via a structure of weighted average of a continuum of option prices), it is remarkable that (Sinclair, 2008, p. 47):

- The number of available strikes is usually very limited
- The bid/ask spread in the options that needs to be crossed makes construction of the swap very expensive
- When the exercise price and the asset price are equal, volatility movement dominates the movement of the implied volatility surface
- Visual inspection of the payoff structure of a straddle position should very clearly show that this position is dependent on the absolute movement of the underlying.

When the exercise price and the asset price are equal, it is possible to distinguish clear regularities in the evolution of implied volatilities. On **Figure 13**, the announcement date is the 25<sup>th</sup> of April 2007. The implied volatility rises before the announcement then drops one the news is publicly released.

![Graph](image)

**Figure 13** Front-month volatility for apple around Q2 2007 (Sinclair, 2008, p. 52)
There are here two trading opportunities: First situation, buy the implied volatility before it starts rising (remembering that the option price will probably not rise). Second situation, sell the implied volatility shortly before the announcement, then buy them back when the implied volatility is low.

Relating to the smile dynamic, although it is not a factor as significant as the level of volatility, academic studies showed that “smile effects are profitably tradable if transaction costs are sufficiently small” (Sinclair, 2008, p. 54). Smiles exist for several reasons (Sinclair, 2008, p. 54):

- In many products the typical end user is long and will naturally buy downside protection
- In equity products, longs may have a propensity to sell calls against their long stock positions
- If customers are long puts and short calls, then the market makers will be short puts and long calls
- In equity indexes the skew will be more pronounced than in the individual stocks that make up the index
- The actual underlying returns are not normally distributed

Black-Scholes option pricing model has been subjected to huge amount of empirical tests. Most of the time, the findings “confirm the model and assert that Black-Scholes model generates option values fairly close to the actual prices at which option trade” (Bodie et al., 2009, p. 747). Nevertheless, empirical failures also exist. Rubinstein (1994) insisted on an important problem of Black-Scholes’ model: if the model were accurate, the implied volatility of all options on a particular stock with the same expiration date would be equal.
In practice, as Figure 14 depicts it, the implied volatility falls as the exercise price rises. To Rubinstein, this situation can be explained by the fear of a market crash like the one of October 1987. Rubinstein indeed pointed out that before 1987, the curve was relatively flat.

While realized volatility measure the underlying’s variability, the implied volatility gives the market price of the options. The spread between the two volatilities is the point to focus on. However, implied volatility is hard to quantify and hard to forecast, it move more slowly than realized volatilities but have a term and strike structure that have to be taken into account (Sinclair, 2008, p. 62).
3. Methods

The methodology part is a focus on the research methodology that is leading this thesis: how is the research conducted? What are the objectives of the thesis? This methodology part, relatively large, is important as it has to demonstrate that this research paper is reliable, replicable and valid. This section is composed of three subdivisions: the scientific approach, the practical methods, and the data collection and processing.
3.1 Literature search

The integrality of the research has been done thanks to the materials put at disposition by Umea University. Books and journals were the two main supports used. Books were used to organize the major ideas, and define the contours. They served to frame and structure the skeleton of the thesis. Manuals provided the first overview of the research purpose: what has been done, what is to be done, what is known, what is unknown. Beyond the classical manual books, journals were broadly used because the information provided by this support was more topical and academically accepted. The databases employed were the following ones:

- *Academy Search Elite*, a database of scholarly information
- *Business Source Premier*, which provides journals but also peer-reviewed articles
- *EconLite*: with 1.1 million articles from 1886-present on economic literatures
- *Social Science Research Network*, an electronic paper collection downloadable in pdf format

The main key words used included the following list:

*Financial disclosure, pre-announcements, earnings announcements, abnormal return, earning forecasts, financial analysts, forecast dispersion, forecast error, forward-looking information, voluntary disclosure, price-sensitive disclosure, earnings performance, disclosure credibility, content analysis, earnings announcement delay, earnings surprises, implied volatility, asymmetric information*

3.2 Scientific approach

This paper has a deductivist approach, where the objective is not to build a theory but to test a theory by using a quantitative research strategy. This thesis has epistemological and ontological considerations. From an epistemological standpoint, it counts among the positivist and interpretivist trends. From an ontological view, this paper is functionalist. Efforts have been made into making this paper reliable, replicable, and valid.

