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# On the Importance of Accounting Information for Stock Market Efficiency

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**Abstract**

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This thesis contributes to the discussion on the importance of accounting information for stock market efficiency. As any analysis of market efficiency depends on the use of adequate risk proxies, the thesis first investigates the ability of commonly used risk factors to explain the cross-sectional variation of Swedish stock returns. The findings suggest that capturing risk is indeed very complicated, as neither CAPM beta nor size and book-to-market equity ratio are significantly associated with realized monthly returns. The relative bid-ask spread is found to be the strongest of all the analyzed factors; nevertheless it does not seem to be related to momentum in the manner predicted in the conceptual argument presented earlier in the paper.

Second, the thesis documents that simple accounting summary measures, such as earnings and book value of equity, can be used as benchmarks for the identification of mispriced stocks. Contrarian investment strategies (CISs) based on these simple measures earn a substantial value premium of 11-14%. In addition, we find that their effectiveness is compromised by noise that is caused by transitory earnings and accounting conservatism. Controlling for these factors increases the magnitude of the value premium and improves the consistency of the CIS. This suggests that the information reflected in key accounting measures is not fully reflected in stock prices.

Finally, this thesis shows that the structure of accounting information matters too. It documents that the transition from the Swedish GAAP to IFRS in 2005 not only changed the average goodwill charges reported by companies, but also affected valuation of goodwill-intensive companies. This suggests that investors were not able to see through the conservative treatment of goodwill prior to the adoption of IFRS and that they recognized its higher persistence only after being provided with accounting information directly highlighting it.

It is sometimes suggested that the structure of financial reporting “per se” should not be relevant to the valuation of companies, because the presentation itself does not affect expected operating performance and because investors and analysts can “see through” and properly discount for various reporting formats. This thesis concludes that, contrary to this proposition, the structure of accounting does matter for equity valuation and that changes in representation do impact on stock prices.

*Keywords:* accounting, capital markets, efficiency, momentum, liquidity, accounting conservatism, transitory earnings, IFRS, goodwill, Sweden

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## List of Papers

**Novak, J. (2007) “CAPM Beta, Size, Book-to-Market, Momentum and Liquidity in Explaining Swedish Stock Returns”, *working paper***

This study analyzes the ability of CAPM beta, size, book-to-market equity ratio, stock price momentum and liquidity to explain the cross sectional variation in Swedish stock returns with a particular emphasis on the impact of liquidity on the importance of momentum. I present a conceptual argument that assumes a non-zero cost of trading and that implies a negative relationship between momentum and liquidity. It is argued that momentum may be significant in explaining the cross section of stock returns because it is correlated with stock illiquidity, for which investors require a premium. The results confirm previous findings on the low explanatory power of CAPM beta. However the results suggest that the significance of commonly proposed remedies for this – size and book-to-market equity ratio – is also low. The direct measure of stock liquidity – the relative bid-ask spread – is the strongest factor explaining the cross-sectional variation in realized returns; nevertheless the findings suggest that it is not related as predicted to momentum.

**Hamberg, M., Novak, J. (2007) “Contrarian Investment, Accounting Conservatism and Transitory Earnings”, submitted to *Journal of Business Finance and Accounting***

Contrarian investment strategies (CISs) based on earnings-to-price and book-to-market multiples are tested and the impact of transitory earnings and accounting conservatism are examined. The existence is documented of a substantial value premium of 11-14% during our sample period, which corresponds to about one-half of the average stock market return. The effectiveness of the CIS is found to be compromised by noise caused by transitory earnings and accounting conservatism. Controlling for these factors increases the magnitude of the value premium and improves the consistency of the CIS.

**Hamberg, M., Novak, J., Paananen, M. (2007) “The Impact of IFRS Adoption on Goodwill Recognition and Stock Market Valuation”, submitted to *European Accounting Review***

Investigation is made of how the adoption of IFRS 3, business combinations, affected reported goodwill and whether the change was relevant for the stock market valuation of companies. Evidence is found suggesting that aggregated goodwill impairment charges in 2005 are lower than aggregated goodwill amortizations in 2004. Hence, goodwill seems to be more persistent than implied in the amortization plans used prior to IFRS. In addition, our results indicate that the information on higher goodwill persistence had not been impounded in stock prices prior to the adoption of IFRS 3. Some evidence is provided of positive returns earned on a zero-investment trading strategy that buys stock of goodwill- and intangible-asset-intensive companies whose expected earnings are favorably affected by the higher persistence of goodwill and that short-sells stocks with low goodwill.



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# Introduction

The concern for efficiency constitutes a central motive in economic studies. It is widely acknowledged that the fundamental economic problem of society concerns the allocation of scarce resources among alternative uses (Gravelle and Rees, 1992). Since human needs are unlimited, but resources are scarce, society faces an obvious challenge in finding such a pattern of allocation that eliminates waste, i.e. to find efficient allocation. It can be noted that even the etymology of the word “economy” pertains to “economical”, i.e. not wasteful, or using available resources in the best (most efficient) manner. Consequently, if the essential economic challenge of society is the pursuit of efficiency, then the natural task of economics is to identify and describe the driving forces and hindrances to efficiency<sup>1</sup>.

In the context of capital markets, efficiency is defined in terms of the amount of information absorbed in share prices. A market is informationally efficient if stock prices immediately and correctly<sup>2</sup> reflect all the available information that is relevant to the future profitability of a company (Fama, 1970). In such a situation, share price constitutes the best possible estimate of the company’s

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<sup>1</sup> It is sometimes suggested that economic policy may also aim at other goals than efficiency, for example fairness or equality in the distribution of economic benefits (Varian, 1987). I would argue that efficiency is a more fundamental goal, for at least two reasons: (1) there is no universal definition of “fairness”, which greatly complicates construction of a positive theory of economic equity, and (2) assuming free trade and rationality, any artificial (policy-driven) departures from Pareto efficiency would be under pressure to be traded away, i.e. under the assumption of rationality, an efficient allocation, unlike a equitable one, is a stable or convergent state.

<sup>2</sup> As there are a number of possible ways in which to assess the implications of a certain piece of information for estimating the future profitability of a company, on the practical level it is rather difficult to decide which is “the correct” one. However, it is possible to positively conclude that certain way of assessment is not correct. For instance, any “correct” way of interpreting information cannot be systematically biased. Some of the tests of market efficiency rely on this point.

intrinsic value<sup>3</sup>, given the information available at that point in time.

The informational efficiency of a capital market has significant consequences for the allocational efficiency of the economy. Hayek (1945) explains how the price system facilitates allocational efficiency by conveying information about the relative importance of relevant factors to decentralized decision makers. Individuals in the economy make decisions that may potentially be influenced by innumerable factors. No one mind can consider all of these factors; instead decision makers may use prices, which serve as a gauge reflecting the relative importance of factors known to anybody in the economy. In other words, prices aggregate information that is possessed by heterogeneously informed traders and thereby they co-ordinate economic activity. If this co-ordination is to promote efficient resource allocation, it is essential that prices send correct signals. This is contingent on their comprising all the relevant information that is available, i.e. on the prices being informationally efficient. Since share prices affect the cost of shareholder equity, they ultimately determine how society allocates capital (Pearce, 1987). If security prices were divorced from earnings' potential, they would send misleading signals for resource allocation, and so the resulting capital allocation would be sub-optimal. Hence, informative share prices are a pre-requisite for efficient capital allocation, which means that the informational efficiency of capital markets sustains the allocational efficiency of the economy.

The belief that share prices tend to be efficient is substantiated by the arbitrage principle (Rubinstein, 2001). If a particular piece of information is not incorporated in prices, there is a powerful economic incentive to uncover it, and to trade on it (Lee, 2001). This trading in turn affects the price in a way that it starts to reflect that piece of information. Ideally, this process should continue until the newly discovered piece of information is fully reflected in prices. As many investors possessing diverse information actively trade in the market, the price quickly incorporates information known by any of them. Price can then be seen as a value-weighted consensus of investor opinions about the expected profitability of the company (Lee, 2001). A market is defined as efficient if this process is comprehensive and quick, i.e. "...on the average, competition will cause full effects of new information on intrinsic values to be reflected 'instantaneously' in actual prices" (Fama, 1965, p.4).

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<sup>3</sup> Intrinsic value is defined as the current value of all future dividends paid out by the firm, discounted by the appropriate risk factor, or, to re-express this, as the current value of all future cash flows generated by the firm (Christensen and Feltham, 2003).