3.2.1 Epistemological consideration

Epistemology sheds the light on the knowledge in hand of scientists. Is today’s knowledge acceptable or enough? Is it required to go into deeper research? Does the topic need constant review over time or is it reckoned timeless? Is the information verifiable on practice? Epistemology can be split into three different categories. The first one is positivism, which according to Bryman and Bell (2007) answers five major principles:
1. The principle of phenomenalism: knowledge confirmed by the senses are considered as acceptable knowledge
2. The principle of deductivism: hypothesis can be tested with data
3. The principle of inductivism: the gathering of data can constitute a form of knowledge
4. A research should be (and can be) objective
5. In opposition to normative statements, scientific statements are the true domain of scientists

Then there is realism, itself composed of two major forms. The first one is called empirical realism, which means that through appropriate methods, it is possible to understand reality. The second one is critical realism: by understanding the world, its actors change it, and the scientist’s conceptualization is a way of knowing that reality.

Interpretivism is an “intellectual heritage that incorporates the Weberian notion of Verstehen, the hermeneutic-phenomenological tradition, and the symbolic interactionism” (Bryman & Bell, 2007, p. 15). To make it simple, Weber described sociology as a science that interprets social actions to explain their effect. Hermeneutics is the theory and method of interpreting human action. And symbolic interactionism is a concept stating that “an individual is continually interpreting the symbolic meaning of his or her environment and acts on the basis of this imputed meaning” (Bryman & Bell, 2007, p. 19).

Interpretation plays an important role in this research. The data are gathered, and then theorized. The data are studied isolated of all of its variables. The observation part has its relevance because this thesis employs stronger and more general theories, and applies them to a specific stock market called OMX Nordic 40. That is why there is an observation step where data are being compared.

While positivism focuses on the explanation and the understanding of a behavior, interpretivism dwells upon the forces that influence an act. This thesis answers the characteristic of positivism because of its deductive approach, and also because it answers the criteria of functionalism: the dominant approach of a rational approach to organization between regulation and objectivism. The realism principles on the other hand are not respected here since the inductive approach is not used here.

### 3.2.2 Ontological consideration

Ontology is the nature of social entities: are these social entities considered objective and “have a reality external to social actors or are they just social constructions built up from perceptions and actions of social actors” (Bryman & Bell, 2007, p. 20)?
Bryman and Bell (2007) underline two concepts. The first one is objectivism and the second one is constructionism. Objectivism can be perceived as a social phenomena where and actors are independent from its environment. Objectivism is a reality that exists independently from its entities; the actors are in contact with this reality throughout the perception of their senses. It allows them to create concept from an inductive or deductive approach.

Constructionists on the other hand reckon that the phenomenon produced through social interaction requires constant revisions. It encompasses social interactions or chains of real causalities leading to the presence or the existence of a fact or entity (Hacking, 2001, p. 74).

This research is objectivist. To illustrate it, investors and stock markets are independent entities. Investors have roles and follow rules set by the market. These rules are not being tested, they are taken as granted. This study is trying to understand the positions of investors around earnings announcements.

3.2.3 Theory and research

By linking theory and research, two questions arise. First, the form of theory; second, the reasons of data collection: is the data collected to test or to build a theory?

What form of theory? Bryman and Bell (2007) differentiate three kinds of theories. The grand theories, they tell how researches have to be lead. The middle-range theories that focus on empirical enquiry. Naïve empiricism, it assumes that “facts” is a legitimate goal in its own right. (Bryman & Bell, 2007, p. 10). The latter is rather close to this research: collecting data then observe. Bryman and Bell reckons that this “fact-finding exercise” is problematic as theory might not arise “like steam from a kettle” (Bryman & Bell, 2007, p. 10). However, in this thesis theories are not built but tested, which leads the debate to the second point: data collection to build or to test a theory?

To answer this question, two approaches are to be taken into consideration: deductive and inductive theory. The deductive theory constitutes the theory testing. Fair enough, its process is usually as follow: (1) theory, (2) hypothesis, (3) data collection, (4) findings, (5) hypothesis confirmed or rejected, and (6) revision of theory. This method starts from general understandings to specific knowledge.

An inductive approach is the reverse process where data is collected in order to build up a theory. The researcher’s mission is to infer the implications of the findings for the theory that prompted the research. Its process is the following: (1) compare theories, (2) gather information, (3) ask questions, (4) develop theory, (5) look for patterns, (6) form categories, and (7) new theory developed. Our research is having a deductive approach as we are testing a theory on a specific environment.
We decided to choose a deductive approach as we are two students with different majors. Gathering general data allows us to build a common ground understandable by both of us.