Even though the arbitrage mechanism constitutes a plausible rationale for market efficiency (Rubinstein, 2001), this is not to say that the price-discovery process is bound to be smooth and unproblematic. There is a substantial amount of evidence suggesting that non-trivial mispricing can occur and persist (consider for instance Lamont and Thaler (2003)), which indicates that the arbitrage mechanism is not always effective in discovering efficient prices. Hence, it has been suggested that unconditional faith in the arbitrage principle in establishing efficient pricing trivializes the process through which prices accommodate new information (Lee, 2001). “It is akin to believing that the ocean is flat, simply because we have observed the forces of gravity at work on a glass of water” (ibid., p. 237). There are a number of hindrances impeding on the swiftness and precision of the price setting process. Market frictions (e.g. transaction costs, limited information availability and restrictive trading rules) may stop the process before the impact of information is fully reflected in prices. In addition, investors’ behavioral biases may completely divert the process from the ideal trajectory (this is, however, contingent on the absence of any rational arbitrageur, who would possess the information and be able to take advantage of the irrationality of the others). Hence, it is vital that sufficient information is available to investors, that investors process the information in a rational manner and that they are able to act on the conclusion they reach.

The accounting figures reported by a firm are one of the most important information resources for investors’ decisions concerning stock prices (Breton and Taffler, 1995). The Financial Accounting Standards Board (F.A.S.B.) explicitly states that one of the purposes of accounting is to inform investors on aspects that help them predict future economic events that are relevant in determining company value: “Financial reporting should provide information to help present and potential investors and creditors and other users in assessing the amounts, timing, and uncertainty of prospective cash receipts from dividends or interest and the proceeds from the sale, redemption, or maturity of securities or loans” (F.A.S.B., 1978, p.371). In order to fulfill this role, accounting measures must reflect the underlying economic phenomena that they are designed to capture. Only then can they serve in establishing stock prices that guide efficient capital allocation in the economy.

Accounting may fail to convey useful information because it is biased, because it is not timely or because it is manipulated. First, accounting figures fail to capture certain significant economic aspects because they do not meet all the criteria applied by standard setters. There is a trade-off between the different (and sometimes conflicting) demands on accounting imposed by its various users (Holthausen and Watts, 2001). The recognition of revenues and assets

both tend to be conservative. While expected future losses should be recognized immediately, the recognition of expected future gains is delayed. Furthermore, some (typically intangible) assets are not capitalized because they do not meet the criteria of being controlled by the entity (e.g. intellectual capital) or because their future economic benefit is difficult to evaluate with a reasonable degree of reliability (e.g. investments in research and development). This prudence in accounting practice is important for credit contracting in that it helps to determine the minimum liquidation value of net assets; however, it biases downwards the value of earnings as well as the going concern value of net assets.<sup>4</sup> Second, it is sometimes suggested that accounting can hardly convey useful information to investors because it fails to reflect the economic conditions in a timely manner. Due to accounting conservatism, the lack of timeliness is more severe for gains than for losses (Basu, 1997). However, Barth, *et al.* (2001) and Beaver (2002) argue that timeliness is not crucial for the usefulness of accounting information. If investors deem some piece of accounting information relevant (e.g. accounting earnings), they will develop sophisticated ways to forecast it and hence the information will be partly (or fully) impounded in stock prices before it is actually announced. Such pre-emption does not indicate a lack of relevance; on the contrary, the more relevant the investors find the information the more accurately they will try to forecast it and hence the less timely it will become. Finally, managers may use their discretion to temporarily manipulate earnings in order to meet performance goals, to boost the stock price prior to a security offering or before executing their stock options, to meet debt covenants, etc. (McNichols, 2000; Beaver and Engel, 1996). Earnings management may be performed by opportunistic adjustments in the accounting methods used to determine accruals (Healy and Wahlen, 1999) or by temporary changes in real economic policies (Roychowdhury, 2006). Manipulated earnings may send misleading signals about the company's economic position to investors.<sup>5</sup> How capable accounting figures are in capturing the most significant traits of economic phenomena is thus an empirical question.

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<sup>4</sup> Similarly, dirty surplus accounting frees the income statement (earnings) of the price fluctuations of marketable securities that are beyond managerial control and hence facilitate the stewardship role of accounting (Holthausen and Watts, 2001). At the same time, however, this treatment violates the clean surplus relationship that is vital for valuation with the use of the residual income model (Ohlson, 1995; Feltham and Ohlson, 1995).

<sup>5</sup> However, it is also argued that one form of earnings management (in particular income smoothing) can be used by managers to signal their private information about company prospects. In such a case, smoothed earnings could actually be more informative for company valuation than plain earnings.

Some empirical evidence suggests that accounting is indeed successful in delivering information that is useful for estimating company value. Dechow (1994) concludes that current accounting earnings are better than current cash flows in predicting future cash flows. The determination of accruals can be seen as one of the major functions of accounting. These results thus indicate that accounting helps in predicting the future value generated by the firm and hence in company valuation. However, several concerns about the decreasing relevance of accounting information have fairly recently been voiced. Amir and Lev (1996) conclude that in high technology industries, such as cellular communications, the value relevance of non-financial information overwhelms the relevance of financial information, which is itself relevant only in combination with non-financial information. Hence, there seems to be an implicit threat that if technological intensity increases over time, the relevance of accounting information will drop. This idea is further developed by Lev and Zarowin (1999) who report a decline in value relevance of accounting information over time. They propose that this decline is due to the inadequacy of the existing accounting system, which fails to reflect aspects that become increasingly important due to the faster pace of business change (e.g. intangible assets). These results were recently confirmed on the Australian market by Goodwin and Ahmed (2006), who make use of the special features of the Australian Generally Accepted Accounting Principles (GAAP) that allow for the capitalization of intangible assets. Thus, it seems that investors are decreasing their reliance on accounting information in determining company values. As the question of the significance of accounting information for efficient stock valuation remains unresolved, it seems to be fruitful to pursue this avenue of research.

## Research Question

The overall purpose of this thesis is to investigate the importance of accounting information for stock market efficiency. It first analyzes the performance of commonly proposed risk factors on the Swedish stock market. Then it examines whether recognizing the characteristics of accounting information impacts on the conclusions about stock market efficiency that are derived from the application of contrarian investment strategies. Finally it examines whether the structure of accounting information has an impact on the amount of information that efficient pricing is able to incorporate.

The importance of investigating the various aspects of stock market efficiency is emphasized, for example, by Lee (2001), who suggests that "... rather than assuming market efficiency, we should study how, when, and why price becomes efficient (and why at other times it fails to do so)" (p. 251). Since accounting information is one of the most prominent inputs to decisions determining pricing, it is a natural candidate to consider when examining the efficiency of the price setting process. Contrary to other information about the company that can be obtained from, for example, press releases, the meaning of accounting items is clearly defined and the definition of key accounting concepts remains reasonably similar over time. Hence, investors can typically obtain long time-series of key accounting figures. Furthermore, accounting information is audited and thus, relative to other information sources, accounting figures can be seen as more reliable. All this means that accounting constitutes a relatively solid type of information that should be easier to interpret and more trustworthy than other types of information. Examining what accounting information investors regard as relevant and what they fail to consider allows us to draw interesting inferences about the alternative reasons for limits to stock market efficiency.

Despite the substantial empirical evidence on market inefficiency (for reviews see e.g. Pearce, 1987; Fama, 1998), we still lack a universally accepted behavioral alternative to the Efficient Market Hypothesis (EMH) that would explain why anomalies arise (Fama, 1998). The construction of such a model seems to be one of the major challenges that behavioral finance faces at the



moment. Lee (2001), for example, suggests that “I believe future studies along these lines will not merely document new anomalies, but will also help to explain them” (p. 242). Understanding the relevance that investors attribute to well-defined accounting information and the aspects of accounting that they fail to consider may be instrumental for assessing the reasons for market inefficiency and thus it may effectively contribute to efforts to develop a model of market inefficiency. In addition, even though markets are not fully efficient in a descriptive sense, it may still be reasonable to assume market efficiency for some of the practical financial decisions (Friedman, 1953). An understanding of the significance of accounting information may also be helpful in decisions regarding the scope of applicability of the EMH. That is to say that it enables us to better assess when the EMH may be used as a sensible point of departure in describing stock behavior, as a somewhat imprecise but still reasonable approximation of reality.

This thesis should also be relevant for accounting standard setters. First, the study confirms that the structure of accounting information matters and it therefore suggests that the substantial effort directed towards finding an optimal financial reporting framework is justified. Summary accounting measures, such as earnings and book value of equity, contain relevant information about the fundamental value of companies that is not fully impounded in stock prices. These measures become even stronger indicators of intrinsic value when the bias in book value of equity due to accounting conservatism is considered and when the transitory component of earnings is disregarded. In addition, this thesis contains a follow-up study to the International Financial Reporting Standards (IFRS) adoption. It shows that the transition from the Swedish GAAP to IFRS affected both the reporting practices and the market valuation of companies with high levels of recognized goodwill.

All three of the papers included in this thesis address the significance of accounting information for stock market efficiency. However, they approach the issue from different perspectives, which reflects the development my own knowledge of the area, as well as being the result of joint work with different co-authors. Kothari (2001), though acknowledging that research in finance and in accounting are related, suggests that the two fields do nevertheless differ. Research in finance assumes that the economic explanatory variables are real and the purpose of these studies is to examine if stock returns can be rationally explained by variation in these fundamental economic variables. Conversely, research in accounting typically assumes rational stock pricing and it aims to assess whether the construction of accounting measures (e.g. earnings)

captures the factors that affect stock prices. In this thesis, the association between accounting information and stock prices (or returns) is central to all three papers, but they approach it from different directions. Using Kothari's (2001) classification, the first two papers may be seen more as finance studies whereas the last paper as an accounting study.

All these studies use the quantitative analysis of data collected for all companies listed on the Stockholm Stock Exchange. The data are obtained through the Trust database provided by Six Estimates. The database started to systematically report data on listed companies in 1979. Thus, the sample period usually spans from 1979 (allowing for the applicable pre-ranking requirements) to 2005. Banks and insurance companies are usually excluded, because it is difficult to interpret their operating performance. The Trust database provides information on approximately 600 companies that meet these requirements, with about 240 observations a year. Precise numbers and descriptive statistics are provided in each of the papers.

In the remainder of this thesis introduction and summary, existing research that is relevant for the thesis is presented and the individual papers are introduced in this context. The efficient market hypothesis (EMH) and its implications are first discussed and the joint hypothesis problem, which is the key methodological issue in testing the EMH is outlined. The first paper is then presented, which analyzes the significance of potential risk factors on the Swedish market. Subsequently, the existing evidence is presented on stock market efficiency and the second paper is introduced. This examines whether recognizing the characteristics of accounting information impacts on the conclusions about stock market efficiency derived from the application of contrarian investment strategies. Finally, research is discussed which examines the impact of the adoption of new accounting standards, with a particular emphasis on IFRS. This provides a background for the third paper, which investigates whether the structure of accounting information has an impact on the amount of information that efficient pricing is able to incorporate.

# Efficient Market Hypothesis

The efficient market hypothesis (EMH) has had a paramount importance in the development of financial theory. Ball (1995) argues that “the theory of efficient markets was an audacious and welcome change from the competitive ignorance about stock market behavior that preceded it ..., [and] it has profoundly influenced both the theory and practice of finance” (p.6). Actually, Frankfurter and McGoun (1999) argue that the EMH has become something of a trademark of financial theory, since “many equate what is called modern finance with the EMH” (p. 160).

## Theoretical Foundation

The EMH rests on the foundations of microeconomic equilibrium. It focuses on the demand side of the market for risky assets (Ball, 1995). It assumes that investors correctly anticipate the future profitability of companies and thus that they demand a company’s share only if its price is less than the present value of the discounted future dividends<sup>6</sup>, i.e. the *intrinsic value* of a share. Thus, the price changes if and only if the market receives new information that changes the estimate of future company proceeds (or profitability) and hence the intrinsic value. The most fundamental idea is that the process of adjustment will occur so quickly that it can be assumed to be instantaneous, i.e. “...on the average, competition will cause full effects of new information on intrinsic values to be reflected ‘instantaneously’ in actual prices” (Fama, 1965). This means that the virtue of the efficient market is that at any instance prices are equal to intrinsic values, or in other words, they fully reflect all the relevant information that is available to the market at that point in time. This in turn means that it is impossible to find any piece of information on which one can earn a higher return than that which would be appropriate for the particular level of risk.

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<sup>6</sup> This is equivalent to saying that the price must be less than the present value of the discounted future cash flows. The resulting value is the same, but the first formulation focuses on value distribution, whereas the second focuses on value creation (Christensen and Feltham, 2003)

What conditions have to be satisfied so that the market is efficient? It is important to bear in mind that there is no single set of such conditions. Fama (1970) specifies one such a set of sufficient conditions that would make a market efficient: (1) no transactions costs, (2) all information is costlessly available to all investors, and (3) investors have homogeneous beliefs about the implications of the current information for the current price and for the distributions of the future prices of each security and they aim at maximizing their utility defined in terms of risk and expected return. It is easy to see that if all these conditions were met, the market would be informationally efficient. However, it is rather obvious too that none of the above conditions can fully hold in real markets. The infeasibility of meeting the first two conditions has received a lot of attention (see, for instance, the work of Grossman and Stiglitz (1980) on information equilibrium<sup>7</sup>). However, it seems that the impossibility of satisfying the third condition is even more significant, as the idea of homogeneous investors assumes away the most important benefit of the market as described by Hayek (1945), namely the aggregation of information dispersed across heterogeneously well informed actors.

Fortunately, though the three conditions mentioned above are sufficient for market efficiency, they are not necessary (Fama, 1970). That is to say, though they jointly guarantee market efficiency, markets can potentially be efficient even if these conditions are not satisfied. For instance, even if information is not readily available to all investors, the market can still be efficient, provided that some investors are well informed and that they are ready to trade upon this information until it is reflected in the prices. In addition, the different evaluation of information does not imply inefficiency either, unless there are investors who can consistently make better evaluations of available information than are implicit in market prices (Fama, 1970). Hence, pointing out that the three conditions (or assumptions) are unrealistic does not disqualify the EMH. Instead, it makes sense to investigate real-life settings to see what impact they may have for the price setting process and thereby for the level of market efficiency.

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<sup>7</sup> The idea of information equilibrium stems from the paradox that occurs in a fully efficient market. If all the securities are correctly priced, there is no chance to earn abnormal returns on any information and thus there is no economic incentive to search for and process information. However, if no rational investor would search and process information, how could the prices become efficient in the first place? Grossman and Stiglitz (1980) introduce the idea that investors search for information as long as the marginal abnormal return that one can earn on it is greater or equal to the marginal costs of acquiring and processing it.

## Use of the EMH for Theory Building

Not only did the EMH impact on the financial praxis, encouraging market liberalization and enhanced corporate disclosure, it also paved the way to a number of other advances in modern finance (Ball, 1995). Neither the irrelevance theorems of Miller and Modigliani (1958; 1961), nor the CAPM (Sharpe, 1964; Lintner, 1965; Mossin, 1966; Black, 1972) or the OPT (Black and Scholes, 1973) would be conceivable without the idea of an efficient market<sup>8</sup>. These models base their conclusions on the assumption of market efficiency. Thus, it is possible to say that the EMH constitutes a fundamental setting for developing financial theories. Viewed from this perspective, the concept of market efficiency in finance can be compared to the frictionless world in physics. It is simply a playground with neatly defined characteristics (indeed simplified in relation to reality) on which the game of theory building is played.

Financial theory, like microeconomic theory, is concerned with the world of theoretical abstraction, i.e. with modeling phenomena as they would be if a certain set of assumptions were satisfied. Modeling phenomena based on unrealistic assumptions is useful in order to highlight certain relationships that may not be tractable without a certain level of simplification<sup>9</sup>. If we view the EMH as an assumption used in these models, it may seem that empirical tests of market efficiency are futile, since all assumptions are to certain extent unrealistic. In the same way that it does not make sense to measure air pressure to assess the quality of formulas used in physics (the only criterion for such an assessment is their internal logical consistency), it makes no sense to measure the level of market efficiency in order to see whether Miller and Modigliani's capital structure irrelevance theorem holds. However, Friedman (1953) suggests that every theory consists of two components – (1) the structure of the causal relationships between factors, and (2) an implicit set of rules concerning its applicability.<sup>10</sup> The proposed causal relationships are explicitly stated,

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<sup>8</sup> It is worth noting that the Miller and Modigliani irrelevance theorems actually came before the EMH was formulated. This means that the logic of the concept was used even before it was explicitly formulated by Fama (1965). Already at the end of 1950s, Roberts (1959) formulated the idea of the arbitrage principle that substantiates the random walk hypothesis. The first empirical test of the autocorrelation of stock returns was also conducted at that time.

<sup>9</sup> Consider, for instance, the Miller and Modigliani (1958) capital structure irrelevance theorem. Based on the assumption of market efficiency, it provides an instrumental insight into aspects of the relationship between financial leverage and the weighted average cost of capital that may otherwise remain overlooked.

<sup>10</sup> Friedman's (1953) argument in favor of positivism in economics was truly ground-breaking

typically in the form of a formula (e.g. CAPM). The realism of the assumptions on which these theorized relationships are built is indeed irrelevant, as the only criterion for assessing their quality is internal logical consistency. However, any theory also includes applicability rules. These are not stated explicitly, rather they are implicit in the philosophy on which the theory is built and it is tacitly assumed that the decision maker will consider these in making judgments about when the theory can sensibly be used. Friedman (1953) argues that the realism of the assumptions can have a bearing on the scope of the theory's applicability. Hence, empirical evidence about the degree of market efficiency allows us to better assess when models that are based on the EMH can be effectively applied.

## Methodological Challenges in Testing EMH

In the previous section, it has been argued that it is worth attempting to test the level of market efficiency. However, this raises the question of whether this is feasible. The answer to this question is much less obvious than it may seem. Markets are efficient when securities are correctly priced, given the information that is available at that moment. Unfortunately, there is hardly any way in which to objectively determine correct pricing. Furthermore, it is even less feasible to say what the estimate of the intrinsic value should be given the information available at that moment. Maybe we now believe that pricing was incorrect at some point in time, but were the investors able to reach that conclusion with the information that they had then?<sup>11</sup> However, even though we cannot determine what is correct pricing, we may positively say what is not correct pricing, i.e. we may objectively identify certain patterns that are not consistent with correct pricing. Examining stock markets in search for such patterns is the aim of studies that are commonly seen as tests of market efficiency (Kothari, 2001).