### 3.2.4 Research strategy

The research strategy, considering our research topic and considering the research methodology mentioned earlier (epistemology and ontology considerations), is a quantitative research strategy. A quantitative research strategy is indeed more suitable because the objectives are to observe first and then draw conclusions. This thesis emphasizes on the relationship between theory and research, and the accent is placed on theory testing, thus this is a positivist approach, where the social reality is perceived as an objective reality. The qualitative strategy in contrast focuses on an inductive approach, where the main mission is to generate theory. It rejects the positivists’ model and considers the social reality as a constantly changing property of individual creation.

### 3.2.5 Reliability and validity

Reliability, replication, and validity are often regarded as important criteria to assess a business and management research (Bryman & Bell, 2007, p.41).

First and foremost, a reliable research paper is a research which results are repeatable. By adapting reliability criteria to a quantitative research, three families of reliability can be distinguished: (1) stability: a measure is stable over time or does it fluctuate. (2) Internal reliability, are the indicators that constitute the index consistent. (3) Inter-observer consistency, it applies when a great deal of subjective judgment is involved, more than on ‘observer’ is involved in such activities, there might be a lack of consistency in the decisions. Replication is the fact that the procedure used in this thesis is repeatable, replicable by someone else. To end up, validity questions if the indicator used does measure the concept. There are five branches of validity: (1) Face validity, the measure reflects the content of the concept in question (Bryman & Bell, 2007, p.160). (2) Concurrent validity, using a concurrent measure instead of using a contemporary one. (3) Predictive validity, the researcher uses a future criterion measure rather than a contemporary one. (4) Construct validity, researcher is encouraged to deduce hypotheses from a theory that is relevant to the concept. (5) Convergent validity, the measure’s validity should be assessed by comparing it to measures of the same concept developed through other methods.

This research paper is reliable and replicable. The measures used here are accepted by peers, and thus replicable. In terms of validity, this thesis does not answer all its criterions but most of them are indeed respected.
3.3 Practical method

3.3.1 Data collection and processing

The historic stock price is extracted from the DataStream of Thomson Reuters and company's’ website. To archive the impact of earnings announcement on stock behavior, quarterly announced earning for the fiscal years 2010 to 2012 were taken from a sample frame of current constituents of the OMX Nordic 40 index. The reason for selecting the OMX Nordic 40 index is that it is a market capitalization weighted stock index mapping 40 of the largest and the most liquid stocks on the virtual OMX Nordic Exchange, which come from the four stock markets operated by the OMX group in Nordic countries. Despite having only 40 companies in this index, we choose quarterly announced earning data from the latest 2 years to make our analyze more generalizable.

Most interday transaction data is extracted from the DataStream of Thomson Reuters, the rest is found on the company's’ website. For accounting data, we use I/B/E/S database from DataStream, the mean of the forecast interim earning per share (EPS) as well as actual EPS are provided. P/B ratio is obtained from Bloomberg website, it contains most recent quarterly P/B ratio, out of Bloomberg website, and we gather this information on the company’s annual report which published on their website. For the exact quarterly earnings announcement day, we found it in the company’s annual report as well as interim report for the fiscal years 2010 to 2012.

Among the 40 companies listed in the OMX Nordic 40 index, two companies, Investor AB and A.P. Moller – Maersk, are excluded from our total sample due to lack of forecasts and actual EPS information in DataStream. Since we are unable to find forecast data in I/B/E/S database for these 2 companies, we decided to leave these out instead of use other database, i.e. public disclosure.

3.3.2 Event study methodology

An event study measures the impact of an announcement on a firm’s stock price by its standard means. This method is suitable for the current research because we gauge the impact of good or bad news on stock prices.

Step 1: Adjusting for the contemporaneous return on the market portfolio

We have to “adjust the event-period raw return on a focal firm’s stock for contemporaneous returns on the stock market, yielding the stock’s event-period abnormal return” (Ogden et al., 2003). The adjustment eliminates the portion of the stock’s return that is due to the effects of contemporaneous information that affected the entire stock market:
\[ R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \]