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for the subsequent development of the field. Kothari (2001) suggests that "Friedman (1953) was perhaps the most prominent among those who were instrumental in making positive, as opposed to normative, science the mainstream research methodology in economics, finance, and accounting" (p. 114).

<sup>11</sup> Let me point out here, that even though most generally agree that IT shares were most probably not correctly priced in late 1990s, at that point in time there were a number of people who actually argued that the pricing was correct (e.g. Claus and Thomas, 1998). In addition, a number of academics used share price as a proxy for intrinsic value – consider for instance the value relevance study by Lev and Zarowin (1999).

What are the patterns that, if discovered, would represent evidence against market efficiency? Fama (1970) classifies these patterns in three groups and distinguishes between three different types of efficiency tests, i.e. test of market efficiency in its weak form, in its semi-strong form, and in its strong form. As the occurrence of good and bad news relevant to the share should be random, so should be the development of efficient share prices reflecting this information. Thus, the serial autocorrelation of stock prices (both positive and negative) is not consistent with efficient pricing. Tests of market efficiency in its weak form investigate the existence of such autocorrelation. In addition, as the concept of market efficiency suggests that all information is incorporated into prices immediately, it should be impossible to earn abnormal returns<sup>12</sup> for any information after it has been made available to investors. This is examined in tests of efficiency in its semi-strong form (which investigate the possibility to earn abnormal returns on publicly available information), and in its strong form (which investigate the possibility to earn abnormal returns on private information).

Unfortunately, even though it is easier to present evidence of market inefficiency than of market efficiency, it is still not a trivial task. Not all manifestations of inefficiency can be measured and so the evidence on mispricing tends to document the patterns that are the most tractable (e.g. overreaction and subsequent reversion to the mean, momentum in prices or post earnings announcement drift), rather than those that are economically most significant (e.g. substantial systematic departures from the correct pricing, i.e. market bubbles). Thus, even though the existence of market bubbles would have much more profound implications on the applicability of the EMH than the existence of a momentum in share prices, this is hardly ever tested, because there is no objective way to define a bubble.

Furthermore, even for the tractable manifestations, the conclusions about the level of efficiency observed are not simple. All the tests that measure the possibility to earn abnormal returns must cope with the “joint hypothesis” or “bad-model” problem (Fama, 1998). In order to measure the level of abnormal returns, an investigator must first determine what the normal returns are, This is not straightforward. “Fama (1970) emphasizes that market efficiency must be tested jointly with a model for expected (normal) returns. The problem is

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<sup>12</sup> Abnormal returns are defined as returns above the normal return, i.e. those that would be expected to be an appropriate compensation for holding securities with that particular level of systematic risk.

that all models for expected returns are incomplete descriptions of the systematic patterns in average returns during any sample period. As a result, tests of efficiency are always contaminated by a bad-model problem” (Fama, 1998, p. 291). Hence, the bad-model problem profoundly complicates the interpretation of empirical studies that are aimed at testing market efficiency.

Friedman (1953) argues that the criterion for judging the usefulness or reasonability of a theory is whether it yields sufficiently accurate predictions for the purpose in hand. It follows that a test of such a theory entails an assessment of whether these predictions conform to empirical evidence. Due to the joint hypothesis problem, however, the accuracy of EMH predictions can never be conclusively assessed. In the absence of the comprehensive risk model, the predicted return cannot be exactly determined, which means that the EMH per se is not testable (Fama, 1998). Acknowledging that a test that could conclusively refute the EMH is infeasible, researchers have to resort to second-best options when deciding on the usefulness of the EMH. Instead of direct evidence on the EMH, they search for indirect indications that cannot unequivocally confirm or refute the EMH<sup>13</sup>, but that can suggest whether the EMH is *likely* to be reasonably accurate or not. The indirect indications are in this present study classified into two groups: (1) intuitive motivations that are based on empirical observations and (2) empirical tests that use various risk proxies.

Intuitive motivations are here understood as inferences from empirically observed general characteristics of phenomena. The arbitrage principle is viewed as the intuitive motivation in favour of the EMH. After observing that people (and investors in particular) tend to be greedy, it can be concluded that they are likely to quickly eliminate any opportunity to earn returns higher than appropriate for a given risk level, which should make the stock market efficient. This argument can be extended by an evolutionary perspective. Any investor who made irrational trading decisions would systematically underperform the market. As a result, his wealth would shrink and sooner or later he would be driven out of the market. Hence, reasonably rational investors who make good use of available information would eventually prevail and thus the value-weighted consensus of their opinions should be reasonably close to efficient pricing.

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<sup>13</sup> Of course, I acknowledge that while a hypothesis can be “refuted” on the basis of empirical evidence it cannot directly “confirmed” (Hunt, 1993). What I mean when I say that a hypothesis is “confirmed” is that empirical tests consistently fail to refute it.



However, it is rather easy to formulate a similar intuitive argument against the EMH. If we assume that the investors who prevail are at least reasonably rational, and the markets are reasonably efficient, it is a mystery why they spend time and effort, and incur information and trading costs, when they know that they would earn on average the same risk-adjusted return by investing to the market index. Why would there be so many active traders, why would so many investors make their placements into actively managed funds and why would there be so much trading? Note also that the intuitive argument in favour of the EMH places a higher requirement on investors' rationality than the argument against the EMH. For the EMH to hold, there is a requirement for a "constant alertness" – to quickly eliminate any arbitrage opportunity at any point in time, there must be at least some investors who collectively know all the publicly available information and are ready to trade. On the contrary, the argument against the EMH only requires investors to every now and then add up what they have earned, compare it with the market return and make a reasonable decision on whether they want to continue to trade actively. Hence, it is proposed that the arguments based on intuitive motivation are inconclusive in deciding about the reasonable accuracy of the EMH. Consequently, it is important to make an EMH test with the use of risk proxies, even if it is acknowledged that they are imperfect.

# Factors Capturing Risk

Tests of the EMH that use risk proxies examine the existence of tractable patterns that are inconsistent with the EMH and they control for variation in risk by using factors that are likely to capture the risk characteristics of stocks. To be able to perform such tests, one needs to identify candidates that are likely to serve as risk proxies and to assess their ability to capture risk. This is the central theme of Paper 1. Ideally, risk factor candidates should be derived from financial theory, which models the stock market under a set of simplifying assumptions. The Capital Asset Pricing Model (CAPM) (Sharpe, 1964; Lintner, 1965; Mossin, 1966; Black, 1972) is an example of such a model. It is based on the assumptions that well-diversified investors with homogenous (on average correct) beliefs are risk averse and that they hence require compensation for holding stocks with higher systematic risk. Because they are well-diversified, they only require compensation for the part of the risk that cannot be diversified away, which depends on the sensitivity of stock returns to market returns. This sensitivity is measured by CAPM beta, which thus represents a theory-based risk factor.

## Empirically Discovered Risk Proxies

Already the early tests of CAPM implications concluded that the model does not fully capture the risk characteristics of stocks. Not only was the explanatory power of CAPM beta found to be weak, but other factors, such as size, book-to-market equity ratio (BE/ME), earnings-to-price ratio (E/P) and financial leverage, were found to be associated with average stock returns. When analyzing the relative importance of these additional explanatory variables, Fama and French (1992) concluded that the combination of size and BE/ME performs best in explaining the cross sectional variation in stock returns and that when these two factors are accounted for, CAPM beta becomes insignificant. Later, Jegadeesh and Titman (1993) documented a short-term persistence in stock prices, which led to the identification of momentum (defined as ex post 6-month dividend adjusted stock return) as an additional variable that is related to average stock returns. Initially, these empirically discovered explanatory variables did not have any theoretical

underpinning comparable to the one for CAPM beta, which complicated their interpretation. However, it has been argued that, provided that the stock markets are efficient, the empirically documented association between these variables and average stock returns implies that the variables are correlated with some hidden risk characteristics. In addition, researchers soon offered several intuitive explanations suggesting why these factors are likely to capture some risk dimension that is ignored by CAPM beta. Chan and Chen (1991) argue that size may be related to the risk of financial distress, as the performance of small firms is more sensitive to macroeconomic events. Penman (1991), as well as Fama and French (1995), argue that BE/ME may also capture some dimension of financial distress risk, since BE/ME seems to be related to the operating performance of a company. Finding the explanation for momentum as a risk factor is more difficult. However, Conrad and Kaul (1998) and Chordia and Shivakumar (2002) argue that momentum is driven by variation in the systematic risk of a firm because stocks with high past realized returns are likely to have high expected returns.

The ex post justification of these factors is open to question and hence the way in which size, book-to-market equity ratio and momentum are related to the systematic risk of stocks remains elusive. It is also uncertain how much of the risk faced by well-diversified investors that they actually capture. Due to these limitations, it is important to test the relevance of these factors on different markets and different time periods, in order to be able to assess if the empirically documented association between them and average stock returns is universal, or whether it is time and institutionally dependent. In addition, it is also important to search for alternative explanations for why these factors are related to average stock returns. Both of these questions are addressed in Paper 1.

## Paper 1

The first paper, “CAPM Beta, Size, Book-to-Market, Momentum and Liquidity in Explaining Swedish Stock Returns”, aims at assessing the relevance of conventional risk factors in the Swedish market and at testing a conceptual argument that provides a rational explanation for the momentum in stock prices. The argument assumes positive costs of trading, which imply a negative relationship between momentum and liquidity. Hence, it is proposed that the positive relationship between momentum and expected return is not because momentum is a risk factor per se; rather the higher (lower) expected return on past winners (losers) is a compensation for reduced (improved) liquidity after an increase (decrease) in the stock price. Data is used from the Stockholm

Stock Exchange covering the period between 1979 and 2005 to run Fama-MacBeth (1973) monthly cross-sectional regressions of stock excess returns on the proposed risk factors to test whether the risk proxies are related to average returns in the predicted direction.

The explanatory power of factors included in the three factor model (Fama and French, 1993) is first tested. Consistent with Asgharian and Hansson (2000), the results indicate that the CAPM beta is largely unrelated to the realized stock returns. Regardless of the specification, CAPM beta is statistically insignificant, for the most part actually being marginally negative. This evidence supports the proposition that beta is “dead”. At the same time, however, the three factor model does not seem to be superior to CAPM, as both the size and the book-to-market equity ratio are insignificant when used in combination; this casts doubt on the universality of their use as risk measures as suggested by Fama and French (1992). The three factor model thus does not seem to be a suitable alternative to CAPM in estimating the expected stock returns on the Swedish market.

The second part of the study investigates the impact of stock liquidity on the capability of momentum to explain the cross section of stock returns. It is motivated by the concern that the justification for momentum as a risk proxy remains elusive. Liew and Vassalou (2000) conclude that there is little evidence that excess returns associated with momentum strategies are related to an additional risk factor. This study proposes that momentum may be associated with stock returns because it is related to liquidity. Empirical analysis tests whether the inclusion of liquidity proxies in Fama-MacBeth (1973) regressions reduces the explanatory power of momentum. The results provide some evidence for the relevance of stock price momentum, but the most significant pricing factor is the direct liquidity measure, i.e. the bid-ask spread. However, contrary to the prediction of the conceptual argument proposed in this paper, the inclusion of liquidity proxies does not significantly impact on the explanatory power of momentum. The inclusion of bid-ask spread does though impact on the explanatory power of size. This suggests that rather than being a proxy for relative distress, size is a noisy proxy for liquidity; when augmented with a direct liquidity proxy, it actually becomes marginally positive. In other words, after controlling for liquidity, large Swedish companies earn on average higher returns than small companies (the significance of size only approaches statistical significance, though, and so the evidence about this relationship is weak).

This paper is intended to prepare the ground for the subsequent papers included

in this thesis, which require risk adjustments. Hence, it seems helpful to analyze the potential candidates for risk factors and to assess their significance on the Swedish market. Francis and Schipper (1999) point out that conclusions from capital market based accounting research are often challenged on the grounds of risk adjustments. “Tests carried out under this assumption require numerous adjustments for (or heroic assumptions about) shifts in risk over time, and results typically are confounded by allegations that the researchers failed to adjust appropriately for risk in implementing trading rules.” (p.325). Hence it seems helpful to make an analysis of these factors, which may give some indication about the extent to which such criticism may be warranted.

# Empirical Tests of EMH

Despite the methodological hindrances to testing the EMH, ever since researchers formulated the efficient market hypothesis, they have been occupied with empirical investigations of whether the capital market characteristics are consistent with what is predicted by the EMH. A number of methodological approaches have been used for these tests; two of them are highlighted by Kothari (2001) – (1) event studies and (2) cross-sectional tests of return predictability. Event studies pioneered by Fama, *et al.* (1969) have been used to test the speed and unbiasedness of the market reaction to new information (the weak form of the EMH requires the reaction to be immediate and unrelated to the previous period return). Cross-sectional tests of return predictability aim at detecting patterns in security returns which cannot be explained by the rational economic explanation, i.e. the systematic risk. The existence of return anomalies is tested by specifying a trading strategy for a portfolio formation and examining whether it subsequently earns an abnormal return (i.e. a return in excess of what should be justified as a compensation for the systematic risk). A number of trading strategies have been constructed based on historical price information (e.g. De Bondt and Thaler, 1985), current accounting information (e.g. Lakonishok, *et al.*, 1994; Sloan, 1996), and expectations in the market (De Bondt and Thaler, 1999). In many of these studies, portfolios that are based on the trading strategy performed better than expected given the systematic risk of the portfolio.

## Anomalies to Market Efficiency

Anomalies are empirical patterns detected in the markets that are not explainable within the framework of most frequently used models for security pricing. Researchers in the field of behavioral finance have put considerable effort into identifying these anomalies. Over time, a vast number of deviant phenomena have been identified; see for example Shleifer (2000) for an overview. Fama (1998) suggests that these days, “dredging for anomalies is a rewarding occupation” (p. 287). In this present study, anomalies are found concerning cross-sectional predictability of returns. In addition to these, there are a number of other anomalies that are related to different market

characteristics. These are outlined in the following paragraph and a more detailed discussion is then made of the most established predictability anomalies for cross-sectional returns.

There are a number of peculiarities of the market that still lack compelling explanations. One set concerns market characteristics that are seen as excessive – price volatility, trading volume and risk premium. The high volatility of share prices is a rather puzzling finding that does not seem to be consistent with the idea of an efficient market. The fundamental model suggests that share prices should only change when new information affecting the intrinsic value (defined as the present value of expected dividends) becomes available to the market. Shiller (1981) found that the volatility of dividend payments is not sufficient to explain the volatility of share prices. Related to this is the equity premium puzzle (Mehra and Prescott, 1985), which pertains to the fact that the market risk premium seems to be much higher than would be justified by the variability of aggregate consumption (one can also view this anomaly as an excess return on risky assets). In addition to volatility and return on risky assets, the trading volume is also sometimes seen as excessive (Thaler, 1999). Ideally, people should only trade for liquidity and rebalancing needs, which seem to require much less trading than is currently observed.

Another group of anomalies – often called seasonal patterns in stock prices – pertains to the puzzling patterns in the longitudinal structure of returns.<sup>14</sup> Two of the most frequently mentioned seasonal effects are the January effect and the Monday effect (Pearce, 1987). The January effect is understood as the tendency of the stock market to yield higher returns in January than in other months. The Monday effect, on the other hand, is based on the finding that realized Friday-close to Monday-close return have been negative, even though the stock market on average has been rising by 10% a year (i.e. Monday's returns seem to be lower than returns in other days in the week) (Rubinstein, 2001). The fundamental model cannot explain such systematic differences. If anything, a return should be higher on Mondays; it is return for three days rather than for one (Pearce, 1987). However, as mentioned earlier, these patterns might not be real anomalies as they may be caused by taxes or market microstructure. Besides, their significance has substantially diminished since they have become well-known.

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<sup>14</sup> It should be noted that these have somewhat different implications for the EMH than the cross-sectional patterns in returns, as it might be more difficult to eliminate them by arbitrage.

A further group of anomalies comprises the cross-sectional patterns in returns. These anomalies are highly relevant to this thesis. Financial theory suggests that in efficient markets, the returns on holding securities should be determined solely by the systematic risk of the portfolio. Over time, researchers have identified a number of factors that do not seem to be related to systematic risk. Portfolios formed with the use of these factors seem to generate excess return (i.e. return in excess of market return). There have been a large number of studies documenting the cross sectional predictability of returns, both in the long term and the short term. One of the first papers on long-term return anomalies is by De Bondt and Thaler (1985). They find that when stocks are ranked on three- to five-year past returns, past winners tend to be future losers, and vice versa. They attribute these long-term return reversals to investor overreaction. Lakonishok, Shleifer and Vishny (1994) show that companies with lower market value in relation to some accounting figure tend to earn excess return in the following five years. They use the relation of share price to accounting information in order to provide theoretical support for the overreaction hypothesis. They argue that ratios, such as price-to-earnings or market value-to-book value, reflect investors' expectations about the persistence of past company performance. By comparing the expected persistence of past performance implied in stock prices and the actual future performance, they document that investors indeed overestimate the persistence of performance. They argue that the consequences of this error in judgment generate the abnormal returns that they report. Sloan (1996) develops the overreaction argument even further by showing that companies with a high proportion of accruals in their earnings tend to underperform in the following three years. This seems to suggest that investors fail to acknowledge the higher reliability of cash flows in comparison to accounting accruals.