Where \( R_{i,t} \) and \( R_{m,t} \) are the day \( t \) returns on stock \( i \) and the market portfolio, respectively. \( \alpha_i \) and \( \beta_i \) are the intercept and slope coefficients of the regression for stock \( i \), respectively, and \( \varepsilon_{i,t} \) is the regression residual. The intercept of the regression \( (\alpha_i) \) captures the average return on stock \( i \) given that the market return is zero. The term \( \beta_i R_{m,t} \) captures the sensitivity of returns on stock \( i \) to contemporaneous market returns. The regression residual captures the deviations of the return on stock \( i \) on day \( t \) from its normal relationship to the market, and is therefore called stock \( i \)’s abnormal return on day \( t \):

\[ \varepsilon_{i,t} = R_{i,t} - (\hat{\alpha}_t + \hat{\beta}_t R_{m,t}) \]

**Step 2: Washing out the effects of other information released simultaneously**

This step is to isolate the valuation effect of the focal event more precisely. This can be done by collecting a sample of firms, all of which have made a similar type of announcement (though on different calendar dates, calculating the event-day abnormal return on each firm’s stock, and calculating the average:

\[ \bar{\varepsilon}_t = \frac{1}{N} \sum_{i=1}^{N} \varepsilon_{i,t} \]

\( N \) is the number of events in the sample. Researchers usually use an event-period window of two days to calculate abnormal returns, the announcement day and the following trading day. This is done like this because many announcements are made after the close of trading on the following trading day. So we have:

\[ \varepsilon_{i,(t,t+1)} = R_{i,(t,t+1)} - (2\hat{\alpha}_t + \hat{\beta}_t R_{m,(t,t+1)}) \]

\[ \bar{\varepsilon}_{(t,t+1)} = \frac{1}{N} \sum_{i=1}^{N} \varepsilon_{i,(t,t+1)} \]

\( \bar{\varepsilon}_{(t,t+1)} \) is the average two-day abnormal return across a sample of firms.

The event study methodology was conducted in this thesis to examine the impact of earnings announcement on stock return. This methodology is a standard approach established by Fama et al. (1969), which has been widely used in variety of researches for gauging the effect of new information on the market value of a security. According to semi-strong form of EMH, price should be observed immediately on the announcement day.
The first attempt to evaluate a stock reaction is to identify an event day. Each quarterly earnings announcement day from 2010 to 2012 is taken as a sample. A 17-day window, which consists of 8 days before the announcement day and 8 days after the announcement day, is determined as the event window to estimate the volatility of stock. Then the normal return and abnormal return are required. In the present study the equilibrium model is used to calculate the normal stock return, and the abnormal return is calculated by market model, which is commonly used in the event studies in present research, the market model can be expressed as:

\[ AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t}) \]

Where \( AR_{i,t} \) is the abnormal return for company i, \( R_{i,t} \) is the return on security i on day t, \( R_{m,t} \) is the return on market index m on day t, \( \alpha_i \) is market model constant, \( \beta_i \) is a parameter that measures the sensitivity of \( R_{i,t} \) to the benchmark market index.

In this thesis we assume that \( \alpha_i = 0 \) and \( \beta_i = 1 \), therefore the above equation is simplified as (Strong, 1992):

\[ AR_{i,t} = R_{i,t} - R_{m,t} \]

**Average Abnormal Return**

An average of abnormal return across N firms on day t.

\[ AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{i,t} \]

**Cumulative Abnormal Return**

Cumulative sum of stock abnormal returns over the window \((T_1, T_2)\)

\[ CAR_i(T_1, T_2) = \sum_{t=T_1}^{T_2} AR_{i,t} \]

**Test for Statistical Significance**

The test statistics are calculated using parametric sign test.
Statistical test for average abnormal return ($AAR_t$)

$$H_0: AAR_t = 0, H_1: AAR_t \neq 0$$

$$T(AAR) = \frac{AAR_t}{S(AAR_t)/\sqrt{N}}$$

Statistical test for average abnormal return ($CAAR_i$)

$$H_0: CAAR(T_1, T_2) = 0, H_1: CAAR(T_1, T_2) \neq 0$$

$$T(CAAR) = \frac{CAAR_t}{S(CAAR_t)/\sqrt{N}}$$

**Determination of good and bad news**

In order to study the impact of stock price on earning disclosures with different information contents, it is necessary to divide the total sample into good news and bad news. There are three methods commonly used (Benos & Rockinger, 2000). The first method is to use the sign of actual EPS to determine good news and bad news. With this method, positive earning per share will be qualified as good news and negative earning will be qualified as bad news. The second method is to use the increase of current earnings to those from a year ago, where positive (negative) EPS changes are labeled good (bad) news. Third, a relevant measure is the analyst’s forecast error, which equals the reported EPS minus the analysts’ consensus forecast of that year’s EPS, good (bad) news occur when analysts’ expectations are (not) met. We construct the third measure and based on earning surprise to sorted companies into three categories: the positive surprise (good news), no surprise and the negative surprise (bad news).
4. Result and analysis