Another set of studies providing evidence about long-term return anomalies concern new equity issues. Ritter (1991) shows that companies performing initial public offerings (IPOs) underperform their benchmark in the horizon of three years. In addition, Loughran and Ritter (1995) document similar patterns for seasoned equity offerings (SEOs). A number of studies, including Mitchell and Stafford (2000), report that companies have very strong returns three years prior to the stock issue, which seems to reflect extraordinary earnings performance in this period. Again, it seems that the market overestimates the persistence of strong performance and the inferior return after the offering results from the gradual recognition and correction of this mistake. It seems likely that managers (who are insiders and so are better informed about a company's prospects) may take advantage of market overreaction and time equity issues in the periods when they believe the shares of their company are overvalued. This would also explain the drop in share price that usually



follows the announcement of equity issues, as it may be seen as a signal reflecting the managers' belief that the company is overvalued.

Additional studies about long-term stock return anomalies include Michaely and Thaler (1995), who find that stock prices seem to under-react to the negative information in dividend omissions and to the positive information in initiations. Furthermore, there are studies documenting improper market reaction to company restructuring. Cusatis, Miles and Woolridge (1993) find positive abnormal returns for divesting firms and for the firms that they divest. By contrast, Agrawal, Jaffe and Mandelker (1992) report negative abnormal returns to the acquiring firms following a merger.

Other types of studies document return anomalies in the short-term investment horizon (i.e. up to one year). These studies are less sensitive to the bad-model problem described above, because the normal returns in the short horizon are smaller and therefore their miscalculation is less of an issue (Fama, 1998; Kothari, 2001). On the other hand, it could be argued that short-term return anomalies may be somewhat less economically significant than the studies outlined above, since the short-term return anomalies tend to indicate that the market is slow in its incorporation of information into prices, while the long-term anomaly studies suggest that the market makes errors in judgment (i.e. misinterprets the importance of some type of information), which seems to have a more profound impact on resource allocation.

The first study indicating that stock prices might be slow in responding to earnings was published already in 1968 by Ball and Brown. More recently, Bernard and Thomas (1990) documented the post-earnings-announcement drift that seems to last for up to one year after the earnings have been announced and that is concentrated around the subsequent quarterly earnings announcement. In line with this finding, Jegadeesh and Titman (1993) find so called momentum in prices, that stocks with high (low) returns over past year tend to have high (low) returns over the following three to six months.

Apart from the studies that document puzzling cross-sectional patterns in short-term and long-term returns, there is the closed-end fund puzzle documented by Lee, Shleifer and Thaler (1991). It is based on the peculiar finding that closed-end funds sell at a significant discount to their net asset value. This anomaly potentially has serious implications for the concept of market efficiency, as it seems to suggest a fundamental mispricing of individual stocks that should theoretically be fairly easily eliminated by arbitrage. One can argue that, if the market cannot get the pricing of a fund correct, how can it be expected to

correctly price individual companies that can be seen as a portfolio of investment projects with numerous complicated synergies between them (Rubinstein, 2001)? However, I have written that the anomaly *potentially* has serious implications. For a number of reasons, it is complicated to interpret anomaly findings. The documented anomaly may be illusory (i.e. giving a misleading impression due to poor methodology) or economically insignificant. These complications are discussed in the following section.

## Inefficient Markets?

Given the extensive evidence on market anomalies, is there any good reason to believe that markets are efficient? Or more precisely, may the EMH still be used as a reasonable point of departure for theory-building and financial praxis? The opinions of researchers regarding these questions differ vastly. For example, Statman (1999), in accord with many other behavioralists, argues that “today’s standard finance is so weighted down with anomalies that reconstructing financial theory along behavioral lines makes much sense” (p. 19). A completely opposite opinion is presented by Fama (1998): “Is the weight of the evidence on long-term return anomalies so overwhelming that market efficiency is not a viable working model even in the absence of an alternative that explains both under- and overreaction? My answer to this question is no..,” (p. 287). A similar position is advocated by Rubinstein (2001). To prevent overly hasty conclusions, it is important to consider the arguments that propose that the EMH is not to be scrapped, despite all the anomaly findings described above.

First, the tasks of gathering evidence to prove and to disprove market efficiency are very asymmetric. As I have argued before, it is impossible to prove market efficiency beyond any doubt, because there is no universal way to objectively determine the price level that is correct given the information available at that moment. By contrast, showing autocorrelation in prices or documenting inconsistent pricing of theoretically identical securities (e.g. Lamont and Thaler, 2003; Lee, *et al.*, 1991) is a fairly simple way of providing evidence against market efficiency. Hence, “anomaly hunters” are in an advantageous position vis-à-vis the promoters of efficiency, who have to resort to presenting indirect evidence that suggests rather than proves market efficiency.

Second, supporters of the EMH often challenge the anomaly-based evidence on the grounds of methodology (Fama, 1998). As has been argued above, all

the studies documenting the possibility to earn abnormal returns on certain trading strategies rely on a model that specifies normal return. In other words, market efficiency and the pricing model can only be tested jointly and hence the evidence of abnormal returns might be misleading, as the results may just reflect a failure of the model to completely predict returns. Fama (1998) suggests that because all models for expected returns are incomplete descriptions of the systematic patterns in average returns, the tests of efficiency will inevitably be contaminated by the so called bad-model problem. He argues that since a reasonable change of model for expected returns often causes an anomaly to disappear, it would seem that the anomalies are only illusory. Besides the bad-model problem, the credibility of these studies may be seriously affected by flaws in data selection. Rubinstein (2001) argues that “many so-called anomalies are empirical illusions created by data mining, survivorship bias, selection bias, short-shot bias...” (p. 23).

Finally, it is also possible that the anomalies actually exist, but they are economically insignificant. That is to say that the abnormal return that can be earned on them does not cover the incremental cost of searching and trading on them. If this were the case, prices would not be perfectly efficient; however, they would tend to oscillate in a fairly narrow belt around the efficient level (the size of the belt would of course be determined by the cost of arbitrage). This is what Statman (1999) calls “efficiency in the beat-the-market sense” and what Rubinstein (2001) calls “minimally rational markets”. Economic logic suggests that if anomalies were economically significant, they would self-destruct, as investors would try to exploit them (Rubinstein, 2001). Rubinstein (2001) also argues that the absence of evidence on investors who consistently outperform the market indicates that potential mispricing seems to be economically marginal. He argues: “Jensen’s 1968 and 1969 studies of mutual funds [that showed that the average actively managed mutual fund does not outperform a market index] almost single-handedly convinced me that large-cap equity markets are, for practical purposes, at least minimally rational [i.e. efficient in a sense that it is not possible to beat the market]” (p. 20).

Even though the complications mentioned in the previous section prevent us from making definite conclusions about the degree of efficiency exhibited in real markets, it is safe to say that markets will never be fully efficient in the most fundamental sense. It will take some non-zero time to incorporate information into prices and thus, at any point in time, some pieces of information will not be fully integrated in prices. It was suggested above that financial theory is derived from microeconomic equilibrium-based theory. It is not fatal to microeconomics that markets for goods will hardly ever be in

complete equilibrium and, by the same token, the impossibility of completely efficient pricing does not render the EMH useless. Instead, the relevant questions are (1) when and to what extent does the assumption of market efficiency affect the conclusions derived from theories that are built on the EMH and (2) when and to what extent does using the EMH as a working assumption affect the precision of practical financial estimations and decisions. Compare this to Friedman (1953), who argues “the relevant question to ask about the ‘assumptions’ of a theory is not whether they are descriptively ‘realistic,’ for they never are, but whether they are sufficiently good approximations for the purpose in hand” (p. 15). Thus, despite the large amount of empirical evidence, the dispute about the level of market efficiency is still inconclusive (Kothari, 2001).

## Paper 2

The second paper included in this thesis, “Contrarian Investment, Accounting Conservatism and Transitory Earnings”, builds on Lakonishok, *et al.* (1994), tests the efficiency of the Swedish stock market by designing zero-investment contrarian investment strategies (CISs) based on earnings-to-price and book-to-market multiples, and examines the impact of transitory earnings and accounting conservatism. In the first part of the study, substantial departures are found from market efficiency. Value (glamour) stocks are identified as those with low (high) market value relative to accounting measures of fundamental values, such as earnings and book value. The value premium, i.e. the difference between returns on value and glamour stocks, is about one-half the annual return of the market, which is deemed economically significant. It is also shown that the value premium has not decreased over time. A number of tests are performed to assess if the results are likely to be driven by transaction costs or risk. The value premium is split into two components – value outperformance and glamour underperformance – and it is shown that the value premium’s persistence is not likely to be explained by transaction costs because a substantial excess return can be earned without any short selling and with portfolio rebalancing once in three years. Considering risk, two commonly recognized risk proxies (size and CAPM beta) are used to directly control for the risk of individual portfolios. These adjustments only marginally reduce the magnitude of value premiums. Furthermore, building on the results from Paper 1, it is acknowledged that the two risk factors that are used may not comprehensively capture the risk characteristics of various portfolios and therefore an analysis is made of how the value premium is related to economic conditions. The correlation between value premiums and economic conditions is reported to be slightly negative, which makes it unlikely for the value

premiums to have arisen because of some unknown risk factor unrelated to CAPM beta or size. Thus, it is concluded that the use of earnings and book value of equity as proxies of company fundamentals is effective in isolating under- and overvalued companies.

In the second part of the paper, the impact of accounting characteristics on the effectiveness of CISs is analyzed. In particular, an examination is made of whether adjusting for the transitory component of earnings and for the bias in book value due to accounting conservatism increases the magnitude of the value premium and improves the consistency of CISs. It is found that the effectiveness of the CIS is indeed compromised by noise caused by transitory earnings and accounting conservatism. To assess the significance of transitory earnings, the sustainable component of earnings is directly estimated. Sorting the entire sample on the basis of the ratio of sustainable earnings to market value produces a value premium which is comparable with the one earned when using plain earnings within the stable half of the companies. Thereafter, the 'unbiased' book value of equity is estimated and a contrarian strategy is conducted that produces better results regarding the magnitude and consistency of value premium. Thus, strategies based on refined measures of company fundamentals are shown to be generally superior to the simple strategies using unadjusted accounting figures. However, it is found that the improvement of E/P-based strategies (i.e. controlling for transience of earnings) is larger and more consistent than the improvement of B/M-based strategies (i.e. controlling for the accounting bias in book value of equity). This suggests that estimating the level of permanent earnings is easier than estimating the level of the unbiased book value of equity. Therefore, it is expected that designing more sophisticated procedures for cleaning the accounting bias out of the book value of equity may further improve the premium and consistency of B/M-based CIS.

In conclusion, the results indicate that value and glamour stocks are often mispriced in the short run. However the market then corrects itself in two to three years time. During this period, it is possible to earn systematic excess returns. In addition, both adjustments for transitory earnings and for accounting conservatism improve the effectiveness of CISs. This finding is interpreted as evidence that the stock market processes accounting information in a sub-optimal manner.

# Introduction of IFRS in Europe

The second paper focuses on two of the arguably most prominent summary accounting measures – book value of equity and earnings – and analyzes whether investors fully recognize systematic biases arising due to accounting conservatism that affect the summary figures. The reported results are consistent with previous findings which suggest that investors tend to focus on the more salient pieces of information that require less cognitive processing and that they fail to appropriately account for its components (Hirshleifer and Teoh, 2003). For example, Sloan (1996) concludes that investors seem to focus on earnings as a summary measure of a company's annual performance and disregard the different persistences of their components, i.e. cash flows and accruals. This implies that the way in which accounting information is structured and which items are more salient than the others may have an impact on company valuation. The third paper investigates whether the new method for the reporting of acquired goodwill, which has been applied after the adoption of IFRS 3 in 2005, affected the valuation of goodwill-intensive companies.

## Value Relevance Studies

The significance of accounting information for company valuation is analyzed in value relevance studies. Value relevance research is based on the idea that accounting information is useful for determining company value in the case that its cross sectional variation corresponds with the cross sectional variation in stock prices or stock returns. Barth, *et al.* (2001) propose that “Value relevance research examines the association between accounting amounts and equity market values. This suggests testing whether accounting amounts explain cross-sectional variation in share prices.” (p. 95). Value relevance studies can be broadly divided into two groups – those investigating general tendencies in value relevance over time (which may be characterized with changing economic conditions) and those examining a change in value relevance before and after an accounting event, such as an introduction of a new standard. In their recent working paper, Gjerde, *et al.* (2007) combine the two approaches. They first analyze the general trend in value relevance of

accounting information in Norway and then focus on four accounting revolutions and assess if each of them had an incremental impact of value relevance.

In an influential value relevance study, Lev and Zarowin (1999) document a decline in the value relevance of accounting information between 1977 and 1996. They propose that the decline in relevance is caused by the inadequacy of the accounting system, which fails to reflect the effect of goodwill and other intangible assets that become increasingly important due to the faster pace of business change. Companies rely increasingly on investments in intangible assets (e.g. R&D) that are not typically recognized on the balance sheet. Lev and Zarowin (1999) argue that this treatment distorts the matching principle and renders accounting figures less relevant for company valuation. Goodwin and Ahmed (2006) elaborate on these results with the use of data from the Australian stock market. The study makes use of the special features of the Australian GAAP that allow for the capitalization of intangible assets and it splits the sample into firms that capitalize investments in intangible assets (i.e. capitalizers) and those that expense them in the current accounting period (non-capitalizers). For an average firm, the authors find weak evidence of a decrease in value relevance of earnings. However, they show that, for capitalizers, the earnings value relevance has not decreased over time and that the gap in earnings relevance between capitalizers and non-capitalizers has widened. This indicates that the conservative accounting of investments in intangible assets may indeed be one of the reasons for the documented decline in the value relevance of earnings. IFRS 3 alleviated somewhat the level of conservatism associated with goodwill reporting. In particular, it abolished periodic amortizations of acquired goodwill and it instead requires regular tests of goodwill impairment. This treatment should bring the reported value of acquired goodwill closer to its economic value. The third paper tests whether the change of accounting treatment actually affected the reported goodwill charges and whether the stock market reacted to this change.

## Research on IFRS Adoption

The introduction of IFRS has been clearly motivated by the intention to improve the quality of accounting information, which should provide investors with better inputs for their capital allocation decisions. The research implications of the IFRS introduction are discussed by Schipper (2005) and Whittington (2005). They both stress the importance of increasing the comparability of financial reports and of faithful representation. The primary motivation for a more extensive use of fair value accounting is to increase its

relevance for investment decisions. However, it is not difficult to think of an intuitive argument that challenges the proposition that the structure of accounting information can change the valuation of companies. The way in which accounting figures are constructed is unlikely to have any effect on either the expected cash flows or the discount rate; hence the choice of accounting regime should be irrelevant to company value. In addition, analysts can easily capitalize the investments in intangible assets and apply any impairment rate that they find appropriate; hence they can easily reverse the accounting treatment when estimating company value. In consequence, there is a reason to believe that the change in accounting principles should not affect company valuations. The third paper of this thesis provides evidence that despite this argument, the adoption of IFRS had a significant impact on the goodwill charges reported by listed Swedish companies and it affected the valuation of recognized goodwill-intensive companies.

Much of the existing research on IFRS examines the market reaction to IFRS adoption, or to events that increased the likelihood of IFRS adoption, in order to find out if investors perceived the adoption of IFRS in general as beneficial. Armstrong, *et al.* (2007) propose that there are two potential benefits to investors from IFRS adoption – (1) higher quality of accounting information and (2) better comparability. A higher quality of accounting figures should lower the information risk faced by investors and thereby reduce the cost of equity capital. Barth, *et al.* (2007) show that IAS/IFRS based accounting is of higher quality than accounting based on the domestic standards of a large number of countries, and Karamanou and Nishiotis (2005) report positive abnormal returns for firms announcing the voluntary adoption of IAS between 1989-1999, which indicates that accounting quality indeed matters to investors. The better comparability of accounting numbers resulting from the convergence of accounting regimes reduces information processing costs, which should ultimately also lower the cost of equity capital. Pae, *et al.* (2005) report that regulations that are expected to increase the convergence of financial reporting increase firm value. However, Ball (2006) argues that the benefits of convergence require effective implementation and the enforcement of standards. When analyzing stock market reaction to events that increase the likelihood of IFRS adoption, Armstrong, *et al.* (2007) conclude that European stock markets react positively. In addition, they find that these reactions are stronger in countries with lower quality pre-adoption information environments, which indicates that equity investors perceive there to be net benefits from the adoption of IFRS, on the grounds of both higher quality and better comparability of accounting information.



Horton and Serafeim (2007) combine the event study approach with value relevance tests. They first report that the U.K. stock market reacted to the IFRS reconciliation disclosures and that the reaction was stronger for firms with negative reconciliation (possibly because investors may view positive earnings reconciliations as opportunistic). In addition, the trading volumes around the announcement dates are higher. Interestingly, the reaction is less pronounced for firms that are cross listed in the U.S., indicating the substitutability of IFRS and the U.S. GAAP. The authors then run value relevance regressions, including IFRS earnings restatements and IFRS restatements of book value of equity, to find out whether earnings restatements are value relevant. When they decompose the restatements into components, they show that investors view share-based payments, goodwill amortization and impairment and deferred taxes as value relevant. Contrary to the commonly expressed skepticism that the IFRS adoption has no cash flow effects and therefore it should not affect stock prices, these results show that the IFRS restatements were value relevant and that the stock market reacted on the reconciliation disclosures.