The data samples are divided into three subsamples aimed at examining the different characteristics of stock price behavior around the event day. In Section 4.1, the study of abnormal return during event window is performed. The main purpose is to study whether there is an evidence of abnormal return in event window. Theoretically speaking, if there is no sign of abnormal return, it could mean that company’s disclosure may have been revealed by financial analysts to the public and the market has already absorbed this information. In Section 4.2, the cumulative abnormal return during event window is analyzed. In Section 4.3 we investigate stock price behavior from different companies, we split the 40 Nordic country’s companies into 2 groups: value firms and growth firms. In each group abnormal return and cumulative abnormal return are evaluated by using parametric tests. By comparing abnormal return and cumulative abnormal return, we can distinguish the differences between value firms and growth firms in terms of reaction to similar information (positive surprise, negative surprise).
4.1. Abnormal returns

The abnormal return is collected within a ± 8 day time window. The abnormal return for each day during the event window is obtained by using market model from daily stock price return and market return. The market return used for model is from the OMX Nordic 40 index, then we obtain the average abnormal return by aggregated the abnormal return.

**Table 3** Average abnormal return in an event window of 17 days

<table>
<thead>
<tr>
<th>Event window</th>
<th>Positive sample</th>
<th>Negative sample</th>
<th>No surprise sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AAR</td>
<td>$T_{AAR}$</td>
<td>AAR</td>
</tr>
<tr>
<td>-8</td>
<td>-0.00028</td>
<td>-0.30559</td>
<td>-0.00091</td>
</tr>
<tr>
<td>-7</td>
<td>0.00070</td>
<td>0.71516</td>
<td>0.00139</td>
</tr>
<tr>
<td>-6</td>
<td>-0.00012</td>
<td>-0.11700</td>
<td>-0.00077</td>
</tr>
<tr>
<td>-5</td>
<td>0.00020</td>
<td>0.19975</td>
<td>-0.00088</td>
</tr>
<tr>
<td>-4</td>
<td>0.00224</td>
<td>2.29195*</td>
<td>0.00115</td>
</tr>
<tr>
<td>-3</td>
<td>0.00179</td>
<td>1.82744</td>
<td>0.00004</td>
</tr>
<tr>
<td>-2</td>
<td>-0.00021</td>
<td>-0.21674</td>
<td>0.00086</td>
</tr>
<tr>
<td>-1</td>
<td>-0.00132</td>
<td>-1.16463</td>
<td>0.00022</td>
</tr>
<tr>
<td>AD</td>
<td>0.00069</td>
<td>0.23697</td>
<td>-0.00366</td>
</tr>
<tr>
<td>1</td>
<td>0.00097</td>
<td>0.66189</td>
<td>0.00198</td>
</tr>
<tr>
<td>2</td>
<td>0.00251</td>
<td>2.13757*</td>
<td>0.00179</td>
</tr>
<tr>
<td>3</td>
<td>-0.00066</td>
<td>-0.66810</td>
<td>-0.00057</td>
</tr>
<tr>
<td>4</td>
<td>-0.00094</td>
<td>-0.88422</td>
<td>0.00033</td>
</tr>
<tr>
<td>5</td>
<td>0.00030</td>
<td>0.31309</td>
<td>-0.00081</td>
</tr>
<tr>
<td>6</td>
<td>-0.00058</td>
<td>-0.58174</td>
<td>0.00010</td>
</tr>
<tr>
<td>7</td>
<td>0.00005</td>
<td>0.04841</td>
<td>-0.00036</td>
</tr>
<tr>
<td>8</td>
<td>0.00079</td>
<td>0.75719</td>
<td>0.00051</td>
</tr>
</tbody>
</table>
Note:* indicates significance at 5%; the positive sample size is 178, the negative sample size is 121, the no surprise sample size is 5; AD is earnings announcement day; \( T_{AAR} \) uses Statistical test for average abnormal return within event window.

**Table 3** shows the average abnormal return (AAR) and respective statistics during ±8 day time window around interim or annual earnings announcement day. Positive sample shows the result for the positive earnings surprise sample, negative sample shows the result for negative earnings surprise sample and no surprise sample shows the result for no earnings surprise.