## Goodwill Reporting

The third paper discusses how IFRS changed accounting for acquired goodwill. Goodwill is a measure of the amount paid in excess of the fair value of an acquired enterprise's net assets. Most of the research on goodwill reporting focuses on the consequences of SFAS 142, which was implemented in the U.S. in 2002. Similarly to IFRS 3, the SFAS 142 abolished the periodic amortization of capitalized goodwill and instead prescribed regular impairment tests of goodwill fair value. It is argued that the "impairment-only" approach better represents the underlying economic reality. To test this proposition, Hayn and Hughes (2006) investigate whether investors are able to assess the value of goodwill, based on available financial reporting, before and after the adoption of SFAS 142. They find that the implementation of SFAS 142 has considerably improved the ability of investors to predict goodwill write-offs. However, they also document a time lag between the occurrence of impairment and the actual recognition. Chen, *et al.* (2004) examine the timeliness and value relevance of goodwill reporting under SFAS 142. They confirm that a higher value relevance of goodwill was reported under SFAS 142. When analyzing timeliness, they find that the adoption impairment was partially impounded in prices prior to 2002, while the impairment made in the following year primarily constituted news to the market. These results are confirmed by Churyk (2005) who tests market valuations of goodwill subsequent to SFAS 142 adoption and finds a strong increase in the value relevance of reported goodwill. All these studies show that SFAS 142 substantially improved the

relevance of reported goodwill for company value. In Paper 3, investigation is made of whether a similar change occurred for the goodwill reported by Swedish companies after the adoption of IFRS 3.

### Paper 3

The third paper included in this thesis, “On the Impact of IFRS Adoption on Goodwill Recognition and Stock Market Valuation”, analyzes whether the adoption of IFRS 3 on business combinations altered the way in which acquired goodwill is reported by listed Swedish companies. The rationale for the “impairment-only” approach is the concern that the amortization of reported goodwill and intangible assets do not represent the underlying economic reality. In particular, it is suggested that the changes in the economic value of goodwill do not tend to be systematically correlated with time. The economic life of goodwill may not be limited and the changes in value may occur randomly, for example as result of bad publicity. These changes may be better traced by impairment tests than by periodic amortizations.

This paper first tests whether goodwill is more persistent than is implied in the amortization plans used under the Swedish GAAP. We assume that after the IFRS adoption, managers truthfully disclose any decrease in goodwill value, i.e. the goodwill impairment tests prescribed by IFRS are performed in an unbiased manner. Under this assumption, the goodwill charges reported under IFRS represent the true decrease in goodwill value. Hence, a comparison of these charges with periodic amortizations applied under Swedish GAAP tells us whether the plans on average reflected the rate of decrease in goodwill value or whether they were too conservative. The information used is from IFRS reconciliations that the Swedish companies were obliged to report at the end of 2004. It is found that the goodwill charges reported under IFRS 3 (either in absolute numbers or as a proportion of sales) were indeed lower than the goodwill amortization charges used under Swedish GAAP. This would indicate that the amortization plans were too conservative, i.e. goodwill is on average more persistent than the amortization charges imply.

Second, a test is made of whether the information on higher goodwill persistence that is reported under IFRS had already been incorporated in stock prices or whether it constituted news to the market. Although the likelihood of higher goodwill persistence has sometimes been acknowledged, it is not given that investors incorporated it in their valuations of company stocks. This may be because investors excessively focus on earnings as a bottom-line salient

accounting number (Fiske and Taylor 1991; Libby et al. 2002) and fail to properly account for the different persistence of its components. In addition, prior to IFRS adoption, the information on goodwill persistence in individual companies may have been private to insiders, and thus investors may not have been able to properly assess it and impound it in prices. A zero-investment trading strategy is performed that tests whether the companies whose earnings are most strongly affected by higher goodwill persistence (because goodwill costs represents a high fraction of their revenues) earn positive abnormal returns. The results from this trading strategy are consistent with our expectations and indicate that a higher level of goodwill persistence was not incorporated in the price prior to IFRS adoption. Thus, the new way of goodwill reporting was relevant to investors and it changes valuations of recognized goodwill-intensive companies.

The third paper thus suggests that the structure of financial reporting is relevant for company value. Investors do not seem to be entirely capable of seeing through a conservative accounting treatment; reporting the fair value estimates thus extends the set of available information and potentially impacts stock price. As would be expected, the revaluation is the most pronounced for recognized goodwill-intensive stocks. These findings suggest that the efforts to optimize accounting standards are indeed worthwhile.

# Conclusions

This thesis contributes to the discussion on the importance of accounting information for the efficiency of the stock price setting process. In the finance literature, it is sometimes maintained that the structure of financial reporting “per se” should not be relevant to the valuation of companies, as it neither affects the expected cash flows nor their variability (hence the operating risk). The general conclusion that can be drawn from the three papers included in this thesis is that the structure of accounting does actually matter for equity valuation.

The second paper provides evidence suggesting that Swedish stocks are not valued in an unbiased manner in relation to their fundamentals. Simple summary accounting measures, such as book value of equity and earnings, can be used as benchmarks to identify companies that are likely to be mispriced. In addition, taking into consideration the bias in the book value of equity, as well as disregarding the transitory earnings component, improves the effectiveness of the identification procedure. This suggests that accounting measures are not impounded in stock prices in an unbiased manner.

The third paper analyzes a situation in which the reporting requirements change, i.e. when the Swedish listed companies had to adopt IFRS. If the structure of accounting information were irrelevant, the change in accounting practices should not cause any market reaction, because it affects neither future operating profitability nor risk. Focusing on companies with high levels of goodwill reported on their balance sheets, it is found, however, that the market did react and in the predicted direction. This suggests that the information about higher goodwill persistence had not been impounded in stock prices prior to IFRS, which required companies to report the non-impaired “fair” value<sup>15</sup> rather than an amortized historical value of goodwill. In other words,

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<sup>15</sup> The label “fair value” is used rather loosely here. The value of goodwill based on the impairment tests can differ from the intrinsic value, not only because it cannot be written up, but also because there is no liquid market for goodwill and hence the assessment of its value is subject to judgment. What is meant here is that, if the impairments are performed in a fair

the third paper provides evidence that investors are not able to see through and adjust for the biases caused by accounting conservatism and hence a change in accounting practices can affect stock prices.

The first paper provides a foundation for the remaining two. When using realized stock returns as an indication of prior mispricing, the most severe challenge faced is the proper adjustment for risk. As the joint-hypothesis problem teaches us, superior returns may result from mispricing as well as from difference in the inherent riskiness of individual portfolios. Even though an alternative risk-based explanation can never be conclusively excluded, because it is impossible to exhaust every potential risk factor, it is, nevertheless, crucial to consider several risk characteristics to obtain at least an indication of whether the risk explanation is likely or not. The first paper analyzes the performance of the commonly considered risk factors on the Swedish market. It confirms that measuring risk is indeed a very challenging task. The track record for none of the three commonly used risk factors – CAPM beta, size and ratio of book to market value of equity – is very strong. By contrast, the relative bid-ask spread, which is used as a direct liquidity measure, seems to be very relevant for predicting stock returns. This suggests that for the Swedish market (possibly because of its limited size) the liquidity of stocks is more relevant to investors than any of the traditional risk factors. Thus, controlling for risk is bound to be problematic.

This thesis focuses on the interactions between the information processing capability of the stock market and the structure of accounting information, which constitutes one of its vital inputs. It highlights the complexity of the task of testing the efficiency of the price setting process and the difficulties that are faced in identifying relevant risk proxies. In fact, the papers generate more questions than they answer, which is not unexpected considering the immense complexity of the interactions that exist between the factors that are involved in price setting processes. Since controlled experiments are outside the realm of feasibility in the field of accounting and finance, it will perhaps never be possible to fully “control” for risk and to conclusively determine whether stock markets process accounting information efficiently or not. The issue of stock market efficiency thus remains subject to judgment and dependent on the interpretation of diverse evidence. Some findings are likely to be paradoxical

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manner, then the goodwill value reported under IFRS is the unbiased estimate capped from above the true intrinsic value. Thus it should better correspond to the “fair value” than to the historical amortized value.

or seemingly contradictory, and sometimes perhaps more puzzling than enlightening. In addition, stock markets, as well as many other social systems, are dynamic and consequently they adjust to new knowledge on their mechanics. This, after all, is one of the prime reasons why the effort is made to gain knowledge in the first place. Consequently, what was valid yesterday may not be valid tomorrow. No findings can therefore be taken at face value; rather they must be interpreted intelligently, with special care for the context in which they are applied. This may certainly give rise to the frustration and bewilderment that is so familiar to those starting out in graduate studies in economics and business administration, myself included. Nevertheless, as diverse pieces of knowledge accumulate, with the partial insights to specific issues that they provide, they enhance our ability to think about complex questions face in a more sophisticated and multi-faceted manner, and hopefully provide a picture that, though not necessarily quite correct, is at least richer and more complete. I believe that this enrichment and refinement of our perspectives is the most that we can hope for in the field of social science. Is this a lot or too little? The answer to this question is, of course, in the hands of the reader. In the end, it is precisely this answer that determines whether we can talk about knowledge in social science, or merely about “knowledge” that is bounded by too many conditionals and too many inverted commas.

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