When analyzing the results in **Table 3**, there is an AAR of 0.069% and -0.366% for the positive sample and negative sample respectively on the earnings announcement day. Indeed, the abnormal return of negative sample reached the absolute maximum value which provides the evidence that the negative sample have a stronger market reaction compared to the positive sample. In addition, it is obvious that abnormal return existed both at event day and within ±8 day time window for positive sample, negative sample and no surprise sample, which may indicate the evidence of information leakage prior to earnings announcement. It has been shown in Joshipura’s study (1999) that firms have to inform the stock exchange in advance on the agenda of the board meeting before the formal announcement of any events of change in capitalization. Consequently it may induces some speculative activities in the market and even triggers some insider activities (Joshipura, 1999). However, one interesting aspect of the stock price behavior should be noticed that when we tested with parametric sign test, only 2 out of 17 days in positive sample and no surprise sample showed statistically significant, whereas none of negative sample have shown statistically significant within event window. According to semi-strong form of efficient market hypothesis, any public information should reflect the stock price at announcement day only. We observed in **Table 3** that most AARs are statistically insignificant around event day, which is consistent with semi-strong form of efficient market hypothesis.

### 4.2. Cumulative abnormal returns

When it comes to cumulative abnormal return over different time periods during event window, we compare positive and negative sample. From **Table 4** we find that the cumulative average abnormal return (CAAR) of positive and negative sample is 0.369% and -0.254% during time -8 to time 0 periods respectively. Whereas CAAR for post-event period time 0 to time 8 is 0.313% and 0.0683% for positive and negative sample respectively. This results show that within pre-event periods both positive and negative sample may have stronger market reaction compare to post-event periods, which may also indicate the leakage of information. Moreover, in **Table 4**, we observe that for positive sample the absolute CAAR value of short-term window is smaller than that of long-term
window. Whereas for negative sample the absolute CAAR value of short-term window is bigger than that of long-term window. Hence, it can be concluded that the effect of positive earning surprise on stock price lasts longer than that of negative earnings surprise.

Table 4 Cumulative abnormal returns for different time periods within the event window

<table>
<thead>
<tr>
<th>Event window</th>
<th>Positive sample</th>
<th>Negative sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CAAR (%)</td>
<td>$T_{CAAR}$</td>
</tr>
<tr>
<td>(-8, 0)</td>
<td>0.3686</td>
<td>0.9542</td>
</tr>
<tr>
<td>(-1, 0)</td>
<td>-0.0628</td>
<td>-0.1943</td>
</tr>
<tr>
<td>(0, 1)</td>
<td>0.1662</td>
<td>0.5193</td>
</tr>
<tr>
<td>(0, 8)</td>
<td>0.3133</td>
<td>0.7778</td>
</tr>
<tr>
<td>(-1, 1)</td>
<td>0.0346</td>
<td>0.1000</td>
</tr>
<tr>
<td>(-2, 2)</td>
<td>0.2646</td>
<td>0.7168</td>
</tr>
<tr>
<td>(-8, 8)</td>
<td>0.6131</td>
<td>1.2694</td>
</tr>
</tbody>
</table>

Note: $T$ test shows there is no significant difference of CAAR in positive and negative sample; the positive sample size is 178, the negative sample size is 121, $T_{CAAR}$ uses Statistical test for average abnormal return within event window.

Then the market under and over reactions were examined in order to test the consequences of stock market on positive and negative sample. As shown in Figure 15 (response to new positive news) and Figure 16 (response to new negative news), according to the semi-strong form of efficient market hypothesis, if the movement of a stock price takes place before or after the event day, it indicates that there is an under/over reaction to the event. Over-reaction and under-reaction are the expression of market inefficiency, extra profit is provided by using information disclosure.
Figure 15 Reaction of Stock Price to New Positive Information

Figure 16 Reaction of Stock Price to New Negative Information

Figure 17 shows that the market reaction to the positive sample existed at $t_{-8}$ day. However, one interesting aspect is that AAR decreased from $t_{-4}$ to $t_{-1}$ before event day. Previous study has shown that insiders may manipulate the timing of good news and bad news for their interest (Shenoy & Chauvin, 2000). We also observe that at event day $t_0$ the stock price keeps trending up and remains for 2 days, CAAR also reached the maximum
value at $t_{z+2}$ for positive sample. This is a typical phenomenon of under-reaction (Figure 15), it indicates that market absorb this positive news for a long time.

**Figure 17** Abnormal returns and cumulative abnormal returns for positive sample

It is showed in Figure 18 that the negative AAR value reached its minimum at the event day and trended up dramatically. The CAAR of negative sample also increases steeply from negative value to positive value on event day. This is considered to be the typical phenomenon of over-reaction (Figure 16), indicating that market makes an over-reaction to compensate the negative news and rebalance during the post-event window.

**Figure 18** Abnormal returns and cumulative abnormal returns for negative sample
Figure 19 describes the trend of stock reaction for no surprise sample, the stock trend is similar with negative sample, the absolute value of both AAR and CAAR reach maximum at event day, and increase immediately within post-event window. One possible reason is that the stocks in OMX Nordic 40 index are all from large companies, the investors usually have rather high expectations to the performance of these companies. When no surprise news is released on the event day, the investors’ expectations cannot be fulfilled, and therefore leads to a similar reaction as what we have observed in negative samples.

![AAR and CAAR of no surprise sample](image)

**Figure 19** Abnormal returns and cumulative abnormal returns of no surprise sample

### 4.3. Behavior over different companies

In order to examine the stock behavior over different qualification company, according to P/B ratio, positive surprise sample and negative surprise sample were divided into two groups, growth firm and valued firm, respectively. P/B ratio is a financial ratio, where a company’s current market price is divided by its book value per share. P/B ratio of growth firm is positive and P/B ratio of value firm is negative.

**Table 5** Cumulative abnormal returns for undervalue/overvalued firm within different time periods

<table>
<thead>
<tr>
<th>Event window</th>
<th>Positive sample</th>
<th>Negative sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value firm</td>
<td>Growth firm</td>
</tr>
<tr>
<td></td>
<td>CAAR (%)</td>
<td>CAAR (%)</td>
</tr>
<tr>
<td>(-8, 0)</td>
<td>0.42</td>
<td>1.02</td>
</tr>
<tr>
<td></td>
<td>0.26</td>
<td>0.49</td>
</tr>
</tbody>
</table>
In the positive sample group, in Figure 20, there is a big difference between value firm group and growth firm group. AAR in ‘Value firm group’ reached the maximum value at $t_{+2}$, which is most likely due to the under-reaction phenomenon. ‘Growth firm group’ reached a higher AAR at $t_0$, and then decreased quickly after event day. We can observe that within post-event window, the stock volatility is more intensive compare to pre-event window, the reason that growth firm responds more actively to positive news is mainly because that their stock prices are undervalued at earnings announcement day, therefore, market behavior will adjust this reaction within post-event window.

<table>
<thead>
<tr>
<th></th>
<th>AAR of growth company</th>
<th>AAR of value company</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-1, 0)</td>
<td>-0.08</td>
<td>0.03</td>
</tr>
<tr>
<td>(-1, 1)</td>
<td>0.23</td>
<td>-0.28</td>
</tr>
<tr>
<td>(0, 0)</td>
<td>0.40</td>
<td>-0.79</td>
</tr>
<tr>
<td>(0, 1)</td>
<td>0.46</td>
<td>-0.75</td>
</tr>
<tr>
<td>(0, 2)</td>
<td>0.75</td>
<td>-0.97</td>
</tr>
<tr>
<td>(0, 3)</td>
<td>0.84</td>
<td>-1.00</td>
</tr>
<tr>
<td>(0, 4)</td>
<td>0.94</td>
<td>-1.00</td>
</tr>
<tr>
<td>(0, 5)</td>
<td>0.94</td>
<td>-1.00</td>
</tr>
<tr>
<td>(0, 6)</td>
<td>0.94</td>
<td>-1.00</td>
</tr>
<tr>
<td>(0, 7)</td>
<td>0.94</td>
<td>-1.00</td>
</tr>
<tr>
<td>(0, 8)</td>
<td>0.94</td>
<td>-1.00</td>
</tr>
</tbody>
</table>

**Figure 20** Abnormal return of growth/value firm in positive sample
As for negative sample group, the result in Figure 21 show that both ‘Value firm group’ and ‘Growth firm group’ exist market reaction before event day, as we mentioned before they may indicate information leakage. However, at the event day, stock price of ‘Growth firm group’ declines sharply compared to ‘Value firm group’, which indicates that market reaction of growth firm is more sensitive to the negative news. Our result suggests that announcing poor performance of a growth firm is usually unexpected and the market requires a bigger adjustment. Furthermore, the same result is confirmed from Table 5, where value firm always shows less stock reaction than growth firm, no matter the earning surprise is positive or negative.

![AAR of different company in negative sample](#)

**Figure 21** Abnormal return of growth/value firm in negative sample
5. Conclusion and further research

In this chapter, the findings are summarized on the first part of the conclusion. The results will provide an answer for the research question: How does stock return behave prior to good and bad earnings announcements? The second part of the paragraph is dedicated to further researches that can complement this research paper.
5.1 Conclusion

In the introduction chapter, we mentioned that no research has been made in OMX Nordic 40 stock index on the behavior of stock price around earnings announcements. We also mentioned that we would try to specify our answer by separating growth stocks and value stocks.

Therefore, the purpose of our thesis was to observe and analyze the specificity of stock behavior around earnings announcements. In this chapter, we present answers to the research question stated in the introduction chapter:

**How does stock return behave around earnings announcements in the OMX Nordic 40 stock index?**

Three major answers were brought:

1. This study shows that stock behavior does respond gradually to the earnings announcement and stock reactions which appear within pre-event window may indicate information leakage. However, our results express that most AAR are statistically insignificant during event window, which suggests that earning information has a lower impact on the stock market.
2. We also find that the effect of positive earnings surprise on stock price lasts longer than that of negative earnings surprise. Considering that our sample are all from large companies in Nordic countries, these association are broadly consistent with large companies are more likely to manage earnings than small companies (Barton & Simko, 2002). It can be result that stocks from OMX Nordic 40 index have a stable reaction on negative earnings surprise.
3. Furthermore, When performing stock behavior to different qualification companies, it showed that value firm gives less stock reaction to both positive earnings surprise and negative earnings surprise than growth firm.

Our analyze concludes that earning interim and annual earning information disclosure were unable to influence the stock market effectively, and therefore cannot fully reflect the changes on the stock price, and investors can get the abnormal returns by using this earning information during whole event window.

5.2 Further research

Since our research deals with a specific stock index, we have three suggestions that can either complete or strengthened this research.
First, a different sample can be considered. When conducting our research, we decided to stress on the case of 38 large Nordic companies. It can be relevant to take another sample. A different sample can be a different stock index. DeFond et al. (2006) noticed that earnings announcements quality differs from a country to another due to the frequency of the disclosures.

Taking another sample can also mean choosing a specific industry. Since a world event impacts differently each industry in terms of time and management, investors’ behavior might vary according to the industry they are dealing with.

Second, different subdivision can be made. In this thesis, we subdivided our analysis in growth and value stocks. We suggest researching with different subdivisions: big companies versus small companies. A smaller structure might react faster, and the consequences and study outcomes can be different.

Finally, the same research with the same methodology but with a focus on voluntary disclosure can be a complementary research topic. We have investigated quarterly and annual announcements. Yet it is also relevant to assess stock return performance around voluntary disclosures. Voluntary disclosures indeed suffer from lack of credibility (Christophe et al., 2004); and investors might have a way of their own to tackle the issue.
References


Roiter, E. Institutional Investors and Investment Research: Coping with Regulation FD.


Appendix

\[ P_0 = \frac{D_0 (1+g)}{1+r} + \frac{D_0 (1+g)^2}{(1+r)^2} + \frac{D_0 (1+g)^3}{(1+r)^3} + \cdots + \frac{D_0 (1+g)^n}{(1+r)^n} \] (1)

\[ P_0 = D_0 \left[ \frac{(1+g)}{1+r} + \frac{(1+g)^2}{(1+r)^2} + \frac{(1+g)^3}{(1+r)^3} + \cdots + \frac{(1+g)^n}{(1+r)^n} \right] \] (2)

Multiply both sides by \( \frac{1+r}{1+g} \)

\[ P_0 \frac{1+r}{1+g} = D_0 \left[ \frac{(1+g)}{1+r} + \frac{(1+g)^2}{(1+r)^2} + \frac{(1+g)^3}{(1+r)^3} + \cdots + \frac{(1+g)^n}{(1+r)^n} \right] \] (3)

Subtract equation (3) from equation (2)

\[ P_0 \left[ \frac{1+r}{1+g} - 1 \right] = D_0 \left[ \frac{(1+g)^n}{(1+r)^n} \right] \] (4)

Assuming \( r > g \) and \( n \) approaches infinity, then the term in brackets on the right-hand side of the equation 4 approaches unity. Therefore:

\[ P_0 \left[ \frac{(1+r)-(1+g)}{1+g} \right] = D_0 \] (5)

And \( (r - g)P_0 = D_0 (1 + g) = D_1 \)

Therefore \( P_0 = \frac{D_1}{r+g} \)

This is the Gordon Growth model (Gordon, 1962).